Onsite water demand management in response to water scarcity in MENA: Community based treatment and reuse of greywater

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- Situate GW in Water Demand Management tools and practices
- Review the experience of IDRC funded projects in MENA
- Assess the potential and limitations of TGWR in the context of marginal communities in MENA
- Concluding remarks
- What prospects for Research Development

What is WDM about

- *Beyond economic and technological tools (water valuation, loss and leakage reduction),*

- *WDM is about freshwater physical saving through the body of interventions and organization systems that societies and their governments implement to increase technical, economic, social, institutional and environmental efficiency in water management.*

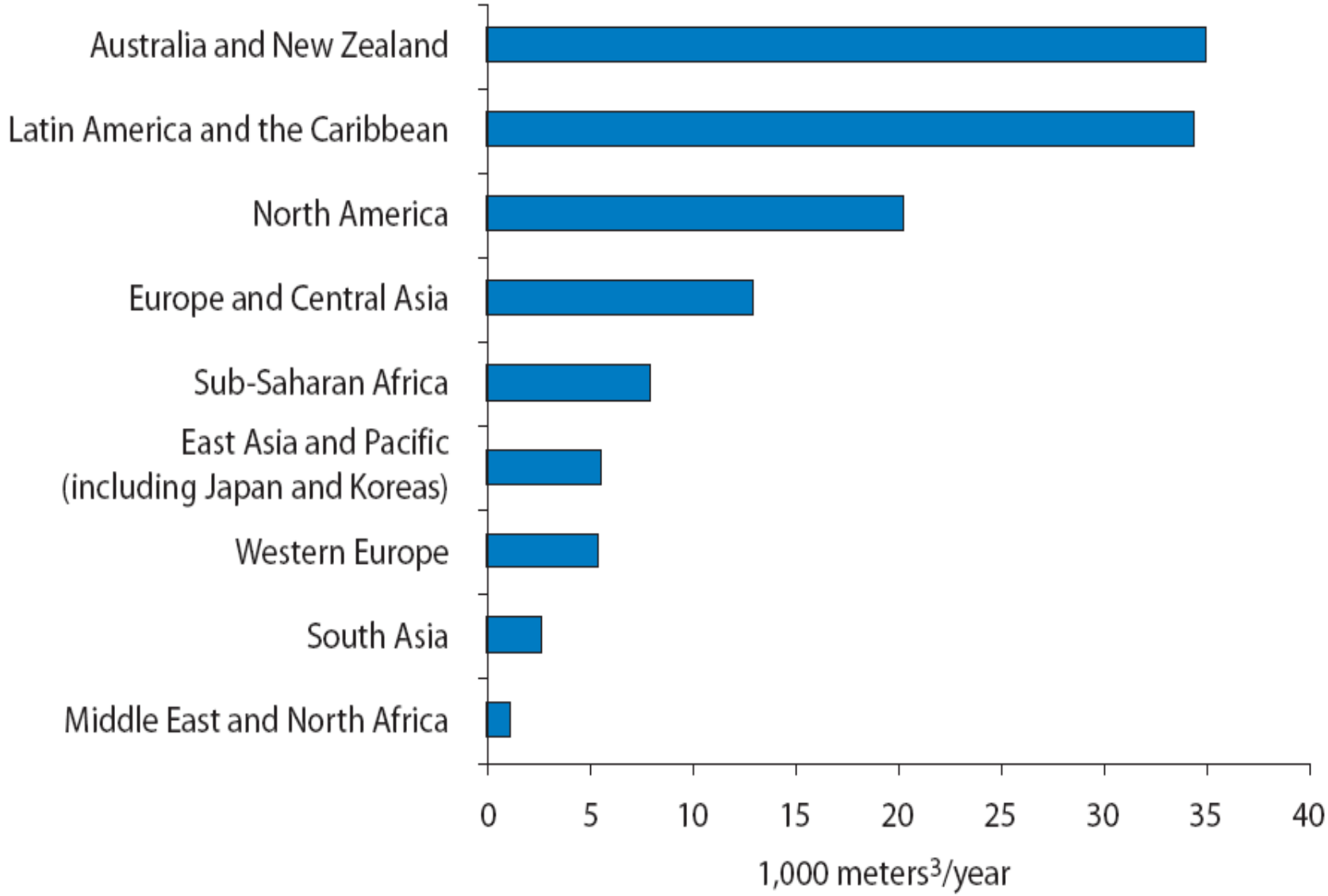
Instrumental

- *Reducing the quantity or quality of water required to accomplish a specific task*
