

National Biomonitoring Programme for Aquatic Ecosystems kicks off

Unanimous agreement at consultation planning meeting

The implementation of a National Biomonitoring Programme (NBP) for Aquatic Ecosystems, with rivers as its initial focus, was launched at a consultation planning meeting held on 17 September in Pretoria.

Affairs and Tourism (DEAT) who both joined the programme as custodians in the past year. They, assisted by the CSIR, Southern Waters, the Institute for Water Research and other consultants, have been working hard over the last two years to develop the conceptual framework for the programme. The conceptual design is now ready to be tested, modified where necessary, and implemented.

The consultation planning meeting was attended by representatives from provincial governments, conservation agencies,

bodies such as Rand and Umgeni Water and others.

Agreement was reached that this is a cost-effective and flexible way of monitoring the health of rivers

which will have many kinds of benefits.

Partnerships to encourage the sharing of resources were forged, and operational structures were proposed for the co-ordination, implementation and maintenance of the NBP.

Agreements for the way ahead

The meeting agreed on the following steps and structures for implementing a nation-wide programme:

A National Co-ordinating Committee, comprising representatives from the DWAF, DEAT and WRC was established as the core co-ordinating body for the programme. The Committee will be expanded to include regional and sectoral representatives, and scientific advisors.

Provincial Implementation Teams should be in charge of implementing and maintaining the NBP at a provincial level.

Provincial champions were appointed to carry forward the impetus established at the consultation planning meeting (see article on page 2).

Scientific advisors should be appointed to serve on the National Co-ordinating Committee, as early as possible in 1997.

A National Co-ordinator for the programme should be appointed, preferably by mid-1997. ■

There was unanimous agreement that the information that can be generated by biomonitoring would greatly assist in improving and conserving the health of river ecosystems, and that the Programme should go ahead.

The custodians of the programme are the Department of Water Affairs and Forestry (DWAF), who has been funding and coordinating the programme for the past three years, the Water Research Commission (WRC) and the Department of Environmental

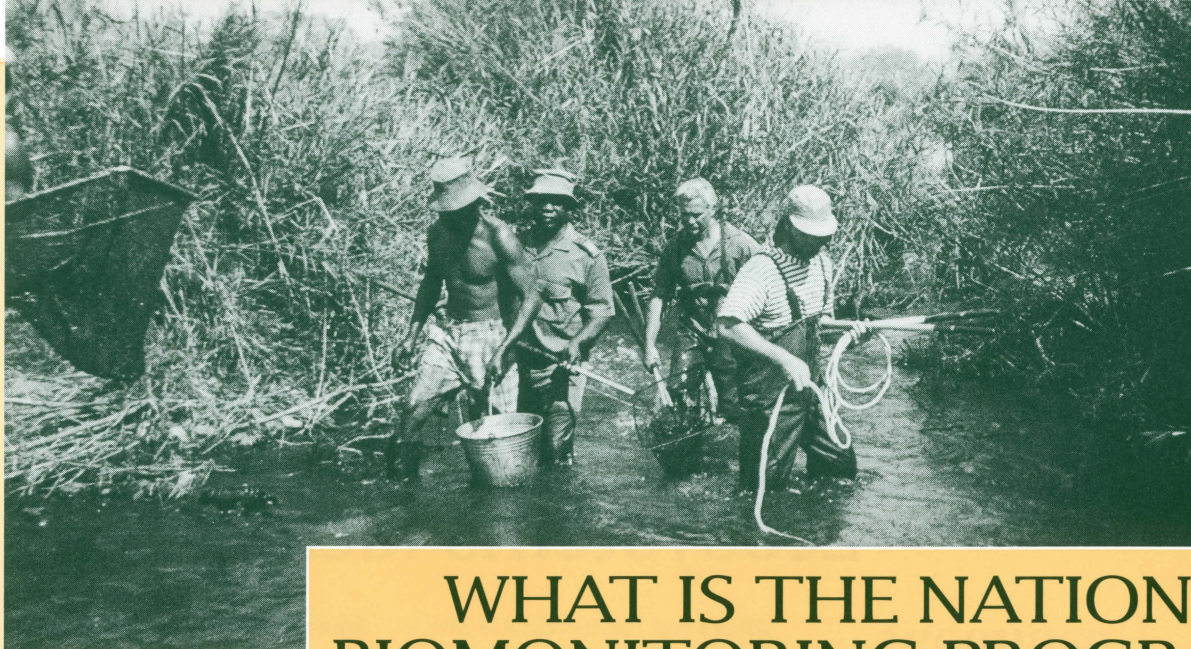
Published by
DEPARTMENT OF WATER
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HOW YOU CAN CONTRIBUTE

The success of the National Biomonitoring Programme depends upon the involvement of as many stakeholders in water resource management as possible. If you or your organisation would like to know more about the programme and how you can become involved, please contact:

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Fish monitoring in the Kruger National Park. Dr Andrew Deacon, the Park's aquatic specialist, says that biomonitoring at these sites is important to assess the impacts of pollution generated outside the park.

The ecological health of South Africa's river and

wetland systems is currently not well documented. It is crucial to have information available on ecosystem health if ecologically sound management objectives are to be set for South Africa's aquatic resources.

