

## OVERVIEW

In 2007 the Water Research Commission initiated a project on integrated water quality management; the aim of the project being to develop a conceptual model for aligning the management of the quality of water resources with that of drinking water quality in order to support the effective management of water use in the interest of all water users (Boyd, Tompkins and Heath, 2010).

The Integrated Water Quality Management (IWQM) approach that has been developed “breaks down” water management into smaller management units while establishing both a horizontal and vertical reporting framework. A further benefit of the model is that responsibility for water quality is based on significantly smaller geographical areas, and accountability to the adjoining areas (horizontal accountability) and to the next level of management (vertical accountability) is established with the establishment of the management unit. This allows accountability for water quality to be focussed on smaller management units, rather than diffused up ever higher levels of management. In other words, by making all water users aware of their own responsibility to the protection of South Africa’s water resources and accountable for the impacts that they have on the resource.

It is this mutual understanding between water users of the impacts of their own uses which is aimed at bringing to life the “Everyone is downstream” and “Every water user is a water manager” philosophy. This phase of the project deals with the implementation of the IWQM model approach and describes various changes that have been made to the model as a result of the implementation.

### ***Objectives of the project***

The aims of this implementation phase of the project were to:

- Streamline and refine the conceptual model through the implementation of case studies at each management boundary;
- Link the model with relevant tools that must be used for implementation in the management boundaries; and
- Develop an implementation framework for future use of the model.

Ultimately the objective of this project is to “populate” the elements of the business process for management units at different levels of the management framework (using the Upper Breede Catchment as a test case) and assess its viability for broader implementation.

### ***Recapping the conceptual framework***

In developing the IWQM model, three main components were identified:

- *Defining principles* which are defined as being generalizations that are accepted as true and that can be used as a basis for reasoning or conduct, such as water being properly valued (e.g. because there is not enough water);
- *Background conditions* which are defined as those conditions external to water quality which support the implementation of this framework and therefore indirectly impact on water quality, such as management systems and tools; and
- *Management units* which are defined as a geographical area that could be managed as a unit owing to common water use characteristics at the “lower” levels and to institutional responsibilities with regard to the management of water quality at the “higher” levels.

The ultimate goal of IWQM is to achieve specific objectives at a particular management unit taking into consideration the defining principles and background conditions relevant to that specific management unit. This can be done using various tools that may include, for example, a Water Safety Plan (WaSP) for a municipality or an Integrated Water and Waste

Management Plan (IWWMP) for an industry. However, there are specific elements that must be included in each of the tools:

- Identification of elements of the water use cycle;
- Hazard assessment or risk analysis in which critical risk factors, critical control points and performance targets are set;
- Risk management; and
- Contingency planning.

In view of the above, the business process proposed for the IWQM conceptual model is generic in the sense that its various elements apply at every level of management, or rather to every management unit, and therefore each aspect must be in place in each management unit. However, the details of each element will vary according to the nature of the management unit in question.

The basic premise is to break down the challenge of IWQM into manageable areas in order to reduce the reporting between management units to a simple “Yes” (quality and quantity parameters are being met) or “No” (they are not). This approach demands effective auditing processes but it is structured in such a way that management units next to each other can audit each other. Each management unit is therefore responsible for auditing the quality of the water entering its geographical area and then reporting on that to the next level of management as well as the management unit where the water came from.

### ***Refining the model***

Practical experience gained from the piloting and implementation of the model in the Breede River catchment area as well as valuable knowledge gained through discussions at World Water Week in Stockholm (2010) have been used to improve the model. This has fine-tuned the model described in detail in (WRC TT 450/10, 2010).

### ***The water use cycle***

The water use cycle is the context for the IWQM framework in the sense that the elements of the water use cycle are those that need to be managed. The water use cycle continues to evolve and it was recognized that precipitation as a consumptive use should also be taken into account.

### ***Amendments to critical control point description***

The initial model describes the process in which the hazard and risk assessment will determine critical controls points (CCPs) which are central to the implementation of the business process in every management unit established. However, during the site visits and the one-on-one meetings it was agreed that the critical control points could be at various levels of priority. Therefore the concept of critical risk factors (CRF) was brought in and the business process changed accordingly.

### ***Stakeholder participation***

In line with the active stakeholder participation undertaken in the first phase of the project, the second phase included workshops, one-on-one sessions and the development of a background information document for the stakeholders involved in the testing of the model. A stakeholder database was developed using Access and can be updated as new management units become involved.

