Online International Knowledge Conclave On Green Infrastructure’

17th December 2020

KALA VAIRAVAMOORTHY, Executive Director, IWA
Global Network for Water Professionals spanning the continuum of research and practice

10,000 members in 140 countries

50 Specialist Groups

17 Journals > 800 books

Biennial Congress with over 9000 participants

Over 30 conferences/year with over 50,000 participants

www.iwa-network.org

Leading edge technologies and best practices
IWA Engagement Platforms

Water Policy and Regulation

- 100+ regulators
  - International Regulators Forum
  - Working Group on public policy and regulation for resilience
  - Working Group on Public Participation

Water-Wise Cities

- 25+ cities
  - 100+ IWA members champion cities’ endorsements
  - Utilities and their cities rally urban stakeholders around a shared water vision

Basin-Connected Cities

- 50+ Contributing organisations
  - Action Agenda (launch 09/2018)
  - 12 action pathways
  - Utilities and cities share best practices

Smart Utilities

- 250+ Utilities
  - Climate Smart
  - High performing
  - Digital transformation
    - Utility Leaders Forums & Summits
    - Peer-to-peer exchange
    - 22+ Champions of Water-Wise Cities

250+ Utilities Climate Smart High performing Digital transformation

Inspiring change
Thought Leadership Areas

- Water Wise Cities
- Digital Water Programme
- Innovators Platform
- Nature for Water
- Climate Smart Utilities
- Coming soon…
  - Financing infrastructure to achieve the SDGs
  - Benefit transfer
Principles for water wise cities

1. Regenerative Water Services
   - Replenish Waterbodies and their Ecosystems

2. Water Sensitive Urban Design
   - Enable Regenerative Water
   - Select and Use Materials to Minimise Environmental Impact

3. Cities & Watershed Stewardship
   - Prepare for Extreme Events

4. Water Wise Communities
   - Empowered Citizens
   - Leaders that Engage and Engender Trust

5 Building Blocks:
- Vision
- Governance
- Knowledge & Capacity
- Planning Tools
- Implementation Tools
IWA Nature Based Solutions

Mobilizing Action Toward Nature-Based Solutions

- Promoting stronger connections between water utilities and regulatory bodies to integrate NBS in water utility operations
- Co-benefits of Nature-based Solutions for Water and Sanitation – development of guidance

What are the opportunities?

- Partner with IWA on developing guidance, projects, publications
- Contribute your case studies
- Join Task Group on Nature Based Solutions for Water and Sanitation
- Join the IWA Connect group on Nature-Based Solutions

Who to contact?
Katharine Cross Katharine.Cross@iwahq.org
https://iwa-network.org/projects/nature-for-water-and-sanitation/
C-GINS
Compendium of Green Infrastructure Network systems
https://www.cseindia.org/c-gins/home
status quo not an option
We require a change of culture and a level of leadership unprecedented in our history.

- Complexity in transitioning to integrated one water solutions
- Deep uncertainty associated with global change pressures
- Productive use of water
- Waste as resource (RRR)

We live in the ‘now’

Decisions need to be made today about our aging & outdated infrastructure.
changes in perspective
productive use of water & waste as a resource
Productive use - we need to have a systems perspective of the water cycle

- Surface water
- Groundwater
- Leakage management
- Stormwater/Rainwater
- Desalination
- Black water
- Grey water
- Demand management

Productive use - we need to have a systems perspective of the water cycle

- Surface water
- Groundwater
- Leakage management
- Stormwater/Rainwater
- Desalination
- Black water
- Grey water
- Demand management
Modelling allows us to connect all flows for productive uses – digital ledgers help
Exploring alternative urban water solutions to rapid population growth

Water demand will at least double until 2035.

NAIROBI
Typical solutions - import more water to meet growing needs

- Unit costs of **US$ 0.36/m³**

<table>
<thead>
<tr>
<th></th>
<th>Demand (2010)</th>
<th>Demand (2035)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New GW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New SW-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New SW-2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 637X10³ m³/d deficit
Need to consider non-conventional resources – a portfolio of options

- Unit costs of **US$ 0.31/m³** (cf. to 0.36)
Need to consider non-conventional resources – a portfolio of options

- Unit costs of **US$ 0.40/m³** (cf. to 0.36)

[Graph showing demand and unit costs]

openknowledge.worldbank.org/handle/10986/11964
Non-conventional water sources may be more energy intensive.
Natural systems can help reduce the energy foot-print.

- River Bank Filtration
  - $0.067/m³ (cf 0.28/m³)

- Lake Bank Filtration
  - $0.012 - 0.024 $/m³ (cf 0.05 - 0.15 $/m³)

- Dam

- Reservoir

- Ecohydrology

- Source Water Protection

- Water Treatment

- Water for Irrigation

- Primary Treatment and/or Constructed Wetlands, WSPs

- WW Treatment & Reuse

Low Energy – Water Efficient Closed Loop
Changing our perspective creates opportunity to do things differently

Energy: electric (microturbines)

Resource Recovery & Reuse (RRR)

Energy: Biogas, bioelec, biofuels, MFC

Energy: Heat, electric (microturbines)

Nutrients: P & N

Nutrients: P & N
changes in perspective
water management in an uncertain world
We are living in an uncertain world

- Uncertainty in storm events
- Uncertainty in demand
- Uncertainty in quantity & quality
- Uncertainty in pipe condition
- Uncertainty in energy
- Uncertainty in water allocation
We need adaptive/flexible smart systems for an uncertain world.
LID’s are modular in nature

- eco-treatment
- green roofs
- pervious pavement
- infiltration trench
- tree filters
- retention pond

LID’s provides modular diversity that increases flexibility resulting in a complex adaptive system

(Sieker et al., 2008, Eckart, 2008)
LID’s provide adaptive capacity
LID’s performance better against diverse future scenarios = higher flexibility

Case Study: Kupferzell Germany

Eckart, Sieker, Vairavamoorthy (2010)
changes in perspective

we’re dealing with a system of systems
It’s ok to optimize at sub-system level
It’s ok to optimize at sub-system level
But we need to recognize that we’re dealing with a ‘system of systems’
We need to reset the default value in terms of what is a sustainable water utility

- **Reward** increased *water use efficiency, resource use efficiency, extraction of value from waste* streams
- **Promote** systems that are more *integrated, hybrid grey & green, multi-use & multi-functional, distributed*
- **Encourage** approaches and solutions that are *flexible* and offer increased levels of *immunity to hydrologic cycle*
- **Embed** these concepts into *institutional strengthening and capacity building*
- **Support champions** who are creating & implementing these types of systems – *share success stories with others*
Choices Before Us

- Stay in Lane
  - Business as Usual
- Try Harder
  - Spend More for Traditional Sys
- Paradigm Shift
  - Truly Different Approach
Thank you!

Follow @IWAHQ on Twitter and share your urban water vision using #WaterWiseCities

IWA-Connect Group: Cities of the Future

www.iwa-network.org