A Framework to Analyse WaSH-Climate Interactions and Path Ahead

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Presentation Outline

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- Water and Sanitation Impacts on Climate
- Climate Change Impacts on Water and Sanitation
- WaSH –Climate Vicious Cycle
- Conventional WaSH Solutions : Challenges and Opportunities
- Leapfrogging to sustainable urban water and sanitation infrastructure
- Possible Alternatives (?)
- Policy Environment
- Way Forward

Water and Sanitation Impacts on Climate

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WATER

Extraction	Treatment	Distribution	Wastewater Management
Surface Water	Filtration	Piped Water Supply	Wastewater Collection
Ground Water	Chlorination	Water Tankers	Secondary Treatment
Non-conventional Sources	Pollution / Contamination	Households Pumping to rooftop tanks	Pumping back to source / re-use
Treated Wastewater		End-Use (Heating / Cooling /Purification)	

- Indirect Emissions from Energy Consumption
- Direct Emissions from processes / chemicals / reservoirs
- Embedded emissions in materials

GHG Emissions from WaSH

Climate Change Impacts on WaSH

SANITATION

Direct GHG Emissions:
(CH_4 and N_2O)

Untreated Wastewater
- River/water body discharge
- Stagnant open sewers
- Septic Tanks / Septic Systems
- Open pits and Latrines

Treated Wastewater
- Biological Processes during treatment

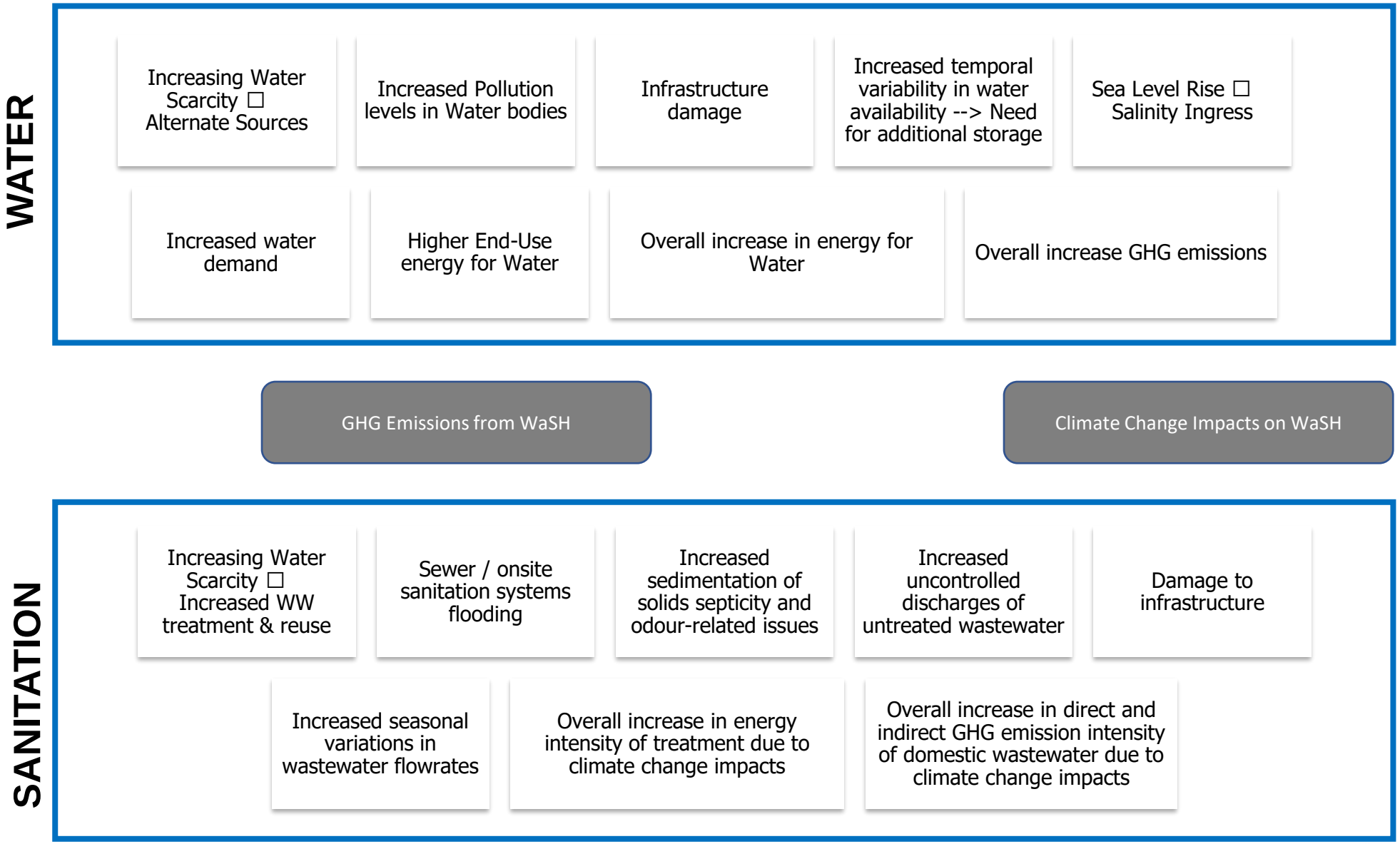
Faecal Sludge
- Off-site Sludge Treatment
- Sludge treatment at WWTP
- Landfilling /Incineration /Composting

