Chapter 9

Toward a more harmonious planning and governance of agricultural water reuse:
Guidelines, practices and obstacles

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Guidelines at a glance

- Ensure buy-in by the key national players around clear goals
- Establish multi-stakeholder platforms and welcome epistemic communities to facilitate
- Conduct a stakeholder mapping exercise
- Understand roles and responsibilities, gaps and overlaps
- Analyze stakeholders' influence and interest
- Clarify roles and responsibilities along six areas of prerogatives
- Establish central coordination and regulatory institutions
- Allow for flexibility in operation and cost-recovery mechanisms
- Empower stakeholders with existing know-how and political leverage
- Understand and re-negotiate local water rights
- Ensure access to information and data sharing between stakeholders
- Create a climate of trust and collaboration
- Develop the capacity of public utilities and local institutions

9.1 Introduction

Planning and managing agricultural water reuse projects come with an inherent complexity. They require harmonizing a multiplicity of decision-making processes and activities performed by stakeholders with different and often conflicting jobs, goals and interests.

The first challenge is that of water allocation among sectors/users. A wastewater treatment and water reuse system is part of the larger hydrosocial cycle, which connects different economic, social and cultural activities via waterflows (Boelens et al. 2016). The quantitative and qualitative access to water for existing users is impacted by treating wastewater discharged into waterways and reallocating it for reuse impacts.

Planning reuse projects or policies involves making difficult choices, which can disrupt existing water rights or political legitimacies linked to state authorities, municipalities, farmers or other social groups (Beveridge et al. 2017).

Secondly, like hydraulic systems, reuse projects can only work if socially accepted, technically reliable and profitable for farmers. This requires strong links between central administrations (and their donor partners) and local stakeholders to analyze local practices, develop appropriate infrastructure and negotiate adaptive management arrangements (Figure 9.1).

Thirdly, a reuse system creates an interdependency between two usually separate activities: wastewater treatment and crop production. These activities need to be synchronized, which requires negotiation and coordination between managers and users, often daily (Maaß and Grundmann 2018).

Finally, reusing treated effluents comes with concerns over the quality of the treated water and its potential negative impacts on health and ecosystems. It implies the intervention of health, agronomic and environmental institutions, which need to collectively develop regulations, monitor and enforce compliance and make trade-offs between safety and enforceability (see Chapter 5). In short, when planning and managing a reuse system, stakeholders will have to collaborate and find consensus – often for the first time – around and across different fields and scales.

In the MENA countries, water reuse projects and policies have been developing for few decades (see Chapter 1). Depending on their own institutional and political history, countries developed different institutional modalities for governing water treatment and reuse (see Chapter 3). Although considerable differences are noted between countries, administrations are generally found to be fragmented, competing and/or excessively centralized with weak involvement of local users (see Chapter 3; Ait-Mouheb et al. 2020; Eid-Sabbagh et al. 2022) and regulations unduly stringent and poorly enforced (see Chapter 5). Drawing from literature from international and MENA sources on water and water reuse governance, the following guidelines intend to guide MENA countries stakeholders toward more coordinated and inclusive planning, implementation and governance of agricultural water reuse systems.

This chapter is solution oriented and provides stepwise guidelines, tools and examples for consensus building. On the other hand, it shows that governance problems are often rooted in deeper socio-political structures that cannot simply be changed by implementing participatory processes and social engineering tools. Some examples identified in the MENA region will be cited to draw the attention on this type of challenges and to open the debate around the difficult question of reaching 'good water reuse governance' in the region.
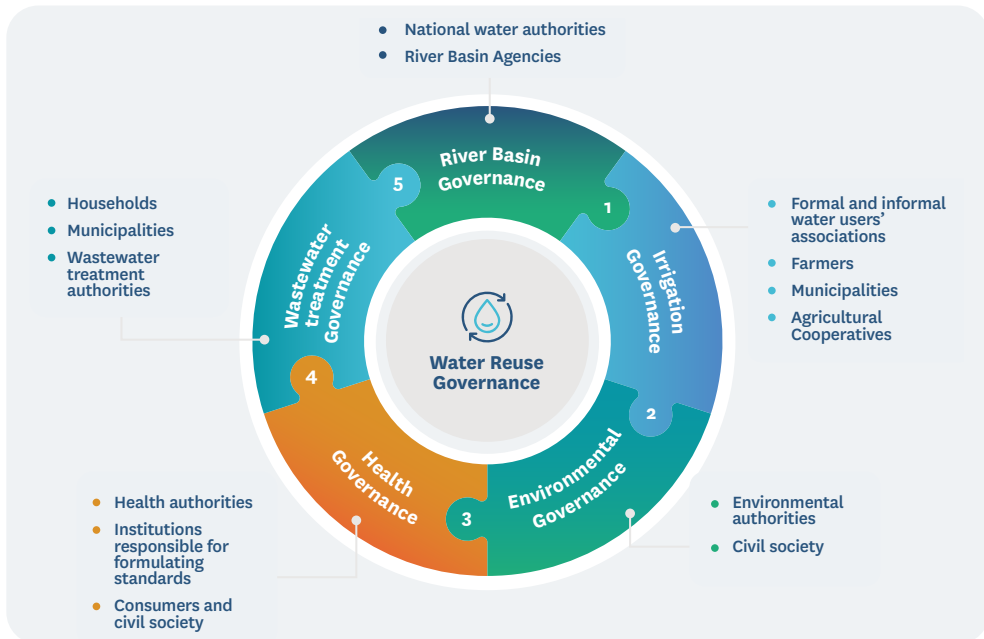
FIGURE 9.1 The large array of stakeholders involved in the governance of agricultural water reuse systems.

