The safe management and use of excreta and greywater in agriculture are facilitated by the appropriate policies, legislation, institutional framework and regulation at the international, national and local levels. In many countries, these frameworks are lacking or are insufficiently developed. This chapter looks at different policy and institutional aspects that will help promote the safe use of excreta and greywater. It also gives some country-specific policy/legal/regulatory examples. A policy framework should be based on a holistic approach that maximizes the public health protection and environmental benefits from the point of excreta and greywater generation through application to final product consumption.

Policy is the overall framework that sets national development priorities. It can be influenced by international policy decisions, by international treaties or commitments or by the policies of multilateral development institutions. Policy leads to the creation of relevant legislation. Legislation establishes the responsibilities and rights of different stakeholders. The institutional framework determines which agency has the lead responsibility for creating regulations (often as part of a consultative process) and who has the authority to implement and enforce the regulations (Figure 10.1).

10.1 Policy
Policy is the set of procedures, rules and allocation mechanisms that provide the basis for programmes and services. Policies set priorities, and associated strategies allocate resources for their implementation. Policies are implemented through four types of policy instruments (Elledge, 2003):

1) *Laws and regulations:* Laws generally provide the overall framework. Regulations provide the more detailed guidance and may be developed at the national, regional or local level by different authorities as set out in legislation. Regulations are rules or governmental orders designed to control or govern behaviour and often have the force of law. Regulations for excreta and greywater use can cover a wide range of topics, including the practices of service providers, design standards, tariffs, treatment requirements, health-based targets and monitoring requirements, crop restrictions, environmental protection and contracts. These regulations, especially treatment and operational monitoring, have to be appropriate to local conditions.

2) *Economic measures:* Examples of economic measures are user charges, subsidies, incentives and fines. User charges, or tariffs, are charges that households and enterprises pay in exchange for the removal of human excreta
and greywater. Subsidies are allocations in cash or kind to communities and households for establishing recommended types of sanitation facilities or services and for the use of excreta and greywater in agriculture. Fines are monetary charges imposed on enterprises and people for unsafe disposal, emissions and/or risky hygienic behaviours and practices, which are a danger to people and the environment.

3) Information and education programmes: These programmes include public awareness campaigns and educational programmes designed to generate demand and public support for efforts to expand sanitation and hygiene services and encourage the safe use of excreta and greywater in agriculture.

4) Assignment of rights and responsibilities for providing services: National governments are responsible for determining the roles of national agencies and the appropriate roles of the public, private and non-profit sectors in programme development, implementation and service delivery.

The legislation resulting from policies for the safe use of excreta and greywater should establish a clear functional framework of how the sanitary system should operate. It should be directed explicitly at the correct level (household, district, municipality) and make clear provisions for all types of sanitation systems (from centralized to on-site systems). Local governments play a key role in implementing and enforcing such legislation.

10.1.1 International policy
International policy may affect the creation of national greywater and excreta use policies. National governments have numerous international obligations. They may originate from global treaties and conventions (such as the Basel, Rotterdam and Stockholm conventions). They may be linked to commitments made in the international arena (e.g. the Millennium Development Goals, or recommendations from the Commission on Sustainable Development). Or they may result from the conditions negotiated for loans and credits from international development banks and agencies. National policies for the safe use of excreta and greywater in agriculture will have to be in harmony with this international framework.

Another major issue is the international trade in food products. Those that are raised in compliance with the WHO Guidelines for the safe use of wastewater, excreta and greywater are internationally recognized as being developed within an appropriate risk management framework. This can help to facilitate international trade in agricultural products grown with the use of wastewater, excreta and greywater.

10.1.2 National greywater and excreta use policies
Policy priorities for each country are necessarily different to reflect local conditions. National policy on the use of excreta and greywater in agriculture needs to consider the following issues:

- health implications of excreta and greywater use in agriculture;
- requirements for a health impact assessment at the planning stage of proposed projects;
- water scarcity;
- wetland, coastal zone and biodiversity conservation;
- resource recovery and recycling;
- resource availability;
- sociocultural factors that influence practices and acceptability of excreta and greywater use;
• capacity to effectively treat excreta and greywater;
• capability and capacity to implement health protection measures to safely manage excreta and greywater use;
• impacts if excreta and greywater are not used in agriculture;
• impacts on household nutrition, food security and local economy;
• numbers of people dependent on excreta and/or greywater use in agriculture for their livelihoods;
• trade implications of growing crops with the use of treated excreta and/or greywater.

Responsibility for excreta and greywater use is often poorly anchored in existing policy and institutional structures. It may be divided arbitrarily between institutions working in public health, water resources management, agriculture and rural development or between town municipalities and regional and national governments. This may result in uncoordinated approaches and strategies, without an overall institutional responsibility. As most of the excreta and greywater management issues are likely to occur at the household or community level, policies should be clearly based on a local approach. Policies developed for sanitation also apply to the safe use of excreta and greywater and are best enforced by local governments and authorities.

In addition to public health aspects, environmental concerns are important in developing excreta and greywater use policies. National policies can strive to reduce environmental damage by requiring appropriate treatment chains and may also encourage the beneficial recycling of water and nutrient resources. This is apparent in relation to phosphorus, an important nutrient in excreta and greywater and indispensable in agriculture for crop development, but also a major cause of eutrophication if it ends up in freshwater bodies.