The ecological health of a system is best determined by the study of the fauna and flora living there. For instance, macro-invertebrates such as aquatic insects give a good indication of the short-term health of the system, whilst a study of fish communities or riparian vegetation can give an indication of the long-term health of the system. These are termed biological indicators, biotic indicators or bio-indicators.

The NBP is a nation-wide programme aimed at using biological indicators, in conjunction with the traditional physical and chemical indicators, to assess and monitor the health of South Africa's freshwater ecosystems.

It will be used to keep a finger on the pulse of aquatic systems, so that corrective action can be taken if a system is threatened or degraded. It is envisaged that all South Africa's major river systems will ultimately be included in the biomonitoring programme.

WHAT IS THE NATIONAL BIOMONITORING PROGRAMME FOR AQUATIC ECOSYSTEMS?

PROVINCIAL CHAMPIONS APPOINTED

The success of the NBP relies on the willingness of stakeholders to become actively involved in the process. In the initial stages of implementation much of the responsibility to involve stakeholders will rest on the shoulders of provincial champions.

Provincial champions (see box) were chosen at the recent consultation planning meeting held in Pretoria. They will liaise closely with the National Co-ordinating Committee and encourage participation in the NBP in their areas. Immediate programmes of action for each of the provinces have been identified, as outlined below.

GAUTENG

Training, especially of experts in the province; identification of roleplayers and their commitment to the process; zoning of areas to split the effort, and co-ordination of effort in the various zones.

NORTHERN PROVINCE

Setting provincial goals; standardisation of techniques, and using the NBP to promote opportunities for technicians in the province. Northern Province already has fish sampling sites that are regularly monitored, and can form the basis for a provincial monitoring programme.

MPUMALANGA

Bringing Mpumalanga's existing monitoring into the ambit of the NBP; identifying new monitoring and reference sites; disseminating information; determining the needs of the province; popular education with regard to the NBP, and identification of potential funding and financial support. Mpumalanga already has a series of fish as well as invertebrate monitoring sites.

FREE STATE AND THE NORTHERN CAPE

Electing a regional committee for the programme, and defining provincial needs in terms of training, capacity building and financial resources.

WESTERN CAPE

Making use of previous public participation drives in water resource management to educate people with regard to the NBP, and encouraging further participation through initial contact meetings.

EASTERN CAPE

Informing stakeholders; assessing provincial needs and resources; recruiting contributors; identifying priority rivers or catchments, and electing the provincial committee(s).

KWAZULU/NATAL

Identifying stakeholders and informing them of the programme; setting up the correct NBP management and implementation structures, and identifying provincial needs.

PROVINCIAL CHAMPIONS FOR THE NBP

We invite you to be in touch with the provincial champion in your area if you are interested in becoming involved:

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The benefits of using biomonitoring to assess ecosystem health are numerous

Although biomonitoring per se has little predictive capability and should not be used to establish causal relationships, biological indicators give a direct and integrated measure of ecosystem health. They give an indication of conditions of the river over the lifetime of the organisms being measured.

Biomonitoring is a robust form of assessment, which can make use of low-tech methods, thus increasing cost-effectiveness. Additionally, results are most often instantaneous.

A RANGE OF TOOLS

Inevitably, the requirements of managers and the resources they have available to them differ from area to area.

A great advantage of using biological indicators is that biomonitoring offers a range of tools that can be tailored to particular purposes, as well as to the resources available.

For instance, more advanced eco-toxicological studies may indicate potential effects of specific pollutants on the environment, while the rapid assessment of macro-invertebrate communities using SASS (South Africa Scoring System) will indicate whether or not the ecosystem is suffering from organic or other pollution.

SUPPORTING MANAGEMENT DECISIONS

The NBP itself will have significant benefits for water resource management in South Africa. The information collected can be used to support assessments of the likely impacts of changes in water quality or flow regimes on the health of aquatic systems; formulation of ecologically sound environmental quality objectives, and regional and national audits of the status of aquatic environments.

THE BENEFITS OF BIOMONITORING

The experience gained from this programme can contribute to developing protocols for ecological investigations on a catchment, reach or site-specific level.

VARIETY OF ADVANTAGES

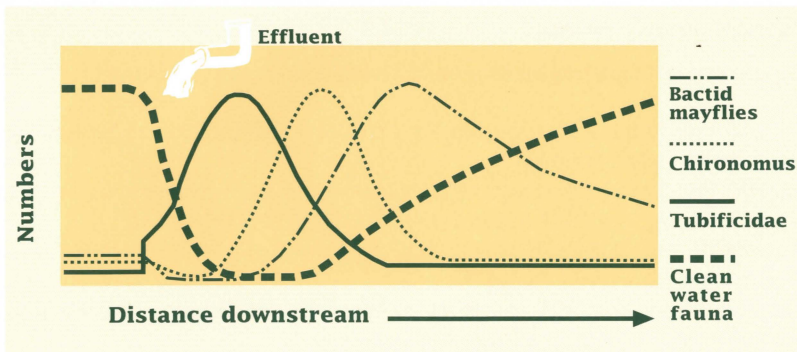
Although the NBP will be primarily designed to meet the information requirements of water resource managers, it has advantages for a variety of organisations, each with a different mandate.

