Guidelines for Catchment Management to Achieve Integrated Water Resources Management in South Africa

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WATER RESEARCH COMMISSION

GUIDELINES FOR CATCHMENT MANAGEMENT TO ACHIEVE INTEGRATED WATER RESOURCES MANAGEMENT IN SOUTH AFRICA

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PREFACE

Background to this Document

During the past decade, significant transformations in the field of water resources management in South Africa have been spurred by two sets of events:

- Growing awareness that the increased exploitation of water resources to meet rising water demands in South African catchments, as well as the intensification of concomitant impacts on water quality, necessitate fresh approaches to water management.
- The democratisation of the Republic of South Africa, initiated in the early 1990's, which brought the elimination of disparities between various sectors of South African society regarding access to resources, among which water is primary, to the forefront of the national agenda.

Primary among these transformations are, at the national level, the complete review of the Water Law of South Africa, and, at the international level, formal participation in the Water Sector of SADC (Southern African Development Community).

By March 1997 the Water Law Review process, which was structured around public participation as well as in-depth research, had yielded a number of Discussion Documents which would inform the formulation of a White Paper on a National Water Policy. Two of these Discussion Documents focus on aspects of Integrated Water Resources Management (IWRM) and, particularly, Integrated Catchment Management (ICM) (DWAF & WRC, 1996; DWAF, 1997; see page v for full references). The process leading up to their publication engendered intense interest in and debate on these topics among all sectors of the water management community.

Simultaneous with these far-reaching developments inside South Africa, there unfolded initiatives in SADC to promote the practice of Integrated Water Resources Management among member states, in conjunction with initiatives by the Global Water Partnership (GWP). The GWP comprises a collaborative effort by a range of development-funding agencies and recipient-governments to coordinate capacity-building projects in the water field according to mutually agreed strategic plans.

Knowing that the imminent publication of the White Paper on the National Water Policy would probably reset the debate on IWRM and ICM in the RSA, the Water Research Commission (WRC) commissioned a short-term consultancy to consolidate the current understanding of catchment management in South Africa into a set of "Guidelines for the Development of Catchment Management Plans as Essential Building Blocks for IWRM". Prof AHM Görgens of the Department of Civil Engineering, University of Stellenbosch, was asked in March 1997 to convene a small Core Team of professional practitioners and academics in fields relevant to catchment management to draft the Guidelines, using only readily-available information and within a time-frame of a few months. The Team comprised:

+ *Prof AHM Görgens* (Convenor),
  Department of Civil Engineering, University of Stellenbosch
+ *Ms R Bengu*,
  Ubuntu Development Consultants, Pietermaritzburg
+ *Dr A Grobicki*,
  Abbott & Grobicki (Pty) Ltd, Consultants in Policy Analysis and Environmental Management, Cape Town
+ *Prof L Loots*,
  Department of Economics and Management Sciences, University of the Western Cape
+ *Dr G C Pegram*,
  Sigma Beta, Nelspruit
+ *Mr A Tanner*,
  Ninham Shand (Pty) Ltd, Consulting Engineers, Pretoria
+ *Adv M Uys*,
  Advocate of the Supreme Court, Malelane.

Additional to the Core Team, a small group of knowledgeable individuals were identified who could provide informed comment on the draft document. This Review Group comprised public officials, consultants, academics and other practitioners in fields related to catchment management. Their names appear in the Appendix to this document. Their comments and suggestions were gratefully received and incorporated, where appropriate. However, the contents of this document, including errors of omission or commission, remain the sole responsibility of the Core Team members.

The Study Process

The limited time frame and budget available for the study necessitated a fairly condensed study process. The Core Team met as a whole for two one-day Workshops, the first on 15 April 1997 to conceptualise the study and its deliverables, and the second on 23 May 1997 to formulate the details of the individual Guidelines and to evaluate the implications of the freshly-published White Paper on a National Water Policy. Before and between these two Workshops individual Core Team members prepared Discussion Papers on specific topics and had interviews with a limited number of practitioners in relevant professional and research fields, while on a number of occasions *ad hoc* discussions took place between two or three Core Team members. As this study unfolded, four conceptual adjustments of the original approach were required:

+ It was soon realised that the aforementioned brief for the study was too limited in that it raised the profile of the Catchment Management *Plan* at the expense of the Catchment Management *Process*, whereas the *Plan* is but an element of the *Process*. The viability of water resource management in a catchment would depend more on the Process than on the Plan; consequently, the brief was rephrased to focus on Guidelines for the complete Catchment Management Process.

+ Parallel to the circulation of the first draft of this document, the drafting process of the New Water Bill got underway. In the Draft Bill the term *Catchment Management Strategy* was preferred to *Catchment Management Plan*; however, *Plan* appears to be very much imbedded in general usage. Consequently, the double term *Strategy/ Plan* has been adopted for the final version of this document.

+ The White Paper on National Water Policy , published during the study, *inter alia* proposed an institutional framework for catchment management that seemed inadequate to ensure growth towards "ideal" ICM. This represented a "new" reality that had to be accommodated in this document in the form of legislative guidelines to promote such growth.

+ The limited time-frame and resources for this study would not enable the Core Team to track all the requirements and stages of "ideal" ICM, nor would their relatively limited experience; therefore the Guidelines proposed here cannot claim to go beyond promoting a form of *Catchment Management that is focused on integrated water resource management on a catchment basis, but with recognition of the mutual and sensitive dependence of water, land-use and aquatic ecology management.*

The Anatomy of this Document

This document comprises three Parts. Part I provides a condensed overview of the concepts and issues surrounding IWRM in a South African context and can be seen as a *conceptual framework* for the material presented in the rest of the document. Part II represents the "business end" of the document, where *Guidelines* are proposed for all the stages of the Catchment Management Process, as well as for higher-level management focal points such as the need for a vision for the catchment's future, public participation and legal and funding frameworks. Part III takes the reader several steps closer to the management process through a hypothetical Catchment Management Strategy/ Plan for a hypothetical catchment.

It needs to be recognised that the Guidelines proposed in Part II, though generic in terms of the situation in the Republic of South Africa, may not be directly suitable for any other particular SADC country, and may need a number of modifications for general SADC applicability. When it is considered that as much as 70% of the SADC land area comprises shared river basins, then the need for capacity-building regarding integrated water resource management across national boundaries becomes self-evident. Unfortunately, the required time frame and available resources for this undertaking did not allow consideration of the water management situation in, or needs of, the SADC region in general.

The Discussion Papers

The Discussion Papers by Core Team members on individual topics in essence formed the foundations for the Guidelines in Part II. During circulation of the first drafts of this Guideline document, these Papers were included as appendices to illuminate the debate that underlies individual Guidelines. For reasons of economy, and also because some of the material in these Papers has been overtaken by events in South Africa, the Discussion Papers are not included in the final draft of this document. However, for the benefit of the reader who may want to assess the origins of the Guidelines, their titles are provided below. Copies of the Discussion Papers are available from the Water Research Commission. The Discussion Papers are:

- *The experience of catchment management in South Africa*, by GC Pegram.
- *The Catchment Management Plan*, by GC Pegram.
- *Classification of catchments by land-use: Issues for catchment management*, by A Grobicki.
- *Legal guidelines for catchment management*, by M Uys.
- *Economic and financial guidelines*, by L Loots and M Shur.

- *Background provided by the , "National Water Policy for South Africa"*, by A Tanner
- *Community participation and consultative infrastructure*, by R Bengu.

The Legacy of Preceding Studies

Invaluable conceptual development regarding IWRM and ICM took place in various South African studies during the past few years, some of which underlay the Water Law Review. In this study heavy reliance was placed on the insights emanating from documents produced by the forementioned studies. Considerable paraphrasing of material in these documents was employed in formulating Part I below. To promote the flow of the discussion, specific references to individual sources have been omitted from Part I. Therefore, acknowledgements of the three main sources are given here:

+ *The Philosophy and Practice of Integrated Catchment Management: Implications for Water Resource Management in South Africa*, 1996, Department of Water Affairs and Forestry (DWAF) and Water Research Commission (WRC).

+ *Research into Alternative Institutional Models for Integrated Water Resource Management in South Africa*, 1997, Department of Water Affairs and Forestry.

