

## PART 2: KNOWING MORE ABOUT O&M

### MODULE 7

## TOWARDS SOUND MANAGEMENT





## OUTLINE OF COURSE

### PART 1 : FACING O&M

- MODULE 1: INTRODUCTION
- 1.1 Introduction of course to participants
  - 1.2 Presentations
- MODULE 2: THE CHALLENGE OF O&M
- 2.1 Concepts and trends
  - 2.2 Links between health, water and sanitation
- MODULE 3: O&M ISSUES
- 3.1 Analysis of constraints
  - 3.2 Identification of strategies

### PART 2 : KNOWING MORE ABOUT O&M

- MODULE 4: O&M TECHNICAL REQUIREMENTS
- 4.1 A systematic approach, with VIP latrine example
  - 4.2 Water supply
  - 4.3 Water distribution and treatment
- MODULE 5: O&M ORGANIZATIONAL AND FINANCIAL REQUIREMENTS
- 5.1 Actors and roles
  - 5.2 Management models
  - 5.3 Cost estimation & cost recovery
- MODULE 6: TOWARDS SUSTAINABILITY
- 6.1 Community management
  - 6.2 Involvement of women
  - 6.3 Local financing
  - 6.4 Human resource development
  - 6.5 Spare parts provision

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| MODULE 7: TOWARDS SOUND MANAGEMENT |
| 7.1 Information and communication  |
| 7.2 Monitoring                     |
| 7.3 Planning                       |

### PART 3 : PLANNING FOR O&M

- MODULE 8: ACTION PLAN/CONCLUSION
- 8.1 Methodology for planning
  - 8.2 Individual assignment
  - 8.3 Writing-up and presentations
  - 8.4 Evaluation and conclusion



## 7.1 INFORMATION & COMMUNICATION

### Description of session

#### ***OBJECTIVES***

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- To explore issues related to differing styles of communication.
- To facilitate the identification of communication problems which commonly occur in water supply and sanitation projects.
- To develop an overview of steps to be taken to establish an effective communication process on O & M.

#### ***OUTLINE OF SESSION:***

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|---|------------|
| • Introduction by the facilitator on communication issues   | 30 min     |
| • Group exercise on communication breakdown in water and sanitation projects                          | 30 min     |
| • In a plenary session, presentation of each group and discussion on methods to improve communication | 45 min     |
|   | <hr/>      |
|   | 1 h 45 min |

#### ***HAND - OUTS***

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- Guidelines for appropriate selection of communication methods
- Ghana case study
- Worksheet



## Background information

### 1. Importance of information and communication in O&M

Information and communication are crucial for an O & M system to function properly. A project manager of a water supply project needs to find out and take appropriate action on:

- what information is to be communicated
- with whom this information needs to be communicated
- when this needs to take place
- skills required for effective information exchange and communication.

This sub-module deals with communication aspects of information, and the next sub-module will deal with monitoring the information.

### 2. Importance of communication

People remember 20% of what they hear, 40% of what they see and hear, and 80% of what they discover for themselves. This fact established in field research might be useful to remember when talking about and planning information and communication efforts in operation and maintenance programmes.

Methods of communication include interpersonal methods, such as person-to-person discussions and group discussions and mass media, such as wall posters, boarding, radio, television.

The communication process involves many different mediums: print, pictures, moving images and the spoken word.

For effective communication, that is to say for the message to be understood and response shown a number of important things have to happen.

- a. The sender of the message must plan the message carefully. This means that a good understanding of the target group must be reached, about:
  - the language spoken by the target group
  - the literacy level
  - the existing levels of understandings about the topic to be communicated, for example, on perceptions about the ownership of a pump or tap, or about maintenance
  - the cultural beliefs of the group
- b. The sender needs to plan the message to meet the needs of the target group. It must be designed for the purpose intended so that:
  - it is clearly understandable
  - appropriate channels can be selected through which the message can be transmitted
  - feedback can be obtained from the target group
- c. The channels of communication must be carefully selected to help the communicator to achieve clearly identified objectives. For example, if the communicator wishes a group of villagers to reach a decision about their involvement in maintenance, then a channel which promotes dialogue should be selected, such as focus group discussions.



- d. Where possible the communicator should observe the target group carefully to see if the message has been received and understood. This can be done by listening to what is said and watching for reactions, or more formally by pre-testing messages with reactions from people.  
(Laver. 1991)

Communication will be more effective when the sender:

- is trusted by the receiver, being the target group,
- has important characteristics such as sex, age, culture in common with the target group
- has sufficient status and is considered reliable by the receiver.

### **3. Different forms of communication media**

See supporting material

### **4. Exercise : see working sheet**



## Worksheet

### GROUP EXERCISE

Identification of communication problems which commonly occur in water and sanitation projects (from Laver, 1991)

#### Exercise:

Using the guide sheet provided, and the Ghana case study, summarise likely communication problems which, in your experience are known to occur in water and sanitation projects.

Give as many examples as possible.

A rapporteur is designed to record discussion on the guide sheet and report back to the main session.



## Guide sheet

PROJECT PHASE

COMMUNICATION PROBLEM

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Planning

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Mobilisation/Motivation/  
Awareness

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Implementation/Activity

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Maintenance/Evaluation



## Supporting material

Communication case study extracted from IEC Journal, January 1992, published by IRC, The Hague, The Netherlands.

### 4.1 Water and health in Northern Ghana

- ◆ Those who attended village education sessions had a 28% increase in knowledge.
- ◆ A survey showed evidence that health had improved where communication had taken place.
- ◆ Maintenance of pump sites improved by 50%.
- ◆ 100,000 people attended water education sessions in 2,000 communities.
- ◆ The project now has 5,000 Community Water Organisers, and 2,500 pump sites producing safe water.
- ◆ Changes for the better came about when communication targets were clarified and key messages identified.

**T**he Water Utilization Project was launched in 1973 in the two Upper Regions of Ghana, bordering on Burkina Faso, where 1.2 million people live in scattered villages and water and sanitation related diseases are responsible for most illness and death in young children.

The first borehole sites were chosen from census figures based on geological criteria, with little consideration of social factors. It soon became apparent that although pumps were well used in the dry season, many women chose to use unprotected water closer to home in the rainy season.

Over the next 18 years, the programme went through a process of evolution and change. The importance of the role of women in making and sustaining change was only slowly understood. Gradually programme organisers realised that the way that knowledge was brought to a rural village; the way messages were devised and delivered; were crucial to the success of the programme, which has now brought safe water to an estimated 75% of the rural population.

As early as 1976 it was decided to add an educational component to the programme, training village education workers to increase understanding of health and water usage. By 1982 a community education programme had been launched in five districts. This campaign made some gains but there was doubt over how effectively messages were being given, and a recognition that too few women were involved.

In 1983 a comprehensive evaluation concluded that the programme was a qualified success. Each pump was used by 400 rural people, and health had improved, with a reduction in guinea worm and diarrhoea. However it also found that too little attention had been paid to selecting messages, developing effective material and building communication links with other rural programmes.

In 1985 Phase II of Project was launched, with priority given to water and health education and to training community based workers and pump caretakers.

