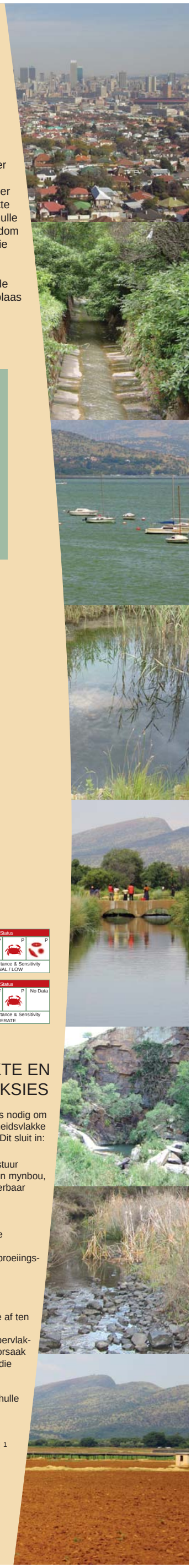
# Crocodile (West) Marico Water Management Area

# RIVER HEALTH



The River Health Programme, under custodianship of the Department of Water Affairs and Forestry (DWAF), the Department of Environmental Affairs and Tourism and the Water Research Commission, monitors, assesses and reports on the biological condition of river ecosystems and the human-induced disturbances affecting them. This information will be used to support sound river management, as well as inform and educate South Africans regarding the health of our rivers. The EcoStatus of the majority of the study units surveyed in the Crocodile (West) Marico Water Management Area (WMA) is **POOR**.

About 25% of the Gross Domestic Product of South Africa originates from this highly developed WMA. The industrial, mining and agricultural sector depend on and place high demands on the water resources in this area.

Die Riviergesondheidsprogram, oftewel die "River Health Programme" (RHP), onder beheer van die Departement Waterwese en Bosbou (DWAF), die Departement Omgewingsake en Toerisme en die Waternavorsingskommissie, moniteer, evalueer en doen verslag oor die biologiese stand van rivierekosisteme en die mensgemaakte versteurings wat dit beïnvloed. Hierdie inligting lig Suid-Afrikaners in en onderrig hulle oor riviergesondheid en sal waterhulpbronbestuurders help om ingeligte besluite rondom die bestuur van riviere te neem. Die ekologiese stand van die meerderheid van die studie-areas in die Krokodil (Wes) Marico waterbestuursarea is **SWAK**.

Ongeveer 25% van SA se Bruto Nasionale Produk is van hierdie hoogs ontwikkelde gebied afkomstig. Die industrieë, mynbou en landbou is hoogs afhanklik van en plaas groot druk op die waterbronne in hierdie opvangsgebied.

## THE ECOLOGICAL ASSESSMENT OF RIVERS

The monitoring and assessment of the environmental condition, by using certain indicators, provide essential feedback on the state of our river systems.

The **ecological indicators** that form part of the RHP, include:

- ***In-stream Habitat Integrity*** - Impacts on in-stream features such as the modification of the volume of water, change in the flow regime (i.e. natural flow patterns), bed and channel modification, water quality, alien water plants, alien fauna that influences habitat directly and waste disposal.
- ***Riparian Zone Habitat Integrity and Riparian Vegetation Integrity*** - Impacts on riparian features such as the modification of the volume of water, change in the natural flow patterns, channel modification, water quality, reduction in vegetation and invasion by alien plants.
- ***Fish Assemblage Integrity*** - Characteristics of a fish assemblage portray longer-term changes in the condition of river habitats. These changes may be in response to alteration in river flows, changes in river structure or changes in the chemical composition of the water.
- ***Macro-invertebrate Integrity*** - Indicators of changes in water quality and habitat conditions over the short term. Aquatic macro-invertebrates include beetles, mussels, snails, crabs, worms and insect larvae.
- ***Water Quality*** - Conclusions from water quality preferences of dominant diatom species are used to support the assessment of water quality. Each diatom species has a specific water quality preference and tolerance.

The state of these indices are described in terms of a **health category** ranging between natural and poor, as described in the table below:

| River Health Categorisation | |
|---|---|
| **Category** | **Description** |
| Natural | No or negligible modification of in-stream and riparian habitats and biota |
| Good | Ecosystem essentially in good state; biodiversity largely intact |
| Fair | Sensitive species may be lost, with tolerant or opportunistic species dominating |
| Poor | Mainly tolerant species present or alien species invasion; disrupted population dynamics; species are often diseased |