+ *Integrated Water and Land Management in South Africa*, 1996, M A Rabie, SA Public Law (1996), (11), pp 322 - 354.

The Arrow of Time

The arrow of time flies particularly rapidly in the sphere of transformation of water management in South Africa. By the time of publication of this document, some of the material in this document may already have been overtaken by insights yielded by many different strands of the transformation process, ranging from the outcome of the rapid drafting of the new National Water Bill and the re-positioning of DWAF, to implementation studies in preparation of the Bill's promulgation, to many "bottom-up" Catchment Management actions driven by the collaborative efforts of concerned inhabitants of particular catchments. This document should therefore not be seen as an all-encompassing manual on Catchment Management, but rather as one further step, at a particular moment, along South Africa's unfolding journey towards wiser resource management.

GUIDELINES FOR CATCHMENT MANAGEMENT TO ACHIEVE INTEGRATED WATER RESOURCES MANAGEMENT IN SOUTH AFRICA

PART I

THE CONCEPTUAL AND INSTITUTIONAL CONTEXT

1. Objectives and Intended Audience

The objectives of this document are:

- *to consolidate and present current South African understanding of the primary facets of catchment management processes that are appropriate for the achievement of Integrated Water Resource Management*

- *to formulate generic Guidelines for Catchment Management, based on this understanding, which can serve to outline the opportunities in and build capacity for situations where a Catchment Management Process is planned or in progress*

- *to provide guiding criteria for the effective constitution and functioning of Catchment Management Structures appropriate for the achievement of Integrated Water Resource Management on a catchment basis in South Africa*

- *to build insight into the primary facets, role and importance of the Catchment Management Strategy/ Plan in Integrated Water Resource Management on a catchment basis.*

The intended audience for this document comprises the following:

- *officials of DWAF, other national and provincial government departments and local authorities, as well as of Catchment Management Structures*, who are tasked with the implementation of a statutory form of CM under the new Water Act

- *participants in planned or existing Catchment Management Processes*, such as water users, water suppliers, effluent dischargers, land-use managers and any other stakeholders associated with Catchment Management Structures
- *politicians and administrators*, who need to be informed as to the administrative, social, technical and financial implications of CM.

2. Key Concepts

In recent years certain key concepts have emerged from research and debate surrounding the topics of integrated water resource management and catchment management processes. As can be expected in such a complex and dynamic field, the contents and usages of these concepts have not necessarily been uniform or consistent. For the purposes of this document it was necessary to arrive at a consistent usage of such key concepts and these definitions are presented below:

- *Any particular **Water Resource** consists of an indivisible complex of naturally occurring surface water or groundwater, related aquatic and riparian ecosystems, certain related catchment characteristics, and return flows from upstream human water use activities.*

- ***Sustainable Water Resource Use** occurs where, with effective management and allowing for temporal rainfall and runoff/recharge variability, the rate of resource withdrawal, consumption or depletion is always equal to or exceeded by the rate of resource replenishment, while maintaining certain selected and agreed characteristics of the resource (e.g. water quality, biological diversity, degree of resilience to external disturbance or change).*

- ***Integrated Water Resource Management (IWRM)** is simultaneously a philosophy, a process and an implementation strategy to achieve equitable access to and sustainable use of water resources by all stakeholders at catchment, regional, national and international levels, while maintaining the characteristics and integrity of water resources at the catchment scale within agreed limits.*

- ***Integrated Catchment Management (ICM)**, in its widest sense, is simultaneously a philosophy, a process and an implementation strategy to achieve a sustainable balance between utilisation and protection of all environmental resources in a catchment and to grow*

a sustainable society through stakeholder, community and government partnerships in the management process.

- ***Catchment Management (CM)**, as foreseen by the National Water Policy, is simultaneously a philosophy, a process and an implementation strategy to achieve a sustainable balance between utilisation and protection of **water resources** in a catchment. Catchment Management recognises the need for mutual dependence of water, land-use and aquatic ecology management and for consensual participation by relevant stakeholders, communities and organs of state.*

- *The **Catchment Management Strategy/ Plan**, as foreseen by the National Water Policy, records a water-focused vision for the catchment and a water-focused mission for Catchment Management. It relates how real or perceived or potential water-related issues, and their associated land-use, social and aquatic ecology aspects, will be addressed through agreed management strategies within a specified time period in that specific catchment. It outlines an associated legislative, procedural and technical framework and programme of actions for implementation. It reflects stakeholder and government (national, provincial, local) commitments, responsibilities and accountabilities, and it requires legal status.*

3. Setting the Focus on Integrated Water Resource Management on a Catchment Basis

The government agency entrusted with custodianship of the water resources of South Africa is the Department of Water Affairs and Forestry (DWAF). Under the leadership of DWAF the pursuance of Integrated Water Resources Management has become the declared goal of water management at national, regional and catchment scales. The background to this position, as well as the related conceptual context, are outlined in the following paragraphs.

3.1 The Technical Challenge

Water is a vital natural resource that is not equitably distributed across the surface area of South Africa and whose availability displays high variability over time. Because of relatively low average rainfall, large parts of the country can also be described as inherently water-scarce. Furthermore, the historical patterns of industrial and agricultural development, as well as politically motivated social engineering, continue to cause a mismatch between locations of concentrated demand centres and available water resources. These physical realities, coupled with the country's need to develop, in a sustainable way, all its people economically and socially while redressing inequalities caused by past political policies,

present water resource managers with significant challenges. The situation is further complicated by the deterioration in water quality resulting from physical developments and human activities in most river basins. These pressures dictate strategic and urgent water resource planning and development initiatives at the national and regional scales, while delivery of water that is fit for use at the "local" catchment and sub-catchment scales needs to be accelerated. However, simultaneously, the "local" scale of water management has become an acute focus for South Africans - for non-technical reasons, as outlined below.

3.2 The Need for People-Oriented Water Management

The recent democratisation of South Africa has also impacted the philosophical environment of water management. People now feel a growing need to participate in, and contribute to, decision-making processes, partly due to their lack of trust in and the lack of legitimacy of previous delivery systems of social services. It has further become evident that the end-users of any resource development project need to be drawn into the planning and management aspects to ensure that their concerns and requirements are met and that they receive appropriate delivery of the resource. Centralistic "command and control" approaches to water resource management, practised in the past, are no longer accepted by the general public. As a consequence, water resource management processes need to become more people-oriented, rather than being dominated by purely technical or bureaucratic considerations as in the past. The impacts of many land-based activities on water resources are largely mitigated or prevented at the individual stakeholder or land-dweller level, and so a people-oriented process is required to draw these individuals or groups into actual implementation of catchment management strategies.

But, as most people would find the complex details relating to the balancing of growing water demand and a fit supply at national and provincial scales quite alienating, or at least uninteresting, a more people-friendly scale is required, if the striving is for a more people-oriented approach to water management. Furthermore, residents of a particular area often have valuable understanding of their local area's problems and appropriate solutions. Such a friendly scale can be provided by the sub-catchment of a tributary to a larger river, which would then link into the scales of the full catchment or the river basin, as discussed below.

3.3 Water Management at the Catchment and River Basin Scale

The water resource at a particular location is the product of runoff or groundwater recharge that originates in, and reflects conditions and events throughout, a physiographically defined drainage area,

known as the catchment ("local" scale) or basin (large scale, multiple catchments). The way humans use and abuse land inside the catchment has a decisive impact on the quantity and quality of the water resource and on the health of the aquatic ecosystems reliant on that resource. In this way the hydrological cycle, land-use and aquatic ecosystem functioning form a continuum bounded by the extremities of the catchment or the river basin. This fact calls for recognition that naturally occurring water can usually be effectively and efficiently managed only within river basin (regional scale management) or catchment (local scale management) boundaries, because of the need to technically account for all aspects of the hydrological cycle, including the way humans change aspects of the cycle by land-use.

