

# A Circular Economy for Sustainable Water and Sanitation Management in Developing Countries

Dr. Miriam Otoo  
Tetra Tech ARD, Washington D.C.

# Challenges



## ACCELERATING URBANIZATION

---

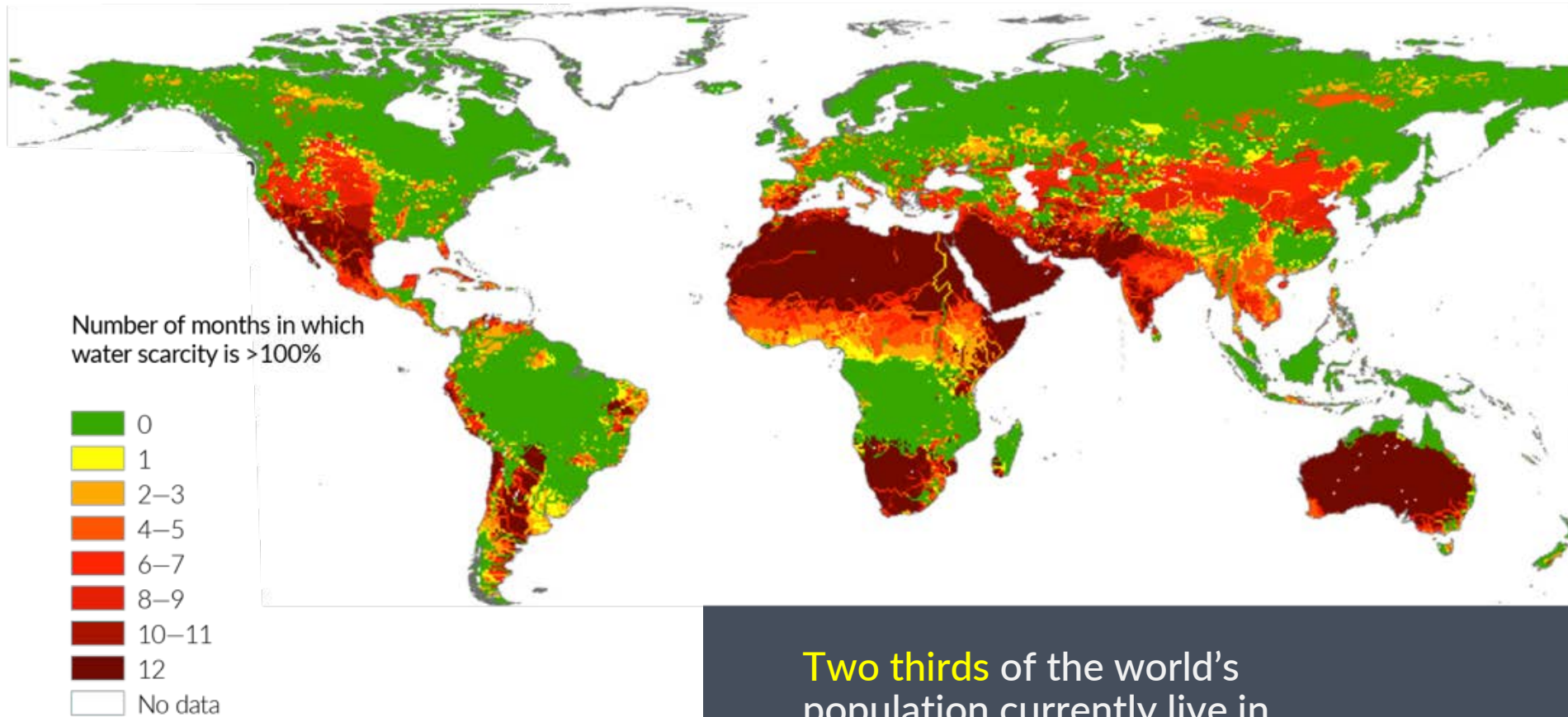
Additional 2.3 billion people  
living in cities by 2050

## INCREASING WATER SCARCITY

---

Climate change will  
intensify the frequency  
and gravity of floods  
and droughts