Indirect GHG Emissions:
(CO_2)

- Electricity consumption
- Transportation of sludge /chemicals

Embedded Carbon in Infrastructure

Climate Change Impacts on Water and Sanitation



WaSH –Climate Vicious Cycle

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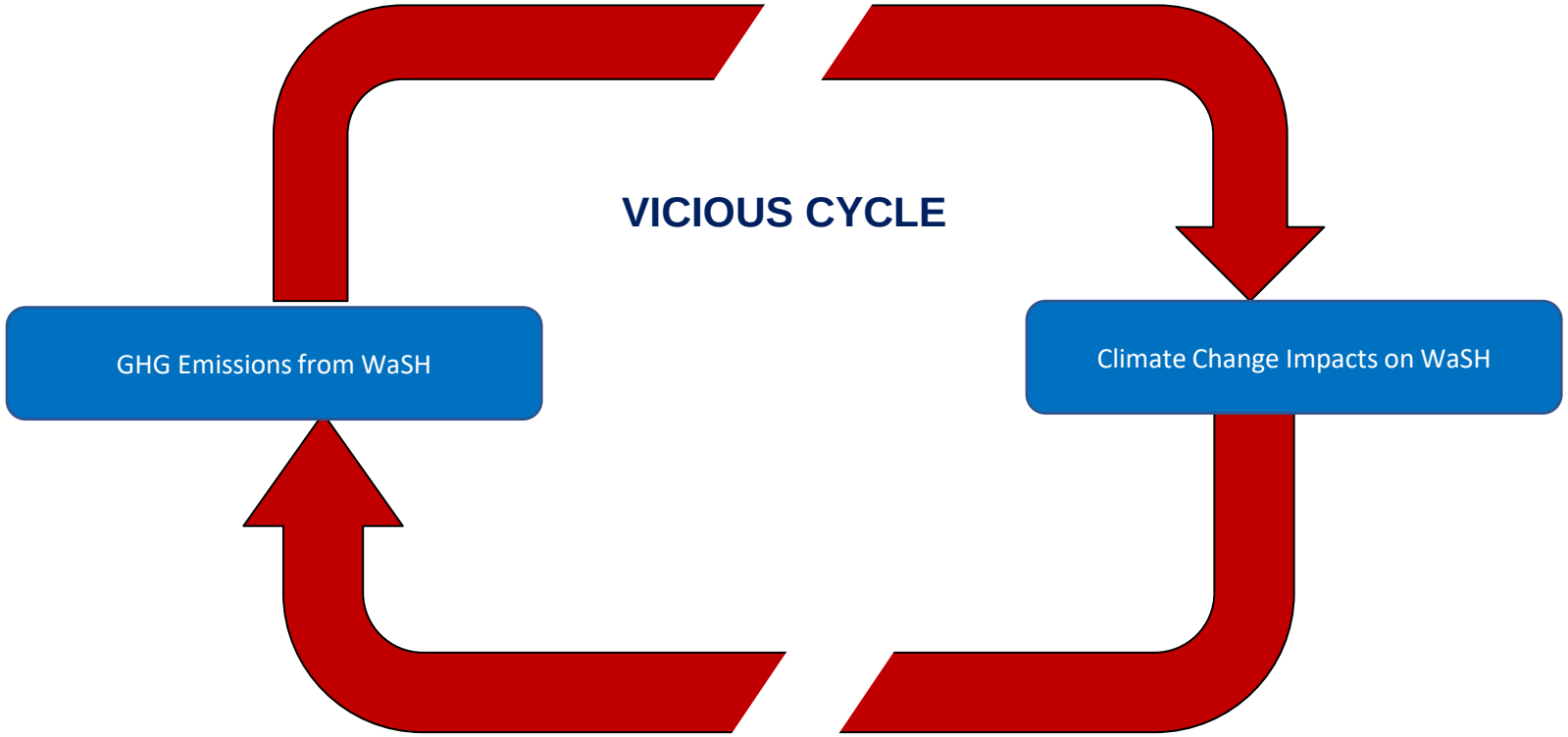
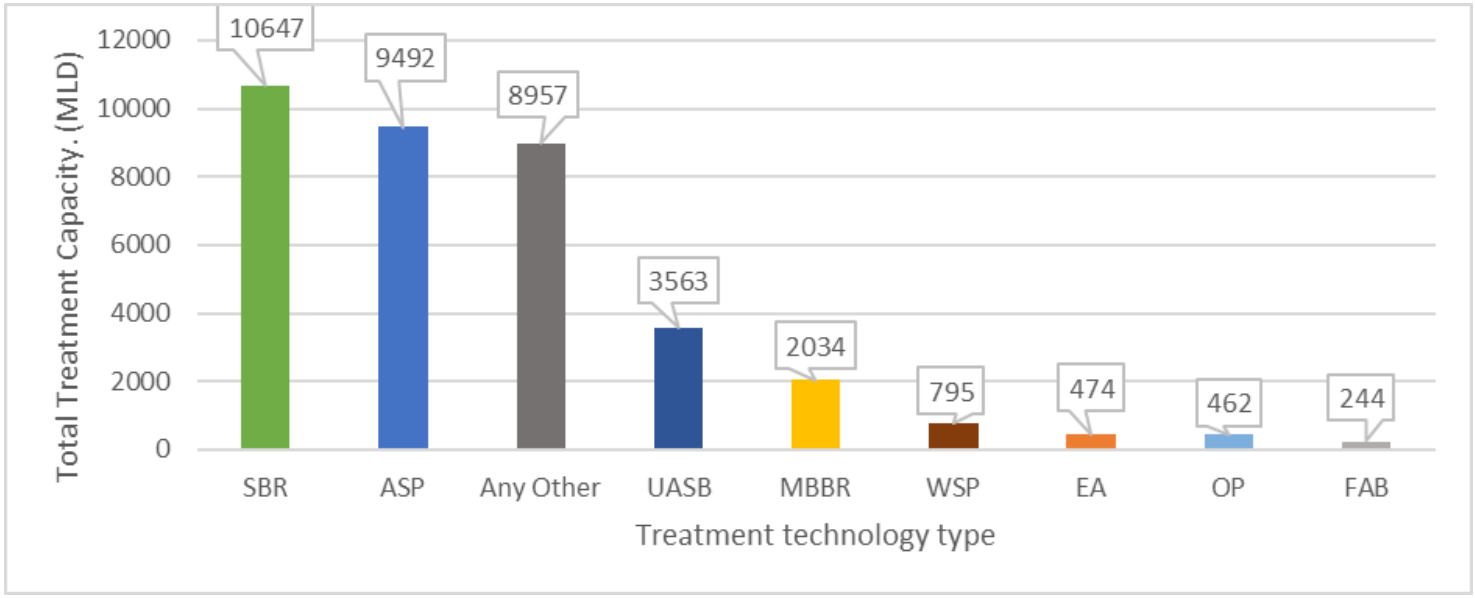
MITIGATION MEASURES



