

Human Resources

Session Objectives

- To describe the human resource requirements of monitoring programmes, whether quality control or surveillance, for all levels of staff.
- To highlight the need for a broad approach to human resources development, including career development structures, overall staffing and training.
- To emphasise the need for and value of ongoing investment in staff in terms of training, delegation of responsibility and encouragement to join professional bodies and undertake applied research.
- To briefly describe some key responsibilities of managerial, analytical, field and data management staff.

Human Resources

Introduction

Monitoring programmes are reliant on good human resources to make them efficient and effective. The strength of any monitoring programme is determined by the weakest element and this can often be identified as inadequate human resources. This may result from insufficient numbers of staff, but also from insufficiently trained and motivated staff who feel undervalued and do not perform their duties well. It is therefore essential that human resources development strategies are developed for the surveillance agency and quality control staff within water supply agencies to ensure that they have the capacity and capability to carry out the activities assigned to them.

Human resources development strategies are not merely training programmes, they encompass a wider view of staff development which acknowledges that access to career structures, interaction with peers and ongoing professional development are all of equal value. Furthermore, the human resources development strategy for an institution should also address the need for adequate numbers of staff at different grades and within different wings of the institution and the need to focus recruitment purely on the basis of job requirements. Therefore, all these elements should be covered by the human resources management team in the monitoring agencies.

Staffing requirements

Different countries will have different staffing requirements depending on the stage of development of monitoring programmes, the institutional framework of the water sector and the availability of qualified and trained personnel. However, appropriately qualified and trained staff will be required both in the surveillance agency and the quality control wing of the water supply agency.

Staff in both agencies will fall into four broad categories: managerial staff; analytical staff; field staff; and, data processors/managers. However, it should be recognised that this classification is very broad and that clearly there will be many instances when individuals play more than one role. For instance, it may be common to find that field staff also undertake analytical work, or that managerial staff or analytical staff undertake a significant amount of information management. Thus the descriptions provided below of key tasks relate to generic needs of the position rather than to the specific tasks undertaken by individuals.

Managerial staff

Managerial staff are responsible for the overall planning, operation and monitoring of the programme. They take responsibility for strategic developments in the programme, reorientation to meet new or changing objectives and for the overall staffing and human resources development of the programme. Managerial staff will certainly include the overall programme or section manager and head of the laboratory/analytical services and possibly other staff such as the head of the information management unit. However, the programme manager and head of analytical services are possibly the two key members of staff and are discussed in more detail below.

Programme manager

The role of programme managers in both supply agency and surveillance agency will be to co-ordinate activities of the different sections and bear ultimate responsibility for the water quality data produced. Both should bear administrative responsibility for their programmes and the staff within the programme. This will include assessing training requirements in collaboration with other senior staff, defining training programmes, lobbying for resources and establishing staff development strategies. They should both clearly identify research needs within their organisation. As both will take ultimate responsibility for the quality of data their organisations produce, both need to work closely with the quality assurance officer to ensure that the analytical data produced is reliable.

In both agencies, the programme manager should lead the national planning team defining monitoring programmes and should ensure that regional and local level monitoring programmes are consistent with broader national goals. The programme managers will also be expected to liaise with section heads to ensure that adequate standard operating procedures are prepared and followed through all stages of the monitoring process from sample collection, through analysis to data manipulation. They should also ensure that data are distributed to all key institutions within the sector in a comprehensible format. Where feasible, programme managers should also take responsibility for ensuring public access to water quality information through the publication of annual reports on water quality.

Other responsibilities will vary between the two agencies. Within the water supply agency, the programme manager must be responsible for the reporting of data to the surveillance agency and liaison with the surveillance agency in cases of water quality failure. They should also make both the operational and senior management staff immediately aware that a water quality failure has occurred and suggest remedial and preventative action.

Within the surveillance agency, the programme manager should co-ordinate enforcement action taken against water suppliers and should be responsible for initiating legal actions where these are to be undertaken. In some circumstances, as the person bearing ultimate responsibility for the water data, the programme manager should act as the expert witness in cases of water quality failure, although this may also be the responsibility for the head of analytical services.

