

True water resources management – it's a matter of integration

A current project by the Water Research Commission (WRC) hopes to bring the different actors of the water sector together to enable true integrated water resource management. Article by Albert Jeleni, Pieter van Rooyen and Pramod Sihna.



In the past, water management was characterised by clearly defined problems that society wanted to be solved. These problems were dealt with in isolation based on scientific concepts and tools mainly concentrated on the supply or resource side. The use side, or rather the human dimension side, was taken into account as an 'external' boundary condition.

Further, over years in the natural science community a tool typically was understood as a stand-alone computer software product describing mainly one topic, for example groundwater flow. This has led to practitioners developing tools reflective of their training and the challenges posed by modelling particular aspects (silos) of water management.

When the need for integrated water management was recognised by practitioners, technological

solutions were sought after, and this to the detriment of the water sector. This quest to solve the integration problem using sophisticated technological systems has led many to forsake basic scientific concepts, and create even more silos in cyberspace, forgetting that tools are only as useful as their users.

While scientific concepts form the necessary basis for developing appropriate management approaches for water systems, such concepts must eventually provide the framework that allows for the integration of tools, and consequent 'breaking down' of silos. Importantly, however, these silos need to disappear without dumbing down the expertise within each segment. Therefore, doing away with silos does not mean doing away with specialisation.

In a South African context, the National Water Act (NWA) makes it

clear that tools (i.e. for conservation, pricing, conflict resolution etc) as required by integrated water resource management (IWRM), should be put in place. IWRM requires that the tools for each domain be integrated and that scientific experts, water management and stakeholders collaborate in the holistic assessment and management of water.

Integration is being pursued within the different domains/silos in the South African water sector (i.e. within water services, water resources information programmes, integrated water resource planning, resource directed measures, catchment management agencies, WRC etc), however, very little has been done to bring the tools of these domains together. There, while the NWA is hailed across the world for getting the right mix between economic growth, social equity and environmental sustainability, the ultimate test is in its implementation, and consequently the sector's ability to develop and integrate the required tools.

Despite the major advances in science and technology in water management that have taken place over the past two decades, a need remains to establish a unifying framework that will lead to appropriate tools for sustainable water management. In recognising the importance of an integrated approach in water management, the WRC has initiated and funded a project with the aim of adding value to the process of looking into requirements for a multidisciplinary approach to IWRM.

The project focused on the integration of tools in general, including mobilisation of social, economic, institutional, legal, environmental and technical expertise, in an effort to address water resources and water uses in an integrated manner. In the project, a 'tool' was defined as something (either tangible or intangible) used to support operational and strategic actions in performing IWRM. This means that a tool can be a guideline, a procedure or protocol, a method or technique, a device, an

apparatus and a software program dealing with all levels in relation to transition to IWRM or a subset of levels and approaches.

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The project has developed a generic integrated conceptual framework (GICF) that can be applied in a consistent and coherent manner to a wide range of water management issues in an integrated manner. The key to building systems that provide a high level of flexibility is to use a component-based design that meets current requirements, and is flexible enough to meet future needs. This requires a dynamic architecture that allows for easy modifications of existing functionalities and easy adoption of new ones.

Hence, in developing the GICF it was necessary to build an understanding of the water management process evolution over the years, the circumstances driving the evolution, the water sector building blocks, as well as the different water management philosophies that shaped the water sector. The framework has, therefore, been developed around the principles of extensibility with four basic characteristics: a) plug and play, b) evolutionality, c) representativity of the problem and d) adaptive water management.

The project has shown that water sector integration should be pursued from a water business perspective instead of the technology perspective. However, technology should be used to support integration efforts where necessary, taking into consideration country needs and skills levels. Essentially, the new framework seeks to achieve integration from the business perspective, and allows users to link their tools to the mandate and objectives, to

the reporting requirements, to the information value chain, and to the required resources in assessing trade-offs.

More importantly, the GICF allows for decision-making and reporting to in a single platform linking the water managers, users and other stakeholders to the national government objectives. The application procedure to guide the use of the GICF consists of nine steps:

- **Step 1** – Identify the high-level mandate of an entity;
- **Step 2** – Identify actors and their objectives;
- **Step 3** – Identify the decision process and performance indicators;
- **Step 4** – Identify required tools and assess their maturity;
- **Step 5** – Identify the required data;
- **Step 6** – Identify the data sources and point of contact on the value chain;
- **Step 7** – Bring the actors with their objectives and data requirements to the unifying platform using the appropriate Level II frameworks;
- **Step 8** – Identify overlaps and gaps on objectives, tools and data; and
- **Step 9** – Streamline the processes accordingly.

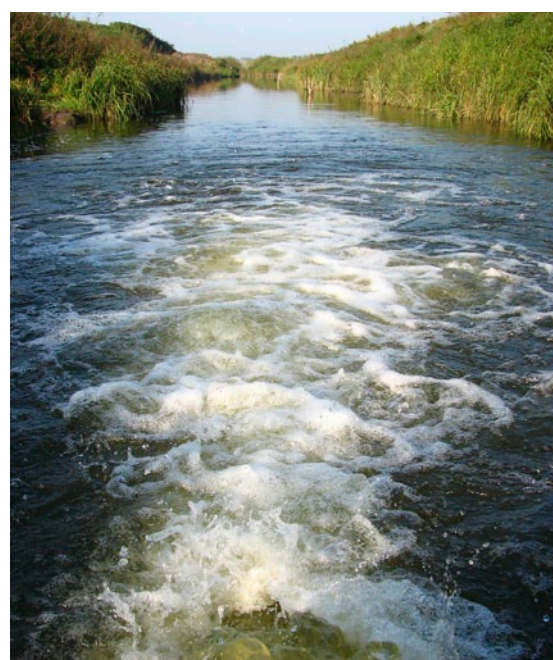
The project has identified data and/or information as a medium through which integration takes place and emphasises the importance of information systems to ‘support’ integration efforts. Three levels of integration hierarchy have been identified and adopted for use in the project, i.e. Level I Frameworks (integrated tools), Level II Frameworks (integrated frameworks) and Level III Frameworks (generic integrated frameworks).

From the outcome of this project it is concluded that many of the water management tools in the South African water sector support the principles of IWRM within their respective domains. However, it is also concluded that the tools, as a collective, do not embrace the principles of IWRM, and to enable a transition to IWRM, a unifying framework (such as the GICF) is required.

The project has also identified that many of the domain specific Level II Frameworks have reached their maturity level, and that efforts are being made to integrate other Level II Frameworks on an ad-hoc basis, this could result in systems procured and developed to solve a specific problem, characterised by a limited focus and functionality, and containing data that cannot be easily shared with other systems.

The GICF provides a long-term high-level process that frames major integration issues and provides strategies and recommendations for addressing those issues. The GICF represents a means to an end, rather than an end in itself, and what is ultimately required is for all the actors in the water sector to align with the GICF’s optimal direction leading to complete integration. □

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