

EXECUTIVE SUMMARY

Environmental (or instream) flows are flows that are left in, or released into, a river system with the specific purpose of managing some aspect of its condition. Their purpose could be as general as maintenance of a 'healthy' riverine ecosystem, or as specific as enhancing the survival chances of a threatened fish species. They could be targeting the river channel and its surface waters, groundwater, the estuary, linked wetlands or floodplains, the riparian zone, and/or any of the plant and animal species associated with any of these system components.

As the condition of river systems deteriorates globally, environmental flows are increasingly appearing on national and international political agendas, and the requirement to use them, in legislation. The science of advising on environmental flows is relatively young (about 50 years), but more than 100 methodologies and methods now exist for such assessments and at least 30 countries are using them routinely in water resource management, with the number growing annually.

South Africa formally addressed the topic in the 1980s, and during the 1990s made considerable progress at a national level. Tharme & King (1998) track the major milestones of this course. Recognising that international approaches to environmental flow assessments did not meet South Africa's needs entirely, development of a local approach was initiated. First introduced in a workshop for the Lephalala River in February 1992, what was to become the Building Block Methodology (BBM) was developed through application in a series of real water-resource development projects. The South African Department of Water Affairs and Forestry (DWAF) organised and partially funded the workshops, and the Water Research Commission (WRC) funded many of the river scientists who stepped forward to become involved, via their research projects. Through a decade of extraordinary cooperation and willingness to contribute, the national body of aquatic scientists, water managers and engineers developed the BBM to the point where it is now one of only a few advanced environmental flow methodologies in the world with a formal manual.

In addition, the BBM has advanced the field of environmental flow assessment in an entirely new direction, being a holistic methodology that addresses the health (structure and functioning) of all components of the riverine ecosystem, rather than focusing on selected species as do many similarly resource-intensive international methodologies. This kind of approach has been spearheaded in South Africa and Australia, in close collaboration, and because of its pragmatic and all-encompassing nature, has triggered exceptional growth in communication between many scientific disciplines, and between scientists and water managers.

During the 1990s, more than 15 BBM Workshops were held for different local rivers, as well as for the Logan River in Australia in 1996. The 1994 workshop for the Luvuvhu River was generally seen as the one in which the BBM 'came together', providing a sound template for further development of the methodology. The 1996 workshop for the Sabie-Sand River System brought together the developers of the BBM and members of the Kruger National Park Rivers Research Programme, in the most data rich application of the BBM to that date. A member of DWAF's Water Law Review Team attended the Sabie-Sand workshop, to

assess whether or not the BBM could meet legal requirements in terms of quantifying the water required for river maintenance. As a result, an environmental flow allocation for maintaining river ecosystems was entrenched in South Africa's new National Water Act (No. 36 of 1998) as the ecological Reserve. This is one of the two components of the Reserve, the other being an allocation for basic human needs. Within the framework of Resource Directed Measures for Protection of Water Resources, established by DWAF, assessment of the Reserve is now being done for every major water body within South Africa. For various kinds of water-resource developments, Reserve determinations may be done at different levels of assessment, namely Desktop, Rapid, Intermediate or Comprehensive. Requirements for Comprehensive Reserve determinations were established based on the BBM, and it is currently the methodology used in such environmental flow assessments.

The BBM is essentially a prescriptive approach, designed to construct a flow regime for maintaining a river in a predetermined condition. This manual describes its basic nature and main activities, and provides guidelines for its application. It also introduces the links between the methodology and the procedures for determination of the ecological Reserve as embodied in the Water Act. The BBM has further provided the impetus for the evolution of several alternative holistic environmental flow methodologies, notably the Downstream Response to Imposed Flow Transformations (DRIFT) methodology. The DRIFT methodology is an interactive, scenario-based approach, designed for use in negotiations, and contains a strong socio-economic component, important when quantifying subsistence use of river resources by riparian peoples.

Reference:

THARME, R.E. & KING, J.M. 1998. Development of the Building Block Methodology for instream flow assessments, and supporting research on the effects of different magnitude flows on riverine ecosystems. *Water Research Commission Report No. 576/1/98*. 452 pp.