The importance of good senior management in monitoring programmes cannot be overstated. It is vital that senior managers understand the programme and pressures staff face and be sympathetic to their needs. Good direction and an active interest in the staff is vital for the success of the programme.

Head of Analytical Services

The Head of the Analytical Services is another key member of the senior management team of monitoring programmes and much of the routine operational management of laboratories, sample collection and reporting of data should come under the remit of the Head of Analytical Services. Clearly a fundamental role of the Head of Analytical Services is to ensure that the reporting of analytical results is done in a comprehensible and timely fashion and in the event of a water quality failure should immediately alert the programme manager.

Key responsibilities will include writing standard operating procedures and ensuring that they are followed by all analytical staff in the laboratory. This member of staff should also actively liaise with the quality assurance officer and when problems are identified in the quality of data produced, should follow this up and identify the cause of the quality failure and implement steps to rectify the problems in the shortest possible time frame.

The Head of the Analytical Services will also be expected to ensure that all the necessary equipment and consumable are available to carry out comprehensive analysis of water quality on both a routine and non-routine basis and have budgetary control of the laboratory services. They should also ensure that adequate health and safety procedures are in place and fully understood by all staff working within the laboratories. As head of section, they will be expected to monitor and evaluate staff performance and identify training needs and appropriate training opportunities.

Other Managerial Staff

The other managerial staff within the programme will depend on the size and structure of the programme, but may include information management, legal advice or administration. All these are key roles, but which may be carried out by other staff members as part of their responsibilities so no further detail will be discussed here.

Analytical, field and data management staff

The bulk of the technical staff employed on a monitoring programme will be involved in the collection and analysis of samples and the processing of analytical data. Some duties of the staff will overlap between several roles, therefore a member of staff who undertakes analysis may also be responsible for sample collection or data management etc. It is essential that staff are recruited who have the necessary skills and experience to do the job they have been given and receive ongoing training whilst in post.

Analytical staff

The analytical staff will report to the Head of the Analytical Services, either directly in the small programmes or through section heads in larger programmes. Analytical staff will normally be divided into chemical and microbiological sections and possibly have further sub-divisions depending on the scope of the programme and the size of the analytical facilities. In some countries, sections will also include biological monitoring and sub-division of chemistry into wet chemistry, organics and trace metals etc.

It is essential that each section has at least one degree educated analyst who can supervise the analysis of other members of staff. Much of the analysis may actually be done by technicians with a lower level of education, but who have experience of routine analysis. They will be commonly supported by assistants who effectively learn whilst in post. It is important that the laboratory has sufficient analysts to perform the numbers of analyses required for routine and non-routine investigations of water quality, but that it is not overstaffed. Underemploying staff tends to lead to motivation problems and boredom and may lead to a loss of good staff.

A check list of key activities is given in box 1 below.

- Routine and non-routine analysis of water quality
- Care and maintenance of all laboratory equipment
- Storage and maintenance of consumables and keeping up to date stock records
- Calibration of laboratory and field equipment
- Training of laboratory assistants and field staff in relevant analytical techniques
- Maintaining a laboratory safety programme
- Recording of results in a comprehensible format and transfer to data base
- Preparation of sample bottles
- Participation in the QA programme

Box 1: Check list of laboratory staff activities

A key member of the analytical staff is the quality control/assurance officer who is responsible for ensuring that the quality of data produced by the laboratories is acceptable and who reports directly to the most senior member of staff. This member of staff will have to monitor analytical and field work, prepare and submit blank samples to analysts and carry out audits of all documentation, including methods, SOPs and field and laboratory notebooks, to ensure that information provided is correct and complete.

Good quality control is essential for monitoring programmes to maintain credibility in their results. It is often a false economy not to recruit a QA officer on financial grounds as the lack of demonstrable quality assurance and control may result in limited ability for water suppliers or regulators to perform effectively.

Where financial constraints prohibit the recruitment of a specific quality assurance officer, a member of staff may be nominated as QA officer, although this will require that this persons work is also monitored by a fellow staff member. In these circumstances, it is important that senior staff minimise conflicts of interest.

