The importance of interlinkages between blue-green-grey infrastructure in cities

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What is **blue-green-grey** infrastructure

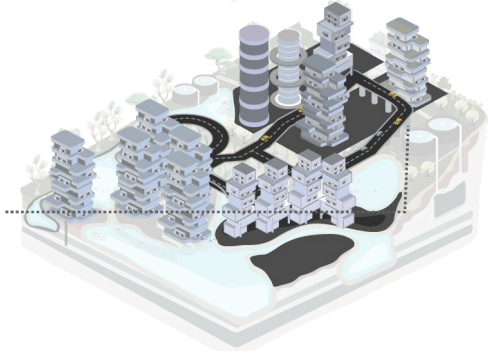
Blue infrastructure:
refers to water bodies:
-surface(like lakes, rivers, canals, ponds)
-and underground water(aquifers)

Blue infrastructure

Green infrastructure:
refers to trees, green roofs, green facades, gardens, parks, fields, forests, rain gardens, bioretention cells, swales etc.

Green infrastructure

Grey infrastructure:
refers to sewage treatment plants, pipeline network, stormwater channels, road network and buildings



Grey infrastructure

Currently material flows between blue-green-grey layers are ignored causing climate threats

POOR SEWAGE & WW MANAGEMENT

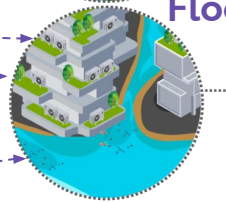
POOR WASTE MANAGEMENT

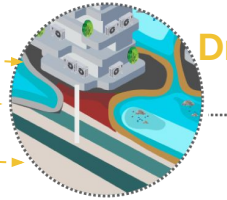
HIGH FRESH WATER USAGE

POOR BUILDING DESIGN & URBAN FORM

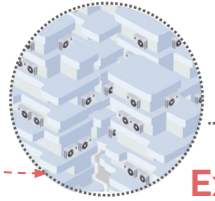
HIGH LEVELS OF AIR POLLUTANTS

Floods

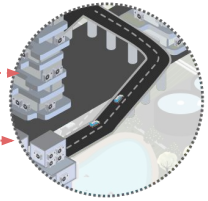


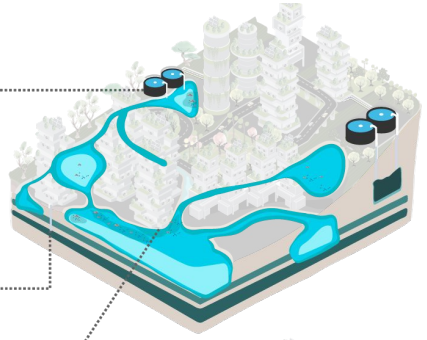


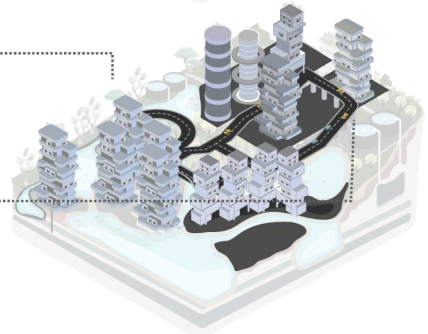
Droughts



