Project Background or Rationale
In Vietnam, a large number of urban and peri-urban farmers rely on wastewater for irrigated agriculture and aquaculture. In Hanoi alone, an estimated 658,000 farmers use wastewater to irrigate 108,178 ac (43,778 ha) of land (Raschid-Sally and Jayakody, 2008).

Thanh Tri is a peri-urban district located in the south of Hanoi, downstream of the To Lich River, one of the main streams contaminated with wastewater from urban areas. Irrigation systems designed to uptake water from the To Lich River have been in use in some communes of the district water since the 1960s and are used to irrigate hundreds of hectares of agricultural land.

In recent years, increased contamination from urban wastewater and industrial effluents has created problems for the traditional practice of wastewater reuse: loss of agriculture and aquaculture production affect the health of farmers and consumers. Thanh Liet commune in this district has designed a decentralized wastewater management system (DWMS) to accommodate wastewater reuse.

Capacity and Type of Reuse Application
To combat the negative impact of wastewater effluent on crops, productivity, public health and the increase of unusable land, the Local Agriculture Cooperative (LAC), in agreement with local farmers, decided to transfer large areas of low productivity agricultural land to fishponds by gathering farmers’ fields and leasing them to fish raising men. In other words, the intervention does not seek to change the quality of the water itself, but instead change the type of reuse application to aquaculture, which is a safer use of the contaminated water.

The fishpond areas in Thanh Liet were originally used as a low land paddy for rice. Rice is less tolerant to contaminated water, so they shifted to other aquatic vegetables and fish ponds, which also have higher market values. Aquatic vegetables and fish production can generate 120 million Vietnamese dong (VND) per ha per year and 150 million VND/ha-yr ($5,760/ha-yr and $7,200/ha-yr), respectively which is three times higher than rice production. The total land area dedicated to aquaculture in Thanh Liet has increased over the last 10 years from about 25 to 85 hectares (60 to 210 acres) in 2011. More constructors are interested in this area since they could get substantial benefit from wastewater fed fishponds.

Institutional/Cultural Considerations
Thanh Liet commune area has a population of 241,000 people (2010) and is not yet covered by the service from Hanoi Sanitation and Drainage Company (SADCO). Therefore, the management of local sewerage and drainage system belongs to the commune’s People’s Committee (PC), who delegates the task to the LAC of the commune.

There is a policy for providing water for irrigation free of charge, creating a financial barrier for the LAC to invest in improving irrigation water quality and involving local farmers to the operations and maintenance (O&M) activities of the system.

Water Quality Standards and Treatment Technology
There are no official regulations for wastewater use in Vietnam, except for microbiological quality standards specifying a maximum total coliform count for effluent discharge to surface water.

Project Funding and Management Practices
For the construction of drainage canals and sewers along the roads of the commune, funding is mobilized from the city’s budget, via the District PC. In some cases, local farmers contribute, especially for their household connection to the drainage lines. Under the
management of the local PC, the Thanh Liet LAC is assigned the function to operate water supply, sewage, drainage and irrigation systems. They are also providing other agricultural services for farmers such as supply of fertilizers, seeding crops and fish fingerlings.

Institutional decentralization has created a strict separation of institutions at upper levels of management, causing difficulties for the LAC to integrate irrigation, drainage and sewage management at the local level. For instance, all of the wastewater collected by the centralized wastewater system in Hanoi is discharged to the upper level of the canals. The LAC is unable to collect the wastewater discharge fee to cover the cost of treatment; therefore the water from these canals is diverted to the local irrigation system without proper treatment.

Locations of fishponds are usually along the open drainage canals. One reason is the availability of leased land; since the soil is contaminated with wastewater and not suitable for growing crops, another reason is that fishermen could actively exploit the wastewater and do not solely depend on the LAC’s pumping services. Meanwhile, the cropping land is about 250 ac (100 ha) of which only 25 ac (10.5 ha) is used for cultivating rice and the rest is for aquatic vegetables. These fields are located further from drainage canals to reduce the impact of wastewater since the quality of the wastewater is improved in terms of nutrients, pathogens, and heavy metal concentration after partial treatment in ponds with the presence of aquatic plant cultivation and long channels.

Farmers and fishermen experience the negative impacts from wastewater such as skin and worm diseases. They have carried out different measures to reduce perceived impacts. Fishermen are more proactive; they combine wastewater and groundwater to dilute the wastewater, and in addition, wastewater pumps provide more oxygen to boost wastewater treatment process through biochemical oxygen demand breakdown in the ponds. Farmers and fishermen wear protective clothes while working to reduce the exposure level to wastewater.

Moreover, the farmers and fishermen are encouraged to participate in the agricultural extension training program organized by the LAC and the extension division of the district. The content of these training programs include the safe practice of wastewater reuse. Most of the crops and all fish products are required to be cooked before eating.
Through a combination of various activities, e.g., conjunctive use of wastewater and groundwater, protective gear, improving hygienic condition, and raising awareness among producers and consumers, the impact of wastewater reuse has been minimized to a certain level. The practice of wastewater reuse in Thanh Liet behaves as spot market with complex and unpredictable long-term outcomes.

Despite the numerous challenges, the DWMS of Thanh Tri could provide a concrete framework to build up an integrated system of wastewater reuse for irrigation at a local level where decentralized provision allows wastewater reuse to maximize resource recovery, i.e., where wastewater is collected and treated to the acceptable level for agriculture and aquaculture use in the area.

Finally, further studies on the measurements taken out by the Thanh Liet people and reinforced with scientific base are needed to support the management of LAC by providing information to set up guidelines, standards, and regulations of the reuse of wastewater for application in other areas of the country.

References

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