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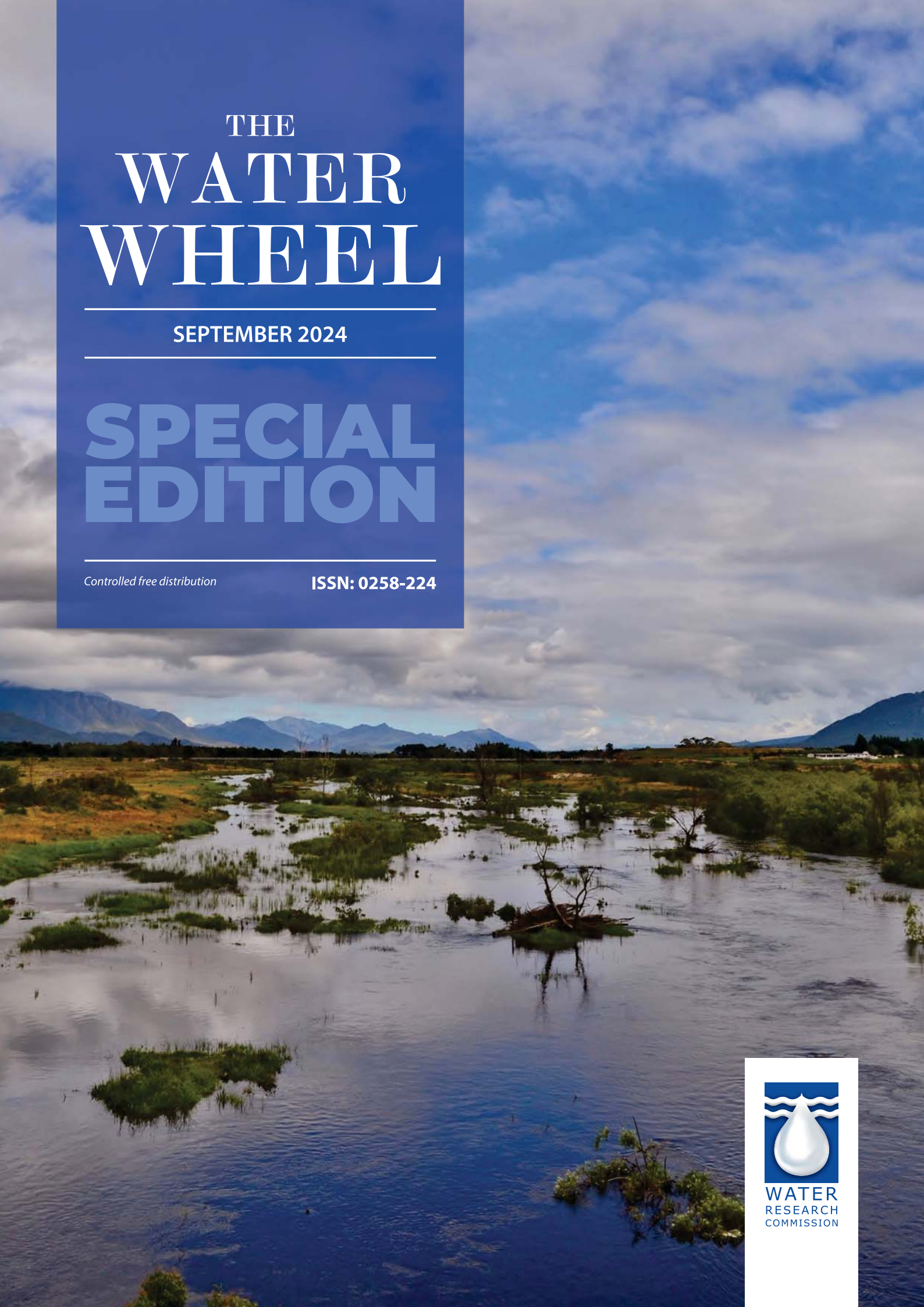

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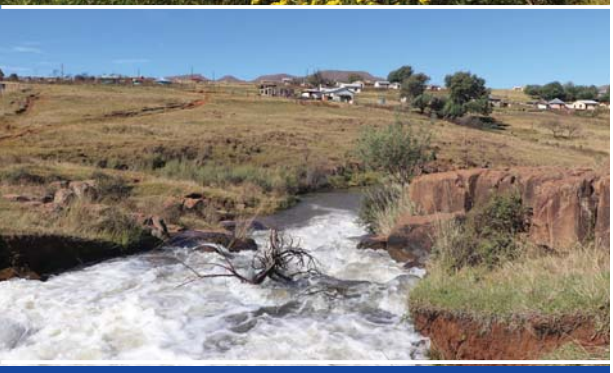

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INTRODUCTION

Ecological infrastructure for water security

Aimee Ginsburg, SANBI

There have been significant shifts globally emphasising the need for a more concerted effort in the effective conservation and management of biodiversity and water.

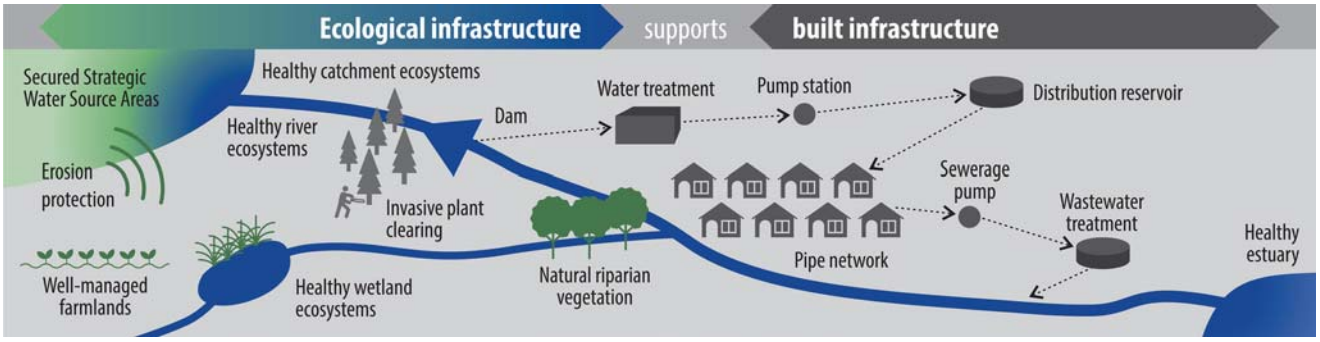
In late 2022, the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted at the 15th sitting of the Conference of Parties on the Convention of Biological Diversity (CoP 15) held in Montreal, Canada. This GBF built on previous strategic plans and sets out an ambitious pathway to reach the global vision of a world living in harmony with nature by 2050. In March 2023, the United Nations Water Conference took place and saw the adoption of the Water Action Agenda, representing voluntary commitments by nations and stakeholders to accomplish the Sustainable Development Goals (SDGs) and their targets connected to water. The conference recognised the close links between water, inequality and the environment.

South Africa, as a country, has taken these key international processes on board. The national ***White Paper on the Conservation and Sustainable use of Biodiversity diversity***, gazetted in 2023, is aligned to the GBF and is a key mechanism for the implementation of the framework. Similarly, in the water sector, there has been a strong drive to strengthen and update relevant policy and legislation to support a more water secure future for South Africa, including the development of the National Water Resources Strategy 3 and the National Water Amendment Bill.

It is against this backdrop that the Ecological Infrastructure for Water Security (EI4WS) project has been implemented, showing

the importance of ecological infrastructure in its role on water security. Ecological infrastructure refers to naturally functioning ecosystems that provide valuable services to people and the economy. It is the nature-based equivalent of built infrastructure, and just as important for providing services and underpinning socio-economic development. It includes rivers, wetlands and strategic water source areas that provide clean water and rangelands that support grazing for livestock, among many other types.

It is also important to understand the relationship between ecological infrastructure and green infrastructure. Green infrastructure is a broader term that also includes man-made structures like green roofs or permeable paving. Ecological infrastructure is a subset of green infrastructure that is focused on naturally functioning ecosystems.



Ecological infrastructure is the nature-based equivalent of built infrastructure, and it is just as important to manage, invest in and maintain. Ecological infrastructure has the potential to complement and, in some cases, substitute for built infrastructure.

In light of South Africa's declining water security, there is an urgent need to include ecological infrastructure in development planning to ensure sufficient resources for its management and protection. This was the aim of the EI4WS project, funded by the Global Environment Facility (GEF6), implemented by the Development Bank of Southern Africa (DBSA) and executed by the South African National Biodiversity Institute (SANBI), along with its various partners.

The project focuses on improving water security by integrating biodiversity and ecosystem services into planning, finance and development in the water sector and operates under the following objective: ***Ecological infrastructure (for water security) is included in relevant policies and costed in catchment management in a way that is reflective of actual costs for rehabilitation and maintenance of ecological infrastructure and reflected in built infrastructure plans etc.***

This objective is operationalised through three components:

- **Component 1:** The enabling environment is strengthened for improving water security through the integration of biodiversity and ecosystem services in the water value chain.
- **Component 2:** The application of policies and financial mechanisms in the water value chain improves water security in critical catchments.
    - The Berg and Breede catchments in the Western Cape which provide water to Cape Town and the surrounding high value agricultural areas, and
    - The Greater uMngeni catchment in KwaZulu-Natal, which supplies water to eThekwini and the midlands.
- **Component 3:** Social learning, credible evidence and knowledge management improves the integration of biodiversity and ecosystem services into the water value chain.

This ***Water Wheel Special Issue*** provides an opportunity to briefly engage with all three of these components. This complex project, underscored by its strong focus on leveraging partnerships and continuous co-learning, effectively responds to the challenges identified. The articles in this special issue have been developed as part of a series of writing retreats convened in response to progressively limited opportunities for writing and reflection.

Against a backdrop of changing contexts brought about by the Covid-19 pandemic, the complexities in responding to youth unemployment, and the growing appreciation for learning and reflection as an important consideration in implementation, this compilation from the project team and implementation partners paints a picture of true collaboration and constant adaptive management.

Ecological Infrastructure for Water Security (EI4WS) project partners

ACCOUNTING FOR NATURE

Natural capital accounting – harnessing information

Natural capital accounting is a practical tool to learn more about how nature supports people and the economy. This article looks at information from water-related accounts available to inform policy and planning, and lessons from this emerging area of work. Article by Mookho Makanyane and Aimee Ginsburg.

Natural capital accounting (NCA) is the process of accounting systematically for stocks and flows of natural resources. The measurement framework for NCA is the United Nation's System of Environmental-Economic Accounting (SEEA), which represents an internationally agreed framework developed collaboratively over many years.

NCA offers a robust approach to harnessing environmental information that can be combined with social and economic information to inform development and investment decision-making. The potential of NCA was recognised in 2016 when the EI4WS project was being designed, although the compilation of ecosystem accounts was still in its infancy.

Project planning identified a lack of integrated ecological and socio-economic information as hindering the management of water resources. Focusing on water in isolation from its source in ecosystems and catchments meant that management was focussed on built infrastructure, rather than the wider land in river catchments that has a direct influence on water quantity and quality. The lack of reliable information on water and ecosystems meant that important decisions were being made based on a limited perspective.