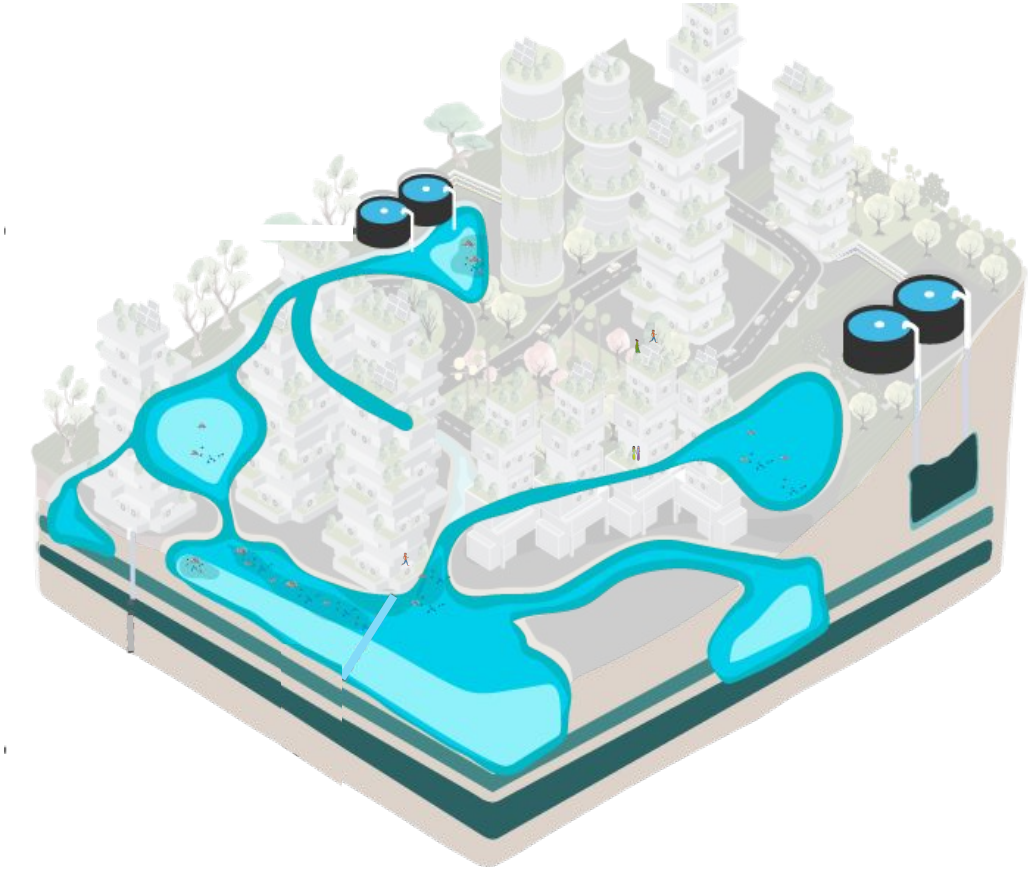
Extreme heat







Blue infrastructure solutions



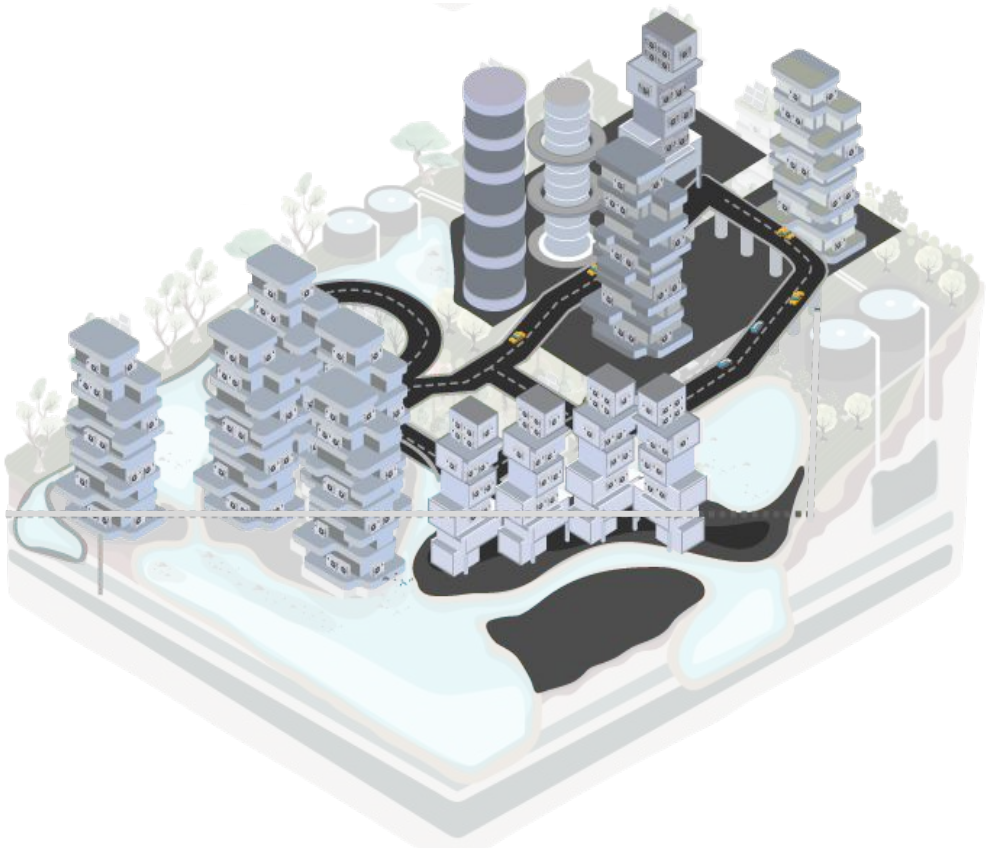
Green infrastructure solutions

INCREASE PRIVATE GARDENS & ROOFTOPS

RESTORE PARKS & FORESTS

CREATE GREEN SIDEWALKS, RAIN GARDENS & SWALES

Grey infrastructure solutions



BOOST WW REUSE & TREATMENT

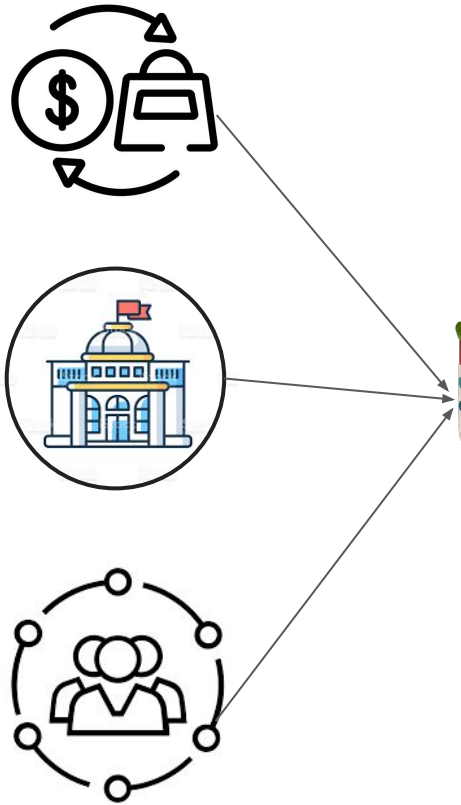
INCREASE PERMEABLE ROAD+PAVEMENT

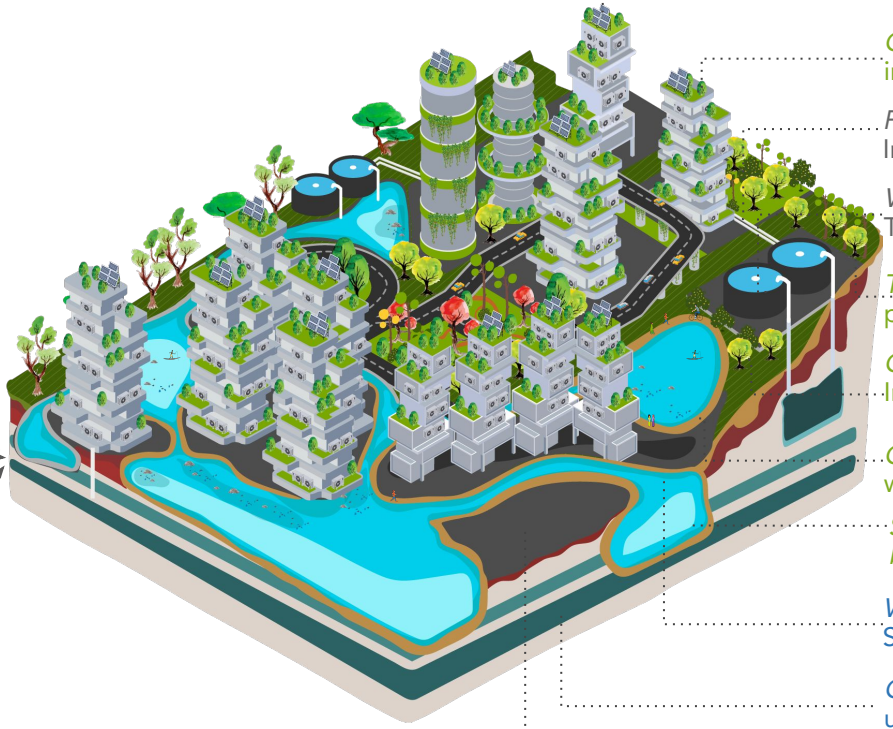
IMPROVE SOLID WASTE MANAGEMENT

IMPROVE PIPELINES/ STORMWATER DRAINS

MAKE BUILDINGS CLIMATE RESPONSIVE

What could planning for material flows between the layers look like?





