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Constraints to wastewater treatment and reuse in Mediterranean Partner Countries - *Project recommendations*

Eleftheria Kampa
Ecologic Institute, Berlin

Partners: Redouane Choukr-Allah (IAVCHA); Mohamed Tawfic Ahmed & Naglaa Loutfi (Suez Canal Univ); Maria Fürhacker (BOKU); Subhi Samhan (Palestinian Water Authority)



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Content

- ▶ Background information
- ▶ Main aspects of key constraints to application of WW treatment technologies and practices of reuse *combined with*:
 - ↕
- ▶ Reference to good practice examples from MPC
 - ↕
- ▶ Recommendations on priority actions and further research needed to support further treatment and reuse in MPC

Check-out Deliverable 13 of INNOVA-MED for details





Why did INNOVA-MED look at „Constraints“?

- ▶ Recognised **need for a systematic and integrated review** of current constraints on treatment and reuse technologies in MPC **to formulate possible priority actions and further research needs**
- ▶ **Fact:** WW treatment and reuse in MPC is not applied to a satisfactory wide extent yet („*we can do more & better*“). In the same time...
 - ▶ Water scarcity is expected to rise
 - ▶ Unofficial use of raw WW is quite common -> environment/health...
 - ▶ MED population becomes increasingly urban; urgent to provide proper treatment and where possible reuse of WW




Basis for the INNOVA-MED review of constraints

- ▶ Review of **existing information** (*INNOVA-MED not a research project*):
 - ▶ Input at INNOVA-MED regional MPC training courses
 - ▶ MPC national projects especially of INNOVA-MED partners
 - ▶ EU-funded projects in MPC, e.g. EmWATER, MEDAWARE
 - ▶ International-funded projects and comparative studies on reuse in the MED
- ▶ Focus set on **WW treatment and reuse for irrigation**, which is most common reuse activity in MPC
- ▶ Little information on sludge - reused to a limited extent in MPC



Main types of constraints



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graph TD
    Financial --- Policy[Policy & political commitment]
    Policy --- Health[Health & environment - Enforcement of standards - Monitoring]
    Health --- Technical
    Technical --- Awareness[Awareness & acceptance]
    Awareness --- Institutional[Institutional set-up & personnel capacity]
    Institutional --- Financial
  
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A. Financial constraints – Key points

- ▶ High construction **costs of treatment systems** (esp. for small and medium size communities)
- ▶ High **O&M costs**, e.g. for electricity, equipment maintenance, investments in trained personnel – *often not recovered by user fees*
- ▶ **Costs** (and lack of funds) to build **sewage collection systems**
- ▶ High **price of reclaimed WW** vs. lower freshwater prices
- ▶ Price that farmers are willing to pay for reclaimed WW hardly covers O&M costs for WW conveyance and distribution <--> **Crop restrictions**

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Financial constraints – *Project recommendations*

- ▶ **Follow-up possible funding sources**, e.g. future EU funds earmarked for sanitation in the MED
- ▶ **Reduce treatment operation costs**, e.g. check research on alternative operating conditions to save electricity; broader use of solar energy
- ▶ **Focus on making reuse more profitable to farmers** (to ultimately recover more costs for reuse of treated WW via user fees):
 - ▶ Research ways to extend list of crops irrigated with WW, e.g. upgrade treatment or apply drip irrigation to avoid contact of crop with WW



B. Policy and political constraints

- ▶ Lack of strategies to support WW treatment and reuse in the context of MPC **national water resources policy**
- ▶ Lack of political commitment and support

Tunisia: Subsidies for treated WW (20% of full price) within the water pricing policy; presidential decisions to support reuse; national strategy prepared for the improvement of treated WW reuse

Jordan: Inclusion of wastewater reuse in Jordan's National Water Strategy since 1997 - signal of placing high priority on the value of reclaimed water.



C. Health and environment risks - Monitoring

- ▶ Public health risks when irrigating with inadequately treated WW (e.g. gastro-intestinal infections, heavy metals, trace pollutants)
- ▶ Environmental risks (mainly soil clogging, soil salinisation, excess of nitrogen, GW & SW contamination)
- ▶ Risk occurrence linked to:
 - ▶ Failure to meet quality standards at source (WW treatment outflow) - not following SOPs; no qualified personnel to monitor treatment
 - ▶ Inefficient monitoring of WW reuse system: lack of trained personnel; lack of monitoring equipment; too high monitoring costs



D. Standards and regulations

- ▶ *Either*, too strict standards/regulations -> not enforced; create attitude of indifference to rules and regulations
- ▶ *Or*, inadequate standards/regulations, e.g. no specific regulations for indirect reuse of WW via agricultural drainage canals in Egypt
- ▶ ... contributing to environmental and health impacts/risks

Jordan: Development of national standards on use of WW for irrigation in agriculture -> water-borne diseases have been reduced. The implementation of monitoring activities has contributed to more transparency regarding health and the environmental impacts of irrigation with reclaimed WW.





