

## Challenges

Fast-growing urban populations and cities generate increasing volumes of domestic and industrial wastewater. This wastewater is used for aquaculture and agriculture production, being often the only (reliable) source of water and nutrients available. Although municipalities are increasingly aware of the significance of the practice and the benefits it can bring, they often do not know the practical recommendations available to make wastewater use safer and more sustainable, without relying on non-affordable treatment technologies alone.

The long-term goal of integrated waste management will always be to move from unregulated use of untreated wastewater to a more regulated and multi-beneficial approach. Environmental legislation should be strengthened and wastewater discharge into public water bodies better monitored and regulated, while low-cost treatment systems are being provided. The level of necessary wastewater treatment however, can vary if complementary health risk reduction strategies are put in place.

The highest priority in the short term should be to minimise daily risks to producers and consumers, which is possible with modest investments. Awareness raising, promoting use of various health-protection measures during production and marketing, and improving institutional coordination are intermediate options for risk-management (IWMI, Water Policy Briefing Series, Issue 17; [www.iwmi.cgiar.org/waterpolicybriefing/index.asp](http://www.iwmi.cgiar.org/waterpolicybriefing/index.asp)).

## Managing health risks to develop wastewater into a valuable resource and asset

### Increasing water scarcity calls for wastewater re-use

According to an estimate based on the UN Medium Population Projections (1998), more than 2.8 billion people in 48 countries will face water stress or scarcity conditions by 2025. Of these countries 40 are in Asia and Africa. By 2050, this number could almost double. What are you planning to do with your city's wastewater: waste it or re-use it?



### Wastewater use has multiple benefits

Peri-urban aquatic production systems can effectively use and treat wastewater, while providing food and income to the urban population. Systems growing fish and edible aquatic plants in considerable quantities in Phnom Penh (Cambodia) and Hanoi (Vietnam) have been shown to reduce numbers of faecal micro-organisms and parasites to levels where the outlet water often meets the proposed guidelines values of the World Health Organisation for wastewater irrigation. Alternative traditional technologies and methods for treatment of the city's wastewater are in most cases considered not to be as practical and comparable in cost.



### Need to minimise risks

Municipalities, producers and consumers are however also increasingly aware of associated health risks related to wastewater use, in case adequate measures are not taken. The given recommendations tackle this issue from different points, aiming to maintain benefits whilst minimising risks, and harmonizing with new WHO guidelines.





# Managing health risks to develop wastewater into a valuable resource and asset

## 1 Separating industrial and domestic wastewater

Increasing pollution and contamination of the city's domestic wastewater with industrial wastewater effluents is a major constraint to the continued viability of aquaculture in many areas. The future potential for growing aquatic vegetables and fish using urban wastewater will depend on the city planners' ability to coordinate and develop strategies for effective separation of toxic industrial waste from domestic sewage. There are already encouraging examples in Hanoi and Ho Chi Minh City (Vietnam) of relocation and zoning of urban industries to industrial parks which allow for more effective treatment and monitoring of effluents. In the medium term, enforcing existing pollution control legislation to control contaminants at their source and monitoring and regulation of industrial wastewater discharge in public water sources can already be effective in reducing health risks.

## 2 Providing low-costs wastewater treatment systems

From a treatment perspective, emphasis should be placed on the one hand on treating wastewater contaminated with chemicals before it enters the domestic wastewater stream. On the other hand, low-cost and farm-based systems, which re-use valuable nutrients, while removing pathogens, should receive more attention. Fish and aquatic vegetable production systems can remove significant levels of nutrients and pathogens contained in wastewater, thus reducing pollution of other surface water. Moreover the technologies are easy to use locally and more affordable than alternatives. Investment and operation costs for stabilization ponds integrating aquatic production are as much as 80% lower than conventional activated sludge or trickling filtration systems, although requiring a larger area.

## 3 Applying proper protection measures in production and marketing

Recent research shows that producers engaged in wastewater-fed aqua- and agriculture experience a number of skin problems at higher levels compared with farmers engaged in non-wastewater activities.

However, little information or guidance is provided to the farmers on how to best protect their health. Protective measures, like the use of gloves and boots, are rarely used as they slow down work. Additionally, skin problems are considered temporary problems that disappear after treatment. More attention should be paid to perception studies to understand producers' needs and identify better protective measures, while at the same time providing incentives for safer farming practices, such as certification programmes for safer crops or awards for innovative farmers.

Research also highlighted the practice of washing produce in wastewater or faecal contaminated water during transport and at local markets for a "fresh and clean" appearance. Producers, traders and authorities should be made aware of post-harvest contamination and access to clean water and sanitation facilities in markets should be provided. Meanwhile, consumers' awareness on safe food and local food disinfection methods (washing, cooking) should be increased, product quality be monitored, and product certification schemes implemented (see also Brief 4).

## 4 Improve institutional coordination

Sanitation, health, agricultural and environmental guidelines and legislation are usually the responsibility of different agencies and often overlap or conflict. Aquaculture, health, waste water management and food safety institutions need to collaborate further to jointly identify and produce research-based data on specific food safety parameters for waste and non-wastewater produced fish and plants, and make these data widely available. They should also work together in choosing the locally appropriate and feasible combination of risk-reduction strategies, in order to encourage their implementation and institutionalisation.



**DFID** Department for International Development

**AFGRP** aquaculture and fish genetics research programme

**ETC** ETC AGRICULTURE



**PAPUSSA** Production in Aquatic Peri-urban Systems in Southeast Asia



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