

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.



The adoption of Circular Economy and its effects on Water

IWMI experience from different regions

Dr. Josiane Nikiema

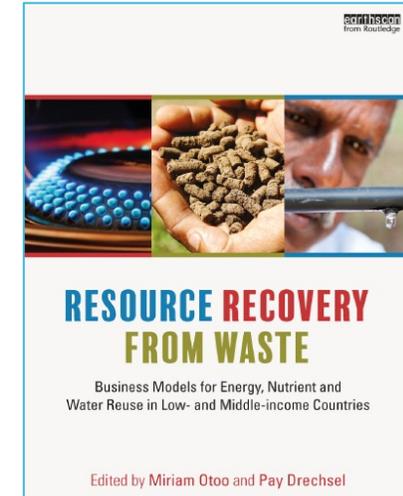
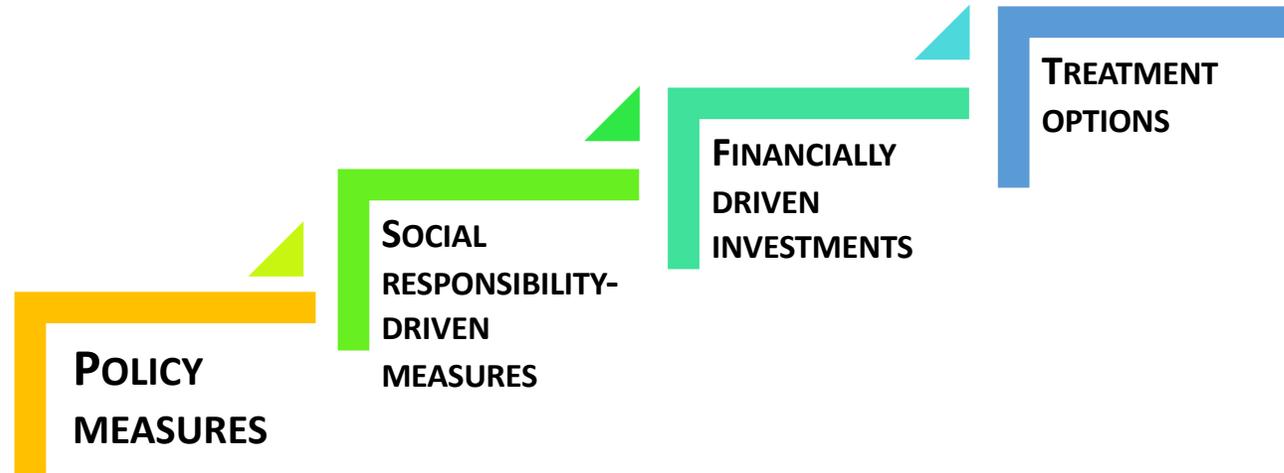
j.nikiema@cgiar.org

