TECHNICAL BRIEF

February 2018
The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

Evidence-based handbooks on how to implement Integrated Water Resources Management

A Water Research Commission (WRC) study has been completed on practicing adaptive integrated water resources management in South Africa: A new paradigm shift.

Rationale

Integrated Water Resource Management (IWRM) has largely failed in South Africa since it was first embedded in the National Water Act in 1998. It is most specifically the practice of **integration** that has proven difficult.

Water management and water supply still work persistently in silos. The core goals for IWRM in South Africa, stated in the NWA are: equity, sustainability and efficient use. These have therefore frequently not been met.

However, since the 1990s, literature has emerged indicating that practical integration, and progress towards the core goals **could** be achieved using a set of 'new' concepts. This set of concepts is sufficiently different from the traditional linear and top-down approach to IWRM, to be called "a new paradigm" for IWRM.

Early research and practice in the South African National Parks and the Inkomati-Usuthu Catchment Management Agency was promising and guided this study. This study aimed to demonstrate the integrated approach towards resources management. This demonstration was required in a wider range of case studies, addressing specific intractable problems, to provide **confidence** that new practice could be encouraged and actioned nationally in South Africa.

The success of the research can and should strongly influence the content and direction of new legislation and the next National Water Resource Strategy. This study engaged the Integrated Water Quality Management Policy and Strategy, led by DWS as well as development of Catchment Management Strategies, such as that of uMzimvubu to Tsitsikama

If uptake does not occur this will mean retention of old practices that have resulted in over-allocation and over-use of water; deterioration of water resource health, instream flows and water quality; human health issues related to microbial, eutrophication and other forms of pollution and water insecurity.

This project recommends the use of the term **Adaptive IWRM** to signify the new approach and practice. The results provide clear, positive evidence that investment in further research into, and related practice of, Adaptive IWRM is essential. The project is referred to in the text as TPNP: towards practicing a new paradigm. The new practice is Adaptive IWRM. DWS and ICMA, were instrumental in testing the concept in their operations

Aims

Some of the main aims of the study included the following:

- Development of a set of guiding principles for the practice of Adaptive IWRM in South Africa.
- Undertake relevant research in three place-based case study areas in respect of each case focus area: (1) household water security; (2) using the Green Drop Programme to address eutrophication and microbial pollution, and (3) water resource protection.
- Produce a set of practical handbooks for 'new paradigm' or Adaptive IWRM practice.
- Have proposed and selectively practiced the new paradigm of water resource management in South Africa.
- Have contributed to the scholarship and practice of transdisciplinarity, particularly in the linked development of concept, theory, and method.

Methodology, key findings and discussion

Engaged research and participatory action research methods were used in all the case studies to address research questions relating to stakeholders. Qualitative methods included the use of questionnaires, and structured, semi-structured and depth interviews.

Specific attention was paid to ensuring stakeholders participating in any of the research processes (planning, data collection and analysis, and knowledge sharing) were able to participate fairly. This required attention to the context of knowledge sharing, making use of translation where appropriate, as well as demonstrating an inclusive and invitational attitude in explicitly inclusive processes. All of these were part of paying attention to epistemic justice – the fairness and equity of participation.

Social and other learning processes require attention to including reflexive opportunities, and explicitly interrogates the questions: (i) was there a change in understanding of participants, (ii) was this change shared and understood within a broad social context or community of practice, and (iii) did the learning take place through social interaction?

Cultural History Activity Theory (CHAT) guided qualitative methods for tracking and identifying expansive learning, and was used particularly in case studies 1 and 2. The theory defines elements of social activity systems. The subject/s are identified in relation to the objective and outcomes of the activity. Engagement with subject/s explores the tools used in the activity, the rules (both formal and informal) controlling the activity, views of the community of practice, especially peers, and the division of labour – those with whom the subject/s work in the activity system.
This choice of CHAT is consistent with critical complexity theory, which emphasises the role of history in understanding a present context. During data analysis, the researcher is particularly attentive to recognising tensions, as these are theorised as the most likely focal points for new learning and behavioural change

A range of systemic approaches were used, including systems thinking, soft system modelling, and system dynamics modelling in all the case studies. Strategic Adaptive Management is a systemic, inclusive process that is particularly attentive to developing a rich understanding of context (social, technical, economic, environmental and political); a shared articulation of values and the co-development of a vision of a shared future.

The political ecology literature can be used to support SAM practice, which was used in all the case studies because the role of politics is increasingly clear in any drive towards equity and sustainability.

The study required a case study methodology, and a case study development process. Since scale has such a strong role influencing social-ecological systems, both the governance, and bio-physical special scale of each of the case studies were described, and a range of scales selected.

Case Study 1: Makana Municipality

At the local government, sub-catchment scale (Upper Kowie River catchment), in the Eastern Cape, this case study extended previous work in the Lower Sundays River Valley Municipality, to Makana Local Municipality – another local municipality in the Sarah Baartman District Municipality.