## Water and health in Northern Ghana - 2

Caretakers had been appointed because they had some technical skill. However the most successful pumps did not lend themselves to local maintenance. There were other roles for the caretakers, including collecting a pump tariff from users to cover maintenance costs. Many villagers felt that pumps should be free of charge, but project organizers believed that if people understood the link between clean water and good health, they would pay a levy.

In 1987, the caretaker post was combined with a newly created Community-based Worker to create a single focus for communication at village level. Water Education for Health (WEFH) trained the Community-based Workers to back up Government field-workers at district and sub-district level, and built close links with other agencies. A rapid increase in training was achieved covering 5,800 Community Water Organizers by 1990.

One decision was to narrow the range of the campaign so that the content of each message was clear and gave villagers achievable targets. This 'lean and clean' approach led Water Education for Health to concentrate on preventing dehydration in children suffering from diarrhoea. This led to a detailed study of the knowledge, attitudes and practices of mothers. Some local remedies such as breast feeding, herbal tea and sugar-salt solutions, were reinforced and oral rehydration salts were promoted, in the hope that effective remedies would naturally drive out ineffective ones (such as mashed cow dung).

Field workers were expected to 'unlearn' technically correct but impractical advice like always boiling water. The aim was "to avoid repeating the same tired messages imploring villagers to be clean and hygienic". Tools included radio, picture books, songs, and dramas. Cassette tapes were prepared by actors improvising dialogue in each of the local languages.

A pilot project in 1986 showed that those who had attended village education sessions had a 28% increase in knowledge. Later evaluation showed that maintenance of pump sites increased by up to 50% after training. During a mass campaign in 1989 approximately 100,000 people attended education sessions in 2,000 pump communities. By June 1990 the project had 5,000 Community Water Organizers at more than 2,500 pump sites. A high proportion of the pumps were delivering safe water. Knowledge of the link between water and disease had increased, and there was evidence that health had improved.

A study prepared for CIDA in 1990 concluded: "Social change does not automatically occur as a result of technical input like the installation of handpumps. Development efforts aimed at improving the quality of life cannot be divorced from appropriate education and a well thought out communications strategy. The experience does serve to emphasize the importance of education and communication in the development of water resources for the urban and rural poor." ■

## Supporting material

Guidelines for appropriate selection of communication methods (from Laver, 1991)

GOAL	SUGGESTED METHOD
<p><b>Knowledge</b></p>	<ul style="list-style-type: none"> <li>- chalk and talk sessions</li> <li>- question and answer sessions</li> <li>- seminars</li> <li>- workshops</li> <li>- print media</li> </ul>
<p><b>Awareness</b> <b>Attitude change</b></p>	<ul style="list-style-type: none"> <li>- articles in news letters/ newspapers</li> <li>- exhibitions</li> <li>- visual displays</li> <li>- stop and study posters on a particular theme</li> <li>- single glance posters depicting one theme/one message</li> <li>- Programmes on local radio and television</li> <li>- discussions</li> </ul>
<p><b>Behaviour change/decision making</b></p>	<ul style="list-style-type: none"> <li>- group discussions</li> <li>- role-play</li> <li>- drama</li> <li>- participatory methods which utilise stories, visual aids such as picture codes etc</li> </ul>
<p><b>Acquisition of skills</b></p>	<ul style="list-style-type: none"> <li>- demonstrations</li> <li>- on job training</li> </ul>
<p><b>Social change</b></p>	<ul style="list-style-type: none"> <li>- Work with influential leaders, groups, eminent persons</li> <li>- Lobby policy makers</li> <li>- Workshops</li> </ul>

## Supporting material

Different forms of communication and audio-visual media (from GTZ, 1989)

Form	Advantages	Comments	Form	Advantages	Comments
Radio	<ul style="list-style-type: none"> <li>• Easily distributed</li> <li>• Illiterate persons can also be reached</li> <li>• Wide variety of presentation forms available</li> </ul>	<p>Topics should be discussed at local meetings and applied to local conditions</p>	Slide shows with synchronized soundtrack	<ul style="list-style-type: none"> <li>• Can be produced for specific topics and target groups</li> <li>• Graphic depiction of topics</li> </ul>	<p>Pictures and accompanying text must be coordinated; without sufficient preparation and follow-up discussion the learning effect is minimal</p>
Television	<ul style="list-style-type: none"> <li>• Combination of sound and pictures permits depiction of complex issues</li> <li>• High degree of attention</li> <li>• Suited for information, motivation and education</li> </ul>	<p>Follow-up discussion of broadcasts is difficult without video systems/textbooks</p>	Slides	<ul style="list-style-type: none"> <li>• Possible to produce, select and arrange topics for specific target groups</li> <li>• Possible to deal with topics in depth</li> </ul>	<p>It is essential to avoid redundant information; priority should be given to detailed shots rather than overall pictures</p>
Cinema	<ul style="list-style-type: none"> <li>• Attracts all social classes</li> </ul>	<p>Can only be used indirectly as an educational medium</p>	Posters	<ul style="list-style-type: none"> <li>• Large target groups can be addressed</li> <li>• Simple messages can be rapidly conveyed</li> <li>• Very cost-effective medium</li> </ul>	<p>Choice of proper sites is important; careful preliminary testing is necessary</p>
Newspapers	<ul style="list-style-type: none"> <li>• Effective for influencing opinions and awareness</li> <li>• Suited for detailed explanations</li> <li>• Important component when combining different media</li> </ul>	<p>Long-term impact achievable with article series</p>	Exhibitions	<ul style="list-style-type: none"> <li>• Can be used to address specific target groups</li> <li>• Overall depiction of topics with variable use of media is possible</li> <li>• Graphic depiction with broad impact</li> </ul>	<p>Limited, permanent and mobile exhibitions are possible; tends to be cost-intensive</p>
Video	<ul style="list-style-type: none"> <li>• Production in close contact with target population</li> <li>• Viewer participation/commitment</li> <li>• Good documentation medium</li> <li>• Teaching medium for small groups</li> </ul>	<p>When used for educational purposes, it is recommended to combine it with brochures and leaflets</p>	Flip charts	<ul style="list-style-type: none"> <li>• Suited for providing information on specific topics</li> <li>• Inexpensive to produce locally</li> <li>• Easy to transport</li> <li>• Versatile</li> <li>• Can be flexibly combined with other media</li> </ul>	<p>Only suited for conveying less complex information; effectiveness depends on the abilities of communicator</p>
Film	<ul style="list-style-type: none"> <li>• High degree of attention</li> <li>• High emotional stimulation</li> <li>• Large groups can be addressed</li> <li>• Effective teaching aid with lasting impact</li> </ul>	<p>Subsequent group discussions are easy to hold</p>	Blackboards	<ul style="list-style-type: none"> <li>• Simple traditional medium</li> <li>• Can be used anywhere</li> <li>• Processes and learning steps are illustrated</li> <li>• Direct illustration by means of text and graphics, possibly colors</li> </ul>	<p>Structure and style of text and pictures are important</p>

