UN Water Conference

Resilient and Inclusive Sanitation in combatting Climate Change Events and Extremities

21 MARCH 2023
Virtual Side Event
MODERATORS

Dr. Sudipti Arora
IWA – Grundfos YWP Fellow

Dr. Virginia Newton-Lewis
Director of Water Sustainability
Grundfos
Introduction and setting the context

Prof. Kalanithy Vairavamoorthy
Executive Director, IWA
Sanitation - a catalyst for climate action & sustainable development!

Dr. Arne Panesar
Sustainable Sanitation Alliance, Germany
**Contribution to global GHG emissions:**

2-6 % CH₄ + 1-3 % of N₂O

**Potential of sustainable and climate-resilient sanitation:**

- Reduced methane and nitrous oxide emissions through adequate wastewater / faecal sludge management
- Production of clean energy (e.g. biogas)
- Low-emission alternatives to chemical fertilisers and irrigation water
- Nature-based solutions (e.g. constructed wetland)
- **Carbon sinks** (e.g. faecal sludge based biochar)
- Less system failures → more sanitation coverage
Sanitation must be seen as a catalyst for climate action & sustainable development rather than an obstacle.
The concept of Sanitation Sensitive Design to deal with climate change effects and extremities

Jay Bhagwan
Water Research Commission, South Africa
Chair of the IWA NSS SG
Binary engineering approach

- Water supply and sanitation is no more an integrated approach in the modern world
- Water supply designed to feed the hunger an unsustainable drainage system, we have to go further and further away from the catchment to find water
- The drainage systems require large amounts of water for transporting human wastes over long distances for treatment.
- LOCK-IN TO THIS TECHNOLOGY
- A water crisis is actually a "Sanitation Crisis"

200 to 400 L per capita per day to pollution
Sanitation Sensitive Design the disruptor

Conventional Sanitation Planning

Sanitation Sensitive Design

Industry driven model

KEY ELEMENTS OF SSD
- ALIGNS TO WATER SENSITIVE DESIGN PRINCIPLES
- INTEGRATES WATER AND SANITATION PLANNING
- OFFERS EQUITABLE SERVICE
- HUMAN WASTE AS A RESOURCE
- MANAGES ENVIRONMENTAL POLLUTION
- OFFERS RIGHT TO ACCESS
- CREATES A NEW SANITATION MARKET AND ECONOMY
- ALIGNED TO TECHNOLOGY DISRUPTION – NON-SEWERED AND OFFGRID SOLUTIONS (GREEN)
- NEW BEHAVIOURS
The NEW NSS EFFECT - SANITATION SECURITY

Cumulative socio-political drivers:
- Water supply access & security
- Public health protection
- Flood protection
- Social amenity & environmental protection
- Limits on natural resources
- Intergenerational equity & resilience to climate change

Service delivery functions:
- Water Supply City
  - Supply hydraulics
- Sewered City
  - Separate sewage schemes
- Drained City
  - Drainage channelisation
- Waterways City
  - Point & diffuse source pollution management
- Water Cycle City
  - Diverse, fit for purpose sources & conservation, promoting waterway protection
- Water Sensitive City
  - Adaptive, multifunctional infrastructure & urban design reinforcing water sensitive behaviours
Inclusive and Resilient Water and Sanitation in Hill Cities

Hitesh Vaidya
National Institute of Urban Affairs, India
Forum for Inclusive and Resilient Water and Sanitation in Hill Cities

Background

The rapid and unplanned urbanization in the Himalayan region has perturbed the hydrological regimes of watersheds and reduced groundwater recharge in the area. This has led to the climate crisis which further has impacted the provision of essential services such as water and sanitation, in an already stressed municipal system.

For the past 4 years, NIUA has been working in one the Himalayan state of Uttarakhand enabling citywide inclusive sanitation
Forum for Inclusive and Resilient Water and Sanitation in Hill Cities

Aim to Constitute the Forum:

- To have a collaborative and responsive forum that provide a platform for Hill Cities to engage actively with each other, states and the central government
- To help in developing and implementing contextual policy, technological, governance and financial solutions

**PILLARS OF THE FORUM**

**Knowledge Sharing**
- National and international networking
- Thematic workshops
- Network of technical experts
- Publication of local practises

**Capacity Building**
- Thematic trainings
- Twinning cum exposure programs of practitioners with national and international cities
- Collaboration with academia

**Advisory Support**
- Access to wide range of experts
- Facilitate conversations with central ministries and think tanks
- Support in formulation of policies, bye-laws etc.

*The forum will be driven by key stakeholders of these Hill Cities and Towns – commissioners, mayors, NGOs, etc*

The Forum is timely, as UN-SDG recognizes this decade as the ‘Decade for Action’, and an explicit reference to “Human rights to a clean, healthy, and sustainable environment” in
Climate hazards, impacts and adaptation - developing resilient sanitation systems

Prof. Juliet Willetts
University of Technology Sydney
Findings from research in 4 cities in Indonesia:

- Water shortages: >50% people lost access to toilets multiple times per month, >30% returned to open defecation
- Floods: Inundate unsealed systems, cause pathogen exposure
- Poor quality sanitation showed highest impacts
- High rates of discomfort and distress, particularly for women and disadvantaged groups

[Link to UNICEF report]

Adaptation actions - Framework for climate resilient sanitation system

1. INSTITUTIONS, POLICY AND PLANNING
   - Policy integration of climate and sanitation
   - Risk- and vulnerability- informed planning and wider urban development links
   - Leadership and political will
   - Institutional responsibilities