The EI4WS project sought to explore possibilities to use NCA to compile accounts for water-related ecosystems. In the same way that national accounts are considered essential for guiding policy and decisions about the economy, the idea was to explore how information from water-related accounts could be used to inform decision-making and guide investment in the water, development finance and environmental sectors.

Demonstrating feasibility

The starting point to demonstrate the feasibility of producing regular accounts was to assess and strengthen the available data on water-related ecological infrastructure.

The EI4WS project supported the finalisation of a fine-scale delineation of strategic water source areas (SWSAs) for surface water. Working with the SANBI Freshwater Biodiversity Programme, it invested in refinements to available data layers for rivers, wetlands, riparian areas, local water source areas and catchment recharge areas (that contribute to river and wetland base flows). Data for accounts need to be spatially explicit and in a time series (data on the same feature at successive times) to be able to report change over time.

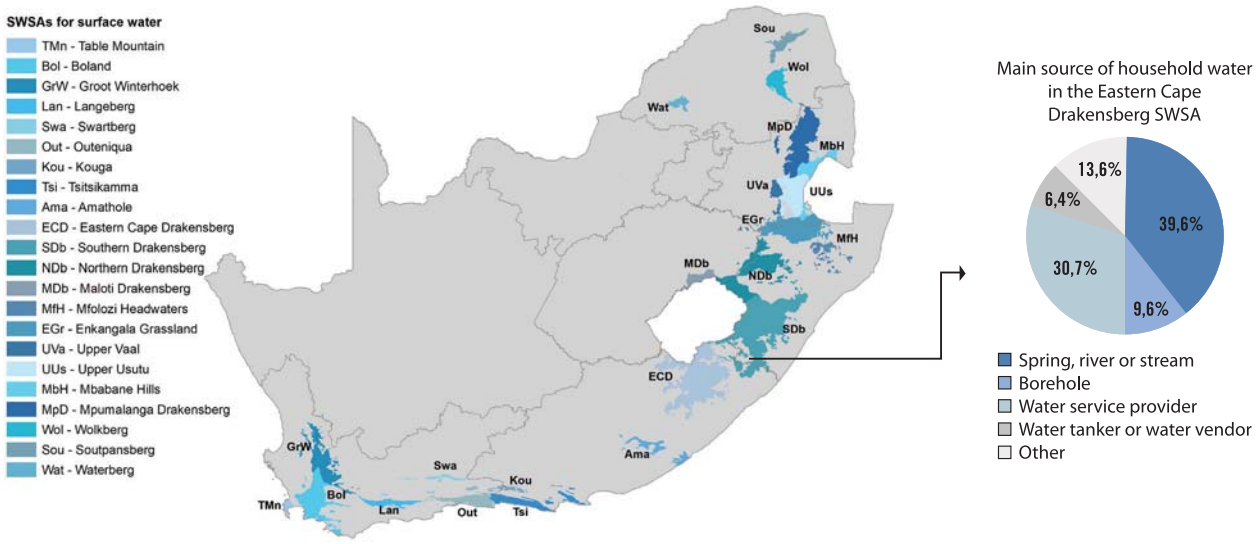
SWSAs are the 10% of the land area of South Africa, Lesotho and Eswatini that supply 50% of runoff to these countries. They are a form of national ecological infrastructure that supplies water to half of the nation's population and two thirds of economic activity. The accounts for SWSAs track changes in land cover and protected area extent for all 22 SWSAs for surface water over 30 years, from 1990 to 2020 over four accounting periods. Compiled nationally, these accounts help to integrate socio-economic and environmental information. The accounts include profiles of the biomes and municipalities within which SWSAs fall, and population statistics such as the number of households sourcing most of their water directly from springs, rivers or streams[1].

A liquid ledger with an ecological perspective

More experimental accounts were compiled at a catchment level. Sub-national Water Resource Accounts offer a comprehensive understanding of water dynamics for an accounting area as a whole and per quaternary catchment. They shed light on the intricate relationship between land cover and water resources.

The Breede catchment in the Western Cape serves as a microcosm of the dynamic nature of water resources. Over the span of six hydrological years, the catchment witnessed fluctuations in water balance, with the lowest recorded during the drought of 2016 – 2017 and the highest in 2020 – 2021. These shifts, driven by variations in precipitation and evaporation levels, underscore the sensitivity of water storage dynamics to

[1] Main publication page for Accounts for Strategic Water Source Areas, 1990 to 2020 D0401.3 (https://www.statssa.gov.za/publications/D04013/D040132020.pdf)

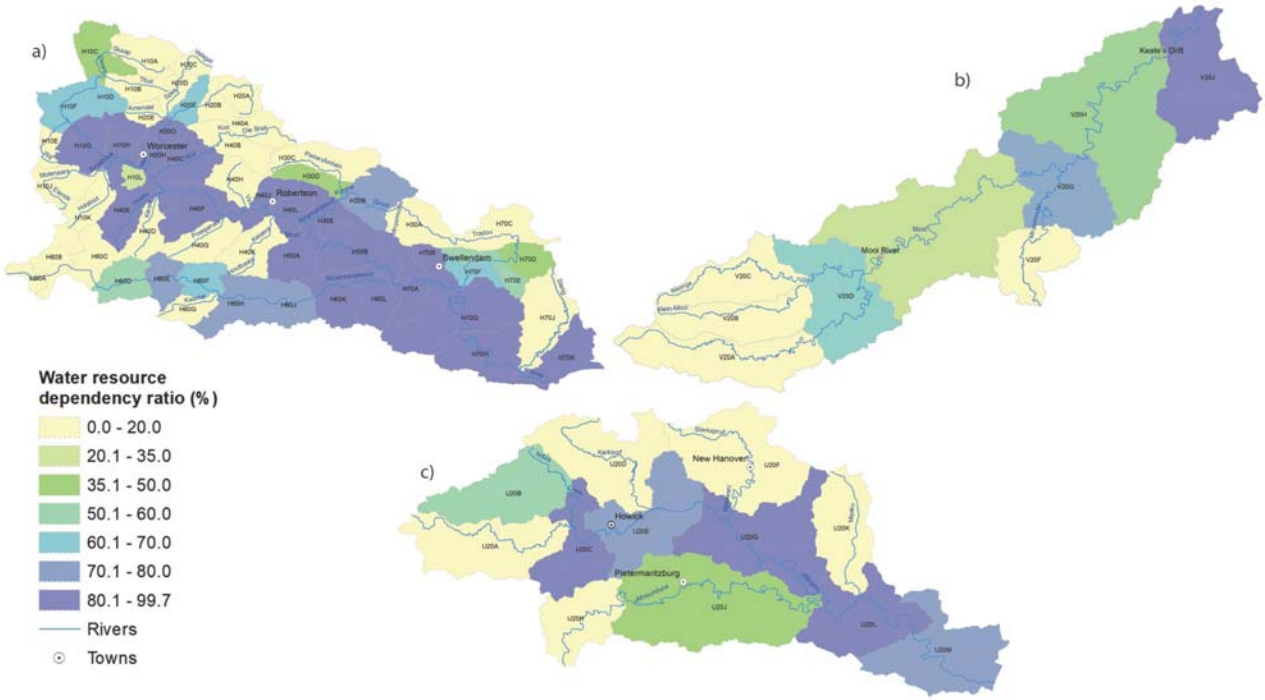


Refined spatial data was the basis for the Accounts for Strategic Water Source Areas (Stats SA, 2021).

climatic conditions. Similar patterns of variability were echoed in the uMngeni catchment in KwaZulu-Natal. Even in high rainfall years, the catchment required inter-catchment transfers from the Mooi catchment, underscoring its reliance on external sources to sustain water resources.

High evaporation is characteristic in South Africa, but differs across land cover types. For instance, cultivated land covers 28.5% of the Breede catchment, but accounts for a disproportionate share of total evaporation, ranging between 31.3% and 34.7% in different accounting periods. This highlights the need to consider land use patterns in water resource management and promote water efficient farming and irrigation practices.

These accounts meet the need for a new generation of water-related accounts that include an ecological perspective, and link water, land, ecosystem and socio-economic information.



Indicators such as the water resource dependency ratio indicate how dependent a catchment is on external water resources, with implications for catchment management and development planning.

Ecosystem accounts of water-related ecological infrastructure were also compiled at a catchment level. They provide further insight into the extent and condition of the wetlands, rivers and riparian areas that play a role in water retention and recharge, flood attenuation, and other water-related ecosystem services.

Combining information from these different accounts gives a spatially explicit picture of where the ecological infrastructure is degraded, thus compromising the supply of water to dependent catchments downstream. These give insights into future potential risks and implications of water scarcity.

Collaborative social and technical processes

The process of compiling natural capital accounts proved to be equally, if not more, important than the data and methods used. Inherent in the NCA work was the facilitation of social processes through which data providers, account compilers, and users of information from accounts could engage collaboratively. The process included technical working groups for each set of accounts, validation workshops with broader stakeholders and small group meetings with experts. Presentations were given to relevant communities of practice – even at a global level. This informed the evolution of methods, presentation of results, interpretation of findings, and quicker uptake of the information once released.

The information from the Accounts for SWSAs was immediately taken up by the Department of Forestry, Fisheries and the Environment (DFFE) in allocation plans to secure SWSAs. This is an example of information from accounts enabling policy, planning and decision-making in favour of ecological infrastructure. This outcome can be ascribed to the fact that individuals from DFFE were included as members of the technical working group and part of validation workshops. They had time to understand the data inputs, methods and results, which meant that by the time the accounts were released, there was both trust in the output and an understanding of the account tables.

Accounting tables can be difficult to understand, and it can be hard to interrogate the underlying data to extract the information needed for a particular user or decision. Learning from accounts compiled prior to the start of the EI4WS project, particular attention was put to describing the accounts, identifying indicators, presenting results and communication. Each set of accounts was accompanied by a data story, key findings, news story and PowerPoint presentations that highlighted key messages about ecological infrastructure for water security.

Building capacity from multiple perspectives

Capacity to produce natural capital accounts and then apply the information in planning, decision-making and management was minimal before the EI4WS project. Building on earlier work, the EI4WS project built capacity in several ways. Already mentioned were the social processes that enabled learning-by-doing. Access to relevant training opportunities was also supported. The NCA team worked to document information resources to support capacity. They also contributed to learning opportunities organised by the United Nations Statistical Division and Africa NCA Community of Practice by giving input to online course materials and participating in webinars. National NCA Forums, hosted by Statistics South Africa in partnership with SANBI and DFFE in 2020, 2022 and 2024, also helped build capacity in a broader group of stakeholders.

New capacity for NCA in South Africa was created through the involvement of young professionals through internships. The involvement of youth added unforeseen value to every aspect of the NCA work. Young, inquisitive minds involved in the co-creation of the accounts inspired some fresh perspectives on interpretation, brought in additional skills, and highlighted areas where we could be clearer about what we were doing and why.

Aimee Ginsburg, SANBI

Increasing capacity for natural capital accounting by involving young professionals.

