CHAPTER 13 - MONITORING AND INFORMATION MANAGEMENT STRATEGIES

NEED FOR MONITORING AND INFORMATION MANAGEMENT STRATEGIES

The Act requires the Minister to establish national monitoring systems for water resources to collect appropriate data and information. The Department is addressing the shortcomings of the current arrangements by amalgamating all existing and planned monitoring and assessment systems into a structured and coherent monitoring, assessment and information system.

Monitoring is required to better assess resource availability, to introduce billing, to ensure compliance with water authorisation conditions, and to control all water use.

The *Monitoring and information management Main Strategy* is required to address:

- ⇨ Water resources availability;
- ⇨ Water use control from freshwater bodies and bulk water infrastructure;
- ⇨ Monitoring networks and data capturing for physical, chemical and biological aspects of surface and groundwater;
- ⇨ Issues relating to information systems and
- ⇨ Information access and requirements.

RELEVANT IDENTIFIED STRATEGIES

The following specific strategies have been developed further:

13.1 Monitoring networks and data capturing;
13.2 Information management.

13.1 MONITORING NETWORKS AND DATA CAPTURING

Management objective:

To install effective regional monitoring networks, undertake data capturing and processing and manage the networks and databases, to ensure adequate availability of data for the management of sustainable water use and protection of surface freshwater bodies and groundwater.

Situation assessment:

Detailed information on flow gauging stations is shown in **Appendix 12**.

A *Strategic Framework for National Water Resource Quality Monitoring Programmes and Guidelines for Designing Such Programmes* [28], as well as a Departmental national 5-year Monitoring Plan [30] has recently been completed.

The Strategic Framework document covers three main topics:

- a strategic framework for water resource quality monitoring;
- generic design guidelines for water resource quality monitoring programmes; and
- capacity building to support water resource quality monitoring.

The 5-year Monitoring Plan provides a summary of the current national monitoring programmes and also addresses potential and upcoming new programmes. It also identifies some critical interventions that need to be taken into account in the move towards integrated resource quality monitoring.

The following national monitoring programmes are addressed in the aforementioned two documents:

- National Microbial, Chemical, Eutrophication, Radioactivity and Toxicity Monitoring Programmes;
- River Health Programme, Ecological Reserve Determination and Monitoring, Hydrographic Surveys for sedimentation, Dam walls for dam safety, Hydrological Monitoring Programme and Geohydrological Monitoring Programme;
- Thirteen potential programmes.

The regional hydrological data capture systems and databases are generally acceptable to regional staff (monitoring and capturing of rainfall, evaporation, surface water, groundwater and water quality). The available information and monitoring systems to capture usable information are however not acceptable.

There is a lack of either personnel and equipment (DWAF for some monitoring functions) or skills (municipalities) to monitor adequately, and a lack of funds to increase monitoring points at an acceptable rate.

Closer co-ordination regarding monitoring is required between all DWAF RO functions that undertake monitoring. Hydrological, water quality and groundwater sampling and data collection as well as collection of borehole sampling information from municipalities should be better co-ordinated.

Registration of abstraction, storage and stream flow reduction activities (forestry) water uses and users on the *Water Use Authorisation and Registration Management System* (WARMS) has a high priority. *WARMS* is also used by DWAF to manage water billing. Accuracy of existing information is problematic and many problems are encountered with the registration of water use authorisations. The RO is busy with verification of the registered information and the correction of captured data.

Meteorological

Monitoring and capturing of rainfall and evaporation data are routinely done. The numbers of evaporation stations are however diminishing and there are not enough rainfall stations. The Regional Office Hydrology sub-Directorate monitors and makes meteorological data available. The level of technology used is good and is continually improving.

