

Accelerating the Climate Resilient Sanitation

A Case of Dal Dwellers-Srinagar

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STHIRA

Global South Academic Conclave on WASH and Climate linkages

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CWAS CENTER
FOR WATER
AND SANITATION
CRDF CEPT
UNIVERSITY

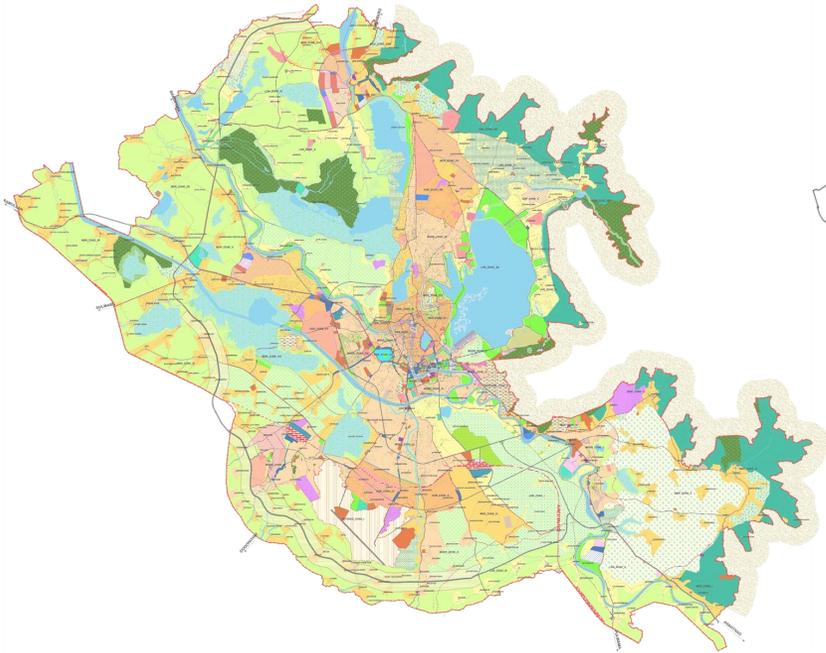
BILL & MELINDA
GATES foundation





this work is dedicated to all the resilient and strong women of Dal, who have been adversely affected by the devastating floods.

1. Understanding Srinagar



766 sq.km
Srinagar Planning Area

17.27 lakhs
Population



227 sq.km
Srinagar Municipal Corporation

11.27 lakhs
Population



04
Number of Zones

74
Number of Wards

(Source: Srinagar Development Authority)

1. Understanding Srinagar WaSH and City



97%
Piped Water Coverage

104 lpcd
Per Capita Water Supply

35%
NRW

0%
Extent of metering



33%
Area Covered by sewerage network

35%
HHs connected by Sewerage Network

7
No. of STPs

58.78 mld
Operational capacity



47%
Area Covered by storm water drainage

100%
Sewerage mixing in the drains

75
No. of times Water logging in a year

93
No. of water logging point



450 MT
Area Covered by storm water drainage

60%
Door to door coverage

90%
Collection efficiency

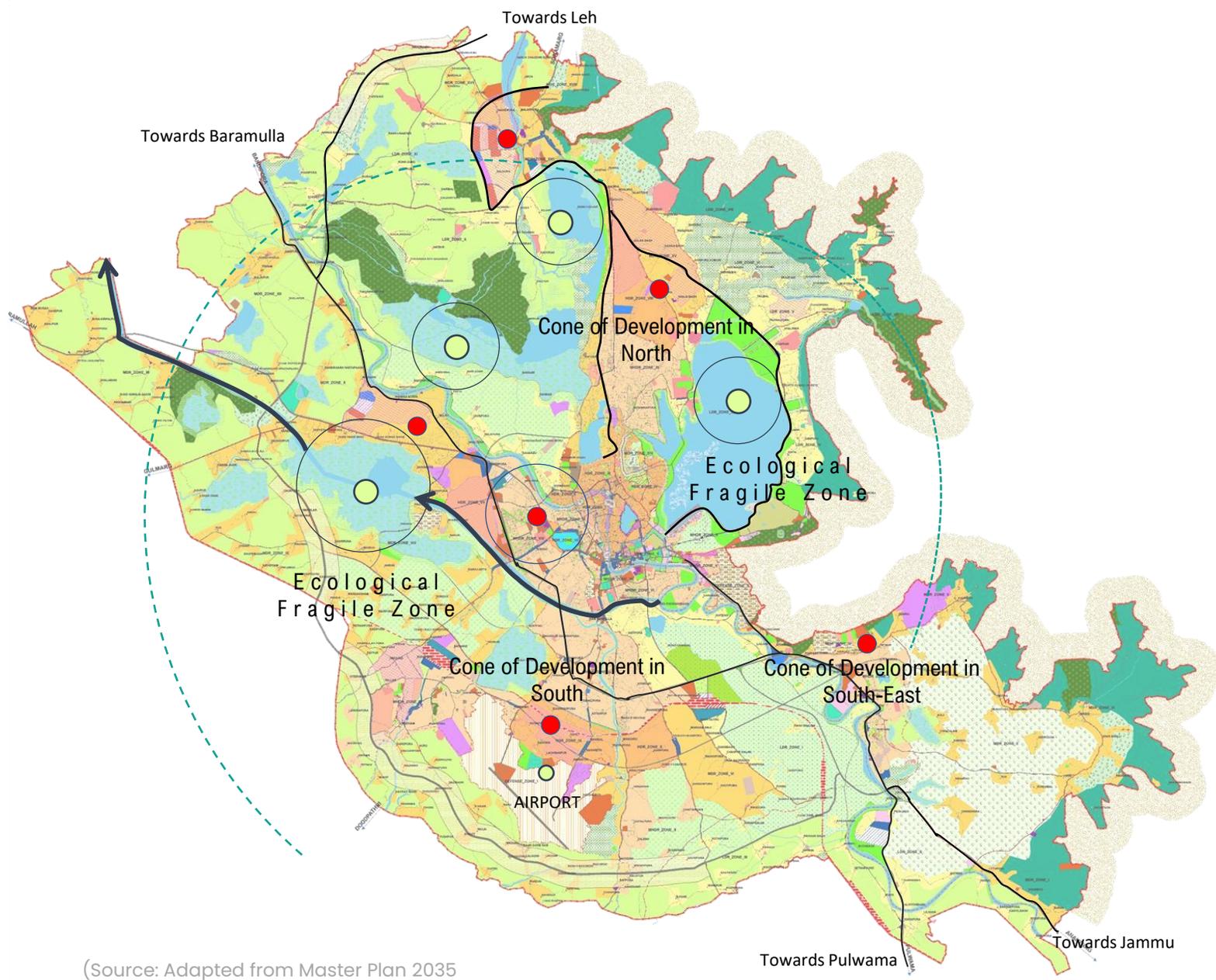
0%
Segregation



67% of Area practices Onsite Sanitation

(Source: Smart City Srinagar, PHED)

1. Understanding Srinagar Landuse Pattern



- RESIDENTIAL**
 - HIGH DENSITY
 - HIGH - MEDIUM DENSITY
 - MEDIUM DENSITY
 - LOW-DENSITY
 - TOWN PLANNING SCHEME
- COMMERCIAL**
 - COMMERCIAL
 - CITY CENTRE
 - DISTRICT CENTRE
 - DRYPORT- IFC
- INDUSTRIAL AND MANUFACTURING**
 - INDUSTRIAL ESTATES
 - SERVICE & LIGHT INDUSTRY
- PUBLIC SEMIPUBLIC**
 - GOVT / SEMI-GOVT / AUTONOMOUS BODIES
 - MEDICAL & HEALTH
 - EDUCATION & RESEARCH
 - SOCIO-CULTURAL
 - UTILITY & SERVICES
 - RELIGIOUS
 - BURIAL/CREMATION-GROUNDS/CEMETERY
- TOURISM**
 - HOTELS AND HUTS
 - GUEST HOUSE
 - HOUSE BOAT AND DONGAS
 - TOURIST VILLAGE CUM URBAN HAAT
- TRAFFIC AND TRANSPORTATION**
 - ROAD NETWORK (ARTERIAL)
 - ROAD NETWORK(SUB ARTERIAL)
 - AIRPORT
 - RAILWAY LINE
 - TUNNEL
 - PARKING
 - TERMINALS
- DEFENCE**
 - DEFENCE
- S E Z**
 - SPECIAL INVESTMENT CORRIDOR
- LEISURE AND SPORTS**
 - PARKS AND GARDENS
 - PLAYGROUND
 - GOLF COURSE
 - ARBORETUM
- SPECIAL AREAS**
 - HERITAGE
 - FLOATING GARDEN
 - SAFFRON FIELDS
- ECOLOGY AND ENVIRONMENT**
 - WATERBODY
 - WETLAND
 - FOREST & WILDLIFE
- ECOLOGICAL RESERVE**
 - CONSERVATION RESERVE
 - BIO-DIVERSITY PARK
 - RIVER FRONT
 - CITY FOREST
- AGRICULTURE AND ALLIED**
 - PADDY FIELD
 - ORCHARDS
 - URBAN AGRICULTURE
 - PLANTATION
- BUFFERS**
 - WATER BODIES
 - HERITAGE
 - NO CONSTRUCTION AREA

01

First Master Plan (1971-91)

The master plan covered an area of 236 sq. km. Acknowledgment of existence of flood absorption basins and water bodies. Development towards the North and South towards South.

02

Second Master Plan (1991-2001)

The Marshy land, flood absorption basins in the west were proposed to be converted into artificial lakes which would later be connected with drains.

Flood Supplementary channel was also proposed which was to be connected with treatment plants.

The areas got developed with huge population between the River Jhelum and the Flood Spill Channel but the measures suggested were not implemented, jeopardizing the safety of the citizens with persistent problems of drainage.

03

Third Master Plan (2001-2021)

The city was growing along National Highways, district roads, major peripheral roads of Srinagar and hesitantly towards silted up flood absorption basins.

The Master Plan identified the trend of development in lateral directions, constraints of expansion towards flood absorption basins, water bodies and mountains existing around.

(Source: Adapted from Master Plan 2035

“the populous character of Srinagar, its lakes surrounded by pleasant gardens and crowded with boats for pleasure and commerce and the lilies growing on the roofs of the houses (Khan, 2013).”

1. Understanding Srinagar Landuse Pattern

04

Master Plan (2021-2035)

416 Sq. km. to 766 Sq.km., i.e.; 84% increase from the existing Master Plan limits

Population of 21.90 lakhs (2015) : SDA

Disaster Mitigation Plan to be incorporated where the planning has to be responsive to the vulnerabilities caused by natural disasters like flood, earthquake, landslides.

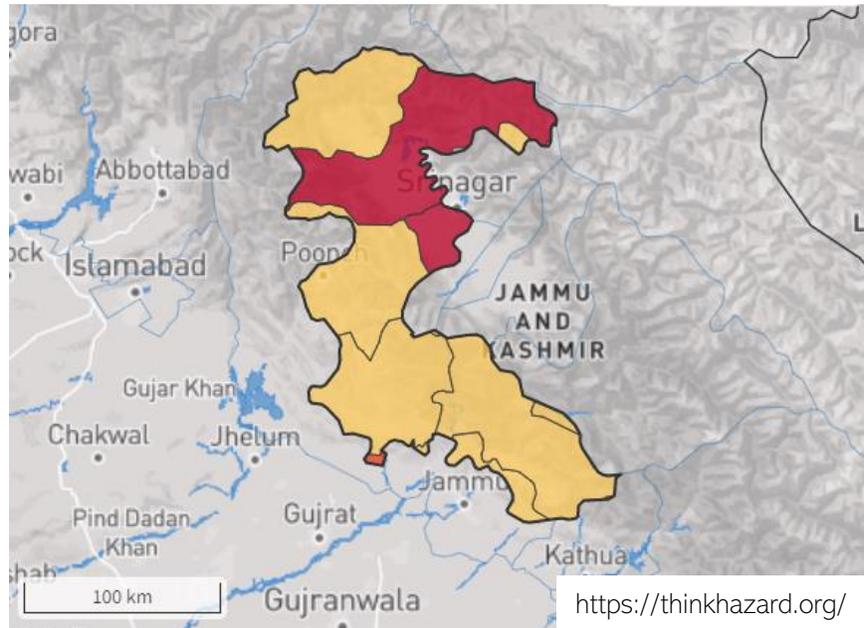


202.25 sq.km	RESIDENTIAL	
	HIGH DENSITY	
	HIGH - MEDIUM DENSITY	
	MEDIUM DENSITY	
	LOW-DENSITY	
	TOWN PLANNING SCHEME	
4.5 sq.km	COMMERCIAL	
	COMMERCIAL	
	CITY CENTRE	
	DISTRICT CENTRE	
	DRYPORT- IFC	
5.96 sq.km	INDUSTRIAL AND MANUFACTURING	
	INDUSTRIAL ESTATES	
	SERVICE & LIGHT INDUSTRY	
24.75 sq.km	PUBLIC SEMIPUBLIC	
	GOVT / SEMI-GOVT / AUTONOMOUS BODIES	
	MEDICAL & HEALTH	
	EDUCATION & RESEARCH	
	SOCIO-CULTURAL	
	UTILITY & SERVICES	
	RELIGIOUS	
	BURIAL/CREMATION-GROUNDS/CEMETERY	
2.6 sq.km	TOURISM	
	HOTELS AND HUTS	
	GUEST HOUSE	
	HOUSE BOAT AND DONGAS	
	TOURIST VILLAGE CUM URBAN HAAT	
48.73 sq.km	TRAFFIC AND TRANSPORTATION	
	ROAD NETWORK (ARTERIAL)	
	ROAD NETWORK(SUB ARTERIAL)	
	AIRPORT	
	RAILWAY LINE	
	TUNNEL	
	PARKING	
	TERMINALS	
	DEFENCE	4.72 sq.km
	S E Z	
	SPECIAL INVESTMENT CORRIDOR	
	LEISURE AND SPORTS	18.2 sq.km
	PARKS AND GARDENS	
	PLAYGROUND	
	GOLF COURSE	
	ARBORETUM	
	SPECIAL AREAS	40.04 sq.km
	HERITAGE	
	FLOATING GARDEN	
	SAFFRON FIELDS	
	ECOLOGY AND ENVIRONMENT	126.17 sq.km
	WATERBODY	
	WETLAND	
	FOREST & WILDLIFE	
	ECOLOGICAL RESERVE	78.41 sq.km
	CONSERVATION RESERVE	
	BIO-DIVERSITY PARK	
	RIVER FRONT	
	CITY FOREST	
	AGRICULTURE AND ALLIED	210.15 sq.km
	PADDY FIELD	
	ORCHARDS	
	URBAN AGRICULTURE	
	PLANTATION	
	BUFFERS	
	WATER BODIES	
	HERITAGE	
	NO CONSTRUCTION AREA	

(Source: Adapted from Master Plan 2035)

14% area (107 sq. km) has medium to high vulnerability to floods.
Global South Academic Conclave on WASH and Climate Linkages

1. Understanding Srinagar River Flood as Climate Hazard



● High ● Medium ● Low

Potentially damaging and life-threatening river floods are expected to occur **at least once in the next 10 years**.

