

## Chapter 4

### **Water and environmental sanitation projects**

This chapter looks at the problems that WES projects try to address. The planning of WES interventions is considered briefly, and the project cycle is presented. Issues which will have to be considered to improve the impact and sustainability of projects are discussed, and the chapter concludes with a more global perspective of development by looking at poverty in society.

Some terms used in this chapter:

**NGO:** non-governmental organisation

**Agency:** any organisation that is implementing a project, including both national and international NGOs

**Project:** an intervention that tries to achieve one specific objective (e.g. to provide an adequate and sustainable water supply for 20,000 people living in particular villages) through specific activities (e.g. installing 60 handpumps)

**Programme:** is usually on a larger scale than a project, and has a goal which is more general (e.g. a sustained improvement of health for 40,000 people living in low-cost housing areas in Jakarta). A programme will usually have several objectives (e.g. install adequate and sustainable services for water supplies, sanitary services, hygiene promotion, and solid waste management), and is usually made up of several projects <sup>(adapted from 19,20,23)</sup>.

Although this manual only covers infections linked to WES, it should be remembered that these are only part of the total health burden of people in developing countries.

## 4.1 The price of poor WES

Infectious diseases related to WES are very common in developing countries. It is estimated that 1 billion people are infected with roundworm <sup>(44)</sup> and the same number with hookworm <sup>(4)</sup>. A study in Lubumbashi, in the Democratic Republic of Congo, showed that more than 90 per cent of young children in poor areas were infected with malaria and/or worms <sup>(63)</sup>. Estimates in the 1980s of the number of infections that occurred worldwide in one year were: diarrhoea, up to 5 billion; malaria, around 150,000,000; trachoma, around 25,000,000 <sup>(59)</sup>.

Every year an estimated 2,900,000 people die of diarrhoea <sup>(52)</sup>, around 900,000 of malaria <sup>(76)</sup>, and around 600,000 of typhoid fever <sup>(3)</sup>. Every year these three diseases together kill the equivalent of the population of Norway – more than 12,000 deaths per day.

Illness more often results in (temporary) disability than in death. Infections like leprosy, trachoma or filariasis are rarely fatal, but often result in permanent disfigurement, blindness, and disability <sup>(59)</sup>. DALYs (Disability-Adjusted Life Years) are a measure of the cost of disease. DALYs represent the number of years lost due to early death, and time and severity of the disability caused by the disease. Table 4.1 shows the number of DALYs lost to several important infections every year.

The developing world is paying the highest price for disease. Only 12 per cent of the suffering caused by disability and early death occurs in developed countries. In developing countries, 35 per cent of all DALYs lost are a result of communicable disease, compared to just over 4 per cent in developed countries <sup>(51)</sup>.

**Table 4.1. DALYs lost to disease worldwide, yearly figures** (from 51 and 76)

<i>Infection</i>	<i>DALYs</i>
Diarrhoeal disease	99,600,000
Malaria	31,700,000
Roundworm infection	10,500,000
Trichuriasis	6,300,000
Schistosomiasis	4,500,000
Trachoma	3,300,000
Chagas disease	2,700,000
Leishmaniasis	2,100,000
Sleeping sickness	1,800,000
Hookworm disease	1,100,000

Disease is expensive at all levels. At a personal level illness results in suffering, loss of time and money because of disability, payment for medical care, transport to health facilities, care by a healthy person, and the need for special food. At national level disease costs because medical facilities have to be maintained, care and medication must be provided, and because part of the workforce is unable to produce.