So, for instance, state-of-the-environment information assists the Department of Environmental Affairs and Tourism to fulfil its national and international obligations. The Ramsar Convention, which South Africa has ratified, aims to stem the loss of wetlands, promote their wise use and afford special protection of listed wetlands.

Geoff Cowan of the DEAT says that the Department will be delighted if wetland areas are included in the NBP. The information could assist in more effective management of wetlands in South Africa through more informed decision-making with regard to wetland conservation.

At a provincial level, the programme will assist nature conservation authorities to identify top-priority conservation sites in the catchments under their jurisdiction, as well as encourage the participation of local conservation bodies and promote research.

It will also form a valuable information base to assist organisations such as the Development Bank of Southern Africa to make strategic funding and development-support decisions.



A graphical description of the response of a river to the effluent from sewage outfall (adapted from Allanson 1995). This clearly indicates the changes in invertebrate community structure with the introduction of organic pollution. In terms of biomonitoring, the SASS scores will drop just below the sewage outfall, and improve gradually downstream as the river recovers.

BIOMONITORING: WHAT ARE THE FIRST STEPS?

**A biomonitoring
programme has two
vital components:**

■
where to measure

■
what to measure.

WHERE TO MEASURE

The criteria used for selecting biomonitoring sites will determine, to a large degree, what the data collected at a particular site can be used for. For example, different site-selection rules may be used if the monitoring objective is to assess the impact of development on a river reach than when the objective is to report on the "state of rivers" in South Africa.

Southern Waters has, for the biomonitoring programme, developed a site-selection protocol which will support state-of-the-environment reporting. This protocol is based on a spatial classification scheme, resulting in geographical areas within which it is valid to compare data from different sites.

No single classification system can ensure that all natural variability is taken into account. A three-tiered hierarchy of classification has been developed, as follows:

STEP 1 :

Identify bioregions to account for variation due to broad-scale distribution patterns of fish, invertebrates and riparian vegetation. This has already been done for South Africa through a recent workshop (see NBP Report Series No. 2 in the Publications list).

STEP 2 :

Identify subregions to account for variation due to river zonation (e.g. mountain streams, foothill rivers and lowland rivers).

STEP 3 :

Identify river types according to other elements of the remaining variation (e.g. perennial or non-perennial streams).

This will help to determine homogenous areas of a region within which data from different sites can be compared.

SITE SELECTION

There are two types of site that can be chosen.

Reference sites are selected at relatively unimpacted sites (as close to pristine as possible), and through monitoring at these sites, the best available physical habitat, water quality and biological conditions are determined for each type of river.

Monitoring sites: In the state-of-the-environment reporting, monitoring sites are randomly-selected impacted or unimpacted sites that will reveal a range of conditions in rivers of a certain kind. In the case of problem area monitoring, sites are chosen to assess the impact of specific perturbations.

*Reference sites
represent the best condition
that can be achieved
in a river of a
particular kind,
against which the
conditions found at the
monitoring sites
in the same kind of river
can be assessed
(see NBP Report 3).*

WHAT TO MEASURE

What to measure depends on the resources available, the information required and on the availability of measuring techniques which have been tested and verified for use in a biomonitoring programme.

The Institute for Water Research has completed a study on "what to measure", recommending certain protocols for selecting biological indicators or indices. The indicator selection protocols propose a degree of flexibility in the number of indicators used in the NBP - this is to accommodate varying levels of resources and expertise in different regions.

The indicator selection protocols range from the simplest protocol where the SASS benthic macro-invertebrate index together with an index of habitat quality are used, to the most comprehensive level where indices of fish community health, riparian vegetation, river geomorphology, hydrology and chemical-physical water quality are added. Some of these indices, however, still require a considerable amount of developmental work before they can be applied (see NBP report No 4).

P U B L I C A T I O N S A V A I L A B L E

Several publications have already resulted from the NBP. These are valuable for background information and for providing guidelines to initiating a monitoring programme.

- Hohls DR. 1996. National Biomonitoring Programme for Riverine Ecosystems: Framework document for the programme. NBP Report Series No 1. IWQS, DWAF, Pretoria.
- Brown CA, Eekhout S & King JM. 1996. National Biomonitoring Programme for Riverine Ecosystems: Proceedings of spatial framework workshop. NBP Report Series No 2. IWQS, DWAF, Pretoria.
- Eekhout S, Brown CA & King JM. 1996. National Biomonitoring Programme for Riverine Ecosystems: Technical considerations and protocol for the selection of reference and monitoring sites. NBP Report Series No 3. IWQS, DWAF, Pretoria.
- Uys MC, Goetsch P-A & O'Keeffe JH. 1996. National Biomonitoring Programme for Riverine Ecosystems: Ecological indicators, a review and recommendations. NBP Report Series No 4. IWQS, DWAF, Pretoria.

**These documents can be obtained from: Liesl Hill Institute for Water Quality Studies Private Bag X313 Pretoria, 0001
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