

PART 2

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MODULE 1

Introduction

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Unit 1: Course introduction

1. Outline of session

► Objectives

- To introduce the participants to one another
- To review the participants' fears and expectations
- To reach a common understanding of the course's objectives and structure

► Methodology

1. Welcome address
2. Exercise for group interaction
3. Group discussion on expectations and fears
4. Interactive presentation on course objectives, methodology and programme

► Materials

- ✓ Transparencies on the course's objectives and programme
- ✓ Flip chart and masking tape
- ✓ Overhead projector, screen or white wall
- ✓ Stationery for each participant, including note pad, binder, pencil, eraser, pen and marker
- ✓ The binder should contain the following: the course's objectives and programme, full list of participants, and practical information concerning food, lodging, transport, recreation areas, access to telephone, medical help, and contact person for information and emergencies.

► Handouts

- ✓ Information on the place where the course is being held (optional)

2. Notes for the facilitator

Welcome address and introduction

The welcome address can be given by the Director of the Institute where the course is being held, or by a well-known specialist. The facilitator's introduction must clearly state his/her credentials and role, including some personal facts that would interest the participants, and he/she presents the team who will be working with the participants through the whole course. This is followed by an explanation of how the session will proceed, its objectives, and the methodology.

Interactive exercise

One way of making introductions is to ask the participants to pair up and spend a few minutes introducing themselves to each other. The facilitator then goes to each pair and, in turn, one of them will introduce the other, giving his/her name, nationality,

place of residence, education, professional function, and one or two personal facts. In a course where the participants are meeting for the first time, this approach allows everyone to get acquainted with at least one person very quickly, and helps the participants to be relaxed and informal. At the end of this exercise, the participants are asked to write the name by which they would like to be called during the course on a folded sheet of paper, which will be placed in front of their respective places.

Expectations and fears

A group discussion can be started by asking the participants, “What are your expectations from this course?”, or “What did you think you would get out of this course at the time when you registered for it?” If no one volunteers to speak, the facilitator chooses someone with whom to start developing ideas, which are written on the flip chart. If any statement is not expressed clearly, these persons should be helped so that it becomes clear. Once the group’s views have been stated, the facilitator summarizes the participants’ expectations and relates them to the objectives of the course.

The same procedure is followed with regard to anxieties within the group concerning the course’s content, logistics, follow-up, etc., which can be started by asking the participants, “Have you any worries about this course?” Removal of such fears is important and allows the facilitator to get to know the group’s strengths and weaknesses, and to help the participants with any problems or difficulties that may arise.

Course’s objectives, structure, methodology and programme

The facilitator describes the course’s objectives, structure, methodology and programme, using the overhead projector and transparencies (see Part 1, Trainer’s Guide, in the section “About the training package”, page 5). In this process the participants’ expectations, which were discussed earlier (see above), should be related to the programme’s objectives. Time must be set aside for questions and clarifications, so that the objectives will be clear to all and any doubts can be dispelled. However, some of the expectations may not be met, and some concerns may remain. These matters should be discussed with the group, and the facilitator should help to clear up any misunderstandings. Questions on technical matters, e.g. a maintenance plan for diesel engines, could be deferred, if feasible, till the appropriate session during the course. If any concerns still remain, the matter should be referred to the course organizers and administration.

3. Overhead sheets: Sheet 1

Course objectives

General objective

- To contribute to the sustainability of water supply and sanitation programmes and projects in rural areas

Specific objectives

- To update knowledge on O&M issues
- To reinforce management skills on sustainable O&M
- To create specific approaches for better work and planning with communities
- To develop individual assignments based on the lessons learnt and each participant's workplace

Overhead sheet 2

Course outline

Module 1: Introduction

- Unit 1: Course introduction
- Unit 2: Presentations
- Unit 3: Concepts and trends
- Unit 4: Links between water, health, sanitation and environment

Module 2: Situation analysis

- Unit 1: O&M requirements
- Unit 2: Analysis of participation
- Unit 3: Analysis of constraints
- Unit 4: Analysis of objectives

Module 3: Towards sustainable O&M

- Unit 1: Linking technology choice with O&M
- Unit 2: Institutional set-up
- Unit 3: Community management
- Unit 4: Gender awareness
- Unit 5: Cost recovery
- Unit 6: Monitoring for effectiveness
- Unit 7: Working and planning with communities
- Unit 8: Field visit

Module 4: Planning

- Unit 1: Planning tools
- Unit 2: Individual assignments
- Unit 3: Final presentations

Overhead sheet 3

Proposed timetable

Week 1	Monday	Tuesday	Wednesday	Thursday	Friday
Session A	Introduction	O&M requirements	Analysis of constraints	Community management	Monitoring for effectiveness
Session B	Presentations	O&M requirements	Analysis of objectives	Community management	Monitoring for effectiveness
Session C	Concepts and trends	Analysis of participation	Linking technology choice with O&M	Cost recovery	Gender awareness
Session D	Linking water, health, sanitation and environmental protection	Analysis of constraints	Institutional set-up	Cost recovery	Preparation of field trip
	<i>Daily evaluation</i>	<i>Daily evaluation</i>	<i>Daily evaluation</i>	<i>Daily evaluation</i>	<i>Daily evaluation</i>

Week 2	Monday	Tuesday	Wednesday	Thursday	Friday
Session A	Field trip	Working with communities	Individual assignments	Preparation of presentations	Presentations
Session B	Field trip	Working with communities	Individual assignments	Preparation of presentations	Presentations
Session C	Lessons learnt from field trip	Planning tools	Individual assignments	Presentations	Evaluation Closing
Session D	Lessons learnt from field trip	Planning tools	Individual assignments	Presentations	
	<i>Daily evaluation</i>	<i>Daily evaluation</i>	<i>Daily evaluation</i>		

Unit 2: Presentations

1. Outline of session

► Objectives

- To enable the participants to present their personal experiences with operation and maintenance

► Methodology

1. Individual or group exercise
2. Presentations by the participants

► Materials

- ✓ Transparencies on the forms to be filled in
- ✓ Flip chart and masking tape
- ✓ Large sheets of paper
- ✓ Overhead projector, screen or white wall

► Handouts

- ✓ Information about operation and maintenance services in the host country
- ✓ Forms for the exercise on initial presentations

2. Notes for the facilitator

The presentations allow the participants to share their personal experiences in different backgrounds with the group, and to give an overview of the problems which they have encountered or are likely to encounter in their professional life. This approach will help the facilitator to plan future sessions, taking into account these problems and the distinctive features of each group.