The present hazard **level may increase in the future** due to the effects of climate change.

It would be prudent to design projects in this area to be robust to river flood hazard in the long-term.

"Climate Change – A Reality"

2014 Massive floods that left thousands stranded inside their submerged houses in

Srinagar

"Flooding as a Hazard of Climate Change"

Frequency of Events In Last 60 years (No. of times)

9

6

1

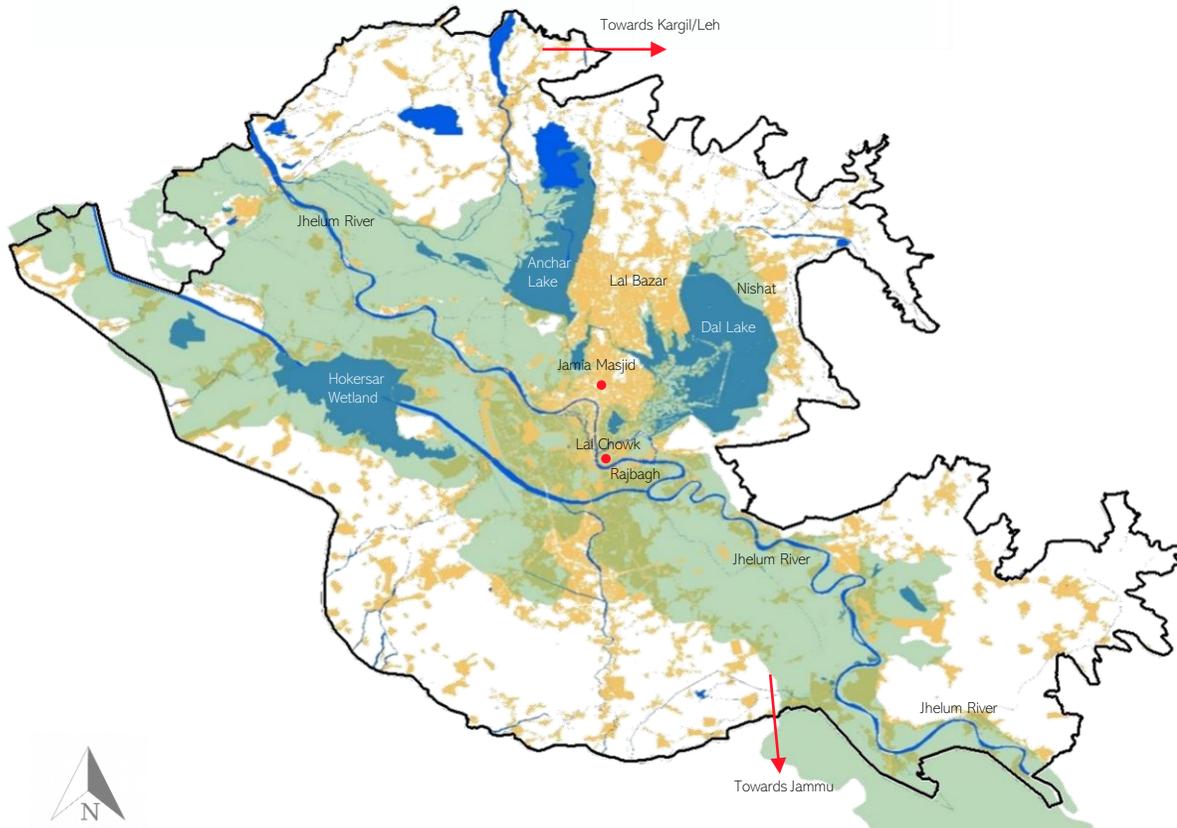
■ Flood ■ Drought ■ Earthquakes ■ Landslides

Source: 1. Google Earth 2. Climate of Jammu & Kashmir, Climatological Summaries of States Series – NO. 2, Indian Meteorological Department, Pune, pp 17 - 24

1. Understanding Srinagar

“Floods of 2014”

2014 Massive floods that left thousands stranded inside their submerged houses in Srinagar



● Flood ● Waterbodies ● Built-up ● Srinagar Planning Area

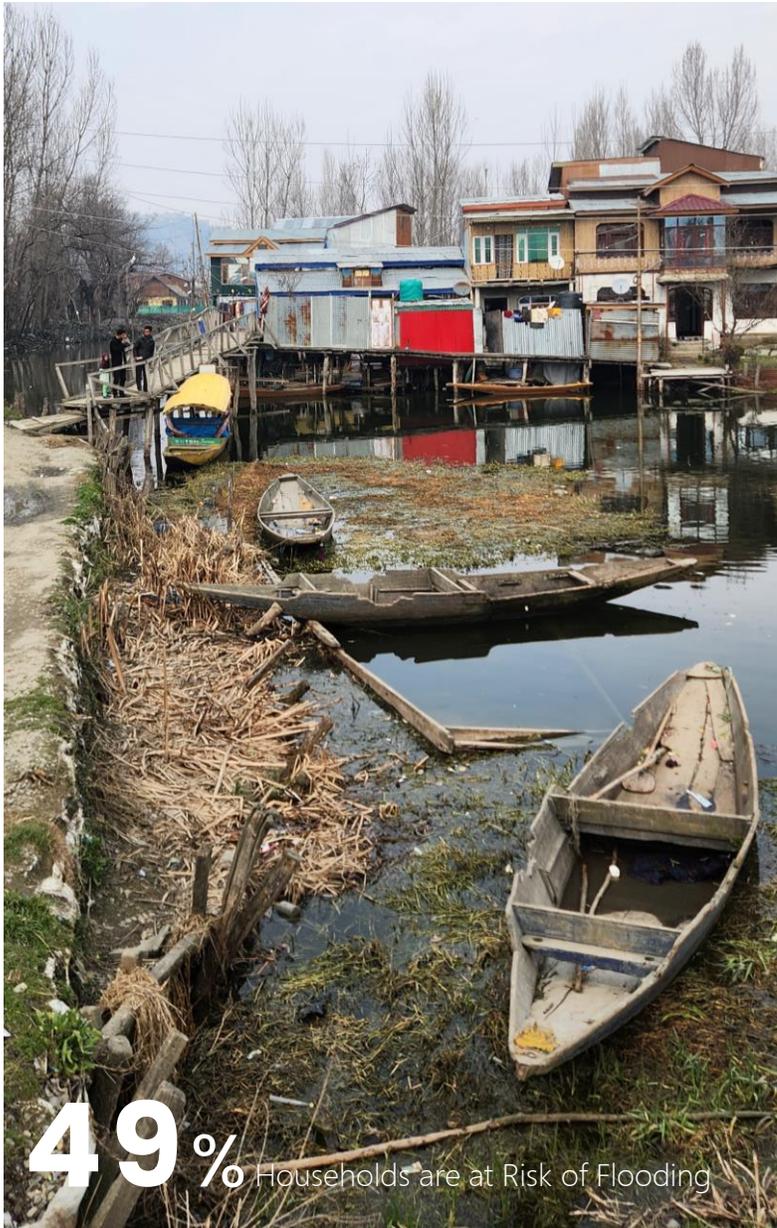
(Source: Adapted from SDA)

Frequency of Events In Last 60 years (No. of times)

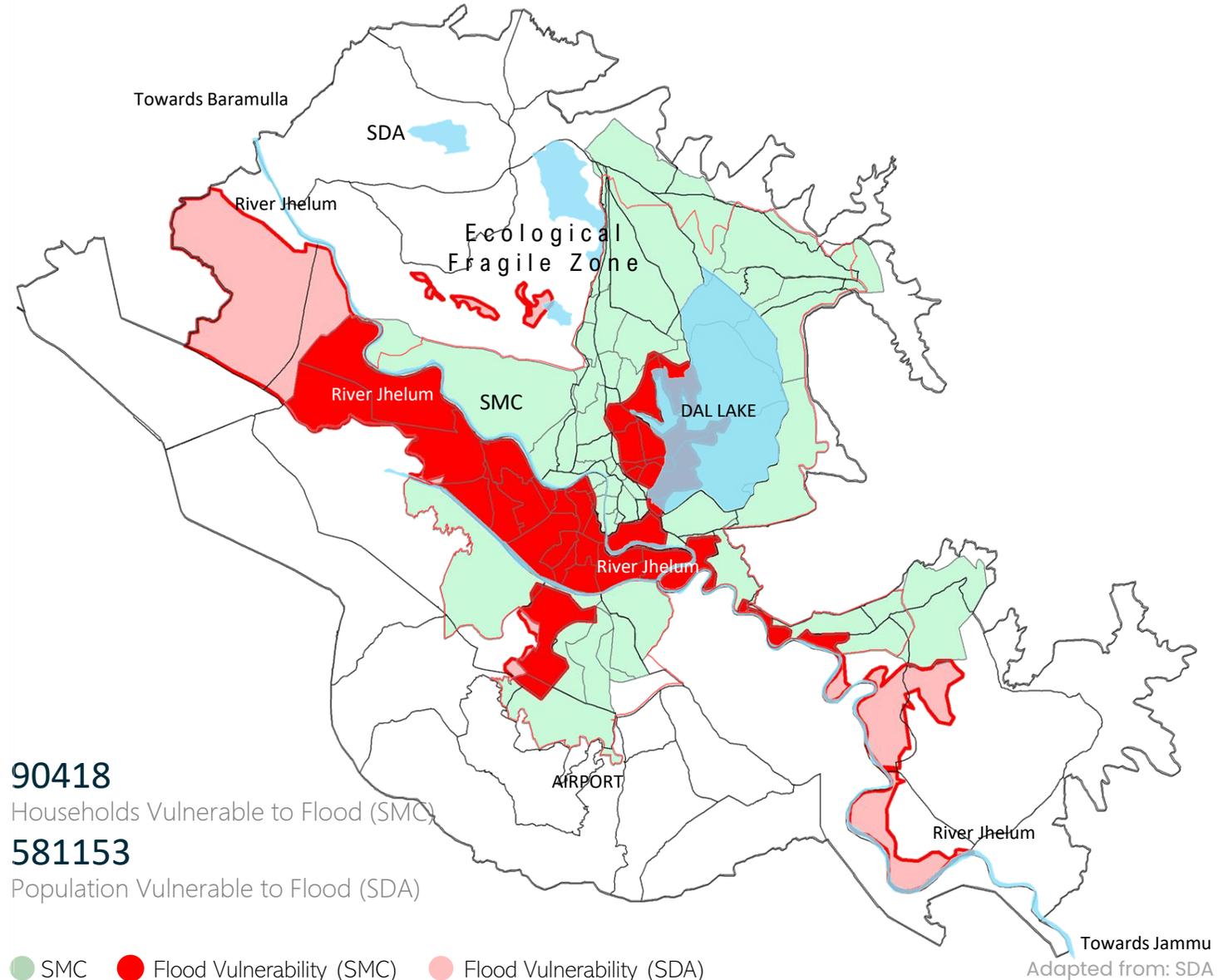
“Climate Change – A Reality”

1. The **Kashmir floods of 2014** are a grim reminder that climate change is now hitting India harder. In the last 10 years, several extreme rainfall events have rocked the country, and this is the latest calamity in that series.
2. A 2006 study by B.N. Goswami of the Pune-based Indian Institute of Tropical Meteorology showed that from 1950 to 2000, the incidents of heavy rainfall events (over 100 mm/day) and very heavy rainfall events (over 150 mm/day) increased
3. Temperature on an average in Kashmir region has shown a rise of 1.450 Celsius while in Jammu region the rise is 2.320 Celsius. The Indian Meteorological Department’s monitoring reveals that temperatures are increasing in both Jammu and Kashmir valley, with significant increase in maximum temperature of 0.050 Celsius per year.
4. The **water level in almost all the streams and rivers in Kashmir has decreased** by approximately two-thirds during the last 40 years with unusual distribution of rainfall in space and time, shifting patterns of precipitation

1. Understanding Srinagar's Vulnerability towards Flooding



49% Households are at Risk of Flooding



1. Understanding Srinagar

The Sheh-re-khaas: Downtown Srinagar

Commercial Capital of the Valley

River Jhelum Integral part of the old city

Tradition of handicrafts & craftsmen

Communities formed around water

Fast disappearing of the core, no timely Interventions.