The focus was on local government governance, linked strongly to community and citizen science, where we recognised the importance of 'water for dignity'. Research started with historical contextual analyses and household surveys by citizen-researchers, engaged with local government.

Although the case study was initiated with the idea of investigating microbial pollution, household water security emerged as the main issue for citizens. ***The case study has catalysed local water institutional development: the establishment of a Water Sanitation and Catchment Management Forum co-hosted by the Municipality and DWS. The forum is actively working on a local catchment management strategy to contribute to the proto-CMA.***

Case Study 2: Crocodile River sub-catchment in the Inkomati River catchment

At the Catchment Management Agency (CMA) - catchment scale, an independently funded (dti-NRF-THRIP) project provided additional resources for the study. Case Study 2 addressed the Adaptive IWRM challenge of building a co-operative integrated water quality monitoring process for the Crocodile River catchment, thus addressing the water quality issues of eutrophication and microbial pollution specified in the study.

The case study brought industries in the Crocodile River catchment together, with local government, water service providers, water managers and regulators. In a three-year

process of working towards collaboratively improving water quality in the Crocodile River, the project contributed to national water quality policy development, the installation of the novel new WQSAM model into the IUCMA, and collaboration toward improved water quality in the catchment.

The Inkomati-Usuthu Catchment Management Agency (IUCMA) made this project part of their business plan for water quality as part of operationalising their Catchment Management Strategy. The IUCMA had embedded the results in the most developed example of water resources governance in South Africa, and has the opportunity to influence the development of a CMA in the Olifants River Catchment.

The case study therefore embodied study approaches, in that researchers and water resource managers were institutionally engaged in co-operative activities to improve in-stream water quality. In this case study, the recognition emerged that conventional research into microbial pollution and eutrophication was not going to effect the kind of instream changes needed.

The project team initiated research-driven Green Drop campaign to see if the DWS Green Drop programme would be a more effective intervention to address both microbial pollution and eutrophication than conventional fundament research. The Green Drop campaign revealed exactly why the constant input of nutrients into aquatic environments from waste water treatment works is so hard to address.

It is indeed a 'wicked problem' that is not likely to be resolved by additional scientific understanding but rather by concerted engagement within DWS, and between national and local government. A political ecology approach is most likely to be constructive.

The Crocodile River catchment case study provided the most comprehensive examples of adaptive IWRM practice in all aspects required. Firstly, water quality and aquatic resource protection: this case study research has had foundational, and strategic input into the 2017 National Water Quality policy and strategy, finding traction at the highest levels of DWS.

Secondly, the Green Drop Programme was identified as a key intervention point for eutrophication and microbial pollution, and the deep intractability of the problem was made explicit. Progress absolutely requires politically-based action.

Further, the case study showcased industry IWQM process co-operation, highlighted in a study of the sugar industry; and novel and original research developed in other WRC projects was applied, and software installed in the IUCMA to integrate water quality and water quantity data for Adaptive IWRM ready to be implemented with implementation dates agreed.

Case Study 3: Olifants River Catchment

At the broadest biophysical scale, within an international catchment, with regional institutional co-operation, the Association of Water and Rural Development (AWARD) have been running a large USAID-funded project.

The project name is RESILIM-O – towards improving resilience in the Olifants River catchment, as part of the Limpopo River Basin. The first stage of the project has been completed, with progress towards building a co-operative, systems-based understanding of the Olifants River basin across South Africa and Mozambique.

Participants demonstrate learning, and are acting to increase the resource protection and climate change resilience in the Limpopo Basin System. Currently the focus in on building civil society and catchment-based local capacity for Adaptive IWRM understanding and action. As the case study partnership progressed it was clear that the RESILIM-O and this study initiatives found traction at different rates.

Conclusions and recommendations

Adaptive IWRM is ground breaking: hard, slow, and effective, and is the way to achieve the balanced protection and use of water resources for the equitable and sustainable benefit those who live in South Africa

Immediate uptake by DWS

The DWS accepted Adaptive IWRM concepts in the 2017 Water Quality Management Policy and Strategy (WQMP&S). Other immediate actions and applications are:

- formally adopt and promote the term **ADAPTIVE IWRM,**
- actively ensure the revised single water law is consistent with Adaptive IWRM,
- actively promote the "How to…" series
- use Adaptive IWRM in the Olifants River IWQMP,
- use Adaptive IWRM in the Master Plan for Water and Sanitation,

- check for consistency between the WQMP&S and the monitoring and evaluation framework,
- Actively support SAM-based stakeholder engagement in catchments, while governance and institutional arrangements are evolving.

Further reading:
To find out more about the project, Economic development under water constraints guidelines, (**Project no. K5/2248**) contact publications at Tel: (012) 761-9300; Fax: (012) 331-2565; Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.