10.1.3 Greywater and excreta in integrated water resources management
In many arid and semi-arid countries, the renewable freshwater resources available are already heavily exploited. Integrated water resources management, as defined by the Global Water Partnership (GWP, 2000) is a process that promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

Increasingly, the management of excreta and greywater is considered in the broad framework of integrated water resources management. Greywater may represent a reliable water source with constant flows even in the dry season, and excreta a constant source of organic material, nutrients and energy. Their productive use should figure prominently in water resources management, as it enables communities to reserve and preserve higher-quality water resources (i.e. uncontaminated groundwater or surface water), as well as to improve soil structure and fertility. Excreta and greywater use policies emphasize approaches that reduce environmental contamination and promote safe resource use. Of equal importance at the policy level is the fact that commercial fertilizers may not be an option for many farmers, due to high costs. Plant nutrients present in excreta and greywater are readily available, and their use helps to reduce reliance on commercial fertilizers for crop production.

10.2 Legislation
Legislation may facilitate technical incentives and financing mechanisms. In addition, legislation defines responsibilities and cooperation between relevant stakeholders, including the private sector, and appropriates financial resources for capacity building.
Guidelines for the safe use of wastewater, excreta and greywater

and training and for monitoring, implementation and maintenance. It provides a basis for enforcement of consistent standards for excreta and greywater collection, treatment and use to be complied with by other sectors (e.g. education, housing construction, workplace safety, etc.). Effective laws and regulations establish both incentives for complying and sanctions for not complying with the requirements (WHO, 2004a).

Often it may be sufficient to amend existing laws, but sometimes new legislation is required. The following areas deserve attention:

- define institutional responsibilities or allocate new powers to existing bodies;
- establish roles and relationships between national and local government levels;
- create rights of access to and ownership of greywater and excreta, including public regulation of its use;
- establish land tenure;
- develop public health and agricultural legislation concerning greywater and excreta quality standards, produce restrictions, application methods, occupational health, food hygiene and other preventive measures linked to health-based targets as deemed relevant.

An example of legal provisions conducive to the recycling of wastewater, excreta and greywater comes from Sweden and is presented in Box 10.1.

10.2.1 Institutional roles and responsibilities

Legislation may be required to establish a national coordinating body for excreta and greywater use and to set up local bodies to manage individual schemes. These will require a certain degree of autonomy from central government and the ability either to charge for the excreta and greywater they distribute or to sell any agricultural produce. Working within an existing institutional framework may be preferable to creating a new one.

At a national level, the safe use of excreta and greywater in agriculture is an activity that touches the responsibilities of several ministries or agencies. Normally, the development of policies to encourage the safe use of excreta and greywater would involve a consultative process between different agencies/institutions with overlapping responsibilities. Examples of ministries, authorities or agencies that have jurisdiction over the use of greywater and excreta in agriculture may include:

- Ministry of Agriculture: overall project planning; management of state-owned land; installation, operation and maintenance of irrigation infrastructure; agricultural research and extension, including training; control of product marketing.
- Ministry of Environment: sets excreta and greywater treatment and effluent quality standards based on environmental concerns, establishes practices for protecting water resources (both surface water and groundwater) and the environment; establishes monitoring and analytical testing protocols; manages and validates the environmental impact assessment process.
- Ministry of Health: health protection, particularly establishment of health-based targets (for treated excreta and greywater, products; health protection measures), monitoring procedures and methods and schedules for treated excreta and greywater; health education; disease surveillance and treatment; manages and validates the health impact assessment process.
• Ministry of Water Resources: incorporation of excreta and greywater use into integrated water resources planning and management.
• Ministry of Energy: integration of energy generation by the anaerobic treatment of excreta and greywater into national energy plans.
• Ministry of Education: develop school curricula concerning sanitation and personal and domestic hygiene and safe practices related to the use of excreta and greywater.
• Ministry of Public Works/Local Government: excreta and greywater collection, treatment and use.
• Ministry of Finance and Economic Planning: economic and financial appraisal of projects; import control; development of financing mechanisms for excreta and greywater conveyance and treatment and use infrastructure.

Box 10.1 Legislation: promoting or preventing?

The Swedish Environmental Code contains an example of legislation where the use and saving of resources are in focus. The objective states:

The purpose of this Code is to promote sustainable development, which will assure a healthy and sound environment for present and future generations....

The Environmental Code shall be applied in such a way as to ensure that: [...] 5. Reuse and recycling, as well as other management of materials, raw materials and energy are encouraged with a view to establishing and maintaining natural cycles. [...]

This aim is underlined in Chapter 2 of the Code, which states:

Persons who pursue an activity or take a measure shall conserve raw materials and energy and reuse and recycle them wherever possible. Reference shall be given to renewable energy sources.

This article ensures that the aim of conserving raw materials and resources is as important as the aim of minimizing emissions of pollutants, etc. Recycling of nutrients is now stipulated in the provisions, for example, for small wastewater plants for single-family houses.

Other ministries and government agencies, for example those concerned with land tenure, rural development, cooperatives and women’s affairs, may also be involved.