Climate responsive buildings:
Reduce energy consumption

Green roofs and facades:
improve internal temperatures

Pipeline network:
Improves water supply

WW treatment technology(STPs):
Treats sewage & reclaims water

Treescapes: Boost air quality, and provide ecosystem services

Green cover:
Increases groundwater infiltration

Green Sidewalks: Increases walkability reducing vehicle usage

Swales, Infiltration trenches & bioretention cells: Stores rainwater

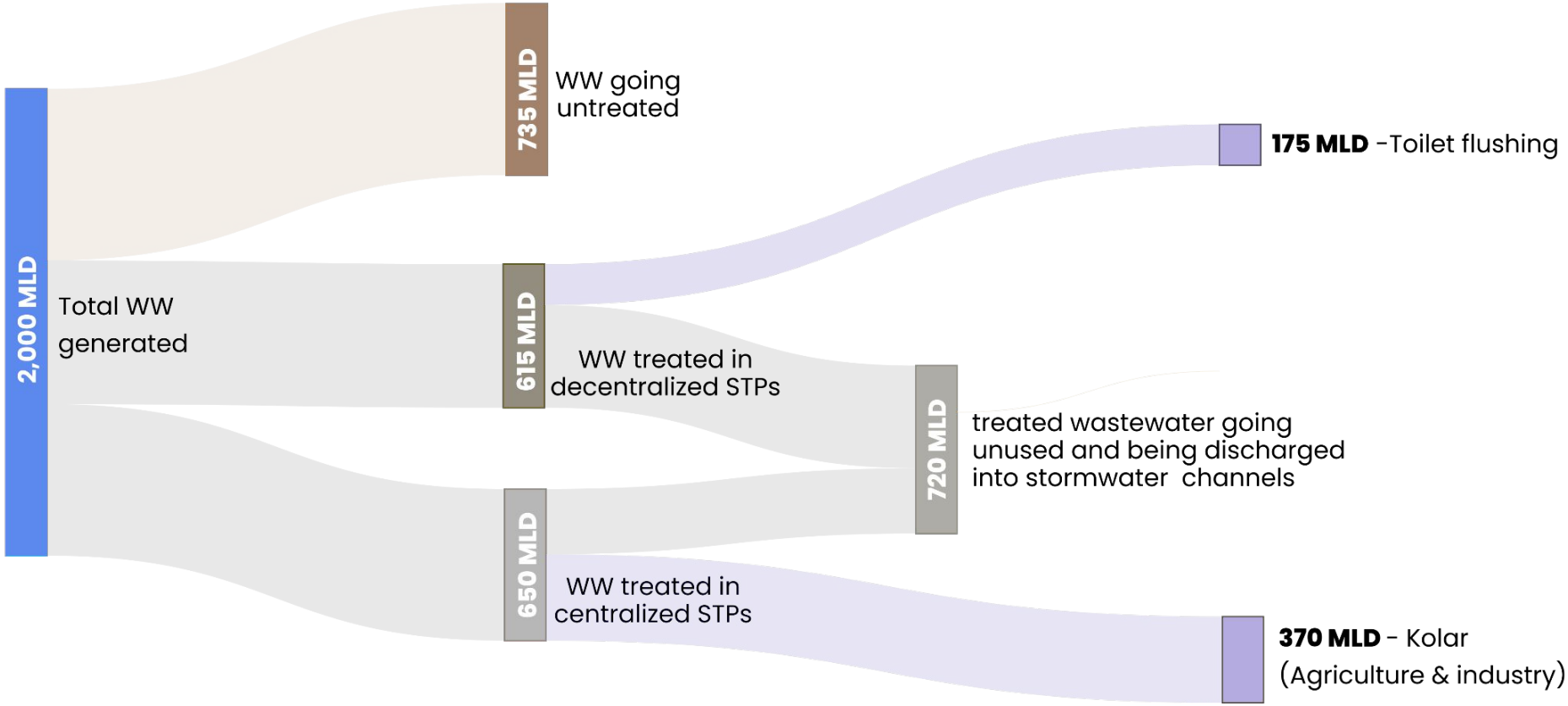
Water bodies and waterways :
Store excess rainwater for reuse

