

National Aquatic Ecosystem
Biomonitoring Programme

**An Implementation Manual
for the River Health
Programme – a hitch hiker’s
guide to putting the RHP
into action**

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CONTENTS

ACKNOWLEDGEMENTS	i
CONTENTS	iii
LIST OF ABBREVIATIONS	vi
GLOSSARY OF TERMS	ix
FOREWORD	xiii
1. INTRODUCTION	1 - 1
2. LEGAL CONTEXT	2 - 1
2.1 National Water Act (NWA).....	2 - 1
2.1.1 Sections of the NWA relevant to the RHP.....	2 - 2
2.2 National Environmental Management Act (NEMA).....	2 - 2
2.2.1 Relevant sections of NEMA for the RHP:.....	2 - 2
2.3 Provincial Ordinances.....	2 - 3
2.4 Legal powers of the RHP.....	2 - 3
3. RESEARCH AND DEVELOPMENT	3 - 1
4. REGISTERING YOUR PROVINCIAL RHP PROGRAMME	4 - 1
4.1 Registration with the national RHP NCT.....	4 - 1
4.2 Registration with DWAF IWQS.....	4 - 1
5. RIVER HEALTH CHAMPION	5 - 1
5.1 Roles and responsibilities of the River Health Champion.....	5 - 1
6. FORMING THE PROVINCIAL IMPLEMENTATION TEAM (PIT)	6 - 1
6.1 Ideal composition of the PIT.....	6 - 1
6.2 Roles and responsibilities of the PIT.....	6 - 1
7. FORMING THE PROVINCIAL MONITORING TEAM (PMT)	7 - 1
7.1 Selection of suitable monitoring personnel - aptitudes, interests and background.....	7 - 1
7.2 Important considerations for field personnel.....	7 - 1
8. TRAINING AND SKILLS DEVELOPMENT	8 - 1
9. COMMUNICATION	9 - 1
9.1 Internal channels of communication.....	9 - 1
9.2 External channels of communication.....	9 - 1
10. PROMOTION AND MARKETING	10 - 1
10.1 Identification of clients and stakeholders.....	10 - 1
10.1.2 Your potential target audience should include:.....	10 - 1
10.2 Content and style of promotional and marketing initiatives.....	10 - 1
10.3 Choosing the medium for promotion and marketing.....	10 - 2
11. PUBLIC PARTICIPATION	11 - 1
11.1 Guiding Principles for Public Participation.....	11 - 2

12. EQUIPMENT	12 - 1
12.1 Basic RHP equipment	12 - 1
12.2 Equipment for sampling invertebrate fauna using SASS4*	12 - 1
12.3 Equipment for sampling for fish using the Fish Assemblage Integrity Index (FAII)	12 - 2
12.3.1 Electroshockers	12 - 2
12.3.2 Additional fish sampling equipment required	12 - 3
12.4 Riparian Vegetation Index (RVI)	12 - 3
12.5 Equipment required for the other RHP indices	12 - 3
12.6 Additional RHP equipment to consider	12 - 3
12.7 Storage and maintenance of equipment	12 - 4
12.7.1 Storage	12 - 4
12.7.2 Maintenance	12 - 4
13. VEHICLES	13 - 1
14. COMPUTER HARDWARE AND SOFTWARE	14 - 1
14.1 Computer hardware requirements	14 - 1
14.2 Software requirements	14 - 1
14.2.1 Rivers Database	14 - 1
14.2.2 Geographical Information Systems (GIS)	14 - 2
15. FUNDING YOUR RHP	15 - 1
15.1 Potential RHP funding sources	15 - 1
16. PLANNING YOUR RHP	16 - 1
16.1 RHP Implementation Plan	16 - 1
16.1.1 RHP Implementation Plan - key components	16 - 1
16.2 RHP Business Plan	16 - 2
16.2.1 Business Plan - key components	16 - 2
17. HOW TO START: “IMPLEMENTING” YOUR RHP IMPLEMENTATION PLAN	17 - Error! Bookmark not defined.
17.1 Selecting a test river catchment for the pilot phase	17 - 1
17.2 Site selection in your test catchment	17 - 1
17.2.1 Reference sites	17 - 3
17.2.2 Monitoring sites	17 - 4
18. MONITORING PROGRAMME AND SAMPLING FREQUENCIES	18 - 1
18.1 Selection of biomonitoring indices for your monitoring programme	18 - 1
18.1.1 Developmental status of the RHP Indices	18 - 1
18.1.2 Biomonitoring Protocols	18 - 2
18.2 Monitoring frequency	18 - 2
19. DATA STORAGE AND INFORMATION MANAGEMENT	19 - 1
19.1 Data Storage	19 - 1
19.2 Information Management	19 - 1
19.3 Information security and user access	19 - 2
20. ANALYSIS AND INTERPRETATION OF RESULTS	20 - 1
21. REPORTING	21 - 1
21.1 Potential Audiences	21 - 1
21.2 Types of environmental reporting to which the RHP can contribute	21 - 2