9.2 Practical steps in planning and governance of water reuse

9.2.1. Ensure buy-in by the key national players around clear goals

Planning a reuse project and initiating regulatory or institutional change related to water treatment and reuse can be a complex process. It involves many players with different jobs, interests and technical backgrounds. It often entails shifting patterns of quantitative and qualitative access to resources, adding new responsibilities on institutions or losing old competencies. This implies gains for some stakeholders and losses for the others, which can come with contestation, resistance and opposition (Beveridge et al. 2017). Hence, implementing water reuse projects or policies inevitably implies initiating discussions and negotiations at early planning and design stages among the various stakeholder groups at the different governance scales (Evans et al. 2010; Nassif et al. 2022).

At the very beginning, key players need to be willing to sit at the same table and work toward the same goal. There should be a clear intention to deploy efforts and resources to collaborate and eventually reach consensus. Hence, any such initiatives need to at least be supported by the legitimate national administrations.

This very first step is often the most challenging especially when projects are stimulated by external donor organizations, which is often the case in the region. National players may not be willing to collaborate simply because a project is virtuous or when political leadership is contested. An illustrative case was encountered in Lebanon when the International Water Management Institute (IWMI) proposed to facilitate a dialogue to develop agricultural reuse around the Sour/Tyr WWTP to reallocate the use of freshwater for drinking water use (Eid-Sabbagh et al. 2022). The planning institution (Ministry of Energy and Water) was supportive of the project, but this was not the case with its administrative subordinate the Litani River Authority (LRA). The LRA's opposition to the project and its capacity to block decisions can be explained by the fragmentation of power in the country and its reflection on state administrations (Nassif 2019).

If incentives can be created to bring stakeholders to collaborate, as we suggest in this paper, this is often constrained by deeper power contestations entrenched in societal structures. The following steps are to be read bearing in mind that instituting 'good governance' can be beyond the capacities of projects. Lobbying for better policies cannot be done without being aware of the political nature of water management (Molle et al. 2019). It is a long-term process which should start by bringing into light these types of challenges.

9.2.2. Establish multi-stakeholder platforms and welcome epistemic communities to facilitate

A multi-stakeholder platform (MSP) is a popular participatory practice that typically gathers stakeholders from diverse groups, willing to collectively work on water projects, policies or regulations (Warner 2005, 2006). It is conceptualized as a privileged space for multi-stakeholder input, debates and negotiation and can be conducive to consensus-building and

conflict resolution (Cleaver 2001, 2017). MSPs can be established to gather the multiple stakeholders that need to coordinate around the development of water reuse projects and policies (Evans et al. 2010). When adequately designed and facilitated, MSPs can help projects avoid future stalemates through democratizing and legitimizing the decision-making process (Warner 2005, 2006; Graversgaard et al. 2017).

As seen above, institutional leadership and political legitimacy are important for such initiatives to take place. On the other hand, epistemic communities, or "communities of techno-scientific experts working to inform policy through their knowledge" are encouraged to facilitate or contribute to such participatory platforms (Bukowski 2016; Mabon et al. 2019). Furthermore, dialogues can be more successful when led by independent facilitators that bring together different stakeholders with divergent background and/or interests, a practice that has been growing in environmental projects around the world (Dionnet et al. 2017). While such expert-based leadership should not be regarded as always neutral or uncontested (Stone 2017), examples show that epistemic communities can lead effective policy building in adequate circumstances. For example, such initiatives were found to be successful with favorable historical context of locally led environmental science research, personal investment of the epistemic community members and regular dialogue between the epistemic community and local society (Mabon et al. 2019).

In Lebanon, Jordan and Egypt, several modalities of participatory initiatives are taking place around different topics related to water reuse projects and policies. In Jordan, the Royal Scientific Society (RSS), comparable to an epistemic community, was able to facilitate negotiations between the Ministry of Water and Irrigation and farmers to incentivize the use of a state-led water reuse project (Box 9.1). In Lebanon, IWMI supported the formulation of an MSP backed by national administrations to design adaptive qualitative water reuse regulations (Box 9.2). In Egypt, different focus groups were facilitated by the project and its partner, the International Center for Agricultural Research in the Dry Areas (ICARDA), to build consensus around the choice of direct and indirect reuse models. Other forms of local participatory platforms were also facilitated through ReWater MENA in Lebanon and Jordan to assess the cost and benefits and design different types of water reuse models.