Value created and transformative potential

Lessons learnt in developing accounts for water-related ecological infrastructure and exploring the use of that information are a key output of the EI4WS project. This was innovative work using a globally emergent approach, through which South Africa has contributed to global knowledge and has emerged as a leader in NCA. It was possible because of the strong partnerships and inputs from many other entities and expert consultants. NCA is multi-disciplinary, cross-sectoral work that does not happen without collaboration.

The NCA work benefitted from the layering of successive investments of three donor-funded projects, with the EI4WS project being the third. This saw not only a continued investment and evolution of NCA but allowed for continuity of capacity across projects, which nurtured relationships of trust, institutional learning and memory over years. The transformations needed to institutionalise NCA, build capacity, increase uptake, and regularly produce accounts do not happen quickly. They also do not happen without investment in permanent capacity in the institutions that compile accounts. Given South Africa's budget cuts in the current economic climate, donor-funded projects will remain important to the future of NCA.

Data gaps and constraints that were found point to areas that need further investment in the future. Such investments would have large returns because these datasets have multiple purposes – not only compiling accounts, but also as inputs to ecological infrastructure investment plans, development planning and catchment management plans to name a few.

What is abundantly clear, is that the value created through the NCA work is manifold. Accounts are a source of information that support reporting, planning and can feed into policy and decision-making processes. The value of NCA as a mainstreaming tool has been recognised at the highest levels. At the launch of the Accounts for SWSAs during the Biodiversity Economy and Investment Indaba, President Ramaphosa highlighted the role of NCA in recognising and quantifying the value of natural resources, contributing to sustainable development and job creation.

RESOURCING ECOLOGICAL INFRASTRUCTURE INTERVENTIONS

Mainstreaming biodiversity and ecological infrastructure into the finance sector

The Ecological Infrastructure for Water Security (EI4WS) project serves as the first time that the Development Bank of South Africa (DBSA) has played the role of an implementing entity for a project funded by the Global Environment Facility. Their mandate as a development finance institution has meant that the areas of focus and envisioned benefits have directed where emphasis is placed throughout project implementation. The central area of relevance is the degree to which the project can shift the understanding in the finance sector of the importance of investing in ecological infrastructure. So reports Alex Marsh.

The EI4WS project developed a working relationship with the ENCORE partnership. ENCORE is a world-leading collaboration that aims to understand how the economy depends and impacts on nature. A second partnership was with the French Development Agency, which had been exploring the possibility of recreating a study they had conducted for France titled 'The Silent Spring' (2021). The study used the ENCORE model to explore the biodiversity-related financial risks in France.

It was agreed to co-develop a similar working paper on nature-related risks and opportunities in South Africa. The French Development Agency provided the full-time expertise of a macro economist. The EI4WS project provided spaces for consultation, technical expertise from the National Biodiversity Assessment and relevant spatial biodiversity data. A series of consultations were held with stakeholders, spatial experts and biodiversity planners to ensure that the right data was used and interpreted in an appropriate manner.

A draft of a large and technical working paper was developed, covering 150 pages, including a 60-page methodology section that focused on being explicit about the approach followed. The draft was reviewed by relevant stakeholders and working groups. Important discussions were held around what the purpose of the working paper was, what kind of product was needed for the work to be accessible and policy relevant. A need was identified for a suite of products for various audiences.

Communicating the results and feedback received

The emerging work was presented at the Conference of the Parties of the Convention on Biological Diversity in December 2022. The presentation showed the way in which this work fits into the global discourse around nature related risks, dependencies, impacts and opportunities. The development of the presentation helped to refine how to communicate key elements with a broader audience. It also helped to establish conventions around what to emphasise, and how.

A series of South African focus group sessions and workshops were held with participation from stakeholders such as SANBI's Natural Capital Accounting team, DBSA, National Treasury, Statistics South Africa, International Monetary Fund, Department of Forestry, Fisheries and the Environment, Water Research Commission and the South African Reserve Bank (SARB). In addition, this work was presented to a core contingency of Business Unity South Africa, who as a result introduced it to the National Economic Development and Labour Council (NEDLAC). Several indications of support and recommendations emerged from the engagement.

DBSA, SARB and National Treasury indicated their support and interest in the approach, noting that the approach is aligned with their focal areas. Recommendations included the importance of emphasising the dependency on ecosystems, as well as the need to bring the business sector along in the engagement process. The need to be clear on the policy environment in South Africa and the application of the work was also emphasised.

In addition, there was a call to build a clear case for investment in strategic water source areas to reduce water-related risks downstream from these areas. The need to make the linkages to climate adaptation as clear as possible was reiterated. It was also noted that the manner in which this work is packaged, and the language used in communicating its possible implications, will be key to developing the necessary traction. A country report and sector specific policy briefs were noted as useful mechanisms to follow the technical working paper.

This work is also being discussed with the DBSA with the intention of ensuring that the relevant outcomes are sufficiently translated and taken up in the development finance sector.

Emerging outcomes

As a result of the first phase of the work, further invitations have been unlocked to present the work to a wider range of financial sector institutions. The expanding partnership with the French Development Agency has been one of the most generative outcomes of the development of the knowledge product. At the time of writing, a funding proposal was in development for phase two of this work. The partnerships built, data analysis, and the language that has been used has been fundamentally informative for the way that SANBI engages with the business and finance sectors going forward. The box below presents a snapshot and first-hand account of how this work is starting to become internalised by the DBSA.

How DBSA has internalised nature-related risk and opportunity (A reflection by Julie Clarke, DBSA)

DBSA is grateful for the opportunity to actively engage in the above work. The study demonstrated how ENCORE (and other available tools listed in the International Development Finance Club (IDFC) Biodiversity toolkit) can be used to the benefit of assessing the national macro economy. The above study focused on risk and vulnerability of various sectors, including the banking sector at a national level. It helped to highlight how risks could be framed and articulated, and how opportunities could be motivated and pursued. This is particularly relevant to a development finance institution such as DBSA.

In assessing the DBSA loan book, we drew on some of the components from the study and applied it to DBSA corporate risk. It saved DBSA duplicating the effort to apply a similar process. For example, by adapting the study we arrived at our own heat map of vulnerability. It is both immensely satisfying and enriching in sharing how various banks and organisations are using frameworks by the Task-Force for Nature-related Financial Disclosures (TNFD), IDFC and World Wide Fund for Nature (WWF) and other toolkits, and to all learn together. WWF for example were also key in developing a practical user-friendly analytical tool called the Water and Biodiversity Risk Filter which DBSA found extremely helpful in assessing our loan book.

The SANBI led partnership with AFD also offered everyone an opportunity to participate and input into the macro-economic study. This was important to establish a meaningful collective process and outcome. SANBI was instrumental in developing maps and metrics for baselines on which all these tools depend. SANBI also helped to share the work through numerous expanded networks and finally to help write up the findings in an excellent user-friendly document. Much of this work fell under the umbrella of the Ecological Infrastructure for Water Security project (a GEF DBSA/SANBI supported initiative). The collective team of people who produced the study, led by AFD and SANBI, were always ready to share knowledge at many meetings with finance institutions. More recently AFD and DBSA shared a platform at the Forum on Scaling Sustainable Finance in South Africa 2024 which was organised by 30 by 30 Zero, the World Bank, and the Banking Association of South Africa.

This particular study together with work driven from within DBSA using the ENCORE tool, the WWF Water and Biodiversity Risk Filter, a range of other tools from the IDFC toolbox and TNFD guidelines helped DBSA arrive at a draft Integrated Biodiversity Strategic Framework.

A summary of lessons learnt in DBSA's nature journey and its quest to align with TNFD can be found in a white paper titled, ***Case Study on Nature Data: a DBSA Report.***

Click link. https://bit.ly/4g13626

WATER USE AUTHORISATIONS

Improving the setting of conditions for water use authorisations in the Breede-Olifants Catchment Management Agency

Despite the requirement of the National Water Act (Act 36 of 1998) to establish catchment management agencies (CMAs) in each of South Africa's water management areas, only two are functional with a third being established in 2024. One of these is the Breede-Olifants CMA. Article by Elkerine Rossouw.

A CMA is a Schedule 3 entity of the Department of Water and Sanitation (DWS) delegated to provide advice, monitor, manage and control water resources for stakeholders in the catchment. With the establishment of the Breede-Olifants CMA in catchments previously managed and controlled by the DWS, much institutional knowledge was not transferred to the CMA staff. This was further exacerbated by the fact that delegations in terms of the National Water Act were only handed over to the CMA as it grew over time.

Initially, the new CMA needed to find a foothold and establish its own identity within the catchment that would set it aside from the already established provincial office of the DWS. The identity was needed to allow CMA staff to assume responsibility both in the private and public sector engagements where previously a DWS employee would have been the link between government and the people.

The CMA started to play an active role in the issuance of water use authorisations in 2012 when staff from the CMA began to work alongside the DWS staff. The project aimed to fast-track a backlog of licence applications through joint baseline evaluations of applications and drafting of letters to applicants. The licencing process has since become a lot easier to manage, monitor and control with the implementation of the online web portal for the submission, processing and authorisation of water use applications (e-WULAAS).

Understanding the catchment

When the licencing process was extended to include the officials within the CMA, the consideration of the applications fell to different people, with different backgrounds, working in an unfamiliar catchment. Initial assessments of licencing involved a lot of research to find information on the current status of the catchment from across different entities, units etc. Existing information is needed to gauge the various options in a specific catchment during considerations of water use authorisations.

The DWS database consists of studies and publications such as the Resource Quality Objectives and Reserves. The Water Allocation Resources Management System provides baseline information on water uses registered within a catchment. But this information may be incomplete, unverified or outdated due to landscape changes.

The scattering of information across different sources causes gaps in the knowledge and understanding of a catchment. It is unclear where the water resources of different irrigation boards or water user associations sit in the landscape, or the reticulation of the water within these schemes (such as pump stations, open channels, piped conduits etc.). Add to this the many previously authorised water uses within the landscape and only then will you start to understand the cumulative impact that licences may have within a landscape. These gaps lead to additional time needed to understand the basic background of a water use authorisation application and to make an informed decision.

The dawn of electronic in(ter)ventions

The Berg-Breede catchment was one of the demonstration catchments of the Ecological Infrastructure for Water Security (EI4WS) project. The project took a spatial approach to understanding the biodiversity and ecological infrastructure of the catchment. The same types of methods could also be used to better capture data in the water sector. The project made available a young professional to be placed within the offices of the CMA to develop GIS maps to capture and update a range of information on water source areas, river maintenance plans and more. The team was then able to add layers of approved water use authorisations in the catchment, as well as the layers of properties serviced by irrigation boards and water user associations.

During the same period CapeFarmMapper® became more popular for use within the Western Cape. It allows water use officials easy access to spatial information for biodiversity,

environmental and water resource aspects that should be considered during water use authorisations.