Certain factors, however, detract from the notion that the catchment and the river basin are ideal water management units. The situation is, firstly, complicated by the fact that catchments are not coincident with the administrative regions within which society functions, at all scales. More than one local authority can fall inside even a small tributary catchment, while many river basins are shared by different provinces and even by different countries. Institutional problems arise when the geographical area of a catchment does not coincide with the area of jurisdiction of the responsible administrative bodies concerned. Secondly, difficulties may also arise in cases where inter-basin transfers cause water to cross catchment boundaries. Thirdly, a different type of complication stems from the fact that ecological systems often traverse the boundaries of different catchments and even large river basins, requiring unconnected sub-basins to be linked for ecological management, in which water management may play a role. It is clear that, for many reasons, water management needs to be manifest at, and integrated across, many different scales ranging from local tributary sub-catchment scale through catchment and basin scales up to regional, provincial, national and international scales.

3.4 The Need for Integration

The intimate connection between water resources and land use dictates that, for development of either to be sustainable, their management be integrated. The need that a people-friendly scale should underlie people-oriented water and land management requires that such integration should primarily occur at the "local" tributary catchment level. The interconnectivity of hydrology, land-use and aquatic ecology across scales above that of the local tributary catchment, adds a basin-wide facet to the need for integration of water and land management. In this way, sub-catchments, catchments, river basins and inter-connected river systems provide a coherent series of inter-linked building blocks designed to support strategic water resource management imperatives that have to operate at scales across and beyond basin boundaries, but that still ensure sustainability.

In universal terms, different levels of integration are conceivable for the management of water resources, each more comprehensive than the previous one:

- *harmonious management of surface water and groundwater, quantity and quality*

- *integrated water resource management* according to the theme developed above, i.e. mutual dependence of water and land management at the local catchment level to ensure sustainability, and upwards integration of strategic water management at scales beyond that of catchments

- *integrated environmental resource management*, which would include management of land, air, water and ecological resources, and which would also include integrated pollution and waste control and which would be motivated by the understanding that all environmental resources are bound by a web of inter-relationships and ultimately impact the water resources

- *integrated development management*, which would envision the management of water, land and other environmental resources in harmony with economic and social development generally and which may be motivated by the understanding that the development of industrialised human society can be sustained only if water and all other resources are managed in a sensitive and wise manner.

When the catchment serves as the territorial unit for achieving the integrated management of all environmental resources and when such management involves stakeholders in a self-regulatory process, the approach has generally become known as Integrated Catchment Management (ICM). This approach clearly falls in the remit of the third level of integration mentioned above, namely environmental resource management, which many participants in this field regard as the "ideal". On the one side of this "ideal", the second integration level, forementioned, does imply that coherent catchment management is the focus, but because it only deals with water, it could be viewed as a heavily diluted form of "ideal" ICM. On the other side of the "ideal", the foregoing fourth level of integration is really only indirectly relevant in the catchment management context. The regional perspective of integrated development management in an industrialised society would focus on metropolitan-industrial agglomerates; therefore the catchment may not be a logical geographical unit for regional planning and socio-economic development.

In South Africa, the principles of "ideal" ICM have achieved wide-spread support, but actual implementation is still in its infancy. This is partly because the "old" Water Act nor any other applicable Act did not explicitly promote catchment management, nor did they provide statutory

capacity for ICM. Furthermore, self-regulation was absent in most facets of public management in the "old" South Africa. The DWAF, as part of the current process of reform of itself and of the Water Law, has embarked on a serious search for measures and institutions to implement this philosophy.

In reality, wherever ICM is currently prominent on the agenda, its conceptual status ranges across a continuum between the foregoing integration levels one and three; i.e.from little more than simultaneous management of water quantity and quality in a particular river, via integrated water resources management, with some recognition of the need for mutual dependence of water-environment and land management at a local scale, all the way to recognition of the need for integrated management of all environmental resource use in a catchment. For example, the White Paper on a National Water Policy (and the subsequent National Water Bill) proposes the creation of statutory space for catchment management that, by implication, would reside on or near the foregoing second level of integration of water management. However, the striving for increasing integration of water management has been a golden thread through the Water Law Review process and is reflected in the Principles for the New Water Law (as well as in the evolving national environmental policy formulation process- known as CONNEPP - and in many current initiatives regarding Integrated Pollution Control, Solid Waste Management and Strategic Environmental Assessments).

3.5 Statutory Integration and the Principles for a New Water Law

South Africa embarked on a revision of its Water Law that led to acceptance by the Government in November 1996 of 28 Fundamental Principles and Objectives which guided thesubsequent process of writing the new National Water Bill. The following Principles relating to integration are particularly relevant to this discussion:

- *Principle 15*: Water quality and quantity are interdependent and shall be managed in an integrated manner, which is consistent with broader environmental management approaches.

- *Principle 17*: Water resource development and supply activities shall be managed in a manner which is consistent with the broader national approaches to environmental management.

- *Principle 18*: Since many land uses have a significant impact upon the water cycle, the regulation of land use shall, where appropriate, be used as an instrument to manage water resources within the broader integrated framework of land use management.

- *Principle 22*: The institutional framework for water management shall as far as possible be

simple, pragmatic and understandable. It shall be self-driven and must minimise the necessity for state intervention. Administrative decisions shall be subject to appeal.

- *Principle 23*: Responsibility for the development, apportionment and the management of the available water resources shall, where possible and appropriate, be delegated to a catchment or regional level, in such a manner as to enable interested parties to participate.

Although these principles have been accepted for the National Water Policy, their ultimate actualisation under the new Water Bill still needs to take shape. At the time of writing, it appears that the Water Bill foresees catchment management that is limited to water resource management.

3.6 *The Limits of Statutory Integration*

There are limits to the degree of integration of water, land and environmental management that can be achieved in the evolving statutory dispensation in South Africa.

- *Fragmentation*:Water and land can both be subsumed under the broader concept of natural resources, and, as complimentary life-support systems, under the even broader concept of the environment. Unfortunately, severe fragmentation has hitherto characterised South African environmental, water and land-use legislation and administration. Despite the comprehensive reforms of water and environmental law currently underway, serious fragmentation will persist because the new Constitution renders water management and certain land-use-related subjects such as mining, energy and land affairs as central government competencies, while other subjects to which land-use relates, such as agriculture, nature conservation, the environment, soil conservation, roads, urban and rural development and tourism, are rendered provincial competencies. In effect, beyond forestry and certain aspects of mining and solid waste disposal, the national agency responsible for water management, the DWAF, has little control over land-use activities.

  Fragmented resource management initiatives are also afoot: it appears that, in statutory terms, ICM "thinking" is driven by DWAF; the emergence of a national "land-care" movement is driven by the national Department of Agriculture; and the establishment of conservation and conservancies is driven by the national Department of Environment Affairs and Tourism and the Parks Boards. Clearly, there is a need and an opportunity for synthesis, but the line-function structures of government seem to militate against effective inter-departmental networking.

- *Feasibility:* The caution has been expressed that, although it is essential to develop a comprehensively integrated strategy for water management through expanding scales from local to international, the maintenance of such a complex perspective at operational levels could overstrain the limited available management resources, especially in a developing country like South Africa. Under such a scenario the operational needs of integrated management based on "ideal" ICM would involve so many varied and inter-related activities and disciplines and so many participatory and/or control bodies at different levels of local, regional and national administration, that the management backbone would simply buckle. Therefore, at the operational level, the focus would need to be narrowed to the "local" catchment scale, where a small number of variables often account for a substantial portion of the water resource and land management challenges. The reality is that people at grass-roots and higher levels are making decisions every day on resource management in the absence of a system which goes much beyond their own interests. The motto "think global, act local" is relevant here.

- *Institutional Uncertainty:* The degree of integration of water and land management would be constrained by the outcomes to the current search for a balance between two opposing models of catchment management institutions or structures. On the one hand, there is a top-down "directive" approach where dominant leadership and institutional power eminate from government agencies operating in a consultative committee format. This was often the historical intention or outcome. On the other hand, support has been growing for a bottom-up "organic" approach, in which a community-based, representative and statutory catchment authority, comprising most stakeholders and administrative agencies, determines and regulates the catchment's management priorities and strategies. Every catchment management process would derive its own balance between these institutional extremes, but the extent to which the implementation of the New Water Law will explicitly promote or constrain statutory promulgation of stakeholder-based catchment management processes, will impact the integration of water management towards sustainability. Section 4 below develops this point further.

