Using potable water in family farming, Belo Horizonte – Brazil

First Edition – March 2003

No. 6

GUIDELINES FOR MUNICIPAL POLICYMAKING ON URBAN AGRICULTURE

Treatment and Use of Wastewater in Urban Agriculture

Four Reasons Why Urban Agriculture Matters

Hunger is growing
In less than 30 years, the number of people who go to bed hungry in Latin America has increased by 20%: as many as 65 million people are now affected. Feeding the entire population is a challenge that cities must meet.

Natural medicines for all
The poor spend between 40 and 60% of their scarce incomes on food and almost 15% on health care and medicine. The production of medicinal plants and derived products — infusions, extracts, and essences, — facilitates access to health care for the very poor and marginalized.

Recycling wastes and wastewater can help ensure food security in cities
Only 2% of the waste produced in our cities is treated properly. Thousands of cubic meters of wastewaters are not being used or are treated at a high cost. These can be transformed, however, into excellent sources of natural fertilizer, irrigation water, and nutritional supplements for animals.

Creating low-cost employment and generating income
Urban agriculture (UA) generates employment at a low cost in relation to the estimated costs of other productive sectors. Creating on job in UA costs less than US $ 500, an investment that can be recovered through micro-credits.

The benefits in terms of food, health, the environment, and job creation explain why an increasing number of municipalities want to develop and modernize their urban agriculture programs.

This series of guidelines is based on current scientific and technological research and reflects innovative practices in cities in the region. These practices are a source of inspiration: we invite you to share them and, in turn, enrich the experience.

Happy urban harvesting!

Y.C.

Pollution of water sources, Maracanaú – Brazil

Challenges

Wastewater treatment plant, Mexico City – Mexico

The treatment and use of wastewaters is both a challenge and an opportunity for municipalities in Latin America and the Caribbean. It is a challenge because the use of nontreated wastewater is often the only option available to periurban farmers. Currently, about 80% of wastewater is discharged untreated into bodies of waters or is used for irrigation in farming. This poses potential serious health problems because of the presence of bacteria, viruses, and parasites. It is an opportunity because wastewater is a valuable resource, not only from the economic viewpoint but also from an environmental perspective (conservation of water resources, nutrient recycling, etc.).

The development of programs for the treatment and use of wastewater in urban agriculture means being able to manage health risks and to facilitate the adoption of appropriate technologies at the municipal or neighbourhood levels.

Regulations that promote financial sustainability and the integration of treatment and usage systems need to be developed and adopted.

This document provides guidelines and suggestions for developing and implementing urban agriculture programs that include the use of wastewater.

"The use of wastewater has emerged as an alternative to the lack of access to potable water services in periurban and rural areas. It also responds to the immediate needs of communities."

Donatilda Gamarra. Municipal Councillor and President of the Special Committee for the Environmental Program. Municipality of Villa El Salvador, Peru (1998-2002).

Four Guiding Principles for Policymaking

In support of the treatment and use of wastewater in urban agriculture

Irrigating with nontreated wastewater, Curaça – Brazil

1. Applying risk-management strategies

In many situations, wastewater is the only source of water for irrigation. Once this is realized, guidelines and mechanisms should be put in place for reducing the health risks associated with the use of nontreated wastewater in farming. At the same time, wastewater treatment should be promoted.

Education and political campaigns

For many, educational campaigns targeted at raising awareness and providing information to different actors are the most realistic, affordable, and efficient means of disseminating information about strategies for managing health risks. These strategies include monitoring water quality, selecting appropriate crops, managing irrigation techniques effectively, and treating produce.

Monitoring water quality

An on-going process for monitoring water quality, soils, and products should be established, with options for certifying and selling "clean" crops at a higher price.

It is also necessary to coordinate actions with municipal, national and/or state laboratories, and to enter into agreements with universities or private agencies for controlling and monitoring the quality of treated wastewater.

Monitoring water quality, Fortaleza – Brazil

In San Juan de Lurigancho (Lima, Peru), the NGO CENCA and the municipality reached an agreement with Universidad Agraria La Molina for monitoring the quality of wastewater used in UA.

Selecting crops

It is important to take into account the quality of wastewater to be used for irrigation when selecting the crops to be planted, since there are many ways in which the plants can become contaminated with pathogens and heavy metals.

The Complejo Bioecológico in San Juan (Lima, Peru), with the assistance of the Centro Panamericano de Ingeniería Sanitaria y Ambiental (CEPIS/OPS-OMS), is using 23 ha. for stabilization lagoons, which accommodate the use of water at various stages of treatment. Depending on the level of treatment (higher or lower), the water is used for different applications, such as forest and recreational parks, fodder, fresh vegetable farming, and aquaculture (carp farming).