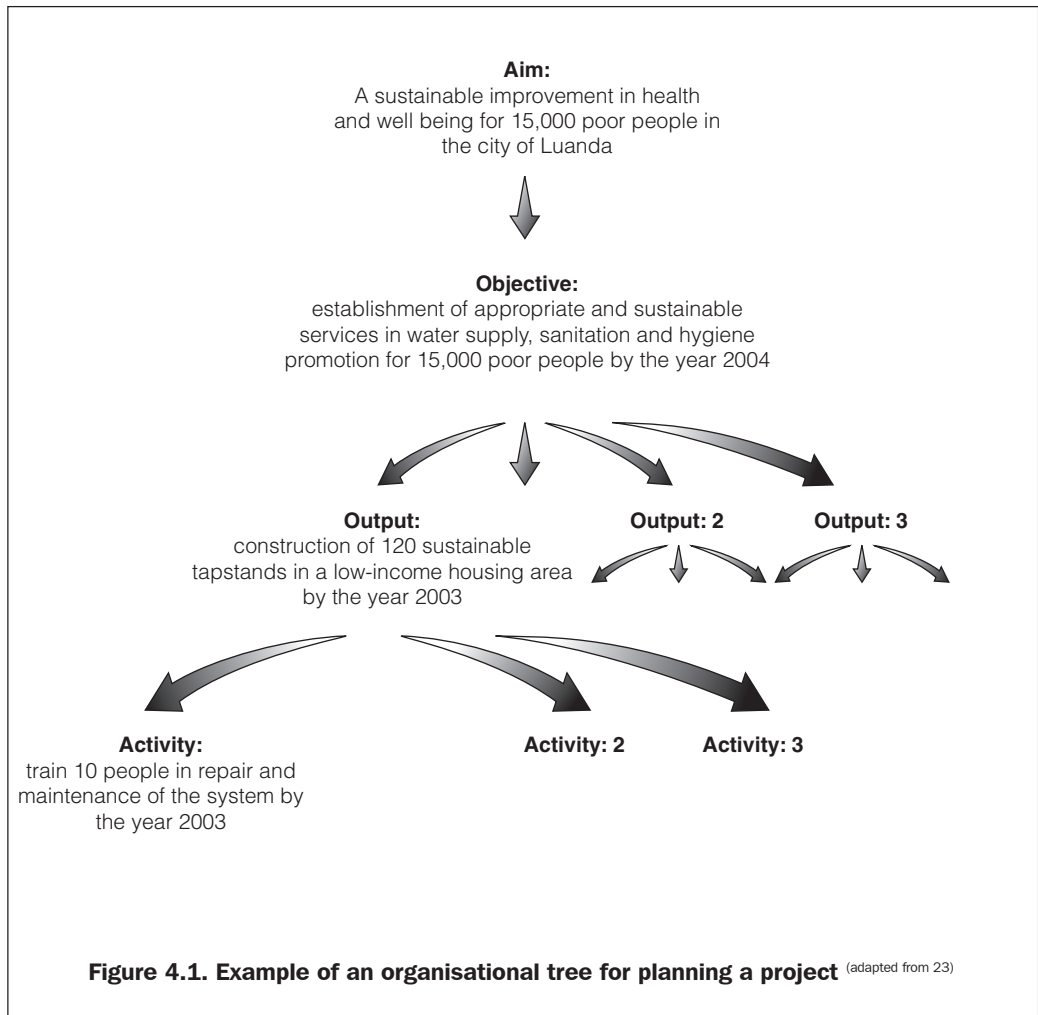
Poor health is not the only price people pay for poor water supply and (environmental) sanitation. Often water has to be carried over long distances, taking up energy and time. In some regions over half the daily energy available to one person is needed to carry the water used by the household every day <sup>(1)</sup>. This time and energy cannot be invested in other activities like going to school, or growing vegetables for sale or consumption. Carrying heavy loads of water can result in deformities of the body and other physical problems <sup>(20,38)</sup>. Where water must be bought from vendors, it may account for a large proportion of the household's expenditure (up to 40 per cent of the income of a household is mentioned) <sup>(69)</sup>. Where (environmental) sanitation is poor, people may live or work in an unpleasant environment of bad smells, nuisance by insects or rats (which can carry disease), and unsightly conditions.

### **4.2 The planning of WES projects and the project cycle**

The aim of WES projects and programmes is usually to improve the health and socio-economic conditions of a population <sup>(20)</sup>. Health is improved by breaking the transmission cycle of diseases present in the project area. People's socio-economic conditions are improved by helping people to gain time, energy, money, and skills in management and decision-making.

Projects and programmes are best approached in a methodical manner. This ensures that no steps are overlooked in the planning and implementation of the project. Although we will not go into much detail on how to plan and conduct projects or programmes, we will point out some important issues.