The facilitator will explain the object of the presentations and distribute a prepared form for each participant to fill in (see exercise sheet, page 34). Participants from the same department, region or project could be asked to join together and prepare a single presentation.

The group is given a maximum of 20 minutes to prepare the presentations. Each presentation is allowed 3 minutes, plus 2 minutes for questions or clarifications. Long discussions are not permitted at this stage since time will be given later during the course.

Each presentation should be written on large sheets, which will be put up on the wall during the presentation. If possible, a secretary should type out the main points and results of the presentations after the session is over, and distribute this information to all the participants.

One problem frequently encountered in this exercise is the tendency to exceed the time allocated. The facilitator must therefore be prepared to warn the participants when their time is nearly over. This responsibility could be shared with one of the participants.

Different presentations often tend to be repetitive as regards the problems or experi-

ences that are described. One way of overcoming this is to organize the presentations by subject, taking all the participants who work on similar projects (e.g. gravity systems, or small piped systems with motorized water lifting, etc.) and grouping them together. Questions will be allowed only after all the participants in the subject area have completed their presentations.

3. Exercise sheet

Form for initial presentations

1. Personal data

Name: _____

Nationality: _____

Location of professional activity: _____

Profession and education: _____

Present function: _____

2. Programme / project

Name of programme / project: _____

Main components of the project (point by point and briefly):

3. Main O&M and management problems

Unit 3: Concepts and trends

1. Outline of session

► Objectives

- To specify the importance of O&M and management
- To analyse O&M in a wider perspective of sustainability. To define the concepts of operation, maintenance and management
- To raise awareness on present trends

► Methodology

1. Introductory note
2. Focused discussion on the importance of O&M
3. Interactive presentation of the factors and process dealing with sustainability
4. Group exercise on definition of concepts
5. Exercise on the attributes of good management
6. Focused discussion on what is rural

► Materials

- ✓ Transparencies on the forms for exercises
- ✓ Flip chart and masking tape
- ✓ Overhead projector, screen or white wall

► Handouts

- ✓ Forms for exercises
- ✓ Copies of selected parts of background information
- ✓ Copies of all transparencies

2. Notes for the facilitator

Introductory note

The aim of this session is to clarify and define the key concepts around which the course has been designed. It is important for all participants to understand that the issues relating to O&M are not only technical, but also social, managerial, institutional, financial and environmental. Recent advances in water supply and sanitation projects reflect these concepts, which are the result of trials and experiences during the past 20 years. The session will also serve to introduce the group to a participatory teaching methodology, which does not exclude presentations and lectures. It is recommended that the group should be reminded, from time to time during the course, of these concepts which are the cornerstone of the whole approach.

Focused discussion on the importance of O&M

After reminding the participants that their decision to attend this course was because they believed O&M was an important issue in their profession, the facilitator asks them, “Why is O&M important?” The group’s answers to this question are written on the flip chart or board by the facilitator or one of the participants. If an answer is not clear, the facilitator helps this person and, in addition, may ask the participants to illustrate their answers with an example from personal experience in order to improve comprehension. The facilitator should ensure that the following ideas are mentioned and discussed by the group: proper functioning, user’s satisfaction, sustainability, quality of life, health standards, and credibility of investments. After the session, the results of the discussion may be typed out and distributed. The facilitator should not forget to keep track of time.

Interactive presentation of the factors and process dealing with sustainability

In an interactive presentation the facilitator, from time to time during the presentation, poses questions so that the group can interact, e.g. by explaining the situation in their own words or by experiencing or proposing new ideas. The presentation starts by reminding the participants of the close links between operation and maintenance and sustainability. The first message to be conveyed is that sustainability is a process which starts right from the planning stage, and that O&M is not simply what happens after the system has been constructed. The first overhead sheet, representing a graphic of sustainability (see page 38), may now be presented. More details are provided below in the section on background information. The second message deals with the factors that influence sustainability. The facilitator can refer to the second overhead sheet and to the content details under background information (see page 45). Another effective way to help the participants’ comprehension is to explain the drawing with sustainability circles (see page 39), step by step.

Group exercise on definition of concepts

The facilitator asks the group to define the following terms: 1) sustainability, 2) operation, and 3) maintenance. Key words suggested by the participants are then written on the board, and from these a definition is gradually formulated for each term. At this stage, full phrases may not be required for the definitions.

A set of overhead sheets provides definitions for this course (pages 41–43), which are compared with what the participants proposed. Any difficulties in understanding should be discussed until the whole group reaches a consensus.

Exercise on the attributes of good management

Management is one of the key terms in this course. It is therefore important to have a common understanding about what it entails. There are no right or wrong answers, but the objective is to highlight the participants’ perception of management and to compare this with what the course will provide in terms of management tools.

The facilitator divides the participants into three or four groups and gives them an envelope containing labels, each representing a major attribute generally connected with management (see exercise sheet, page 44). Each group must choose five major attributes, which they think are needed for the proper management of projects. Some 15 to 20 minutes are required for this exercise.