# Water Scarcity



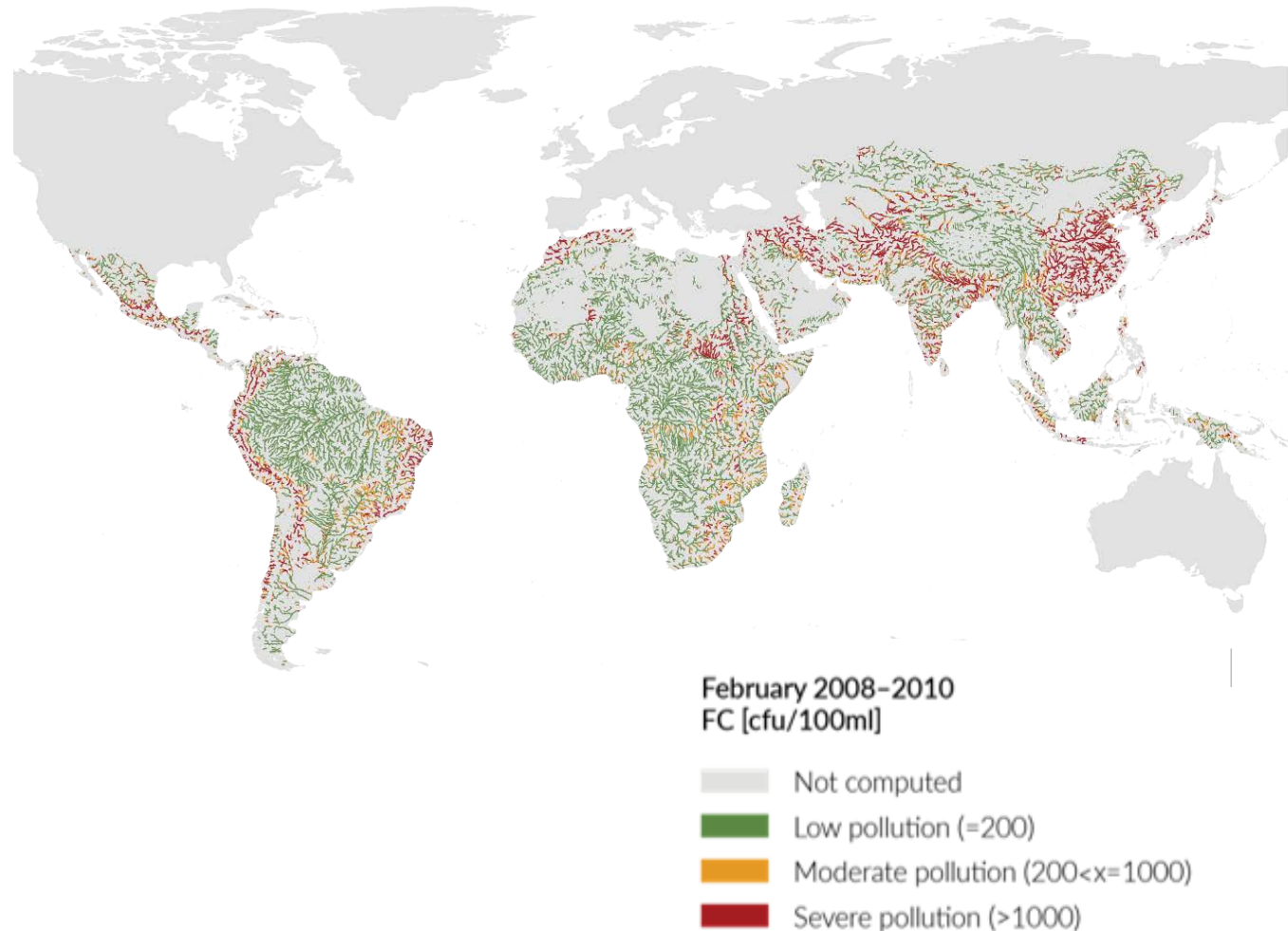
**Two thirds** of the world's population currently live in areas that experience water scarcity for at least one month a year

