



Real-time management of a river highly in demand

Security and efficiency for the Crocodile River, across borders and competing interests



The Crocodile East River System is over-allocated and stressed because its waters are highly demanded. The river forms an important axis of life, extending eastwards from the frequently irrigated agricultural areas in north-eastern South Africa until it forms the southern border of the Kruger National Park and finally joins the Komati River on its way into Mozambique.

Competing water demands together with its transnational setting make the management of the Crocodile East River very challenging. It is one of the tasks of the Inkomati Catchment Management Agency (ICMA) to make sure that there are appropriate amounts of water available for the cross-border flows to Mozambique, sufficient ecological flow to Kruger National Park and enough water to satisfy the regional needs for irrigation and industrial and domestic use.

Who knows the flows?

The water running through the Crocodile East River is dominated by run-of-river flows, as it mostly stems from unregulated tributaries. Only one dam at the top end of the catchment, Kwena Dam, regulates the flow to some degree for water users on the main stem of the Crocodile River. The frequent scarcity of water is further impaired by the lack of information about water supply and demand. Up until now, there has been no system in place to inform ICMA, in real time, of the flow in the different tributaries or the water demands. This has made it almost impossible for ICMA to manage the system in a satisfying and sustainable manner. Frequently, too little or too much water was released from the dam, impacting both water security in the dam as well as the ability of water users to benefit from the water.



The Crocodile East River has a catchment area of 10,446 km² and mean annual runoff of 1,236 million m³ per year. It flows through the Nelspruit industrial area, the lowveld agricultural area and the Kruger National Park.

DHI real-time decision support enables the right decisions at the right time

DHI set up a real-time decision support system (DSS) relating to releases from Kwena Dam, helping ICMA to make the right decisions at the right time. This system gathers information on the current status flows and dam levels

SUMMARY

Client

The Inkomati Catchment Management Agency (ICMA)

Challenge

The Crocodile River Catchment is highly over-allocated. Its management is complicated by many unregulated tributaries and competing local, international and ecological demands.

Solution

A real-time decision support system (DSS) optimises the release from the dominant dam and ensures that no water is wasted.

Value

- Sufficient flows to meet all obligations
- Optimised release from Kwena Dam
- Long-term supply reliability
- Increased stakeholder buy-in
- Improved stakeholder communication and transparency
- A suitable platform for water auditing

Location/Country

Crocodile East River System, ZA

Client testimonial

“It’s a far better situation than what we had before. We now have a system where we’re basing our decisions on information available, in real-time, at our fingertips, and we have far better knowledge of what’s going on in the catchment.”

Brian Jackson, Executive Manager,
Water Resources Planning, ICMA



CROC - Crocodile River Operating Committee

CROC Home

Observed Data
River / Reservoir Levels
 X2H005: Nels
 X2H006: Karino
 X2H013: Montrose
 X2H014: Houtbos
 X2H015: Elands
 X2H016: Tenbosch
 X2H022: Kaap
 X2H032: Weltevrede
 X2H036: Komatiqoort
 X2H046: Riverside
 X2H059: Goedehoop
 X2H070: Kwena Outflow
 X2H096: New Montrose
 KOB004: Lebombo
 X2R005: Kwena Dam

Weather / Climate
 WX Maps
 SAWS Short Term
 SAWS Long Term
 SASRI
 CSIR

CRMB Data
 Section 1
 Section 2
 Section 3
 Section 4
 Section 5
 Section 6

DWA and KOBWA Observed Data
 River and Reservoir Levels
 Map reflects values for date: 2011-10-13 07:15
 Page updated: 2011-10-13 07:36

A public website displays all the relevant information on river and reservoir levels, weather data, modelling results, international obligations, environmental requirements, etc.

Have a look at <http://crocdss.inkomaticma.co.za/Website/Obs.River.Reservoir.html>

Kwena Dam. It also helps to ensure that all water users are complying with their water use allocation, and this has helped to reduce tension between competing water users.

in the catchment. Moreover, it is connected to a rainfall forecast provided by the South African Weather Service (SAWS). The DSS also links with a water ordering system, including ecological water requirements (EWRs) and international flow requirements, which details the amount of water that legitimate water users require over the next few days. Combining this information, DHI's system determines if there is enough water from unregulated flows in the tributaries to meet the demands of water users. If not, the system calculates how much water needs to be released from Kwena Dam to supplement the unregulated flows. Without this information of flows in the tributaries in real time, ICMA might end up releasing too much water from Kwena Dam, thereby drawing the dam down unnecessarily and wasting water when there are sufficient flows from the tributaries.

The DSS also advises if water needs are to be restricted. Looking at real time values as well as projections of rainfall and dam levels in the future (i.e. months to years) and past observed water demand patterns, such restrictions can be implemented in a timely and transparent manner.

Summing up, DHI's DSS provides a reliable framework for improved water release decision making by supplying information on (1) how much water is available over the next few days, (2) how much the water users will demand during that period, and (3) how much water needs to be released to meet this demand. The system also disseminates this information publicly for maximum transparency.

Promoting harmony in the catchment

Besides supporting sustainable decisions, DHI's DSS has also improved stakeholder discussion related to water restriction. As the catchment is over-allocated, periods when water restrictions need to be implemented occur frequently. The system provides an agreed-upon platform to make restriction-related decisions in a clear, scientific and transparent manner. In addition, all water use sectors agree that it promotes the efficient release of water from

Improved management entails increasing stakeholder buy-in

Setting up a functional real-time system is not always easy. Such a system relies heavily on good and sufficient field data. This necessitated the installation of telemetry at various weirs in the catchment. Moreover, independently running the system requires sufficiently trained employees. DHI provided such training to ICMA staff.

After overcoming these set-backs, the benefits of the new system are obvious. ICMA witnessed an improvement in its management as well as stakeholder buy-in once the system was implemented. Involving the stakeholders has certainly paid off: The positive stakeholder feedback has encouraged ICMA to continue with improvements. It now wants to extend the functionality of the system further to help it better manage water for ecological purposes.

While the Inkomati catchment is still one of the most over-allocated catchments in South Africa, the difference is that the stakeholders are now comfortable that a world-class decision support system is in place to help ensure their water is managed optimally.



Listen to Brian Jackson from ICMA, describing the challenges and values of the project.