Each group puts up their labels on the board and explains briefly (in five minutes) the reasons for their choice. The facilitator then presents the group with a definition of

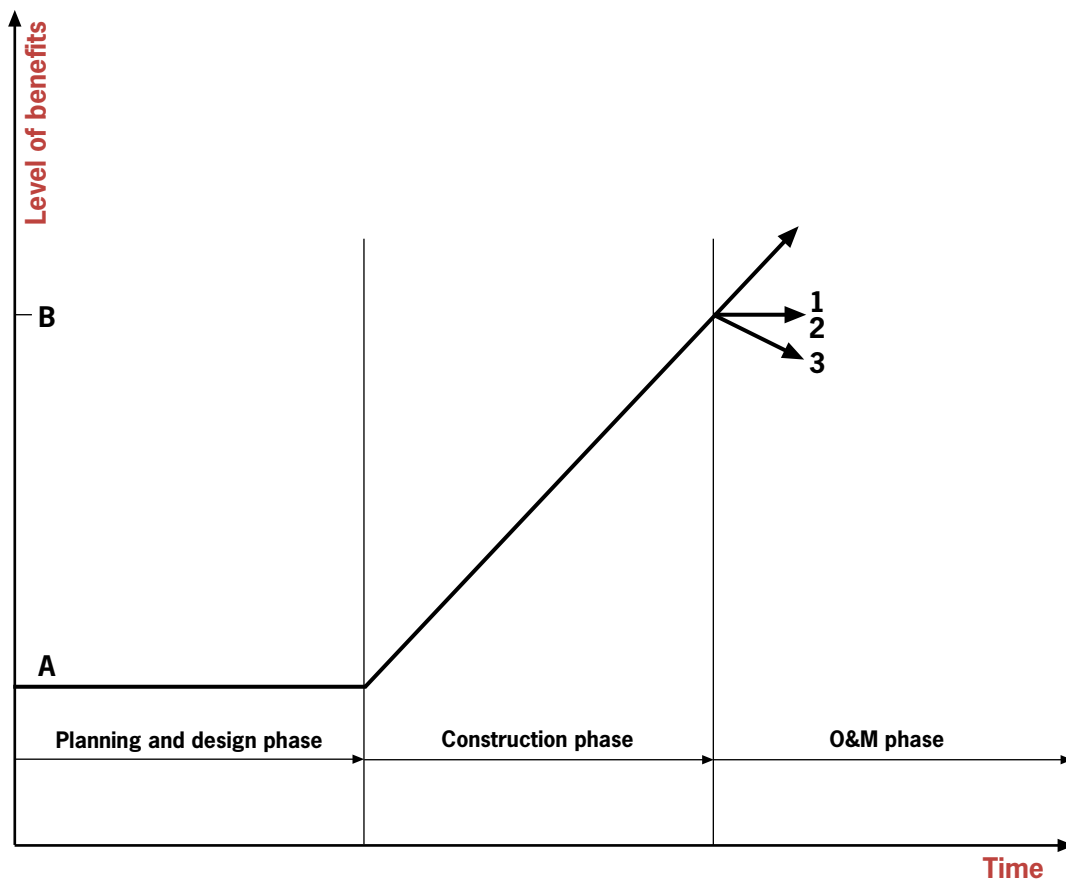
management and highlights some issues on management, which will be worked upon in the course. Time should be set aside for discussion and questions to promote clarification.

Focused discussion on what is rural

To end the session, the facilitator asks the group to reflect on this key term in the title of the course, i.e. what do they understand by “rural”? The participants’ answers may cause some difficulty because countries vary in their rural situations and characteristics. To facilitate consensus it can be proposed that, in the present context, the focus must be on low-cost technologies, including small piped-water supply systems. The aim here is not to give a precise definition of what is rural, but to provide a framework for improving rural water supply and sanitation, and to give an overview of the size and socioeconomic conditions of human settlements in the rural areas. Water supply and sanitation technologies will be reviewed during the session on “O&M requirements” (see Module 2, Unit 1, page 63).