Cooperation between the relevant agencies will require effective communications between the technical staff involved. Some countries, especially those facing water scarcity, may find it advantageous to establish an executive body, such as an interagency technical standing committee, under the aegis of a lead ministry (Agriculture or Water Resources) or possibly a separate organization (with both government and private funding sources), to be responsible for the development, planning and management of excreta and greywater use projects. Professionals involved in this will be required to develop skills in intersectoral negotiation and decision-making.

In many countries, the establishment of an ad hoc committee may be sufficient. Alternatively, existing organizations may be given responsibility for this intersectoral issue, or parts of it: for example, a National Water Board may be given responsibility for the safe use of wastewater, excreta and greywater in aquaculture/agriculture/energy generation. Such an organization should have the power to convene a committee of representatives from the different agencies with
relevant responsibilities, which, in turn, will provide the interagency or interministerial mechanism to inform others of the challenges/opportunities in developing safe approaches in this connection.

For example, in Uganda, an Inter-Ministerial Steering Committee was set up as a policy- and strategy-making body to oversee activities related to water supply, sanitation and hygiene. It was made up of the permanent secretaries and directors from the ministries of Health, Water, Lands and Environment, Gender, Labour and Social Development, Local Government, Education and Sports, Finance Planning and Economic Development. The role of this committee was to review the overall water supply, sanitation and hygiene policy, coordinate and promote convergence between sectoral activities and promote appropriate changes in policies for sectoral programmes and projects.

In countries with a federal administration with a higher or lower degree of decentralization, such arrangements for interagency collaboration will be important at the appropriate levels. Whereas the general framework of greywater and excreta use policy and standards may be defined at the national level, the regional body will have to interpret and adapt these for effective implementation under local conditions.

Individuals collecting greywater and excreta and managing a scheme will often be under municipal control. If greywater and excreta use is to be promoted in the context of a national policy, this implies careful coordination and definition of the relationship between local and national government. On the one hand, it may be necessary for the national government to offer incentives to local authorities to promote safe use of greywater and excreta; on the other hand, sanctions of some sort may have to be applied to ensure that schemes are implemented without significant risk to public health.

Local governments usually have the authority to develop their own regulations within the national legal framework. For example, they should be able to collect fees for greywater and excreta treatment or other services, issue permits, conduct inspections, develop produce restrictions, inspect markets and develop decentralized greywater and excreta treatment and use facilities.

Permits may be issued by the local agriculture or water resources administration or by the body controlling the greywater and excreta distribution system for the use of excreta and greywater from a public conveyance network. Provision of such permits could be made conditional on the correct observance of sanitary practices regarding application methods, produce restriction and exposure control.

It is common for the agencies administering the distribution of greywater and excreta to deal with the landowners through users' associations, which may develop from traditional institutions. Permits to use greywater and excreta can then be issued to the associations, which simplifies the administrative task of dealing separately with a large number of small users. It also delegates to the associations the task of enforcing the regulations that must be complied with for a permit to be renewed.

A joint committee or management board, which may include representatives of these associations, any particularly large users, the authorities that collect and distribute the greywater and excreta, and also the local health authorities, is required. Even in small organizations, some form of arrangement, such as a committee with community representatives, is important for the users to participate in the management of the project. In some cases, farmers will be able to directly negotiate contracts for a specified supply of treated greywater and excreta with the treatment utility.
10.2.2 Other roles and responsibilities

The number of stakeholders that may be involved in the safe use of excreta and greywater can be quite large and may include individuals, groups, institutions or organizations with different needs and concerns. A detailed stakeholder analysis is normally carried out at the start of activities to identify those that will be of relevance and how large stakeholder groups may be effectively addressed and represented.

The stakeholder analysis given below provides a generic overview of the possible stakeholders in excreta and greywater use programmes:

- **Users of sanitation facilities**: These are most often the individual households. In rural areas, the households are usually the final decision-makers, responsible for the construction and maintenance of the sanitation facilities as well as the collection and treatment of the excreta and greywater; in urban areas, households may be marginally involved, with service providers collecting the excreta and greywater for further secondary off-site treatment, generally against payment. The households can help drive the process forward by adopting good sanitation and hygienic practices, innovating, taking action, talking to the neighbours about solving local problems and encouraging political representatives to support locally developed solutions.

- **Users of the treated excreta and/or greywater**: These may be the users of the sanitation facilities themselves, farmers in nearby areas or, in urban settings, market gardeners or communities involved in (peri-)urban agriculture.

- **Community-based organizations and self-help groups**: These support the households by organizing the delivery of the different services needed (e.g. maintenance of the facilities or the collection and treatment of the final treated products) and the use of the produced fertilizer at the level of the community-based organization or neighbourhood groups.

- **Nongovernmental organizations**: These provide information and raise awareness among potential users. They also often advise the households on the use of sanitation systems and support (poor) households in the contact with, for example, financing institutions and municipalities.

- **Service providers**: Service providers encompass a group of diverse stakeholders engaged in public or private market-oriented activities of service provision. These include planners, consultants, producers/suppliers, construction companies, utility providers and companies involved in excreta and greywater collection, transport and treatment. Farmers also act as service providers by collecting and treating excreta from the users of the sanitation facilities.

- **Developers and investors**: Developers and investors from either the private or public sector may initiate the construction of residential units. The decision of developers and investors to introduce systems for the safe use of excreta and/or greywater is often tightly related to the demand for the treated product. They are often actively involved in the planning and implementation process of an entire programme.

