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POLICY BRIEF

Aquatic science

The freshwater science landscape in South Africa, 1900-2010

A WRC-funded study determined the extent to which aquatic sciences have contributed to effective management of South Africa's water resources by providing appropriate evidence-based information to guide decision-making.

Aquatic sciences guide decision-making

The effective management of South Africa's water resources requires an informed and reliable scientific foundation to provide appropriate evidence-based information to guide decision-making. Aquatic sciences, together with engineering, provide this foundation and help to ensure that the country's water resources are managed sustainably.

History and future challenges

Recognising the crucial importance of institutional memory to the development of all scientific endeavours, the specific objectives of this study were to:

- Capture the chronology (sequence of events) that shaped aquatic science in South Africa, including the prominent characters, contributors, findings and decisions, while identifying the evolution of general culture within the discipline and the interactions between aquatic scientists with water resource management; and
- Reflect on the current state and likely future trajectory of aquatic science in South Africa and how the role of aquatic science can be strengthened to meet current and future challenges.

Freshwater aquatic ecosystems

This investigation focused on freshwater. Its scope spans all of the major aquatic ecosystems, including rivers, lakes, impoundments and wetlands (and touches on estuaries and groundwater); aquatic taxa, including phytoplankton and benthic algae, aquatic macrophytes, zooplankton and zoobenthos, aquatic invertebrates, fishes and other aquatic vertebrates; aquatic habitats and their composition and structure, including sediments and water chemistry; physical, biological and catchment processes; policy formulation and policy implementation, and the development and application of management techniques.

Crucial education and career development

The study found that there is a clear and urgent need to strengthen the South African education system at all levels so that it provides an environment within which the individuals that have the ability and drive to develop a career in science and/or engineering can flourish. Equally problematic is the need to create sufficient opportunities for aquatic scientists and engineers to develop meaningful careers and work together to achieve the goals articulated in our national vision for water resources.

Experienced mentors and skilled technicians

A key part of the career development of all individuals is the crucial role played by experienced mentors. In addition, aquatic scientists must deploy their skills and experience to address those societal needs that relate to their fields of expertise.

The education system needs to develop technically-skilled individuals who are capable of developing, adapting, manufacturing and maintaining the instrumentation and software that are pivotal to the scientific enterprise. This will require aquatic scientists to realise that they have a responsibility to provide 'solutions' that will help to solve a particular problem experienced by society.

Crucial water quantity and quality data

The national systems of water quantity and water quality monitoring urgently need to be expanded and improved to the point where they can provide reliable data to aquatic scientists, and engineers. These data form the foundation upon which defensible decisions can be made on the sustainable management of our water resources.

Strategic research programmes

Understanding socio-ecological systems at landscape, continental and global levels is complex and, therefore, effective research programmes are required to build knowledge systems that span disciplinary, research, policy, and operational domains. This takes much more time and requires more persistence and investment in social capital than is typically afforded by individual research projects.

Research programmes seek to produce new knowledge, new alliances and new understanding that will influence the longer term management and governance of the use of a particular resource. Strategies to promote such systems require a sufficiently long-term perspective that takes into account the generally slow diffusion of ideas and new scientific information in practice.

Over-arching funding system

One way to build, maintain and strengthen synergy between research teams is to have a clear, over-arching funding system that guides and co-ordinates research efforts and addresses clear national priorities. The current approach to research funding tends to focus on single projects or small groups of projects, and only provides a partial solution to the problem.

The approach used so successfully by the Co-operative Scientific Programmes (CSP) to fund and guide research programmes during the 1980s could serve as a useful starting point for re-evaluating funding systems.

Local and international responsibilities

There is a growing realisation that rivers and the water they transfer connect people and economies across local and international boundaries. South Africa cannot isolate itself from the rest of the region.

Because of our economy, experience and competencies, we have a broader responsibility to develop the regional understanding and competencies that are required to make the inevitable trade-offs in ways that are equitable and sustainable. The study underlines the role of the WRC in developing and sustaining the partnerships that are needed to enable research to take a regional, social-ecological systems perspective of the management of water resources.

Revitalise SASAqS ?

The important function that Southern African Society of Aquatic Scientists (SASAqS) used to fulfill in bringing together water resource managers and aquatic scientists from all disciplines needs to be revitalised, according to the final report. This would help to re-establish and strengthen the previously strong links between aquatic scientists and those individuals in Government who are responsible for water resource management and policy.

In turn, this would enable aquatic scientists to more clearly understand the specific information needs of water resource managers and also to help them to transfer research findings to water research managers.

Improvements

Many improvements have taken place during the past century in aspects such as occupational health and safety and monitoring apparatus, mapping ability, navigation and data processing have improved beyond all recognition and are very important.

Policy implications

The report captures most, if not all, the development and processes behind the development of a sound base of our knowledge on the intrigued fresh water aquatic systems and the elements and disciplines interlinked to the current understanding and knowledge we have on these systems.

However, to improve on the crucial management of the resources it would be necessary to develop an overarched strategic plan for research programmes for South Africa that includes all the relevant inter-disciplines.

Further reading:
To obtain the report, *The Freshwater Science Landscape in South Africa, 1900-2010* (**Report No: TT 530/12**) contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.