The current direction of statutory development in South Africa seems to preclude the achievement of integration of environmental resource management as a "government programme" in the short- to medium-term. What would support integrated resource management, is a *national policy that binds all relevant national and provincial government departments and agencies, as well as local authorities, to work together for sustainable development*, and provision for procedures to ensure that consensus is formed regarding resource management objectives and strategies. This requires political

will and political commitment from the highest level through to the "local" level, as well as a deep commitment to extensive interaction and communication between organs of state, both among themselves and with catchment stakeholders.

3.7 Integration and these Guidelines

The potential severity of these limits or threats to wider integration of water resource management also threatens the achievement of "ideal" ICM. The study process and budget that yielded this document and the Guidelines proposed in Part II were much too limited to adequately track the path to "ideal" ICM. In recognition of this, use of the term "Integrated Catchment Management", or ICM, is avoided in terms of the Guidelines and the Management Process described in Parts II and III below. Instead, the less comprehensive term "*Catchment Management*" is used. Nevertheless, it is hoped that the insights and guidelines derived for this document would contribute to expanding both the statutory and the social "space" for Catchment Management and to moving the locus of CM closer to that of "ideal" ICM, and towards growing a sustainable society.

4. Growing Sustainable Catchment Management Structures

This section proposes legal requirements which will have to be complied with in order for the institutional model outlined in the National Water Policy to be practicable and effective in view of the variable interests of and within the different catchments in the country. This is done by comparing the ideal model for a catchment management structure with that proposed in the National Water Policy, and by way of evaluating relevant *legal* aspects.

4.1 The Ideal : Integrated Environmental Resources Management towards Sustainability

As stated earlier, in view of current environmental perspectives towards sustainability, the ideal institutional model for catchment management would be based on a system of integrated environmental resources management, ie. where all environmental resources (not natural elements only) are managed in an integrated way, within the framework of an *integrated legal system*, within catchment boundaries and by a management structure which represents not only all stakeholders, but also all relevant government authorities.

The achievement of this ideal of sustainability does not only depend on the setting up of appropriate institutional management structures. Streamlined inter-relationships between all environmental management components will be required, the achievement of which is as much a process of education

and human development, than a legally prescribed procedure or plan. However, the timely establishment of flexible and dynamic management structures will facilitate the process of achieving sustainability. It is a long-term ideal, which will be achieved only if it is actively strived for by establishing the building blocks and by proceeding towards it in a gradual and phasing manner, with all the capacity contained in the catchment - be it social, economic, legislative, political or environmental energy.

When guidelines for catchment management are proposed, it should be done with this long-term view, but with the necessary practical and immediate elements included, in order to ensure that they are feasible in the short term. In turn, this will enable catchment management implementation in the medium and longer terms. An attempt to propose guidelines for the ideal system and structure, while ignoring the painful requirements and conditions attached to the growth process which are characteristic of the unique South African catchment setup, will therefore not suffice. Provision should be made for ongoing and phased steps towards a system of Integrated Catchment Management, and eventually towards sustainability.

In view of the importance of establishing an appropriate institutional structure which could facilitate the process towards integrated resources management and sustainability, the rest of this section will focus on the competing alternatives for this structure. This will be done against the background of the above view that the ideal structure to facilitate the process, will be one where provision is made for the establishment of representative, self-regulating catchment authorities (reflecting the interests not only of water user sectors but also of all relevant government authorities). Such authorities would have extended statutory apportionment and administrative powers according to the provisions contained in a well-considered legal framework.

4.2 Proposed Alternatives : From Centralized Control to Representative Management

The Water Law reform, from its official commencement in 1994 until publication of the National Water Policy in April 1997, consisted of two main components: a public consultation process, and a research process. Each of these two processes produced various models for institutional catchment management structures.

In terms of the *consultation process*, water users seemed to be in favour of maximum participation in the decision-making process by way of representative presence of all water users and user sectors on catchment authorities with statutory apportionment powers, and where minimum state-intervention is required. Due to a lack of capacity at grassroots level, due in its turn to the composition of society

and various political and historical reasons, such authorities may not - in all catchments - be feasible in the short term. Extensive capacity-building, funding and empowerment processes may be required to develop such structures. Although such structures should be aimed at in order to comply with the demands of the consultation process, they should be phased in gradually. If, at first, a more state-driven directive structure might be required, it should be flexible enough to be gradually converted to this ideal of organic public participation in its broadest sense.

The *research process* (specifically the task team on institutional development) proposed a system similar to that of Australia, namely of active community and stakeholder participation in natural resources management and decision-making, within a framework of guidance and support from government agencies. It however recommended that South Africa was not yet in the position to establish such authorities, and that there was a requirement for a gradual shift from a situation where ICM is regulated and controlled by central, regional and local government levels, but still with some stakeholder consultation, to the community-based self-regulatory approach, because this would allow sufficient time for learning and the development of an appropriate skills base. The report further recommends the initial establishment of statutory participatory catchment forums which can, as local capabilities are developed and enhanced, take up more responsibility and accountability. This would then lead to the development and constitution of catchment authorities, whose legal, executive and fund-raising status would depend on local needs.

It may therefore be said that what crystallised from the Law Reform process, was an indication of a need for self-regulatory catchment authorities with extended apportionment and control functions. Appropriate regulatory bodies should gradually grow towards such status by the initial establishment of state-driven catchment management structures, which receive increased decision-making powers in accordance with their growing capacity to assume more responsibilities. Therefore, the following legal requirements should apply for the establishment of catchment management structures for all catchments in the country :

- Legislation which directs the establishment of a management structure for each catchment and, where the complexity of interests or the extent of the catchment requires it, also of structures for sub-catchments (Phase I catchment structures);

- Legislation to prescribe the procedure for establishment (viz. to allow for certain members to be appointed and others to be elected from the various water user sectors in the catchments);

- Legislation to enable and direct the Department to assign primary functions to the structures

(including the establishment of data-banks for water situation assessments, eg. water availability, existing water rights, needs and demands, relevant data on land rights, environmental requirements etc.)

- Legislation to set criteria, the compliance with which will direct and enable the Department to transform catchment management structures into catchment authorities (Phase II catchment structures), and assign and devolve appropriate increased responsibilities and functions and powers to them.

4.3 Institutional Structure according to the National Water Policy

The following principles have been accepted by DWAF as the National Policy for institutional arrangement :

- The unit of management will be dictated by socio-economic considerations, and will not necessarily be the catchment, but could also be "a water system in which a number of catchments are linked";

- Water resource management functions within management units will, "whatever arrangement is introduced, ... remain subject to national authority";

- There is a need for "the possible development of other bodies at national and regional level to carry out specific water management functions";

- "The present generalised lack of technical and managerial expertise means that a mechanical decentralisation or delegation of functions is unlikely to achieve the objectives of more responsive and effective water management", unless "delegation goes hand in hand with systematic capacity building and effective monitoring and support from the National Department. This should include specific attention to make sure that the objectives of equity and corrective action are promoted and that existing differences in economic and social power are not strengthened".

On the basis of these principles, the following is concluded to be DWAF's official Policy *strategy* :

- An institutional framework will be established "which reflects the central responsibility of the National Government as custodian of the nation's water resources";

- This institutional framework will also "build capacity at regional level for the execution of

certain management and operational functions";

- "Apart from the governmental functions of policy formulation and regulation, certain water resource management functions will continue to be performed by Government at National level, including :

  - strategic and technical planning and the maintenance of a national water plan;
  - joint management of international catchments;
  - *overall management of catchments on a national basis*;
  - water information services".

In order to attain the policy goals as set out above, the Water Policy proceeds to state the following practical measures which may be taken by the Department of Water Affairs and Forestry:

- To promote the establishment and support the functioning of Catchment Management Agencies (CMAs) where conditions permit;

- CMAs will receive delegated functions according to regional considerations, their capacity and policy decisions;

- Where the Department decides not to establish CMAs, it may establish catchment advisory committees to enable stakeholders to participate indirectly in water management.

In view of the above, it seems as if the proposed institutional structure in terms of Water Policy, can be summarised as follows :

- All water resources management functions vest in the Department in terms of its role as custodian of water;

- The Department may, in its discretion, establish CMAs (where the unit of management is not necessarily a catchment) and delegate to them certain functions, but subject to policy, which dictates that overall management of catchments may not be delegated;

- There are no prescriptions on the structure and establishment of CMAs, and it seems as if the Department may decide on the manner of appointment;

- The Department may refrain from establishing CMAs and retain all functions, but establish Catchment Advisory Committees to assist it by way of advice.

