

PLANNING AND IMPLEMENTATION

Planning and implementation of wastewater use programmes require a comprehensive progressive approach that responds to the greatest health priorities first. Strategies for planning should include elements on communication to stakeholders, interaction with stakeholders and the collection and use of data. This chapter describes key considerations for planning and implementation of wastewater use programmes at the national level.

Additionally, planning for projects at a local level requires an assessment of several important underlying factors. The sustainability of wastewater use in agriculture relies on the assessment and understanding of eight important factors. These eight factors — health, economic feasibility, social impact and public perception, financial feasibility, environmental impact, market feasibility, institutional feasibility and technical feasibility — have been described in previous chapters. A brief description of how these factors relate to planning and implementation of wastewater use projects is included in this chapter.

The protection of public health in wastewater irrigation requires the development and use of mechanisms for promoting improvement. This is an important planning aspect. The focus on improvement (whether as an investment priority at the regional or national level, development of hygiene education programmes or enforcement of compliance) will depend on the nature of the wastewater use practices and the types of problems identified (WHO, 2004a). A checklist of mechanisms for improvement of wastewater use in agriculture is given below:

- ✓ *Establishing national priorities:* When the most common problems and shortcomings in wastewater use have been identified, national strategies can be formulated for improvements and remedial measures; these might include changes in training (of managers, administrators, extension workers or field staff), rolling programmes for improvement or changes in funding strategies to target specific needs.
- ✓ *Establishing regional priorities:* Regional or local health agencies can determine the communities in which to work and which improvement activities are priorities; public health criteria should be considered when priorities are set.
- ✓ *Establishing hygiene education programmes:* Many of the health-related issues associated with wastewater use in agriculture are related to personal hygiene and food hygiene and cannot be solved by technology alone. The solutions to many of these problems are likely to require participatory educational and promotional activities.
- ✓ *Auditing of systems and upgrading:* Wastewater use systems should be audited or inspected. The results of these audits can be used to encourage farmers to improve their practices. Enforcement of local regulations to improve health protection measures may be difficult with small-scale producers. It may be more productive to work with farmers through extension workers to improve practices by educating them about health protection measures and risk reduction strategies.
- ✓ *Ensuring community operation and maintenance:* Support should be provided by a designated authority to enable community members to be trained so that

they are able to assume responsibility for the operation and maintenance of small-scale and community wastewater use operations.

- ✓ *Establishing public awareness and information channels:* Publication of information on public health aspects of wastewater use in agriculture can encourage farmers to follow good practices, mobilize public opinion and response and reduce the need for regulatory enforcement, which should be an option of last resort.

In order to make best use of limited resources, it is advisable to start with a basic programme that develops in a planned manner. An example of a step-by-step approach, with actions to be taken at initial, intermediate and advanced phases, is described below:

- **Initial phase**
 - Establish requirements for institutional development.
 - Provide training for staff involved in the programme.
 - Define the role of participants (e.g. agricultural extension staff, local health authorities, food safety inspectors, etc.).
 - Develop health protection measures suitable for the area.
 - Implement health protection measures in priority areas.
 - Monitor performance, but limit verification monitoring to a few essential parameters and known hazards of the greatest importance.
 - Establish reporting, filing and communication systems.
 - Advocate improvements according to identified priorities.
 - Establish reporting to local communities, media and regional authorities.
 - Establish liaison with communities; identify community roles in developing health protection measures and means for promoting community participation.
- **Intermediate phase**
 - Train staff involved in the programme.
 - Establish and expand systematic implementation of health protection measures.
 - Expand access to analytical capability for monitoring (often by means of regional laboratories, national laboratories being largely responsible for analytical quality control and training of regional laboratory staff).
 - Develop capacity for statistical analysis of data.
 - Establish a national database.
 - Identify common problems, and promote activities to address them at regional and national levels.
 - Expand reporting to include interpretation at the national level.
 - Draft or revise health-based targets for wastewater use in agriculture.
 - Use legal enforcement where necessary.
 - Involve communities routinely in the development and implementation of health protection measures.
- **Advanced phase**
 - Institutionalize a staff training programme.
 - Establish routine testing for all health-related parameters at defined frequencies.