Innovative water solutions for sustainable development

Food · Climate · Growth

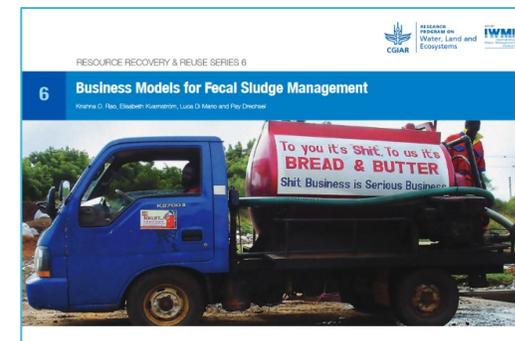
IWMI's work on circular economy

1. Sustainable solutions to waste management



2. Technologies and processes for consumption and use

3. We have developed 20 business models for waste management



RESEARCH PROGRAM ON
Water, Land and
Ecosystems



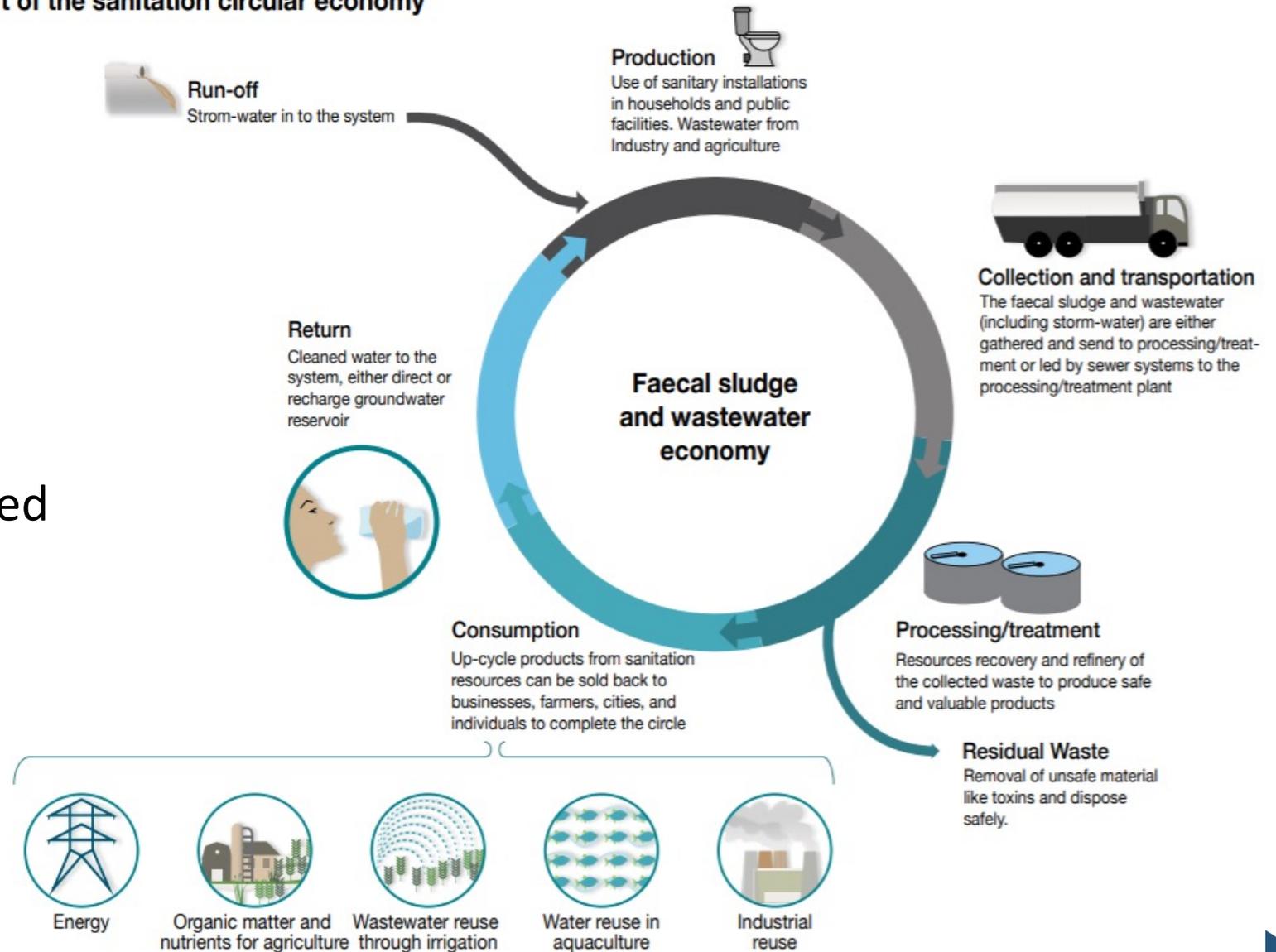
International Water
Management Institute

CE – Models with multiple benefits

One key challenge: financial sustainability, even when the economic viability is established

Successful cases are still rare, small scale initiatives, sometimes unintentional