Form	Advantages	Comments	Form	Advantages	Comments
<p>Meetings and lectures</p> <p>Group discussions</p>	<ul style="list-style-type: none"> <li>• Easy to organize</li> <li>• Direct and complex exchange of opinions</li> <li>• Provides an overview of the overall problem situation</li> </ul>	<p>Social hierarchy can prevent participation</p> <p>Dominance by certain individuals can be a problem</p>	<p>Role games</p>	<ul style="list-style-type: none"> <li>• Topics can be illuminated from different points of view in the form of a game</li> <li>• Call attention to typical unmediated behavior</li> </ul>	<p>Follow-up treatment of topics is necessary</p>
<p>Cards/ diagrams</p>	<ul style="list-style-type: none"> <li>• Illustration of selected topics</li> <li>• Focus on important aspects</li> </ul>	<p>Target group must have already received instruction</p>	<p>Drama</p>	<ul style="list-style-type: none"> <li>• High entertainment value</li> <li>• Stimulates audience to critically analyze the situation</li> </ul>	<p>Presentation of too many topics at once must be avoided</p>
<p>Models</p>	<ul style="list-style-type: none"> <li>• Highly effective demonstration of processes and constructions</li> <li>• Encourages imitation</li> </ul>	<p>Production is difficult and expensive; transport is problematic</p>	<p>Puppet and shadow plays</p>	<ul style="list-style-type: none"> <li>• High degree of acceptance, since these are traditional media</li> <li>• Puppets are produced locally</li> <li>• Information can be embedded in the cultural context</li> <li>• Impact is enhanced by linking entertainment and learning</li> </ul>	<p>Use of puppet and shadow plays requires familiarity with the local culture</p>
<p>Brochures/ leaflets</p>	<ul style="list-style-type: none"> <li>• Can be used for specific target groups</li> <li>• Permits graphic illustration and in-depth presentation of topics</li> <li>• Easily combinable with other media</li> <li>• Effective and vivid means of conveying lasting information</li> </ul>	<p>Production costs are relatively high; effectiveness depends on graphic and didactic quality</p>	<p>Case studies</p>	<ul style="list-style-type: none"> <li>• Provides incentive for initiative if connections with local phenomena are recognized</li> </ul>	<p>Group being addressed should prepare its own case studies</p>
			<p>House visit</p>	<ul style="list-style-type: none"> <li>• Establishment of good personal relations between field workers and target group</li> <li>• Increases community participation</li> <li>• Provides additional source of information</li> </ul>	<p>It is recommended that the talks be taped</p>
			<p>Demonstrations</p>	<ul style="list-style-type: none"> <li>• High degree of attention</li> <li>• Encourage and motivate the target group to participate</li> <li>• Practical learning process</li> <li>• Increase receptivity of the target group</li> </ul>	<p>Brochures must be distributed after the demonstration</p>



## For further reading

- Laver, Sue (1991), Communication skills for trainers ; Manual for trainers, Training Centre for Water and Sanitation

This training guide has been designed to provide personnel working in the water and sanitation sector with some practical guidelines to effective communication. The guide contains a short introduction into learning and communication and a step by step explanation of communication planning. It also contains a range of suggested activities which are designed to assist the user to identify and solve problems in communication.

Available from:

Dr. Paul Taylor  
Training Centre for Water and Sanitation  
Department of Civil Engineering  
University of Zimbabwe  
P.O. Box MP 167, Mount Pleasant  
Harare  
Zimbabwe

- Gorre-Dale, Eirah, De Jong, Dick and Ling Jack (1992) Resource booklet for communication in water supply and sanitation, Core group on IEC, IRC, The Hague  
This booklet is intended for all those who are assigned to plan and implement communication efforts in and for water supply and sanitation programmes. Pages 16 - 22 contains basic elements for messages which have to be adjusted to local needs relevant for policy makers, sector professionals and user communities.

Available from

J.M.G van Damme  
Chairperson IEC Working Group  
c/o IRC  
P.O. Box 93190  
2509 AD The Hague  
The Netherlands

- GTZ 1989, Different forms of communication and audiovisual media, Tool no. 18 CPHE series no. 3, in: Community participation and hygiene education in water supply and sanitation, GTZ, Eschborn

This tool provides advantages and comments on a wide range of media. It may facilitate the decision on which media could be useful. pp 38 - 40

Available from

GTZ  
German Agency for technical Co-operation  
Division 414 (Water)  
Postfach 5180  
D-6236 Eschborn  
Germany



## 7.2 MONITORING

### Description of session

#### OBJECTIVES

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- To identify the purpose of monitoring
- To develop objectively verifiable indicators
- To evaluate possible use of monitoring data

#### OUTLINE OF SESSIONS (2 sessions)

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##### Session 1

- Introductory lecture aimed at identifying the purpose of monitoring 1 h
  - Group exercise aimed at developing indicators (See background information #5)  
The facilitator presents the methodology and divides the participants into 3 groups, each group trying to determine indicators for a different type of scheme 45 min
- 
- 1 h 45 min

##### Session 2

- Group exercise continued 45 min
  - Plenary discussion for the review of indicators (15 min for each group) 45 min
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- 1 h 30 min

#### HAND - OUTS

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- Basic performance indicators for O&M (examples)
- Managerial indicators for O&M (examples)
- Policy implementation indicators for O&M (examples)
- Guideline for group exercise

#### MATERIAL NEEDED

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- Overhead projector



## **Background information**

### **1. Purpose of monitoring**

Monitoring O&M aims to provide information to be used to maintain or improve O&M performance, to ensure or increase efficiency, and to establish favourable conditions for organizational sustainability. Users of monitoring data can be classified in two groups:

- Actors in O&M (Including community members etc)
- Managers and planners at different levels

For a monitoring system to serve its purpose, its users should be involved in deciding which information is essential and which data will be collected to serve these information needs. Therefore, while developing monitoring systems, the main purpose of the programme or organization concerned must be kept in mind. The purpose of O&M organizations or programmes for rural water supply and sanitation is to ensure the functioning of installations for the design life of systems and beyond. Management of O&M aims to achieve this purpose efficiently by minimizing costs and involving different partners or actors in such a way that O&M will be sustained in the future.

The volume of data collected should be as small as possible. The data should be easy to store and analyze to make them accessible for the above target groups.

In the past, efforts to develop monitoring and management information systems for O&M in rural areas have often failed because the developed monitoring systems were not sufficiently simple, too costly and not user friendly. Most of these systems were top down and followed a blue print approach. As it was often not sufficiently clear what information was really needed for those who carry out O&M tasks and for day to day management of O&M, the data were not used. Another reason has often been that the monitoring data were not reliable and not verifiable. Thus, for successful monitoring the following principles need to be applied:

- Keep it simple and do not collect more data than really needed.
- Make sure in advance that these data can be processed and used timely without increasing over-all costs.
- Ensure flexibility by a bottom-up approach.

For an operational monitoring system, it is essential to develop a set of monitoring indicators which are accepted and used both by actors in O&M and managers at various levels in the organization or organizations concerned. Some of these indicators would be used more specifically for a management information system. The various indicators must measure the performance of the O&M system, its efficiency and if possible progress towards organizational sustainability of O&M. Indicators are often developed by first defining targets or results in terms of quality, quantity, time and place.