3. Overhead and exercise sheets: Sheet 1

Sustainability in the project phases

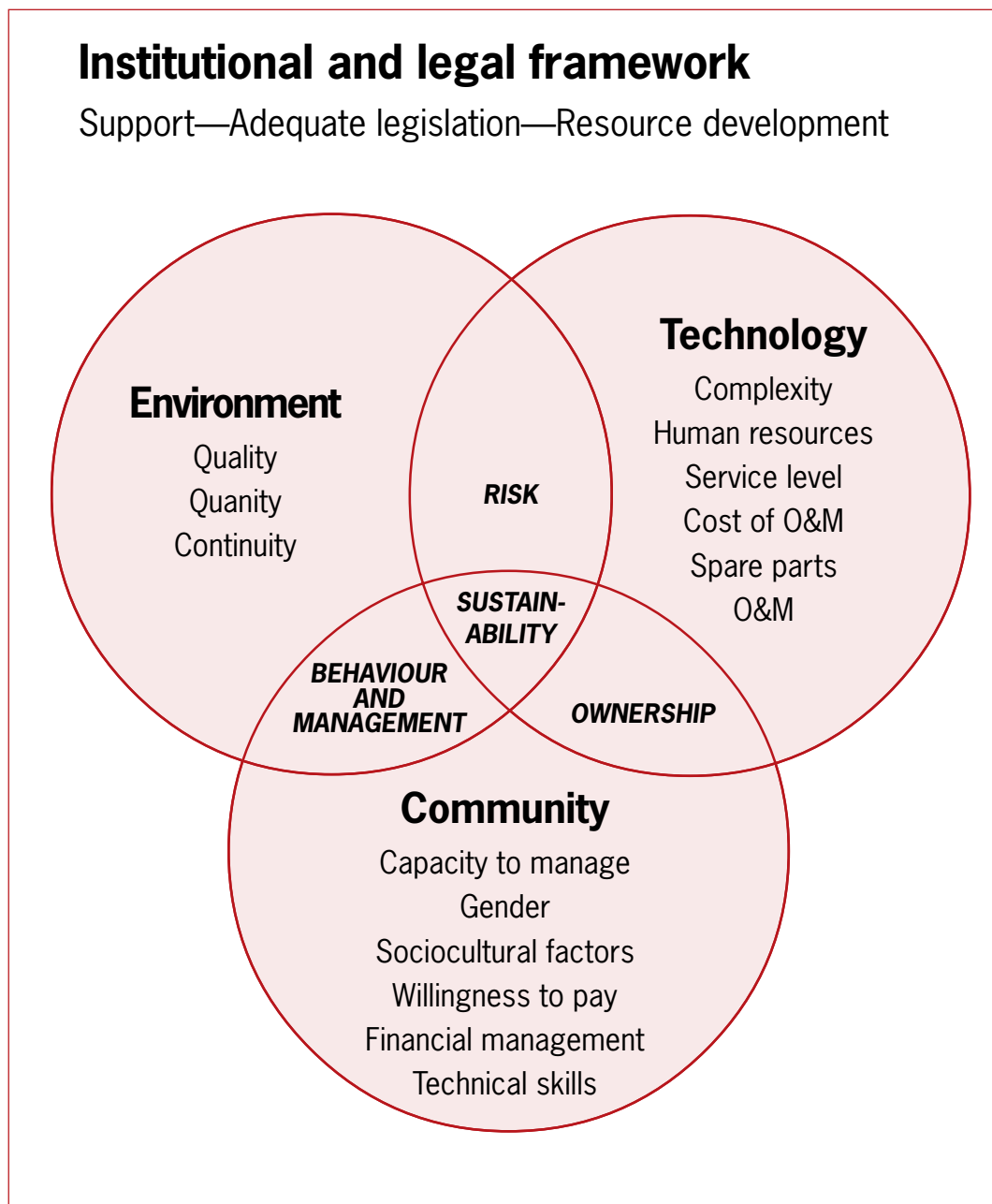


1 & 2: Development reaches sustainability
3: Unsustainable development

- Careful planning and design of O&M must already be completed during the planning and design phase
- Sustainability starts at the planning phase
- What are the factors that influence sustainability?

Overhead sheet 2

Factors which influence sustainability¹



¹ From CINARA-IRC course material: *Gestión para la sostenibilidad en programas de agua potable y saneamiento* (Management of sustainability in drinking-water and sanitation programmes), 1994–98.

Overhead sheet 3

Processes which influence sustainability

- Demand from the community
- Responsiveness from the supporting institutions
- Participation of the community throughout the project phases
- Linking technology choice with operation and maintenance
- Integrated planning (sanitation, water, hygiene, environment)
- Planning with a gender perspective
- Decentralization and transfer of responsibilities and resources
- Capacity-building at all levels
- Communication among stakeholders
- Public-private partnership
- Co-responsibility between communities and municipalities

Overhead sheet 4

Definitions

Sustainability

A service is sustainable when:

- it functions and is being used
- it is able to deliver an appropriate level of benefits (quality, quantity, convenience, comfort, continuity, affordability, efficiency, equity, reliability, health)
- it continues over a prolonged period of time (which goes beyond the life-cycle of the equipment)
- its management is institutionalized (community management, gender perspective, partnership with local authorities, involvement of formal/informal private sector)
- its operation, maintenance, administrative and replacement costs are covered at local level (through user fees, or alternative financial mechanisms)
- it can be operated and maintained at local level with limited but feasible external support (technical assistance, training, monitoring)
- it does not affect the environment negatively.

Overhead sheet 5

Definitions

Operation

Operation deals with the actual running of a service (e.g. provision of fuel, starting or handling of pumps, control of water collection points, general mechanical or water treatment procedures, hygienic handling, etc.).

Maintenance

Maintenance deals with the activities that keep the system in proper working condition, including management, cost recovery, repairs and preventive maintenance.

- **Crisis maintenance:** maintenance undertaken only in response to breakdowns and/or public complaints, leading to poor service level, high O&M costs, faster wear and tear of equipment, and user's dissatisfaction.
- **Preventive maintenance:** maintenance activities undertaken in response to pre-scheduled systematic inspection, repair and replacement, leading to continuity in service level, O&M costs spread over time, extension of life-span of equipment, user's satisfaction and willingness to pay.

Overhead sheet 6

Definitions

Management

Management deals with the control and organization of a service and encompasses the following main functions:

- Development of a vision and strategy
- Planning
- Organization and mobilization of resources
- Administration
- Accounting
- Leadership, motivation of personnel
- Supervision, monitoring and evaluation
- Promotion of external relationships.

This course focuses on the following managerial issues:

- Strategy development
- Planning skills
- Skills in problem-solving
- Integration of technical and social issues
- Communication (efficient presentation technique)
- Monitoring
- Human resource development
- Planning with communities.

Exercise sheet

Management attributes ¹

Prepare in advance an envelope containing the following labels which describe a possible management attribute. Each group will have to choose the five most important attributes for managing O&M (see notes on page 36).

Sense of responsibility

Willingness to
take risks

Skill in problem-solving

Capability to generate
new ideas

Planning with
communities

Promotion of external
relations

Strategy development

Integration:
technical/social

Mobilizing resources

Human resource
development

Skills in planning

Staff supervision

Sense of humour

Communication

Enthusiasm

Monitoring

Initiative

Technical skills

Ability to work in groups

Stimulating leadership

¹ Adapted from: Srinivasan L. *Exercise in tools for community participation—A manual for training trainers in participatory techniques* (PROWESS/UNDP Technical Series). PROWESS/UNDP—World Bank Water and Sanitation Program, New York, 1993.

4. Background information

4.1 Operation and maintenance in the context of sustainability

Sustainability depends to a large extent on effective and efficient operation and maintenance. Many factors and processes that contribute to sustainability have a direct influence on operation and maintenance.

Sustainability can be analysed in time, as shown in the Figure on project phases (see page 38). A service is sustainable when:

a) it is functioning and being used; b) it is able to deliver an appropriate level of benefits (*quality, quantity, convenience, comfort, continuity, affordability, efficiency, equity, reliability, health*); c) it continues over a prolonged period of time (*which goes beyond the life-cycle of the equipment*); d) its management is institutionalized (*community management, gender perspective, partnership with local authorities, involvement of formal/informal private sector*); f) its operation, maintenance, administrative and replacement costs are covered at local level (*through user fees, or alternative financial mechanisms*); g) it can be operated and maintained at local level with limited but feasible external support (*technical assistance, training, monitoring*); and h) it does not affect the environment negatively.