A part of the sanitation circular economy

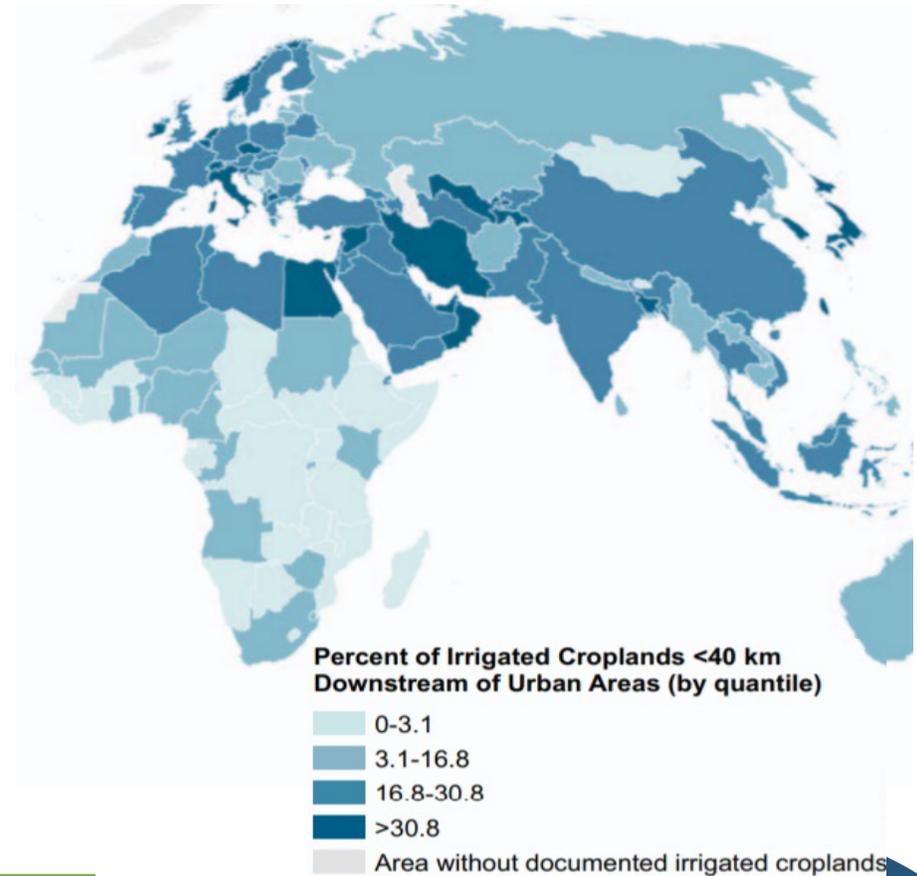


1. Effect of reuse on water availability: Example 1

Water reuse in urban/peri-urban farms - **Global**

High volumes of wastewater are released to surface waters with little or no treatment

- 65% (35.9 Mha) of downstream irrigated croplands in catchments with high levels of dependence on urban wastewater flows.
 - *Home to 1.37 billion urban residents.*
- 29.3 Mha of croplands - in countries with low levels of wastewater
 - *Home to 885 million urban residents.*