9.2.3. Conduct a stakeholder mapping exercise

The processes of stakeholder engagement start with a thorough analysis of the existing actor networks. The first step is known as 'stakeholders mapping' and consists of an inventory of stakeholders either formally (legally) or informally in charge of the different aspects of wastewater treatment and reuse planning and management. In the MENA region, formal institutional frameworks tend to focus on state administrations and formal organigrams while in practice, community and private stakeholders are also key actors at many levels but are frequently unknown or not officially recognized (Cleaver 2002; Tawfik et al. 2021). These actors should be identified and ideally represented in the MSP in order to have a full view of the sector's governance and identify local knowledge and technical practices as well social dynamics.

Identifying informal/socially embedded arrangements requires interviews and field work. It can be done through collaboration with public officials in local offices, civil society and community leaders. Since those arrangements occur at the intersection points with formal ones, local officials are often the ones working closely with the 'informal' actors to facilitate the implementation of their tasks (Barnes 2017; Cleaver 2002) or vice versa. In the Nile Delta in Egypt, for example, many types of informal treatment technologies were found to be built in collaboration with public officials living there (Reymond et al. 2010). In the Bekaa Valley of

Lebanon, officials from the regional state authority borrowed some equipment from municipalities to repair water networks (Nassif 2019).

9.2.4. Understand roles and responsibilities, gaps and overlaps

Mapping the different stakeholders is followed by analyzing their roles and responsibilities with relation to the planned water reuse practice (stakeholder analysis). Who is in charge of each of the different activities? Do some of the responsibilities overlap and how? Are there important activities that no one performs or where responsibility is not clear? It is also necessary to understand the stakeholders' administrative boundaries: at what scale do they intervene (e.g., national level, watershed, municipality, regional, local)? How do these scales overlap? These are important questions to address in order to anticipate how each stakeholder will be impacted by an intended policy or project intervention (e.g., 'plan a water reuse project', 'design an implementation plan for the management of a reuse system', 'formulate qualitative standards for water reuse').

Many methods and tools were developed to help decision-makers, planners and researchers conduct stakeholders' analyses of the water sector. A recent analytical tool was developed specifically for water reuse (see Chapter 3) adapted from Tawfik et al. (2021). The framework is divided into strategy and policy formulation, wastewater management activities (i.e., collection, treatment, discharge or transfer); water reuse management (i.e., license, approval and allocation); codes and standard and monitoring (Figure 9.2). Its purpose is to help identify existing gaps and overlaps between stakeholders (formal or informal) at the same governance scale (horizontal) and between institutions at different governance scales. It is recommended to complete this framework with different types of informed stakeholders to avoid assumptions or misunderstandings particularly in complex institutional contexts as in Lebanon and Egypt.

Wastewater management and reuse activities	Strategy and policy formulation	Wastewater management (collection, treatment, discharge or transfer)		Water reuse (license, approval and allocation)			Codes and standards	Monitoring
		Infrastructure development	Operation and maintenance	Industry	Agriculture	Urban (e.g., landscaping)		
Responsible institution								

**FIGURE 9.2** Institutional mapping of governance activities.
SOURCE: Tawfik et al. 2021

9.2.5. Analyze stakeholders' influence and interest

Participatory processes often include a range of trade-offs among stakeholders. Therefore, it is important to analyze who may be better-off or worse-off as a result of the intended intervention and what are the relationships between the 'winners' and the 'losers'.

Project managers need to comprehend the influence, interest and power relations of stakeholders in addition to their technical roles and responsibilities. LISODE, a French-based consultancy service, proposed a simple way of studying actors' relations during the training for public participation provided to Lebanon public officials in the framework of ReWater MENA. It is a simple tool that allows the mapping of stakeholders in a diagram according to their 'Interest' and 'Influence,' where their position on the 'Interest' axis relates to how much the topic is important for them, while their position on the 'Power' axis shows their ability to influence the decision-making process (Figure 9.3) (Eden and Ackerman 1998). Other useful tools for stakeholders' analysis can be found in the online *Guide to public participation and facilitation* that helps designing participatory processes around the management of environmental resources management (Dionnet et al. 2017).
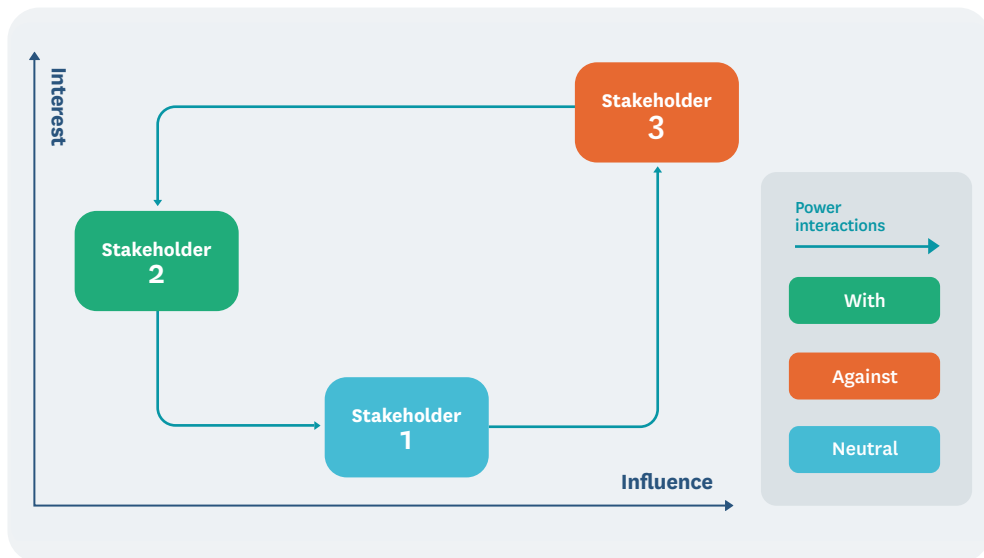
FIGURE 9.3 Analytical tool to assess stakeholders' interest, influence and power relations.
SOURCE: Adapted from LISODE 2019