Proper operation and maintenance activities will contribute to the sustainability of a service after its construction, depending on a series of factors and processes which will have to be developed during the design and planning phase, and consolidated during the construction phase. In other words, the sustainability of operation and maintenance starts right from the planning stage.

4.2 Factors which contribute to sustainability and to effective operation and maintenance

As described in the chart with circles (see page 39), sustainability relies on four interrelated factors (adapted from CINARA—IRC course material, 1994 to 1998): a) technical factors, b) community factors, c) environmental factors, and d) the legal and institutional framework.

The **technical factors** which are likely to influence operation and maintenance as well as sustainability as a whole are: technology selection; complexity of technology; its capacity to respond to a demand and a desired service level; its impact on the environment; the technical skills needed to operate and maintain a system; the availability, accessibility and costs of spare parts; and the cost of maintenance.

The **community factors** which are likely to influence operation and maintenance as well as sustainability as a whole are: availability of technical skills to operate and maintain a service, and implement preventive maintenance activities and small and big repairs; capacity and willingness to pay; participation of all social groups in the community and both men and women; financial and administrative management carried out by a legitimate and organized community structure; the felt need for an improved service; socio-cultural aspects related to water; and individual, domestic and collective behaviour regarding hygiene and sanitation.

The intersection between the technical circle and the community circle (see chart on page 39) indicates the level of ownership and responsibility of communities towards the service. Ownership and responsibility are the key prerequisites for sustainable operation and maintenance.

The **environmental factors** which are likely to influence operation and maintenance as well as sustainability as a whole are: the quality of the water source (which will in turn influence the technology choice, and its need for treatment); and its quantity and continuity.

The intersection between the environmental circle and the community circle (see page 39) represents the way the community will manage water resources and especially

the impact on the environment of community behaviour in terms of sanitation and management of used waters. Water resources management, pollution control, hygienic behaviour, and proper wastewater management are all crucial components for sustaining a water supply service, to which operation and maintenance must contribute.

All these factors evolve within a **legal and institutional framework**. At the national level there must be clear policies and strategies towards operation and maintenance, which can be implemented. Support activities, such as technical assistance, training, monitoring, water quality control, and the setting up of alternative financing mechanisms are all likely to influence operation and maintenance activities.

Financial factors are key components inherent in all the above factors (technical, community, environment and institutional).

4.3 Processes which influence sustainable operation and maintenance

Processes differ from factors since they focus on the approach and the methodology of working. In the past, it was thought that the development or consolidation of factors alone could contribute to greater efficiency, effectiveness and sustainability. Now, however, it is realized that processes also have an important role to play. Among the processes can be listed the following: demand from the communities; responsiveness from supporting institutions and agencies; participation of communities (men and women) through the whole project cycle; linking technology choice with operation and maintenance; integration of water, sanitation, health and environment; planning with a gender perspective; effective decentralization; communication among all stakeholders; public/private partnership; co-responsibility between community and municipality; and capacity-building at all levels.

Demand for an improved service by the communities is a prerequisite for sustainability. It is an expression of their commitment, and a way to make communities responsible for their choices and future tasks. However, demand should be promoted because communities must be made aware of the different technology options available, and of their financial consequences. The concrete expression of demand varies from one country to another and from one development agency to another. Demand can be manifested in the form of an initial contribution in cash or in kind to the capital costs, or in the form of a written solicitation from an organized community group to the municipality.

Responsiveness of support institutions and agencies is the capacity of municipalities, nongovernmental organizations (NGOs), and other institutions and agencies to respond adequately to the needs and demand of communities. In many countries, municipalities need to be consolidated in their ability to deal with rural communities.

Participation of communities (men and women) throughout the whole project cycle is essential since it is a way to motivate, make responsible and build the capacities of communities in their new tasks and functions.

Linking technology choice with operation and maintenance at the planning stage is the key in the technology selection process. Indeed, communities must be able and willing to operate, maintain, administrate and finance the new service.

Planning with a gender perspective implies that the roles and functions of both men and women are clearly defined for management, operation and maintenance, since these might also highlight the need for specific capacity-building activities.

The **decentralization process**, which is underway in most developing countries, has a definite impact on the way institutions deal with the provision of water supply services. The main trend is for municipalities to be responsible, while the private sector (formal and informal) can contribute actively in the maintenance of systems.

Communication from central to local level and vice versa, and between private agencies and development agencies can enhance the coordination of activities and

implementation of policies. Furthermore, a proper information and monitoring system relies on effective communication channels.

Public / private partnership can have an important role in the operation and maintenance of improved water supply and sanitation services, where the private sector can operate, maintain, and manage the service under contractual agreements.

Co-responsibility between communities and municipalities implies that the tasks, responsibilities and functions of both parties are clearly defined. This is especially true now that municipalities are increasingly being given the legal and constitutional responsibility for the provision of public services. At the same time, community management is being promoted as a key element of sustainability. Efficient dialogue and a clear definition of roles need to be worked out, developed and consolidated.

Capacity-building at all levels is needed, especially in an environment of changing roles and responsibilities induced by the decentralization process.