Source: Mekonnen and Hoekstra (2016)  
From WWDP 2017

# Water Quality Degradation...

## Degradation of water quality

Severe pathogen pollution affects around **one-third** of all rivers in Latin America, Africa and Asia, putting the health of millions of people at risk



© CESR, University of Kassel, April 2016, WaterGAP3.1

Source: UNEP (2016) in WWDR 2017

# Inexistent and malfunctioning WWTPs!



# Severe water and land pollution



# Severe water and land pollution.




# CE opportunities for sustainable water and sanitation management.

Waste(water)'s vast potential as a source of water, energy, nutrients, biosolids, animal feed, etc. which remains **underexploited, or only used informally**





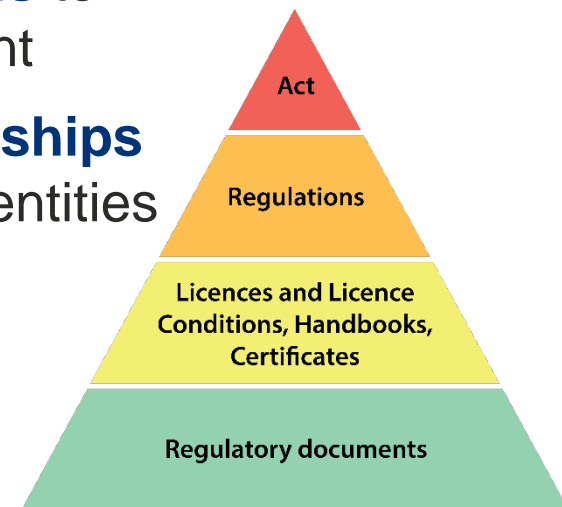


Why don't we see CE innovations at scale to address some of the direst water challenges?

# Scaling CE innovations requires much more than the technology!



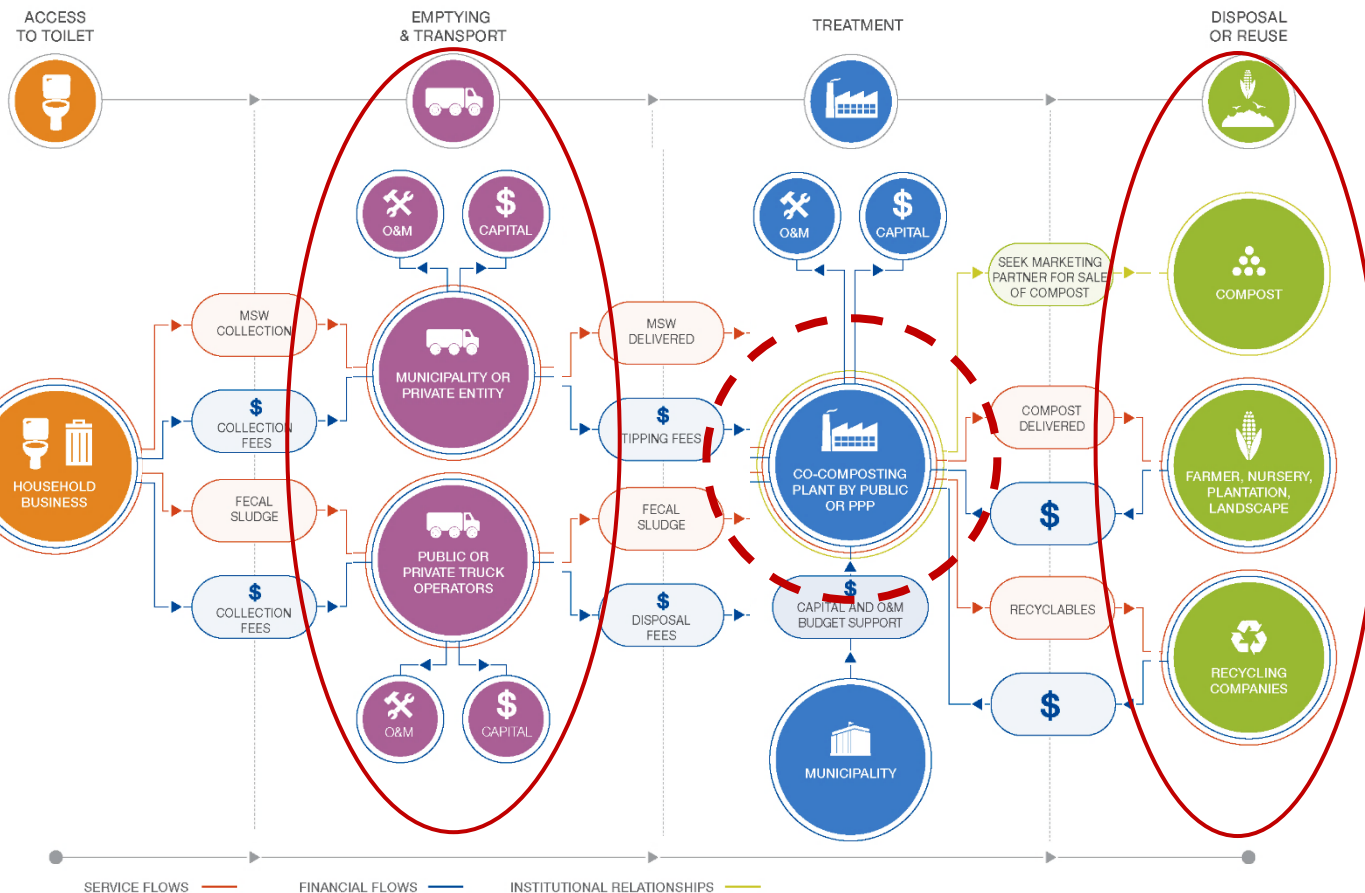
- Understanding and supporting the development of an enabling environment:
  - Innovation development devoid of **business modeling**
  - Missing **legal and regulatory framework**
  - Limited **financial and economic info** and appropriate **financing mechanisms** to incentivize private sector investment
  - Unclear **opportunities for partnerships** between public and private sector entities