9.2.6. Clarify roles and responsibilities along six areas of prerogatives

As simplified by Ait-Mouheb et al. (2020), ideally at least six management areas should be clearly assigned to specific stakeholders to ensure success of reuse projects and policies:

- who proposes and designs the basic socio-physical parameters of the project (i.e., location, surface area, beneficiaries, mode of water reuse);
- who authorizes the project after assessing its social desirability and whether it complies with existing regulations;
- who decides who pays what in upfront investments, operation and maintenance;
- who operates and maintain the project;
- who subsequently monitors water quality and its impact on soil, crops and human health; and
- who assumes responsibility of any unintended dispersion of contaminant?

There are many references on water reuse in MENA that document how project failure comes from the duplication and/or or gaps in institutional frameworks. Responsibilities overlap and accountability mechanisms are lacking, which leads to competition around some tasks and/or others being left unperformed (see Chapter 3; Ait-Mouheb et al. 2020; Choukr-Allah 2010; FEMIP 2009). Several political and economic factors can lie behind such (often depoliticized) institutional problems: competition around power, scale and resources, typically in infrastructure building and planning (e.g., between Ministry of Energy and Water [MEW] and Council for Development and Reconstruction [CDR] in Lebanon); inconsistency of donor-stimulated reforms (e.g., Egypt and Lebanon); lack of local legitimacy to levy fees and ensure system's operation (e.g, the case of the regional water establishments in Lebanon); and political protection of certain administrations from assuming legal responsibility over quality control of infrastructure or processes (in Lebanon) (see Chapter 3).

9.2.7. Establish central coordination and regulatory institutions

An independent arbitrator with sufficient political legitimacy to make things happen is required to develop sound decision-making between institutions, enhance integrated planning, and ensure mandates and regulations are adequately designed and implemented.

A researcher on the issue of implementing sound risk management safety plans in Jordan stated: "If there is no strong decision and follow-up from the Council of Ministers, administrations have no incentives to implement these extra tasks." Other experts recommend establishing independent regulatory and monitoring bodies to ensure good governance of water reuse and synchronizing the work of different administrations (Ait-Mouheb et al. 2020; EPA 2012).

Different types of regulatory bodies and mechanisms were institutionalized in MENA countries, often under donor-conditioned reforms. In 2004, the Egyptian government established the Egyptian Water Regulatory Agency (EWRA) for the regulation, monitoring and evaluation of all activities related to water supply services and wastewater disposal (Ménard 2022).

In Lebanon, the new, long-awaited 2018 Water Code proposed a Higher Water Council meant to coordinate the work between different ministries and involve municipalities and civil society (Riachi 2013; Eid-Sabbagh 2015; Nassif 2019). In Morocco, where institutions are also influenced by donor-oriented agendas (Tanouti 2017), a High Water and Climate Council and an inter-ministerial committee were established to ensure coordination and monitoring (Molle and Tanouti 2017).

Creating such legal entities does not guarantee their functionality. For instance, in Morocco, those two bodies were deemed largely ineffective (Molle and Tanouti 2017) In Egypt, the role of EWRA was hindered by the current overlapping responsibilities in the water sector and was found to be more 'ceremonial' than executive (see Chapter 3). In Lebanon, the High Water Council has been modified by parliamentarians to keep the power centralized in the hands of a few ministries (Eid-Sabbagh 2015). As rightly stated by a high-level official interviewed at the Ministry of Energy and Water, "Coordination is not complicated but there should be a will to coordinate" (Eid-Sabbagh et al. 2022).