ADAPTATION MEASURES

Conventional WaSH Solutions : Challenges and Opportunities

- Increasing long distance water transfer projects instead of rejuvenating local sources
- Large Scale water treatment plants instead of source management
- Increasing energy intensity of distribution systems → Use of water Tankers
- Increase in built storage construction instead of rejuvenating natural storage (Groundwater aquifers)
- Piped water supply projects promoting dependence on a single source



Distribution of total sewage treatment capacity (in MLD) across secondary treatment technologies;

Data Source: CPCB,2021

Leapfrogging to sustainable urban water and sanitation infrastructure

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City-wise Status of Sewage Generation and Sanitation Infrastructure

Population size	No. of Cities	Population (Million)	Total Households (HH)	Households with sewers	% of HH with sewer connection	Share of sewer HHs	Share of non-sewered HHs
Million Plus (1 million above population)	46	116.56	24,708,210	15,574,765	63%	60%	17%
Class I cities (more than 1,00,000 population)	458	111.18	22,958,005	6,399,441	28%	25%	31%
Class II Cities (50,000- 99,000 population)	607	41.46	8,635,358	1,417,061	16%	5%	14%
Class III Cities (20,000-49,000 population)	1,904	58.15	12,039,395	1,447,175	12%	6%	20%
Class IV, V, VI cities	4,911	49.65	10,543,164	938,185	9%	4%	18%
Total	7926	377	78,884,132	25,776,627	33%	100%	100%

- High growth centres
- High Density
- Land availability concerns
- Lock-in infrastructure & investments
- Limited scope for Alternatives

- Low density
- Land is available
- Great scope for Alternatives
- E.g. Alibag

Alternatives??

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Nature-Based Solutions

Benefits:

- Climate mitigation (reduced GHGs and enhanced carbon storage)
- Reduction of major climate risks
  - Stormwater and sewer overflow
    - Extreme heat
    - Drought
    - Water Pollution
- More resilient infrastructure to external and internal shocks
- Strengthening adaptive capacity
- Increased Water Storage and recycling
- Recreational opportunities and access
- Local biodiversity support
- local Community development and economic revitalization

Policy Environment

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- Development and growth is seen essential for resilience to climate change
- WaSH infrastructure services considered critical for resilience
- WaSH framing
  - Adaptation : rooted in water scarcity and access to services
    - Renewed focus on water efficiency and wastewater recycling and reuse
  - Mitigation : rooted in energy self- sufficiency
    - Focus on energy efficiency in water cycle and renewable energy use
- Adaptation - Mitigation interconnectedness needs attention
- Sectoral decision-making → Lack of Policy Coherence
- No policies on climate-proofing of future WaSH infrastructure and services

Way Forward

- Generate evidence for mainstreaming CC considerations into WaSH Policies
  - Modelled estimates of the complete emission profile for city-wide water and sanitation systems
  - Deepen understanding of climate change impacts on WaSH to generate future scenarios
  - Highlighting international best practices and cases
  - Life cycle assessment of conventional and alternative solutions
- Enabling policy environment for steering WaSH -energy- climate interlinkages into more sustainable configurations.
- Policy instruments to reward mitigation efforts within the WaSH sector
- Institutional arrangements facilitating interactions within and across inter-connected sectors
- Context-specific and actionable climate mitigation and adaptation strategies for towns
- Innovative financial models for WaSH from climate lens.

Thank You

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