To be able to assess whether a project functions well, or has been successful, every project should have a clear goal, and a clear idea of how this goal is going to be achieved. Figure 4.1 shows how an organisational tree could be set up for a project. The objective must lead to the aim; to attain the objective, certain outputs will have to be achieved; and to realise the outputs, certain activities will have to be accomplished. In the end everything that will have to be done and achieved in the project must be included in clear and measurable form in the organisational tree, which is a simplified form of the logical framework.



A project goes through a cycle, the project cycle, which consists of a sequence of assessment, planning, implementation and evaluation activities.

Figure 4.2 presents the steps of project cycle.

### 4.3 Improving impact and sustainability

Projects take place in a dynamic society with its own cultural, financial, physical/technical, and institutional/political particularities. It is therefore difficult to predict all the short- and long-term effects of an intervention. Although it is impossible to eliminate all uncertainties, a thorough assessment of the local situation, and an intervention that is well adapted to the local situation, will improve the chances of success of a project.

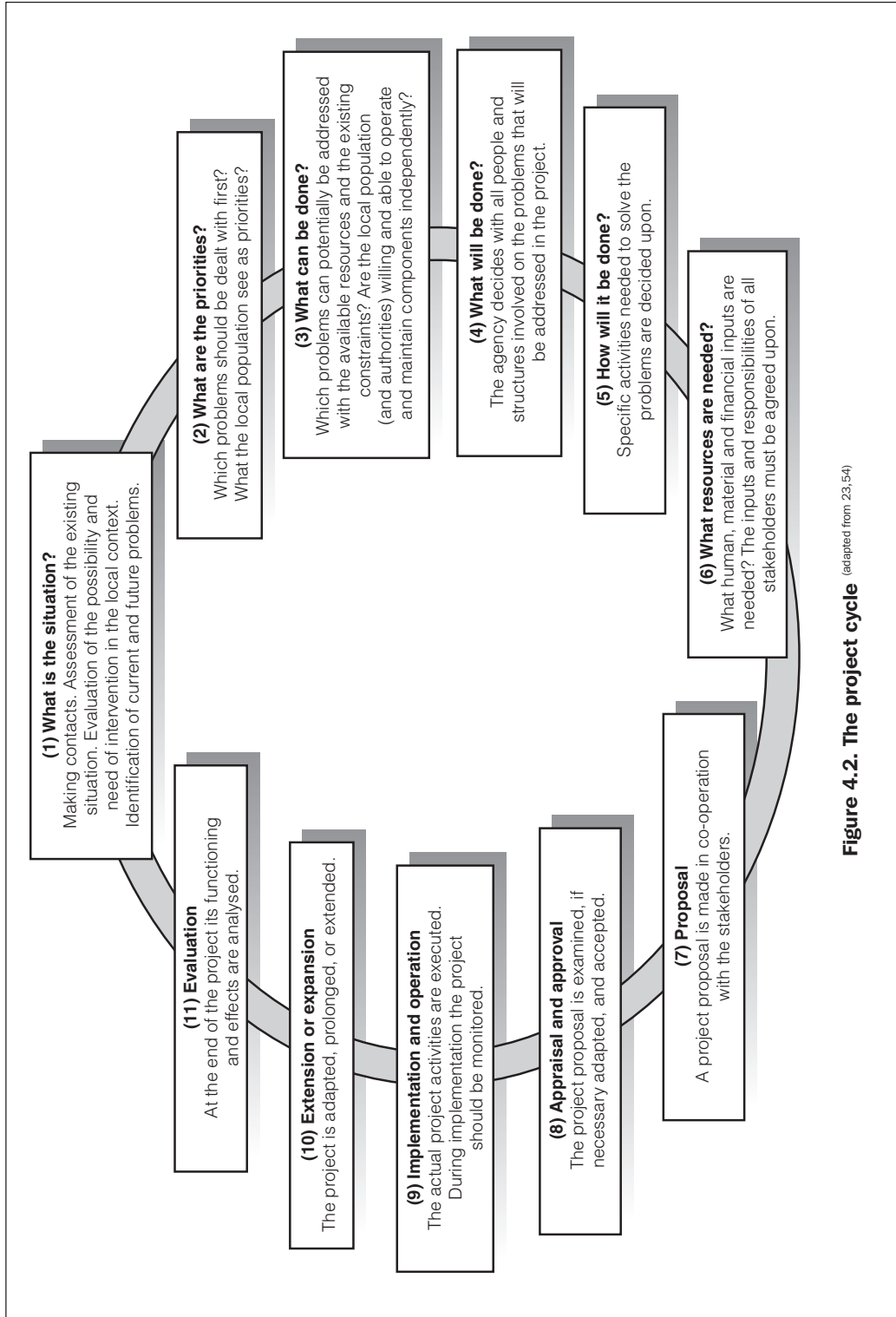


Figure 4.2. The project cycle (adapted from 23,54)

This section looks at some of the cross-cutting issues which must be addressed in the project planning phase to improve impact and sustainability.