People shifting due to lack of basic infrastructure facilities i.e.
WATER & SANITATION



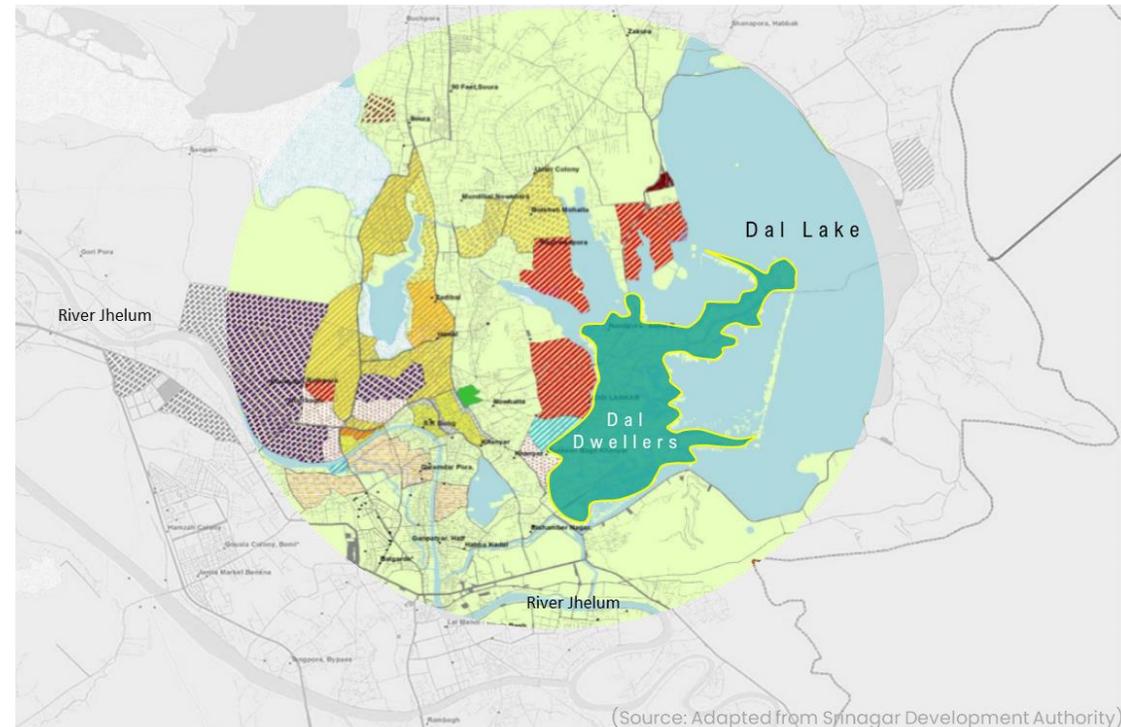
Impact of Climate Change (Flooding)

Flood as a Risk of Climate Hazard

Issues and Challenges due to climate Hazard

Floating Communities (Dal Dwellers) : Highly Vulnerable

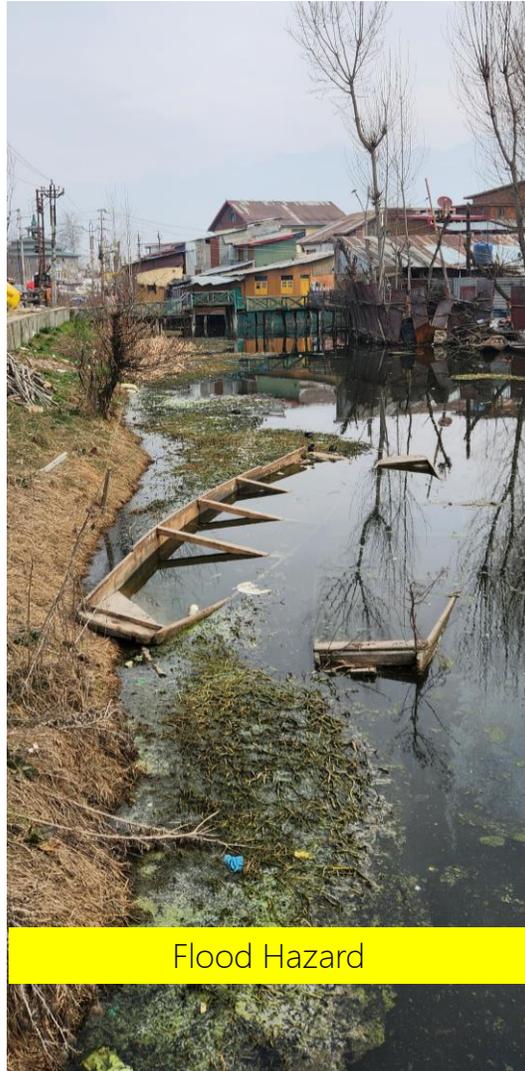
The Medieval charm, the old city of Srinagar which resides various communities in heart of the city.



Symbiotic Relation of Community & Water



Close to Sanitation



Flood Hazard



Source of Livelihood



Social & Culture



Tourism

(Source: Author)



“The research aims at analyzing the **Climate Change Impact on Sanitation** In Vulnerable Dal Dwellers of Srinagar”

OBJECTIVES

01 | Assessing the Climatic Risk on Sanitation

Understanding the relationship between Climate Change and Sanitation of Dal Lake Dwellers

02 | Understanding the Vulnerability

Understanding the most Vulnerable and marginalized to analyze the factors leading to unsafe Sanitation environment and unhygienic practices.

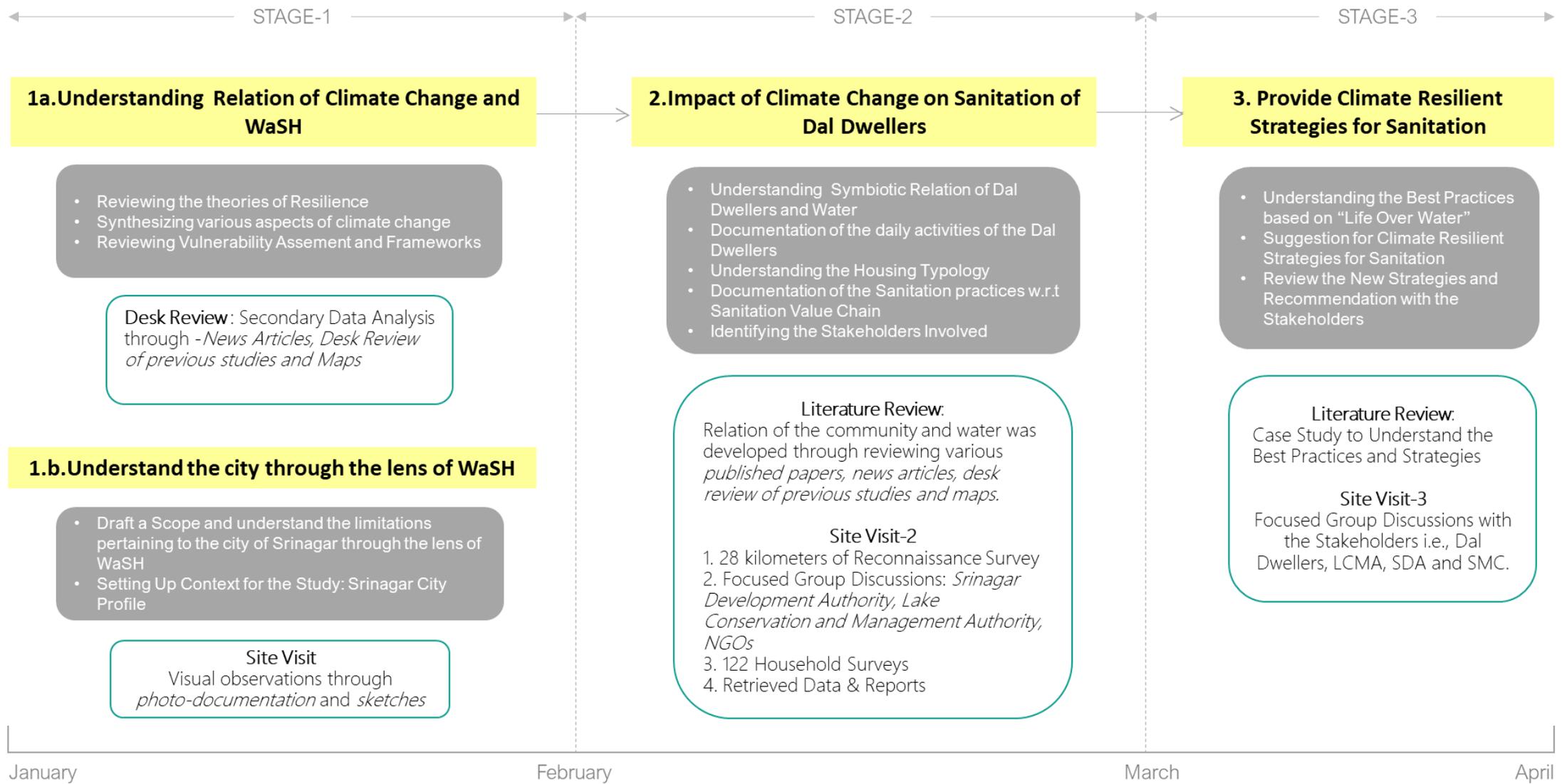
03 | Climate Resilient Framework and Strategies for Sanitation

Way forward by identifying strategies towards improving Climate Resilience for the Dal Lake Dwellers

“Race to Zero”



Source: Author



● Objectives ● Tasks Tasks

2. Natural Heritage of Srinagar

KASHMIRIS

Dal Dwellers
“Demb Hanz”

“Demb Hanz,” a term encompassing the households and people who live on the lake islands. The term **dēmb** signifies “muddy” and “moist land” and refers especially to the artificially raised fields

FARMING
“Zamindar”
(Mainly Shia)

HOUSEBOAT OWNERS
“Hanji”
(Sunni)

FISHERS
“Gad Hanz”
(Sunni)

“all boatmen who live on the Dal, on any other lake or on the rivers in the valley”

(Madan 1995: 247; also 1972: 111).



(Source: Author)

2. Natural Heritage of Srinagar

1



A small two-year-old raised field in spring.

Source: © 2021 Michael J. Casimir

2



Three-year-old raised field ready to be cultivated.

Source: © 2021 Michael J. Casimir

3



Twenty-year-old raised field

Source: © 2021 Michael J. Casimir



“The Raised Dembs”

Source: Himanshu Satvi

The story of "DAL DWELLERS"

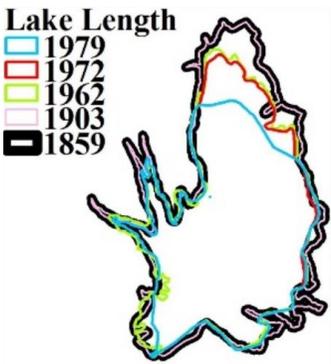
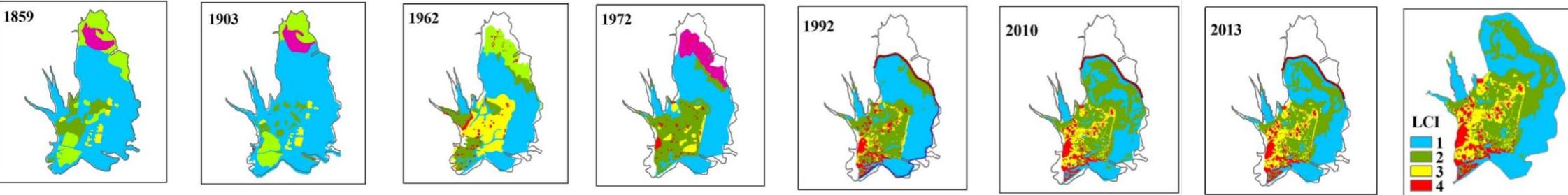
Close to WATER + No SANITATION + Flood VULNERABLE

Understanding the symbiotic relation of the Community and the Lake

3. The story of DAL DWELLERS



3. The story of DAL DWELLERS

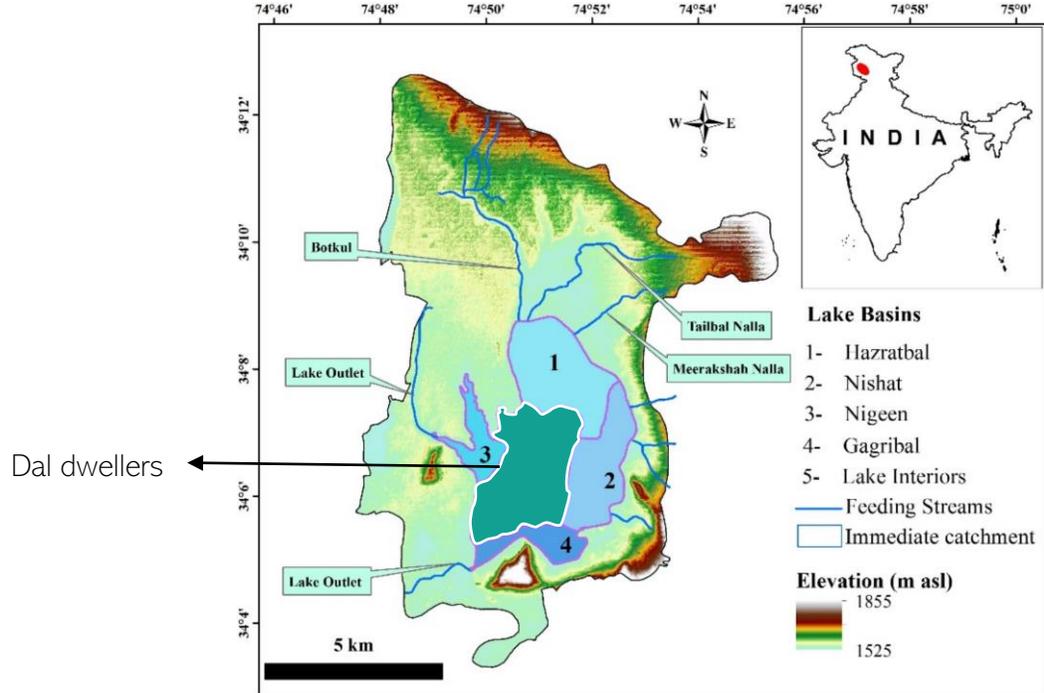


● Aquatic vegetation ● Floating garden ● Marsh land ● Plantation ● Settlement ● Water

