

Wastewater Reuse through Aquaculture in Hanoi: Status and Prospects

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Objective

At present, there are only preliminary and/or incomplete descriptions on the development and potential of wastewater reuse through aquaculture which has been practiced in Hanoi since the early 1960s. A field study was carried out to describe its historical development and to evaluate the current status and prospects of wastewater-fed aquaculture production in the Thanh Tri District, the main wastewater reuse area of Hanoi city.

The specific objectives were to:

- describe the historical development and the different farming systems;
- determine the main constraints and the potential of the system in the context of high economic growth rate and rapid urbanization; and
- offer recommendations for further research and development of the system.

Methods

This study was of an exploratory nature and the survey followed the methodology recommended by Weber and Tiwari (1992). For data collection and information gathering, methods of rapid appraisal and a combination of personal observations and standardized questionnaire surveys were used.

Almost all farms with wastewater reuse were interviewed to obtain primary data. A stratified random sampling technique (Miah 1993) was used to increase representativity and precision. A total of 92 farms from these four production systems (24, 19, 30 and 19 from Production Systems I, II, III and IV, respectively) which were fed either with or without wastewater were interviewed using standardized questionnaires.

Data collected from the farm household survey were entered in a Dbase computer package. For statistical and economic analysis SPSS was used.

Results

In Thanh Tri district (figure 2) the total aquaculture area was 1121 ha or 19 percent of total farmed area (as at 1995). This figure shows a 120 percent increase from 1985. From this area more than 3,000 tonnes/year of fish (10% of the total fish supply for Hanoi city) are produced. Aquaculture should be retained in the Thanh Tri district for improving and extending to new

farming areas (as recognised by the Hanoi authorities in the Master Plan for City Development 1993). All interviewed farmers displayed a strong willingness for obtaining wastewater and improving their present system of production.

Four farming systems: fish-only, rice-fish culture, fish seed and vegetables were practiced in the wastewater-fed production area. In the fish “grow-out” system, a polyculture of Mozambique tilapia (*Oreochromis mossambicus*) and Nile tilapia (*O. niloticus*), two Indian major carps (Rohu, *Labeo rohita* and mrigal, *Cirrhinus mrigala*), and Chinese silver carp (*Hypophthalmichthys molitrix*), was practiced in wastewater-fed earthen ponds. While tilapia had precocious, uncontrollable breeding, slow growth rates and were small in size at harvest, rohu and mrigal were the most popular species in farmed areas both with and without wastewater supply. In wastewater-fed fishponds, fish yields ranged from 4.7 tonnes/ha in rice-fish culture to 5.6 tonnes/ha in fish-only culture during the 10-month growing season.

Privatization of land use rights has made it difficult to supply wastewater to fish ponds resulting in a decrease in the area of wastewater-fed aquaculture. The systems were highly efficient economically and had a positive sociological impact because of higher gross margins and job opportunities than the rice-only production system.

Conclusions

Wastewater-fed aquaculture is a well understood and well established production system and has been developed mainly through farmer experience accumulated over the past 30 years. Production systems have gained importance for local people and the Hanoi authority in terms of socioeconomy, environmental improvement and resource recovery. As such, it has received much attention in the city and district development plans.

Techniques and skills developed are still far from sustainable and optimal in achieving the dual objectives of aquaculture production and treatment of the wastewater.

Further studies and development of the systems should focus on the improvement of the effectiveness of wastewater-fed fishpond systems in terms of wastewater treatment and reuse through aquaculture, rice and vegetable culture and their potential health risks.

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