Unit 4: Linking water, health, sanitation and environmental protection

1. Outline of session

► Objectives

- To raise awareness on the need to link water, health, sanitation and environmental protection
- To show that adequate operation and maintenance of water supply and sanitation will contribute to health and environmental protection

► Methodology

1. Introductory note
2. Video presentation followed by a discussion
3. Interactive presentation on the links between major health preventive measures and environmental protection
4. Focused discussion on behavioural change
5. Exercise in plenary using a behavioural change matrix

► Materials

- ✓ Overhead transparencies
- ✓ Flip chart and masking tape
- ✓ Overhead projector, screen or white wall
- ✓ Video projector
- ✓ Video: "Prescription for Health"

► Handouts

- ✓ Copies of all transparencies
- ✓ Selected extracts from background information

2. Notes for the facilitator

Introductory note

It was mentioned in a previous session that there is a trend to link water supply, health, sanitation and environmental protection activities because an adequate water supply by itself cannot solve all health problems. Proper handling and hygienic use of water, hygienic maintenance of water points and water sources, protection of the environment, safe sanitation disposal and cleaning of hands all contribute to the improvement of health. The facilitator must therefore focus on the importance of linking water supply, health, sanitation and environmental protection, and help all participants to see the need for such integration.

Video presentation followed by a discussion

A 23-minute video film, “Prescription for Health”, was produced by the IDRC (International Development Research Centre), P.O. Box 8500, Ottawa K1G 3H9, Canada, and is suitable for audiences of diverse cultural backgrounds. It was filmed in Bangladesh, Kenya, Philippines, Sri Lanka and Thailand, with extensive animation sequences to illustrate clearly the contamination path. The video promotes personal hygiene and community practices linked to water supply and sanitation, which can help to break the cycle of infection. Produced in collaboration with the World Health Organization and OXFAM, the video is primarily aimed at health care workers and water and sanitation engineers. It is a source of information for planners and policy-makers, and particularly strong in raising awareness.

After viewing the video, the participants are asked by the facilitator to comment on the key messages brought up in the film. Their main ideas are written on the board, together with statements from the video which are added by the facilitator who must be thoroughly familiar with the film. The facilitator then asks the participants how far this type of approach has been or could be utilized in their own working environment, and encourages them to discuss freely based on their personal experiences.

Identification of obstacles that inhibit the link between water supply, health, sanitation and environmental protection is discussed in a plenary session. The aim of this exercise is to show the constraints that must be overcome in order to reach integration. Such issues as no priority, not our mandate, no knowledge about it, poor financial resources, and poor inter-sectoral cooperation might come out during the discussion. The course does not try to solve these problems, but tries to show how O&M activities can contribute to this integration.

Interactive presentation on major preventive measures and environmental protection

Using the overhead sheets provided, the facilitator shows the major preventive measures for reducing the transmission of diseases related to water and sanitation. Some explanations are available in the background information and supporting material.

The topic of environmental protection is dealt with in the same way. In both cases, it is important to show how these issues are related to O&M and its management. After an overhead sheet is presented, the group is asked, “How can a better O&M contribute to this situation?”

Focused discussion on behavioural change

Since hygiene practices and environmental protection activities are linked to specific individual, domestic or collective behaviours, the facilitator initiates a discussion with the group by asking the following questions: “Can you give examples from your professional experience of activities that aimed at changing behaviour, or specific outcomes which depended on behaviour change?” “Were they successful?” “What made them successful or not successful?” The facilitator then discusses with the group some basic aspects which make behavioural change not always successful (see background information, page 55).

Exercise in plenary using a behavioural change matrix

Key criteria for activities to promote behavioural change have been developed in a matrix by UNICEF, which can be presented to the whole group as an exercise in a plenary session. The matrix is given in an exercise sheet (see page 54).

The facilitator asks the group for examples of behavioural change which all participants are familiar with, such as “Use of chlorine tablets to disinfect water at household level”. The facilitator goes through the whole matrix with the participants, analysing the chosen behaviour change, and scores the total number of points. The final result is evaluated according to the ranges given in the exercise.

3. Overhead and exercise sheets: Sheet 1

Prevention of diseases related to water and sanitation

Major preventive measures

1. Safe human excreta disposal*
2. Personal hygiene
3. Domestic hygiene
4. Food hygiene
5. Water hygiene*
6. Safe wastewater disposal and drainage*

* Link with Operation and Maintenance.

Overhead sheet 2

Relationship between infection and preventive measures¹

Infection	Safe human excreta disposal*	Personal hygiene*	Domestic hygiene	Food hygiene	Water hygiene*	Drainage*
Diarrhoea Dysentery Typhoid Cholera						
Roundworm (ascariasis) Whipworm (trichuriasis)						
Hookworm						
Beef and pork tapeworms						
Schistosomiasis (bilharzia)						
Guinea worm (dracunculiasis)						
Scabies Ringworm Yaws						
Trachoma Conjunctivitis						
Louse-borne typhus Louse-borne relapsing fever						
Malaria Yellow fever Dengue						
Bancroftian filariasis						

* Can be influenced by adequate operation and maintenance.

¹ From: Boot M, Cairncross S. *Action speaks: the study of hygiene behaviour in water and sanitation projects*. The Hague, IRC (and London School of Hygiene and Tropical Medicine), 1993.

Overhead sheet 3

Drinking water source protection ¹

- Appropriate source selection and intake
- Catchment protection*
- Sanitary surveying of water point*
- Improvement of sanitation practices*
- Physical protection of wells and intakes*
- Soil and water conservation techniques*
- Wastewater treatment*
- Wastewater recycling*
- Artificial recharge
- Reforestation
- Community motivation and awareness*
- Partnership between communities and authorities
- Legislation and enforcement

* Can be influenced by adequate operation and maintenance practices.

¹ From: Bastemeyer TF, Lee MD. *Drinking water source protection*. The Hague, IRC, 1991.