- Use a national risk management framework for wastewater use in agriculture.
- Improve wastewater use practices on the basis of national and local priorities, hygiene education and enforcement of standards.
- Establish regional databases compatible with the national database.
- Disseminate data and other information at all levels (local, regional and national).
- Involve communities routinely in the development and implementation of health protection measures.

■ 11.1 Reporting and communication

An important element of a safe wastewater use programme is the sharing of information with stakeholders. It is useful to establish appropriate systems of communication with all relevant stakeholders. Proper communication involves both the provision of information and the solicitation of feedback from interested parties. The ability to improve wastewater use practices is highly dependent on the ability to analyse and present information in a meaningful way to different target audiences (see Box 11.1). The target audiences may include:

- public health officials at local, regional and national levels;
- organizations or utilities that manage the collective treatment of wastewater;
- local administrations;
- communities and agricultural producers; or
- local, regional and national authorities responsible for development planning and investment.

■ 11.2 Interaction with community and consumers

Community participation is a desirable component of the planning and implementation of wastewater use programmes. Communities often share both the benefits of wastewater use and exposure to the hazards. The community represents a resource that can be drawn upon for local knowledge and experience. They are the people who are likely to first notice health problems associated with wastewater use and thus can help to solve the problems. Communication strategies should include provision of summary information to product consumers and producers and establishment and involvement of consumer associations at the local, regional and national levels.

It may not always be feasible to provide information directly to an entire community. Thus, it may be appropriate to use community organizations, where they exist, to provide an effective channel for providing feedback and other information to users. By using local organizations to relay information, it is often easier to initiate a process of discussion and decision-making within the community. The most important elements in working with local organizations are to ensure that the organization selected can access the whole community and can initiate discussion on the health protection measures selected and used in wastewater use programmes.

Box 11.1 Communicating health issues

A key issue in the planning process is the communication of important health issues to different stakeholders. Communicating health-related issues to the public and policy-makers should be based on scientific evidence, transformation of the evidence into meaningful information, the development of feasible solutions, impact assessment and engagement and communication with key stakeholders. These are discussed below.

- **Evidence** of a particular environmental or health problem or issue develops. This may be via formal scientific research or analysis or via the monitoring of various environmental and health indicators. Alternatively, evidence may surface anecdotally, in the media or as a result of a catastrophic event. Usually, the evidence, whether formal or informal, will relate directly to local conditions.
- **Transformation** of formal scientific evidence into evidence that is meaningful to policy-makers and/or the general public takes place. This may be via a process of epidemiological/burden of disease assessment, cost-effectiveness and cost-benefit analysis, risk assessment or the aggregation of environmental and health monitoring data into a few key indicators that are readily understandable to decision-makers.
- **Solutions** (i.e. policy alternatives) are considered, along with a discussion of the environmental and health problems. For politicians, the emphasis on or discussion of problems that have no apparent solution may be politically unappealing. Conversely, problems that have solutions may be transformed into political capital.
- **Impact assessment** must occur, to consider the evidence in light of existing and proposed policies. That process may be formalized as part of a health impact assessment (see Annex 3), a loan process, a poverty reduction strategy, a national plan or a budget debate. Alternatively, it may be a completely informal process. In all cases where government articulates policy explicitly, some sort of “impact assessment” is taking place.
- **Engagement** of key decision-makers and stakeholders takes place, considering new evidence and new policy options. That engagement may be facilitated by the activities of local nongovernmental organizations and academic institutions, the activities of a local or international champion or processes triggered by international and intergovernmental agencies, including new conventions or protocol agreements. Commitment by key decision-makers to consider new evidence may require attitude change on the personal, as well as the institutional, level. This change usually occurs incrementally.
- **Communication** of the health risks, and the potential solutions or policies that may address the problem, takes place alongside the engagement and impact assessment process. Optimally, that communication should involve actors in government, the media and all interest groups and stakeholders. Communication is most effective when it is “hands-on,” demonstrates the tangible results of the intervention and is interactive, not frontal or passive — e.g. getting key decision-makers, media and stakeholders involved in observing or participating in the improvement of wastewater use in agriculture, sampling/tracking water quality results or running through an estimate of savings to health. Communication materials should be multilayered — e.g. one-page briefs for top officials, more detailed backgrounders for the professional level, media materials, etc.