9.2.8. Allow for flexibility in operation and cost-recovery mechanisms

Clear roles and responsibilities do not imply a rigid governance framework. Rather, it is important for the governance structure to be flexible enough to match the dynamic nature of water institutions especially in countries where community practices around water and wastewater management are longstanding. As proposed by Cleaver (2017), the "uneven patching together of old practices and accepted norms' would be a good framework for thinking about institutional design in MENA." This is particularly relevant for the tasks of operating small- to medium-sized decentralized reuse systems but can be extended to other tasks such as rule enforcement. While central/regional administrations need to be involved in large-scale planning, high-budget funding or issuing legal standards, planning and managing a reuse project (operation of a WWTP, fee collection, distribution of irrigation water) can be performed by different categories of stakeholders (regional authorities, municipalities, civil committees and private sector) and through a variety of institutional arrangements (EPA 2012).

In the MENA region, top-down oriented, state-centered approaches to water and wastewater management are still dominant (see Chapter 3). Planning, management and cost recovery are assigned to national or large-scale regional water authorities (regional water establishments in Lebanon, Water Authority of Jordan in Jordan, Holding Company for Water and Wastewater in Egypt) who often fail to levy tariffs, to guarantee a reliable operation and enforce regulations. In practice, other stakeholders such as municipalities or local water committees often take the lead in operating utilities, or even in securing funds and implementing infrastructure (Table 9.1). Building on the role that such actors already play or involving other community leaders has the potential to strengthen the governance of water reuse systems.

TABLE 9.1 Common community arrangements for wastewater and reuse management found in MENA.

Water Reuse System/ Wastewater treatment plants	De-facto performance of operation and maintenance (O&M)	Funding and cost-recovery mechanisms (de facto)	Official responsibility
Ablah Wastewater Treatment and Reuse Scheme – Lebanon	Municipality of Ablah through a local engineer closely cooperating with farmers	Infrastructure building funded by donor projects	Bekaa Water Establishment through wastewater tariff subscriptions
Fourzol, Ablah, Aitanit, Hammana and other municipal wastewater treatment plants – Lebanon	Municipality of Fourzol through local engineers	Municipalities use municipal taxes and funds	
Egypt decentralized sanitation systems in the Delta	Residents in collaboration with local officials with technical knowledge	Residents put funds in common to fund infrastructure and operation	Holding Company for Water and Wastewater (HCCW)

SOURCE: Eid-Sabbagh et al. (2022) for Lebanon; Reymond et al. (2014) for Egypt.

9.2.9. Empower stakeholders with existing know-how and political leverage

Planning the governance of a reuse system should build on existing practices in terms of technical know-how, local leaderships and more broadly collective action around water and wastewater management and reuse. Different factors should be considered to decide on the most effective institutional arrangements. It is important to consider institutions with political

leverage and to build on existing historical expertise. For example, additional responsibilities may be assigned to different groups depending on their historical roles and technical and managerial expertise (EPA 2012). In the Settat Reuse Scheme of Morocco, the management of a reuse irrigation system was assigned to a water user association under the leadership of a local leader (Mayaux and Massot 2019).

Nevertheless, one should not fall into the 'local trap' that assumes that building on local institutions will naturally lead to the expected social and ecological outcomes (Purcell and Brown 2005). Empowering local actors should be studied with care and well accompanied. It should rely on an in-depth understanding of the existing social structures not to compound the vulnerability of certain groups, or delegate tasks undesired by local communities, as discovered in the case of the Settat scheme (Mayaux and Massot 2019).

Equally important, the involvement of local actors depends on the willingness of state authorities to share power and delegate some of their prerogatives (Pretty 1995). In several MENA countries, decentralization or participation in water management is often pushed by international donors' agendas and in different cases, it was seen that state authorities seemingly abide by these agendas but are often reluctant to institutionalize decentralization. This has been reported in Lebanon (Nassif 2019), Egypt and Morocco (Ghazouani et al. 2012) in the case of irrigation management transfer. Reluctance of state authorities to involve local communities in planning WWTPs was also seen in Lebanon (Eid-Sabbagh et al. 2022) and in Jordan, it was found that farmers have only a 'consultative' role in technical committees that design standards (see Chapter 5).

9.2.10. Understand and re-negotiate local water rights

Involving users and local leaderships is particularly important when planning water reuse and reallocation schemes among sectors and/or users/beneficiaries. Treating and redistributing effluents through a new reuse system need to be negotiated at multiple scales. While in this case consensus between key water authorities is a must, it is equally important to reach this consensus at the community level. This is particularly important where a reuse system would lead to changes in the current irrigation system, crop patterns and the economic feasibility of agricultural sector (Tawfik et al. 2021). In many documented cases in Lebanon, conflicts were identified between upstream and downstream farmers disputing access to treated water discharging from a WWTP into developed rivers. Old 'water rights' – in this case, local water allocation rules (legalized in the 1920s under French Mandate) – were used as an argument to justify priority to use the 'new' water (Eid-Sabbagh et al. 2022), although water allocation irrigation areas had substantially changed with the development of pumping and groundwater use (Nassif 2019). Similar arguments around the allocation of treated effluents in developed river irrigation systems have been identified in Settat and Marrakech in Morocco (Ait Mouheb et al. 2020; Mayaux and Massot 2019) and in Jericho in Palestine (Al-Khatib et al. 2017).