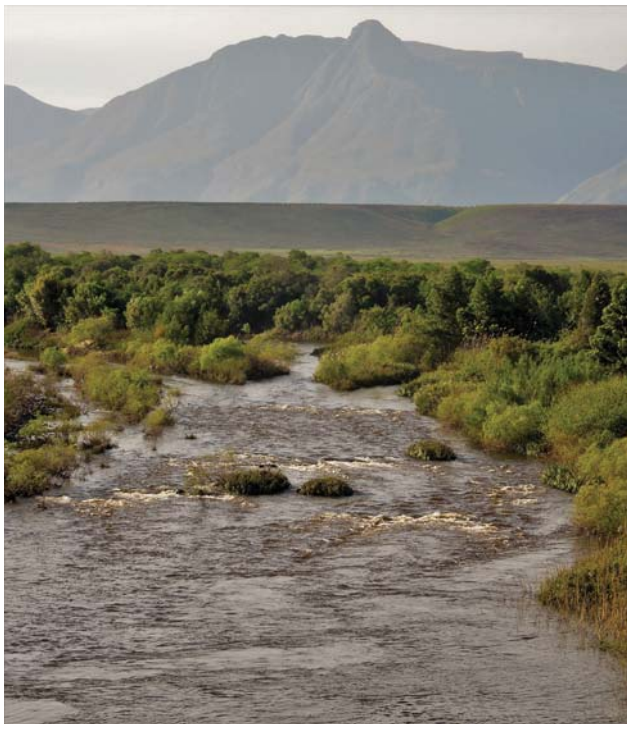
A pilot area to test the mapping

The project started with the basic question – Where have authorisations been approved in the catchment? It then triggered other questions: How do we map them? How do we show the different types of licences? and How can we differentiate between the ages of these licences with visual aids such as maps?

To answer these questions, a pilot catchment was chosen to provide a test case. The H10 catchment falls within the Boland and Groot Winterhoek strategic water source areas in the Western Cape and is part of the catchment management by the Breede-Olifants CMA. The Ceres Basin is considered the 'roof' of the Breede River catchment and has several irrigation boards abstracting water from three of the main streams and supplying the water to different areas within the catchment. The larger of these schemes is the infrastructure for the Koekedouw Dam, which supplies most of the North-Western area of the Ceres Basin as well as the drinking water for the towns of Ceres and Prince Alfred's Hamlet in the Witzenburg Municipality.

Authorisations were tabulated and colour coded in such a way that it would be easier to view the type of licence. Water use authorisations can be for a singular water use or could have various water uses mixed together. The data were then developed into a GIS layer that could be imported into CapeFarmMapper®.

Konstantin/Flickr



The Breede River.

Some of the challenges encountered during the mapping included assisting non-GIS people to understand the colour-coded information when working with the map. There were also challenges associated with retrieving information, especially for authorisations approved a long time ago, which have incomplete information. GIS files were not always available for the pipes and canals of the various irrigation boards.

Cumulative impacts

With the development of the GIS layers, information could suddenly be interpreted in a cumulative way. It allows an assessor to "visualise" the authorisation while assessing it, but more importantly allows for a better pre-assessment of conditions on the ground before the authorisation process commences. The development of these amalgamated data sources also sparked some more fundamental questions. In more than 20 years of water licencing in these catchments, what has been the cumulative impact on the environment? To what extent can water resources be managed going forward?

The Breede-Olifants CMA has embraced the methodology as a way to assist the water use officials that comment on land-use planning processes such as subdivisions, rezonings to municipalities and environmental applications such as the Environmental Impact Assessment Reports for new developments etc. The layers developed will also inform water use licensing processes and water balances of the catchments. This approach may be useful for emerging CMAs who are still developing their own systems, and may assist in accurate and effective licensing.

PLANS AND PROCESSES

Building a resilient environment through river maintenance and management plans

The Berg-Breede catchment in the Western Cape is no stranger to severe drought and flooding. These extremes are made worse by climate change and human practices in the landscape. The change in climate causes an increase in the frequency and intensity of rainfall and results in larger volumes of water being discharged downstream. Major flooding between 2018 and 2023 led to the destruction of road and agricultural infrastructure, human settlements and loss of lives. Article by Ndzolo Bam.

River maintenance and management plans are a proactive response to improve safety measures from extreme weather events. They are a set of activities to be implemented to ensure that the ecological infrastructure of rivers is maintained and restored. By strengthening the ecological infrastructure, downstream communities are better protected against floods and droughts.

In the Berg-Breede catchment, river maintenance and management plans have been implemented in different river stretches to reduce the impact of flooding and improve the resilience of surrounding communities. They also provide a framework for decision-making. Developing and implementing these plans will ensure collaboration between organisations, farmers, communities and landowners to ensure the river ecosystems are rehabilitated[2]. The plans not only play a role in climate change adaptation but also increase environmental awareness and provide an opportunity for capacity development in organisations.

Youth involvement builds capacity

The EI4WS project, as part of its commitment to actively involve young professionals in various social and technical processes, engaged the project's GIS interns in the mapping for the plans. The interns were responsible for mapping the locations of authorised environmental impact assessments (EIAs), basic assessments, and the related river maintenance and management plans with their associated river reaches. The EI4WS interns were also responsible for cleaning the data before sharing it with stakeholders. The mapping captured the attention of a range of stakeholders in the Berg-Breede catchment, including provincial government, catchment management agencies, water user associations, irrigation boards and other interested parties.

Challenges experienced during the mapping

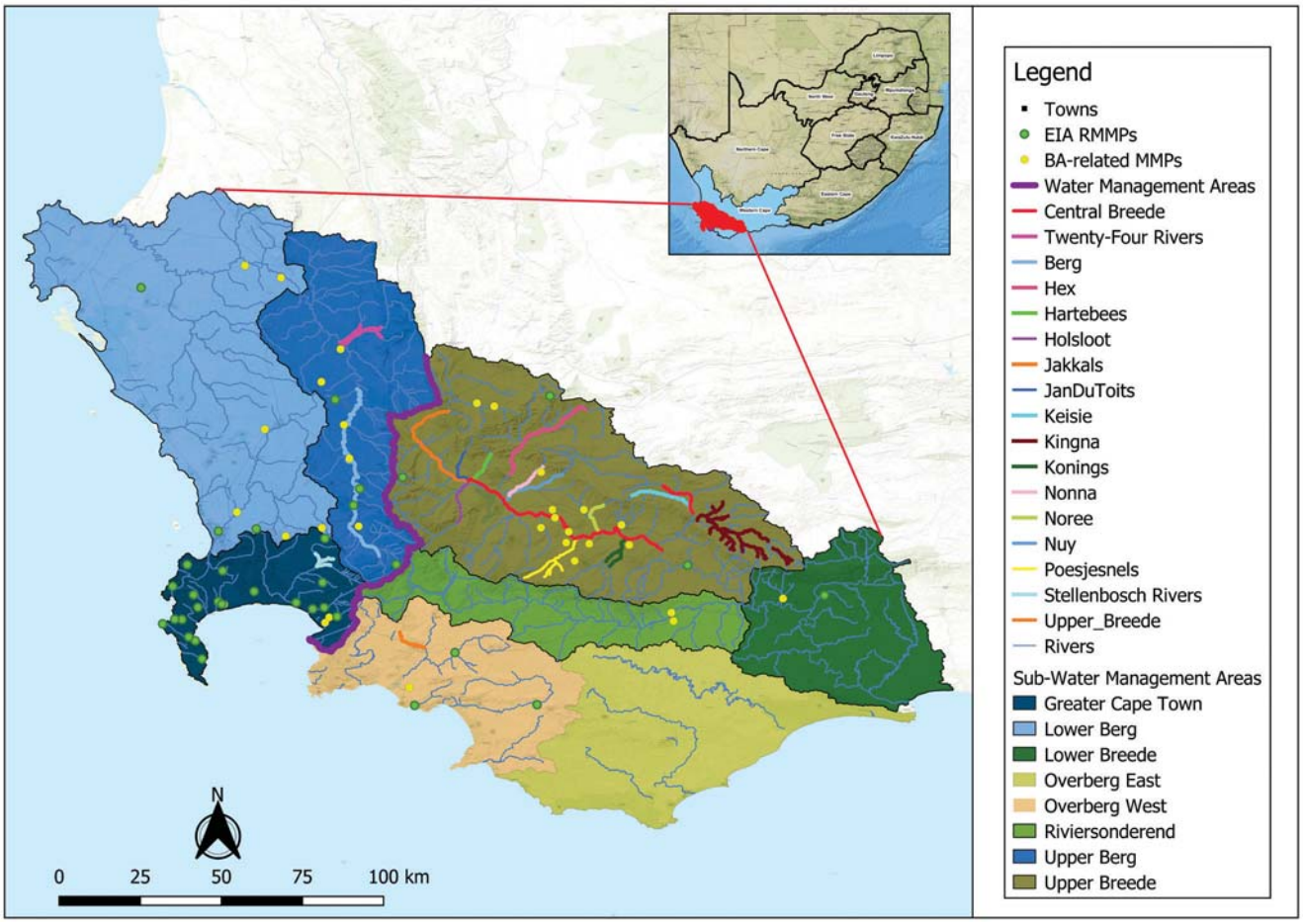
The main challenge encountered during the mapping process was the lack of sufficient details about the project locations of the river maintenance and management plans associated with EIAs. The issue was discussed during the stakeholder engagements. One of the suggestions was for the provincial department to maintain a database system for collecting and storing the data in a structured way.

The results were maps of river reaches where river maintenance and management plans have been implemented, as well as a technical report highlighting the mapping process and stakeholder participation. However, it was recommended that the EI4WS project addresses the limitations of the river maintenance and management plan process and explores options for effective national implementation in the future. It proved that additional GIS capacity is needed to enhance the spatial layer and incorporate biophysical and ecological conditions of sites before and after approval of the river maintenance and management plans. The ultimate goal is to better monitor the implementation of the plans, to promote evidence-based decision-making and facilitate learning.

Creating awareness through engaging communities

River maintenance and management plans can help landowners develop their property in a climate-resilient manner. However, the implementation of the plans sees limited participation from community members and farmers, as a result of a general lack of transparency and poor communication between agricultural

[2] Belcher, A. & Grobler, D. 2022. Assessment of River Management and Maintenance Plans within the Berg-Breede Demonstration Catchment of SANBI's Ecological Infrastructure for Water Security Project.



Mapped river maintenance and management plans and their related river reaches associated with environmental impact assessments and basic assessments in the Berg-Breede catchment.

practitioners, landowners and government agencies. This results in delays in implementation that increase the catchment's vulnerability to climate change and loss of ecological infrastructure.

Raising awareness about river maintenance and management plans through community engagements is crucial. It begins with identifying and involving all key stakeholders within the community, from residents, farmers and environmental groups to government agencies. Through educational workshops and regular community meetings, the significance of preserving and restoring our river systems can be communicated. Building transparent partnerships with relevant organisations and advocating for supportive policies at various levels of government further amplifies the community's impact. Establishing feedback mechanisms ensures that concerns and suggestions are heard and addressed promptly. In the long run, the sustained dedication of the community is essential for the successful preservation and management of our precious river ecosystems.

The journey towards effective river maintenance and management through community engagement is a collective effort that holds promise for the environment and society. Collaboration between communities, farmers, environmental organisations and government will promote the long-term health and vitality of rivers. The effective implementation of river maintenance and management plans further promotes sustainable practices that seek to benefit livelihoods, promote the protection of ecological infrastructure and improve water security within priority catchment areas.