## 2. Types of indicators

**Basic performance indicators** for O&M in rural areas mainly relate to the state of functioning of installations and to the functioning of key components of an O&M system, such as the provision of spare parts. These indicators serve to monitor progress towards planned results (Progress monitoring in result areas)

**Managerial indicators** combine the above basic performance indicators with data reflecting the use of human and other resources (Resource monitoring). These indicators are important for a management information system. Often monitoring of costs (Financial monitoring) is a good way to monitor the use of resources.

In construction programmes this would compare with monitoring of physical progress (basic performance of a programme) in combination with financial progress.

**Policy implementation indicators** may be used to monitor progress towards organizational sustainability along policy lines. Use of policy indicators may help to strike a balance between achieving long term sustainability of O&M and short term improvement of O&M performance.

Policy implementation indicators relate to the impact of an O&M programme on its institutional environment (impact monitoring). In construction programmes this compares with monitoring of socio-economic impact (health, wellbeing, income) of drinking water supply and sanitation provision.

In the case of O&M programmes and organizations concerns progress the desired impact or long term goal is to ensure the organizational sustainability of O&M. This term has been defined in other modules (see working sheet)

Examples of the above three types of indicators are given on "supporting material" pages of this sub-module.

## 3. Methodology

A monitoring system for O&M is developed by :

- identifying which information is needed by those who carry out or supervise the actual O&M tasks,
- determining how they could realistically collect and store this information, and
- defining who will verify the information and how.
- ensuring that this information can be easily processed and used by managers and planners

The above implies that the information needed at the field level suits the needs of managers and planners provided it is processed and combined with other information concerning the use of resources.

In practice, monitoring systems are developed locally by trial and error. It is often useful to consult other programmes and compare basic indicators. Testing indicators and data collection mechanisms on a small scale is essential.



Those who collect and verify the information are the actors in an O&M system. Monitoring systems requiring additional field personnel are not sustainable.

An example of the setting up of a monitoring system is the WASAMS monitoring system developed by WHO & UNICEF, see supporting material.

#### 4. Summarizing lecture

This summary aims to highlight the main issues and to propose an approach to develop a monitoring system for O&M.

##### Use of monitoring data

It is important to concentrate on data which really measure the performance of O&M. Not all information can be included in the monitoring system. Data will be collected if they are of direct use to those who collect the information. For more elaborate data collection, evaluation studies are needed. Evaluation studies may show if monitoring data are reliable and meaningful.

##### Indicator development

There are different types of indicators. Basic performance indicators form the basis of a monitoring and management information system. The number of indicators must be kept small. An indicator which is not objectively verifiable is not an indicator, and should not be included in a monitoring system. Social or behavioral aspects of O&M cannot really be dealt with in a monitoring system as they are not objectively verifiable. These aspects can be covered as part of evaluation studies.

##### Towards monitoring of O&M

The suggested approach towards better monitoring of O&M is to work from the bottom up, and to start small.

The following steps are proposed:

- Identify the basic O&M tasks including provision of equipment and spares
- Identify the information needed to organize the work of staff at the lower levels.
- Identify basic performance indicators for O&M
- Test the indicator at a small scale for a limited period and ensure that the intended users of information give feed-back.
- Carry out evaluation study to verify if the monitoring data are significant (reflect the status of O&M in the area concerned).
- Adapt the indicators and apply at larger scale
- Start building up management information system including development of management indicators, and also policy implementation indicators if appropriate.



**5. Group exercise on monitoring** (Methodology adopted from Charles de Montchy, Management for Development Foundation, Ede, The Netherlands.

Once groups are formed, they will have the duty to:

- a) define the project in brief words, with the objectives, type of schemes, and type of management structure.
- b) formulate information needs by answering to the question: "What do I want to know on O&M as a manager?  
In order to answer to the question, the group will first brainstorm and then select the most relevant information needs (maximum 5)
- c) determine indicators for each information need, by first brainstorming on type of indicators and then select quantifiable, reliable and precise indicators.
- d) define the information flow, determining the way the data is going to be collected, the way it is going to be processed and the way it will be used.

Sharing information with other groups (15 min for each group) will help to see the diversity and see the difference for different types of schemes.



Overhead sheet 1

**BASIC PERFORMANCE INDICATORS FOR O&M (EXAMPLES)**

<b>BASIC PERFORMANCE INDICATORS FOR O&amp;M (EXAMPLES)</b>	<b>FORMULATED AS TARGET</b>	<b>WHO COLLECTS DATA</b>	<b>WHO VERIFIES</b>	<b>METHOD OF VERIFICATION</b>
WATER SUPPLY SYSTEM FUNCTIONING ACCORDING STANDARDS *)	X% OF SYSTEMS FUNCTIONING IN REGION TO EXCEED 90% BY JANUARY 1995	USERS OPERATORS	LOCAL AUTHORITIES HEALTH DEP. PROJECT	CHECK DATA SHEET WITH ACTUAL SITUATION WHEN VISITING VILLAGE
WATER SUPPLY SYSTEM (OR COMPONENT) REPAIRED PROMPTLY AFTER BREAKDOWN OCCURS	BY 1995, MAXIMUM DURATION OF BREAKDOWN REDUCED TO 2 DAYS IN ALL VILLAGES	VILLAGERS OPERATORS	LOCAL AUTHORITIES BOOK KEPT BY WATER	SAMPLE SURVEYS COMMITTEE
ESSENTIAL SPARE PARTS REGULARLY AVAILABLE AND SOLD AT MARKET PRICE	ALL *) SPAREPARTS AVAILABLE IN SUFFICIENT QUANTITIES*) AT AGREED PRICES IN EACH DISTRICT HEADQUARTERS BEFORE 1994	SHOPKEEPER STOREKEEPER	VILLAGERS, OPERATORS LOCAL AUTHORITIES	- BUY SPARE PARTS - VISIT STORE OR SHOP WITH LIST OF SPAREPARTS AND CHECK
ESSENTIAL SPARE PARTS REGULARLY AVAILABLE AND SOLD AT MARKET PRICE	TURNOVER OF SALES OF SPAREPARTS INCREASED TO X USD BY 1994	SHOPKEEPER STOREKEEPER	- PROGRAMME - SUPPLIER	- CHECKING FIGURE OF SUPPLIES TO SHOPS