Surface water

Surface flow gauging in the ISP area is generally good. An additional flow gauge, closer to the Bushmans Estuary, would improve management. The Sundays River should also be gauged below Darlington Dam (and possibly also closer to the estuary), but no proper sites are available. None of the estuaries have water level recorders. There is a need to improve estuarine monitoring. Flow gauges should preferably also be installed in the rivers upstream of estuaries. Global Systems for Mobile Communication modems are used at some gauging weirs, which ensures that hydrological data is continuously available for management purposes. The intention is to install such a modem at every site.

Surface water hydrology information, but not water quality, is populated in the *Hydstra* database. The RO Hydrological Services section populates the database as well as processes information. The populated information is reliable, which can be attributed to good instrumentation.

Figure 13.1: Crump weir

Water quality

The Hydrology section monitors water quality at each gauging station fortnightly by taking one sample for macro-analyses. They also measure quality at a few boreholes. Routine water quality samples are taken monthly by DWAF and not two-weekly, as is preferable, due to a lack of manpower. Water quality information is populated in the *WMS* database.

Groundwater

Groundwater monitoring is inadequate. The location and status of monitoring boreholes in the ISP area is not well documented. In addition to the absence of sufficient monitoring boreholes, resource capacity for monitoring is a problem.

Borehole and spring water quality samples are sent to Pretoria for analyses and data capture into the Water Management System (WSM). There is however no current feedback to hydrogeology staff.

Groundwater data is continually entered into the National Groundwater Database (NGDB) from a dedicated link in the Port Elizabeth DWAF office. Groundwater quality monitoring is done bi-annually in May and September as part of the national monitoring network.

There was a loss of captured waste-site data in the RO due to inadequate backup facilities. There is ongoing capturing in the *Waste Manager* programme (information relating to licensing of waste sites) according to priority in the registration process.

The coastal strip incorporating the Alexandria Dune Field will become part of the Addo Elephant National Park. There are groundwater seepages to sea, which results in a unique form of plankton blooms in the Bay, which needs to be monitored. Seawater intrusion into the coastal dune aquifer as a result of over-utilisation is a risk, and DWAF should ensure that it is adequately monitored and managed.

River health:

There is a need for monitoring to support State-of-River / State-of-Environment Reports, and to ensure both Reserve compliance and that this compliance is resulting in the desired objective.

Strategic approach:

The Fish Sundays river system is very dependent on transferred Orange River water. This is a very valuable resource, provided at the cost of a significant historic investment. There is also significant opportunity cost in the light of national need. This puts a high prerogative on managing and using this water well. The uncertainties in availability, use, losses etc. are in fact very high, and improved management and monitoring is essential if DWAF is to meet its management responsibilities.

A major impetus needs to be given to monitoring in the Fish Sundays. This will require investment in a detailed situation assessment and the development of a co-operative strategy that goes beyond the realm of this ISP. The necessary resources must be provided to monitor the availability and use of surface and groundwater, water quality, and all ancillary parameters (from rainfall and climate to demographic and land-use change).

DWAF should not be shouldering the whole burden of monitoring, but is willing to take a leading role. Monitoring should be used as a co-operative governance activity with each authority monitoring those aspects or elements of most direct concern. The approach is therefore one of co-operation in data gathering (and information sharing). The identification of gaps on the one hand, and avoidance of duplication on the other, are key principles. So too would be some sharing of responsibility as appropriate.

The first step in developing a co-operative strategy lies in identifying role-players and in a joint assessment of needs, roles and responsibilities.

With regard to groundwater, far more responsibility needs to be devolved upon the individual users. A critical approach is both to impose a requirement and develop a culture whereby groundwater users recognise the absolute importance of sustainable management and the need to monitor the resource if that goal is to be achieved. No farmer fails to take notice of the level of water in a farm dam, and groundwater must be treated with the same mindset.