It is important that all analytical staff are aware of and follow the standard operating procedures and keep a clear record of all operations performed. They should be actively involved in the quality control/assurance programme and understand its value to them as analysts in improving techniques and maintaining high standards.

Field staff

In some programmes, field staff are specifically employed for the collection of samples and carrying out field tests so a restricted number of parameters. In other programmes, these roles are performed by the analytical staff. Where field staff are employed, it is essential that they have sufficient skills to be able to perform the activities assigned to them and an understanding of the wider implications of their role.

Training should be provided in standard operating procedures for sample collection, storage and transport and the proper labelling of samples and the information to be included when

sending samples. It is essential that sampling procedures are designed to be representative of water quality and that field staff have an appreciation of the risks and implications of sample contamination. Field staff should also be clearly aware of the handling procedures for any preservative agents which may be used when transporting samples.

Where field staff will carry out some basic analyses on-site, they obviously require adequate training in the techniques to be employed, recording of the results and interpretation of the data. Such on-site analyses may include pH, chlorine residual, thermotolerant (faecal) coliform analysis and conductivity. In some circumstances, field staff will be expected to make recommendations for actions based on water quality data, particularly when they are dealing with community managed rural water supplies in remote areas. It is essential that these staff are provided with the skills to do this effectively.

A key role field staff should undertake is sanitary inspection and risk assessment of water supplies and sources. This data may be used by themselves to implement remedial or preventative actions, but should also be submitted to the central or regional data store. Again, field staff will require training in appropriate techniques and in the interpretation and use of data generated. A check list of key activities for field staff is given in box 2.

- Sampling of water supplies and sources
- Sample labelling, preservation, storage and transport
- On-site analysis of pH, chlorine residual, microbiological quality
- Sanitary inspection and risk assessment
- Providing feedback to communities and suppliers
- Identifying remedial and preventative actions with communities
- Routine maintenance of field equipment

Box 2: Check list of field staff activities

Information management staff

Information management staff are responsible for the collation and manipulation of all data generated in monitoring programmes. They should process data into standard reporting sheets and produce regular water quality reports.

Information management may be done by a member of the analytical staff who takes responsibility for data processing. This is acceptable when the throughput of data is limited and where only standard analytical reports are being produced. However, this approach limits the use of the data and serious consideration should be given to appointing a full time information management system administrator who can produce and manage a national water quality databank and produce summaries of water quality data for the general public or other agencies. There are many uses of water quality data and effective management of available information can greatly enhance national decision-making regarding priorities for investment and selection of appropriate alternatives.

Staffing structure

It is important that all monitoring programmes, whether quality control or surveillance, have a staffing structure which clearly defines lines of responsibility and accountability and which provides a framework for career development within the programme. Each monitoring programme will be structured in slightly different ways, but in many circumstances, a clear demarcation of roles played by the enforcement wing of the water quality department and the analytical wing is established.

In all organisational structures, it is essential that there are clear lines of accountability and responsibility which allow senior managers to run departments and programmes effectively. Usually, if programmes are to be successful, there should be a high degree of delegation to senior staff and regular meeting of senior management to discuss progress.

Delegation of key responsibilities allow staff to feel that they have a greater investment within the programme and more closely identify with the programme's success or failure. However, it is important that delegation is not seen as abrogation of responsibility by the programme manager, who must retain an overall responsibility for the performance of the programme.

Training and professional development

Training of staff will be essential in most circumstances. Although staff should be recruited with appropriate qualifications, apart from the senior staff, they may have limited professional experience. Therefore, training in the aims and objectives of the programme, use of equipment and quality control procedures will have to be given. Ongoing training will also be required in safety and other aspects, such as data processing. Training should be focused on the needs of staff and aim to assist them in optimising their performance. However, it is also valuable to provide staff with opportunities to acquire new skills and develop into new areas of activity as this will help to motivate staff. If this is done, it is important that staff are able to use new skills developed during training within the workplace. This is important as otherwise these skills may be rapidly lost without practice and because restricting potential to take new areas of responsibility and put theory into practice may well lead to frustration amongst staff.