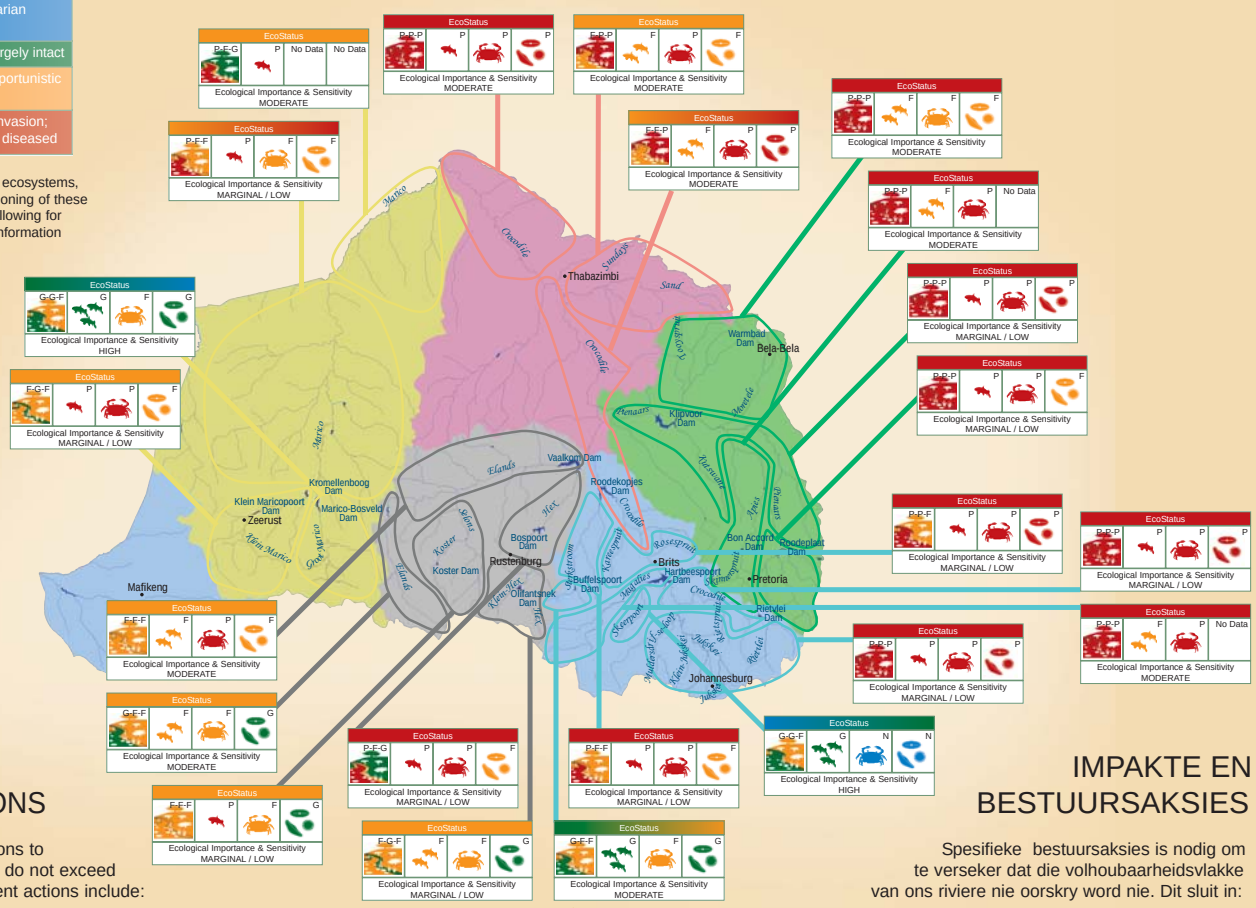
Together with other information about river ecosystems, we improve our understanding of the functioning of these resources and how to protect them while allowing for economic and social development. Other information include:

- The **Ecological state (EcoStatus)** which gives an overall impression of the ecological health of a river and is an indication of the capacity of the system to provide a variety of ecosystem services; and
- The **Ecological importance and sensitivity** which provides an indication of whether a river should receive a high level of protection or not.

This poster is a summary of the tenth South African *State-of-Rivers Report: Monitoring and Managing the Ecological State of Rivers in the Crocodile (West) Marico Water Management Area.* It illustrates some of the major findings from biomonitoring surveys that took place during **April to August 2004**. This study was conducted by die RHP Task Teams of Gauteng, North West and Limpopo, together with DWAF: RQS.

In hierdie opsomming van die tiende Suid-Afrikaanse Stand-van-riviere-verslag: "*Monitoring and Managing the Ecological State of Rivers in the Crocodile (West) Marico Water Management Area*", word sommige van die hoof bio-moniteringsbevindinge soos waargeneem vanaf **April tot Augustus 2004** toegelig. Taakspanne van Noordwes, Gauteng, Limpopo en DWAF: RQS het aan hierdie studie deelgeneem.