The proposed system contains the following practical problems :

- Legal uncertainty due to high levels of Ministerial or Departmental discretion, and a lack of legislative criteria and prescriptions. This means that, if the Department regards it appropriate in the public interest, all functions may be retained at central level and it is not obliged to establish CMAs or to delegate functions.

- No clarity on the right of CMAs to eventually receive apportionment functions, ie. to entirely manage water resources in the catchment in terms of statutory decision-making powers.

- The lack of explicit space for provincial authority over water may lead to lack of commitment at provincial and smaller scales.

- No overt dynamic mechanism which will promote the development of the CMA to an authority responsible for integrated resources management, since the CMAs will be largely subject to Departmental control and water policy.

Legislative Guidelines are needed to overcome the apparent inadequacies of the Water Policy in terms of sustainable catchment management structures. As such Guidelines would relate to the legal environment in which the Catchment Management Process functions, they lie at a level above the Catchment Management Guidelines proposed in Part II of this document. Therefore, "*Legislative Guidelines*" are provided in this section of the document, as follows:

4.4 Legislative Guidelines for Effective Constitution and Functioning of Catchment Management Structures

(i) *Statutory prescriptions should direct the establishment of management processes in all catchments that would ultimately lead to full CMAs.*

The submission of the establishment (or otherwise) of CMAs to Ministerial/ Departmental discretion can dilute incremental (and organic) development of institutional structure for catchment management. Under the "old" Water Act (1956) the Department had a similar *ad hoc* discretion as to the declaration of control areas. The result is an inconsistent dispersion of control areas throughout the country, negating water resources management in an integrated and consistent manner. Legislation should

therefore provide that for every catchment there shall ultimately be established a CMA, and local considerations may necessitate that catchment management task teams or committees be established for sub-catchments.

(ii) *Statutory prescriptions should regulate the composition of CMAs to allow for appropriate stakeholder participation*

In order to optimize public participation, it is necessary that stakeholders receive the opportunity to elect representatives on CMAs. The new Water Law should dictate that all user sectors within catchments should be represented, while relevant government authorities (eg. regional DWAF officials from all the provinces affected by the CMA, as well as officials from other Departments such as Environment Affairs and Tourism, Agriculture, Mineral and Energy Affairs, Land Affairs, and from local authorities) should also be appointed. If the composition of the CMA is left to Ministerial/Departmental discretion, it may lead to inconsistencies.

(iii) *The units of management should coincide with natural catchment boundaries*

A system where **either** socio-economic considerations, **or** natural catchment boundaries may determine water management units, may lead to overlapping and inconsistent management procedures. Although catchment boundaries do not coincide with political boundaries, and although inter-basin transfers are common, the management of water on a catchment basis will not necessarily create insuperable administrative difficulties, as long as CMAs have real authority and responsibility and as long as the composition of the CMAs allow for appropriate representation of all affected provincial or local authority departments.

(iv) *Statutory criteria should determine the level on which water management functions are assigned to CMAs*

Ideally, the functions of CMAs should potentially include integrated environmental resource management, where all decision-making powers of water apportionment and control are vested in such bodies, with minimum state intervention. On the short and medium term, however, as the majority of catchments are not yet equipped for assuming such extensive management functions, focus should be on building data-banks on water availability and needs, water rights and existing systems which are in place (in other words conducting situation assessments), and building capacity by way of the establishment of catchment fora with limited powers. Prescribed criteria should, however, determine the level of empowerment which can be allowed, and not Ministerial/ Departmental discretion, as the

latter will engender legal uncertainty. CMA functions should be subject to statutory prescription regarding management procedures and rules : the Law should thus be the framework within which water management functions must be executed.

(v) *Existing statutory institutions should not be transformed to CMAs, but these agencies ought to be established afresh*

Existing *ad hoc* water management bodies such as Water Boards and Irrigation Boards have, under the "old" Water Act, specified purposes and functions. They serve, and will in future continue to serve, certain user sectors for certain purposes. Extending their functions in order to transform them to CMAs will not only leave their functions vacant, but their history as sector-oriented bodies will be shed with difficulty, which will affect their credibility. These bodies should fit into the institutional structure as representative user sector bodies which deserve seats on the CMAs together with representatives of other sectors and communities. (The Guidelines in Part II deal more comprehensively with the administrative and technical support functions that Water Boards could perform in the CMA infrastructure.)

5. The Catchment Management Process

5.1 Stages of the Process

Regardless of whether or not the Catchment Management Process starts off in a state-driven, directive manner, or in a community-driven, organic way, and regardless of the state of evolution of the catchment management structure, the process can be expected to develop through approximately similar stages in an iterative fashion. For sustainability of management, proactive *stakeholder participation* and public consultation need to form the back-bone of all stages of the process. Parts II and III of this Document propose detailed Guidelines for all the stages, but, as an introduction, they can be outlined here as follows:

+ *Initiation* - the start of the management process would be triggered by one or more issues related to the water-environment, or to urban or economic development and may be informally championed by a few individuals, or more formally driven in a structured committee format, but would need an interim vision for the desired future status of the catchment to focus energies during the subsequent stages.

+ *Assessment* - studies are undertaken to understand the physical and socio-economic cause-and-

effect relationships governing the key water-related problems in the catchment, and to evaluate the administrative environment in terms of water, land and aquatic ecology management requirements.

+ *Planning*- armed with understanding through the assessment tasks, stakeholder consensus is sought about institutional needs, water and land management strategies, social and ecological concerns, funding and stakeholder responsibilities, which would lead to a more permanent vision for the catchment and, more importantly, a permanent Catchment Management "Institution Structure"; the above then needs to be promulgated as a Catchment Management Strategy/Plan.

+ *Implementation* - responsible parties identify and implement Programmes of Actions to address the management strategies specified in the Catchment Management Strategy/Plan.

+ *Administration* - the Catchment Management Institution Structure monitors the implementation of management strategies, fine tunes these, applies agreed procedures to screen new development proposals and maintains stakeholder support and funding for the Strategy/Plan.

+ *Monitor* - information is continuously gathered, processed, stored and interpreted on water use and catchment water health in terms of quantity and quality indicators.

+ *Review and Audit* - periodically reassess, replan and revise responsibilities, objectives and strategies, based on internal and external audits to assess the success of the catchment management process.

NB: These stages imply a certain degree of chronology, but vast overlap between stages is inevitable and, indeed, desirable, to accommodate feed-back between tasks and stages. *The catchment management process is, by its very nature, continuous, recursive and perpetual.*

5.2 Catchment Management Strategy/ Plan

The Catchment Management Strategy/Plan has a specific role within the Catchment Management Process, and represents but a single, though crucial, step and element of the wider Process. It records a vision for the catchment and formalises the understanding of the water, land, social and aquatic ecology issues or concerns in terms of that vision. As the outcome of "interests-focused" bargaining,

rather than "rights-focused" bargaining, it states how such issues or concerns will be addressed through agreed management strategies within a specified time period in that specific catchment, and outlines an associated legislative, procedural and technical framework for implementation. It reflects stakeholder commitments and requires legal status, either as a contract or as a legal proclamation.

Specific Guidelines for the Catchment Management Strategy/Plan are proposed in Part II of this document, while Part III presents a hypothetical Strategy/Plan as an illustration.

6. Rationale and Structure of Parts II and III of this Document

Guidelines for the Catchment Management Process to achieve Integrated Water Resource Management are proposed in Part II of this document. The rationale of their formulation was to provide potential participants in catchment management with a detailed overview of *considerations and principles* that may apply to each of the forementioned stages of the Process, as well as to crucial higher-level aspects, such as the need for a vision for the future of the catchment, public participation, the management focus, the physical scale and the legal, funding and institutional frameworks.

The structure of each individual Guideline is in the form of a concise statement, followed by a "context" paragraph, which embellishes the statement with details, conditions and wider implications.

The rationale of Part III of the document is to provide a mind-picture of the inter-relatedness of the elements of the Management Process. It also takes the reader several steps *closer to the nature of the Process* by outlining a hypothetical Management Strategy/Plan, as well as a Programme of Actions, for a hypothetical urbanised catchment in which water quality concerns have triggered a Catchment Management Process.

