

# Indicators of sustainable development for catchment management in South Africa - Review of indicators from around the world

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## Abstract

Indicators are the ideal means by which progress towards sustainable development can be measured. However, most indicator initiatives throughout the world have been aimed at state-of-the-environment reporting, with relatively few aimed at developing sectoral indicators. This paper provides the results of a review to establish trends in the development of indicators that assist in integrated water resource management. Twenty-one organisations from around the world were approached with regard to whether they had developed indicators of sustainable development for catchment management. Of these, only five organisations had developed, or were in the process of developing, indicator sets that were available for review. These included the Fraser Basin Council (Canada), the Murray-Darling Basin Commission (Australia), the Tennessee Valley Authority (USA), the United States Environmental Protection Agency and the World Resources Institute. All of these indicator sets were developed using an issues-based approach. Each indicator set was unique, reflecting the policy, both national and organisational, upon which it had been based. An analysis of these five indicator sets revealed that the most important themes that required information for water resource management at a catchment level, were *biodiversity and ecosystem integrity*, *land-use change*, *water quality*, *waste production*, *water availability* and *resource use*. Common indicators included population growth; community involvement; water availability; water use; water quality trends; soil contamination; non-compliance; species at risk; key species assessment; change in vegetation; agricultural impact; access to recreational opportunities, and ecosystem health. The identification of these themes and common indicators will be useful for the development of indicators for catchment management in South Africa. More importantly, policy frameworks and the physical characteristics of catchment systems in the country need to be taken into account. Additionally, it is recognised that no effective indicator set can be developed without the input of stakeholders.

## Introduction

Sound water resource management is one of the key components of sustainable development as advocated by Agenda 21 (Chapter 18). In the last 10 years, governments throughout the world have reviewed their policies so as to achieve sustainability of water resources. In particular, the South African government has introduced the National Water Act (No. 36 of 1998), which will effectively dictate water resource policy and practice for at least the next 10 years. A core feature of this Act is the introduction of catchment management agencies that will be responsible for integrated water resource management of specific catchments. Catchment management strategies are to be developed for each catchment in South Africa to ensure that the water resources are utilised in a sustainable manner. Additionally, the Act (Chapter 14) requires that the Government establish a national monitoring and information system for water resources as soon as possible. This system should provide for the collection of appropriate data to assess the quantity, quality, use and rehabilitation of water resources at catchment and national levels, as well as compliance with resource quality objectives, health of aquatic ecosystems and atmospheric conditions that may impact on water resources.

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Indicators are the ideal means by which progress towards a goal, in this case integrated water resource management, can be monitored. Indicators provide a summary of conditions, rather like temperature and blood pressure are used to measure human health. They have been used for many years by economists to explain economic trends, a typical example being Gross National Product, but have only fairly recently been introduced to determine the sustainability of environmental systems as required by Agenda 21 (e.g. OECD, 1993; MacGillivray, 1994; Gouzee et al., 1995; Hammond et al., 1995; Trzyna, 1995; World Bank, 1995; Bakkes et al., 1994; Moldan and Billharz, 1997).

Most indicator initiatives have been aimed at providing information at a national level for state-of-the-environment reporting (e.g. Ward, 1990; OECD, 1991; ANZECC, 1998; GRID-Arendal, 2000) or for answering specific policy questions at national and international levels (e.g. UNEP and WHO, 1988; FAO, 1992; Eeronheimo et al., 1997). Few initiatives have been aimed at developing sectoral indicators, although some attempt has been made to develop sectoral indicators for agriculture, forestry, transport and energy (Obst, 2000). In South Africa, indicators are currently being developed for national state-of-the-environment reporting (CSIR et al., 2001) and for forestry (NFAC, 2001). It is uncertain to what extent an attempt has been made to develop indicators for catchment or water basin management, either within South Africa or internationally. This paper provides the results of a review to establish what progress has been made towards development of