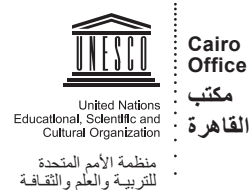


AGRICULTURAL DRAINAGE WATER REUSE: AN OPPORTUNITY FOR INCREASING WATER USE EFFICIENCY

POLICY BRIEF



Key Messages

- Reuse of agricultural drainage water in the Arab region holds great potential and offers an opportunity to reduce the gap between water supply and demand in agriculture, increase the overall water use efficiency, and preserve fresh water for higher-value uses.
- Investment in drainage water reuse represents a low-cost water management opportunity with high economic return. However, environmental risks exist due to the high contents of salts, residues of agro-chemicals and sometimes other biological and toxic pollutants.
- Agricultural water reuse has to be managed carefully to safeguard the environment and minimize the negative impacts on water, land, crops and the ecosystem. Similar to freshwater, policies to protect agricultural drainage water from pollution should be in place.

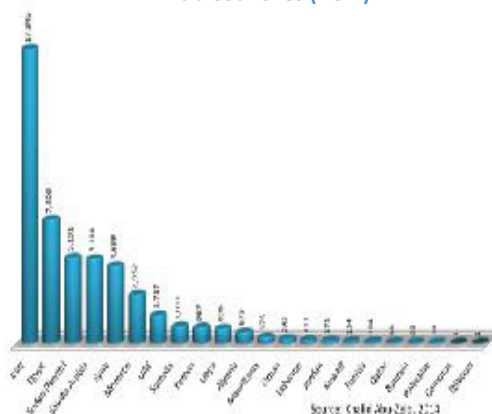
Policy recommendations aim to support drainage water reuse in terms of improved legal and institutional arrangements; financial and economic organizations; technology and infrastructure; and planning and management tools, and knowledge development.

Context

With growing demands on freshwater resources in the Arab region and increasing signs of climate change, pressure is mounting on the agriculture sector to give up part of its allocation to prime sectors such as domestic and industrial ones. This represents the greatest challenge to the agriculture sector that it has to continue producing more food and fiber, with less water, to satisfy current and future demands for food security (World Bank, 2006). For the Arab region, agricultural drainage water reuse is available in large values particularly in large scale irrigation countries (Figure 1). It offers an opportunity to reduce the gap between water supply and demand in agriculture and increase the overall water use efficiency.

This policy brief outlines challenges, trends and impacts related to agricultural water reuse in the Arab region. The brief provides recommendations that could form policy solutions. This effort is part of the mandate of the Arab Water Council and UNESCO to establish an Arab Regional Initiative in support of the non-conventional water resources (NCWR) development. The initiative will help mobilize the financial, legal and technical support required to adopt proper policies and build up appropriate structures and human capacities for the sustainable development of NCWR including agricultural drainage water reuse.

Figure 1: Available Agricultural Drainage Water in Arab Countries (BCM)



Seizing the Opportunity and Managing the Challenges

In addition to rain-fed areas, irrigated agriculture in 2010 produced only 50% of the total food requirements for the Arab region. The rest of food commodities have been imported in the form of virtual water (CEDARE and AWC, 2014). Mobilization of financial resources to achieve water and food securities possesses a serious concern for governments in the region. Water withdrawn for agriculture (208 billion cubic meters) represents 85 percent of the total available renewable water resources (AQUASTAT, FAO). Only 60 percent of the water withdrawn for agriculture is actually consumed and the rest is returned to the hydrologic cycle in the form of run-off or groundwater recharge.

Drainage water is often available in large volumes near or within the reuse sites. It is the lowest investment in all non-conventional water resources development opportunities. Investment ranges from just small diesel pumps privately operated by farmers to a large pump station publicly owned and managed by irrigation authority. Large scale of drainage water reuse is practiced in Egypt and on a more limited scale in Iraq, Saudi Arabia, and Syria, (CEDARE and AWC, 2014). (see Box 1). Agricultural drainage water could be used in conventional farm irrigation, saline agriculture, aquaculture, wildlife habitats and wetlands, and for initial reclamation of salt-affected soils (FAO, 2002). The choice of a certain reuse option depends largely on drainage water quality, plant tolerance to salinity, and availability of freshwater resources. The temporal and spatial availability of drainage water are also of major importance. In conventional irrigation practices, drainage water can be reused either as a sole source, mixed, or alternated with freshwater. The choice is mainly an agro-economic option.

Box 1. Drainage Water Reuse in Egypt and Iraq

In Egypt, reuse of agricultural drainage water became a national policy during the 1980s. Recently, around 6 billion m³ of drainage water with an average salinity of 1.8 dS/m is reused on annual basis. Egypt's reuse strategy was achieved through drainage water mixing with freshwater that has low salinity content. Operational water quantity and quality monitoring systems have been developed for planning and management (World Bank, 2006).

The reuse of drainage water in Iraq is considered of strategic importance in helping Iraq meet the 2030 development goals. However, topography and poor water quality limit the options of re-using drainage water in agriculture. Reuse options include the development of green belts around cities, and re-injecting water into oil field. Drainage water could also help supporting the lateral extension of Hammar Marshes and providing the minimum flow along the Shatt al Arab River (Lecollinet and Cattarossi, 2015).