CATCHMENT MANAGEMENT STRATEGY

The development of an interim catchment management strategy for the Pongola-Mthamvuna

The National Water Act (Act 36 of 1998) provides the basis for the establishment of catchment management agencies (CMAs). CMAs are statutory institutions that guide water resource governance at a local level. They represent the interests of water users, businesses, environmental interest groups, as well as local and provincial government within their defined water management areas (WMAs). So writes Nontutuzelo Gola.

The intention is that CMAs serve as an institutional space for collaborative planning, allocation and management of shared water resources. They promote community participation in all aspects of water resource management. The CMAs are also responsible for revenue collection from water users. However, only two CMAs had been operational by 2024, with the remaining four coming online this year. The slow progress in establishing CMAs two decades after the ratification of the National Water Act has left a significant institutional and governance vacuum for South Africa's water resource management at the catchment level.

The National Water Act also requires CMAs to develop catchment management strategies. A catchment management strategy (CMS) is a statutory document that provides the vision and strategic actions for integrated water resource management in the defined water management area. According to the Act, the CMS must be developed progressively with engagement of stakeholders and interested persons to seek cooperation and agreement on water-related matters.

Nontutuzelo Gola; SANBI

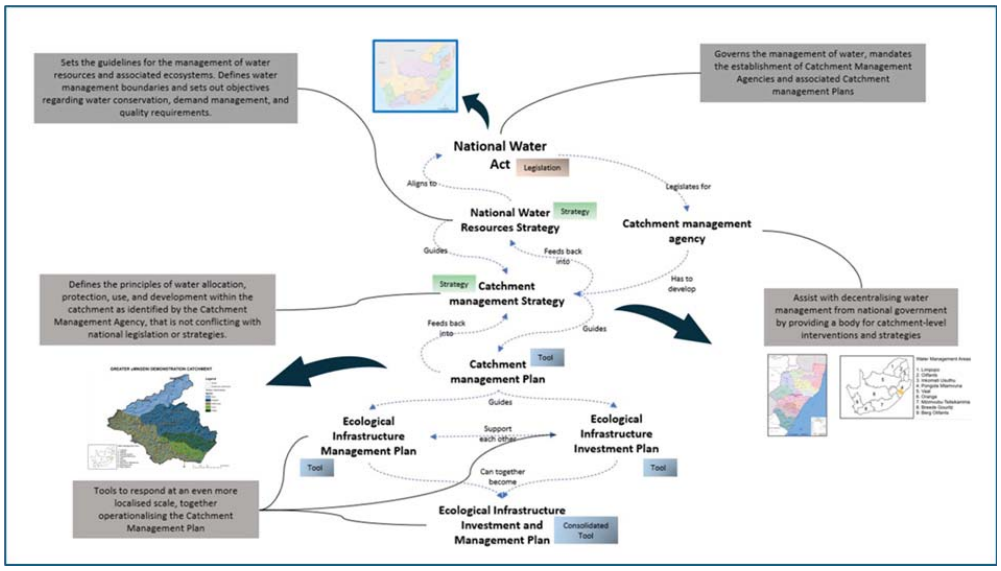


Diagram showing the alignment of ecological infrastructure management with policies and strategies.

The Pongola-Mthamvuna water management area

The Pongola-Mthamvuna is one of the largest water management areas in terms of surface area. Its boundary almost aligns with the provincial boundary of KwaZulu-Natal. The area comprises significant catchments that supply water and support the economy of not only KwaZulu-Natal, but other provinces such as Gauteng. The Pongola-Mthamvuna CMA was established in 2014 and operationalised in 2024.

In 2019, the CMA took the initiative to start developing an interim CMS. This would help to guide water resource management until the

CMA is fully functional. The interim CMS would define the main objectives and strategic themes to support implementation of water resource management in the water management area. The CMA then embarked on iterative engagement with diverse stakeholders across the area.

This process afforded stakeholders an opportunity to give input to the draft interim CMS, and hear different voices from science, policy, communities and organisations. Importantly, this approach enabled the CMA to take the lead in developing the interim CMS rather than relying on a service provider to facilitate the process. In the spirit of collaboration and partnership, the CMA also used existing networks and platforms to reach a wide range of stakeholders. Partnerships with national and international organisations were instrumental in maximising on collective human capacity, technical expertise and financial resources during the process.

The involvement of the Ecological Infrastructure for Water Security project

One of the objectives of the Ecological Infrastructure for Water Security (EI4WS) project was to enhance organisational capacity and investment in ecological infrastructure for improved water resource management in the greater uMngeni catchment. The EI4WS project actively applied the principles of social learning, which included efforts to build networks, convene discussions, engage tensions and share learning. The project was able to bring these principles of social learning to its involvement in developing the interim CMS.

A key platform for the advancement of this work has been the uMngeni Ecological Infrastructure Partnership (UEIP), which is a multi-stakeholder partnership that consists of government, business, civil society and academia, who collaborate to maintain and restore the ecological infrastructure of the greater uMngeni catchment. The UEIP played a crucial role in contributing to the development of the interim CMS by ensuring stakeholders were engaged intentionally and meaningfully. The involvement of the UEIP also meant that the concept of ecological infrastructure could be integrated into the interim CMS, in line with other key water sector policies and plans. The EI4WS project supported the continued functioning of the UEIP by contributing financial and human capacity to its co-ordination office. In turn, the UEIP played a pivotal role to convene stakeholder workshops and bring in key participants to contribute their expertise into the process.

The EI4WS project also provided additional capacity through the Pongola-Mthamvuna Ecological Infrastructure coordinator. The coordinator worked closely with the KwaZulu-Natal Department of Water and Sanitation and facilitated engagements with municipalities. Aligning across local and provincial government helps to create practical pathways to integrate the management of ecological infrastructure across sectors. This helps to ensure information flow for the efficient allocation of resources to manage ecological infrastructure.

Results and benefits of the interim catchment management strategy

The process of developing the interim CMS was highly participatory. Facilitation was carefully designed to promote collegiality, inclusiveness, ownership and advocacy for integrated catchment management across the water management area. It is intended that this approach is now an example of how CMSs can be developed in other parts of the country.

Catchment management is intended to be in accordance with the principles of integrated water resources management. Integrated water resources management is about collaborative governance that allows many different views of the demands and pressures on the catchments. It recognises that catchments are often unique in their ecological characteristics, landscape patterns and societal demands. It is therefore expected that stakeholders from each catchment will contribute different expertise and experiences. The process was also a capacity development opportunity for all involved. In contrast to a strategy developed by a service provider, the capacity has now been developed directly within the organisations and partners who will be responsible for implementing it. Involving stakeholders throughout the process has increased ownership of the strategy by water users.

CMAs are also responsible for collecting revenue from water users. The development of the interim CMS allowed the opportunity for stakeholders of the uMngeni catchment to be involved in the revision of the National Water Pricing Strategy. This strategy sets the framework for water tariffs for the recovery of costs associated with the management, use, conservation and development of water resources. An important aspect is to include the costs related to the management of ecological infrastructure directly into the raw price of water.

The process of developing this interim CMS has demonstrated a stakeholder-driven approach that was well received by catchment partners. It has also led to a representative framework that will lead to increased collaboration in its implementation.

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Comprehensive engagements were critical to ensuring a co-produced interim Catchment Management Strategy that considers the views of all stakeholders and that could be adopted and implemented by the newly established Catchment Management Agency.

LEARNING, SHARING AND REFLECTING

Learning weeks: A valuable tool to empower institutions involved in policy advice

There are several institutions whose mandate includes giving advice towards the development of policy. Policy advice is understood to mean advice on, or support for, the development of laws, regulations, norms and standards, strategies, frameworks, plans, guidelines and more. So writes Nombulelo Ntongolo.

The South African National Biodiversity Institute (SANBI), for example, has a responsibility to advise on the consideration of biodiversity in the policy of other sectors. The Water Research Commission (WRC) plays a role in bringing scientific evidence into the policy of the water sector. The work of a policy advisor can have an important influence on the policy direction of the country. However, the role is often poorly defined, spread across organisations, or combined with other roles. The capabilities required for an effective policy advisor, including negotiation, relationship building, attention to detail, contextual knowledge and communication, are most often learnt through experience.

Recognising that policy advice is a role that requires unique and often rare capacity, SANBI began to hold regular Policy Advice Learning Weeks. These workshops were designed for individuals within the organisation whose work brings them into contact with policy. They offered the opportunity to build capacity and strengthen the practice of policy advice in the organisation. The Learning Weeks are a space for continuous learning for policy advice practitioners within SANBI and beyond. They also provide ways to communicate the idea of policy advice internally and to make the work visible and accessible across the organisation. Additionally, the Learning Weeks help to empower young professionals and bring new capacity into the work of policy advice.

The Policy Advice Learning Weeks also dedicated time for policy advisors to reflect on their practice, assess their own strengths and areas for improvement, and develop strategies for enhancing their skills and performance.

Facilitating the Policy Advice Learning Weeks

Policy Advice Learning Weeks were held over three to four days with an experienced facilitator. During these weeks, policy advice practitioners engaged in meaningful discussions about the practice of giving policy advice. The Policy Advice Learning Weeks were conducted using transformative social process facilitation. This is an approach that emphasises inclusivity, collaboration, shared learning and reflection. All participants were encouraged to share their viewpoints and insights. The sessions were often interactive and involved collective responses.

A crucial element of the Policy Advice Learning Weeks was working on current, real-world policy examples aimed at influencing governance. These examples were derived from the experiences of policy advisors who were currently leading in the development of the policy comments. For example, at one week the participants looked in detail at the National Water Pricing Strategy. This allowed current policy advice practitioners to share their approaches, tips and techniques with others. Experts in certain topics, such as legal specialists, were also brought in to provide specialised information. The exposure to diverse viewpoints broadened the participants' understanding of complex issues and encouraged critical thinking.

The Policy Advice Learning Weeks also dedicated time for policy advisors to reflect on their practice, assess their own strengths and areas for improvement, and develop strategies for enhancing their skills and performance. Through self-reflection exercises, the participants were able to identify gaps in their knowledge or practice, set personal development goals, and work towards continuous professional growth.

An interesting part of the Policy Advice Learning Weeks was the efforts to sketch a diagram of the policy advice system. Developing across the successive Learning Weeks, the diagram sought to capture the institutions, policies and platforms that formed the policy advice systems of the biodiversity and water sectors. This method can be used by any institution that plays

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Development of a diagram of the water and biodiversity policy advice systems from collaborative inputs across various Policy Advice Learning Weeks.

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Discussion groups at one of the workshops.

a policy advice role to better understand the spaces they are working in as well as pinpoint areas they aspire to engage with.

Sessions dedicated to sharing case studies allowed participants to reveal their experiences and the challenges faced by the local communities or implementers in particular areas. These examples helped the group to identify policy problems and implementation challenges where further policy advice could be focussed. Together, through a collective learning process, participants were able to come up with strategies to address the issue.