Reducing risks - *Project recommendations I*

- ▶ Do not neglect importance of monitoring:
 - ▶ For treatment processes, easy to measure parameters should be developed e.g. T for thermal treatment, pH for lime treatment, oxidation-reduction potential (ORP) for anaerobic or aerobic processes
 - ▶ For affordable monitoring in WW reuse, limit parameters to be monitored (e.g. to coliforms, helminths, salinity, pH, nitrogen)
- ▶ Pretreat industrial WW to domestic WW quality levels



Reducing risks - *Project recommendations II*



- ▶ Develop common guidelines (ISO standards) on operating WW treatment in MPC
- ▶ Establish common norms and standards for WW reuse in MPC:
 - ▶ Should comply with framework criteria of WHO guidelines
 - ▶ *But* be adapted to local conditions & specificities
- ▶ Set up codes of good practice for reuse of WW to complement obligatory requirements

E. (Some) Technical constraints

- ▶ **Insufficient infrastructure** for treating, conveying and distributing WW for reuse
- ▶ Most existing treatment plants were **not designed for reuse** purposes and/or are located far from irrigated areas
- ▶ Lack of **storage basins** for interseasonal storage of WW for reuse when needed
- ▶ Main technologies used in MPC (e.g. activated sludge) involve high costs and highly qualified technical personnel in O&M

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Technical constraints - *Project recommendations*

- ▶ Research the development of more affordable technologies for WW treatment and reuse (and sludge treatment) in MPC
- ▶ Consider in selection also innovative emerging treatment and reuse technologies, incl. biotechnologies

Check-out technical deliverables of INNOVA-MED for specific recommendations on treatment and reuse technologies


- ▶ Before selecting a treatment technology, make a cost-effectiveness analysis and compare with different alternatives

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F. Awareness & acceptance constraints

- ▶ Insufficient involvement of **farmers** and inadequate information on health risks from WW reuse & appropriate management procedures
- ▶ Insufficient involvement and information of **civil society** on benefits of treatment and reuse
- ▶ Insufficient involvement of **crop consumers** & inadequate information on effects of marketed crops irrigated with WW


Egypt: *Pilot construction of first gravel bed hydroponic systems to treat/reuse grey water in rural areas:*

- Involvement of local association and NGOs very important for initiating and organizing this type of pilot projects.
- Awareness campaigns helped to mobilize and inform the rural community about the advantages from the correct operation of the grey water treatment systems.



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Awareness & acceptance - *Project recommendations*

- ▶ Organise **capacity building and training for farmers** on how to use WW and on health protection aspects
- ▶ Work more with **demonstration activities** - Users and public should be able to see tangible results
- ▶ Clearly **inform consumers about crops irrigated with WW** that was treated appropriately (monitoring programmes accessible for general public and supervised by special authorities or independent experts)
- ▶ **Producer responsibility and certification** – Implement quality assurance systems independently audited – Quality competition & benchmarks

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Outlook

- ▶ We already have substantial information on the key factors constraining a wider application of WW treatment and reuse technologies in MPC
- ▶ Time to take more action on priority issues:
 - ▶ Financial factors
 - ▶ Gaining political commitment
 - ▶ Risk mitigation (incl. Monitoring & appropriate standard development)
 - ▶ Awareness & acceptance of users, consumers and civil society
- ▶ Target research on crop restrictions, affordable technologies and affordable monitoring for MPC setting

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Thank you for listening.

Eleftheria Kampa

Ecologic Institute, Pfalzburger Str. 43-44, D-10717 Berlin
Tel. +49 (30) 86880-0, Fax +49 (30) 86880-100


eleftheria.kampa{at}ecologic{dot}eu

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Key types of constraints

- ▶ Financial constraints
- ▶ Policy & political constraints
- ▶ Health impacts & environmental safety, closely interrelated to presence and enforcement of standards & regulations plus monitoring
- ▶ Technical constraints
- ▶ Public acceptance & awareness
- ▶ Institutional set-up & personnel capacity

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G. Institutional set-up & personnel capacity

- ▶ Often, large number of governmental departments share competence on different aspects of WW treatment and reuse (lack of effective cooperation and coordination mechanisms)
- ▶ Conflicts between institutional actors, e.g. over quality standards of treated WW for different purposes
- ▶ Lack of expert personnel on technical set-up, operation and maintenance of WW treatment and reuse systems

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