Analyzing how water is physically managed and socially perceived prior to reaching consensus around new allocation mechanisms were two substantial steps for designing a local reuse system in central Bekaa, Lebanon (Box 9.3). Different tools can be used to accompany users

toward building consensus around shared environmental resources such as role-play games that simulate water use in the targeted river or sub-river basins and help farmers understanding their mutual perspectives and impacts of the problem (Figure 9.4).

FIGURE 9.4 Board of the role-play game prepared to design reuse systems around Zahleh and Ablah WWTPs. *SOURCE*: LISODE 2020.

BOX 9.3 Consensus-building around water allocation mechanisms to design a local water reuse system around Zahleh WWTP (Lebanon)

Zahleh WWTP (25,000 m³/day) is located in the largest agricultural plain of Lebanon in a heavily exploited river basin where irrigation systems exist for centuries. Zahleh WTTP's tertiary-treated effluents discharge in the Litani River Basin and are now partially and informally reused by large land and well owners that pump it in the summer to reduce the cost of vegetable irrigation from deep wells.

Storing and distributing the WWTP's effluent in an organized system has the potential to provide supplementary irrigation for around 100 farmers and 500 ha of land. However, many community-based irrigation system co-exist in the command area and different farmers claim their 'water right' to use the effluents.

The co-design of a water reuse system was one of ReWater MENA's local pilots in Lebanon. A three-year participatory study allowed the mapping of the socio-technical arrangements around the WWTP and proposal of different scenarios to redistribute the effluents. In November 2021, the various farmer groups, as well as WWTP operators, Zahleh municipality and other stakeholders met around these different scenarios and reached a consensus. The treated effluent would be distributed to downstream farmers in the spring irrigation season and pumped in the summer to Zahleh farmers.

9.2.11. Ensure access to information and data sharing between stakeholders

Public participation in decision-making processes can only be meaningful in the presence of full access to relevant information. The *Manual on the human rights to safe drinking water and sanitation for practitioners* recommends sharing all relevant technical details of water and sanitation services, not only related to water quality, but also related to costs, budgets and operation of treatment facilities (Bos 2016). The manual recommends that details and procedures of data sharing be incorporated in the regulatory frameworks as well as contractual agreements between public authorities and/or service providers, including aspects of rights and responsibilities of individuals and institutions.

9.2.12. Create a climate of trust and collaboration

Coordination is based on trust and is only meaningful if stakeholders regularly communicate and work together. Success stories from other countries showed that a day-to-day, less formal means of collaboration builds trust between actors. For example, it was found that formal and informal engagement activities centered on risk management of a reuse scheme in London supported the development of common understandings, built important inter-stakeholder relationships and helped maintain trust (Goodwin et al 2017). In Braunschweig (Germany), informal discussions and negotiations between employees distributing reclaimed water on the field and farmers was also found to be crucial to adjusting water schedules (Maaß and Grundman 2018). This was also found in the case of a reuse scheme in the Bekaa Valley of Lebanon where, even in the absence of a formal governance framework for reuse, water schedules are decided jointly by the technician working at the WWTP and farmers (Eid-Sabbagh 2022).

9.2.13. Develop the capacity of public utilities and local institutions

Finally, funds and efforts need to be directed to strengthen both community-based (municipalities, farmer committees, etc.) and state institutions at different scales and with different expertise. While non-party stakeholders (NGOs, epistemic communities and private sector) can stimulate and/or contribute to different components of policy and project design and management, this cannot be effective if public administrations are not financially, institutionally and technically equipped. For example, the Private Public Partnerships (PPP),[1] attempted in the sector to fill technical and efficiency gaps in public utilities were often unsuccessful because of a lack of proper monitoring from the side of the governmental agencies (see Chapter 3; Reymond 2020; Eid-Sabbagh 2022). Moreover, many governance tools proposed in this chapter can only be truly useful if incorporated and transferred through long-term institutions anchored in society with legal or social legitimacy to lead more collaborative and accountable forms of governance.

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[1]PPPs were not addressed in this paper but this type of governance mechanism, which is widely promoted in MENA deserves, to be critically assessed.

9.3. Conclusion

To harmoniously plan and manage reuse policies and projects in MENA and beyond, various central ministries, regional authorities and community institutions need to develop coordination instruments across different fields and scales. These guidelines provided a framework for action to improve stakeholder engagement, collaboration and consensus-building and documented past and current participatory practices around different policy or project design initiatives. They illustrate that thinking and practices linked to stakeholder participation are expanding in the region, essentially fueled by research and development projects.

Many multi-stakeholder platforms and participatory processes have recently been established to design context-based water quality standards, negotiate water allocation mechanisms and create incentives for farmers to use new reuse projects. While these initiatives are undoubtedly useful, they often encounter resistance. They were constrained by inter-administrative competition, technocratic decision-making, lack of knowledge of local practices and reluctance to involve users in policymaking processes.