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GUIDELINES FOR CATCHMENT MANAGEMENT TO ACHIEVE INTEGRATED WATER RESOURCES MANAGEMENT IN SOUTH AFRICA

PART II

GUIDELINES FOR THE CATCHMENT MANAGEMENT PROCESS

Catchment management provides the opportunity to follow an integrated approach to manage water resources and the water environment on a catchment basis. Guidelines for the possible components of the Catchment Management Process are presented in the following discussion. Not all of these Guidelines are necessarily appropriate for all catchments. Thus, the following Guidelines merely provide a general outline of the nature, structure and ingredients of the *Process of Integrated Water Resource Management on a Catchment Basis*. They must be interpreted and adapted to suit local catchment conditions.

1. The Vision and Focus

Guideline 1.1

A catchment management initiative should take cognisance of the values of, and the pressures on, the society which is dependent upon the water resources in that catchment.

Catchment management provides the opportunity for catchment communities and stakeholders to develop an integrated management process which takes cognisance of their spiritual, ethical, social, economic and environmental value systems, and addresses their desires and needs, within the context of sustainable water resource management and use.

Guideline 1.2

Every catchment has a unique character and resources, which requires the development of a locally appropriate vision of the catchment's future and a locally appropriate process to ensure sustainable management.

There is no universally applicable template for catchment management, therefore each catchment management process will be different. The administrative, socio-economic, land use and environmental

resource character of the catchment will indicate the opportunities and constraints for their management.

Guideline 1.3

Initially, the focus of catchment management should be limited to a few existing or perceived water-related issues on which "sufficient consensus" had been achieved, with other issues being included once experience and success is achieved.

The complexity of most catchments and the general lack of capacity among stakeholders requires that the initial focus should be on a limited number of priority water-environment-related issues or concerns, preferably already identified by the stakeholders. These issues should be existing, potential or perceived problems, which have significant direct social, economic or environmental implications for the stakeholders, thereby inducing them to participate in the process. The experience, local capacity building, management systems and success achieved by this narrow focus can later be expanded to other issues. In fact this is likely to occur involuntarily, because all elements of the catchment are ultimately interdependent, and thus, to resolve one issue, many others must be addressed.

Guideline 1.4

Catchment management should address all components of the water resource and all elements of the hydrological cycle which may relate to each issue.

Effective management of a water resource problem requires that all the facets of the water resource are addressed, including the water quantity, quality and aquatic environment (abiotic and biotic), as well as all the processes occurring during the hydrological cycle, including the rainfall (pollutant generation), surface runoff (pollutant discharge), streamflow (pollutant transport), groundwater yield, aquatic ecological functioning and water use. Coastal and estuarine waters should be incorporated in the management process.

Guideline 1.5

Building vision and developing a focus for the catchment management process require systematic planning and the allocation and application of considerable resources, which have to be planned and budgeted for.

The search for an appropriate vision and focus may be seen as one of the core determinants of success in catchment management. Because these concepts may be perceived as somewhat "soft" in comparison with, say, water scarcity or water quality issues, this phase of the catchment management process can

easily disintegrate into cosmetic or ad hoc actions. Also, the inputs of previously marginalised South Africans, who are now active in many local or higher levels of government, may need to be fostered during the vision-building phase. This phase clearly requires systematic planning and resources.

2. The Scale

Guideline 2.1

The administrative arrangements for catchment management should be coordinated at a catchment or river system scale.

The economies of scale achieved by coordinating institutional, legal and financial arrangements at a catchment scale, together with the need for relative self-sufficiency and independence from other catchments, require that catchment management is supervised at this level. This may range from a group of small independent neighbouring catchments (such as the Wilderness catchments), through an independent secondary catchment, with or without donor catchments (such as the Mgeni catchment, with or without the upper Mooi catchment), to a significant part of a large river basin or system (such as the upper Vaal catchment). Any statutory catchment management structure should be established at this scale (see Guideline 6.4).

Guideline 2.2

The units for catchment management should be sub-catchments within this administrative catchment and should be based on the socio-economic, land use and water environmental resource character of the catchment.

The choice of units at which catchment management is applied is critical to the success of catchment management. Units should be small enough that the issues and problems in different parts of the unit are similar, in order to facilitate the development of a common vision, agreement on measurable objectives and agreement on the priority issues. However, they should be large enough to include stakeholders from a range of impactor and impacted sectors with differential access to resources, to ensure inter-sectoral communication and multi-perspective solutions.

Guideline 2.3

Coordination of policy and strategic water resource development imperatives between catchments should be at national, regional and/or river system level, with representation from relevant catchments.

The limited issue focus and nature of stakeholder participation and management strategy implementation imply that the catchment management units be relatively small and homogeneous, or

of a size that captures existing intra-dependencies of resource use. Therefore, coordination at a river basin, river system, regional and national scale is required to enable the integrated management of the inter-management unit impacts (ie. upstream, downstream and inter-catchment transfers) and also to enable regional and national water resource policy and strategic development priorities to be represented.

3. The Integrated Management Process

Guideline 3.1

The catchment management process generally involves the following stages, but without any pre-set time frame: initiation, assessment, planning, implementation, administration, monitoring and review.

Catchment management requires an open-ended process with different activities being required at different times. Activities should not be confined into a given time period, and the process should be on-going, recursive and perpetual. As illustration, Part III of this document provides a tabular bird's-eye view of these management process components and their overlaps and linkages.

Guideline 3.2

The management process should be dynamic, with significant overlap and linkages between all stages of the process.

Although the different stages of the management process imply a chronology, this should not be interpreted as indicating a sequential process. Activities associated with different stages of the process should occur concurrently when possible, as this enables feedback between understanding, decision making and action. The process must be dynamic and responsive to changing circumstances, thereby facilitating flexible management.

Guideline 3.3

The management process should continually aspire towards holism and inclusivity, with growing integration of relevant issues and elements affecting the water resource in a catchment, as a prerequisite for sustainable development.

Although only a few priority issues may be tackled at first, the interconnections and interdependence between different components of the water resource will likely result in further issues being addressed.

The relationship between water and waste, for instance, will eventually necessitate the evolution of a comprehensive waste strategy for the catchment. Ultimately integrated management of the natural, physical, socio-economic and environmental resources in a catchment will provide the most effective mechanism for sustainable development.

Guideline 3.4

The management process should improve the linkage of all the available resources in a catchment.

Catchment management is an integrating process, striving for effective use and management of the administrative, human, economic, land use, infrastructural and natural resources in the catchment. Under the New Water Act this process will tend to be water resource-limited or -focused, but the integrating impulse that will eminate from this process must be harnessed to bring an ever-widening set of natural resources into the catchment management net.

Guideline 3.5

Provincial governments and local authorities should have an effective role and responsibilities in catchment management.

As many land and environmental resource management functions fall wholly or partially under provincial governments and local authorities, these agencies should have effective roles and responsibilities in catchment management, to ensure a process that is both horizontally and vertically integrated in its statutory aspects.

4. Stakeholder and Public Participation

Guideline 4.1

The stakeholder and public participation and consultation processes must be appropriate, inclusive and representative, and continue throughout the ongoing process.

The active involvement of the relevant stakeholders throughout the catchment management process is critical to its success and sustainability. Therefore this element represents the core of catchment management, without which the process is doomed. Care must be taken to be representative (by not favouring economically and educationally advantaged groupings because they are usually more vocal) and inclusive (by involving all affected communities). Stakeholders may be resident within the

catchment, or may be located in donor catchments or receptor supply areas (or catchments). They may include: bulk, industrial, mining and agricultural water users; recreational and ecological interests; urban and agricultural land use managers; effluent dischargers; residential communities; statutory and regulatory authorities; local authorities; and provincial and national governments.

Guideline 4.2

The catchment management process should recognise that stakeholder participation and public consultation are somewhat different processes and should make adequate allowance for those differences.

Stakeholder participation is critical because of the direct and structured role stakeholders play in *implementation* of a Catchment Management Strategy/ Plan (see Guidelines 10.1 to 10.7). Public consultation may be a much less structured process, though still absolutely necessary. However, it must be carefully managed in order to keep the overall management process on track, yet must allow input and involvement by the public who actually live in the catchment that is being managed. Scoping the key issues of concern to the public is an important part of the public participation process (see also Guideline 5.2). Even if these perceived problems are shown by scientific investigation not to be of concern, they still need to be addressed through public education programmes.