Land use land cover- Dal lake (1859-2013)

Irfan Rashid, 2017

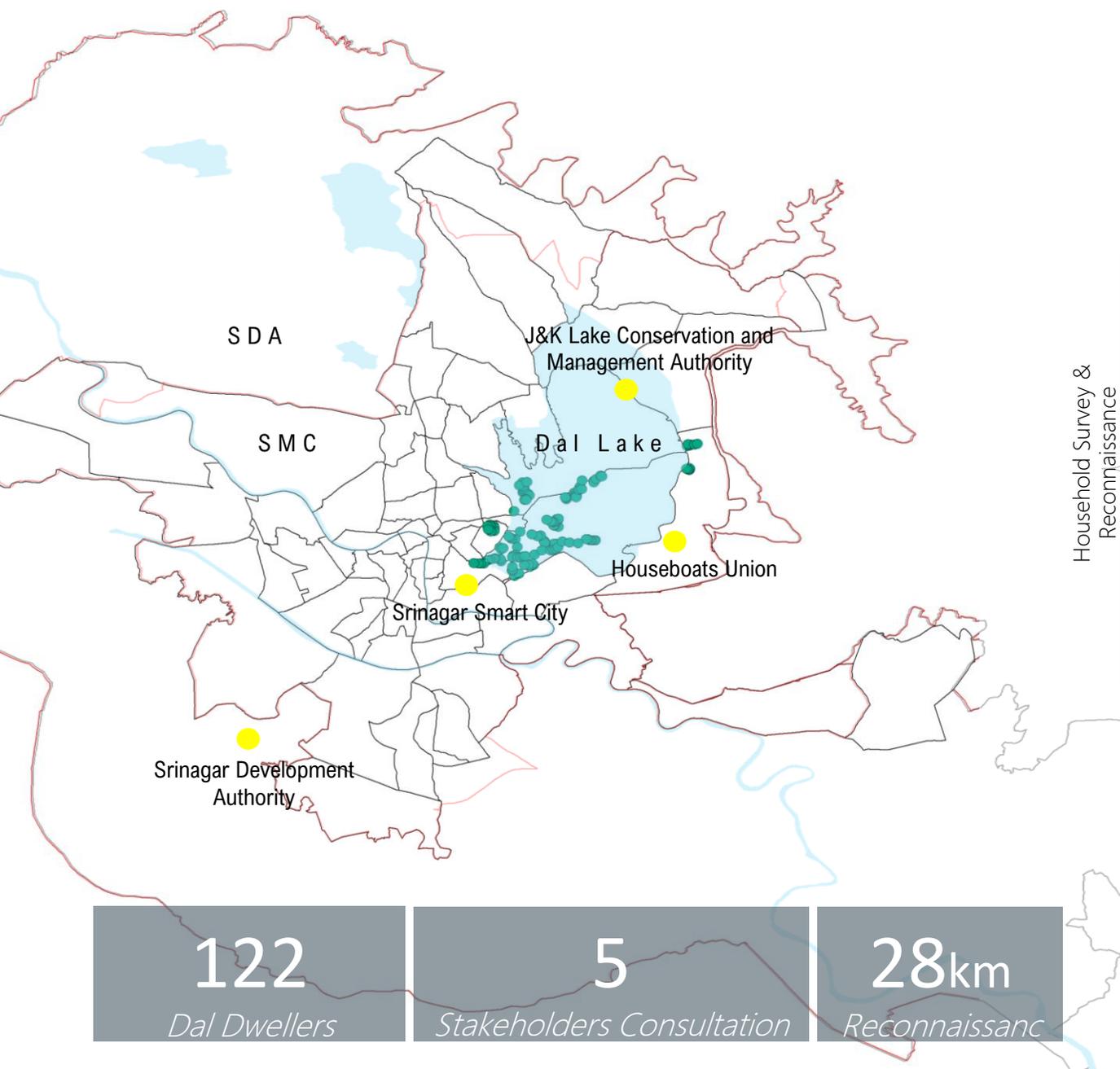
3. The story of DAL DWELLERS



Dal lake basins

Irfan Rashid, 2017

3. The story of DAL DWELLERS



Understanding the Linkage of Housing and Sanitation

Mapping different typologies and their challenges w.r.t sanitation and flooding

Understanding the Sanitation System of the Dal Dwellers

Understanding the Accessibility to Sanitation (Interface)
 Containment of the Sewerage/Faecal Sludge
 Understanding Nexus of Sanitation and Lake
 Conveyance of the Sanitation System

Understanding the Relation of Sanitation & Climate Hazard (Flood)

Access to Sanitation during flooding
 Impact on Sanitation system during flooding
 Resilience of Sanitation system during flooding

- Household Surveys
- Focused Group Discussions

Source: Author

3. The story of DAL DWELLERS

1. Linkage of sanitation with housing



A. Kaccha houses along the stream B. Stilt houses on floating islands C. Kashmiri houseboats

Typical typologies that has evolved out of *politics, migration, and economy*.

The varied typologies considered for study are *kaccha houses, stilt houses, and Kashmiri houseboats*

3. The story of DAL DWELLERS

Typology -1
Kaccha Houses Along the stream
Hanging Toilets Over Lake

These households are owned by "Gad Hanz"- Fishermen's and Farming labour

A Access to Sanitation

Closest to the Water Household is → Sanitation User Interface completely hanging over water

Safety Issues while accessing the toilet for children's, elders and specially abled

B Containment- Conveyance-Disposal

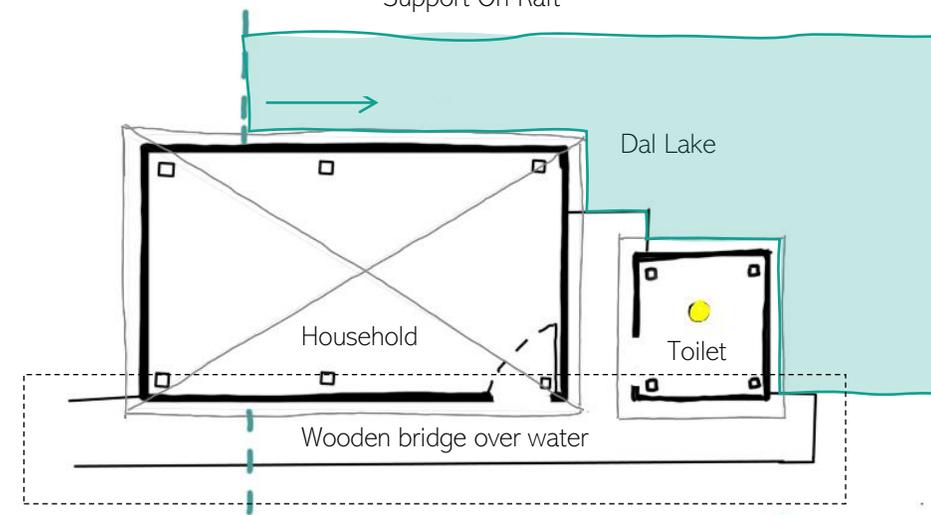
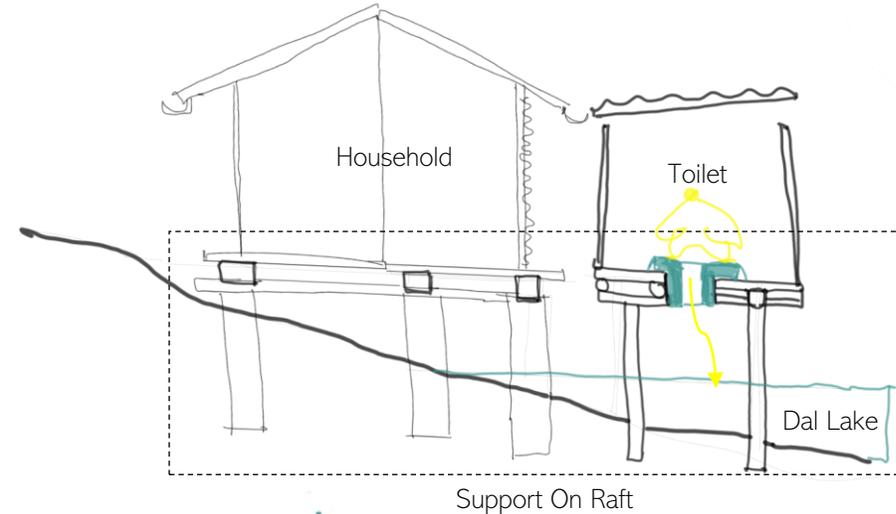
Lack of Containment - The Faecal Sludge and the waste water directly drained into water

- Creating Unhygienic Environment around
- Impact on Water Quality of lake
- Water and Sanitation Nexus
- Health Issues

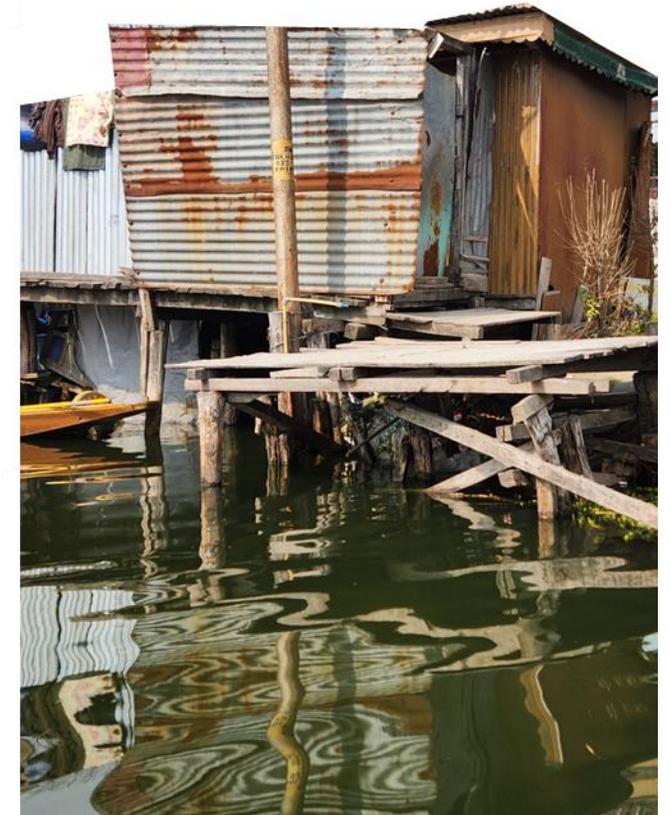
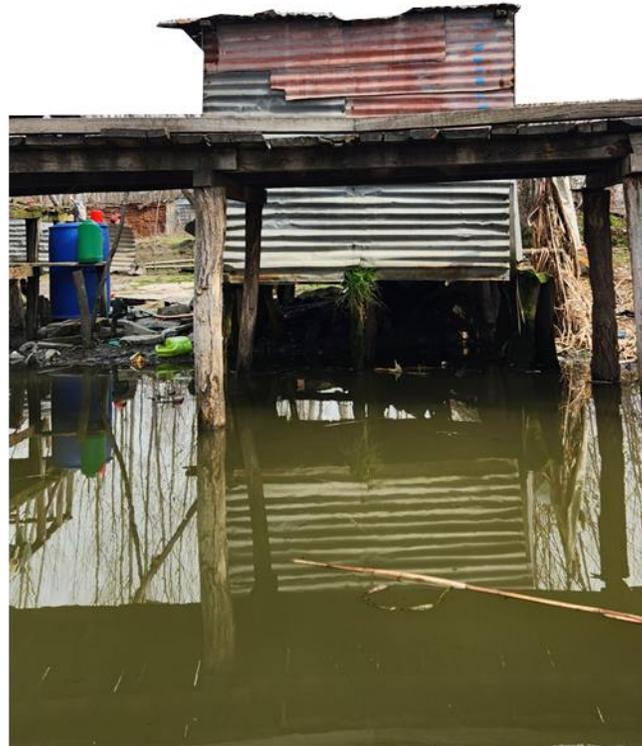
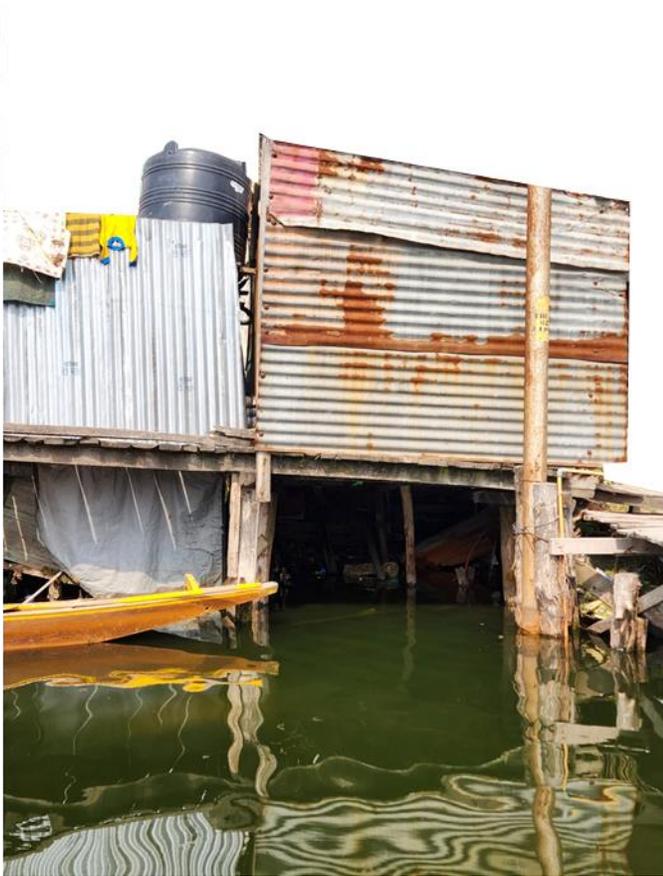
C Impact of Climate Hazard

Breakdown of Interface ever year due to Flooding

- No access to Sanitation during flooding
- Open defecation
- No alternative during Flooding
- Post Flood Trauma



Source: Author



Hanging Toilets

3. The story of DAL DWELLERS

Typology -2
Stilt Housing on Islands
Containment opening into Lake

These households are owned by "Zamindars"- Farmers and Artisans/Craftsman

A Access to Sanitation

Household on the Demb lands
(demb lands which were made more than 20 years back)

→ Toilets inside the houses

B Containment- Conveyance-Disposal

Lack of Containment - The Faecal Sludge and the waste water directly drained into water.