22. MANAGEMENT ACTIONS	22 - 1
23. QUALITY CONTROL AND ASSURANCE.....	23 - 1
24. ADDITIONAL CONSIDERATIONS.....	24 - 1
24.1 The RHP and transboundary rivers and shared catchments	24 - 1
24.2 International river systems.....	24 - 1
24.3 Collaborating with the State-of-Rivers (SoR) initiative	24 - 1
24.4 Linking your RHP with existing conservation and biodiversity programmes.....	24 - 1
24.5 Working-for-Water programme	24 - 2
25. ORGANISATIONS OFFERING SUPPORT FOR THE RHP	25 - 1
26. LIST OF CONTACTS.....	26 - 1
27. USEFUL READING.....	27 - 1
28. REFERENCES	28 - 1

LIST OF FIGURES

Figure 1. Fundamental steps to RHP implementation.....	1 - 2
Figure 2. Identifying stakeholders from each of the three dimensions of sustainability (economic growth, social equity, ecological integrity) (Greyling and Manyaka, 1999).....	11 - 1
Figure 3. A model for public participation (adapted from Greyling and Manyaka, 1999).....	11 - 2
Figure 4. The site selection process (adapted from Dallas, 2000).	17 - 1
Figure 5. Proposed protocol for deriving ecological reference conditions for riverine macroinvertebrates (adapted from Dallas, 2000).	17 - 3
Figure 6. Information transfer using the Rivers Database system (local, regional, national) (adapted from Fowler <i>et al.</i> 2000).	18 - 1
Figure 7. A diagram for the instituting management actions for the RHP.....	22 - 1

LIST OF TABLES

Table 18.1. RHP Biomonitoring indices.....	18 - 1
Table 18.2. The range of Biomonitoring Protocols and associated indices.....	18 - 2
Table 18.3. The application of biomonitoring indices and suggested monitoring frequencies.	18 - 3

LIST OF APPENDICES

Appendix 1. An example of a gant chart for RHP pilot implementation in a test catchment	1
Appendix 2. An example of a RHP Business Plan.....	1

LIST OF ABBREVIATIONS

ASPT	Average Score Per Taxon (Invertebrates)
BP1-5	Biomonitoring Protocol 1 to 5
CMA	Catchment Management Agency
DEAT	Department of Environmental Affairs and Tourism
DWAF	Department of Water Affairs and Forestry
FWI	Department of Freshwater Invertebrates, Albany Museum
FAII	Fish Assemblage Integrity Index
FCII	Fish Community Integrity Index
GI	Geomorphological Index
HI	Hydrological Index
I&AP	Interested and Affected Parties
IHAS	Invertebrate Habitat Assessment System
IHI	Index of Habitat Integrity
IWQS	Institute of Water Quality Studies
IWR	Institute of Water Research (Rhodes University)
NAEBP	National Aquatic Ecosystem Biomonitoring Programme
NEMA	National Environmental Management Act
NCC	National Coordinating Committee
NCT	National Coordinating Team
NWA	National Water Act
NWRS	National Water Resource Strategy
PIT	Provincial Implementation Team
PMT	Provincial Monitoring Team
PP	Public Participation
QC/QA	Quality Control/Quality Assurance
R&D	Research and development
RHP	River Health Programme
RVI	Riparian Vegetation Index
SASS4	South African Scoring System version 4
SoE	State of the Environment
SoR	State of Rivers
WMA	Water Management Area
WMS	Water Management System (as used by DWAF IWQS)
WQI	Water Quality Index
WUA	Water User Association
WRC	Water Research Commission

GLOSSARY OF TERMS

Aquatic ecosystems. Ecosystems which provide a medium for habitation by aquatic organisms and sustain aquatic ecological processes.