\*) TO BE SPECIFIED



Overhead sheet 2

**MANAGERIAL INDICATORS FOR O&M (EXAMPLES)**

<b>MANAGERIAL INDICATORS (EXAMPLES)</b>	<b>FORMULATED AS TARGET</b>	<b>WHO COLLECTS DATA</b>	<b>WHO PROCESSES DATA</b>	<b>METHOD OF VERIFICATION</b>
<b>AVERAGE O&amp;M COST OF FUNCTIONING SYSTEMS*)</b>	<b>AVERAGE O&amp;M COST OF FUNCTIONING SYSTEM TO DECREASE BY 30% BEFORE 1995</b>	<b>- VILLAGE ORGANIZATION - PROGRAMME MANAGEMENT</b>	<b>PROGRAMME MANAGEMENT</b>	<b>- MANAGEMENT INFORMATION SYSTEM - SEE BASIC PERFORMANCE INDICATOR</b>
<b>NUMBER OF WATER USERS/O&amp;M STAFF RATIO (EMPLOYEES PER 1000 CONNECTIONS, USERS)</b>	<b>THE NUMBER OF O&amp;M STAFF PER 1000 CONNECTIONS (100 HANDPUMPS) TO DECREASE BY 50% BEFORE 1995</b>	<b>PROGRAMME MANAGEMENT</b>	<b>MINISTRY</b>	<b>- MANAGEMENT INFORMATION SYSTEM - LIST OF STAFF</b>
<b>NUMBER OF DAYS SUPER- VISING O&amp;M STAFF SPENDS IN THE FIELD</b>	<b>SUPERVISORS SPEND AT LEAST 50% OF TIME IN THE FIELD BY 1993</b>	<b>INDIVIDUAL STAFF MEMBERS</b>	<b>MANAGEMENT</b>	<b>MANAGEMENT INFORMATION SYSTEM (TIME REGISTRATION)</b>

\*) O&M COST ARE LOWEST WHEN NO REPAIRS ARE CARRIED OUT. THEREFORE IT IS IMPORTANT TO SPECIFY THAT SYSTEMS FUNCTION (SEE BASIC INDICATORS)



Overhead sheet 3

**POLICY IMPLEMENTATION INDICATORS (EXAMPLES) FOR O&M**

<b>POLICY IMPLEMENTATION INDICATORS FOR O&amp;M (EXAMPLES)</b>	<b>FORMULATED AS TARGET</b>	<b>WHO COLLECTS THE INFORMATION</b>	<b>WHO VERIFIES</b>	<b>METHOD OF VERIFICATION</b>
COMMUNITY FINANCING OF O&M EFFECTIVE	COMMUNITIES TO PAY 100% OF O&M COSTS BY 1998	COMMUNITIES	LOCAL AUTHORITIES PROGRAMME	- BANK ACCOUNT
PRIVATE SECTOR MAKES PROFIT ON SALES AND REPAIRS WITH SUFFICIENT TURNOVER	ALL AGENTS TO MAKE SATISFACTORY PROFIT BY 1995	PRIVATE SECTOR AGENTS	PROGRAMME	- DISCUSSION
LOCAL AUTHORITIES CONTRIBUTE TO O&M SUPPORT SYSTEM	LOCAL O&M FUND CONTAINS MINIMALLY X\$ BY 1995	PROGRAMME, LOCAL AUTHORITIES	LOCAL COUNCIL STEERING COMMITTEE	- ACCOUNTS



**Overhead sheet 4**

**GUIDELINE FOR EXERCISE**

**DEFINING A MONITORING SYSTEM ON O&M**

- A. DEFINE PROJECT
- OBJECTIVES
  - TYPE OF SCHEME
  - MANAGEMENT STRUCTURE
- B. FORMULATE INFORMATION NEEDS, BY ANSWERING TO THE QUESTION: "WHAT DO I WANT TO KNOW ON O&M AS A MANAGER?"
- BRAINSTORM
  - SELECT MOST RELEVANT INFORMATION NEEDS
- C. DETERMINE INDICATORS FOR EACH INFORMATION NEED:
- BRAINSTORM ON INDICATORS
  - SELECT QUANTIFIABLE INDICATORS
  - DETERMINE RELEVANCE (PRECISION, SENSITIVITY) IF INDICATORS
- D. DEFINE INFORMATION FLOW, FOR ALL DATA:
- WHERE AND HOW IS DATA COLLECTED?
  - WITH WHAT METHOD
  - WHO WILL PROCESS DATA?
  - HOW AND WHEN WILL YOU BE INFORMED?



## Supporting material

The following is extracted from:

PEOPLE IN FOCUS, A human resources development case study,  
No: 5 in a series of WHO.

The document present a series of managerial indicators, mainly relating to a programme aiming to increase efficiency. It shows how indicators can be formulated as targets in the form of graphs or tables showing progress over a certain period. It further shows how the action plan is linked to the achievement of results as defined in the form of indicators.

### Managerial indicators

Results Areas	Indicators	Unit	Past Results		
			1979	1980	1981
1. User satisfaction	1. Provision of water	%	80	80	83
	2. Provision of sewage services	%	32	32	33
	3. Completion of facilities on time	%	62	91	55
	4. Total complaints per month	%	4.2	3.3	2.8
	5. Negative reports received per day		0.23	0.17	0.13
2. Innovation	6. Expenditure on exploration	%	73.9	71.2	69.6
	7. Per capita investment				
	7.1 Water supply systems ) 7.2 Sewerage systems )	US\$/per inhabitant	174.4 269.95	112.57 188.73	101.38 159.79
3. Productivity	8. Employees per 1000 connections	employee	5.59	4.84	4.30
	9. Payroll/operational receipts	%	40.1	45.3	44.11
	10. Water losses	%	37.78	35.10	33.50
4. Physical resources	11. Maintenance stocks per 1000 connections	US\$	2350.87	1822.03	1586.03
	12. Current liquidity		1.25	0.71	0.76
	13. Punctuality of payment	%	100	97	100
5. Financial resources	14. Bills received	%	74	41.0	35.0
	15. Efficiency of collection	%	96.2	99.2	98.4
	16. Indebtedness		2.43	2.20	2.33
6. Employee attitude and performance	17. Staff turnover	%	10.17	9.58	6.51
7. Public responsibility	18. Contracts in Paraná	%	87	92	100
	19. Quality of final product	%	96	97.2	94.8
	20. Per capita consumption (litres/day)		125	119	115
8. Profitability	21. Return on investment (assets)	%	(0.98)	2.6	3.6
	22. Operating account	%	92.0	87.0	85.71
	23. Trading account	%	110.5	100	99.5
	24. Trading results		(99.0)	(62)	121

## Supporting material

This monitoring system could be used as an example by the facilitator, if found necessary.

### WASAMS COMPUTER SYSTEM

WASAMS is a sector management tool. It has been developed to improve monitoring at the country level through systematic coordinated reporting within the framework of sector strategies and goals. It was designed to facilitate the collection and aggregation of data from the lowest level of administration, through to national level.

The system has been developed as an open ended "add-on" to the broader CESI+ Country Statistics Monitoring System (CESTAT) developed during the IDWSSD<sup>1</sup> by WHO for the purpose of monitoring the water supply and sanitation sector and has therefore the potential for continuous modification, expansion and upgrading to correspond to specific country needs. The limited number of core indicators remain a permanent feature to ensure regional and global standardization.

The WASAMS computer application is an information management system developed on relational data base. It is primarily intended to facilitate water supply and sanitation sector monitoring, planning and management at country level. The system was developed in 1990-1991 in response to needs for enhancement of sector monitoring at country level identified during review of the sector situation at the end of the IDWSSD by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF).

The microcomputer application is an on-line, interactive, real time and menu driven system. As a user you will find out that there are built-in controls and validations for most fields and there are also "look-up and/or select" functions to help you to enter or edit information.