2. FINANCE
   - Financing along the sanitation chain (households, service providers, city governments) for:
     - Preventive/adaptation measures
     - Disaster response

3. INFRASTRUCTURE AND SERVICE PROVISION
   - Robust or repairable sanitation infrastructure
   - Responsiveness and flexibility in service delivery and treatment operations
   - Integration across urban water cycle, including drainage
   - Monitoring for continual adaptation

4. USERS
   - User engagement, awareness and capacity to cope and adapt
   - Disaster response and support

UTS-ISF (2022) Landscape report on climate change and urban sanitation: Views of >60 organisations
Climate Change, Sanitation, and Public Health Risks

Suraja Raj
Emory University, USA
Fig 1. SaniPath Tool Pathways

- Street Food
- Drinking Water
- Surface Waters
- Raw Produce
- Open Drains
- Bathing Water
- Public Latrines
- Flood Water

Fig 2. Climate Change and Health Exposures

CLIMATE IMPACTS
- Increased temperatures
- Precipitation extremes
- Extreme weather events
- Sea level rise

ENVIRONMENTAL AND INSTITUTIONAL CONTEXT
- Land-use change
- Ecosystem change
- Infrastructure condition
- Geography
- Agricultural production and livestock use

EXPOSURE
- Extreme heat
- Poor air quality
- Reduced food and water quality
- Changes in infectious agents
- Population displacement

HEALTH OUTCOMES
- Heat-related illness
- Cardiopulmonary illness
- Food-, water-, and vector-borne disease
- Mental health consequences and stress

SOCIAL AND BEHAVIORAL CONTEXT
- Age and gender
- Race and ethnicity
- Poverty
- Housing and infrastructure
- Education
- Discrimination
- Access to care and community health infrastructure
- Preexisting health conditions
Fig 3. Total Fecal Exposure by 9 Pathways Across 9 Cities

Wang et al. 2022
Manila Water’s Climate Change Mitigation and Adaptation Strategies

Jennifer Vergara-Chan
Manila Water, Philippines
ESG COMMITMENTS TO 2025

ENVIRONMENT

Carbon Emission Reduction
60% reduction and avoidance through renewable energy and other initiatives

SOCIAL

Water Security
At least 15% Raw Water buffer

ECONOMIC

CAPEX
Building infrastructures sufficient to satisfy service improvements

ESG Programs and Projects

Decarbonization Strategy
Renewable Energy Initiatives
Watershed Management
Forest Carbon Capture

Capex Program
Vendor Management

New Water Sources
NRW Reduction
Watershed Protection and Reforestation
Tubig Para Sa Barangay
Environmental Advocacy
WASH, Lingap and CSR Programs
COVID Analysis in Wastewater

Philippine Nationally Determined Contribution to the Paris Agreement: Reduction and avoidance of greenhouse gas emissions of the country by 75% based on business as usual by 2030

NDC Wastewater Sector Strategy: Expansion of sewage and septage treatment to avoid methane emission (25x GWP) from septic tanks

Manila Water’s contribution: methane avoidance from aerobic wastewater treatment (sewage and septage)
On the Road to Net Zero

Hinulugang Taktak Sewage Treatment Plant

Mandaluyong West Sewage Treatment Plant

QC East Sewage Treatment Plant

Cardona Treatment Plant Solar

Balara Treatment Plant 2 (TP-2) Solar

Watershed Protection and Reforestation Phase 1

Installation of Small-Scale Solar

100% Sanitation and Sewer Services – Manila Concession

Continuing increase in supporting operations with RE

Energy Efficiency Initiatives

Greening the Supply Chain

Watershed Protection and Reforestation Phase 2

NET ZERO

Scope 1 and 2 Carbon Emissions

60% reduction and avoidance through renewable energy and wastewater treatment

20-25% Renewable Energy Purchase through RCOA

Future projects for MWSS and other regulatory bodies’ approval
Sanitation and climate resilience in Rio de Janeiro

Pericles S. Weber
Igua Saneamento, Brazil
Sanitation and climate resilience in Rio de Janeiro
Sanitation and climate resilience in Rio de Janeiro

The challenge diagnosis

- Direct impact on the life of more than 1 million inhabitants
- GHG emissions and loss of coastal area resilience
- Loss of marine biodiversity due to degradation of mangrove areas

Sewage released directly into the lagoons and sea, on a tourist beach

Siltation and eutrophication of Lagoons

Miscellaneous waste disposal
Sanitation and climate resilience in Rio de Janeiro

Our transformation actions

Combination of engineering projects and nature-based solutions promoting sanitation, public and environmental health: mitigation and adaptation options for strengthening climate resilience.

- Sediment removal from the bottom of the lagoons, recreating the natural exchange between the ocean and the lagoon system
- Removal of solid waste and prevention of new deposits
- Expansion of treatment capacity and efficiency at WWTP Barra da Tijuca
- Construction of combined sewerage systems for collecting sewage and directing it to the WWTP
- Creation and maintenance of a mangrove seedling nursery. More than 40,000 seedlings are already being planted in an area of 5,000m².
QUESTIONS TO PANELLISTS
Q and A

Yang Villa
IWA – Grundfos
YWP Fellow

Chelsea Hayward
IWA – Grundfos
YWP Fellow
Agenda

❖ Introduction of session and setting the context
❖ Panel Pitch
❖ Questions to Panelists
❖ Q & A with Participants
❖ Wrap up & Thanks

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