Management actions:

1. Develop a detailed regional strategy, in line with the national guidelines, as follows:
    a. Review or identify all aspects that need to be monitored. Group all monitoring needs into logical systems with common goals according to functional areas, which are then divided further into sub-systems;
    b. Develop a detailed information requirement and monitoring needs assessment for the various systems, which were grouped by functional areas;
    c. Identify and motivate required or additional monitoring points or functions;
    d. Amalgamate the identified existing and planned monitoring and assessment systems needs into a coherent and structured monitoring, assessment and information system;
    e. Review resources required for adequate monitoring of surface and groundwater;
    f. Motivate for the regional share of the national monitoring budget;
    g. Regularly review and update the regional monitoring strategy;
    h. Identify and meet with role-players that have relevant data or operate water-related monitoring, assessment and information systems and co-ordinate activities;
    i. Develop co-operative, collaborative relationships between the Department and other role-players.

2. Develop an Integrated Regional Monitoring Programme that includes the following:
    a. The situation regarding monitoring in the ISP area indicating what is being monitored, further monitoring requirements and what monitoring is duplicated or unnecessary;
    b. Include all monitoring functions within DWAF (Hydro, Geohydrology, Water Quality, Regional Office and Head Office and the River Health of the CMA);

c. Liaise and integrate with organisations with a strong water interest outside DWAF but within the ISP area (Dept. of Agriculture, other Provincial departments such as DEAET, Housing, Mineral and Energy Affairs, local authorities, Nature Conservation (Weather Bureau) and research institutions such as the CSIR, universities, non-Government organisations and the Agricultural Research Council.

3. The Programme must address:
   a. The co-ordinating structure and responsibilities;
   b. Who will be responsible to gather data, according to which methods and standards will it be gathered and at what frequency (standards should conform to the needs of all users and if international standards exist it should be the minimum standard);
   c. Agreement on who will fund the functions and whether it is financially feasible over the longer term;
   d. An Implementation Programme with required actions and budgets;
   e. Address custodianship of the databases and requirements for auditing of information or databases through the *Information Management Strategy*, Strategy 13.2;

4. Specific actions to be included in the Monitoring Programme are:
   a. Prioritise estuarine monitoring needs to obtain the relevant monitoring data;
   b. Regular biological sampling is required in the Bloukrans tributary of the Kowie River, which has extremely high levels of E-coli;
   c. Monitor salinity in the Glen Melville Dam, and compare with the situation in the downstream river, before making releases;
   d. Ensure adequate monitoring and availability of data from coastal aquifers;
   e. Meet with the Coastal and Marine Research Institute of the University of Port Elizabeth and ask them to assist with coastal and marine monitoring related to the Alexandria dune field;
   f. Consider the merits of outsourcing groundwater monitoring;
   g. Re-capture waste-related licence information in *Waste Manager*.

Responsibility:

The development of this strategy is the responsibility of the RO in consultation with the RDM Directorate and the Directorates of Information Programmes, Waste Discharge and Disposal and the Sub-Directorate: WQP of Directorate: Water Resource Planning Systems.

Priority:

Priority 2 – High. Implement over the medium term.

13.2 INFORMATION MANAGEMENT

Management objective:

To facilitate improved storage, manipulation, backup, archiving, dissemination, access to and sharing of information within the ISP area.

Situation assessment:

Except for a number of organised initiatives e.g. wetlands, information is not adequately managed and shared and adequate liaison regarding information management does not take place, both inside the Department, and with other Departments and organisations that have water management functions. The Department manages a number of databases, as discussed in the *Monitoring networks and data capturing Strategy,* Strategy 13.1. A groundwater data audit is also available for the Eastern Cape. Water Services manages a database of groundwater supply to towns. The GIS Section of the Premier's Office in Bisho has a GIS section that does GIS co-ordination, where DWAF should be represented.

A proper Information Management Plan for the ISP area (or larger area) is required. There is an urgent requirement for adequate data storage, backup and archiving systems for captured Eastern Cape data, since data is valuable and expensive.