- **Financial institutions**: The introduction of new infrastructure generally requires that the investment and operation costs be secured.

- **Research institutions**: These may be universities or other research-oriented institutions or organizations that can provide evidence and advice to programme initiators, developers, municipalities and nongovernmental organizations.
International organizations: International organizations can ensure that external funds for sanitation hardware are bundled with appropriate hygiene promotion and sanitation marketing activities; encourage governments to consider appropriate, cheaper and more sustainable sanitation systems; finance local sanitation research; develop guidance and tools for facilitating good practice; disseminate information; actively endorse the idea of flexible technical norms and standards to allow for innovation where excreta and greywater use is promoted; and offer support in adopting the legislative and regulatory framework to facilitate safe use and resource efficiency as part of sanitation systems.

Table 10.1 Different factors influencing stakeholders on the adoption of safe use systems

<table>
<thead>
<tr>
<th>Principal stakeholders</th>
<th>Examples of motivating factors</th>
<th>Examples of constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Users of sanitation facilities: households, neighbourhoods, tourists, pupils, employees.</td>
<td>No odour, hygiene improvement, structural stability, local physical factors (high groundwater table, rocky ground, etc.), reduced costs, increased comfort, improvement of quality of life, greater security (inhouse construction), interest in treated products, prestige, ecological reasons, water scarcity, unreliable water supply.</td>
<td>Habits, taboos, hygienic concerns, unfamiliarity, fear of loss of comfort, unavailability of structural elements, legislative restrictions, economic factors (e.g. for start-up, etc.).</td>
</tr>
<tr>
<td>II. Users of treated products.</td>
<td>Economic reasons, local and reliable availability of agricultural inputs (water, nutrients, organics), increase of crop yields for either the market or family needs, improvement of self-sufficiency, ecological reasons.</td>
<td>Habits, taboos, lack of logistics, fear of negative consumer perception, fear of negative long-term effects on soil.</td>
</tr>
<tr>
<td>III. Community-based organizations and self-help groups.</td>
<td>Failure of conventional/existing sanitation system, local improvement of quality of life, Agenda 21, MDGs, interest in treated products, reduced costs, local physical factors (high groundwater table, rocky ground, etc.).</td>
<td>Habits, taboos, lack of information, insufficient financing, inappropriate legislation, influence of interest groups, hygiene concerns.</td>
</tr>
<tr>
<td>IV. Nongovernmental organizations.</td>
<td>Failure of conventional/existing sanitation systems, economic reasons, ecological reasons, agricultural reuse of treated products, improve quality of life, etc.</td>
<td>Habits, taboos, lack of information, insufficient financing, inappropriate legislation, influence of interest groups, hygiene concerns.</td>
</tr>
<tr>
<td>V. Local authorities, government institutions.</td>
<td>Political reasons, economic reasons, ecological reasons, Agenda 21, MDGs, failure of conventional/existing sanitation system, possibility of financial support, sustainability of system, support regional self-sufficiency, promotion of (urban) agriculture, job (and income) creation, long-term security of social services (water supply, etc.).</td>
<td>Habits, taboos, lack of information, lack of start-up funds, insufficient financing, monitoring of treatment/handling, etc., more difficult for decentralized system, distrust of alternative systems, not recognized as state of the art technology, reluctance to change status quo, contradiction of existing legal framework/long-term plans, powerful lobby from conventional centralized sanitation industry, corruption.</td>
</tr>
<tr>
<td>Principal stakeholders</td>
<td>Examples of motivating factors</td>
<td>Examples of constraints</td>
</tr>
<tr>
<td>------------------------</td>
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</tr>
<tr>
<td>VI. Service providers: planners/consultants, builders, maintenance service providers, producers of equipment, providers of collection, treatment, transport and marketing of the treated products.</td>
<td>Increased profit, opening up of a potentially huge new market, request/need for particular product, further develop their own know-how, ethical/ecological reasons.</td>
<td>Absence of technical knowledge, absence of products, inappropriate legislation, lack of suitable tools, economic interest of (waste) water monopolies, fear of failure (economic risk), not yet recognized as state of the art, reluctance to make the necessary increase in effort, lack of experience in decentralized planning/participation, lack of start-up funds, fear of reduced profit margins in smaller/decentralized projects, regulatory obstacles.</td>
</tr>
<tr>
<td>VII. Developers and investors.</td>
<td>Increase attractiveness of developments (eco-label), safe and secure &quot;management&quot; (especially in tourist areas), user satisfaction, economic reasons, legal requirements.</td>
<td>Absence of service logistic, habits, taboos, lack of information, lack of start-up funds, monitoring of treatment/handling, etc., more difficult for decentralized system, distrust of alternative systems, not recognized as state of the art technology, reluctance to change status quo, contradiction of existing legal framework/long-term plans, powerful lobby from conventional centralized sanitation industry, corruption, less &quot;commission&quot; for projects.</td>
</tr>
<tr>
<td>VIII. Financial institutions.</td>
<td>Economic reasons, failure of existing/conventional systems, improving sustainability, guarantee repayment of credit.</td>
<td>Absence of specific financing instruments, not recognized as state of the art technology, need for research and development.</td>
</tr>
<tr>
<td>IX. Research institutions.</td>
<td>Need for research and development, availability of research funds, ecological reasons.</td>
<td>Availability of research funds, prestige.</td>
</tr>
<tr>
<td>X. International organizations.</td>
<td>Political reasons, improvement of public health, pro-poor development goals, improvement of livelihood, social/economic/ecological sustainability, Agenda 21, MDGs, failure of conventional/existing sanitation system.</td>
<td>Culture, habits, taboos, lack of information, monitoring of treatment/handling more difficult in a de-centralized system, distrust of innovative systems, reluctance to change, contradiction with existing legal framework, powerful lobby of conventional sanitation industry.</td>
</tr>
</tbody>
</table>