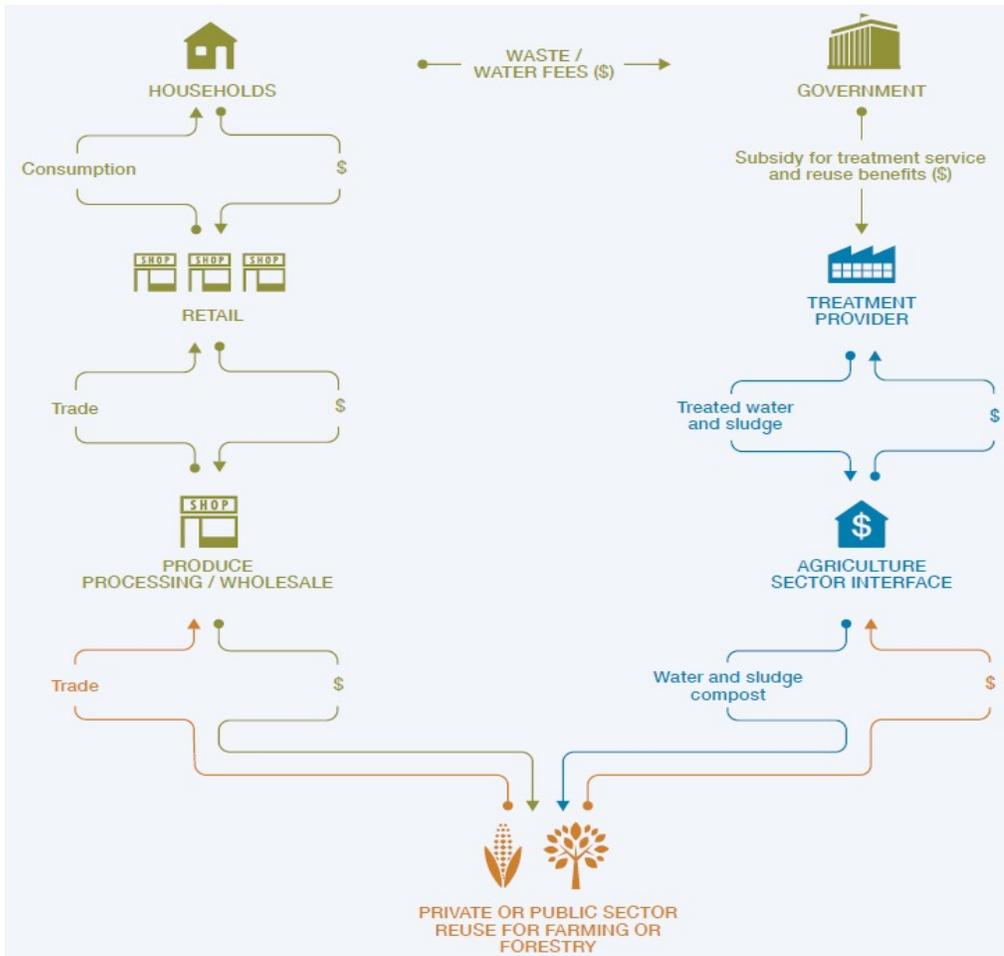
Safe water reuse plays a key role in meeting the water and food needs of the growing global population.

The main issue: mitigate health risks



What incentives to provide farmers and the various key players to adopt the necessary safety measures?

2. Reduces dependence on fresh water: Conventional schemes (e.g. India)



- Urban local bodies are not obliged to treat water beyond secondary level in India
 - Our work: Derive the tariffs for financial sustainability of the system
- Two cities considered: Solapur and Vijayawada
 - Both these cities had existing treatment facilities, however the treated water is not suitable for agricultural and industrial use
 - Proposed tertiary treatment facility in addition to the existing system – Sand Filtration and Reverse Osmosis

Results from the financial modelling

Tariffs (USD) derived for sustainability - Solapur and Vijayawada

Basic tertiary technology: e.g. Sequencing Batch Reactor + Sand Filtration

Agriculture	7 cents/m ³
-------------	------------------------

Industries	20-25 cents/m ³
------------	----------------------------

Advanced tertiary technology: e.g. Sequencing Batch Reactor + Reverse Osmosis)