→ Creating Unhygienic Environment around
→ Impact on Water Quality of lake

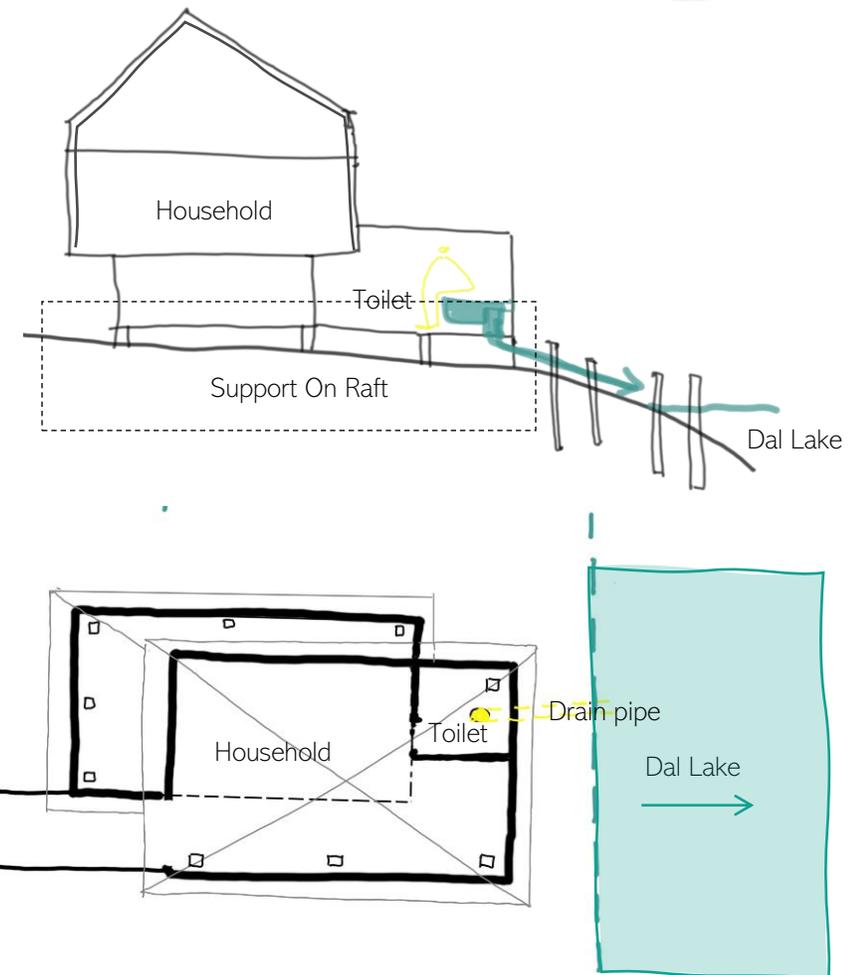
Lack of Conveyance – Some houses of this typology have container storage but since they don't have conveyance they end but disposing it into lake.

→ Some households collect waste in containers between the rafts, which they further use for manure by mixing with weeds.

C Impact of Climate Hazard

Backflow of sewage into the houses

→ No access to Sanitation during flooding
→ Open defecation
→ No alternative during Flooding





Stilt houses on islands

3. The story of DAL DWELLERS

Typology -3
Houseboats
Containment opening into Lake

These households are owned by "Hanji"- Houseboat Owners

A Access to Sanitation

Floating Boat

(These typology is continuous floating over the water and tied back to the deck)

→ Toilets inside the houseboats

B Containment- Conveyance-Disposal

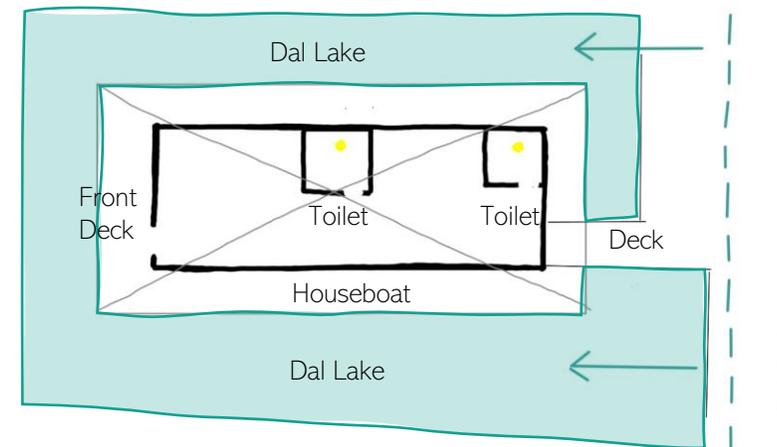
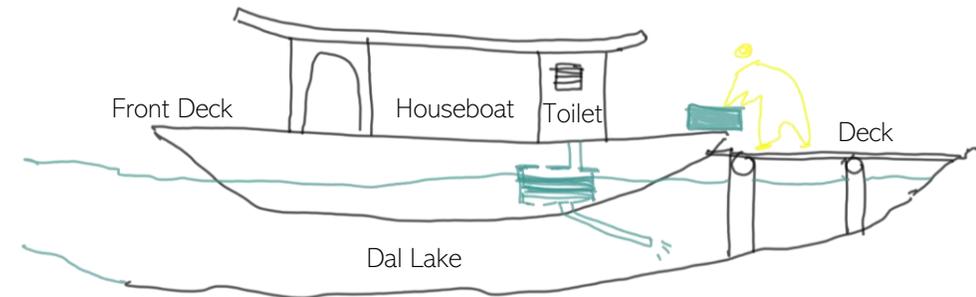
Containment - The Faecal Sludge is contained in the container and the waste water directly drained into water.

→ Impact on **Water Quality of lake**
→ **Creating Unhygienic Environment** around

Lack of Conveyance – Some houses of this typology have **container storage** but since they don't have conveyance they end but disposing it into lake.

C Impact of Climate Hazard

Very less impact of Flooding

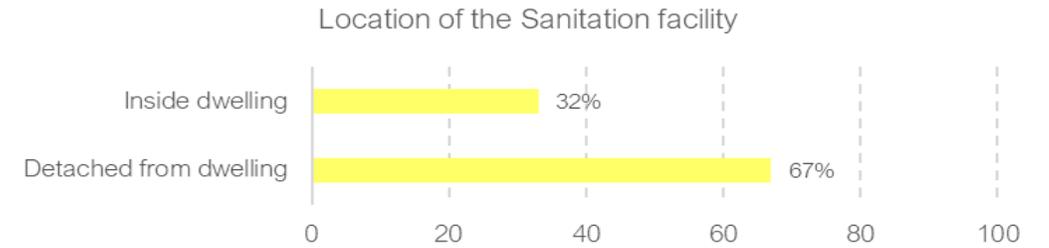


Source: Author

3. The story of DAL DWELLERS

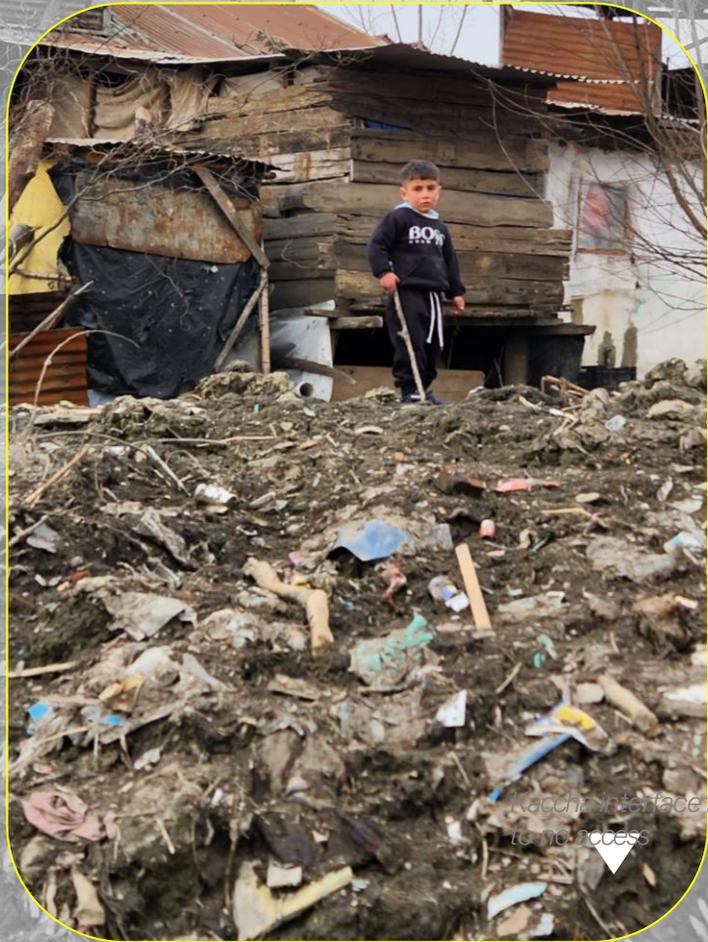
Climate Change Impact on Sanitation

Impacts of climate hazards on sanitation access, use and functionality



Location of sanitation facility that creates issues with the access, use and functionality

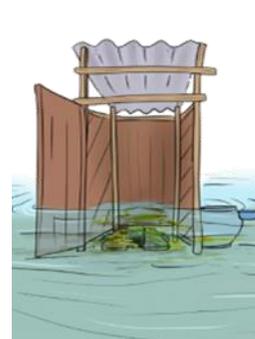
67% of the respondents have sanitation facility which is detached..



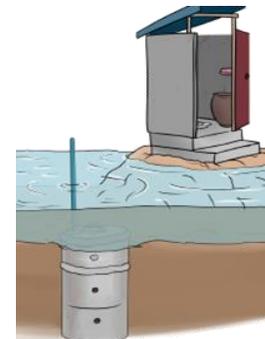
Kaccha interface flooded leading to no access

Safety Issues while accessing the toilet for children's, elders and specially abled

Source: Author

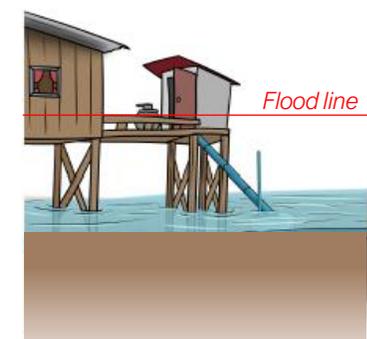


CASE-1



CASE-2

Floodwater around raised pour-flush toilet on mound.



CASE-3

Floodwater around wooden stilt hanging toilet.