The system operates on three data bases: PRODUCTION, SIMULATION and TEST/CONTROL. The "production data base" is where the verified data is stored. The "simulation data base" is a subset or full copy of the first one. It can be freely modified for analysing the resulting changes - simulations. The "test/control data base" is used to load data received and to examine it. Once it is checked and eventually corrected it can be moved to the "production data base".

To learn more about WASAMS functions and how to use the programme, a WASAMS tutorial is available, but to find out more about installation, operation requirements, logical and physical data base characteristics and other more technical issues, please refer to the TECHNICAL MANUAL.

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<sup>1</sup> International Drinking Water Supply and Sanitation Decade

The WASAMS monitoring system is a computer system to enter, store, maintain, exchange, process and present Water Supply and Sanitation Sector information.

The information is collected in the countries or any administrative, political or data collection sub-level and forwarded on a questionnaire (or on a diskette) to the national level (National Monitoring Unit).

This information, some 290 data items, is the input to the computer system, WASAMS, and provides the basis for national, regional or local reporting and analysis.

WASAMS works with three databases: PRODUCTION, SIMULATION and TEST/CONTROL. The PRODUCTION database contains the actual data. The SIMULATION database is a subset, or a complete copy, of the PRODUCTION database. It can be freely modified for any purpose, such as training, or for analysing various assumptions about possible changes - simulations. The TEST/CONTROL database is used to load data received from a "sub-level", and to examine it. Once it is verified (and corrected), it can be transferred to the PRODUCTION database, or sent back for appropriate corrections.

WASAMS is adapted to fit the country's administrative structure. Some countries have a number of administrative sub-levels (eg. states, republics, regions) which collect sector information. The data from any sub-level within a country can be merged to produce the appropriate data record for the next higher administrative level.

The country record should periodically be sent to a WHO or UNICEF regional office and/or to the headquarters.

WASAMS is a user-oriented computer system. It is completely menu driven and has many help features and an extensive validation mechanism which reduces data entry/edit errors. There are also "look up" and/or "select" functions (window overlays) to help with data entry and with making selections.

To learn more about WASAMS functions and how to use the system, read the WASAMS TUTORIAL and the WASAMS USER GUIDE.

There are a number of options to choose from the WASAMS main menu, providing the user with all that is needed to store, maintain, search, analyse and present the sector information.

Some of the main WASAMS features are:

- An extensive built-in validation mechanism, to help prevent errors during data entry/edit.
- A merge facility, which creates a record as the sum of the existing records at the next lower administrative level.
- Reference tables of national sub-level names and locality codes.
- Reference tables of regional groupings (for reports).
- A number of standard reports, as well as the provision to create user defined reports.

### Subsystems

The system was designed to give the user guidelines even in its main menu. The order of the modules or subsystems (main menu options) is actually the task order when using the system.

The subsystems (main menu options) are:

- |                           |                     |
|---------------------------|---------------------|
| 1. Data entry/edit        | A. Data utilities   |
| 2. Data view              | B. System utilities |
| 3. Report creation        | C. Go to DOS        |
| 4. Report lookup/printout | S. System overview  |
| 5. Data merge/aggregation |                     |
| 6. Localities and regions |                     |
| 7. Reference tables       |                     |
| 8. Application utilities  | X. Quit             |

### Data entry/edit module

Countries which don't use the WASAMS system can provide the information by completing a questionnaire. Those countries which are using WASAMS will be able to use the data entry/edit module to enter and maintain their information. The download utility programme can be used to copy selected data to diskette which can then be mailed to higher or lower administrative levels.

At any level, the data will be entered manually if it is received on a form, or uploaded from a diskette if WASAMS computer system is in operation.

The DATA ENTRY/EDIT module is divided into 5 parts. Each part is very similar to the corresponding part of the questionnaire. The screens are almost identical to the questionnaire parts, the only restriction being the size of the screen and for that reason additional screens are being used.

In addition, there is a review function to check what has so far been entered into the system. This function provides the option to print a questionnaire for specified country and year with all the data entered.

There are also a number of features assigned to "F" (function) keys. F1 is for reading special definitions (comments) to the questionnaire parts. F2 is used for deleting a form. F4 invokes a lookup/selection feature. For example, when entering/editing a 3-letter country code, pressing F4 will cause a window to appear giving a list of the valid codes from which a selection may be made.

#### Data view module

The data view option is very similar in appearance to the data entry/edit option, but no changes are allowed, and it is much faster. There is one major difference. In the view option, one can move around (view different localities) in only one file at a time (next, previous, first or last record) corresponding to a specified form part (0, 1, 2, 3 or 4). In the entry/edit option, one can move between the different parts of a specified locality's questionnaire.

In either case, one can move between the various screens for each part of the questionnaire (part 0. has 1 screen, part 1. has 6 screens, part 2. has 3 screens, part 3. has 4 screens, and part 4. has 1 screen.)

#### Report creation module

Once the data is entered reports can be generated. All the reports generated by the system are saved for later viewing and/or printout. Each report takes several pages. Many reports can be generated and saved. A systematic use of file names facilitates retrieving the reports. Reports can be deleted when no longer needed.

There are five standard reports:

- Population and System Utilization
- Coverage
- Management (operation and maintenance costs)
- Number of people served (by facilities managed by different institutions)
- Funding

The reports can be national, regional or local. Local reports show the data for all of the localities at the next lower sub-level. Regional reports show the data for all of the localities in a specified (user defined) region. National reports show the data for all localities grouped by the user defined regions.

#### Data merge module

The data merge option is another important feature of the system.

The data records for any locality (except at the lowest administrative sub-level) can be created by merging (aggregating) the data from the next lower sub-level.

For example, the data for the states of India can be merged to create the Indian country record. The system provides for up to five sub-levels below the country level. The names of the sub-levels (for example: state, county, zone, municipality and precinct) must be entered into the data base by the user, and also the 3-letter codes and locality names within each sub-level (for example, there might be 50 states, 900 counties, 3,000 zones, 12,500 municipalities and 100,000 precincts in a large country).

#### Application utilities

The utilities subsystem consists of a number of functions used in everyday work.

Note the utilities for data download and upload, which are used for data export and import (for sending and receiving data between sub-levels within a country).

#### System utilities

One of the utilities, "database choice", is used to switch between the different databases (production, simulation and test/control).

When data is received on a diskette, it should first be uploaded into the test/control database and examined there. Once the data is confirmed as correct (after it is corrected), it can be transferred to the production database.

#### Sub-national administrative levels

The feature of specifying country sub-national levels and their components, and monitoring water and sanitation indicators on any level, makes the WASAMS country-oriented management information system.

This module is described in detail in the WASAMS TUTORIAL.

### Regional sub-divisions

WASAMS computer system allows the user to specify an unlimited number of different regional sub-divisions (set-ups) eg. Ministry of Health Regions, Ministry of Education Regions, Water Commission Regions, etc.

Reports can be generated for any region type, by its regions, or for any region by its localities.

### Logical structure

An analysis of the proposed data collection questionnaire and the data items resulted in an OBJECT-RELATION type data model.

Further analysis of the system requirements gave the final structure of a normalized form database.

The data model shown on the next page is an OBJECT-RELATION type model.