Guideline 4.3

Suitable communication channels and formats form the cornerstone of stakeholder and public participation in the catchment management process and should be systematically developed.

Stakeholder and community representatives who participate in the catchment management process are empowered by and build credibility through access to appropriate information, while the process itself feeds of the inputs and feed-back from these representatives.

Guideline 4.4

Stakeholder and public participation is the cornerstone of catchment management, and must be aimed at mobilisation of and building of capacity among the residents and stakeholders of the catchment.

The participation strategy used in catchment management is central to the effectiveness and sustainability of the process, because catchment management often requires a shift in paradigm. South Africa's history has led to a general disempowerment and marginalisation of many communities, which needs to be addressed through the public participation process. This includes changing people's

behaviour, tapping into their energy and resources, empowering them to take control of their neighbourhood environment, and owning the catchment management process and its implications. Together with involvement, capacity building of the stakeholder representatives is of paramount importance to the process, because informed participation will lead to understanding and informed decision making, which will facilitate effective implementation and administration.

Guideline 4.5

The catchment management process should be paced by the capacity of and degree of consensus among stakeholders, but may often need to be accelerated through careful capacity building and wide exposure of small successes.

Capacity building and achievement of consensus may take considerable time and effort, which may inherently slow the process. In this context it should be remembered that catchment management involves a paradigm shift in people's attitudes and the way in which decisions are made, which should not be rushed. Ideally, the process must be allowed to develop at it a pace with which most stakeholders are comfortable, because this is a key ingredient for sustainability of the process; but without allowing any participant to slow it down for selfish agendas. However, the threat of unsustainable utilisation of South Africa's water resources is acute enough to suggest that some acceleration of the catchment management process is desirable in many parts of the country.

Guideline 4.6

Continuity in stakeholder participation should be fostered and protected.

Frequent changes in stakeholder participation or their individual representatives lead to breakdown in chains of commitment to implement particular catchment management actions. It also causes inconsistent feed-back mechanisms to the wider stakeholder constituency or the general public.

5. Initiation

Guideline 5.1

As representative and inclusive an interim catchment management structure as possible should be formed to guide the process from the outset.

An interim management structure may arise initially from a small concerned stakeholders group, which then brings on board other key actors, especially from various communities and local authorities in the

catchment area. On the other hand, the process may be initiated by a regulatory authority, but to ensure sustainability, some catchment stakeholders have to be included in the process and decision making from the beginning.

Guideline 5.2

Key catchment issues must be scoped through public and stakeholder consultation, in order to provide a focus for the catchment management process and the basis for an associated interim vision and goals, which reflect the stakeholders' priorities and needs.

In all but the smallest catchments, the available information which could influence catchment management may be overwhelming. It is essential to select the key catchment issues, within a participatory process, and then to define carefully the approach and information required to address these issues during the detailed assessments. See also Guideline 4.2 for views on the importance of public inputs on perceived problems to the scoping exercise.

Guideline 5.3

Adequate resources and energy need to be allocated for the continuing process.

Catchment management requires a "champion" or mentor to provide the energy required to continue the initial process and obtain support for its continuation. Such a champion should preferably arise from concerned citizens' groups, or relevant civil organisation, but in lieu of that , national or provincial government agencies may need to provide initial mentorship. Seed funding may also be required to continue and broaden the process, before ongoing funding may be obtained under the auspices of a functioning process. Provision of such seed funding may be one of the mentorship duties pertaining to national or provincial government agencies.

Guideline 5.4

In several parts of the country, because of lack of local capacity, DWAF or local authorities or NGO's may need to mentor and facilitate the initiation phase of the catchment management process and assist stakeholders with scoping, problem identification and issue prioritisation.

6. The Catchment Management Structure

Guideline 6.1

The catchment management structure should equitably represent all the relevant stakeholders, including regulatory authorities (national, provincial and local), statutory agencies and non-governmental sectors. (See Guidelines 4.1 - 4.5)

All regulatory authorities are also stakeholders, i.e. they are simultaneously "player" and "referee". It is important for such authorities to learn when to behave as a player and to refrain from behaving as a referee. Conversely, non-governmental players need to learn appropriate referring roles in catchment management.

Guideline 6.2

The composition of the catchment management structure must balance the requirement for representativeness with the need for effective management of the catchment.

The drive for public participation in effective catchment management must recognise the general lack of capacity and expertise in this field in South Africa. Thus the establishment of the management structure must specifically recognise the need for capacity building in this regard. Government agencies at national and provincial level should provide mentorship, aimed at facilitating and coordinating the development and transfers of skills, and assisting with the provision of technical advice, to local groups and individuals.

Guideline 6.3

The catchment management structure should evolve from an interim arrangement, such as a stakeholder steering/advisory committee, to a statutory Catchment Management Agency (CMA), which is established by Government Gazette.

The ultimate actualisation of this Guideline depends upon the final wording of the Water Act. There is an extended discussion of these institutional-legal issues in Part I of this document. Nevertheless, whatever the outcome of the evolution of catchment management structures may be, in terms of the Water Law Principles, the national water authority carries a unique responsibility to promote the growth of self-regulating catchment management.

Guideline 6.4

The CMA should be established at the catchment or river system level, with sub-committees responsible for management of individual units within the catchment (see Guidelines 2.1 and 2.2).

The economies of scale and access to resources achievable through a larger administrative structure implies that institutional, legal and financial arrangements should be kept at the catchment level, while the need for flexible local management requires that management sub-committees are constituted within this larger body to represent each management unit (and the relevant stakeholders).

Guideline 6.5

Devolution or delegation of relevant powers to a Catchment Management Agency under the Water Act, should be based on criteria related to capacity, representativeness, inclusivity and the development of an appropriate catchment management plan.

Guideline 6.6

The delegated (or devolved) powers of a Catchment Management Agency should be consistent with the scope of the catchment management strategy/ plan.

The statutory jurisdiction of the authority responsible for implementation and administration of a plan (preferably the Catchment Management Agency) should be adequate, but not exceed the requirements for management of those issues addressed by the strategy/ plan. The possibility of increasing jurisdiction required for the administration of additional management issues should be enabled, particularly since authority should not be delegated until the management structure has met those criteria which will determine its ability to manage effectively.

Guideline 6.7

The catchment management structure should be consulted by the national water authority or its delegate (eg. provincial government) in all decisions concerning policy and strategic water developments that may affect a particular catchment.

Guideline 6.8

Where neither a Catchment Management Agency nor an interim management structure exists, the national water authority or its delegate should continue water resource management in

the catchment on an interim basis, while building capacity until such time as such a structure can be established.

Where the capacity does not exist, the national water authority should undertake catchment management on an interim basis, or should delegate certain catchment management functions to existing authorities in the catchment, such as water boards, irrigation boards or local authorities. However, this should be done in consultation with and through training of an interim catchment management structure, with the objective of establishing an operating catchment management agency at the earliest opportunity.

Guideline 6.9

Care should be taken that the gap between catchment water governance and national government does not grow too large, by ensuring an effective role for local authorities and provincial governments in the catchment management structures.

Guideline 6.10

In catchments where managerial and/or technical expertise is not readily available, it may be necessary to hire this expertise on a cost recovery basis.

Technical inputs required during the assessment of the physical conditions in the catchment, the study of the legal and institutional environment, aspects of the public participation process and planning of management strategies may have to be obtained by hiring appropriate practitioners in these fields. Consequently, sources of funding for such tasks may need to be found. A prudent choice of standardisation and the development of installed information and modelling systems, may help to constrain costs.

7. Financing

Guideline 7.1

Catchment Management requires three levels of financing:

- *seed funds for initiation of the process;*
- *continuous assured income to fund the activities of the catchment management structure (including sub-structures in sub-catchments or individual management units) and the development of a Management Strategy/Plan,*
- *funds for execution of individual projects under the Strategy/Plan's Programme of Actions (see Guideline 10).*

One-off seed funds may need to be supplied from public, private and donor sources from both inside and outside the catchment to initiate the formal management process. Continuous assured income needs to be derived from all users of water from the catchment via both a dedicated catchment management charge and a resource conservation charge, as detailed in Guidelines 7.2 to 7.5, as well as from pollution charges. Funds for individual projects under a Programme of Actions need to be provided by the budgeting process inside individual public and private institutions which are party to the Management Strategy/ Plan . The generation of such project funds are not under consideration here.