Source: Adapted from GTZ (2003); UNESCO/GTZ (2006).
Table 10.1 presents some of the factors that may either motivate different stakeholders to adopt or discourage them from adopting safe use systems. A participatory approach is essential where the stakeholders have the possibility to voice their motivations and reservations. Equally important is dealing with the constraints raised. Mapping the motivations and constraints is a useful task, which should be adapted during the course of the project, becoming increasingly specific with time.

### 10.2.3 Rights of access

Farmers will be reluctant to install infrastructure or treatment facilities unless they have some confidence that they will continue to have access to the greywater and excreta. Permits dependent on efficient or sanitary practices by the farmers may regulate this access. Legislation may therefore be required to define the users’ rights of access to the greywater and excreta and the powers of those entitled to allocate or regulate those rights.

### 10.2.4 Land tenure

Security of access to greywater and excreta is worth little without security of land or water tenure. Existing tenure legislation is likely to be adequate for most eventualities, although it may be necessary to define the ownership of virgin land newly brought under cultivation. If it is decided to amalgamate individual agricultural areas under a single management, powers of compulsory purchase may be needed.

### 10.2.5 Public health

The area of public health includes rules governing crop restrictions and methods of application, as well as quality standards for treated greywater and excreta, which may require an addition to existing regulations. It may include application requirements or required withholding periods between application and harvest. It also covers other aspects of health protection, such as the promotion of hygiene and other health issues, occupational health and food hygiene, which are unlikely to need any new measures. Consumers also have the right to expect safe products.

Legislation on the use of excreta and greywater, intended for the protection of public health, should be based on the health-based targets and health protection measures discussed in chapters 4 and 5 of this volume of the Guidelines.

### 10.3 Regulation

Regulations are the rules that specify actions that need to be performed by the users (can be individuals or communities, etc.) of excreta and greywater. Regulations are usually created through a consultative process led by an administrative authority, with a delegated responsibility in legislation. Regulations governing the use of excreta and greywater should be practical and focus on protecting public health (other issues will also be relevant, e.g. environmental protection). Regulations should also establish requirements to obtain permits, specify the risk management approaches that will be required in different settings, describe water quality/produce monitoring requirements, create disease surveillance requirements and develop financing mechanisms. Most importantly, regulations should be feasible to implement under local circumstances. Box 10.2 provides an example of regulations that affect the use of excreta and greywater in South Africa, and Box 10.3, the development of municipal regulations through consultation with various stakeholders in Tepoztlán, Mexico.

A framework of regulations could be set up around the different health protection measures (i.e. excreta and greywater treatment, use restriction, application, exposure
Box 10.2 National Building Regulations in South Africa

The National Building Regulations state that waterborne sewage and chemical closets are the only acceptable indoor toilets. The assumption is that municipalities will automatically be able to treat the sewage and safely discharge it to the environment. The safe use of excreta and greywater could be incorporated into the standards by allowing the choice of different technologies, e.g., different types of toilets or storage and treatment systems that facilitate the safe use of excreta and greywater. The National Building Regulations could allow the use of different systems if, for example, the owner of the building and/or the municipality can demonstrate that they can comply with system operation and treatment requirements.

Box 10.3 Developing a municipal regulation for the city of Tepoztlan in Mexico

The content of a regulatory framework for a municipality with regard to sanitation is being proposed for the municipality of Tepoztlan in Mexico. The regulation will be developed after extensive consultation with key local and national stakeholders and in parallel with proposals for appropriate institutional reforms to ensure their effective application. This municipal regulation will contain the following specifications:

a. Basic principles and rules taking into account particularities of the municipality.
b. Inclusion of rules for construction permits and new urban developments.
c. Policy and procedures regarding water management and sanitation, including assessment and monitoring.
d. Specify concrete measures and actions regarding sanitation that should be undertaken by the municipality.
e. Adapting local regulations to federal and regional legislation to avoid conflicting jurisdictions and to promote concurrent jurisdictions.
f. Institutional mechanisms of participation of the local population in the process of municipal management in specific affairs of importance such as sanitation, with specific emphasis on surveillance.
g. Definition of minimum norms of quality of the public services offered by the municipality.
h. Requirements for housing development to fulfil the regulation in relation to sanitation and other issues.
i. Establishing proper incentive systems for conversion and retrofitting of conventional technology towards alternative sanitation technologies that facilitate the safe use of excreta and greywater.
j. Implementation of registers and inventories of waters and soils.
k. Improving the tariff system collection.