Exercise sheet

Behavioural change matrix

Criteria for evaluating the likelihood of behavioural change

(Source: van Wijk C, Murre T, Esrey S. *Motivating for better hygiene and behaviour*. New York, UNICEF—IRC, 1996)

<p>Health impact of behavioural change</p> <ol style="list-style-type: none"> 0. No impact on health 1. Minor impact 2. Some impact 3. Significant impact 4. Very significant impact 5. Eliminates the problem 	<p>Complexity of behavioural change</p> <ol style="list-style-type: none"> 0. Unrealistic 1. Involves too many actions 2. Involves many actions 3. Involves few actions 4. Involves two actions 5. Involves one action 	<p>Direct consequences of behavioural change</p> <ol style="list-style-type: none"> 0. No consequences 1. Minor consequences 2. Some consequences 3. Significant consequences 4. Major consequences 5. Consequences guaranteed
<p>Frequency of behaviour</p> <ol style="list-style-type: none"> 0. Too cumbersome 1. Must be done hourly 2. Must be done once a day 3. May be done every few days 4. May be done once a week 5. May be done occasionally 	<p>Cost and effort of engaging behavioural change</p> <ol style="list-style-type: none"> 0. Unrealistic 1. Requires important resources and effort 2. Requires significant resources and effort 3. Requires some resources and effort 4. Few resources or effort 5. Requires only existing resources 	<p>Persistence needed to induce behavioural change</p> <ol style="list-style-type: none"> 0. Unrealistic 1. Requires compliance for several weeks 2. Compliance for a week 3. Compliance for several days 4. Compliance for a day 5. Very brief compliance
<p>Compatibility with existing activities</p> <ol style="list-style-type: none"> 0. Totally incompatible 1. Significantly incompatible 2. Some incompatibility 3. Little incompatibility 4. Easy to incorporate in existing activities 5. Type of activity already widely practised 	<p>Observability</p> <ol style="list-style-type: none"> 0. Cannot be observed by an outsider 1. Very difficult to observe 2. Difficult to observe 3. Is observable with attention 4. Observable 5. Cannot be missed 	<p>Similar practices</p> <ol style="list-style-type: none"> 0. Nothing like this is done 1. Slightly similar 2. Existing practice similar 3. Several similar practices 4. Many similar practices 5. Similar practices widely existing

For each proposed behavioural change, score 0 to 5 for each of the nine boxes. Aggregate the total score for each behavioural change. If the score is less than 20, it is highly unlikely that the audience will make the change. Different goals must be set. If the score is over 36, it is highly likely that the goal will be achieved.

4. Background information

4.1 Why is behaviour not changed by conventional hygiene education?¹

Planners of hygiene programmes and practitioners often believe that it is possible to give universal hygiene messages to the population. Such messages are based on the assumption that the knowledge of health educators is superior to local insights and practices. The fact that people have adapted their lifestyle to local circumstances and developed their insights and knowledge over years of trial and error is overlooked. General hygiene messages can therefore be irrelevant, incomplete or unrealistic.

The methods used to get the information across are often not suitable to create behavioural change. Many health messages are given in the form of lectures at health clinics, talks in meetings and gatherings, and through the mass media (e.g. posters, radio talks, brochures and booklets). Even if the educators succeed in reaching the intended audiences using the media, the people are only “told what to do”, and often do not get the chance to relate the message to their own experiences. It is important to realize that people can make sense of new information only in the light of their own experiences, perceptions and cultural backgrounds.

Many health education programmes teach people about water and sanitation-related diseases—what they are, how they are caused, and how they are prevented. But education does not, by itself, reduce the risks of transmitting these diseases. Only action can do this; knowledge is useful but not sufficient. Reviews of hygiene programmes show that appropriate settings to promote particular changes are rare.

4.2 What motivates people to improve their hygiene?

If general messages and information on disease transmission do not change people’s behaviour, what is it that can bring people to take action on the risky practices and conditions in their own environment?

An individual will adopt new behaviour when he or she believes that the practice has clear benefits—for health or other reasons—and considers these benefits as important. Change of behaviour is also considerably influenced by convenience, comfort, and status. The individual will then develop a positive attitude to the change. Positive or negative views on the environment from others can also influence a person’s decision to try the new practice. Thus, an individual’s attitude and situation will determine if the practice is taken up, and when this is found to be beneficial, it is continued.

What hygiene education programmes can do is to support water and sanitation projects, which are planning to install new facilities for the community’s use:

a) by assessing if water, sanitation and hygiene have a high priority among the various groups in the community, and by promoting their understanding of the implications of the existing conditions and proposed technical options for both community and family health;

b) by following up people’s use of the newly installed facilities and their hygiene practices in order to provide feedback to planners who will be better prepared to reduce other disease transmission risks, which prevent the realization of health improvements in the communities concerned.

Certain practices cannot produce results by individual change alone, but require concerted action by larger groups and the whole community. Making choices together, assigning responsibilities, and monitoring action will increase the people’s commitment to put into practice the agreed changes. Communal change is only possible when the com-

¹ From: van Wijk C, Murre T, Esrey S. *Motivating better hygiene behaviour: importance for public health—Mechanisms of change*. New York, UNICEF—IRC, 1996.

munity members themselves feel there is a problem and jointly undertake action that will permanently improve the conditions and their practices.

When learning, people remember 20% of what they hear, 40% of what they hear and see, and 80% of what they discover for themselves. This calls for a change in the way teaching is carried out—from a didactic to a more participatory and growth-centred education.

Four major factors stimulate people to change their behaviour: 1) facilitation (convenience, making life easier); 2) practical understanding; 3) influence of others; 4) capacity to change.

4.3 Experiences in better water resource management¹

Source selection and siting of intakes

Field experience shows that good source selection and adequate siting of intakes contribute to the reliability of the water supply system. For the selection of groundwater sources, in particular for small point source supplies, procedures could be more systematic, both in terms of locating high-yielding sites and in terms of avoiding sites with a high potential for contamination by seepage from the surface.

For the siting of shallow drilled and hand-dug wells, the risk associated with faecal contamination from on-site sanitation are poorly understood and quantified. Where water supply points are located within or adjacent to settlements, two elements have not been adequately addressed with respect to possible contamination by existing sanitation units and/or waste disposal practices. The first element concerns the risk of contamination of drinking-water sources from waste. The second is the lack of criteria for the establishment of safe distances between water source and possible contamination points.

With increasing population pressures and expansion of human activities into previously undisturbed catchment areas, risk assessment must take into account both current and projected activities within the catchment area.