By nature, power structures and social histories constrain social engineering approaches. To be useful, we recommend that such types of initiatives be duly documented and critically analyzed. This is an important step, we argue, toward opening the debate around the socio-political factors underlying the often-deplored institutional fragmentation in MENA countries.

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References

Ait-Mouheb, N.; Mayaux, P.L.; Mateo-Sagasta, J.; Hartani, T.; Molle, B. 2020. Water reuse: A resource for Mediterranean agriculture. In: Zribi, M.; Brocca, L.; Tramblay, Y.; Molle, F. (eds.) *Water resources in the Mediterranean Region*. Elsevier. pp. 107–136. https://doi.org/10.1016/B978-0-12-818086-0.00005-4

Al-Khatib, N.; Shoqeir, J.; Ozerol, G. 2017. Governing the reuse of treated wastewater in irrigation: The case study of Jericho, Palestine. *International Journal of Global Environmental Issues* 16(1–3): 135–148.

Barnes, J. 2017. States of maintenance: Power, politics, and Egypt's irrigation infrastructure. *Environment and Planning D: Society and Space* 35(1): 146–164.

Beveridge, R.; Moss, T.; Naumann, M. 2017. Socio-spatial understanding of water politics: Tracing topologies of water reuse. *Water Alternatives* 10(1): 22–40.

Boelens, R., Hoogesteger, J., Swyngedouw, E., Vos, J.; Wester, P. 2016. Hydrosocial territories: A political ecology perspective. *Water International* 41(1): 1–14.

Bos, R. 2016. *Manual on the human rights to safe drinking water and sanitation for practitioners*. London: IWA Publishing. 110p.

Bukowski, J. 2017. A "new water culture" on the Iberian Peninsula? Evaluating epistemic community impact on water resources management policy. *Environment and Planning C: Politics and Space*. 35(2): 239–264. doi:10.1177/0263774X16648333.

Cleaver, F. 2002. Reinventing institutions: Bricolage and the social embeddedness of natural resource management. *The European Journal of Development Research* 14: 11–30.

Cleaver, F. 2017. *Development through bricolage: rethinking institutions for natural resource management*. London: Routledge.

Choukr-Allah, R. 2010. Wastewater treatment and reuse. In: El-Ashry, M.; Saab, N.; Zeitoon, B. (eds.) *Report of the Arab Forum for Environment and Development*. http://www.afedonline.org/uploads/afed_reports/Full-English-report-2010.pdf#page=130

Dionnet, M.; Imache, A.; Leteurtre, E.; Rougier, J-E.; Dolinska, A. 2017. *Guide to public participation and facilitation*. Montpellier, France: Lisode.

Eden, C.; Ackermann, F. 1998. *Making strategy: The journey of strategic management*. London: Sage.

Eid-Sabbagh, K.P. 2015. *A political economy of water in Lebanon: Water resource management, infrastructure production, and the International Development Complex*. Doctoral dissertation, SOAS, University of London.

Eid-Sabbagh, K.; Roukoz, S.; Nassif, M-H.; Velpuri, N.; Mateo-Sagasta, J. 2022. *Analysis of water reuse potential for irrigation in Lebanon*. Research Report 181. Colombo, Sri Lanka: International Water Management Institute.

EPA (Environmental Protection Agency). 2012. *Guidelines for water reuse*. Anchorage, AK, USA: US Environmental Protection Agency.

Evans, A.E.; Raschid-Sally, L.; Cofie, O.O. 2010. Multi-stakeholder processes for managing wastewater use in agriculture. In: Drechsel, P., Scott, C.A., Raschid-Sally, L., Redwood, M., Bahri, A. (eds.). 2010. *Wastewater irrigation and health: Assessing and mitigating risk in low-income countries*. Colombo, Sri Lanka: International Water Management Institute (IWMI). https://hdl.handle.net/10568/36471

FEMIP (Facility for Euro-Mediterranean Investment and Partnership). 2009. *Identification and removal of bottlenecks for extended use of wastewater for irrigation or for other purposes. Summary report*. Available at https://www.eib.org/attachments/country/study-on-the-reuse-of-wastewater-en.pdf (accessed on September 9, 2022)

Ghazouani, W.; Molle, F.; Rap, F. 2012. *Water users associations in the NEN region. IFAD interventions and overall dynamics. Submitted to IFAD*. Available at https://core.ac.uk/download/pdf/39832831.pdf (accessed on September 9, 2022)

Goodwin, D.; Raffin, N.; Jeffrey, P.; Smith, H.M. 2017. Collaboration on risk management: The governance of a non-1 potable water reuse scheme in London. *Journal of Hydrology* 573: 1087–1095. https://doi.org/10.1016/j.jhydrol.2017.07.020

Graversgaard, M.; Jacobsen, B.H.; Kjeldsen, C.; Dalgaard, T. 2017. Stakeholder engagement and knowledge co-creation in water planning: Can public participation increase cost-effectiveness? *Water* 9(3): 191.

