



Questionnaire

to support the
Individual's Capacity Needs Assessment
In the framework of the
Joint FAO/ UNW-DPC/UNU-INWEH
Capacity Development Project on
Safe Use of Wastewater in Agriculture
Phase I

General Objective of the Questionnaire

The Food and Agriculture Organization of the United Nations (FAO), the UN-Water Decade Programme on Capacity Development (UNW-DPC), and the United Nations University Institute for Water, Environment and Health (UNU-INWEH), in collaboration with designated national coordinators, are compiling data on the existing knowledge and skills for the safe use of wastewater (including greywater) in agriculture.

The questionnaire is addressed to key institutions and organisations in developing countries or in countries in transition, with competences on safe use of wastewater in agriculture. Your organization has been identified as one of these organizations. The aim of the questionnaire is to help in the classification and prioritisation of the knowledge and skills on the safe use of wastewater in agriculture that individuals working in your organization may need.

The questionnaires results will be collected by designated national coordinators and summarised in a National Report.

Please provide full contact information of your organization so that national coordinators may communicate directly on technical matters, if necessary.

For additional glossary and definitions related to safe use of wastewater in agriculture please refer to WHO/FAO/UNEP (2006) Guidelines for the safe use of wastewater, excreta and grey water. Volume II: Wastewater use in agriculture. World health Organization, Geneva. (Available at http://www.who.int/water_sanitation_health/wastewater/gsuweg2/en/index.html)

Filling out this questionnaire will take about 30 min. We highly appreciate your support in this task and look forward to receiving your reply.

Structure of the Questionnaire

This Questionnaire is divided into 8 sections referring to different capacity areas on the safe use of wastewater in agriculture:

1. Assessment of health risk
2. Health protection measures
3. Monitoring and system assessment
4. Crop production aspects
5. Environmental aspects
6. Sociocultural aspects
7. Economic and financial considerations
8. Policy aspects

Any other relevant capacity area is welcome. Please use the final section “Others” for this purpose.

Each of the above mentioned capacity areas is presented in a separate table that is divided in three columns:

The first column shows selected components (e.g. microbial and chemical laboratory analysis) of each capacity area (e.g. assessment of health risk).

The second column enquires about the current knowledge and skills of the pertinent staff in your organization in relation to the different components.

The level of the knowledge and skills can be rated as follows:

Poor = No or little knowledge in this area;

Basic = Some basic knowledge with a little experience;

Good = Good knowledge with experience;

Excellent = Demonstrable specialist knowledge in this area (ability to coach/train others).

The third column enquires about the importance that your organization allocates to a specific component to effectively play its role on the safe use of wastewater in agriculture.

The importance of the component can be rated as follows:

Very low = Not desirable/important/relevant

Low = Sometimes desirable/important/relevant

High = Highly desirable/important/relevant

Very High = Core function and very highly desirable/important/relevant

**Questionnaire on
knowledge and skills on
safe wastewater use in agriculture**

Organisation name.....

Organization type¹.....

Roles and Responsibilities²:.....

.....

.....

Reporting Office /Department and Contact Details

Reporter name:.....

Title/Level:.....

Specialization:

Department/office:.....

Address:.....

Country: Institute's Web site:.....

Tel:Fax:.....e-mail:.....

Please return the filled questionnaire (electronically and in hard copy) to:

National coordinator contact address and name

¹ e.g., national governmental organization, local governmental organization, research organization, university, professional association, NGO, other (specify)

² Refers to roles and responsibilities related to the safe use of wastewater in agriculture. e.g. national policy making, local policy making , project planning, advocacy and communication, research, extension, training, others (specify).

1 - Assessment of Health Risk

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Microbial and chemical laboratory analysis	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Epidemiological studies	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Quantitative microbial risk assessment - QMRA	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Setting health based targets	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Assessment of Health Risk – Definitions

Microbial and chemical laboratory analysis

Refers to materials and methods to implement effective laboratory analysis concerning the type and number of harmful chemical agents (e.g. heavy metals) or pathogens (viruses, bacteria, protozoa, helminths) in wastewater, soil and on crops.