- *adjusting the nature of the task or the way it is undertaken so that it can be accomplished with less water or with less quality water;*
- *reducing the loss in quantity or quality of water as it flows from source through use to disposal;*
- *Shifting the timing in use from peak to off-peak periods;*
- *Increasing the ability of the water system to continue to serve society during times when water is in short supply.*
- Ensuring equity in costs associated with and benefits resulting from

Why Water demand management in MENA

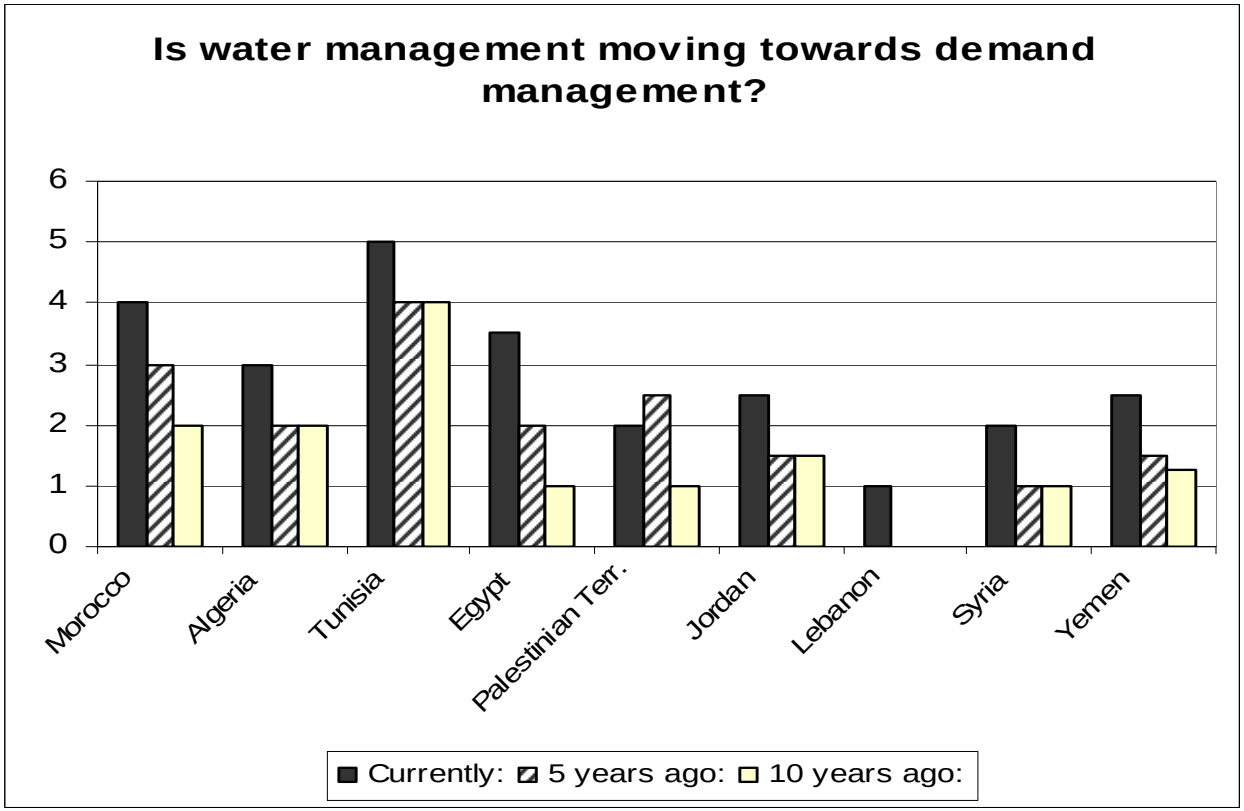
- A strategic element to respond to water scarcity, poverty alleviation and the upcoming challenges of climate change and global market
- Supply management has come to limits in most countries, expensive
- Depletion of water quality that is affecting the GDP (0.4 to 1.4)
- A way to ensure water use efficiency, social equity and environment sustainability