Training programmes may be either established as in-house programmes utilising resources within the agency or programme, or may involve outside agencies. In-house training is only likely to be cost-effective where very large numbers of staff will require similar training and therefore is possibly most appropriate for training in analytical techniques or sanitary inspection or as part of an orientation programme. In-house training is less likely to be able meet all the ongoing professional needs of individuals and in these circumstances outside courses should be used.

In addition to training, staff should also be encouraged to undertake applied research, attend conferences and seminars and join professional bodies as means of improving professional knowledge. Training should also be linked to a broader process of improvement which encourages progression on the basis of merit and provides a career structure for staff. Unless this is done, staff-turnover will be high and motivation low.

Conclusion

Human resources are a key element in the success or failure of monitoring programmes to meet their objectives. Without an adequate strategy to develop the human resources available and attract high calibre staff, monitoring programmes rapidly stagnate. Whilst poor quality of staff in water quality monitoring programme may reflect a wider difficulty in attracting staff to the sector, every effort should be made to invest in staff at all levels.

Human resources development should encompass a much wider remit than training and should address issues such as career structures and professional development. It should also provide all levels of staff with the support and framework within which to function effectively and efficiently.

References:

Bartram, J. *Resources for a Monitoring Programme*, in Bartram, J. and Ballance, R. (eds) *Water Quality Monitoring*, 1996, Chapman and Hall, London, pp 61-70.

Howard, G. *National Water Analysis Laboratory, Zimbabwe, Report 7*, ODA Project Report, 1996.

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Human Resources

Presentation Plan

Section	Key points	OHP
Introduction	<ul style="list-style-type: none"> • monitoring programmes are reliant on good human resources • need to have human resources development strategies in surveillance and supply agencies • HRD strategies are not merely training programmes but should address wider issues such as staff numbers, career structures and pay scales • recruitment should be focused on need for staff 	1
Staffing requirements	<ul style="list-style-type: none"> • these vary according to level of development of monitoring programmes, institutional framework and availability of staff • staff may be divided into 4 categories: managerial; analytical; field; and. data processors • many staff may have roles which overlap more than one area 	2
Managerial staff	<ul style="list-style-type: none"> • responsible for planning, implementation and monitoring of programmes • should also be responsible for strategic development of programme • will include programme managers and other key senior staff such as head of analytical services/laboratory <p><i>programme manager</i></p> <ul style="list-style-type: none"> • bear ultimate responsibility for data quality in their institution • responsible for overall administration of programmes and need to work closely with heads of section and QA officer • need to ensure that monitoring programmes conform with national goals and that data is distributed to appropriate agencies • in the supply agency, the manager should ensure that information sent to surveillance agency in timely manner when failure in quality occurs • make operational and senior staff immediately aware of water quality failure & suggest remedial/preventative action • surveillance agency: co-ordinates enforcement action and for initiating legal action when required • may also act as expert witness • good senior management is essential for smooth running of programmes, good direction and active interest in staff vital for success of programme 	3, 4

Section	Key points	OHP
Managerial staff <i>continued</i>	<i>head of analytical services</i> <ul style="list-style-type: none"> • responsible for routine operation of laboratories • must ensure data reporting is in a format which is comprehensible and done in a timely fashion • immediately alert programme manager in the event of water quality • should prepare SOPs and ensure that these are followed by all analytical staff • ensure that health & safety procedures in place • ensure that laboratories are able to carry out all routine and non-routine analysis requested by programme manager and that is consistent with programme goals • also identify staff training needs and evaluate staff performance 	
Analytical, field and data management staff	<ul style="list-style-type: none"> • bulk of staff involved in the collection and analysis of samples and processing of data produced • individual staff members may have roles which overlap more than one area, therefore essential they have the skills to perform all tasks assigned <i>analytical staff</i> <ul style="list-style-type: none"> • normally divided into two or more sections according to discipline • each section should have at least one degree educated member of staff as a supervisor, although analysis may be done by technicians • technicians may be supported by assistants who learn in post • need sufficient analysts to perform analysis required, but should not overstaff laboratories as this will lead to under-employment and a possible loss of motivation • check list of key tasks is given • key analytical staff member is the QA officer as they are responsible for ensuring that data produced is of an adequate quality • should monitor use of SOPs, submit blank samples, audit documentation and reports to most senior member of staff • where specific QA officer cannot be recruited, then appoint a member of staff to do this in conjunction with other roles, but ensure that conflicts of interest are minimised and that QA officers work is also monitored 	5, 6, 7