Agriculture	7 cents/m ³
-------------	------------------------

Industries	30-35 cents/m ³
------------	----------------------------

Assumptions for the financial model

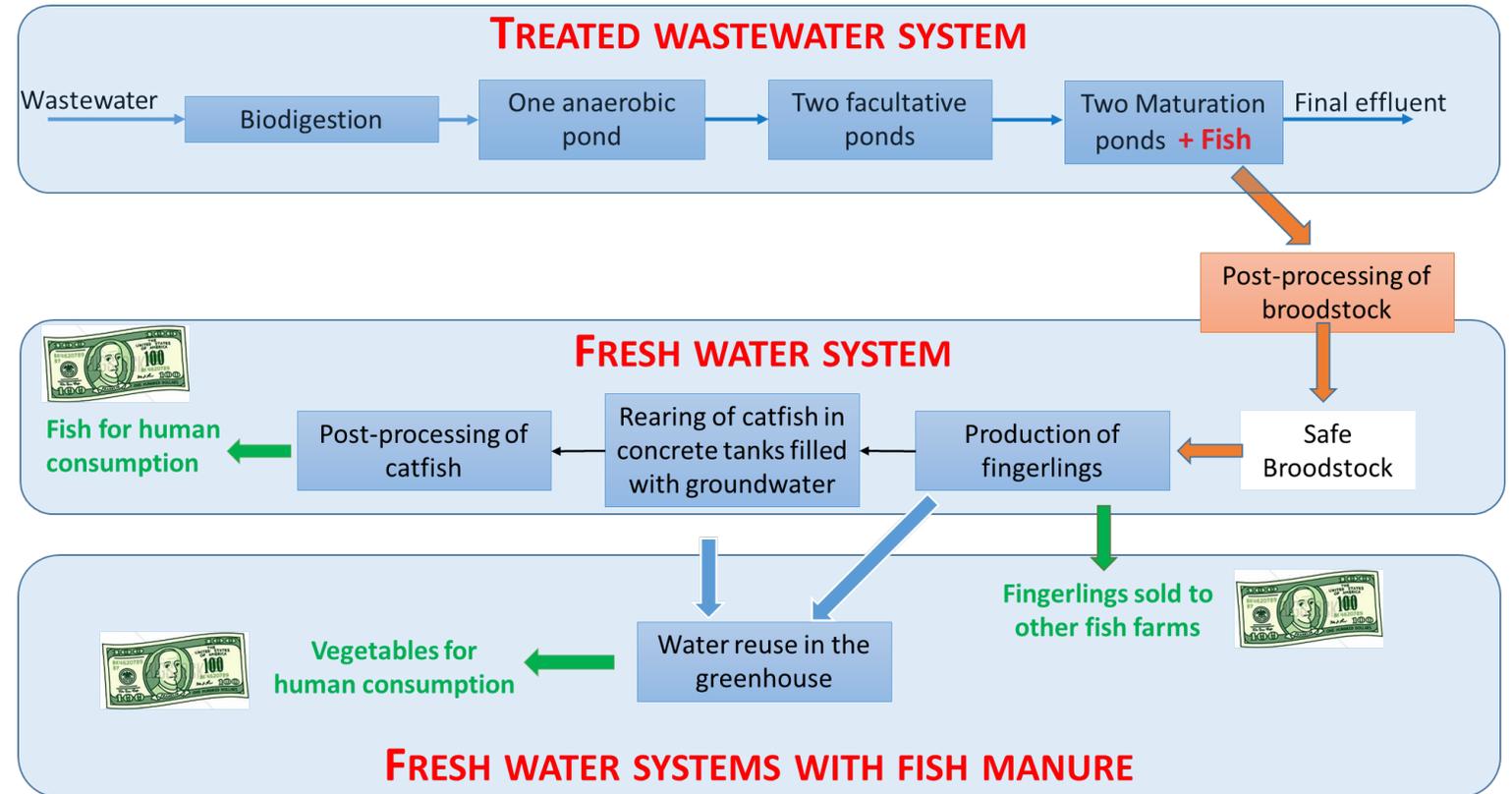
- Treated water channeled through pipeline to industry, and existing canal for agriculture
 - 5% reused by industry in year 1, which will steadily increase to 50% after ten years
 - About 45% adoption by agriculture

Tariff imposed for industrial use will subsidize reuse for agriculture

3. Reuse in aquaculture and irrigation (e.g. in Ghana)

- Producing broodstock and fingerling to ensure social acceptance of the model
- Only domestic wastewater is used in this case

Some variants were in operation in Bangladesh, producing fish feed (duckweed, protein), fish and fruits



- Can achieve OPEX and CAPEX recovery
- Strong potential unless **land is in short supply**.
- Compliance with health safety protocols important.

Lessons learnt, but more to do!

Cost recovery

Social behaviour

Policy environment and
capacities

Process and
Technological
constraints

1. Uncertain investment climate
2. Gender, diversity and inclusion
3. Cross-sectoral linkages with other sectors
4. Future safety concerns



International Water
Management Institute

Contact:

Dr. Josiane Nikiema

j.nikiema@cgiar.org

Innovative water solutions for sustainable development

Food · Climate · Growth