### ***Capacity development***

As part of the capacity building for the project the following were undertaken:

- Mr Oliver Malete, a project team member, obtained a bursary through Golder Associates Africa and registered and started his Honours degree in Applied Science. This may lead to an MSc in 2011 at the University of Pretoria.

- Ms Dee Padayachee, a project team member, registered with the University of South Africa and started a BSc Honours degree in Environmental Management. Core subjects included impact mitigation, integrated environmental management and environmental systems. The programme runs over two years and is scheduled for completion at the end of 2011.
- Several workshops and working sessions were held with stakeholders from the area.

### ***Conference presentation and proceedings***

The project was presented at several conferences and an article accepted for publication in an internal water resources journal:

- WISA 2010 Durban presentation entitled: Implementation of a conceptual model for integrated water quality management in South Africa, L Boyd, R Tompkins, O Maletle and D Padayachee.

This paper was presented by Oliver Maletle and Dee Padayachee.

- WISA 2010 workshop: Integrated water quality management: A new mindset, facilitated by R Tompkins and L Boyd.
- Stockholm Water Week (5-11 September 2010) presentation entitled: An integrated water quality management framework for South Africa: A new mindset.
- Boyd L and Tompkins R (2011). A New Mindset for Integrated Water Quality Management for South Africa. International Journal of Water Resources Development, 27: 1, 203-218.
- Presentation at the Young Water Professionals Conference in April 2011 entitled: Implementation of an Integrated Water Quality Management (IWQM) Model – A South African Context. This will be presented by Oliver Maletle and Dee Padayachee.

### ***Challenges***

Some challenges experienced during the testing of the model are detailed below.

- Establishment of the CMA was very new and several people from both DWA and the municipality moved to BOCMA; so that while the passion to implement the project was there, the changes occurring internally hindered the process somewhat as the project team struggled to maintain communication with stakeholders;
- It was recognized that stakeholder management is an unrecognized skill; it needs to be done properly and by a skilled practitioner with experience in those processes, not as an add-on to the technical team's tasks; and
- When considering the 'bigger picture' of various levels of management units, the question of who will manage the data exists.

### ***Conclusions***

The IWQM management approach breaks down water management into smaller management units while establishing both a horizontal and vertical reporting framework. A further benefit of the model is that responsibility for water quality is based on significantly smaller geographical areas, and accountability to the adjoining areas (horizontal accountability) and to the next level of management (vertical accountability) is established when the management unit is established. This allows accountability for water quality to be focussed on smaller management units, rather than diffused up ever higher levels of management. In other

words, this makes all water users aware of their own responsibility to the protection of South Africa's water resources and accountable for the impacts that they have on the resource. Based on the identification of CRFs and CCPs in various management unit types, we conclude that the business process is scalable at the various levels of the management framework and across different types of management units in the "Community" level of the management framework. The complexity of the process rests in the details rather than the process itself, and therefore larger management units would necessarily have more CRFs and (possibly) CCPs and different types of management units would have varying degrees of technical expertise required for measurement of their CCPs.

Finally, the IWQM approach allows water quality information to be packaged for a broader audience because reporting is simplified to provide information on whether or not a management unit is within specifications of its CCPs; rather than extensive technical reports to national level through the management chain. This addresses the issue of raising of awareness in the broader community of the basic premise that good water quality is in everyone's best interests while providing for "everyone's" involvement in its management through the allocation of responsibility at more localised levels.

### ***Recommendations***

Based on the results of this second phase, it is recommended that a third phase be undertaken to maintain the momentum of the model implementation. As part of such a third phase the following recommendations are made.

It is recommended that a stakeholder engagement team is added to the project team in order to improve the approach to the implementation of a collaborative management mechanism. The project team should be augmented with specialists in stakeholder participation processes who are directed specifically to that task in order to maintain the links with stakeholders. Simultaneously, the technical team will continue its interactive process of workshops to establish Management Units and determine CCPs and CRFs.

To maintain the momentum of the model implementation it is recommended that it is presented more widely at for example, catchment management forum meetings. These meetings are usually constituted of representatives from the various levels that could potentially be management units, including national government.

The implementation of the model will be greatly enhanced if it is converted into a web-based system into which the various management units can report. It is understood that not all management units will have access to the technology required to enter data into such a system and receive reports from it. However, the upper levels of management certainly will. A system for collecting data from those without access to technology (e.g.. a management oriented monitoring system or MOMS) should be integrated into the implementation process of the model. Adequate feedback loops must also be created to ensure that reports reach all management units even if they are not operating a web-based system.