BUSINESS MODEL PROFILES: WATER
SUMMARIZED FROM THE FORTHCOMING PUBLICATION
RESOURCE RECOVERY FROM WASTE
CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems
LED BY: IWMI International Water Management Institute

Inter-sectoral Water Exchange

Business characteristics

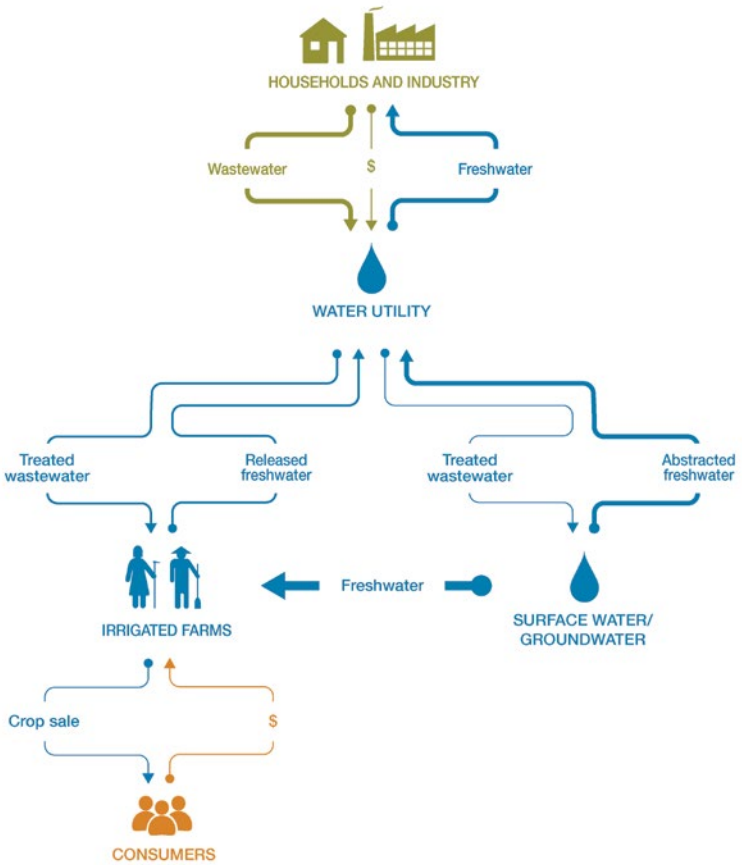
Geography	Temporarily or continuously water-short areas where urban and agricultural water demands could be better aligned
Scale of production	Medium to very large scale
Type of organization	Public, public-private partnership (PPP), or private
Investment cost range	Can vary in large margins depending on how far existing treatment infrastructure meets standards for irrigation and distance for water transport
Key costs	Capital investment in treatment and water conveyance, operation and maintenance (in particular, water pumping, quality monitoring), and the cost of awareness campaign for exchange, and safe wastewater reuse training
Revenue stream	Sales of wastewater (optional), sales of gained freshwater and indirect revenues (saving on socioeconomic costs and damage claims from inability to supply water during periods of drought)

Business model

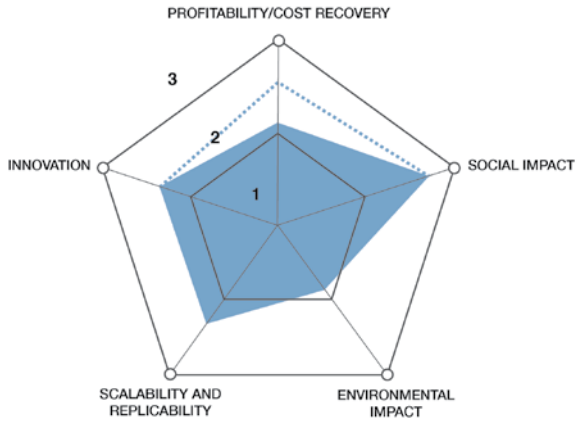
The business model supports the transfer of freshwater used in agriculture to urban areas for domestic use in exchange for treated wastewater. This model is increasingly gaining importance where urban water demand can no longer be (economically) met through local reserves, long-distance transfer or desalinization.