A bottom-up strategy is thus proposed, where appropriate regulation for a municipality, in this case Tepoztlan, could serve as a model for other municipalities and gradually influence regulation at other levels of government.

Regulations may already exist for some of the protective measures. Without some complementary measures, such as regulations that control market hygiene (e.g., availability of adequate sanitation and safe water supplies and market inspectors), safe food products grown in compliance with the excreta or greywater regulations could easily become recontaminated in the market, mitigating any impact of previous public health protective measures that have been implemented (see Table 10.2 for examples of activities that might require regulations).

10.4 Development of a national policy framework

In developing a national policy framework for the safe use of excreta and greywater in agriculture, it is important to define the objectives of the policy, assess the current policy environment and develop a national approach.
10.4.1 Defining objectives

The use of greywater and excreta can have one or more of several objectives. Defining these objectives can help to start the planning and implementation process (Mills & Asano, 1998). The main objectives might be:

- to increase national or local economic development;
- to increase crop production;
- to increase energy production;
- to augment freshwater supplies and otherwise take full advantage of the resource value of greywater and excreta;
- to manage greywater and excreta in a cost-effective, environmentally friendly manner;
- to improve household income, food security and/or nutrition.

Where greywater and excreta are already used, sub-objectives might be to incorporate health and environmental safeguards into management strategies or improve produce or yields through better practice.

Table 10.2 Examples of activities that might be covered in regulations

<table>
<thead>
<tr>
<th>System components</th>
<th>Regulatory considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greywater and excreta</td>
<td>Access rights; tariffs; management (e.g. municipalities; communities, user groups, etc.)</td>
</tr>
<tr>
<td>Conveyance</td>
<td>Responsibility for building infrastructure and operations and maintenance, pumping costs, delivery trucks</td>
</tr>
<tr>
<td>Treatment</td>
<td>Treatment requirements depending upon final use; process requirements</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Types of monitoring (e.g. process monitoring, analytical, parameters), frequency, location, financial responsibilities</td>
</tr>
<tr>
<td>Greywater and excreta application</td>
<td>Fencing, need for buffer zones</td>
</tr>
<tr>
<td>Produce restrictions</td>
<td>Types of produce permitted, not permitted, enforcement, education of users/public</td>
</tr>
<tr>
<td>Exposure control</td>
<td>Access control for use areas (e.g. sign posting, fences), protective clothing requirements, provision of water and sanitation facilities for workers, hygiene education responsibilities</td>
</tr>
<tr>
<td>Market hygiene</td>
<td>Market inspection, provision of safe water and adequate sanitation facilities at markets</td>
</tr>
<tr>
<td>Financial authority</td>
<td>Mechanisms for charging tariffs, collecting fines</td>
</tr>
<tr>
<td>Enforcement</td>
<td>Mechanisms for ensuring regulatory compliance</td>
</tr>
</tbody>
</table>

10.4.2 Analysis of the existing policy framework

The right formal and informal policy framework can facilitate the safe use and management of excreta and greywater. Existing practices, habits and customs need to be integrated to understand what actions should be taken to reduce risks and maximize benefits.

An existing policy framework facilitates, impedes or is neutral towards the safe use of excreta and greywater. The most practical approach is from a "what is not strictly prohibited" rather than from a "what is specifically allowed?" perspective. This analysis should include the whole handling chain, from point of household generation through conveyance, storage, treatment, use and product consumption. Coordination of many authorities/agencies at the community level will be helpful, and the analysis of the existing framework should have that objective in focus.

As legal, institutional, cultural and religious contexts differ, it is not possible to prescribe a specific methodology for institutional analysis that functions globally.
questions in Table 10.3 should be seen as examples for a structured approach with the aim of identifying the system. Is the purpose to use the excreta and greywater at the household level and then to delegate responsibility to individual households? Or is the system to be operated by a municipality? What permits are necessary? Is it possible for local farmers to sell their crops after using these substances? The framework should not be prescribing specific technologies, but it should be based on the principles of maximizing public health and environmental protection and identifying the necessary changes within the existing institutional framework. Once an analysis is completed, it will be helpful to develop an action plan.

Table 10.3 Structured questions providing input for an institutional analysis of excreta and greywater use