## PRESENT ECOLOGICAL STATE




## IMPACTS AND MANAGEMENT ACTIONS

It requires specific management actions to ensure that the capacity of our rivers do not exceed sustainable levels. These management actions include:

*The riparian zone forms a buffer between the river and potential catchment impacts*

- Minimise future development within the riparian zone. Control and manage existing activities such as urban development, road construction, grazing and mining activities which, sometimes irreversibly, change the structure and functioning of the riparian zone [1, 2, 3, 4, 5, 10]
- Clear alien vegetation [1, 5, 6]

*Water resource quality and water quantity determine the capacity of a river to sustain development*

- Set water resource quality objectives for the rivers and monitor to ensure compliance [1]
- Improve farming practices: water abstraction; agricultural return flows pollute water resources [1, 3, 7]
- Adhere to licensing conditions for discharges [1, 7, 8, 10, 11]
- Upgrade sewage systems and improve their management [1, 10]

*Wetlands and groundwater form an integral part of the total water resource*

- Characterise, delineate and classify seeps, springs and palustrine wetlands within the WMA in order to derive their protection status [1, 3, 5, 9]
- Manage surface runoff at the source - impervious surfaces (roads, paving, roofs, etc.) that accompany urban development cause water that would naturally percolate into the ground to form rapid flowing surface runoff [1, 7, 10]

*Aquatic plants and animals have specific habitat requirements to exist*

- Control alien flora and fauna - alien fish cross breed and their feeding behaviour alter in-stream habitat [5]
- Install fish ladders and eelways in flow regulating structures - allow natural migration patterns; improve functional connectivity [5]
- Release water from dams to simulate natural flow patterns [1]
- Implement in-stream flow objectives; classify rivers to determine protection level required [1]

## IMPAKTE EN BESTUURSAKSIES

Spesifieke bestuursaksies is nodig om te verseker dat die volhoubaarheidsvlakke van ons riviere nie oorskry word nie. Dit sluit in:

*Rivieroewerareas vorm 'n buffer tussen die rivier en potensiële impakte in die opvangsgebied*

- Beperk toekomstige ontwikkeling in rivieroewerareas. Beheer en bestuur huidige praktyke soos voorstedelike ontwikkeling, padbou, weiding en mynbou, wat die struktuur en funksie van die rivieroewerareas soms onomkeerbaar verander [1, 2, 3, 4, 5, 10]
- Verwyder uitheemse plante [1, 5, 6]

*Beide die hoeveelheid water en hulpbronkwaliteit bepaal 'n rivier se vermoë om ontwikkeling vol te hou*

- Stel vereistes vir watergehalte en verseker nakoming deur gereeld te monitor [1]
- Verbeter boerderypraktyke: water onttrekking; die terugvloei van besproeiingswater besoedel die waterbron [1, 3, 7]
- Kom lisensievoorwaardes vir loslatings na [1, 7, 8, 10, 11]
- Verbeter die bestuur van rioolwerke en opgradeer waar nodig [1, 10]

*Vleilande en grondwater vorm 'n integrale deel van die totale waterhulpbron*

- Karakteriseer, klassifiseer en baken syferwater, fonteine en vleilande af ten einde hulle bewaringsstatus te bepaal [1, 3, 5, 9]
- Bestuur afloopwater by die oorspong daarvan - ondeurdringbare oppervlaktes, as gevolg van dorpsontwikkeling (paaie, plaveisel, dakke), veroorsaak vinnigvloeiende afloopwater wat onder natuurlike omstandighede in die grond sou insyfer [1, 7, 10]

*Waterplante en diere het spesifieke habitat voorkeure om te kan voortleef*

- Beheer uitheemse plant en dierspesies - uitheemse vis kruisteel en hulle voedingsgedrag verander die instroomhabitat [5]
- Bou vislere in vloeibeheerstrukture sodat natuurlike migrasiepatrone toegelaat en funksionele aaneenlopendheid verseker word [5]
- Bestuur damloslatings sodat natuurlike vloeipatrone nageboots word [1]
- Implementeer instroom vloeidoelwitte en klassifiseer riviere om te bepaal tot watter mate hulle beskerm moet word [1]

River Health Programme

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## RESPONSIBLE AUTHORITIES AND INDIVIDUALS

1 Department of Water Affairs and Forestry
2 Department of Environmental Affairs and Tourism
3 National Department of Agriculture
4 Department of Minerals and Energy
5 Provincial Departments of Conservation and Environmental Affairs
6 Working for Water
7 Landowners, farmers
8 Developers
9 Rural communities
10 District and Local Municipalities
11 Industry and Mining
12 Water User Associations and Future Catchment Management Agencies


environment & tourism — Department: Environmental Affairs and Tourism, Republic of South Africa
water & forestry — Department: Water Affairs & Forestry, Republic of South Africa
Province of the North West
Gauteng Provincial Government
Yunibesiti ya Bokone-Bophirima North-West University Noordwes-Universiteit Potchefstroomkampus (Pukke)
Anglo Platinum
Sustainable Development & Environment
CSIR