Impact of Policy Advice Learning Weeks

The Policy Advice Learning Weeks offered a range of benefits, including knowledge sharing, reflective practice, collaboration, exposure to diverse perspectives, peer learning, organisational learning, and institutional development. By investing in this kind of platform, policy advise institutions can improve the quality and effectiveness of their policy advice, ultimately leading to more informed and impactful policy.

The Policy Advice Learning Weeks have already had a significant impact on individuals and organisations. Participants have a better understanding of their roles in this area of work. They also identified different forms of advice including formal and informal processes, written and relational, inter and intra-institutional. Discussions about defining and mapping the policy advice system helped practitioners to understand the broader context and where they fit into a larger system. The skills and capacities needed to do effective policy advice were better articulated. In a practical sense, the Learning Weeks helped practitioners know how to approach policy documents, where to focus their input and how to think critically.

At the organisational level, Policy Advice Learning Weeks have helped organisations to better understand how and where policy advice occurs. It has increased capacity to provide policy advice in a more co-ordinated manner across and between organisations. Knowledge is transferred from experienced policy advice practitioners to new entrants to the field. An important recognition was that challenges related to governance, update and implementation are just as important as research, evidence and policy advice. A need was identified for ongoing mentorship of new individuals and young professionals.

The platform has improved transdisciplinarity by creating a space for colleagues with diverse views, perspectives, and interests to listen to one another. Given the water focus of the Policy Advice Learning Weeks held thus far, they have improved the understanding of how biodiversity and water policy are interconnected and the importance of co-operative governance between these two related sectors.

Policy Advice Learning Weeks also thus far served to make connections between colleagues working on the ground at local level and those involved in advising national policy. These critical linkages can ensure that policy advice is practical, implementable and incorporates realities on the ground.

The Policy Advice Learning Weeks have become an integral part of SANBI's organisational practice. They provide a structured and effective learning environment, ultimately enhancing an institution's ability to provide informed and impactful policy advice.

SOCIAL LEARNING

The Ecological Infrastructure for Water Security project benefits from a social learning strategy

The Ecological Infrastructure for Water Security (EI4WS) project made a deliberate effort to apply social learning during its implementation. Social learning is a process of collective learning at various interlinked levels of organisation. Its aim is to work towards changing practices and shifting paradigms in a sustainable and impactful way. Roderick Juba reports.

The leveraging of social learning processes is an innovative way of working for large donor-funded projects, where tensions may arise due to the need for immediate and tangible outcomes. The development of a Social Learning, Knowledge Management and Mediation (SLKMM) Strategy for the EI4WS project shows how social learning was envisioned for its application throughout the project, some of the lessons learnt throughout this process, and provides a good baseline for its use in future similar projects.

A project component for social learning

The need for a dedicated component of work around social learning and knowledge management was identified in early project planning. It recognised that a social learning component to the project would 'enhance appreciation of the value of biodiversity and ecosystems for water security'. This recognition developed out of practice within the institutions involved, from lessons learnt in their ongoing work and through previous projects. Elements of a social process way of working had already been implemented long before the formation of a component of work to hold it. During those early stages of the project, these elements were deliberately brought in to guide how engagement processes would be managed in the project.

The Water Research Commission (WRC) was responsible for facilitating knowledge management and social learning for the project. The purpose was to change the way targeted stakeholders and decision-makers in the public and private sectors engage with, think about and integrate ecological infrastructure into water sector planning and finance. Social learning is widely recognised as vital to people-centred knowledge sharing and social change.

The social learning and knowledge management component of work was tasked with managing knowledge and raising awareness to support project interventions, influencing how the project was implemented, and leading to change in behaviour to increase sustainability beyond the project timelines. While these tasks were allocated to a dedicated component of work, they were also adopted as a defining way of working throughout the entire project.

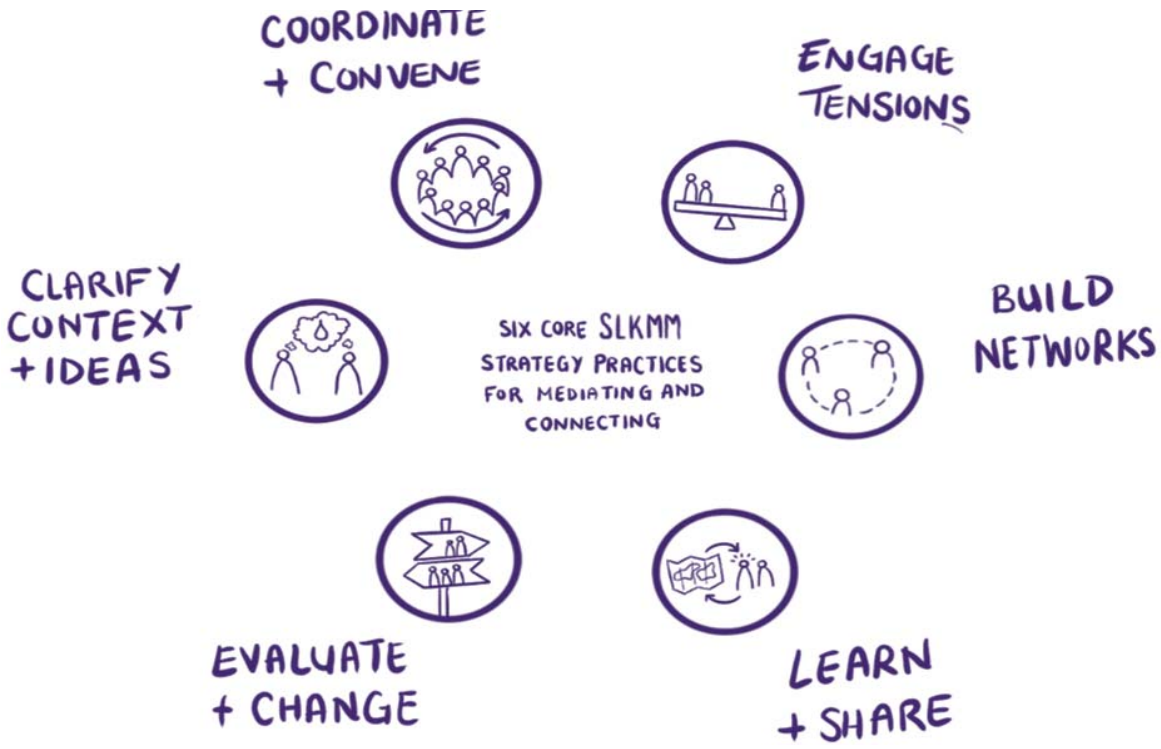
The Social Learning, Knowledge Management and Mediation Strategy[3]

The EI4WS project sought to develop a strategy that would guide its efforts towards social learning and knowledge management. The intention was to create a strategy that avoided the pitfalls of both a predetermined top-down approach, or laissez-faire bottom-up approach. Instead, it provides a well contextualised strategy for ongoing development with people and stakeholders in complex contexts. The SLKMM Strategy was borne out of practice and is a living strategy. The articulation of this approach has enabled the project team to explore the scientific grounding of the approach and created a shared language throughout the project's stakeholder network. Such an approach also helped the project to navigate the unprecedented upheaval of the Covid-19 pandemic. The strategy demanded a response to lessons learnt through implementation throughout the project and build a platform for adaptive management, which is critical in a long-running project.

The Strategy incorporated six core strategy practices for mediating and connecting. The diagram representing these in the strategy took on its own name within the project team and was affectionately known as "***the purple diagram***". Notice how the practices in the diagram are not numbered, as there is no intended sequence to these practices.

The strategy developed a shared understanding of the concept of investing in ecological infrastructure. It explored the origins

[3] Lotz-Sisitka, H., Cockburn, J., Rosenberg, E., le Roux, L., Zwinkels, M., Mbanjwa, W., Ward, M., Brownell, F., Sithole, N., Makhaya, Z., Mponwana, M., & du Plessis, P. (2023). SUPPORTING SOCIAL LEARNING AND KNOWLEDGE MANAGEMENT WITHIN THE ECOLOGICAL INFRASTRUCTURE FOR WATER SECURITY PROJECT (WRC report no. 2988/1/23)



The six core practices for mediating and connecting that underpinned the Social Learning, Knowledge Management and Mediation work of the EI4WS project.

of the concept of ecological infrastructure and its international policy influence, combined with a localisation process led by national institutions and supported by development institutions. The strategy also advocated for more inclusive and participatory democratic decision-making in investing in built and ecological infrastructure. While it is important to highlight financial values, this is not sufficient for assessing value creation and investment decisions, given that government, business and communities depend on a wide range of financial, social and natural resources.

Implementing the social learning strategy

One of the most strenuous asks from the strategy was to engage tensions as and when they arose. Such moments of tension are key for learning. Ironically (but not unexpectedly), the inclusion of a component of work around social learning, and with it the creation of space for collective growth, created its own tension in a project that seeks to deliver on predetermined outcomes. Social learning process is, by design, slow and open-ended.

However, knowledge sharing and co-ownership of practices and processes have to be embedded in project design to such an extent that it can strengthen the agency of those who are working on the ground at a local level. In this way, national interventions like policy changes become more responsive to the lived realities that people experience. The EI4WS project believed in building a collective understanding of shared challenges and responding to those challenges by leaning on partnerships. A great way to do this is through communities of practice. These typically consist of a wide range of stakeholders who get together around a shared objective with the intention to make a difference in their own context. The opportunity for learning is boundless but *"the space is fragile and easily choked by power plays"*. Skilled convening is thus crucial to ensure the best possible outcomes from multistakeholder engagements.

On monitoring and reporting

A crucial part of the Social Learning, Knowledge Management and Mediation Strategy was to report on the learning and

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Creating a safe space for discussion profoundly enhances the quality of outcomes of the engagement.

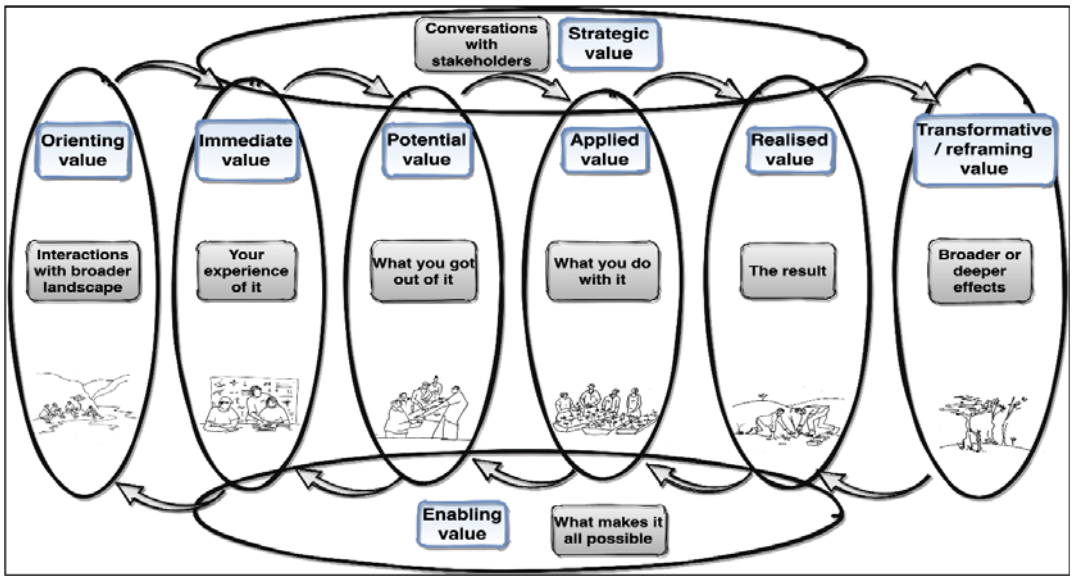
change taking place through the EI4WS project. The overall monitoring and evaluation of the project is strengthened by using a framework to evaluate the value created by the work[4]. The Value Creation Framework foregrounds the qualitative project impacts and positions these next to the quantitative ones. The framework revealed how social learning created value within the project and beyond, by allowing for reflection and continuous learning from successes and failures.