Anthropogenic. Resulting from the presence or activities of humans.

Benthic. Living on the bottom substrata (sediments, debris, logs, cobbles, etc.) of aquatic biotopes.

Biological River Segment. A portion of a river in which the fish community remains generally homogenous due to the relatively uniform nature of the physical habitat.

Biomonitoring. The gathering of biological information in both the laboratory and the field for the purpose of making an assessment or decision or in determining whether quality objectives are being met.

Biodiversity. The array of life from gene to species to communities and associated habitats. Biodiversity comprises composition, structure and function. Composition is the identity and variety of elements in a collection, and includes species lists and measures of species diversity and genetic diversity. Structure is the physical organization or pattern of a system, from habitat complexity as measured within communities to the pattern of patches and other elements at a landscape scale. Function involves ecological and evolutionary processes, including gene flow, disturbances, and nutrient cycling.

Bioregions. Geographical regions delineated by South African river scientists as the first level of an hierarchical classification of the rivers of the country. The rivers within each bioregion were considered, on the basis of expert opinion, to be similar in terms of physical and biotic characteristics.

Biota. Animal and plant life characteristic of a given region.

Biotic Integrity. The ability to support and maintain a balanced, integrated, adaptive community of organisms having a full range of elements (genes, species and assemblages) and processes (mutation, demography, biotic interactions, nutrient and energy dynamics and metapopulation processes) expected in the natural habitat of the region.

Biotope. A homogeneous environment that satisfies the habitat requirements of a biotic community (e.g. riffle, pool or sandbank).

Catchment. The area from which any rainfall will drain into a watercourse through surface flow.

Catchment Management Agency. A statutory body established by the Minister of Water Affairs to delegate water resource management to a local level and to involve local communities. They may be established for specific geographical areas, after public consultation, on the initiative of the community and stakeholders concerned.

Diffuse-source Pollution. Pollution that comes from a wide area, such as fertilisers draining off farmlands or pollutants in the runoff from urban areas (also known as non-point source pollution).

Ecological Indicator. Measurable attribute of a high-level ecosystem component (biological, chemical or physical). A high-level biological component would typically be either fish, invertebrates or riparian vegetation. (For example, one measurable attribute of fish is frequency of occurrence at a series of sites.) A high-level non-biological component might be either habitat, water quality or geomorphology. (One measurable attribute of geomorphology is bank stability.)

Ecological Index. A single quantitative value that incorporates the information contained in a number of related ecological indicators. It is based on field data that are simple to collect and it provides a meaningful and accurate representation of the river condition for a high-level ecosystem component. The purpose is to simplify the interpretation of the indicators and hence make them more understandable to non-specialists such as resource managers, conservationists and the general public.

Ecological Integrity. The ability of and ecosystem to support and maintain a balanced, integrated composition of physicochemical habitat characteristics, as well as biotic components, on a temporal and spatial scale, that are comparable to the natural (i.e. unimpaired) characteristics of such an ecosystem. (High ecological integrity implies that the structure and functioning of an ecosystem are unimpaired by anthropogenic stresses.)

Ecoregions. Geographic regions grouped together on the basis of shared similar characteristics, such as geology, rainfall, vegetation and altitude.

Ecosystem. Any unit that includes all of the organisms (i.e. the community) in a given area interacting with the

physical environment so that a flow of energy leads to clearly defined trophic structure, biodiversity and material cycles (i.e. exchange of material between living and non-living parts) within the system.

Ecosystem Health. A value judgement of the overall condition of an ecosystem.

Geomorphology. The study of the origin of secondary topographic features which are carved by erosion in the primary elements and built up of the erosional debris.

Groundwater. Water found underground, typically supplying wells, boreholes, and springs.

Habitat Integrity. The maintenance of a balanced, integrated composition of physicochemical and habitat characteristics on a temporal and spatial scale that are comparable to the characteristics of natural habitats of the region.

Hydraulics. The branch of science and technology concerned with the mechanics of fluids.

Hydrology. The science that treats the occurrence, circulation, distribution, and properties of the waters of the earth, and their reaction with the environment.

Infrastructure. The basic structure of an organisation, system, etc.

Integrated Catchment Management. Environmental considerations are fully integrated into the management of all activities within a catchment in order to achieve a desirable balance between conservation and development

Integrated Environmental Management. A code of practice ensuring that environmental considerations are fully integrated into the management of all activities in order to achieve a desirable balance between conservation and development.