Impact of Inundation on access during heavy rainfall

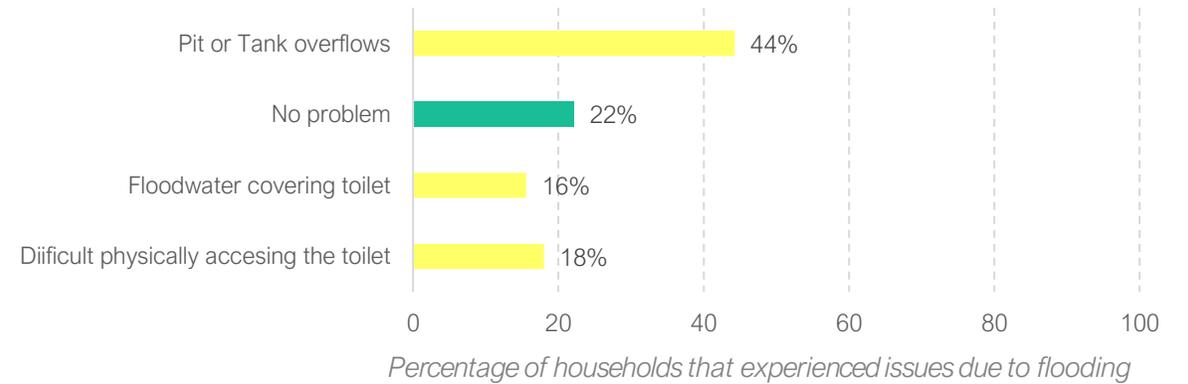
Difficult route towards sanitation facility | Either undesirable or inaccessible

3. The story of DAL DWELLERS

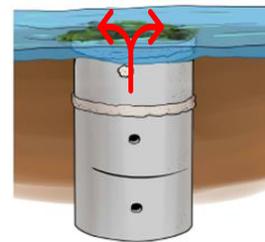
Climate Change Impact on Sanitation

Floods creating different forms of issues for household sanitation access, use and functionality

Different issues related to access and functionality

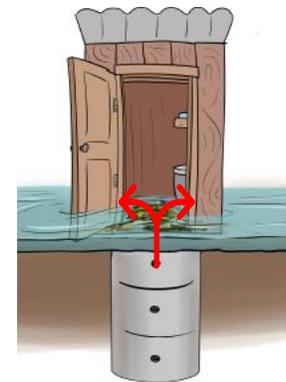


1. Pit or Tank overflows



44% of the households uses single pit toilets and experiences *backflow of the faecal sludge and wastewater into the interface*

2. Floodwater covering toilet



3. Difficulty physically accessing the toilet



Faecal contamination and unhygienic environment creating a substantial public health risk.



Lack of Basic WaSH Infrastructure to store and treat the Sewerage

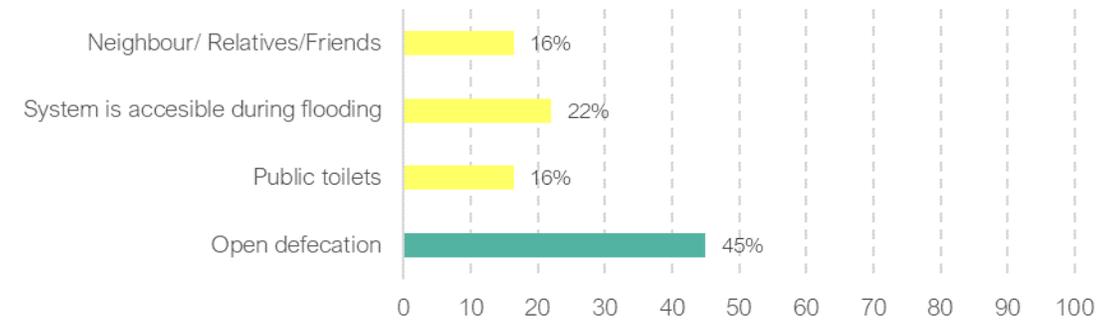
Source: Author

3. The story of DAL DWELLERS

Climate Change Impact on Sanitation

Secondary options for sanitation facility in the absence of primary facility

Alternative during flooding



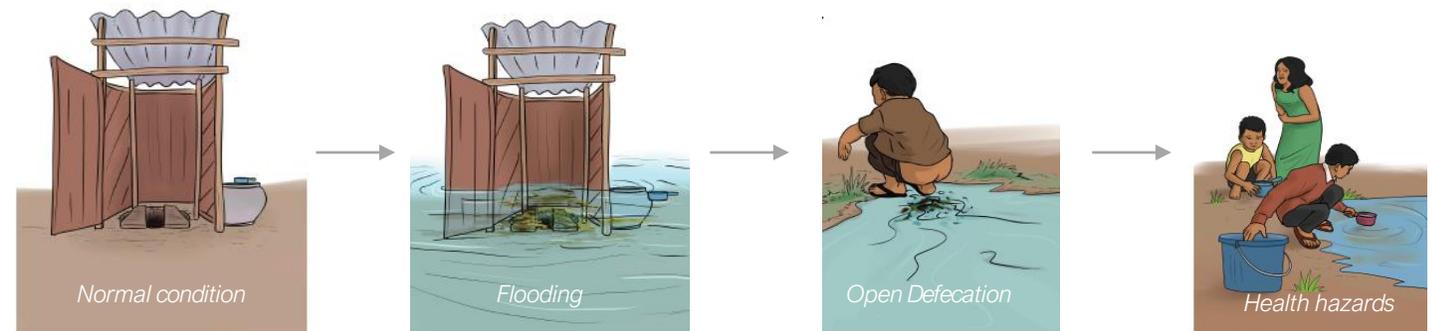
Alternatives used if primary sanitation facility is inaccessible due to flooding

Households chose a variety of alternatives, including **open defecation which is 45%** and is the most preferred alternative during flooding.

In terms of public toilet, the **challenge and gap is in providing a public sanitation facility over water which can be accessed by the Dal dwellers.**



4 in 10 households open defecate during flooding



78% of Dal dwellers lack access to sanitation during flooding

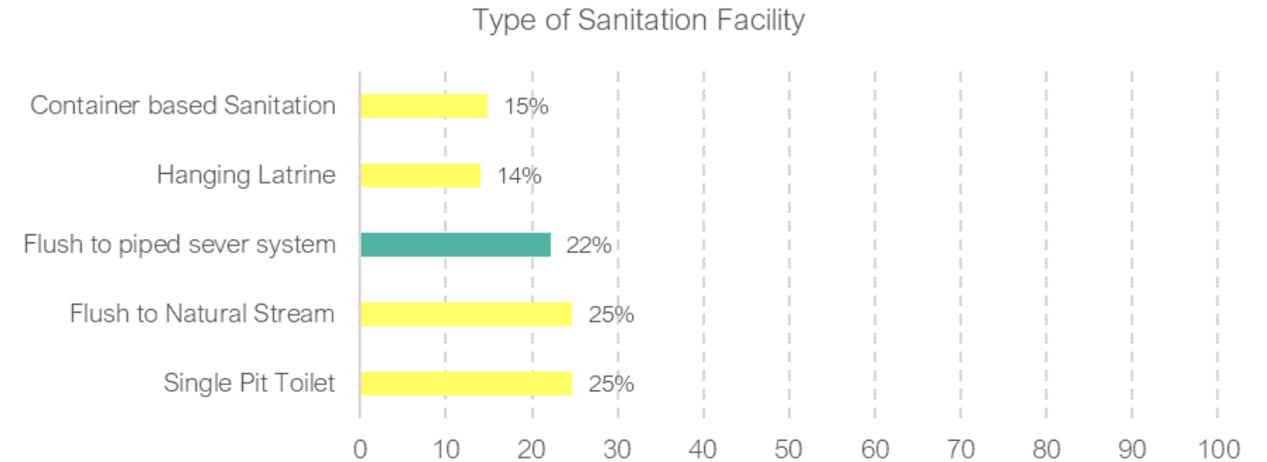


Source: Author

3. The story of DAL DWELLERS

Climate Change Impact on Sanitation

Impacts of climate hazard on containment of sanitation facility



Alternatives used if primary sanitation facility is inaccessible due to flooding

78% of households who lack or have unreliable containment facility experienced difficulties with sanitation facility like overflow, backflow and accessibility as compared to those who used sanitation facility with containment.

Containment facilities that are linked or overflow into drains, along with the flushing of contaminants in floodwaters leads to the release of large amounts of pathogens into the water.

Containments which are unsealed, which is common in single pit sanitation and container-based sanitation, depending upon the conditions of groundwater and soil there is a huge risk of contamination of groundwater.

STRONGER SMELLS | INCREASED PRESENCE OF FLIES | ROOF LEAKS | ELECTRICITY ISSUES

39% of households have no containment facility at all
(Hanging latrine + Flush to natural stream)

3. The story of DAL DWELLERS

Climate Change Impact on Sanitation

Gender and age-based impacts

85% of households have Issues related to females

Impact of prevalent culture of inequality and disparity

Access to water is limited, the whole household is affected (toilet, drinking, & cooking). They spend more time to access as compared to males creating distress.

Menstrual hygiene which becomes difficult to ensure since there is limited or no access to water and hygiene

48% Issues faced by children's, elders and specially abled

Children experienced reduced ease in meeting their defecation needs during climate hazards.

Cases of children drowning during accessing the hanging toilets during flooding

Lack of disability-inclusive practices for sanitation affects the accessibility and becomes a stress for the households who have elders or specially abled individual.



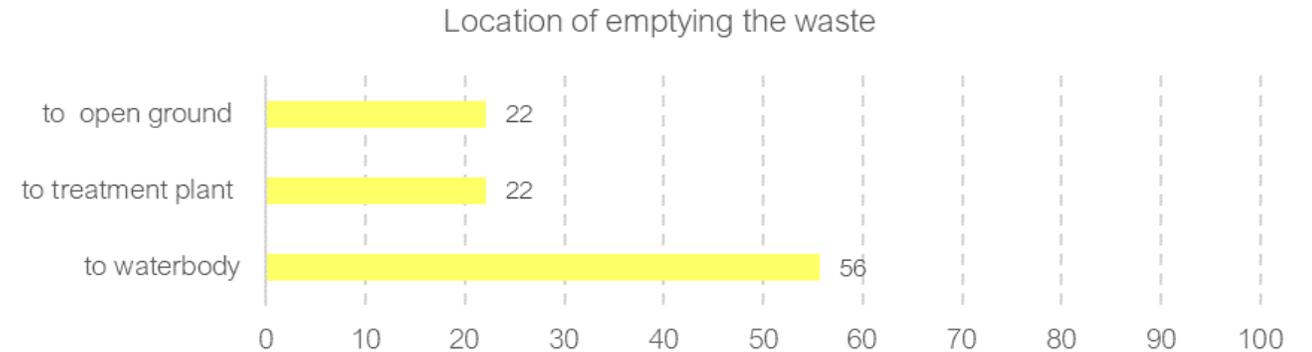
Vulnerable to climate hazard

Source: Author

2. The story of DAL DWELLERS

Climate Change Impact on Sanitation

Climate hazard impact on emptying services



In case of Dal dwellers 56% of the dwellers directly drain their waste into the lake due to lack of emptying system in place.

Out of 56% emptying happening into lake, 39% do not have containment and the rest 17% have containment facility but since they do not have desludging facility, they end up draining into lake

Deteriorating Water Quality

3. The story of DAL DWELLERS

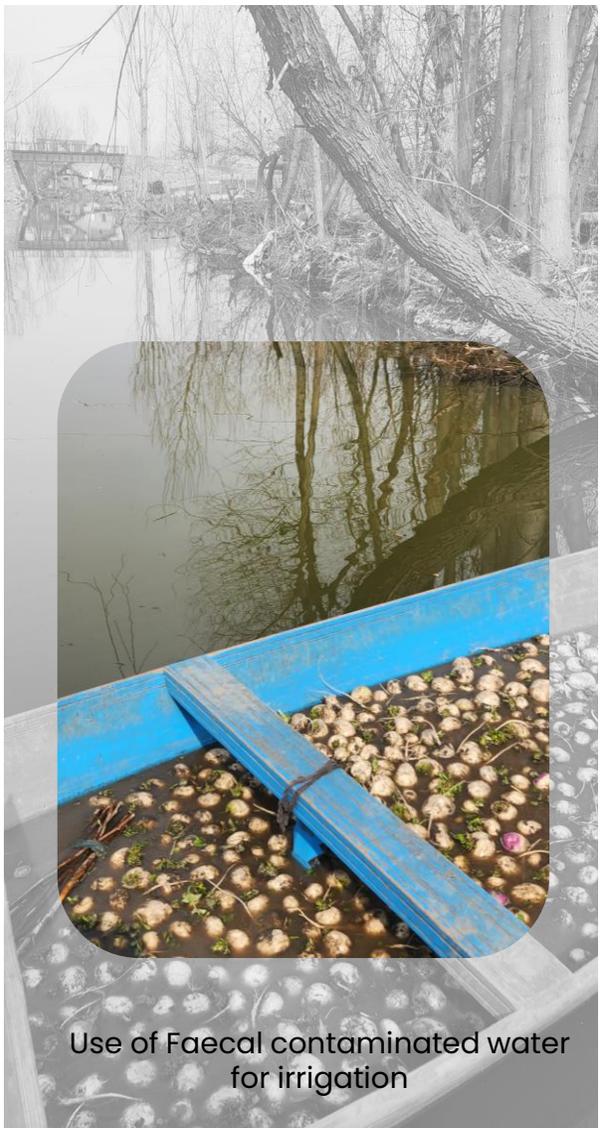
Impact of Climate hazard on urban water cycle