Epidemiological studies

Refers to evaluation of risk of infections for farming families and local communities. This includes risk to consumers eating uncooked crops, risk to agricultural workers and their families, risk to local communities from sprinkler irrigation.

Quantitative microbial risk assessment - QMRA

Refers to the method for assessing risk from specific hazards through different exposure pathways. QMRA has four components: hazard identification, exposure assessment, dose-response assessment, and risk characterisation.

Health based targets

Refers to a defined level of health protection for a given exposure. This can be based on a measure of disease, e.g. 10^{-6} DALY³ per person per year, or the absence of a specific disease related to that exposure.

³ DALY (Disability Adjusted Life Years): population metric of life years lost to disease due to both morbidity and mortality)

2 - Health Protection Measures

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Wastewater treatment	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Non-treatment options	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Health Protection Measures – Definitions

Wastewater treatment

Refers to processes, design, construction, operation and maintenance of wastewater collection and treatment systems, including:

Primary treatment processes such as sedimentation tank, skimming and chemical enhanced primary treatment.

Secondary treatment processes such as Aerated Lagoon, Activated Sludge, Up-flow Anaerobic Sludge Blanket, Trickling Filters, Rotating Biological Contactors, Oxidation Ditch and Settling Basin Digester.

Natural biological treatment processes such as Waste Stabilization Pond, Constructed Wetlands, Overland Treatment, Nutrient Film Techniques, Soil Aquifer Treatment, High-Rate Algal Pond, and Floating Aquatic Macrophyte Systems.

Tertiary treatment processes such as Membrane filtration (Micro-; Nano-; Ultra- and Reverse Osmosis), Infiltration/Percolation, Activated Carbon and Disinfection.

Non-treatment options

Refer to the design and implementation of health protection measures (different than wastewater treatment), such as:

Crop restriction: that refers to growing non-food crops (e.g. cotton and jojoba); food crops that are processed before consumption (e.g. wheat) and food crops that have to be cooked (e.g. potatoes and rice).

Selection of wastewater application techniques: that refers to the selection or irrigation methods to minimize exposure of edible plants, farm workers and nearby communities to wastewater.

Cessation of irrigation: that refers to the withholding periods to allow pathogen die-off after the last wastewater application and before the consumption.

Food preparation measures that refer to hygienic practices at food markets and during food preparation and health and hygiene promotion.

Human exposure control that apply to consumers, field workers and their families, and refers to the use of personal protective equipment (e.g. gloves and boots), health and hygiene promotion, chemotherapy and immunization.

3 - Monitoring and System Assessment

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Monitoring of health protection measures	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Wastewater use system assessment	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Monitoring and System Assessment – Definitions

Monitoring of health protection measures

Refers to the observation and inspection of the wastewater use system (combination of the health protection measures), collecting samples for analysis and establishing the necessary institutional arrangements to ensure the good management of the collected information to provide feedback to those that have implemented the health protection measures. Monitoring has three different purposes:

1. To prove that the system is capable of meeting its desired requirements (e.g. microbial reduction targets).
2. To provide information regarding the functioning of individual components of the health protection measures (e.g. wastewater treatment), on a routine basis.
3. To ensure that the system is achieving the specified targets (e.g testing for E.coli crop contamination), which usually takes place at the end of the process

Wastewater use system assessment

Refers to the comprehensive description and evaluation of wastewater use systems including identification of sources of hazards, the assessment of the risk and development and implementation of preventive strategies to manage the risks. It also requires an assessment of capabilities to meet targets.

4 - Crop production aspects

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Components of wastewater harmful to crop production	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Agricultural tradeoffs of wastewater irrigation	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Management strategies for maximizing crop production	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Crop Production Aspects – Definitions

Components of wastewater harmful to crop production

Refers to evaluation of the quality of wastewater in terms of concentration of elements that may have an adverse impact on the crop production (e.g. salts, toxic ions, suspended solids, etc)

Agricultural tradeoffs of wastewater irrigation

Refers to evaluation of positive effects (e.g. nutrient supply) and negative effects (e.g. salinity or sodicity) of using wastewater for crop production.