<table>
<thead>
<tr>
<th>Questions regarding...</th>
<th>Examples of relevant questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>the legal framework</td>
<td>Does the existing legal framework adequately govern excreta and greywater use?</td>
</tr>
<tr>
<td></td>
<td>Are existing regulations appropriate? Or do existing regulations conflict with desired outcomes for the use?</td>
</tr>
<tr>
<td></td>
<td>Are national policies within the sector based on appropriate levels of legality? Are there barriers or obstacles resulting from the legal basis of excreta or greywater use?</td>
</tr>
<tr>
<td></td>
<td>Are these policies sufficiently comprehensive to allow institutions to develop strategies and action plans to act upon them?</td>
</tr>
<tr>
<td></td>
<td>Are these national policies compatible with other relevant national policies and regulations, for example, environment, public health, education and decentralization?</td>
</tr>
<tr>
<td></td>
<td>Are the policies more appropriate for one or more target groups or areas (e.g. urban areas, small towns, rural areas)?</td>
</tr>
<tr>
<td></td>
<td>Do laws or by-laws cover responsibilities of landlords for providing adequate storage or treatment facilities for tenants?</td>
</tr>
<tr>
<td></td>
<td>What challenges and possibilities exist within the spatial planning and building codes? How is construction permitted or restricted?</td>
</tr>
<tr>
<td></td>
<td>What is stated in technical norms and standards?</td>
</tr>
<tr>
<td></td>
<td>To what extent can neighbours have opinions on land use? Do these rights pose challenges?</td>
</tr>
<tr>
<td></td>
<td>Who has the right to use the resource (e.g. water)?</td>
</tr>
<tr>
<td></td>
<td>Will the owner of the resource, such as the land and water, be entitled to compensation?</td>
</tr>
<tr>
<td></td>
<td>What is stated in the health legislation?</td>
</tr>
<tr>
<td></td>
<td>What is stated in the infectious disease protection legislation?</td>
</tr>
<tr>
<td></td>
<td>Are there environmental quality standards regulating effluent quality?</td>
</tr>
<tr>
<td></td>
<td>Are there legislative obstacles hindering the commercialization of products cultivated with human excreta?</td>
</tr>
<tr>
<td></td>
<td>Is authorization or notification needed for different aspects of the recycling scheme?</td>
</tr>
<tr>
<td></td>
<td>Is there legislation that, in practice, suppresses the development of recycling-oriented sanitation systems?</td>
</tr>
<tr>
<td></td>
<td>Who enforces the rules?</td>
</tr>
<tr>
<td></td>
<td>What is the legal status of excreta and greywater? Covered or excluded?</td>
</tr>
<tr>
<td></td>
<td>How is the flow of different fractions regulated (keeping excreta and greywater separate throughout collection/transport/use)?</td>
</tr>
<tr>
<td></td>
<td>Does the existing legal framework direct the excreta and greywater flow towards use or towards deposition/discharge?</td>
</tr>
<tr>
<td></td>
<td>Who has a right of access to excreta and greywater?</td>
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<tr>
<td></td>
<td>Are quality standards in place for excreta and greywater, restrictions on crop use, application methods, occupational health, food hygiene, etc?</td>
</tr>
</tbody>
</table>
Table 10.3 (continued)

<table>
<thead>
<tr>
<th>Questions regarding...</th>
<th>Examples of relevant questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>...the relevant authorities</td>
<td>Who has the responsibility to make legislation/regulation on different levels?</td>
</tr>
<tr>
<td></td>
<td>What are the appropriate standards for excreta and greywater use?</td>
</tr>
<tr>
<td>...the relevant authorities</td>
<td>Is there coordination between the relevant authorities in terms of responsibility?</td>
</tr>
<tr>
<td></td>
<td>Is there a clear and proper division of powers/finances/competence?</td>
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<tr>
<td></td>
<td>What supportive policies are there? Is there a coordination of water and sanitation policies with environmental and agricultural policies?</td>
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<tr>
<td></td>
<td>Are there action plans connected to the policies?</td>
</tr>
<tr>
<td></td>
<td>What are the roles and relationships between national and local governments?</td>
</tr>
<tr>
<td></td>
<td>Do authorities comply with legislation/regulations? Does the national or state-level government intervene when national policies are not implemented?</td>
</tr>
<tr>
<td>...the informal institutions</td>
<td>What are the attitudes, human and organizational behaviour, codes of conduct and behavioural patterns from an excreta and greywater use perspective⁵</td>
</tr>
<tr>
<td>...other issues</td>
<td>Is there compliance with legislation/regulation⁶?</td>
</tr>
<tr>
<td></td>
<td>Is there a potential for corruption?</td>
</tr>
<tr>
<td></td>
<td>Are there any other competing interests with the excreta and greywater?</td>
</tr>
</tbody>
</table>

⁴ Many existing standards (national or municipal) are based on those developed in industrialized countries, under conditions different from those applying in developing countries, and so they are often inappropriate. Part of launching a household-centred environmental sanitation approach should therefore be to secure a moratorium on the application of existing standards to the programme area, and part of the overall exercise should be to try to identify standards that would be more appropriate because they meet the basic purpose of standards, to ensure that everyone has a healthy life (WSSCC, 2005).

⁵ It is important to remember that informal institutions are more resilient towards change than formal ones (Hukkinen, 1999).

⁶ Many of the problems related to the legal field have to do with a strong dichotomy between legislation and reality. Some countries may have advanced legislation and comprehensive policy and planning instruments, but poor law enforcement and poor implementation of plans and policies. Any effort to build a different legal framework must tackle this issue in order to promote laws that are in accordance with the complexities that the different actors will have to deal with when applying or being affected by the legislation concerned (Johansson & Kvarström, 2005).

Source: Adapted from Elledge et al. (2002).