The situation relating to regional databases are as follows:

Spatial data
DWAF is the custodian of an extensive GIS (UNIX based) corporate spatial database (CSDB) based in Pretoria and managed by the Directorate: Geomatics. The region keeps a copy of the CSDB which is updated regularly. It includes data obtained from other companies, state departments, consultants and academics. A list of available data with metadata is available on the DWAF website (www.dwaf.gov.za).

Aerial Photography
The Department owns 1: 30 000 aerial photography covering parts of the area, which was undertaken by the regional Working-for-Water programme.

Invasive Alien Plants Mapping
Invasive alien plants density mapping has been undertaken for the WMA in 1999-2001. Working-for-Water uses this mapping for planning purposes.

Surface Water Hydrology & Water Quality
The Hydrological Information System and related systems were replaced with an Australian hydrological database system called HYDSTRA in 2002. It is functioning effectively and is providing support for management decisions utilising water quality and quantity data.

WARMS
The Water Use Authorisation & Registration Management System (WARMS) is not currently supporting management sufficiently in the ISP area. The system is unable to provide basic information

(For example, it does not produce a list of all farmers scheduled in a particular quaternary). It also has no way of graphically displaying all registered users on a map. The registration data must be verified before it can be used for decision-making purposes. If, once verified, this information was publicly available it would allow for refinement and self-policing by other registered users, forcing more unregistered users to come into the fold. Maximum allowable water use is not captured, but only average use. It should be noted that assurance of supply is the same in all cases.

POLMON and WMS
The Pollution Monitoring Information System (POLMON) is still active. This is currently used in conjunction with the Water Management System (WMS) for water quality resource management.

Strategic approach:

Develop and implement an ISP area Information Management Plan.

The current resources in the RO (staff, hardware and software) to implement this strategy are inadequate. Skilled IT and GIS staff, funds to buy and properly manage the software and databases and technical staff to evaluate, manage and improve the systems and databases and to liaise with other information managers are required. The available staff is very stretched and address issues according to priorities. The most important approach is thus to source resources. Restructuring is under way in the RO, which is a difficult time to source resources, but is also opportune to divert resources to information management, which in the past generally seemed to be undervalued in importance.

Co-operation with other Government Departments in this respect and with other managers of water-related information is essential.

Management actions:

Develop and implement an ISP area Information Management Plan as follows:

1. Identify what information the Departmental information managers require;
2. Determine GIS-specific requirements such as hardware for storage;
3. Identify information requirements from other departments, provincial and local government and other organisations in the ISP area with a water interest;
4. Compile an *information sharing policy* with other departments, provincial and local government and other organisations and identify the following:
   - What information should be shared?
   - Who should have access to it?
   - What is the integrity of the information to be shared?
5. Implement the *information sharing policy* through co-operative governance with other departments, local authorities and institutions through various formal and informal committees or other forms of effective co-operation;
6. Address *custodianship* of the databases and requirements for auditing of information or databases for shared databases. Set time intervals between data gathering and availability on the databases and determine a policy of the costing aspects of making data available;
7. Install adequate storage, backup and archiving facilities and library systems in all DWAF Eastern Cape offices;

8. Formulate an approach to deal with available WARMS information.

Include the following specific *groundwater*-related actions in the Information Management Plan:

9. Obtain support for maintaining momentum on the current Groundwater Resources Information Project (GRIP) project underway in the Eastern Cape. All existing information (which is substantial) should be made available and be incorporated;
10. It should be a future condition of licences issued that all data collected through the course of studies (including electronic information) should be provided to DWAF;
11. Provide currently available regional planning information and aquifer-specific modelling information as input to local government planning;
12. Ensure proper co-ordination with the GIS Section of the Premier's Office in Bisho.

Responsibility:

The Chief Directorate Information Management is overall responsible. The development of the regional strategy is the responsibility of the RO. The Information Management Group in the Western Cape office will provide support to the Eastern Cape as well.

Priority:

1 – Very high.