Good reuse practices could be guided by FAO and WHO guidelines (FAO, 2002 and WHO, 2006) that take into account the salt and biological elements of the drainage water. Meanwhile, laws and regulations on water quality and pollution control should provide a framework for safe drainage water management (Abdel-Gawad, 2013). Farmer awareness and training programs for managing the relatively saline water areas are also essential.

As in any complex water management system, planning drainage water reuse projects requires an integrated approach that looks into the functions of the natural resources systems (goods and services) and values attributed to these functions by people within and outside the reuse domain as well as at the short-and-long terms (Abdel-Dayem et al., 2007). Participatory approaches involving all stakeholders are essential for planning and management with full buying in from stakeholders.

Pollution Prevention Provides Clean Water for Wide Usability

Understanding the tradeoffs in reusing drainage water and its impacts on crops, soil, health and the environment will ensure that reuse programs can be designed and maintained in a way that meets the essential economic, social, and environmental requirements.

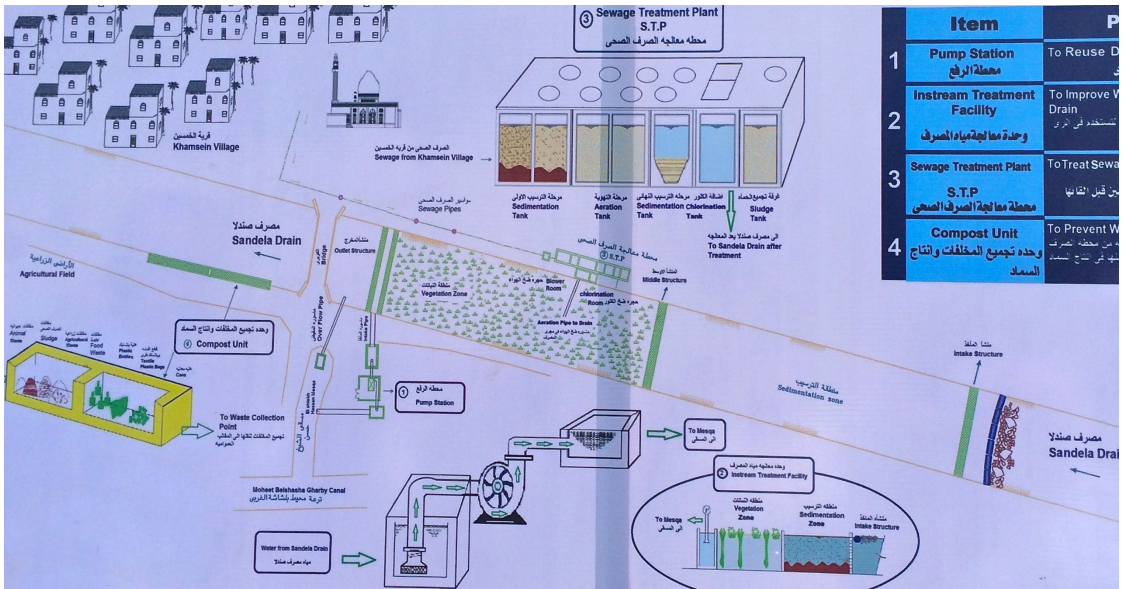


Figure 2: Decentralized wastewater treatment combined with in-stream wetland for reuse in irrigation in rural areas.

Risks associated with drainage water reuse are mainly due to its salt and agricultural chemical contents. However, risk increases when untreated domestic and industrial wastewater is disposed into agricultural drains. Pollution and contamination of agricultural drainage water manifest itself in the form of increased acidity, and higher concentration of nutrients, sediments, salts, trace metals, chemicals as well as pathogenic organisms. As water quality deteriorates, water usability diminishes, intensifying water scarcity, increasing health risks and damaging the environment, including fragile ecosystems. Prevention of pollution strategies should focus on reduction or prevention of pollution at source. Prevention is widely regarded as the cheapest, easiest and most effective way to protect water quality. Addressing the water pollution problem in the Arab region will significantly improve the usability of the agricultural drainage water. Meanwhile, research and pilots involving local communities for identifying cost-effective technologies for controlling pollution in agricultural drains should be encouraged (Figure 2).

Policy Recommendations

The following set of policy recommendations will support drainage water reuse in terms of improved legal and institutional arrangement; financial and economic returns; technology and infrastructure; and more effective tools for planning, management, and knowledge development.

Governments in the Arab region have to include agricultural drainage water management and reuse in their national water, and agricultural policies. Governments' relevant institutions should also develop technical criteria, use guidelines and legal and regulatory frameworks for agricultural drainage water reuse.

Governments also have the responsibility to support and encourage research to explore low-cost treatment options and reuse implications on freshwater quality, public health and the environment. This will help develop management options, evaluation criteria and guidelines for beneficial and safe reuse.

Policy-makers should use the updated evidence concerning crop production and health impacts associated with the use of drainage water in agriculture and develop rational and cost-effective policies for managing and protecting water quality to maximize the beneficial use of natural resources.

The Arab Water Council and its partners should support governments and users in developing drainage water reuse policies and guidelines, offer regional awareness and capacity building programs and disseminate information on good practices.

For Further Reading

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