Source: Fletcher (2005).

11.3 Use of data and information

Strategies for regional prioritization are typically of a medium-term nature and have information requirements. While the management of information at a national level is aimed at highlighting common or recurrent health issues, the objective at a regional level is to assign a degree of priority to individual interventions. It is therefore important to derive a relative measure of health risk. Feasible health protection measures that address the hazards associated with the highest relative risks can then be developed and implemented.

In many situations, especially where production occurs at very small scales, wastewater use practices may fail to adequately protect public health. In such circumstances, it is important that realistic goals for progressive improvement are agreed upon and implemented.

11.4 Project planning criteria

Eight criteria should be considered when planning wastewater use projects: health, economic feasibility, social impact and public perception, financial feasibility, environmental impact, market feasibility, institutional feasibility and technical feasibility (see Figure 11.1) (Mills & Asano, 1998). Failure to meet any one of these criteria may cause a project to fail. Meeting all the criteria can help to ensure that the project is sustainable.

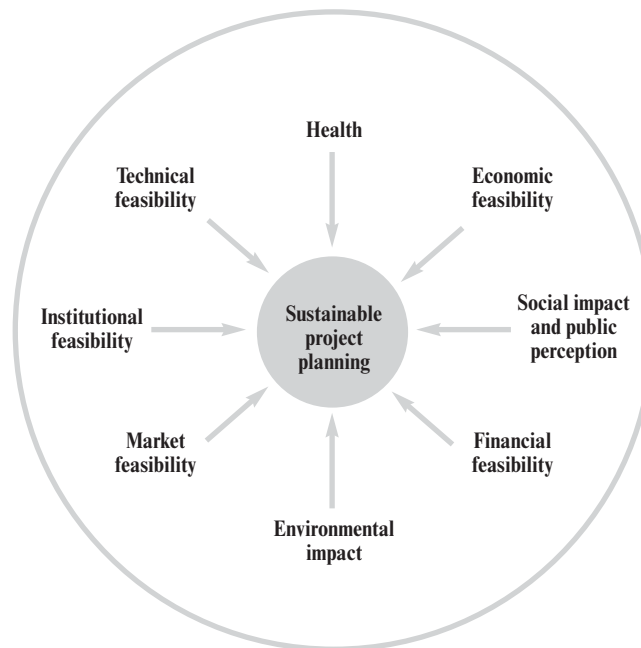


Figure 11.1
Project planning: Eight criteria that impact project success

Most of the eight criteria have been discussed in previous chapters, but a brief discussion of each follows:

- 1) *Health*: Health is the focus of these Guidelines. Because health issues may vary from one location to the next in the same country, it is important to understand and determine which health issues associated with wastewater use in agriculture are likely to be the most important. Studies are often necessary to identify the key issues. Conducting a health impact assessment prior to the development of new projects or as part of an assessment of ongoing projects is an important planning tool (see Annex 3). Health impact assessment helps to identify populations (e.g. local communities in close proximity to wastewater use areas) that might be at increased risk from different exposures (e.g. vector-borne diseases or schistosomiasis) but may not be considered in other studies. Health impacts, both positive and negative, on the most susceptible populations (e.g. subsistence-level practitioners) need to be considered in the project planning.
- 2) *Economic feasibility*: Economic feasibility is discussed in chapter 9. Health protection measures that provide the greatest health benefit at the lowest cost should be considered first during project planning.
- 3) *Social impact and public perception*: These issues were discussed in chapter 7. Cultural practices with respect to wastewater and excreta use, food consumption patterns and other behaviours are very important in the development of health protection measures. It may be very difficult to change long-held beliefs or practices. Health protection measures should be planned to accommodate or even incorporate traditional beliefs and practices. Public perception can be a powerful tool for the acceptance or rejection of a scheme for wastewater use in agriculture. It is important to involve the public in project planning and communicate with different stakeholders. If there is a perceived need for the activity (e.g. because of economic reasons or other factors such as water scarcity), then the public is more likely to accept it.
- 4) *Financial feasibility*: This is discussed in more detail in chapter 9. Financial planning looks at how a project can be funded. A sustainable project will need to be able to fund the project at all of its stages (i.e. start-up to completion), including equipment, operations and maintenance activities, staff training, monitoring, etc. In some cases, project planners may want to create user's fees or sell products grown in the wastewater-based agricultural system to offset costs.
- 5) *Environmental impact*: This is discussed in greater detail in chapter 8. Wastewater use often has positive environmental benefits associated with the recycling of important nutrient resources and offering a form of wastewater treatment. However, it can lead to contamination of surface waters and groundwaters, especially if the aquifers are near the surface. Project management to reduce environmental consequences should also assess whether wastewater use activities could lead to increased habitats for vector or snail breeding.
- 6) *Market feasibility*: The demand for products produced with wastewater should be assessed before they are produced. For example, if one of the health protection measures chosen to meet the health-based target is crop restriction, there has to be sufficient market demand to ensure that the product can be profitably sold in the market (this does not apply to products for household consumption). This also applies to an agency that treats wastewater and wants to create a user fee to recover costs. Treated wastewater can only be sold at a price that farmers are willing and able to pay.

- 7) *Institutional feasibility*: Project planners should understand the legal and regulatory requirements concerning wastewater use in agriculture. They should be aware of what national and local institutions control wastewater-based agricultural activities and involve them in the planning process. Institutional feasibility is further discussed in chapter 10.
- 8) *Technical feasibility*: Wastewater use projects should be technically feasible to succeed. Technologies include aspects such as hardware used in the treatment, storage, distribution and use of wastewater and other aspects, such as technical support services and technical training. The most sustainable technologies will be cost effective, upgradable and easy to operate and maintain with local resources. The main technical aspects that should be considered during planning are listed in Box 11.2.

Box 11.2 Technical information to be included in a project plan

- Current and projected generation rates of the wastewater, proportion of industrial effluents, dilution by surface water
- Existing and required wastewater treatment facilities, pathogen removal efficiencies, physicochemical quality
- Existing and required land areas: size, location, soil types, proximity to nearby villages
- Evaporation, especially in waste stabilization ponds (impacts salinity and need for dilution water)
- Conveyance of treated wastewater to farms
- Storage requirements for the wastewater
- Wastewater application rates and methods
- Types of crops to be grown, and their requirements for wastewater quality
- Estimated yields of crops per hectare of land per year
- Strategies for health protection

11.4.1 Support services

Various support services to farmers are particularly relevant to the implementation of health protection measures, and detailed consideration should be given to them at the planning stage. They include the following:

- machinery (sales and servicing, or hire);
- pumps, fences, protective clothing, etc.;
- facilities for processing crops;
- extension and training;
- marketing services, especially where new products are to be introduced or new land is to be brought into productive use;
- primary health care, possibly including regular health checks for workers and their families.

11.4.2 Training

Training requirements must be carefully evaluated at the planning stage, and it may often be necessary to start training programmes, especially for farmers and treatment facility operators, before the project begins, in order to ensure that adequately trained staff is available. Sewage treatment plant operators require on-the-job training in all aspects of the operation of the treatment plant, delivery systems and pumping stations; farmers will need training in agricultural methods most suitable for wastewater use; and technicians will require training in sample collection and analysis.

Similarly, the likely need for agricultural extension services must be estimated and provision made for them to be available to farmers after implementation of the project. Extension officers will themselves need training in the methods appropriate to health protection, as will the staff responsible for enforcing sanitary regulations regarding crop restriction, occupational health, food hygiene, etc.