The value-creation framework draws on the idea that learning can happen at any stage of the project and does not necessarily have to follow the project's logical framework. Specifically, the value can be unique to the participant. The framework refers to core types of value created as:

- **Immediate value** – How participating in the space makes the participant feel.
- **Potential value** – What may still come as a result of the participation in the space.
- **Applied value** – How the learnings from their participation are applied in different contexts.
- **Realised value** – What the result was of that application.
- **Transformative value** – What has fundamentally shifted for the participant, their institution or social context.

These are positioned within a framework of supporting questions aimed at generating additional information such as the participant's background (orienting value), the factors that enabled the engagement (enabling value), and the quality of engagement and relationship with stakeholders that have led to the success of the engagement (strategic value).

Knowledge management



The project used the Value Creation Framework to document and report on change pathways experienced by stakeholders[4].

Knowledge management was also a key part of the Social Learning, Knowledge Management and Mediation Strategy. The EI4WS project commissioned and conducted various projects aimed at generating and packaging knowledge about water-related ecological infrastructure, such as gathering evidence on the value of ecological infrastructure to communicate with development finance institutions and the private sector.

Sharing of the information was done sporadically but purposefully. A community of practice for catchment management agencies was earmarked as the platform to share this information further and build capacity in these important institutions. The modality of sharing information was informed by a deep understanding of the project's stakeholders, which was achieved through a stakeholder mapping process. Understanding the stakeholders is a crucial part of how social learning is facilitated.

Long-term benefits

Tracking the wider impact of the EI4WS project will provide a much longer-term view of how the project has potentially changed the policy direction, finance flows and institutional arrangements around ecological infrastructure. Internal shifts in understanding and ways of working are critical in amplifying the impact of initiatives such as the EI4WS project. The project aims to affect these shifts at a level of policymakers, community leaders, and institutional leaders, to improve the sustainable management of our natural resources. In this way, the social learning process generates lasting impact.

A key insight of the EI4WS project is how a dedicated component of work around social learning created safe spaces for engagements that contributed meaningfully to the project outcomes. This Water Wheel special issue is a direct result of products developed through the spaces convened by this component and provides evidence for the need for its inclusion in other large and complex projects.

[4] Wenger-Trayner, E and Wenger-Trayner, B. 2020. Learning to Make a Difference – Value Creation in Social Learning Spaces. Cambridge University Press. United Kingdom.

COLLABORATION IN NATURAL RESOURCE MANAGEMENT

Lessons from a collaborative approach to natural resource management

The uMngeni catchment is strategically important in South Africa, providing water to the country's third-largest economic hub and supporting over six million people. While the catchment is less than 5% of the area of KwaZulu-Natal province, it supplies water to more than 42% of its population. The catchment is under much stress with degradation and loss of natural land cover. Article by Nomalungelo Ndlovu.

The uMngeni catchment alone can no longer meet the demands of the growing population of the region, despite its four major dams. Inter-basin transfers are required. Spring Grove Dam on the Mooi River was completed in recent years and Smithfield Dam on the upper Mkhomazi River is planned to bring additional water into the uMngeni. When this system is considered as a whole, it is referred to as the greater uMngeni catchment.

The Department of Forestry, Fisheries and the Environment (DFFE) developed the Natural Resource Management (NRM) programmes (called Environmental Programmes since 2023) to address degradation and support sustainable livelihoods for people. The programmes are an important mechanism for the government to meet its responsibilities relating to water resource management, biological diversity and functional natural systems whilst ensuring the creation of meaningful livelihood opportunities.

The need for coordinated effort in the uMngeni catchment

DFFE has invested hundreds of millions of Rands into natural resource management in KwaZulu-Natal. Various national and provincial departments operate programmes that are complementary, using similar operational models and methods. While these departments and programmes have a shared vision, they have historically planned and operated in relative isolation. The lack of coordination reduced the efficiency and effectiveness of these efforts, creating unintended trade-offs and conflicts, and inadvertently threatening the overall sustainability of the various initiatives in the catchment.

Catchment-level coordination is required to ensure a greater impact of interventions. In the absence of an accepted Catchment Management Strategy, the uMngeni Ecological Infrastructure Partnership (UEIP) stepped in to fulfil this coordinating role. The UEIP is a catchment-wide, multi-stakeholder partnership comprising government, business, civil society and academia. It aims to harness the potential of functioning ecosystems to complement built infrastructure in an integrated approach to managing water resources in the greater uMngeni catchment.

Responding to the need for coordinated planning, DFFE's NRM Programme in KwaZulu-Natal developed the KZN Coordination Strategy and Implementation Plan. The strategy was developed with four pillars: communication, coordination and planning, information management, and monitoring. It provides a framework to coordinate where restoration work is happening and understand the resources (budget) that the different stakeholders are investing.

Operationalising the coordination strategy

The UEIP undertook to support the development and operationalisation of the strategy. It has been a strategic partner by providing an established platform for stakeholders to engage in the strategy, including by co-hosting key events that have brought stakeholders together to discuss and find solutions to common issues.

The initial focus of the strategy was on government programmes. But it was quickly realised that, although the government is a significant investor in natural resource management, many other actors working across the landscape are not funded by government. These include, for example, forestry companies who own large tracts of land, farmers associations and conservancies. They should not be left out of coordination efforts.

Since the implementation of the strategy began, various spaces have been convened with stakeholders to develop relationships, build trust and advance a common vision for collaboration. Over time there has been a slow, but increasing willingness of stakeholders to share where they are working, how much they are spending on natural resource management in catchments and the source of those funds. A consolidated map of natural resource management investment in the province has been developed over the years.

The challenges in sharing data across organisations emerged early on, especially when data collection became digital after the first workshop. The technical difficulties of collating, managing and sharing the data were (and remain) a big issue. Data were provided in varied electronic formats. The financial years differed across institutions, making it difficult to do comparisons and analysis. In addition, there were process and relational concerns of stakeholders. As this was the first process of its kind in the province, there were misgivings about how private or confidential data on spend on natural resource management are, how the data will be used and who had the mandate to collect these data.

Platforms for coordination and co-learning

Over the years, under the UEIP and the Ecological Infrastructure for Water Security (EI4WS) project, several platforms have been hosted to plan, develop and address some of the challenges identified in the strategy together. A learning space focused on biocontrol and identifying emerging weeds was created in 2019 to start addressing capacity constraints and limitations of technical know-how within some of the implementing entities. In 2020 an Indaba was held that focused on the management of invasive alien plants (IAP) across the greater uMngeni catchment. The Indaba created space for a dialogue that led to increased levels of coordinated planning for managing invasive alien plants in the catchment.

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While the catchment is less than 5% of the area of KwaZulu-Natal province, it supplies water to more than 42% of its population.

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The KZN NRM colloquium brought together stakeholders from all over the province to discuss issues of water resources management from the perspectives of research, governance, and implementation.

The IAP Indaba was held as a hybrid event during the first year of the Covid-19 pandemic. It was a time of great difficulty for the country as a whole, and many implementing agents were struggling and unable to operate with reduced funding. The Indaba provided a safe space for these tensions to be discussed. The engaging response in the room was important for the process of building trust with stakeholders.

There is agreement among stakeholders that there needs to be an ongoing conversation to facilitate coordination of efforts. There has been a conscious effort to make these spaces open, inclusive and accessible to as many stakeholders as possible and to involve stakeholders in all aspects of the programmes. One of the points that was reinforced throughout these engagements is that natural resource management work is as much about the people who do the work and who live in the catchment as it is about the ecology.

Looking forward

After five years of operationalising the KZN Coordination Strategy and Implementation Plan, several key themes have emerged that still need to be resolved. The stakeholders in the greater uMngeni catchment, and from across the province, will need to grapple with these issues and find ways of resolving them sustainably.

The importance of catchment partnerships has been brought to the fore. Such platforms are a space to discuss common issues, find ways of resolving challenges, and coordinate activities of the different actors. The UEIP serves this purpose in the greater uMngeni catchment area, but catchment partnerships are required to cover the rest of the province. Then, coordination between these partnerships will also become crucial.

There must be ongoing development of technical and project management skills. Meaningful contractor development is required as there is an appreciation that implementers are being required to work in very complex systems. Stakeholders are advocating for a focus on the holistic development of young professionals and youth in the environmental sector. Environmental internships and youth programmes need to incorporate soft skills development to nurture well-rounded leaders who can find creative, community-focused solutions for the greater good of society.

For the development of long-term natural resource management programmes, it is critical to find ways for business to get involved as a strategic partner. The urgent need for blended finance models for natural resource management has emerged very strongly in recent years. Traditional authorities and communities also need to be involved in planning and decision-making. This supports the concept of community-private-public partnerships that need to be brought into blended finance models.

Lastly, there is a need for a data management platform where stakeholders can contribute their data on where they are working and how much is being invested, see where others are working and be able to demonstrate the impact that efforts are making towards water security.

ENVIRO CHAMPS

Mpophomeni enviro champs contribute to rehabilitating Mthinzima wetland

The township of Mpophomeni is situated less than four kilometres upstream of Midmar Dam, which provides water to Durban and Pietermaritzburg in KwaZulu-Natal. Two streams, the Mthinzima and Mhlangeni, run directly through Mpophomeni and into Midmar Dam. The Mpophomeni sewerage system is dysfunctional and overburdened, with the result that raw sewage frequently flows into Midmar Dam from the township. The quality of water in the dam has declined significantly due to contamination from sewage and industrial waste, as well as nutrient inputs from agricultural activities upstream of the dam. Article by Lindokuhle Khanyile.

According to the 2016 strategy of the uMngeni Ecological Infrastructure Partnership (UEIP): *"These interventions of investing in engineered or built infrastructure have not been sufficient to adequately address the issue of water security in this catchment, and more investments are planned to address the growing demand. While built infrastructure remains essential for providing water to large populations, there is a growing call for exploration of the potential role of ecological infrastructure to supplement and enhance, and in some cases substitute for, built infrastructure".*

Early initiatives set the foundation

In 2012, the Duzi Umgeni Conservation Trust (DUCT) established the Mpophomeni Sanitation Education Project (MSEP), a community-engagement project aimed to address the problem of sewage pollution in the township through citizen involvement in monitoring and reporting sewage pollution events. The MSEP also involved the public in raising awareness, environmental education activities, and monitoring of water quality in streams. The main aspect of the MSEP was the nomination of enviro champs. Enviro champs are a group of young people that are given incentives to help create a healthier environment in the communities that they live in. In the MSEP, these young enviro champs were monitoring and then reported the sewage spills to the local authorities to enable a timely and effective response. The enviro champs worked closely with plumbers who were employed by the district municipality. The data generated through the monitoring activities were recorded and analysed to determine the major causes of the problems.