Invertebrate. An animal lacking backbone and internal skeleton.

Macroinvertebrates. Invertebrates retained by mesh size 200 µm.

Monitoring Site. Sites identified as important in assessing the condition (i.e. available habitat, water quality and biological parameters) of a river or reach, relative to a reference site. For State-of-Environment reporting, monitoring sites are randomly selected sites to assess the range of conditions prevailing in rivers.

Morphology. The form and structure.

Perennial. All year round.

Provincial Implementation Team. A group of people involved in implementing the RHP provincially.

Provincial Monitoring Team. A group of people charged with RHP monitoring provincially using the indices of ecosystem health.

Point-source Pollution. Pollution that comes from a single source, such as a pipe.

Pool. A feature with slow through-flow of water (low or zero velocity,) generally deep relative to river size.

Reference Condition. A benchmark of the best attainable ecological conditions for a specific type of river.

Reference Site. A site that has been exposed to relatively little or no anthropogenic impact that can be used to define the best physical habitat, water quality and biological parameters for a particular kind of river. These sites represent the best condition that can be achieved in a particular kind of river, against which the conditions found at the monitoring sites in the kind of river can be assessed.

Riffle. A shallow, fast-flowing reach of a river with turbulent flow and broken water.

Riparian. Living or located on the banks of streams or rivers.

River Forum. A group of interested and affected parties living within a river catchment which have come together to address common issues

Run. An area of transition between a pool/rapid and riffle. Depth is variable and velocity is generally moderate.

Runoff. Water that does not filter into soil but flows over the surface and into natural surface waters.

Site-specific. Unique or specific to a certain locality.

State-of-the-Environment Reporting. Detailed reporting on the current state of the biophysical components of the environment (i.e. air, land, water and oceans) and on the social, economic and political activities that impact on these resources.

Stressor. Any physical, chemical or biological entity or process that can induce adverse effects on individuals, populations, communities or ecosystems.

Surface Water. Water above the ground surface in lakes, dams, rivers and pans.

Suspended Solids. Inorganic or organic matter, such as clay, minerals, decay products and living organisms, that remains in suspension in water. In surface waters it is usually associated with erosion or runoff after rainfall events.

Sustainable Development. Integrating social, economic and environmental considerations into planning, implementation and decision-making to ensure that development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Turbidity. A measure of the light-scattering ability of water. It indicates the concentration of suspended solids in the water.

Water Board. An organ of state established or regarded as having been established in terms of the Water Services Act (No 108 of 1997) to perform, as its primary activity, a public function. This includes a “water services provider” who provides water services institution, but does not include a water services intermediary. The National Water Act (No 36 of 1998) provides for the restructuring of water boards as water user associations.

Watercourse. A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows.

Water Management Area. A geographical area demarcated i.t.o. National Water Act to be administered by the relevant Catchment Management Agency.

Water Management Institution. A catchment management agency, a water user association, a body responsible for international water management or any person who fulfills the functions of a water management institution in terms of the National Water Act (No 36 of 1998).

Water Resource. Includes the physical or structural aquatic habitats (both instream and riparian), the water, the aquatic biota, and the physical, chemical and ecological processes which link habitats, water and biota.

Water User Association. Co-operative associations of individual water users who wish to undertake water-related activities for their mutual benefit. They operate at a restricted local level.

FOREWORD

The intention of this manual is to serve as a recipe or cookbook to guide those involved in putting the RHP into action. It is designed to complement the *National Implementation Assessment* NAEBP Report Series No.8 (Murray, 1999) and *Overview of the design process and guidelines for implementation* NAEBP Report Series No6 (Roux, 1997) by providing practical insights into implementing the RHP programme.

In so doing, it strives to bridge the gap between the theoretical components of the River Health Programme and the practical realities of getting a fully-fledged provincial River Health Programme up and running. Hence, it will (where possible) steer clear of the theoretical aspects of the programme and the scientific aspects of the biomonitoring indices as there is a large body of literature available for the user to consult on these topics.

As the RHP continues to grow in South Africa, so too will the wealth of insights and experiences in the practical implementation of the programme. Hence, it is believed that this first edition of the RHP implementation manual is the forerunner of future versions to complement the advancements of the RHP in South Africa. It is hoped that this manual will be of benefit to the many people out there who are planning to do or are doing River Health to develop their programme and reap the rewards of successful implementation.