The business is initiated by a public or private water utility, which makes an agreement with farmers or their water user associations. Once set up, the farmers transfer freshwater rights to the water utility on demand or continuously. The utility then sells it to urban consumers for domestic use at a higher price. In return, the water utility transfers treated wastewater from households and industries to the farmers to irrigate their crops. The revenue generated from urban consumers can support cost recovery of water transport and treatment. The business depends strongly on the incentives offered to (and accepted by) farmers to release their freshwater. Also, the water utility may have to invest in additional treatment capacity and water conveyance, as conventional treatment might result in water that is too high in contaminants or salinity for crop irrigation. While such investment might appear high, the costs to urban society of any extended drought will easily justify the measures.

BUSINESS MODEL VALUE CHAIN



Business performance



The business model scores particularly high on social impact thanks to the increased supply of freshwater provided to urban households during periods of drought, and the guarantee for farmers in receiving reclaimed water all year round. It performs less well on environmental impact, as under severe drought, highest priority is usually given to immediate socioeconomic needs and benefits. Profitability of the model multiplies with the duration of droughts and decreasing urban water availability.

Main risks

Market risks: Fragile market, with business success depending on willingness and availability of enough farmers to exchange freshwater against reclaimed water.

Competition risks in water swaps: Farmers could continue using freshwater, the city could receive freshwater through desalination or long-distance transfer at lower costs or less (human) risks and/or technical advances could allow to treat wastewater to potable quality making the swap redundant.

Political and regulatory risks: The business requires that farmers have well-defined water rights or entitlements, which can be transferred, and regulations that allow the use of (partially) treated wastewater on farms serving local markets.

Social equity-related risks: The inclusive planning process required by this model can be hindered depending on the political power of each actor, notably the usually significant power of urban centers.

Safety, environmental and health risks: Health risks from the use of treated wastewater on farms can affect the farmers themselves and, depending on the produce and the way it is consumed, the urban consumers.

Case study: Mashhad Plain, Iran

In the city of Mashhad, Iran, the regional water company has negotiated the exchange of freshwater rights from farmers' associations in the Mashhad Plain in exchange for the supply of treated wastewater from the city. The main objective is to mitigate the impact of increasing water scarcity in the urban area and to improve farmers' continuous access to water, especially in view of the declining groundwater table in the Mashhad Plain.

The exchange of reclaimed water against reservoir water rights is one of two parts of a larger water swap project. It involves a number of villages downstream of two dams with the aim of exchanging fixed volumes of water annually: 15.7 and 9.4 million cubic meters (Mm^3) of treated wastewater for 13 and 7.8 Mm^3 of water rights (freshwater) from the Kardeh and Torogh dams, respectively. The project was implemented from 2005 to 2008 and most of the treated wastewater has been distributed to agricultural lands, and the freshwater from the reservoirs has been transferred to the city as drinking water. However, more efforts are needed to improve the quality of the treated wastewater and capacity of farmers on how to use it safely.

Key performance indicators (as of 2011)

Capital investment:	USD 6 million (Kardeh Dam area only)
Operation and maintenance cost:	USD 650,000 (Kardeh Dam area only)
Output:	Release of about 21 Mm^3 of freshwater for municipal use (13 Mm^3 from Kardeh area)
Potential social and environmental impact:	Cost savings in water extraction, improvements in urban living standard and economic development (including tourism) because of additional freshwater for Mashhad, reduced over-exploitation of aquifers, rivers and lakes, and benefits for ecosystem services

For more information on the business model and related cases, see Chapter 17 of **Otoo, M.; Drechsel, P. (Eds.). 2017. *Resource recovery from waste: Business models for energy, nutrient and water reuse in low- and middle-income countries.* London: Earthscan/ Routledge. In press.** The book has been produced by the Resource Recovery and Reuse subprogram of the International Water Management Institute (IWMI), under the CGIAR Research Program on Water, Land and Ecosystems (WLE) and its Rural-Urban Linkages Research Theme.

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