Section	Key points	OHP
<p>Analytical, field and data management staff</p> <p><i>continued</i></p>	<p><i>field staff</i></p> <ul style="list-style-type: none"> • may have specific field staff employed to collect samples and undertake on-site analysis • staff should be trained in sample collection, storage and transport and be aware of their role in the monitoring programme and the need for quality control in sampling • where on-site analysis is carried out by field staff, training will also be required in this • field staff should also be effective communicators, particularly where they are providing feedback to communities and initiating remedial and preventative actions • field staff should also undertake sanitary inspection and risk assessment of water sources <p><i>information management staff</i></p> <ul style="list-style-type: none"> • responsible for input and manipulation of data and generation of water quality reports • analytical staff may undertake some data processing, although this limits use of data and consideration should be given to appointing a full time member of staff 	
<p>Staffing structure</p>	<ul style="list-style-type: none"> • all programmes should have a staff structure which shows clear lines of responsibility and accountability • structure should also provide a framework for career development • enforcement and analytical wings in a monitoring body should be clearly separated • delegation is important, but should not be allowed to become abrogation of responsibility 	
<p>Training and professional development</p>	<ul style="list-style-type: none"> • training is essential in most circumstances, including for staff with high qualifications • training will include programme aims and objectives, SOPs, QA procedures etc. • staff should also be provided with an opportunity to acquire new skills, however, it must be possible to practice these in the workplace to maintain motivation • training may be either in-house or use external trainers • in-house training only cost-effective in large programmes where many staff require the same training at one time • otherwise make use of training opportunities outside the programme which may be more focused on individual needs • staff should also be encourage to undertake applied research, attend conferences and join professional bodies 	<p>8, 9</p>

Section	Key points	OHP
Conclusions	<ul style="list-style-type: none">• human resources are vital to monitoring programme to meet objectives• HRD strategy is essential and should address training, career structures and ongoing professional development• monitoring programmes must be able to attract and retain high quality staff	

Human Resources Development: Constraints

- Lack of adequate numbers of trained staff is often a key constraint
- Training should be ongoing and for all levels of staff
- Training opportunities are often limited
- Training must be matched to job requirements and likely future development of staff
- Training needs assessment is vital for human resources development



Staffing Requirements

- This depends on:
 - size of programme
 - frequency of sampling
 - numbers of samples
 - whether on-site or laboratory testing used
- In a microbiology laboratory doing 70 samples per day by membrane filtration (or 40 by MPN):
 - 2 laboratory staff (1 scientist, 1 technician)
 - 2-3 (minimum) field staff
 - 1 (possibly) data processing staff
- Using field testing approach:
 - 16 samples per day can be processed
 - Therefore up to 16 point sources or 1-3 piped water supplies may be visited per day
- Provincial and national levels:
 - staff to collate information, provide feedback & identify trends
 - these may not be full-time posts



Managerial Staff

Programme Manager

- Responsible for planning and management of monitoring programmes
- Make sure programme conforms with national goals for the sector
- Water supply agency: liases with surveillance agency and makes sure data is shared
- Water supply agency: ensures remedial action taken promptly
- Surveillance agency: responsible for enforcing relevant legislation
- Surveillance agency: liasing with suppliers to help improve water supply quality
- Both provide direction and leadership and oversee staff development
- Both receive QA data from QA officer and take ultimate responsibility for data
- Oversee information dissemination, staff development and QA



Managerial Staff

Head of Analytical Services

- Responsible for routine operation of laboratories and for quality of data produced
- Should report findings in a comprehensible and accessible format
- Should alert programme manager when results indicate water quality failure
- Should develop SOPs and ensure these are followed
- Should ensure health & safety measures are in place and observed
- Should identify staff training needs and evaluate performance



Analytical Staff

- Usually divided into sections by discipline
- Each section should be headed by a degree educated supervisor
- Much of analysis may be done by technicians
- QA Officer is vital to ensure that results produced are reliable
- QA Officer reports to most senior staff member - usually programme manager