Nexus of water supply and sanitation



Faecal sludge being discharged into urban water sources



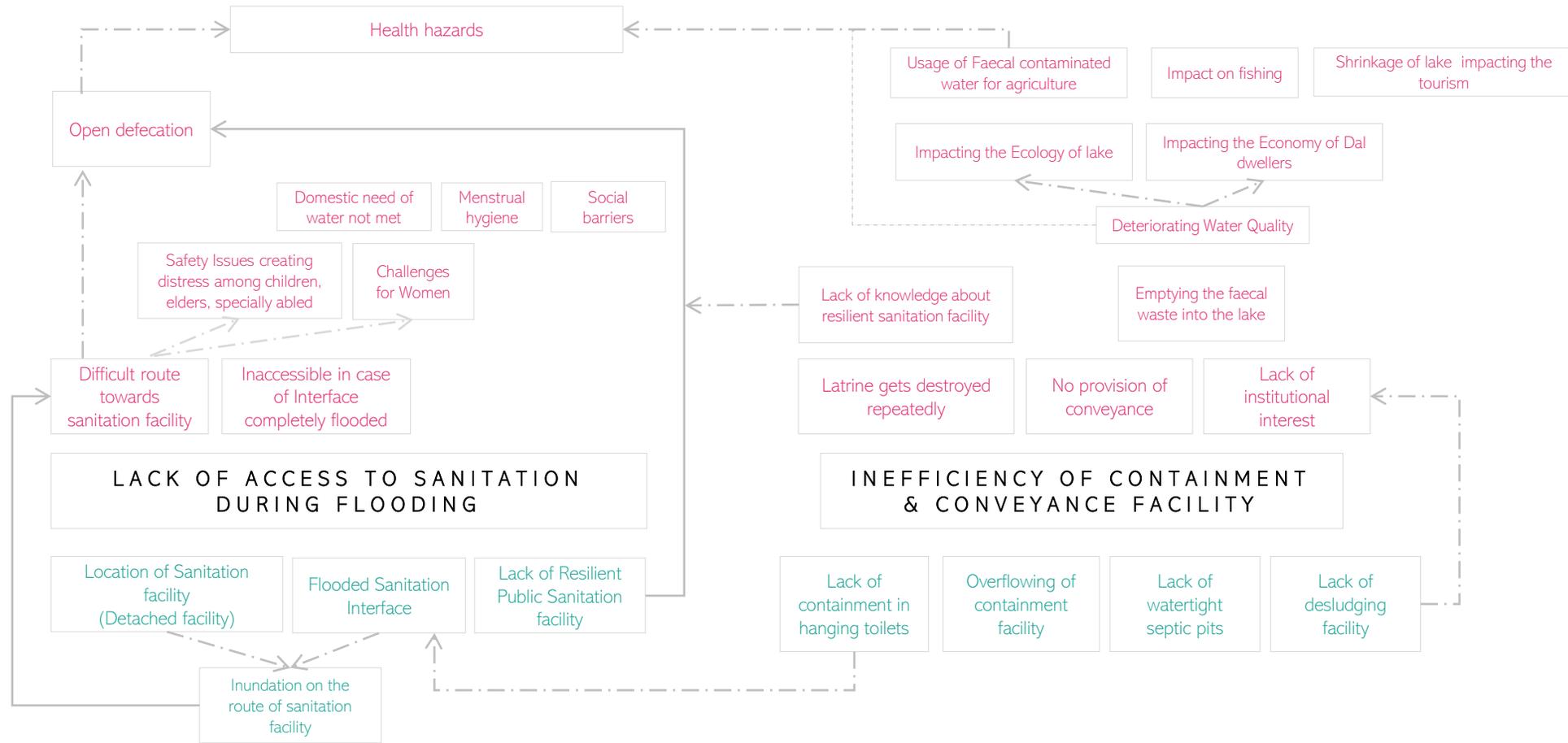
Use of Faecal contaminated water for irrigation



Contamination of the ground water table and unhygienic surrounding

3. The story of DAL DWELLERS

Summarizing the Problems, Cause & Effects



■ PROBLEM ■ CAUSE ■ EFFECT

“To provide Climate Resilient Strategies for Sanitation”

- 1** Reviewing the Case Studies and Good Practices based on “Life Over Water”
- 2** Focused Group Discussion: To review the New Strategies and Recommendation with the Stakeholders
- 3** Suggestion for Climate Resilient Strategies for Sanitation

जो देखते हैं खाब जन्नत का उन्हें बता दो
जन्नत का रिश्ता भी कश्मीर की तस्वीर से है



Source: Author



Project DRAINS

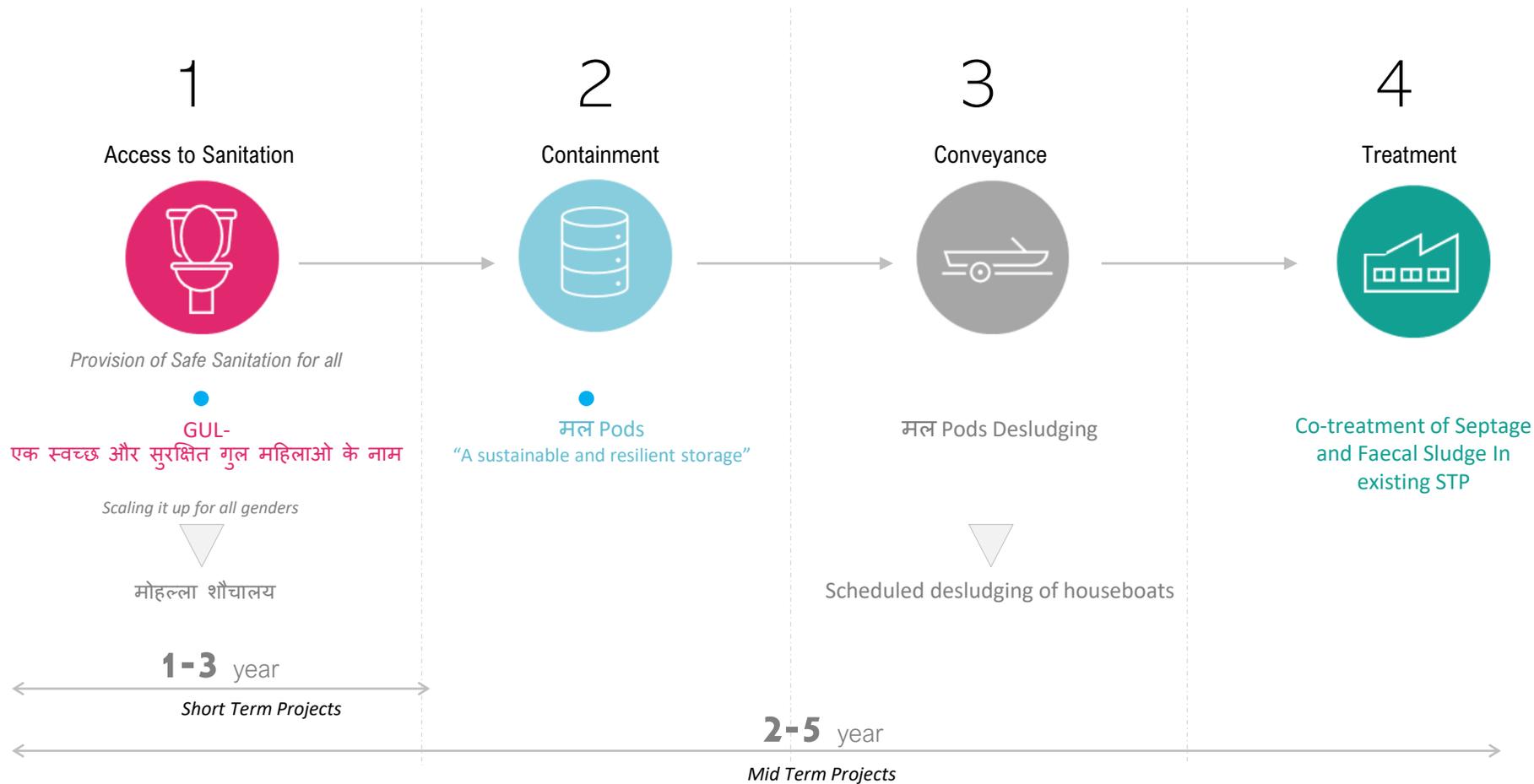


Dal Resilience and Access to Improved Non-sewered Sanitation

"गौरव के लिए स्वच्छता, दल जीवनों के लिए संवेदनशील स्वच्छता"

Strengthening Access to Sanitation services | Appropriate Technologies

GUL a pilot of "Project DRAINS"



● Pilots detailed out for recommendation

The process of implementation of "Project DRAINS"





Access to Sanitation

PROBLEMS

- 1. More distressed among females for sanitation
- 2. Dwellers whose interface is under water during flooding
- 3. Dwellers who have hanging Interface

CAUSES

Sanitation facility getting destroyed every time
 Open defecation and Unsafe Access
 Unsafe and Unhygienic sanitation
 Lack of Resilient Sanitation facility

SOLUTIONS

Introducing to the most vulnerable

“GUL-एक स्वच्छ और सुरक्षित गुल महिलाओ के नाम” –
 1. a floating community Sanitation facility for females and flood rescue point

Scaling it up for all genders

“मोहल्ला शौचालय ” –
 2. a floating community toilet facility

“Access to the Sanitation to the most vulnerable”



1

Access to Sanitation

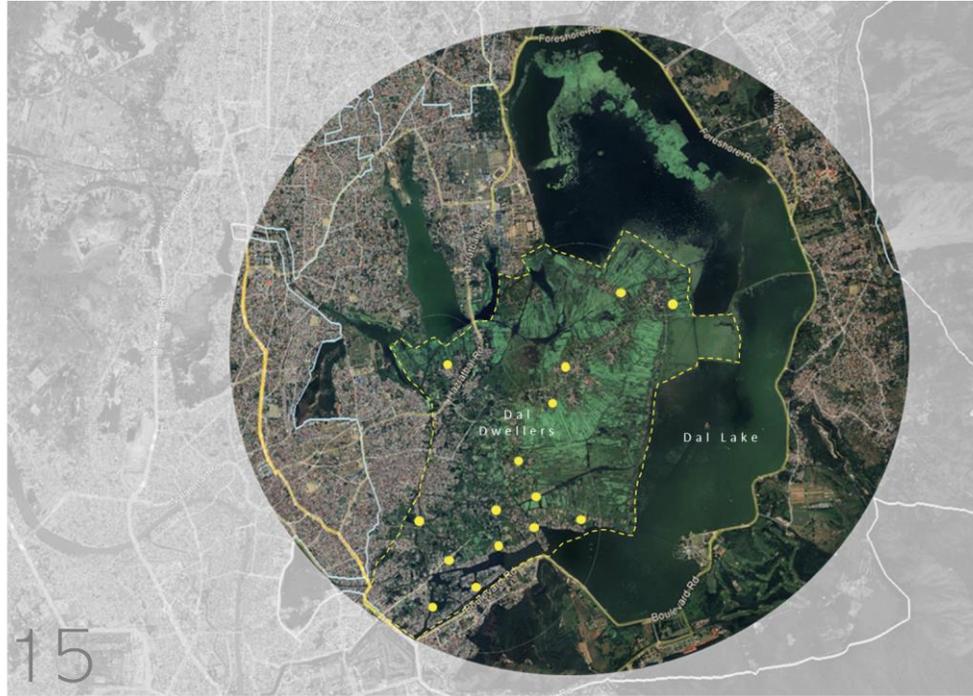


एक सुरक्षित और स्वच्छ



A RESILIENT APPROACH TOWARDS SAFE AND SUSTAINABLE SANITATION

Accessible | Close Proximity to Vulnerable | Efficiency
POTENTIAL "GUL" LOCATIONS



Parameters considered for Identification of Locations



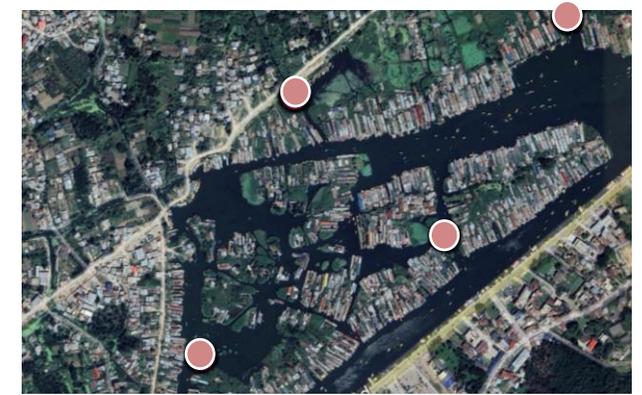
FACILITY ACCESSIBLE BY ALL

The problem of the community is not about accessing the facility over water but the facility which is not accessible because of breakdown.



PROXIMITY UNDER 300 METRES

The Sanitation facility is located not beyond 300 meters from the households who lack access to sanitation during flooding



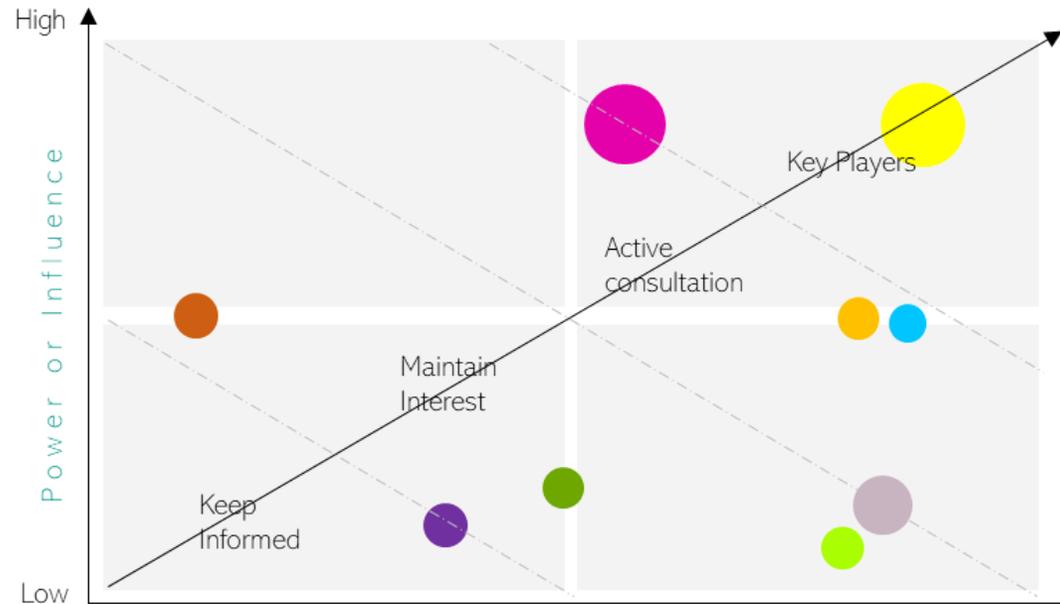
STRATEGIC LOCATIONS

The locations of the houseboats have been identified strategically so that the facility is shared amongst different hamlets.