Applying proper techniques for irrigation and treating products

Appropriate irrigation practices include (a) irrigation to roots to avoid direct contact with the leaves, and (b) drip irrigation rather than flood irrigation, to avoid excessive irrigation and the contamination of underground waters.

Washing the products with clean water before offering them for sale and avoiding contamination during food processing, transportation, and sale are of equal importance.

2. Adopting appropriate technologies for the treatment of wastewater

Wastewater treatment for farming or recreational uses should be promoted. The selection and subsequent investment in suitable technology for water treatment should result from an evaluation process that has taken into account minimizing pollution, costs, the scale of the operation (city, neighbourhood, household), as well as the quality of water needed for specific purposes.

Separating industrial outflow from household outflows

The separation of household outflows from industrial flows reduces the contamination of water by heavy metals. Industrial parks need to have their own special treatment plants. The adoption of some industrial processes should be promoted (avoiding contamination during the process), as well as treatment at the source before discharging the water to the sewerage network in the city. Suitable urban planning is required, as well as cost calculation, because many cities have small industries, located in different places.

Selecting the technology for wastewater treatment

The most interesting treatment options are those designed to eliminate pathogens while keeping nutrients, as do, for instance, stabilization lagoons. Their investment costs are as much as 80% lower and the operation costs 90% lower than more sophisticated technologies, such as aeration plants or those activated with mud. Their installation, however, requires a larger area: it is therefore recommended to locate them at some distance from urban areas.

In 1976 the municipality of Mendoza (Argentina) licensed the operation of its almost 300 ha. stabilization lagoon plant to a private company. The company charges the city a fee of $0.05/m^3 of wastewater that enters into the facility and treats 50.7 million m^3 per year (1.6 m^3/s). The system directs the treated outflow to a farming area of over 2,500 ha., where grapes, fresh vegetables, fruit trees, and forests are grown using a combination of treated wastewater with water for irrigation. Despite the close relationship between the water company and the farmers, they have not yet negotiated a comanagement process and conflicts often arise from the management of water and access to this resource.

Alternative sanitary treatments could also be used for treating sewage and graywater at the household or neighbourhood level, with a cost under US$200 per unit.

The CEDICAR NGO in Mexico City (Mexico) and CENCA NGO in Lima (Peru), developed a system for treating excrements. The system separates solid waste from liquid and after a period of storage (18 months), the solid waste is transformed into compost. The liquid is channeled to phyto-treatment plants and is used for irrigating green areas or for agricultural purposes.

3. Developing an enabling political framework

The treatment and use of wastewater should be included in a coherent, pertinent legal and regulatory framework linked to physical planning. Developing new or reforming existing regulations should be considered (national or local), such as sanitation, environmental, and agricultural legislation.

Coordinating the actors involved

It is also important to create mechanisms and opportunities for coordination and concertation between the institutions in charge of regulations, the management of wastewater, and the final users.

Including wastewater treatment and use in municipal planning

The location of water treatment systems should be determined in coordination with the planning and land management departments, taking into account (a) the quantity of land required; (b) the relationship between where water treatment takes place and where it is used; and (c) future urban development. (See Guideline 3.)

In Villa El Salvador (Lima, Peru), the municipality included the construction of water treatment plants for irrigating recreation parks in its urban development plans. They are currently exploring the possibility of initiating UA activities, either family farming or group farming operations, in the same areas.

Phytotreatment of wastewater, Lima – Peru

4. Determining the financial sustainability of wastewater treatment and use

For water treatment plants to be financially sustainable, wastewater treatment and use systems need to be integrated. All the costs involved in the implementation of these systems need to be calculated, as well as their direct and indirect benefits. Finally, it is important to determine who will be responsible for covering the cost of the treatment and use of wastewater.

Cost-benefit analysis

It is necessary to take into account installation, operation, and maintenance costs of the water treatment systems, as well as the benefits of using treated water. The benefits could be direct (income generated through farming) and indirect (savings from using less potable water and fewer fertilizers).

Determining the cost of wastewater treatment and use

The application of the "polluter pays" principle should be adopted as a priority. The industry and the urban population should assume the cost of treating the wastewater they produce.

Farmers, on the other hand, should pay for the use of treated water, just as they pay for potable water. Only in the case of low-income farmers should the central or local government assume the cost as part of their social policy.

Wastewater treatment lagoons, Paranuá – Brazil

"Livelihood and food security should be protected and improved, mitigating the risks to health and the environment and conserving water resources, facing the reality concerning the use of wastewaters for agriculture production by adopting suitable policies and by committing the financial resources required for its implementation."