Actual Renewable Freshwater Resources per Capita, by Region



Source: FAO AQUASTAT.

Note: These data do not indicate what share of these resources is exploitable at acceptable cost. The definition of "region" makes a big differ-


Is water management moving towards demand management?
6
5
4
3
2
1
0
Morocco
Algeria
Tunisia
Egypt
Palestinian Terr.
Jordan
Lebanon
Syria
Yemen
Currently:
5 years ago:
10 years ago:

How are we promoting WDM

- Applied research funding (Projects in 15 countries) (Wastewater, greywater, saline water reuse, public awareness, local/decentralized management of groundwater)
- Capacity building (Research, practitioners, policymakers)
- Regional networking

Assumption

- Use of water from bathrooms, laundry, dish and cloth washing machines is a practice that could alleviate pressure on freshwater resources

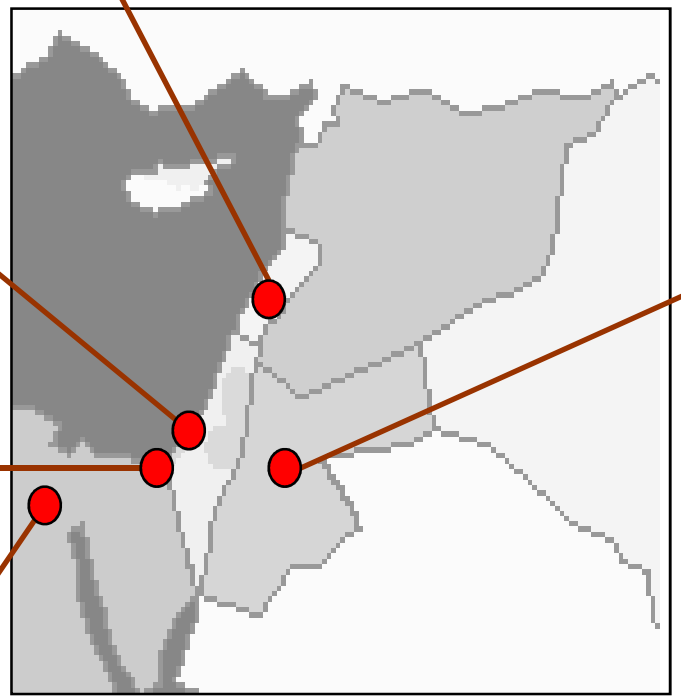
Why treated greywater

- Water physical saving significant as it represents most of the HH wastewater
- Culturally more accepted as there is a tradition in irrigating home gardens with TGW
- There are situations in MENA region where little options are available to the communities except onsite TGWR
- Relatively easier to treat since not contaminated with heavy metals, emerging pollutants thus cheaper
- Less environment and health risks compared to mixed WW (If managed properly)
- Potential benefits to marginal communities as a water source and an income generating activities (irrigation, less cesspit emptying)
- Can be implemented in scattered households and small rural and periurban communities

MECTAT (2001)
Lebanon

PARC Gaza
Workshop (1998)

Greywater recycling
identified



INWRDAM (2000)

Jordan

PARC (1999)

WaDI*mena* (2005-2010) MENA (Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Tunisia, Syria, Yemen et Gulf Peninsula)