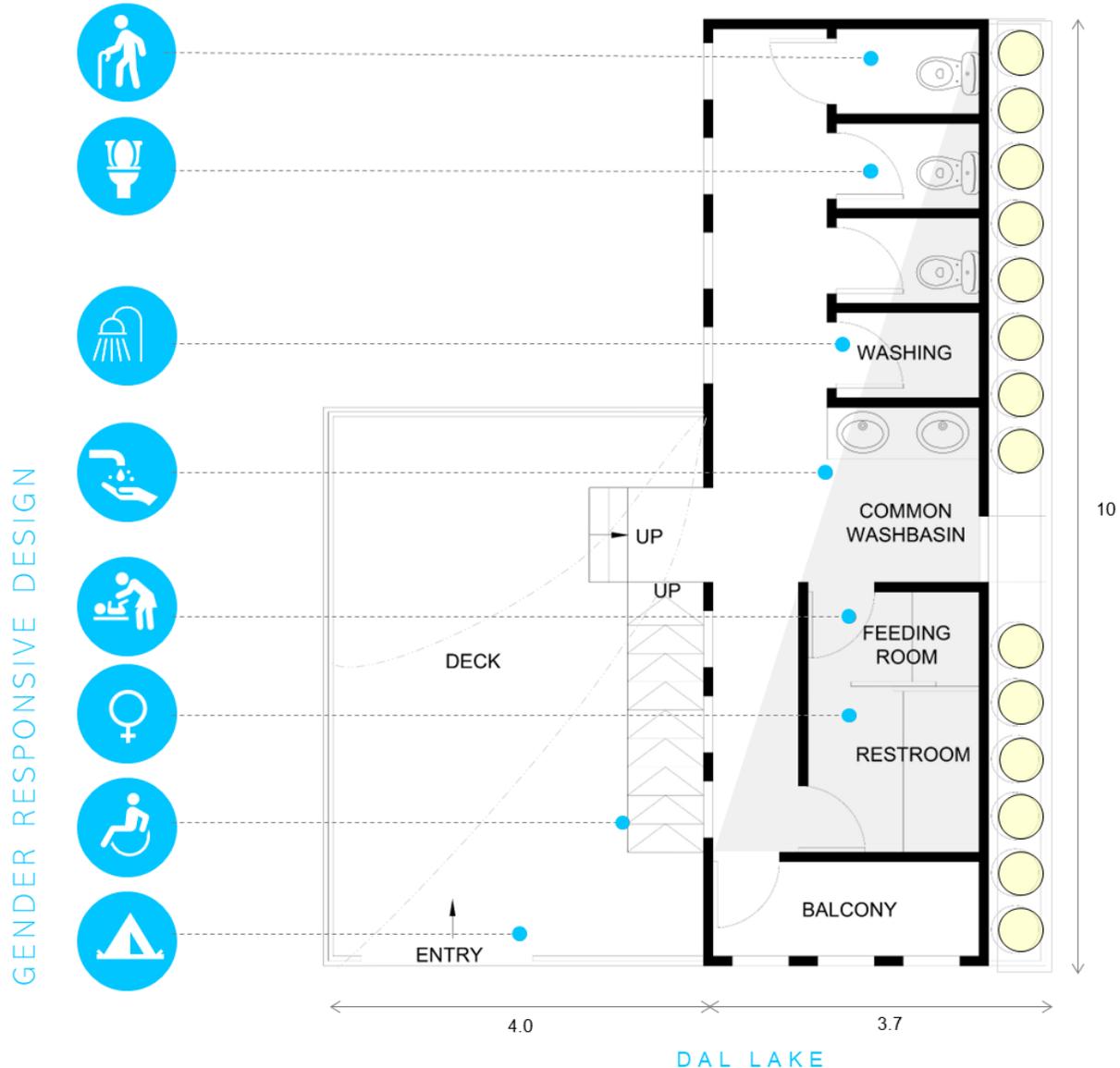
Stakeholder Mapping

INFLUENCE LEVEL vs LEVEL OF INTEREST

	● Srinagar Municipal Corporation/ Smart City	● Dal Dwellers	● J&K Lake Conservation & Management Authority	● NGO	● Srinagar Development Authority	● PHEED	● J & K Tourism	● Houseboats Association	● Farmer and Fishermen's Association
Resources to Influence the Pilot	Funding	Behavior Change & Support	Land	Funds, Awareness/ Support	Land use/ Development Plan	Provision of STP facilities	Tourism & Economy	Tourism & Economy	Share in Economy
How will the intervention influence	Safely Managed Sanitation, Flood resilient	No relocation, Access to Safe and resilient sanitation	Conservation of lake	Development of society and communities	Blue and Green Infrastructure	Efficiency of Sewage Treatment Plant	Increasing the tourist footfall	Sanitation for houseboats	Irrigation and control on depleting quality of water



User Interface Design



“GUL-एक स्वच्छ और सुरक्षित गुल महिलाओ के नाम”

CLIMATE RESILIENT FLOATING SANITATION
 Floating sanitation facility for females which can withstand climate hazards

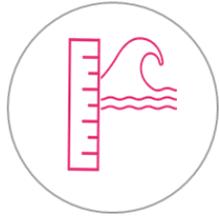
RESCUE AND SHELTER
 Acts as a rescue point/ shelter during climate hazards like flooding

BARRIER FREE DESIGN
 Inclusion of ramps, handicap toilets, accessible by children

EMERGENCY RESTROOM
 Provision of first aid and emergency rest room
 Vending machine for sanitary napkins

Salient Features

1



FLOOD WARNING SYSTEM

Sensors for flood will be clipped with the sanitation facility, if there is rise in lake water, sirens would alert the hamlets nearby.

2



USER FEEDBACK SYSTEM

The feedback system will be linked with Srinagar Municipal Corporations SBM App

3



PRESS FOR EMERGENCY

EMERGENCY BUTTON

Provision of emergency button during emergency inside the interface. It warns the person guarding the facility

4



SMOKE DETECTORS

Will help to alert emergency services

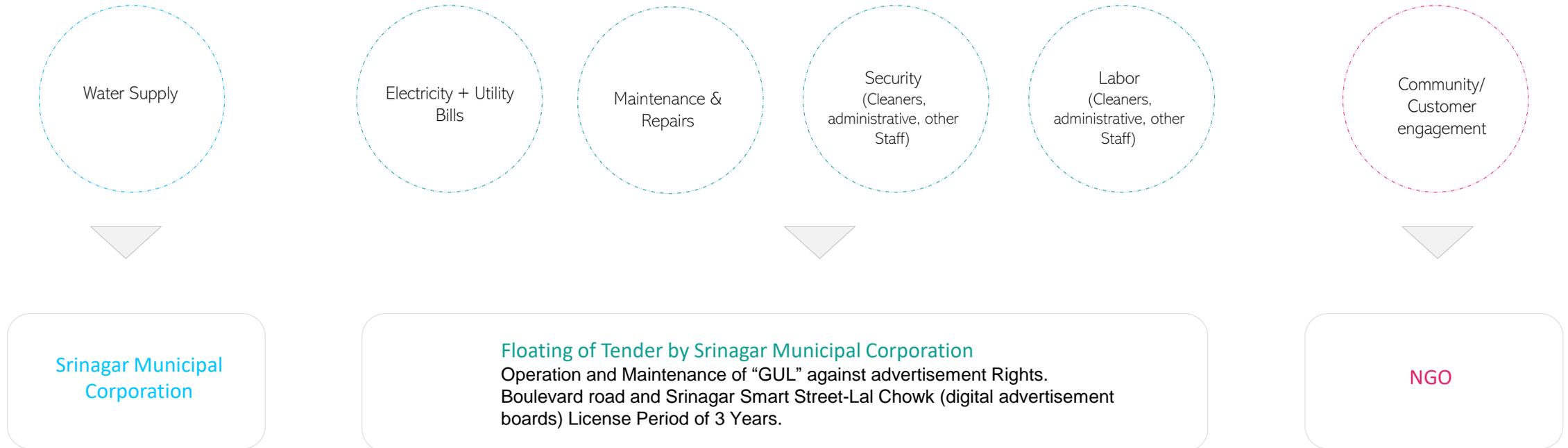
Finance Model

CAPITAL EXPENDITURE:



Finance Model

OPERATIONAL EXPENDITURE:



DIGITAL ADVERTISEMENT RIGHTS





Visualization of Pilot "GUL"

Project DRAINS



Containment

PROBLEMS

Dwellers draining waste directly into lake due to lack of containment
Dwellers draining waste on the “Demb lands” in open



CAUSES

Floodwater covering Interface which cuts the access to Sanitation.
Health risk to family and surrounding

SOLUTION

Dal dwellers to be provided containment system- **“मल Pods”- A sustainable and resilient storage**
The households which are along the stream and lack safe and sustainable containment facility to be provided with Resilient Pod System

“Provision of the basic WaSH infrastructure which the community lacks”

2

Containment



मल Pods- A sustainable and resilient storage



Before



After

Technology Implemented

- Minimal maintenance
- Flood Resilient and Excellent water treatment
- Easy assembly
- Long-life use
- Stability in storm events and low temperatures
- No odor
- No chemical or electrical inputs



Microbial Biofilm Process

Sludge Container

Treated Discharge

STEP - 1

First container receives waste and pour-flush water from the latrine pan.

Flows passively by gravity into a second container- 3 days treatment.

STEP - 2

The 2nd and 3rd container contains naturally occurring microbes that respond to the waste as food, including significant predation on the pathogens.

The container's extensive internal surface area of microbial biofilm which absorbs the chemicals and particulates that sustain the metabolism and ecology of the microbes.

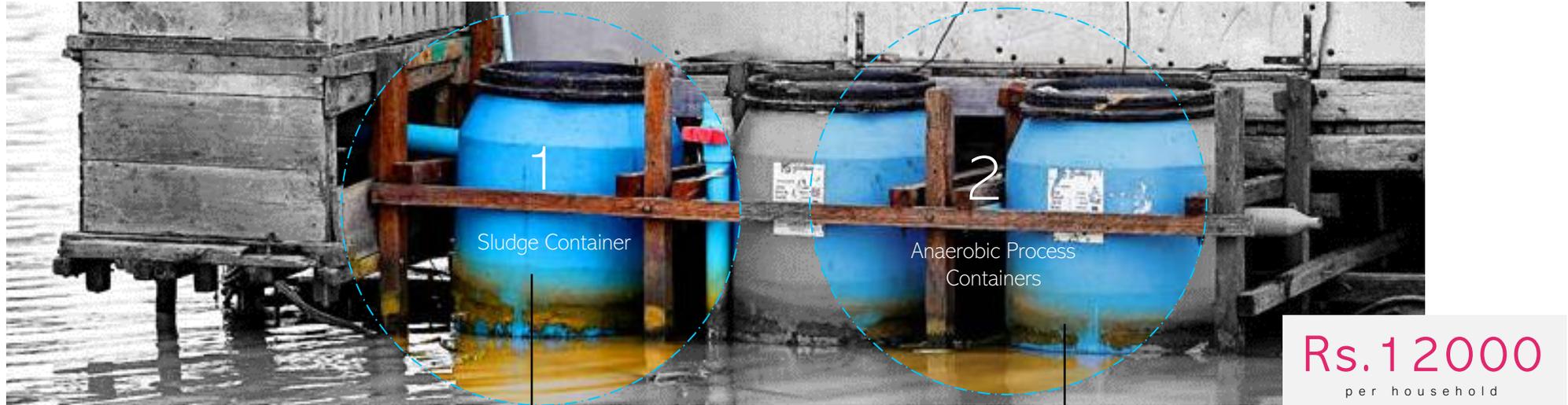
The microbial biofilm activity provides a treated effluent that results in 'safe ambient water' next to the discharge pipe.

STEP - 3

The treated water is then discharged back into the surrounding natural environment

Microbial Biofilm Processes by Wetlands Work!

Capacity and Cost of the Treatment



300 Liters Capacity *(Each household will be entitled to a pair of container)*

Needs maintenance every five years

Total Yearly Sludge Accumulation
240 Liters
(considering family size 4)

Needs Desludging Yearly.
*Srinagar Municipal Corporation takes the filled container
for co-treatment at STP and exchange it with spare*



Conveyance

PROBLEMS

- 1. Lack of conveyance for Container based sanitation households which end up emptying the waste in open or lake
- 2. Lack of conveyance for Containers for houseboats



CAUSES

Health risk to family and surrounding
Deteriorating water quality of lake



SOLUTION

“मलीय कचरा प्रबंधन” – PHASE2

- 1. 100% Households to have containment facility
- 2. Demand based Desludging through Shikars and floating honey sucker

Treatment

PROBLEMS

Lack of Emptying and treatment facility for the Faecal waste from households and houseboats.



CAUSES

Need advanced technologies due to cold temperature for the treatment of faecal in the existing Sewage Treatment Plant



SOLUTION

Provision of co-treatment facility in the existing STPs

“Completing the Loop”



“Gar Firdaus bar-rue zamin ast, hami asto, hamin asto, hamin ast”

-Amir Khusrau

Thank You

CWAS CENTER
FOR WATER
AND SANITATION
CRDF CEPT
UNIVERSITY

BILL & MELINDA
GATES foundation



Global South Academic Conclave on WASH and Climate Linkages