Irvin, R.A.; Stansbury, J. 2004. Citizen participation in decision making: Is it worth the effort? *Public Administration Review* 64: 55–65.

LISODE. 2019. *Introduction to public participation. Training report,* May 27-29, 2019, Beirut. Submitted to International Water Management Institute as part of ReWater MENA project.

LISODE. 2020. *Draft material prepared to organize a facilitation process around the design of water reuse projects in Lebanon*. Submitted to IWMI. Unpublished.

Maaß, O.; Grundmann, P. 2018. Governing transactions and interdependences between linked value chains in a circular economy: The case of wastewater reuse in Braunschweig (Germany). *Sustainability* 10: 1125.

Ménard, C. 2022. Institutional challenges to efficient governance: Water, sanitation and wastewater in Egypt. *Water International* 47(2): 205–222.

Mabon, L.; Shih, W-Y.; Kondo, K.; Kanekiyo, H.; Hayabuchi, Y. 2019. What is the role of epistemic communities in shaping local environmental policy? Managing environmental change through planning and greenspace in Fukuoka City, Japan. *Geoforum* 104. https://doi.org/10.1016/j.geoforum.2019.04.024

Mayaux, P-L; Massot, A. 2019. Entre décharge participative et Etat développeur: Des élites rurales marocaines en quête de légitimité. *Revue Gouvernance* 16(1): 84–109.

Molle, F.; Closas, A. 2020. Comanagement of groundwater: A review. *WIREs Water* 7(1): e1394. https://doi.org/10.1002/wat2.1394

Molle, F.; Sanchis-Ibor, C. 2019. Irrigation policies in the Mediterranean: Trends and challenges. In: Molle, F.; Sanchis-Ibor, C.; Avellà-Reus, L. (eds*.) Irrigation in the Mediterranean: Technologies, institutions and policies.* New York: Springer.

Molle, F.; Tanouti, O. 2017. Squaring the circle: Agricultural intensification vs. water conservation in Morocco. *Agricultural Water Management* 192: 170-179. https://doi.org/10.1016/j.agwat.2017.07.009

Nassif, M.H. 2019. *Analyse multiscalaire des politiques et de la gouvernance de l'eau dans le bassin du Litani, Liban*. Doctoral dissertation, Université Paul Valéry-Montpellier III.

Pretty, J.N. 1995. Participatory learning for sustainable agriculture. *World Development* 23: 1247–1263.

Purcell, M.; Brown, J.C. 2005. Against the local trap: Scale and the study of environment and development. *Progress in Development Studies* 5(4): 279–297.

Reed, M.S. 2008. Stakeholder participation for environmental management: A literature review. *Biological Conservation* 141: 2417–2431.

Riachi, R. 2013. *Institutions et régulation d'une ressource naturelle dans une société fragmentée: Théorie et applications à une gestion durable de l'eau au Liban. (Institutions and regulation of a natural resource in a fragmented society: A case study for a sustainable management of water in Lebanon).* Doctoral dissertation, École doctorale sciences économiques, Université Grenoble Alpes, Grenoble, France.

Reymond, P.; Demars, C.; Papangelou, A.; Tawfik, M.H.; Hassan, K.; Wahaab, R.A.; Moussa, M. 2014. *Small-scale sanitation in the Nile Delta: Baseline data and current practices*. ESRISS: Egyptian-Swiss Research on Innovations in Sustainable Sanitation, Eawag.

Saldías, C.; Speelman, S.; Amerasinghe, P.; van Huylenbroeck, G. Institutional and policy analysis of wastewater (re)use for agriculture: Case study, Hyderabad, India. Water Science and Technology 72(2): 322–331. https://doi.org/10.2166/wst.2015.220

Saldías, C.; Speelman, S.; van Koppen, B.; van Huylenbroeck, G. Institutional arrangements for the use of treated effluent in irrigation, Western Cape, South Africa. *International Journal of Water Resources Development* 32: 203–218. https://doi.org/10.1080/07900627.2015.1045970

Stone, D. 2017. Understanding the transfer of policy failure: Bricolage, experimentalism and translation. *Policy & Politics* 45(1): 55–70. https://doi.org/10.1332/030557316X14748914098041

Tanouti, O. 2017. *La gestion intégrée des ressources en eau à l'épreuve du bassin versant –cas du bassin du Tensift au Maroc*. PhD thesis. Université Paris Nanterre, France.

Tawfik, M.H.; Hoogesteger, J.; Elmahdi, A.; Hellegers, P. 2021. Unpacking wastewater reuse arrangements through a new framework: Insights from the analysis of Egypt. *Water International* 46(4): 605–625.

Warner, J. 2005. Multi-stakeholder platforms: integrating society in water resource management? *Ambiente & Sociedade* 8(2): 4–28.

Warner, J.F. 2006. More sustainable participation? Multi-stakeholder platforms for integrated catchment management. *Water Resources Development* 22(1): 15–35.