World Health Organization

Third edition of the Guidelines for the Safe Use of Wastewater, Excreta and Greywater in Agriculture and Aquaculture

Fact Sheet for Agricultural Policymakers

Stakeholder Group and Relevance

The third edition of the Guidelines intends to help authorities, professionals and farmers maximize public benefits while reducing health risks through the use of two common agricultural inputs: irrigation water polluted by human waste (wastewater/greywater) and/or human excreta.

Agricultural policy makers increasingly recognize that wastewater irrigation is a trend that cannot be ignored. As wastewater treatment remains underdeveloped in many countries, and its potential limited by high capital and maintenance costs, there are an estimated 20 million farmers around the globe who use untreated or only partially treated wastewater consciously or unconsciously often due to the lack of affordable alternatives. Especially in developing countries polluted stream water or even raw wastewater is increasingly used for agriculture in or around three of four major cities. This practice contributes significantly to (urban) food supply. Wastewater use can be an important coping strategy where fresh water is scarce.

Unless comprehensive wastewater treatment is in place, authorities from both the agricultural and health sectors have to strive at the right balance of protecting public health without losing the irrigation benefits and jeopardizing the associated livelihoods.

The third edition of the Guidelines for the Safe Use of Wastewater supports these efforts, as they can also be applied in countries where international standards for restricted or unrestricted wastewater irrigation are unsuitable. In fact, the third edition of the Guidelines does not prescribe rigid guideline values for irrigation water quality, but introduces the concept of realistic health-based targets to aim for in the local socio-economiccontext, be it through wastewater treatment and/or other options, on-farm or off-farm, alone or, preferably, in combination.

The Guidelines address all types of wastewater, generated in kitchens or bathrooms, coming from a broken sewer pipe or collected from river water heavily polluted by the settlements upstream. They can be applied to any size of farm, from a small urban farming plot to a medium or large-size irrigation scheme or a fish farm (aquaculture), irrespective of their geographic location. The Guidelines are as applicable to formally recognized irrigation systems using treated wastewater like the ones in the USA, Jordan, Israel and Tunisia, as to informal irrigation using untreated or partially treated wastewater like in urban and peri-urban areas where simple watering cans are the main infrastructure.

The risk and your role

Although wastewater and excreta are important farm inputs and sources of water and/or nutrients, they also contain harmful contaminants. These are mostly invisible pathogens like viruses, bacteria and parasites, as well as eggs of intestinal parasitic worms or chemical contaminants. If the risks from such farm inputs are not controlled, they can cause harm to the farmer, his/her family and community and those handling and consuming the irrigated crops or fish, especially if these are eaten uncooked (salad greens or fruits are examples). The resulting infections can result in fecal-orally transmitted diarrhoeal diseases (including cholera) typhoid, hepatitis and amoebic dysentery. All these diseases can also derive from poor water supply and sanitation at home, thus wastewater irrigation is not the only pathogen pathway which needs to be addressed, but, as many studies have shown, an important one.

The good news is that these health risks as far as they derive from wastewater irrigation can be controlled and minimized. Especially good news for agricultural policy makers is that the Guidelines no longer restrict irrigation where irrigation water quality is poor, but offer alternative options for risk reduction. The expert group supporting the production of this third edition of the Guidelines realized that in most developing countries functional wastewater treatment facilities are so rare that it is unrealistic to expect global water quality standards to be met. The experts also realized that insisting on any water quality standards would actually jeopardize the livelihoods of most farmers irrigating along polluted streams. The Guidelines therefore define health (and not water) based thresholds and a number of options how to reach these as good as possible in the local context. These options reduce pathogen levels at different entry points between the polluted water body and the consumer. In addition, the Guidelines outline ways for farmers to protect themselves.

In a number of countries policies and regulation have been put in place that reflect the strict, global guideline values proposed in the 1989 second edition of the Guidelines. National policy makers should review these existing policies and regulations, which would now be too rigid and restrictive, and adapt them to the procedures and values proposed in the third edition.

Agricultural policy makers have an important role to play in this context by either enforcing restrictive regulations (like crop restrictions), or alternatives to the use of polluted water (like wells or land with safer water sources), or incentives and training which support the adoption of alternative health risk reduction measures. These include

a) safer irrigation practices or on-farm wastewater treatment, and/or
b) post-harvest measures like safe crop handling in markets and produce washing before consumption.

Each of these measures contributes towards health risk reduction, and combinations of several options add up to a level of risk reduction to meet the health-based targets, especially as not all are suited for use everywhere. There is therefore a need for agricultural policy makers to support local screening and adaptation involving farmers, extension workers and researchers to make the Guidelines work.

Monitoring and assessment

To verify how good health risks can be reduced on- and/or off-farm, it is necessary to test and monitor the application of risk-reducing measures. This could be done by extension agents assisted by researchers with access to laboratories. Monitoring and assessment is done in three steps

1. ***Identification of best practices (Validation step):*** Although many good practices for risk reduction are known, they have to be validated in the local context. Validation means to test the adequacy of a risk management measure or process before it gets promoted or implemented. Action research where farmers or traders actively participate in developing (identifying and testing) risk management measures is encouraged. This is a more sustainable approach than prescribing any particular method or using controlled conditions in station experiments to allow early adjustments if, for example, farmers express strong concerns in terms of an unacceptable additional burden. Possible risk-reducing measures should also be validated in different locations, production systems and farming seasons. Three examples include:

   A) Stopping irrigation several days before harvest to allow natural pathogen die-off may be implemented in a cooler season or climate but could make leafy vegetables look unfit for marketing in hotter conditions.