### **Integral approach to projects and programmes**

Most of the infections covered in this manual could be controlled by any one or several components of WES. Water supply, sanitation, drainage, solid waste management, and vector control should therefore always be combined to achieve the best overall results in disease control. Interventions that combine the different components are usually the most effective in improving the health situation <sup>(38)</sup>.

Health is affected by many factors other than WES. Programmes should try to combine components of all relevant sectors (e.g. WES, medical, environmental, economic) to achieve maximum impact. Programmes are most effective when projects from different sectors are integrated <sup>(26,38)</sup>.

### **Hygiene behaviour and health and hygiene promotion**

Adequate hygiene behaviour is crucial in preventing disease. Improving infrastructure without improving behaviour will rarely result in effective disease control. The largest improvements in health have occurred where hygiene improved because of a change in behaviour <sup>(13)</sup>. Improving hygiene behaviour through health and hygiene promotion should therefore receive the same priority as structural improvements.

Changing people's behaviour is difficult and often requires prolonged education. Health and hygiene promotion must therefore be included in a project from the beginning, and will require its own time scale, material, and people with specific skills <sup>(20)</sup>. Health and hygiene promotion must be adapted to the local culture <sup>(27)</sup>.

### **Technical aspects**

Infrastructure must be designed to fulfil needs. Where the population density is high and the infiltration capacity of the soil low, a sewage system may be appropriate. In most other cases, however, sewerage will be inappropriate because it is expensive and requires demanding operation and maintenance.

Often different components of WES need to be supplied together. A water supply system should always be combined with adequate wastewater disposal; a sewage system needs a reliable piped water supply system.

Infrastructure should be adapted to local needs and capabilities. A handpump may be very convenient, but a proper hand-dug well may be more appropriate in terms of local capacity to build and maintain the structure. A brick latrine may look

good, but may also be too expensive for local people. If people use corncobs to clean after defecating, a pour-flush latrine will soon be blocked.

Changes in population, or in use of the structures, have to be planned for. The number of people using the infrastructure may increase because of natural growth or migration. A latrine designed to receive only excreta may not cope with the sillage if a piped water supply is later installed. Where possible, infrastructure should be built with potential upgrading or extension in mind.

### **Operation and maintenance**

Operation and maintenance (O&M) must be addressed early in the project. Infrastructure which functions poorly often becomes a health threat, and improvements will only last if a reliable O&M system is in place. O&M must be as easy and affordable as possible. Spare parts and other necessary materials must be affordable and easy to obtain, and responsibility for O&M should be agreed upon early in the planning of a project.

Infrastructure should be installed at family level if possible, as O&M by users is the most reliable system. To facilitate this, local construction techniques and materials should be used as much as possible. People should be offered training and adequate tools for building and O&M. The quality of construction should be as high as possible, but adapted to what is adequate and affordable to the users.

### **Socio-cultural aspects**

Even if the population understands the importance of improved infrastructure and behaviour, there is no guarantee that the infrastructure will be used or good behaviour practised<sup>(18)</sup>. If users believe the components are inadequate, they will not respect them.

Although an outsider will never completely understand people's perceptions of adequate and inadequate, it is important to understand the issues that are relevant to the project. For this the traditional beliefs, ideas, and expectations of the people about WES must be identified and taken into account.

Societies are not homogeneous; they are made up of people of different sex, age, religion, ethnic origin, socio-economic status, occupation, and caste. Some are more vulnerable than others, particularly women, children, religious and ethnic minorities, and people who are old, disabled, or poor. These groups of people must be identified and included in the project as much as possible. As domestic WES is often the responsibility of women, they should play an important role in the planning of an intervention<sup>(23)</sup>. All components must be acceptable to all users.

