



## **Building a Better post-COVID Water Sector**

### **Advisory Note 4: The foundation of our water security is eroding – why hydrological information is important**

Floods have recently taken lives and destroyed infrastructure across the country, from the Northern Cape to Mpumalanga. After a few dry years, water shortages in Nelson Mandela Bay have seen companies close their doors and jobs lost; Cape Town suffered similarly a few years before.

These events were predictable. And, in other parts of the country, many potential climate disasters have been avoided because early actions were taken to address risks identified using available hydrological information.

The present danger is that the foundation of South Africa's hydrological information system is being undermined. This is a long-term threat to the country's water security that must urgently be addressed if we are to have a sustainable future under present or future climates.

#### **What is hydrological information and where does it come from?**

Hydrological data comprises data on water flows and quality in our rivers and water storage in our dams as well as data on rainfall and evaporation. The raw data is processed and analysed to produce many kinds of hydrological information.

That information could include warnings about tomorrow's floods or predictions about the worst drought that may be experienced in the next 50 years. It is also essential for the planning and operation of our infrastructure as well as to support a multitude of social and economic activities.

Data on flows in rivers and into dams, levels of underground water as well as data on water quality and evaporation is monitored by the Department of Water and Sanitation while rainfall and other climate data is collected by the South African Weather Service and the Agricultural Research Council. In order to understand how the climate varies over time, we need many years of data to make reliable predictions. Many observation stations are automatic and their data is monitored and transmitted electronically. When they work, this makes real-time monitoring and the collection of long-term records easier and more efficient. It should be noted that hydrology is one discipline where remote sensing/satellite systems still have limited application and on-site measurement and sampling is needed.

#### **Importance of hydrological information**

Hydrological information is applied in various ways and poor information can lead to large financial losses, damage to infrastructure and even loss of life. Important applications of this information include:

- Determining how much water can reliably be supplied from rivers and dams in order to plan and develop the water resource and allocate it between different users, including the natural environment;
- Guiding the application of supply restrictions during dry periods in a predictable and timely manner;
- Identifying the risks posed by floods to life and property and preparing mitigation strategies such as demarcating safe areas for housing development or identifying locations where flood warning systems are needed;
- Providing information about the likely size of extreme floods and the duration of extreme droughts to inform the design of transport, power and other infrastructure;
- Assessing the likely extent and impact of climate variability and change in order to develop mitigation measures and implement them in a timely manner.

Some recent practical applications of hydrological information are:

- Warnings about and the management of recent flooding events arising from Tropical Storm Eloise where real-time information was needed;
- The application of water restrictions during the 2015-2018 drought in the Western Cape, based on analysis of long-term climate records and daily observations of dam levels and river flows;
- The maintenance of water security in the Vaal system over the past two decades, guided by models that use decades-long data records.

These examples show that there is a need for both 'real-time' data, particularly for flood and drought management, as well as for very long-term data records, without which it is not possible to estimate climate variability or detect climate change trends.

### **Current problems with hydrological information**

There is a number of problems which threaten the availability of the hydrological information needed to ensure South Africa's water security:

- Observation stations are not being adequately maintained so data is sometimes not available when required and gaps in long term data records reduce the accuracy of the information produced;
- The number of river flow and rainfall monitoring stations is falling; a third of river flow gauging stations have been abandoned in the past 30 years; water quality monitoring has also deteriorated alarmingly while the number of formal rain gauging stations is less than it was in 1920;
- Much hydrological and climate information is not freely available. The South African Weather Service charges a fee for providing rainfall data. The hydrological services of the Department of Water and Sanitation are understaffed and their IT systems are outdated and not effectively maintained so data is not easily available;
- Government apparently does not recognise that most hydrological information is a public good that should be made publicly available to enable all citizens and organisations to collaborate in planning and utilising the nation's water resources as well as to support education and research.

### **Recommendations**

In our highly variable and uncertain climate, South Africa's growing population and economy needs reliable hydrological information to manage the scarce water resources and assured supplies on which we depend. The South African Academy of Engineering recommends that the Ministers responsible for Water and Sanitation and Environmental Affairs should prioritise

the hydrological and climate information systems for which they are responsible and ensure that they are adequately funded to continue to collect and maintain hydrological and climate data records. While some specialised 'value-added' services may be provided on a commercial basis, information is most valuable when it is used. Thus we recommend that recent data and long-run hydrological and climate records should be made publicly available at no cost, recognising that the whole nation will benefit from their use. It is also recommended that the hydrological monitoring network, particularly rainfall, evaporation and streamflow, should be expanded or intensified in a strategic way.

The Academy stands ready to avail its members to work with a team from DWS and SAWS to review the systems, determine priorities and support detailed remedial actions.

A handwritten signature in black ink, appearing to read 'E. P. Kearsley'. The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

Prof Elsabe Kearsley  
President, South African Academy of Engineering  
15 February 2021