   B) In some countries, like India or Kenya, drip kits are easily available while in others, they are rare.

   C) Depending on local diets and market demand, some farmers have the option to change crops, while others are more constrained in this respect.

   Validation can be done on the effectiveness of the changed irrigation practice or vegetable washing by analysing the pathogen levels on the crop in the laboratory, and comparing it with a business-as-usual control.

2. ***Operational Monitoring:*** In this step, planned observations and measurements are made to assess whether the introduced management options are adopted and work properly. It is important to decide how frequent the monitoring will be done and which parameters should be used. This should be done in an easy though effective way so that it doesn't become an additional burden to farmers or extension officers.

   The main monitoring practice is observation: For crop restrictions or protective clothing, for example, this can be done by making observations on the crops grown or use of rubber boots. In case of non-compliance, extension officers should analyse with the farmer the reasons for this and move back to Step 1 to test modified or other risk-reduction measures. Where farmers continue using the introduced practices, laboratory analyses are the preferred option to monitor the performance of the new measures. Where no laboratory is nearby or the money for the tests not available, the use of local indicators for testing water quality like smell and water appearance is possible; however, these parameters need to be validated first. Generally, operational monitoring should be based on simple and rapid observations or tests. However, it should be done in such a way that it provides statistically meaningful information, which requires regular observations.

3. *Verification:* In this step, it should be tried to measure how far the introduced practices really protect health or reduce health risks, be it for farmers or consumers. For example, if the target was to reduce the frequency of diarrhoea in the farm community, the verification can be done by monitoring the cases of diarrhoea in randomized selected farm families, compared with control families not using the suggested improvements. Generally, if the verification fails, then the system will need modification or revalidation (back to Step 1).

A clear regulatory framework for monitoring will come a long way in ensuring that the practice of wastewater or excreta use for agricultural production applies the necessary health safeguards in a optimal and cost-effective manner.

Environmental considerations

Wastewater and excreta are attractive farm inputs as they are always available and can greatly improve farm productivity, be it in crop or fish production; this is also due to their high nutrient levels. Both inputs are high in organic matter content, which helps improve soil structure and fertility. In short, waste recycling in agriculture obviously reduces waste amounts discharged directly to the environment, where they can provide a health risk. In this sense, many forms of wastewater use, similar to irrigated rice fields, can be considered as a productive land improvement and water treatment process, a win-win situation for all. However, improper management of nutrients by farmers can similarly lead to negative agricultural and environmental impacts. For instance, applying high concentrations of nitrogen on farms over longer periods can lead to reduced fruit size and quality, while making plants more prone to pest attacks and less resistant to diseases. Some nutrients and especially pathogens can easily be transported through soils and may contaminate aquifers therefore affecting the quality of groundwater. Depending on climate and wastewater source (domestic or industrial) continuous agricultural use of wastewater can also lead to accumulation of salts and heavy metals in soils. This can lead to reduced agricultural productivity and when those substances are taken up by edible plants (this varies from crop to crop) can lead to negative health impacts. In such cases, farmers should be assisted in the use of salinity control practices such as salt leaching and proper drainage. High levels of organic matter in irrigation water can also lead to clogging of soil pores (therefore affecting soil structure) or clogging in drip irrigation emitters or sprinklers, which needs special attention.

Clearly, there is a need to harmonize the policies for the use of wastewater and excreta in agriculture and aquaculture with the existing environmental policies and legislation, ensuring that the spirit of “local solution in line with local conditions” proposed by the Guidelines is maintained.

Socio-economic considerations

It is important for agricultural policy makers to consider socio-cultural perceptions and understanding of health risks related to wastewater and excreta use, and related economic benefits before suggesting any ‘improved’ practice. Beliefs, perceptions and economic implications can strongly vary between locations. Most important for farmers is the economic viability of their farming and it requires comparative studies which risk reducing options will combine the highest health benefit with the lowest negative implications for those who should adopt them. Agricultural policy makers can support this process by creating social or economic incentives from awards to marketing channels for safe produce, better access to low-cost drip irrigation kits, or tenure security to set up on-farm treatment ponds.

Involvement in policy processes

In many developing countries, the productive use of wastewater and excreta is still an illegal or at best informal activity without related or enforced regulations. It is only now that agricultural policy makers increasingly realize that the use of wastewater in agriculture or aquaculture is a common reality and probably even increasing as urbanization has outpaced the development of the sanitation infrastructure. In many countries the related informal irrigation sector significantly contributes to urban food supply and livelihoods and in some countries is even more vital and/or important than the formal irrigation sector. To take advantage of this development while addressing possible negative health impacts, proactive policies and regulations are needed. The Guidelines provide the required framework and details, especially feasible options for health risk reduction, also for the common situation where wastewater treatment is still rudimentary. Agricultural policy makers are therefore encouraged to facilitate a multi-stakeholder dialogue for a broad institutionalization of the Guidelines while strengthening research on locally viable measures to achieve the health-based targets.

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