Catchment protection

More active protection of catchment areas is needed, which involves a systematic appraisal of catchment areas for surface or groundwater sources and the identification of environmental factors related to land use. There is a need for practical experience to develop checklists for small sources to be effectively managed and maintained by local communities.

The groundwater pollution risk is the product of the contaminant load applied to the subsurface by human actions and the natural pollution vulnerability of the aquifer. To protect aquifers, it must be clear which pollutants and pollution sources affect them most. This knowledge forms the basis for delimiting protection zones within which human activities must be regulated.

Protection zones are important for the design, prioritization and distribution of water resources protection measures. The zones can be delimited with respect to the level and nature of the risk, resulting in more coherent and incisive protection strategies. The effectiveness of protection zones depends on the commitment of the local population to observe established protection measures. Protected areas are obviously increasingly vulnerable as population density increases.

¹ Extracts from: Bastemeyer T. *Drinking-water source protection*. The Hague, IRC, 1991.

Sanitary surveying

Sanitary surveys are a form of risk assessment in which the bacteriological, physical and chemical quality of a water source, the technical quality of the water supply point, the way it will be used by the communities, the surrounding environmental hygiene conditions, and the potential causes for contamination are examined. Their purpose is to minimize the level of risks of on-site contamination by identifying remedial measures which can quickly and easily be undertaken.

Improvement in sanitation

The problem of contamination of the water supply by users through poor sanitation and hygiene is widespread. Use of latrines and other sanitary systems reduces the risk of faecal pollution by excluding contamination of the topsoil or ground surface so that excreta are not washed into the surface water or transported by animals. The design of latrines should in principle ensure that there is no direct sub-surface link between the excreta and the groundwater supply, which involves taking into consideration the site, soil type and depth, and seasonal and daily water levels.

Physical protection of wells and intakes

Users pollute their water sources due to the lack of awareness about ways and means to ensure adequate physical protection of the water supply point. Community water supply projects, which are engaged in groundwater development through construction of wells, recognize the importance of simple site protection against pollution. The addition of well-aprons, soakway drains, covers and handpumps protect the water's quality by preventing the inflow of contaminated water back into the well.

Soil and water conservation techniques

Soil and water conservation activities can decrease turbidity by preventing sediment transport, increasing groundwater recharge, and decreasing surface flow peaks by increasing infiltration. A full range of erosion control techniques and strategies has been pioneered for developing countries and applied with considerable success.

However, soil erosion has expanded at a faster pace than most national governments have been able to cope with. A large proportion of soil erosion problems resulted from the expansion of shifting cultivation techniques into marginal areas. Additionally, they result from the settling of previously semi-nomadic people who have little history of terrace building or other traditional forms of soil stabilization.

Wastewater treatment

Both industrial effluent and domestic sewage should be treated to minimize pollution risks. For domestic sewage, different on-site and off-site technical options are available, but they are not always applied. In the developing countries, sewage lagoons and oxidation ditches are among the most economical methods. There is little experience in the use of simple and effective, low-cost treatment technologies for small-scale industrial polluters, especially for small rural agro-industries. There are no feasible treatment possibilities to deal with the many toxic elements originating from industries and the misapplication of fertilizers. Preventive measures against contamination from industrial and agricultural activities are therefore crucial.

Wastewater recycling

Wastewater treatment is complementary to wastewater recycling. As such, sewage waste may only need partial treatment in order to be used on farmland for irrigation or in a range of industrial processes where water quality standards are not critical. Wastewater recycling, if carried out correctly, can be a form of water source protection as well as conservation. The risk of contamination of water sources is decreased through proper recycling and increases the efficient use of the water source. In this way, water is treated by less expensive methods, since treatment requires mainly the removal of coliforms and helminths (e.g. wastewater treatment ponds).

Artificial recharge

Ground-water resources can be managed in order to decrease water table recession and saltwater intrusion, by artificial recharge. On the small and medium scale, recharge is predominantly performed from infiltration ditches, ponds and basins, retention of river underflow (using sub-surface dams), and through the retention of river floodwater. Sand storage dams can also be used to increase the dimensions of the shallow ground-water reservoir.

Reforestation

Reforestation programmes coupled with anti-erosion, soil and water conservation techniques are considered essential for the improvement of many water source problems. However, at the present time many more trees are cut down than planted.

Community motivation and awareness

Many water pollution problems are due to a lack of awareness of the causes of health problems among communities. The link between water, hygiene and illness is not strongly perceived since water is assumed to be beneficial and cleansing rather than a potential source of infection.

Partnership between communities and government agencies

A reliable and functioning water supply system may greatly contribute to the protection of water sources, and vice versa. Community-based maintenance and management of water supply systems is a good starting point for a more integrated approach to water source protection and environmental conservation. Although community water management strategies are possible, there must generally be direct links between the community and the water source. Communities must be the users of the water source or derive some other benefit from the protective action such as commercial benefits from tree planting or increased crop production following soil conservation. Conflict of interest between upstream and downstream users is a serious problem worldwide. That is why a sound legal basis for community water supply systems is very important. Government institutions and local authorities should support community efforts to manage and protect their drinking-water sources.

Legislation and enforcement

At the present time, water resource and environmental legislation in most developing countries has evolved over the years in response to specific water management problems, which were associated with economic and demographic growth. The legislation has usually been directed towards controlling the use of water from major rivers or lakes, which

are of economic significance, and currently does not provide a good basis for the protection of drinking-water sources.

WHO has listed the following legal issues which require attention:

- regulations are needed to ensure that the source exploited for community water supply is the most favourable in terms of quality, quantity, and access;
- regulations are needed to ensure health and environmental protection for wastewater use since there are obvious public health hazards;
- legal provisions are required to ensure that potential water sources are adequately protected from the harmful effects of wastewater infiltration;
- legislation and regulations are needed to ensure that the costs of community water supply and sanitation are recovered from all water source users.