Field Staff

- May collect samples and/or carry out on-site testing
- Important to provide field staff with adequate training and support
- Field staff must be effective communicators, particularly where community supplies are monitored
- Field staff should undertake sanitary inspection and risk assessment



Information Management Staff

- Responsible for input and manipulation of data
- Maybe dedicated member of staff or member of analytical staff
- Must have support to maintain software and hardware
- Must be trained in use of appropriate software and understand basic data manipulation

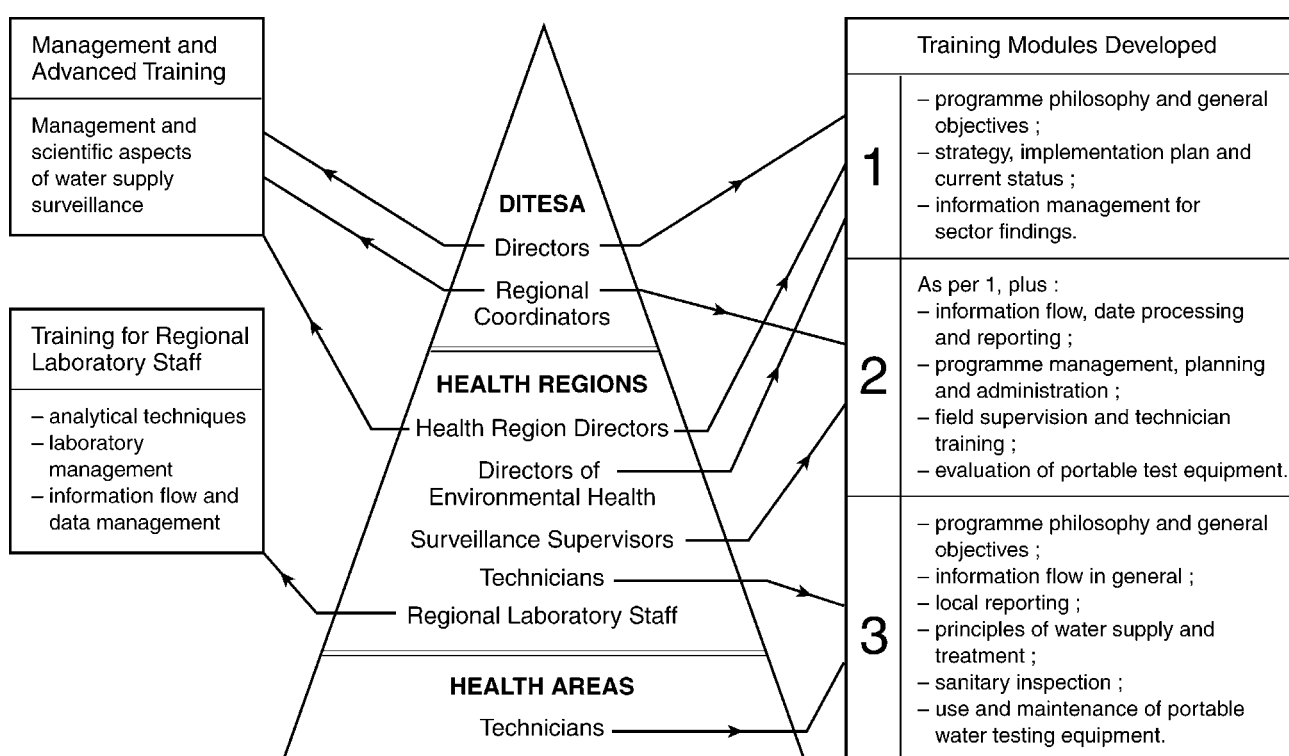


Human Resources Development: Training

- Training should be provided in a number of ways, including:
 - short courses
 - 'on-the-job'
 - longer formal training
- Refresher training is vital for ongoing good operational performance
- Senior staff should respond to training needs of their staff and identify suitable opportunities
- Training is not the only means of acquiring additional knowledge & expertise
- Applied research has great value for HRD
- All training should be linked to career development
- Training should be evaluated



Example of Human Resources Development for Water Supply Surveillance



Source: Lloyd et al, 1991