Hyderabad Declaration, signed by 27 national and international institutions from 18 countries. Hyderabad, India, 2002. (www.iwmi.org)

Selected Bibliography:

CENCA. *Propuesta innovadora y sostenible de evacuación, tratamiento y reuso de residuos sólidos y líquidos domésticos.* USAID, COSUDE and the World Bank. Lima, 2002. (www.chez.com/cenca)

Helmer, Richard and Hespanhol, Ivanildo. Control de la contaminación del agua. Guía para la aplicación de principios relacionados con el manejo de la calidad del agua. CEPIS/OPS-OMS. Lima, 1999. (www.cepis.ops-oms.org)

León, Guillermo and Moscoso, Julio. Curso de tratamiento y uso de aguas residuales. CEPIS/OPS-OMS. Lima, 1996. (www.cepis.ops-oms.org)

CEPIS/OPS-OMS. Resumen ejecutivo, Proyecto Regional "Sistemas integrados de tratamiento y uso de aguas residuales en América Latina: realidad y potencial". IDRC and CEPIS/OPS-OMS. Lima, 2002. (www.cepis.ops-oms.org. See aguas residuales-proyecto regional)

CEPIS/OPS-OMS. Guía para la formulación de proyectos, Proyecto Regional "Sistemas integrados de tratamiento y uso de aguas residuales en América Latina: realidad y potencial". IDRC and CEPIS/OPS-OMS. Lima, 2002. (www.cepis.ops-oms.org. See aguas residuales-proyecto regional.)

Contacts:

Francisco Arroyo. Director. Centro de Investigación y Capacitación Rural AC, CEDICAR. Mexico City, Mexico. Tel.: (52 5) 641 90 22; Email: farroyo@laneta.apc.org.

Jaime Zea. Mayor of Villa El Salvador, Lima, Peru. Tel. (511) 909-8250 Fax (511) 287-6485; Email:jazu37@latinmail.com/ jzea10@hotmail.com

Juan Carlos Calizaya. Advisor on urban rivers. Instituto de Desarrollo Urbano, CENCA, Lima, Peru. Tel.: (51 1) 421 58 66 / 466 00 12 / 466 00 14; Email: cenca@terra.com.pe.

Julio Moscoso. Advisor on wastewater use. Centro Panamericano de Ingeniería Sanitaria y Ambiental (CEPIS/OPS-OMS), Lima, Perú. Tel.: (51 1) 437 10 77; Email: jmoscoso@cepis.ops-oms.org

Eduardo Barbeito. Advisor on wastewater use. Mendoza, Argentina. Email: edubarbeito@infovia.com.ar

Fish farming in stabilization ponds, Argentina

Treatment and Use of Wastewater in Urban Agriculture

No. 6

This document was developed from a background paper written by Jorge Price (Executive Director, IPES).

Edited by *Marielle Dubbeling and Alain Santandreu (IPES/PGU-ALC)*

Text copy-edited by *Nancy Sánchez and Mónica Rhon D.*

Advice on Communication and Design: *Roberto Valencia (Zonacuario)*

This policy document is part of a series of nine guidelines on different urban agriculture themes:

1. *Urban agriculture: A tool for sustainable municipal development*
2. *Urban agriculture and citizen involvement*
3. *Urban agriculture: Land use management and physical planning*
4. *Micro-credit and investment for urban agriculture*
5. *Recycling organic wastes in urban agriculture*
6. *Treatment and use of wastewaters in urban agriculture*
7. *Urban agriculture: Fostering equity between men and women*
8. *Urban agriculture and food sovereignty*
9. *Processing and marketing urban agriculture products*

The series is available on the Web sites of the Urban Management Program ***(www.pgualc.org)*** *and IDRC* ***(www.idrc.ca)***

This work was coordinated and financed by the International Development Research Centre (IDRC), of Canada, the Urban Management Program for Latin America and the Caribbean (PGU-ALC/UN-HABITAT) in Ecuador, and IPES, Promotion of Sustainable Development, Peru.

IDRC CRDI

International Development Research Centre
250 Albert St, PO Box 8500
Ottawa, ON, Canada K1G 3H9
Tel.: (613) 236-6163, ext. 2310
Email: blwilson@idrc.ca
www.idrc.ca

IPES
Promotion of Sustainable Development
Jorge Price, Executive Director
Calle Audiencia Nº 194, San Isidro
Apartado Postal 41-0200
Tel.: (51 1) 440-6099/ 421-6684.
Email: ipes@ipes.org.pe

PNUD
Programa de Gestión Urbana
Regional Office for Latin America and the Caribbean
UN-HABITAT
Yves Cabannes, Regional coordinator
García Moreno 751 entre Sucre y Bolívar
Fax: 593-258 39 61 / 228 23 61
Email: pgu@pgu-ecu.org
www.pgualc.org

Canada