The OBJECTS are data items with unique identifiers, like sub-level (name), report type and region. They all have a unique identification code. One of the most important OBJECTS in the WASAMS system is the locality itself. Each locality has a unique 18-character identification code: its own 3-letter code, prefixed by the codes for all of the levels above, and padded at the end with blanks.

To "describe" each object a database file is needed. The object's unique identifier is the record key field while the rest of the information on the object are attribute fields.

The objects are related to each other. Each relation results in a file with a key inherited from the object files. For technical reasons, some relations will result in more than one file. For example, the relation COUNTRY <-> YEAR is described in the four files: 0\_PART, 1\_PART, 2\_PART and 3\_PART. In each of them, the key is: LOCALITY + YEAR.

This data modelling technique helped achieve a stable structured database, unaffected by changes in data processing procedures or output requirements.



### **For further reading**

IRC, International Water and Sanitation Centre (1991). Partners for progress : an approach to sustainable piped water supplies. IRC Technical Paper Series No.28. The Hague, The Netherlands, IRC International Water and Sanitation Centre.

Ministry of Community Development, Women Affairs of Tanzania (1992). Reporting and Monitoring on Operation and maintenance : Shinyanga Region. Dar es Salaam, Tanzania.

National Industrial Development Corporation. (1988). Integrated monitoring system for rural water supply : executive summary. New Delhi, India.

World Health Organization (1989). People in Focus. A human resources development case study, No 5 in a series. Geneva, Switzerland.

World Health Organization/UNICEF (1992). Water and Sanitation monitoring system. WASAMS, WHO, Geneva, Switzerland.



## 7.3 PLANNING

### Description of session

#### OBJECTIVES

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- To develop an overview of O&M relating to planning and design
- To gain knowledge concerning experience in planning and design for better O&M

#### OUTLINE OF SESSION

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- Introductory presentation on overview of planning and design factors with examples of experiences coming from the participants (see par.6) 45 min
  - Work in plenary session aimed at elaborating a checklist (see par.7) 45 min
- 
- 1 h 30 min

#### HAND - OUTS

---

- Proposed steps in developing an operation and maintenance system.
- Extracts from background information

#### MATERIAL NEEDED

---

- Overhead projector



## **Background information**

### **1. Integrated water resources development and management**

Planning for O&M cannot be done outside the general context of the water resources or sanitation management. There is a tendency to promote an integrated approach in planning for water supply and sanitation. This tendency is reflected in the following document which represents the thought of the human conscience on this matter.

(From the Agenda 21, chapter 18, adopted by the Plenary of the Earth Summit in Rio de Janeiro, on June 14, 1992)

Integrated water resources management is based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization. To this end, water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perenniality of the resource, in order to satisfy and reconcile needs for water in human activities. In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged appropriately.

Four principal objectives should be pursued:

1. To promote a dynamic, interactive, iterative and multisectoral approach to water resources management, including the identification and protection of potential sources of fresh water supply, that integrates technological, socio-economic, environmental and human health considerations;
2. To plan for the sustainable and rational utilization, protection, conservation and management of water resources based on community needs and priorities within the framework of national economic development policy;
3. To design, implement and evaluate projects and programmes that are both economically efficient and socially appropriate within clearly defined strategies, based on an approach of full public participation, including that of women, youth, indigenous people, local communities, in water management policy-making and decision making;
4. To identify and strengthen or develop, as required, in particular in developing countries, the appropriate institutional, legal and financial mechanisms to ensure that water policy and its implementation are a catalyst for sustainable social progress and economic growth.

### **2. Planning for O&M right from the beginning**

(From WASH Technical Report n. 71)

The project cycle is an ordered progression of activities designed to produce benefits over time.

At the start, organizational matters take precedence and there are no project benefits before construction begins. A properly planned project will incorporate



O&M at the design stage. As each facility completed, O&M activities begin and benefits start to accrue. When the projects ends, it should leave in place an O&M system that will maintain or even increase benefits. Such a projects is said to be sustainable, a state that is primarily dependant upon achieving a proper O&M management system.

The activities in the project cycle are listed below in order of occurence. Some reordering an overlap may occur under specific circumstances:

- \* Design of Water Supply and Sanitation system
- \* Training to import needed skills
- \* Financial management
- \* Construction
- \* Operation and maintenance
- \* Health education
- \* Repair
- \* Rehabilitation and extension
- \* Monitoring and evaluation

**Design** covers the detailed planning of not only the physical plants but also the institutional structure and management arrangements. Government agencies design the facilities, with input from the community. (The technology must be compatible with the local cultural setting and users wishers).

**Training** is provided to equip the community with skills to support the activities specified in the project design. Specialized agencies must design training according to community needs. Training may include such subjects as leadership, accounting, pump repair and hygiene.

**Financial management** is the control of O&M funds and should be entrusted to the community if it is given the responsibility for meeting O&M costs.

**Construction** covers the building of the facilities and depending on the technology, may be a joint effort by a government agency, private entrepreneurs and the community. The technology must be compatible with the manager's ability to control and utilize the facilities.

**Operation and maintenance** covers the efficient day by day working of the facilities, regular preventive maintenance and the assurance of proper use. The communities are the logical choice but other actors have a potential role depending on the situation.

**Health education** is intended to promote hygienic use of the facilities and tends to be an ongoing activity to reinforce positive user attitudes and practices, which in turn will facilitate O&M management. Specialized government agencies, usually within the



Ministry of Health are normally responsible.

**Repair**, as opposed to preventive maintenance, covers the replacement of damaged parts and typically is a joint effort between the government, the private sector and the community.

**Monitoring and evaluation** is the formal assessment of the effectiveness of the system and its benefits to the community. The community itself is the logical evaluator but government extension agents also should closely monitor the evaluation to ensure the public good. An essential purpose of monitoring and evaluation is to use the results to modify activities if needed.

**Rehabilitation and extension** completes the cycle by replacing worn out segments of the facility or extending it to accommodate changed needs. This should not be necessary for several years after the project has been completed and will depend on the effectiveness of the O&M system. The community plays a prime role in this process but may need assistance from government agencies and the private sector.

### **3. Technology choice**

Choice of technology and determining service levels is the most obvious factor which is dealt with in planning and design, and which affects the success of O&M because it determines the O&M requirements and has a bearing on institutional, organizational, financial and socio-cultural factors affecting O&M. Concerning community-based water supply, a useful principle which evolved during the 80'ties is that the technology chosen should give the community the highest service level that it is willing to pay for, will benefit from, and has the institutional capacity to sustain. Environmental considerations may to some extent diminish the validity of this principle (Water resource constraints, poor sanitary conditions resulting from high water use), but over all it is a better starting point to end up with appropriate solution than to look for low-cost or cheap solutions.

### **4. Accepting varying needs**

Different communities are not uniform in their needs and capabilities, and even within communities the demand for services and the readiness to contribute may vary considerably. Though it is impossible to meet all demands optimally, a mixture of technologies and service levels may be the right answer.

Please note that even when there seems to be only one feasible option, in decisions concerning construction details, much can be done to comply with specific needs and demands, for instance, by site selection, site improvements around tap points, by decentralizing storage, by determining user groups which are served from their own branch line etc. Thus, design options should be developed and discussed with communities and user groups.