If certain groups do not see the infrastructure as adequate, they will either not use it or use it incorrectly. It cannot be assumed that the agency, authorities, or communities' representatives know what type of structures are most appropriate to all users.

### **The accessibility of infrastructure**

The presence of improved water supply or sanitation does not mean that everyone has access to it <sup>(25)</sup>. Accessibility of services depends on the time, energy, money, and security. To make infrastructure accessible it has to be present in sufficient numbers, close to where it is needed, at a price affordable to all, and where it can be used and reached safely. Using the services must be as easy and comfortable as possible.

The groups that are most at risk in a society (e.g. single women, people who are older, disabled, or poor) will often suffer most because of poor accessibility, and accessibility for these groups must be taken into account during planning.

### **Financial aspects**

Improvements are more likely to be sustainable if the full costs of operation and maintenance can be borne by the users. How much people are able and willing to pay for the services must be determined in an open discussion between the people and the agency. Where people buy water from vendors the price they are already paying is an indication of what people are prepared to pay <sup>(15)</sup>. It is not realistic to say that all families will be willing to pay the same percentage of their income for water and sanitation. What people are willing to pay for improved services will depend on the importance of WES to them, how much they pay for the service already, what level of service is on offer, and their expectations from authorities or agency.

Where possible the initial costs of construction should be (at least partly) recuperated in the form of money, labour, or material. Again, the community's contribution must be adapted to what they are able and willing to provide. This has to be determined in discussions between the agency and the community, and by realistically assessing the availability of resources.

If there is a central regulating body (e.g. for a piped water supply or communal latrines), an adequate system of collecting fees must be installed. Where the infrastructure is at a household level, the family can cover its own maintenance and operation costs. If subsidies are offered, they should be used to make services accessible to people who would otherwise not be able to afford them. To prevent abuse, the policy for allocating subsidies must be transparent <sup>(23)</sup>.

### **Institutional aspects**

The agency does not plan and run projects on its own. It usually works with one or several governmental bodies. Other authorities or organisations will often be given the responsibility to implement the project, or operate or maintain infrastructure.

It is important to identify all the organisations that are, or could be, connected to the project. They have to be assessed on their organisational skills, capabilities, level of motivation, availability of time as well as their access to resources, transport, and materials. Transparency and accountability will be important issues. Training or help buying materials will be necessary.

The general guidelines and regulations of the country have to be followed, and the project should fit as closely as possible in the programmes, plans, or guidelines of the government or other organisations.

### **4.4 Health, poverty, and development**

Health in a population is linked to many factors. The general environment <sup>(79)</sup>, housing, legal and physical security at home and at work, education, nutrition, gender differences, access to health facilities <sup>(88)</sup> and stress <sup>(41)</sup> all play important roles in public health. Most of these factors are closely related to poverty.

The poor are usually most at risk of infection because of their degraded environment and inadequate nutrition, so they are the hardest hit when ill as they have no reserves or rights to fall back upon, have difficulty accessing medical care, and pay the most for it. Few poor people can afford to create a healthy environment with good housing, adequate water supply and (environmental) sanitation.

Disease can also be very expensive because of the direct costs (e.g. treatment, transport) and loss of income (sick people cannot work).

Poor health often leads to poverty, and poverty often leads to poor health. Once people are in this vicious circle, it is very difficult to escape. Most people in developing countries live in poverty. In 1993 it was estimated that half of the over 1.5 billion people who inhabit cities live in extreme poverty <sup>(81)</sup>.

Poverty, and with it poor health, is not only crippling for individuals, it is a serious handicap to developing countries as a whole. Improving environmental hygiene, water supply, housing, education, nutrition, and health facilities is only possible if

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resources are available. But as a large proportion of their population already suffers from disease, these countries do not have the productive workforce needed to create these resources <sup>(1)</sup>.

While general access to an adequate water supply and acceptable (environmental) sanitation are crucial to good health in a population, the only long-term solution to poor health and underdevelopment is poverty reduction. The only way the poor can afford and maintain better services (wells, piped water, improved latrines) is by increasing their income <sup>(78)</sup>. Remember this when planning a programme, and address poverty wherever possible.