Groundwater aquifers: Recharged using rainwater and treated WW

Permeable roads & pavements:
Increases groundwater infiltration

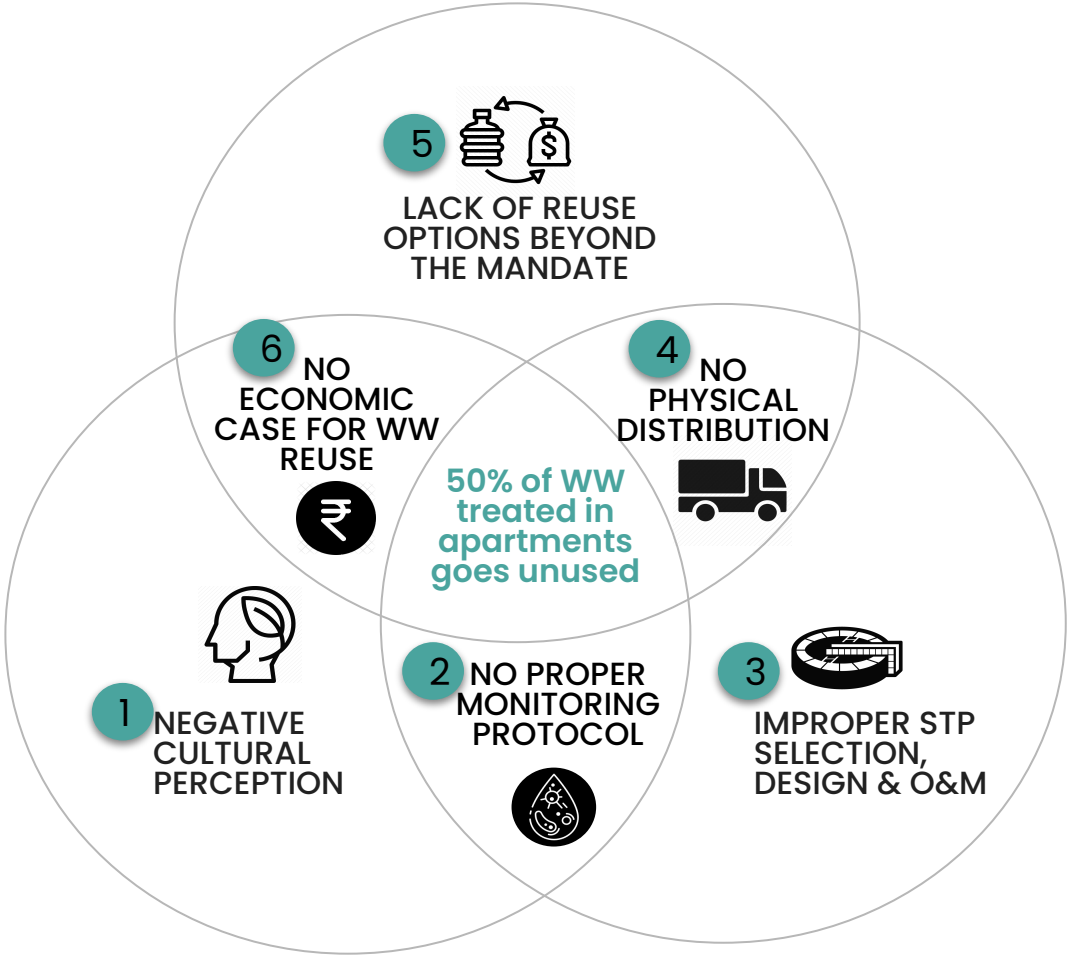
How to apply the idea of planning for material flows between blue-green-grey layers when they have been previously ignored