### **5. Making choices with users**

The choice for a final option should normally be determined by an assessment of benefits in comparison with investments in time, cash, and energy. Often discussions concentrate on the construction phase. In fact, it is far more important to concentrate on choice, all partners in the process must have the same information upon which decisions



can be based. Bridging knowledge gaps is needed both ways, and can be achieved by going through a systematic selection process to determine the technology and the service levels. See table 1 from "Partners for Progress", which is attached.

## **6. Presenting examples in plenary session**

Each participant, including trainer and resource persons if present will draw upon their experience to give if possible three practical examples as follows:

- An example where O&M was taken into account in planning and design
- A case where O&M was neglected in the planning phase
- A practical example of design of systems influenced O&M.

This last example relates to technical design options and technology choices as far as system components are concerned.

For each example they will indicate the effects by discussing the present status of O&M.

## **7. Group work on listing O&M considerations**

The facilitator jointly with the participants will determine the activities to consider when developing an operation and maintenance system.

Technology choice and service levels first have to be defined.

Four steps are proposed :

- A. Review present status of water supply and sanitation coverage and sustainability of existing systems
- B. Identify maintainable water supply and sanitation improvements
- C. Testing the feasibility of O&M system
- D. Expansion of O&M system along with programme implementation

A detailed overview of activities implied in each step is given in the supporting material



## **Overhead sheet 1**

Integrated approach (from Agenda 21)

### **Four principal objectives**

- 1. PROMOTE INTERACTIVE MULTISECTORAL APPROACH**
- 2. PLAN FOR SUSTAINABILITY**
- 3. DESIGN AND IMPLEMENT PROJECTS BOTH ECONOMICALLY EFFICIENT AND SOCIALLY APPROPRIATE**
- 4. STRENGTHEN INSTITUTIONAL, LEGAL AND FINANCIAL MECHANISMS**



## **Overhead sheet 2**

Activities in the project cycle (from WASH Technical Report)

- **DESIGN OF WATER SUPPLY AND SANITATION SYSTEM**
- **TRAINING TO IMPORT NEEDED SKILLS**
- **FINANCIAL MANAGEMENT**
- **CONSTRUCTION**
- **OPERATION AND MAINTENANCE**
- **HEALTH EDUCATION**
- **REPAIR**
- **MONITORING AND EVALUATION**
- **REHABILITATION AND EXTENSION**



## Supporting material

### Steps in developing an operation and maintenance system (Technology choice and service levels to be defined)

<i>Steps</i>	<i>Activities</i>
<p><b>I. REVIEW PRESENT STATUS OF WATER SUPPLY AND SANITATION COVERAGE AND SUSTAINABILITY OF EXISTING SYSTEMS.</b></p>	<p>Make inventory of present technology options and service levels (including traditional systems)</p> <p>Define coverage in terms of technology and service level</p> <p>Collect data on functioning and use of existing systems</p> <p>Identify present constraints in ensuring O&amp;M</p> <p>Assess institutional, financial and legal implications of extended coverage</p> <p>Assess the human and organizational potential for O&amp;M in communities, government agencies, and private sector</p> <p>Review financial systems and resources for O&amp;M.</p>
<p><b>II. IDENTIFY MAINTAINABLE WATER SUPPLY AND SANITATION IMPROVEMENTS</b></p>	<p>Approach local authorities (districts, provinces, municipalities) to discuss partnership approach</p> <p>Agree on basic service levels and technology options including improvements of existing systems</p> <p>Elaborate a long-term (10-15 year) indicative programme aimed to increase coverage and ensure sustainability through investments and O&amp;M system development, including a pilot stage or demonstration phase</p> <p>Inform communities in selected area about pilot activity</p> <p>Elaborate procedure to prepare community requests for improvements</p> <p>Channel requests through local authorities and apply criteria for selection of communities to be considered</p> <p>Identify key O&amp;M tasks and estimate costs</p> <p>Organize communities to review O&amp;M roles and financial obligations, and to choose realistic options</p> <p>Organize (training) workshops for local authorities, project staff, and community members involved in O&amp;M</p> <p>Execute demonstration schemes at sufficiently large scale</p>

## Supporting material

from Saul Arlosoroff et al. Community Water Supply, The Handpump Option (1987), the World bank, Washington, D.C., USA. (Chapter 2 of this publication presents a good overview of service options for community water supply and considerations for technology choice).

Options for Community Water Supply

Step	Type of Service	Water source	Quality protection	Water use LPCD <sup>a</sup>	Energy source	Operation and maintenance needs	Costs	General remarks
5	House Connections	Groundwater Surface water Spring	Good, no treatment May need treatment Good, no treatment	100 to 150	Gravity Electric Diesel	Well-trained operator; reliable fuel and chemical supplies; many spare parts; wastewater disposal	High capital and O&M costs, except for gravity schemes	Most desirable service level, but high resource needs
4	Yardtaps	Groundwater Surface water Spring	Good, no treatment May need treatment Good, no treatment	50 to 100	Gravity Electric Diesel	Well trained operator; reliable fuel and chemical supplies; many spare parts	High capital and O&M costs, except gravity schemes	Very good access to safe water; fuel and institu- tional support critical
3	Standpipes	Groundwater Surface water Spring	Good, no treatment May need treatment Good, no treatment	10 to 40	Gravity Electric Diesel Wind Solar	Well trained operator; reliable fuel and chemical supplies; many spare parts	Moderate capital and O&M costs, except gravity schemes; collection time	Good access to safe water; cost competitive with handpumps at high pumping lifts
2	Handpumps	Groundwater	Good, no treatment	10 to 40	Manual	Trained repairer; few spare parts	Low capital and O&M costs; collection time	Good access to safe water; sustainable by villagers
1	Improved traditional sources (partially protected)	Groundwater Surface water Spring Rainwater	Variable Poor Variable Good, if protected	10 to 40	Manual	General upkeep	Very low capital and O&M costs; collection time	Improvement if traditional source was badly contaminated
0	Traditional sources (unprotected)	Surface water Groundwater Spring Rainwater	Poor Poor Variable Variable	10 to 40	Manual	General upkeep	Low O&M costs (buckets, etc); collection time	Starting point for supply improvements

a. LPCD = liters per capita per day

### **For further reading**

Arlosoroff, S. & co, (1987). Community water supply: the hand pump option. World Bank/UNDP, Washington D.C., USA.

IRC, International Water and Sanitation Centre (1991). Partners for progress : an approach to sustainable piped water supplies. IRC Technical Paper Series No.28. The Hague, The Netherlands.

Mann, L. (1984). Maintenance management. Revised edition. Lexington Books, Massachussets, Toronto.

Mukoyogo, S.M. (1987). District planning-budgeting and management of operation and maintenance of water facilities : management training seminar for programme implementors. Mzumbe, Tanzania, Institute of Development Management.

Okun, A. Daniel; Ernst, Walter R. (1987). Community piped water supply systems in developing countries : a planning manual. World Bank Technical Paper No.60. Washington, DC, USA.