# Case 1: Nutrient Recovery for Sustainable Sanitation in Ghana.



## SANITATION SERVICE CHAIN



## IWMI-BMGF Fortifer Project

- CE exists within a broader sanitation value chain.
- **Business Model:** PPP, Revenue – tipping/ disposal fees, CE
- **Partnerships:** E/T and Treatment, Financing, Marketing & Distribution
- **Legal framework:** Policy for FS use, Subsidy program
- **Technology:** Drying beds, Ponds and Windrow composting

## Case 2: Energy recovery for improved livelihoods in emergency contexts in E. Africa



- **Scale:** Wide range (<1T/ year to 100T/ day)
- **Strong market:** Low to middle income households
- **Legal framework:** Policy to address deforestation and strong enforcement
- **Low start-up capital:** Easy market entry and great opportunity for women and youth
- **Financial viability:** Strong and positive RoI
- **High replication and scaling potential**

# Scaling CE innovations will require more action research...

## Circular Economy research

---

## Huge data and definition challenges

- What **financing mechanisms** truly work for CE? Is there potential for blended financing options?
- What are the **legal and regulatory frameworks, decision support tools** that support sustainable and equitable CE models?
- Can we truly **reverse the economics of sanitation** with integration of circular economy innovations?
- CE interventions are ‘economically’ viable. Are they **financially viable** to attract private sector investment?

# ...and much more!

- **Actual implementation** to complement ‘action’ research
- **Build capacity and knowledge:**
  - Generate employment opportunities
  - Promote policies and public investment for green growth.
- **Raise public acceptance and social awareness:**
  - Account for dynamics of social acceptance.
  - Go beyond informational campaigns and increase public participation to build trust.
- **Support development of regulatory frameworks.**

**Thank you.**

Dr. Miriam Otoo, Tetra Tech  
[miriam.otoo@tetratech.com](mailto:miriam.otoo@tetratech.com)

Dr. Pay Drechsel, IWMI  
[p.drechsel@cgiar.org](mailto:p.drechsel@cgiar.org)