Sankey diagram showing current flow of wastewater in Bengaluru



Sewage and wastewater flows into lakes causing environmental degradation

We uncovered six reasons for why WW is going unused

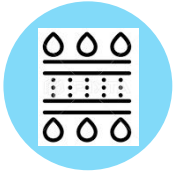


How could wastewater become a valuable resource?

GREY to GREEN

- Parks, medians, road side greening
- Private green spaces
- Urban farms & Large nurseries

GREY to BLUE



- Recharging aquifers
- Recharging water bodies

GREY to YELLOW

- Building construction
- Road laying
- Brick manufacturing
- Floor washing in small scale industries
- Textile industry
- Cooling towers

Network of Partners

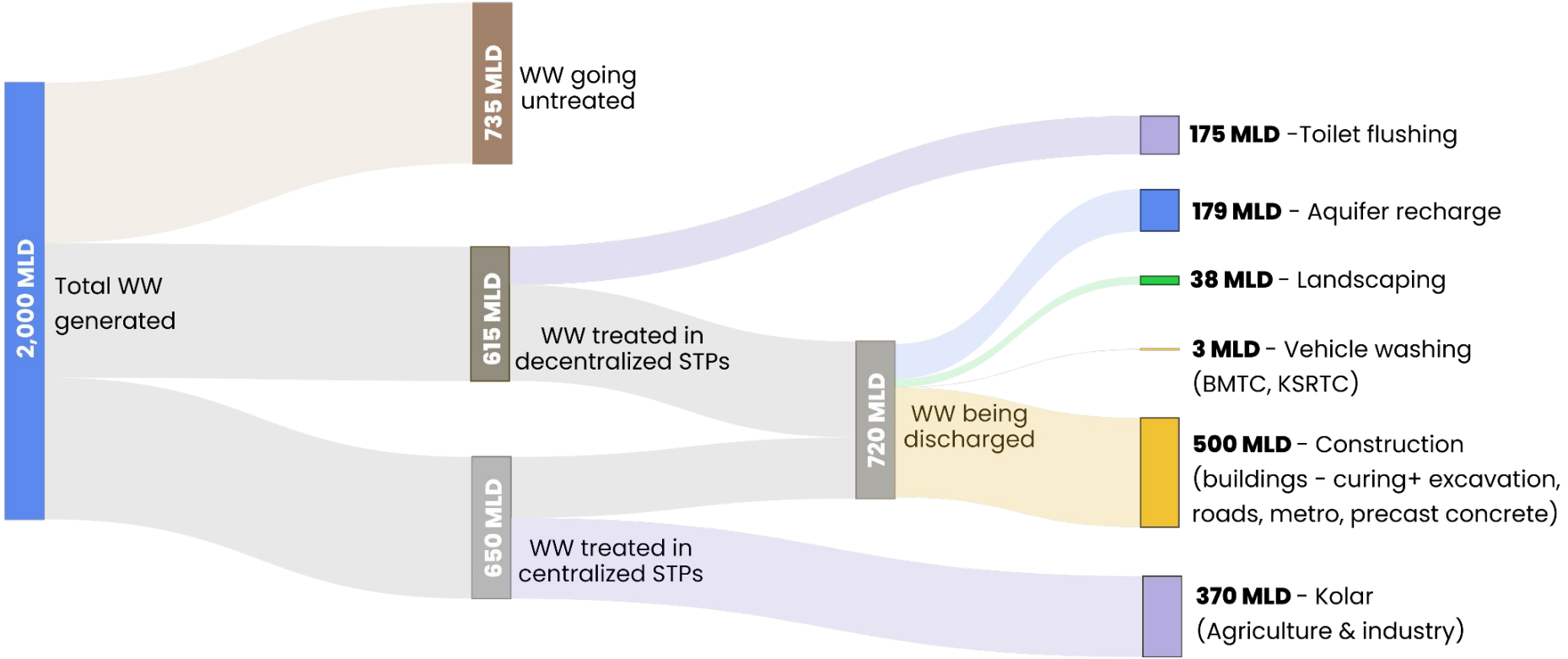
INFLUENCER

DECISION MAKER

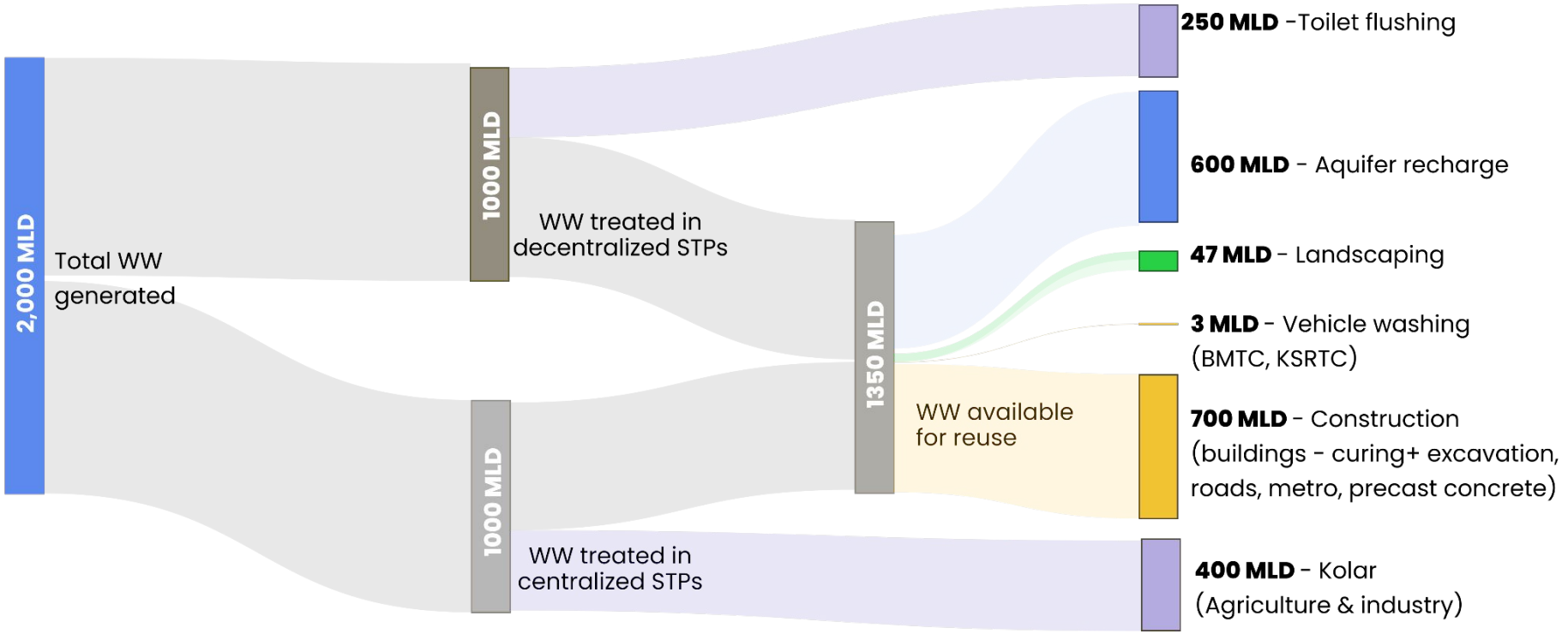
REGULATOR

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ
Karnataka State Pollution Control Board

Sankey diagram showing flow of water in Bengaluru if currently treated wastewater is reused



Sankey diagram showing flow of wastewater in Bengaluru if ALL sewage is treated and the wastewater is reused



Thanks!

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