SANBI

Mpophomeni enviro champs taking water samples.

The MSEP later evolved into the 'Save Midmar Project', a collaborative effort of the UEIP. The aim was to coordinate activities to restore the ecological infrastructure within key areas around the Midmar Dam such as Mpophomeni. The UEIP was formed in 2013 and comprises 17 member organisations from various levels of government, business and academic institutions, as well as civil society. The primary focus of the UEIP is to explore the role that ecological infrastructure can play in supplementing-built infrastructure to improve water security and water quality in the catchment.

Collaborative efforts to rehabilitate Mthinzima wetland

SANBI

The Mthinzima wetland.

The Mthinzima wetland covers an area of approximately 98 hectares on land owned by the Zenzele Community Trust, situated directly downstream from the Mpophomeni township and adjoining Midmar Dam. The Mthinzima wetland plays a significant role in trapping the effluent from the Mpophomeni Wastewater Treatment Works from going into Midmar Dam. The Save Midmar Project sourced funding and developed a rehabilitation plan for the Mthinzima wetland, which included the scope of work for the enviro champs.

The rehabilitation project focused on repairing and re-constructing wastewater infrastructure, wetland rehabilitation, water quality monitoring through citizen science, as well as community education and outreach. Structures were constructed in the Mthinzima wetland to alter the flows of water through the wetland and re-distribute water across the surface of the wetland rather than being confined to one channel. This has helped to improve the wetland habitat and wetland functioning. At the same time, work has been done to fully refurbish the dysfunctional Wastewater Treatment Plant to increase the capacity of the sewer network within Mpophomeni area. An Adopt-a-River project promoted river health at the community level. The pooling of resources by different partners demonstrated the power of co-finance and collaboration.

A monitoring plan for the Mthinzima Rehabilitation Project was also developed in line with the UEIP strategy. It hopes to show how strategic investments in ecological infrastructure can contribute to enhanced water security in the uMngeni catchment. Just as-built infrastructure requires ongoing investment in maintenance, so does ecological infrastructure.

SANBI

Collaborative effort to rehabilitate the Mthinzima wetland.

The continued role of the enviro champs

In 2021, the Ecological Infrastructure for Water Security (EI4WS) project employed 13 enviro champs under ***Amanzi Eth Nobuntu***, which is a multi-partner, blended finance, community-public-private-partnership that was initiated in 2021 under the auspices of the UEIP. It was piloted as a three-month project for proof of concept of a blended-finance model in the greater uMngeni, with 300 young people doing work for the environmental common good and learning for the future. The Mpophomeni enviro champs conducted door to door education, fixed domestic water leaks, monitored and reported sewage spillages, conducted biomonitoring and wetland monitoring using citizen science tools. The enviro champs have all completed Level two Environment Practices Training conducted by the Wildlife and Environment Society of South Africa (WESSA).

Several organisations and research institutions have undertaken uncoordinated monitoring and research work on the Mthinzima wetland and Midmar Dam. There are a number of formal water quality monitoring points that exist within the area, with regular water sampling undertaken to monitor a suite of water pollutants entering Midmar Dam. Enviro champs monitor the water quality in the Mthinzima wetland using Mini-SASS biological monitoring. These water and ecosystem monitoring results can be used as a baseline for the current state and functioning of the Mthinzima wetland.

The use of the citizen science as the monitoring tools will help to improve the water quality of the Mthinzima wetland. Through collaborative, and innovative ventures, the Mpophomeni enviro champs continue to foster relationships with both the community and organisations in paving a way to rehabilitate the Mthinzima wetland.

PARTNERSHIPS

Changing minds and missions through catchment partnerships to restore ecological infrastructure

What this special issue of the Water Wheel has demonstrated is a case study on the importance of building and maintaining partnerships across the water value chain to improve water security. The project focused on ecological infrastructure as a key consideration for water security but with a strong narrative around the social, political, cultural, and economic dimensions of water resource management. The messaging provided through this project has been clear: investing in ecological infrastructure is essential to sustain ecosystem services for both people and nature. So writes Sinegugu Zukulu.

Areas that invest in managing and restoring their ecological infrastructure will have more clean water, more water available for food production, will spend less money to clean water, and will be more resilient to climate change. Investing in ecological infrastructure is not just about protecting the environment. It is also about investing in our own future. By managing these natural systems, we are ensuring that we have the resources we need to survive and thrive. There are several ways to invest in ecological infrastructure, including protecting and restoring natural areas, such as forests, wetlands, and rivers, managing land and water resources sustainably, reducing pollution, mitigating the effects of climate change, and designing built infrastructure to coexist with ecological infrastructure.

Partnerships to invest in ecological infrastructure

In a broad sense, a partnership can be any endeavour undertaken jointly by multiple parties. The parties may be governments, non-profit enterprises, businesses or private individuals. Partnerships are guided by specific goals they want to achieve. Investment in ecological infrastructure helps to bring together a wide range of stakeholders who have a shared vision to maintain a healthy catchment. Common goals and objectives lead to the creation of partnerships that work together to achieve those set goals.

There are many benefits to bringing together different stakeholders in this way. For example, it can help to:

- **Improve communication and coordination** – Stakeholders share information and ideas, and develop plans that consider the needs of everyone involved.
- **Increase understanding and trust** – Stakeholders get to know each other and develop a better understanding of each other's needs and concerns. This helps to build trust and cooperation, which is essential for achieving long-term success.
- **Pool resources and expertise** – Stakeholders can pool their resources and expertise, to make the most of limited resources and to achieve better results.

Of course, there may also be some challenges to bringing together different stakeholders. It can be difficult to get everyone to agree on a common vision and to work together effectively. However, the benefits of doing so are significant, and it is worth making the effort to overcome these challenges.

Key stakeholders in ecological infrastructure

A variety of stakeholders are involved in managing ecological infrastructure in catchment areas.

- **Landowners** are encouraged to manage their land in a way that maintains ecological infrastructure for water security. This includes practices such as reducing pollution, removing alien trees and restoring wetlands.
- **Conservation bodies** help develop and implement conservation strategies that protect and conserve ecological infrastructure in the catchment. These may include establishing protected areas, monitoring populations of plants and animals, and educating the public about the importance of ecological infrastructure.
- **Municipalities** are charged with providing services to the people within their area of jurisdiction. They are responsible for water provision, electricity, waste management and other services. It is in their interest to be part of catchment partnerships.
- **Businesses** are encouraged to invest in the management and restoration of ecological infrastructure. This could include supporting conservation projects, using sustainable

practices, and reducing their environmental impact.

- **Government departments** provide resources and information that promote the sustainability of ecological infrastructure. This includes funding conservation projects, providing technical assistance, and developing policies that protect the environment. Cooperative governance is essential to bring together legal and policy implementation across sectors such as water, environment and agriculture.
- **Research institutions** contribute to the understanding of how to better manage ecological infrastructure. This includes studying the effects of climate change on ecosystems and testing the effectiveness of different management strategies.
- **Water sector** stakeholders ensure that water resources are managed in a way that protects ecological infrastructure. This includes reducing pollution, monitoring of water quality and restoring wetlands.
- **Communities** are engaged in activities that manage ecological infrastructure, such as planting indigenous trees, managing waste in their yards, cleaning up rivers, protecting wetlands and monitoring invasive species.

By working together, these stakeholders make a significant difference in managing ecological infrastructure for the long-term health of catchments. A positive outcome for the management and restoration of ecological infrastructure is contingent upon the interaction among the policy, science and practice realms. Success of implementation of catchment partnerships is dependent on the quality of engagement, and richness and adeptness of pragmatic approaches employed between various actors during the implementation process.

Youth as agents of change

Young people are the future. They are the ones who will be living with the effects of climate change and environmental degradation for many years to come. Young people are often more receptive to environmental messages than adults. By involving them in catchment management work, they gain the skills and knowledge they need to take care of our planet.

Young people are more likely to adopt sustainable practices. They are more open to new ideas and are more likely to be willing to change their behaviour for the sake of the environment. When young people are involved in catchment management, they are more likely to continue these practices in their own lives and to encourage others to do the same. Young people can also bring new energy and ideas to the table. They are not afraid to challenge the status quo and to think outside the box. This can be an asset in catchment management, which often requires new and innovative approaches.

Involving the youth helps to build community cohesion. When young people from different backgrounds come together to work on a common goal, it can help to break down barriers and build trust. This is especially important in areas where there is a history of conflict or division.

Working on a real-world project can give young people the opportunity to develop valuable skills, such as teamwork, problem-solving and leadership. It can help them to succeed in their future careers. Overall, there are many good reasons to involve young people in catchment management. It is an investment in the future of our planet and our communities. If we are to change the status quo, all gatherings and platforms of stakeholders should endeavour to create space for youth engagement and participation.

By adopting the six core SLKMM strategy practices for mediating and connecting, the project has shown that working through partnerships can be an effective approach to dealing with complex challenges, can lead to amplified and lasting impact, and provides a basis for long-term continuation of implementation efforts, monitoring, and adaptive management.

THE WATER WHEEL

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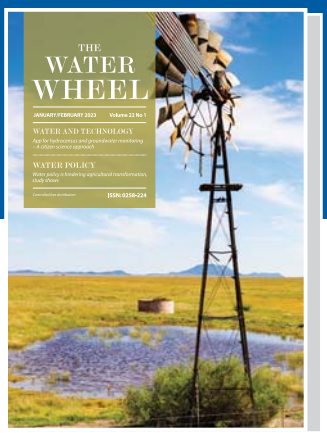

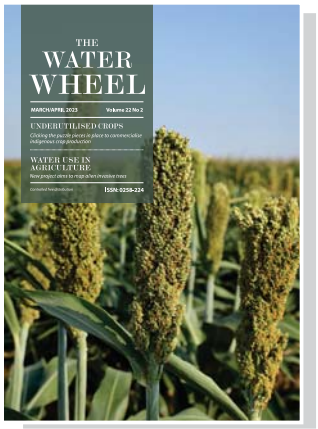

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The Water Research Commission not only endeavours to ensure that its commissioned research remains real and relevant to the country's water scene, but that the knowledge generated from this research contributes positively to uplifting South African communities, reducing inequality and growing our economy while safeguarding our natural resources. The WRC supports sustainable development through research funding, knowledge creation and dissemination.

The knowledge generated by the WRC generates new products and services for economic development, it informs policy and decision making, it provides sustainable development solutions, it contributes to transformation and redress, it empowers communities and it leads various dialogues in the water and science sectors.

The WRC Vision is to have highly informed water decision-making through science and technology at all levels, in all stakeholder groups, in innovative water solutions through research and development for South Africa, Africa and the world.

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