

## Estuaries

### Ecological water requirement studies for estuaries – How far have we come?

## A newly-completed Water Research Commission (WRC) study critically assessed the completed ecological water requirement studies for South African estuaries and responses to changes in freshwater inflow.

### Background

Freshwater abstraction for human activities threatens the health and provisioning of ecosystem services supplied by aquatic ecosystems. Estuaries are sensitive to a reduction in freshwater inflow, which is the main driver of their dynamic, variable nature.

Input of discharge from wastewater treatment works and agricultural return flow can result in increased freshwater inflow to estuaries. Ecological water requirements (EWR) quantifies the water regime (quality, quantity and timing) required to ensure the adequate functioning and future persistence of estuaries.



*Housing developments along Thesen Island, Knysna.*

Estuaries are unique (e.g. shape, size, protection from wave energy) and have different responses to altered freshwater inflow. Thus studies of individual systems need to be undertaken.

South Africa has been a forerunner worldwide for

determining methods to assess EWRs. The South African Resource Directed Measures developed in 1999 in response to the National Water Act (Act 36 of 1998) has been consistently applied to different estuary types in the country.

This provided an opportunity to summarise and critically assess the completed EWR studies. Existing data and insights have essentially gone unrecognized by the rest of the world, as the knowledge has not been integrated into uniform reports for international publication.

Thus this project set out to also recommend a framework to capture EWR study data to be used in long-term monitoring and future studies by DWS, other consultants and specialists.

This study aimed to:

- Compile and integrated the completed EWR studies for South African estuaries.
- Critically assess past EWR studies for lessons learnt.
- Collate and integrate available knowledge on the response of South Africa's estuaries to changes in freshwater inflow.
- Develop a framework to capture data produced by ecological water studies.
- Promote South Africa's knowledge on the EWRs of estuaries globally.

### Main findings

The final report not only provides a summary of available EWR studies completed in South Africa, but also insights into the response of estuaries to altered freshwater inflow. It also highlights studies that have led to improved understanding of the freshwater requirements of estuaries.

To date, studies have been conducted on 40% of South Africa's estuaries, although some studies are still ongoing. The majority (69%) of studies were completed as low confidence desktop or rapid levels.

The classification of the Mvoti-Umzimkulu Water Management Area assessed 22% of South Africa's estuaries. The EWRs of half of South Africa's permanently open estuaries have been determined. Only three comprehensive reserve determinations have been completed.

From the estuaries assessed the following lessons have been learnt:

1. Each estuary is unique in terms of its EWR.
2. Water can be released from dams to supply the EWR, but cannot mimic the entire natural flow regime.
3. Floods are needed to flush out and reset estuaries.
4. Deterioration in water quality is a growing concern.
5. The importance of groundwater input to South African estuaries is unknown.
6. The offshore marine environment also has an EWR, but this does not form part of the current legal framework.
7. A catchment-to-coast integrated water management approach is necessary to ensure connectivity.
8. Cooperative governance is required to address non-flow related impacts and improve estuary health.
9. Field and long-term data are needed for high confidence EWR assessments.
10. Monitoring must take place in a strategic adaptive management cycle.
11. The tools developed to determine the EWR of an estuary are now being used to meet other legislative requirements.

**Further reading:**

To order the report, *Assessment of completed ecological water requirement studies for South African estuaries and responses to changes in freshwater inflow (WRC Report No. KV 352/15)*, contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; Email: [orders@wrc.org.za](mailto:orders@wrc.org.za) or Visit: [www.wrc.org.za](http://www.wrc.org.za) to download a free copy.