IDRC-WaDImena experience

- **Jordan**
  - Gradually Scaling out : Muta'h University, INWRDAM-IDRC + CARE Intl. 750 GWT units of 4 barrels in more than 90 villages (low income families)
  - Feasibility: currently moving from household to large consumer, Muta'h University dormitories
- **Palestine**
  - water saving, acceptance, socio-economic impact
- **Lebanon**
  - Ownership of TTT technologies at HH level, income and reduction in cesspit maintenance (100 treatment kits)
- **Yemen**
  - Cultural heritage, poverty alleviation old Sana'a gardens

Greywater Diversion

Treatment Units

Drip Irrigation

Results

- Households saved 10% of their income
- 15% water savings and 27% lower bills
- Greywater friendly detergents
- Women Prefer Household Systems
- Being upscaled in Jordan, Yemen Palestine and Lebanon

Intermediate technologies do work but

- Context specific
- Require a good enough exposure to the basic operation and maintenance
- Requires some changes in habits/practices to reduce organic inputs and optimize the operation of the primary treatment kits (use of detergents, oils Fat remnant in Kitchen sinks).
- Requires an integrated Monitoring and Evaluation system

- Operation and maintenance:
  - The different treatment kits tested are a viable and simple technology in most of the situations
  - Two barrel greywater treatment unit
  - Four barrel
  - Circular concrete
  - Confined trench greywater

Economic and financial benefits

WITH Direct market values

- **1. Additional water to be used**
  - The HH water bills indicating savings in water consumption
- **2. Incremental quantities of crops irrigated with this water (mainly tree crops)**
- **3. Savings associated to the reduction in black water that needs to be discharged from the septic**
- **Capital cost**
  - **4 barrels kit $US 260 (can treat 150-200 l/day of GW for a family of 6 members)**
  - **Confined trench $US 300**
- **Cost benefit: 1: 2.7**
- **These figures may be scaled down if the system is not properly operated**

Environment and health

- Reduction of demand for freshwater
- Increased availability of water for hygiene
- Treatment improves significantly water quality, hence better pollution management

- **Constraints**
- Health risks (Coliforms++)
- Risks associated with TGW stored for more than 24 h if irrigated land is not enough
- Odours
- Risk of contamination of water source if site selection is not properly done
- Restricted use of reclaimed water (crops eaten raw, cash crop??)
- Chemicals used in

Others constraints

- Absence of qualified person in the HH
- Lack of ability to afford the capital investment
- Land limitation
- Unsuitable climate for reuse at some periods of the year
- Inappropriate soil conditions
- Lack of clear regulation and bylaws on the reuse of TGW

In the bottom line

- The assessment of benefits and risks is crucial
- The users participation is systematic at the inception phase
- The choice of the technology may reduce risk
- Capacity building of the users ensure viability and optimizing the benefits
- Positive perception and high level of compliance among users needs demonstration in some settings
- Stockholm declaration and WHO norms of reuse? What norms for what realties?

Concluding remarks

- TGWR has a potential for poverty alleviation but more on water scarcity management in the context of MENA
- Little documented experience in most of the countries in the region particularly in the Maghreb
- Pilots need more consolidation with comparative analyses
- What are the long term impacts on soil health under different scenarios
- Jordan developed norms for Greywater treatment and reuse

More research is needed

- Improving the treatment technology
- Corrective measures for soil salinity and alkalinity
- Health risk management
- Cropping pattern and types of crops
- Soil health protection
- Large water consumers is yet to be investigated
- What figures of water savings
- What guidelines to make responsible, safe and reliable use in the context of each country and locally
- How the figures will be comparable in the context of peri urban areas and in Urban agriculture
- What innovation in combining rainwater and greywater in some fo the MENA countries

More info

- www.idrc.ca/wadimena
- www.csbe.org
- www.waterCASA
- www.oasisdesign.net

THANK YOU