Management strategies for maximizing crop production

Refers to implementing of control measures to maximize crop production when using wastewater to irrigate. The control measures refer to: crops selection (e.g. less sensitive for toxic compounds of wastewater), good conditions (e.g. scheduling of irrigation, application of correct amount and quality of wastewater), irrigation methods (e.g. drip irrigation allows to maintain high soil water potential throughout the growing season and minimize the effect of salinity).

5 - Environmental Aspects

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Components of wastewater harmful to the environment	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Environmental effects through the agricultural chain	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Management strategies for reducing environmental impacts	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Environmental Aspects – Definitions

Components of wastewater harmful to the environment

Refers to evaluation of the quality of wastewater, in terms of concentration of elements that may have an adverse impact on the environment.

Environmental effects through the agricultural chain

Refers to evaluation of effects of using wastewater for agriculture on: soils (e.g. salinization and loss of soil structure), groundwater (e.g. contamination) and surface water (e.g. eutrophication).

Management strategies for reducing environmental impacts

Refers to implementing of control measures to minimise the environmental impacts. The control measures can be presented by polluting agent (e.g. control measure for excessive nitrogen is to dilute wastewater with fresh water when possible); or kind of problem (e.g. control measure for clogging of irrigation systems is to use water with low total suspended solids content).

6 - Sociocultural Aspects

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Cultural and religious beliefs	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Public acceptance	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Sociocultural Aspects – Definitions

Cultural and religious beliefs

Refers to cultural and religious factors that can limit the feasibility of a wastewater reuse system and the ways to overcome these limiting factors.

Public acceptance

Refers to the tools and methods to assess and attain communities' (farmers and their families, vendors, processors, consumers etc.) acceptance and confidence on wastewater use for agriculture. This includes public participation, education and information, public meetings, workshops, interviews surveys, questionnaires, etc.

7- Economic and financial considerations

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Economic feasibility	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Financial feasibility	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Market feasibility	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Economic and financial consideration – Definitions

Economic feasibility

Refers to assessment whether a project is affordable and has a positive internal rate of return (projects that provide the most benefits at least cost are the most desirable).

Financial feasibility

Refers to establishment of the sources of revenues and evaluation who will pay for what for a project.

Market feasibility

Refers to assessment of the ability to sell (treated) wastewater to producers and evaluation of the marketability of products grown with wastewater or greywater.

8 - Policy aspects

	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
Institutional roles and responsibilities	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Laws and regulations	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Plans and programs	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Economic instruments	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
Education and social awareness	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Policy aspects – Definitions

Institutional roles and responsibilities

Refer to the responsibilities, jurisdictions among public institutions and the coordination mechanisms among them

Laws and regulations

Refer to legal instruments to facilitate and govern (control) the safe use of wastewater for agriculture, (e.g. creating rights of access to wastewater, establishing land tenure, developing public health and agricultural legislation, etc.)

Economic instruments

Refer to financial tools that the public authorities can use to promote safe practices when using wastewater in agriculture and to share the costs of wastewater treatment and reuse projects (e.g. subsidies, taxes, water pricing, payment for environmental services, etc)

Education and social awareness

Refer to the education and training tools to increase knowledge and skill on the safe use of wastewater in agriculture, as well as the advocacy and communication campaigns to impact public perception and awareness

Others:		
	How are the <u>current knowledge and skills</u> of the pertinent staff in your organization in relation to:?	What is the <u>importance</u> of this subject for your organization?
	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>
	<i>Poor</i> <input type="checkbox"/> <i>Basic</i> <input type="checkbox"/> <i>Good</i> <input type="checkbox"/> <i>Excellent</i> <input type="checkbox"/>	<i>Very low</i> <input type="checkbox"/> <i>Low</i> <input type="checkbox"/> <i>High</i> <input type="checkbox"/> <i>Very High</i> <input type="checkbox"/>

Definitions