10.4.3 Development of action plans

Analysis of the existing legal framework may find that new institutions, laws or regulations are warranted or that existing frameworks should be modified to accommodate the safe use of excreta and greywater.¹ New tasks within the changed framework may be included in action plans. Action plans should be output oriented with monitoring mechanisms. Developing an action plan may include consideration of the following elements:

- **Institutional reform action**
  - adding sanitation and resource recycling into poverty reduction strategy papers
  - allocation of new or changed powers to existing bodies

¹ Institutional change is a complex process and depends on (i) the stability characteristics of institutions, (ii) the sources of change, (iii) the agent of change and (iv) the direction of change and path dependence (North, 1990). Institutions typically change incrementally rather than instantaneously, which means that short-term profitable opportunities cumulatively create the long-term path of change (Seppälä, 2002).
the creation of new authorities or new tasks for old authorities

- development of new policies (see above for key features of sanitation policies)

- coordination of policies

- creation of economic incentives, removal of economic hindrances

- new/changed legislation/regulation
  - e.g. identification of environmental quality standards, identification of time period to respect between excreta/greywater amendment event and harvest
  - One way to keep legislation modern for a longer time period is to make it less detailed and specific. For the sanitation case, one way of achieving this is to avoid mentioning technologies in legislation/regulation, but rather focus on functions that the sanitation services should provide. A function, or performance or criteria, approach opens up for innovative technologies/systems as long as they comply with the criteria identified in the legislation/regulation.

- action plans to enforce existing/new regulations
  - Better compliance with existing laws and rules and in many cases also reformed legislation are needed, as both these issues are important and intimately related. Better rules may foster different policies and help, among other things, to get better compliance. However, new laws and rules have to be coupled with concrete and specific application and enforcement of the law.

- reallocation of financial resources

- creation of monitoring mechanisms

- creation of financial mechanisms allowing the safe use of excreta and greywater (e.g. microfinance, revolving funds, etc.)

- completed decentralization processes

**Change in ways of working**

- continuous stakeholder involvement in order for legislation/regulation and institutions to be viable and accepted by the public

- enhanced cooperation between existing authorities

- execution of integrated planning approaches

**Piloting**

- If the institutional framework does not embrace the safe use of excreta and greywater, identification of waiver possibilities in order to conduct use in pilot projects may be essential for decision-making. The programmes should be integrated, encompassing sanitation, health and hygiene, nutrient/resource recycling and food security.

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1. Legislation/regulations should create conditions that favour innovation (in both technology and financing mechanisms); define cooperation between relevant stakeholders, including the private sector; and allocate financial resources to capacity building, training and monitoring implementation and maintenance (WHO, 2004a).

2. If you apply the household-centred environmental sanitation approach to planning of urban environmental sanitation services, it is important to decentralize powers and functions, since it builds on both bottom-up and top-down approaches to service provision planning (WSSCC, 2005).

3. Household-centred environmental sanitation is a multisector, multiactor approach to delivering urban environmental sanitation services, where urban environmental sanitation services comprise not only sanitation but also storm water and solid waste as well as water provision. In this way, the stakeholders have opportunities to participate in the planning, implementation and operation of urban environmental sanitation services, which is believed to increase their sustainability (WSSCC, 2005).
Guidelines for the safe use of wastewater, excreta and greywater

- **Information, education, communication**
  - awareness-raising campaigns at different levels\(^1\)
  - development of local guidelines for the safe use of excreta and greywater in agriculture
  - capacity-building efforts (e.g. bringing together more resources, stronger institutions, better trained people and improving skills; WHO, 2004a)
  - training regulators so that they know how to support, regulate and control systems for the safe use
  - information sharing through conferences, workshops and other forums
  - information and education programmes (see, for example, WHO’s sanitation and hygiene promotion programming guide; WHO, 2005b).

### 10.4.4 Research

Research on minimizing health impacts associated with use of excreta and greywater in agriculture should be conducted at national institutions, universities or other research centres. It is important to conduct research at the national level, because data concerning local conditions are the most important for developing effective health protection measures and may well vary considerably between countries. Pilot schemes can be developed to investigate feasible health protection measures and answer production-related questions. In situations where excreta and greywater use is practised in small-scale diffuse facilities, often at the household level, national research may be used to validate health protection measures and then develop guidelines and standards to be used by small-scale farmers. Research results should be disseminated to various groups of stakeholders in a form that is useful to them.

A pilot project is particularly useful in countries with little or no experience of managing excreta and greywater use in agriculture or when the introduction of new techniques is envisaged. Health protection is an important consideration, but there are other questions that are difficult to answer without local experience of the kind a pilot project can give. These questions are likely to include important technical, social and economic aspects. A pilot scheme can help to identify potential health risks and develop ways to control them.

Pilot projects should be planned — that is, a variety of crops (both old and new) should be investigated, with different application rates. Information is required not only on yields, but also on levels of toxic metals, organic chemicals and pathogens typically present in the region in local waste and their effects on the environment.

A pilot project should be carefully planned so that the work involved is not underestimated and can be carried out correctly; otherwise, repetition is required. After the experimental period, a successful pilot project may be translated into a demonstration project with training facilities for local operators and farmers.

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\(^1\) The main reason for awareness raising, on a decision-maker level, with regard to the use of excreta and greywater is that the possibilities it entails are relatively unknown. However, extensive, unregulated use of wastewater occurs in many cities today (e.g. Dakar), even if the main reason for farmers to divert raw wastewater to agricultural or horticultural fields might be to capture water rather than nutrients. Awareness-raising campaigns geared towards farmers should thus address the health risks associated with the use of raw wastewater/excreta and highlight the nutrient value of treated excreta. Awareness raising for safe excreta and greywater use applies also to engineers, planners and even sanitation professionals. There is an overall need to broaden the nature of the debate concerning the role of sanitation and the aims of sanitation provision.