Guideline 7.2

Sustainable availability of water from a catchment induces three separate costs, namely costs of infrastructure, catchment management and resource conservation; in principle, charges for all three should be levied, but only the latter two should be directly used for catchment management.

Guideline 7.3

The infrastructure charge should be payable only by the beneficiaries of a particular water supply scheme and should be used to recover the full financial cost of supplying water from that scheme.

The infrastructure charge should reflect the full capital cost of the scheme along with interest, a refurbishment reserve, as well as the maintenance and operating costs of the scheme. By its nature it would vary from scheme to scheme and even from year to year and would be collected and administered on a sub-annual basis by the owner/operator of the scheme. This income cannot be directly used for catchment management.

Guideline 7.4

The catchment management charge should be imposed on all water used in, or anthropogenically intercepted in, or exported from the catchment; it should be charged, as far as equity allows, to all water users, including practitioners of commercial dry-land cultivation, such as afforestation and extensive field crops; and should be used to recover the financial cost of catchment management.

The catchment management charge should reflect the financial costs of the Catchment Management Process and the administration of the Management Strategy/ Plan. These costs can be direct or indirect, and should always include the hidden cost of coordination. Direct costs can be attributable to specific issues in a particular catchment and should be charged to all users of water in or from that catchment. Illustrative examples are the eradication of invasive vegetation, or the implementation of a flow monitoring network in a particular catchment. Indirect costs affect most catchments, but cannot be directly attributed

to a particular catchment. An example of this is the supply of centralised capacity-building training or laboratory facilities by DWAF. By its nature, direct charges would vary from catchment to catchment, while charges for indirect costs would require nationally-derived guidelines. The catchment management charge should be collected by the catchment management structure, or its proxy, on an annual basis.

Guideline 7.5

> *The resource conservation charge should be payable, under a competitive system, by holders of time-limited water use allocations in water-scarce catchments (where demand approaches or exceeds the total utilisable resource); part of this income should be spent in the catchment of origin, while the rest should be kept in a dedicated central fund to support catchment management nationally.*

The resource conservation charge would reflect the relative scarcity of water for use in a particular place, in a particular way and at a particular time. This charge represents not a financial, but rather an economic cost, in that, by pricing it through competitive bidding, it would provide an incentive for water to be allocated as a priority to those who would make high-value use of it, though at an economic price. The concept of this charge links well to the proposal in the White Paper on National Water Policy that the historical permanent land-linked water use rights be replaced by time-limited water use allocations. This charge may also have to be applicable to practitioners of significant dry-land cultivation for commercial purposes by the timber industry and agriculture. However, such a charge might effect a high administrative burden and might have a deleterious effect on marginal practitioners in the forestry or agriculture industry and could impact rural economies in certain cases. Its implementation, therefore requires careful planning.

The resource conservation charge would be very low in catchments with excess supply of water, but would rise as demand approaches supply. In areas of significant unsatisfied demand, the charge would ultimately be in excess of the value of water to low-value users. This implies that the charge would differ from catchment to catchment and would change through time. Because the resource conservation charge would need to be based on somewhat complex economic considerations, the competitive bidding that determines the charge, should occur within a framework set by and a process facilitated by DWAF. During the transition from the present to a future fully evolved resource conservation charge, a gradually increasing proxy charge may need to be levied by DWAF to foreshadow the future bidding process. In all cases DWAF should collect and administer these funds and distribute them for catchment management purposes according to national criteria.

Guideline 7.6

Provisions to waive part of, or all of the three foregoing water charges for a determined period, or in perpetuity, specifically to promote equitable access to basic water supplies, or to address the inequalities of the past, or to promote sustainability, or to meet international river basin-sharing obligations, would be needed.

Water is a social good and is essential for human life. Thus, pricing policies cannot be formulated in terms of financial and economic considerations alone. Basic Human Needs, defined according to National Water Policy, are to be supplied free of charge, as is the Environmental Reserve and allocations for downstream countries (see Guidelines 8.8, 8.9, 8.10 and 9.7). Furthermore, many South Africans, mostly black, were historically denied direct access to bulk raw water, while many commercial farmers, mostly white, benefited from a variety of State subsidies. In redressing these imbalances, catchment management structures should implement concessionary periods during which the full cost of water would not be levied. This concession would vary from catchment to catchment, would change through time and would either be time-limited in the case of redressing historical inequalities, or permanent in the case of the Environmental Reserve and international obligations.

Guideline 7.7

Direct grants should be made available from the fiscus to catchment management structures in catchments where there is a dearth of economic users of water.

The introduction of a Basic Reserve, supplied free of charge, implies that less water is available for economic pricing, the income from which is needed to ensure sustainable availability of water. In this way, the economic use of water subsidises the non-economic (Basic Needs, Environmental Reserve and International Obligations) use. In catchments where there is little economic use of water, such subsidisation is not possible. Therefore, it may be necessary for the Financial and Fiscal Commission to recommend the payment of direct grants to those catchments where cross-subsidisation is not possible. Alternatively, grants for these catchments may come from the central fund created from the resource conservation charge income (see Guideline 7.5).

Guideline 7.8

A pollution charge should be imposed on all discharges of effluent or return flows to streamflow; the income from which should be used by the catchment management structure for the catchment management process.

Catchment management should *inter alia* ensure that water of acceptable quality continues to be available

to the users thereof, as well as to the relevant aquatic ecosystems. Therefore, the pricing policy must be used to support water quality management by adopting a "polluter pays" approach to the generation of water pollution. The pollution charge should provide incentives for recycling and for improving the quality of effluents and return flows. This pollution charge should include a premium in the case of certain selected hazardous pollutants. This charge should be collected by the catchment management structure, or its proxy, on an annual basis. It should increase as the pollution loading of a catchment's streams increase.

8. Assessment

Guideline 8.1

Planning and decision making for catchment management requires an understanding of the administrative, socio-economic and physical environments associated with the catchment.

Holistic management to address specific water resources issues on a catchment basis, requires an understanding of the issues, including the social, economic, land use, infrastructure and natural resource conditions, pressures and processes, both within the catchment and possibly from outside its boundaries. Furthermore, the development of an institutional and legal framework through which to manage the catchment, requires an understanding of the relevant institutional arrangements, legislation and financing mechanisms. The assessment stage should therefore provide the required understanding of the different catchment elements, together with their interrelations, upon which management decisions during planning, implementation and operation may be based. Such understanding may require numerous iterations of assessments or components thereof.

Guideline 8.2

Catchment assessment consists of two phases or processes: on the one hand, data and information gathering, collation, and storage, and, on the other, quantification, interpretation and assessment.

Guideline 8.3

Cost-effective assessment to provide this understanding should only be performed at the level of detail required to address information needs about relevant catchment management issues.

It is critical that the assessment is oriented towards management information needs and is particularly focused on the issues that have been identified during the initiation of the process. The "know everything about everything" philosophy is not possible with the limited resources and time usually available.

Therefore, assessment should address only those issues which are critical to understanding the key problems in the catchment at an appropriate scale and resolution.

Guideline 8.4

The assessment should be based on interpretation of existing and available data, rather than the collection of new information.

The investigation should begin with the collation of already existing data and information, with further data collection only being initiated where it is absolutely critical to the understanding of the issues for management. The costs of data collection are very high and, usually, an adequate understanding may be gained through manipulation of available data. However, cost effective programmes for collection of critical data should be designed and implemented where necessary.

Guideline 8.5

The contribution from the main causal factors and their effect on the key management issues must be estimated in order that they may be prioritised for management during the planning.

Understanding of the cause and effect relationships and processes which contribute to catchment problems is central to their solution. Causal factors generally implies anthropogenic activities which result in flooding (eg. urban areas), reduced water availability (eg. afforestation), excessive demand (eg. inefficient irrigation), water quality deterioration (eg. dense settlements or effluent discharge) and/or destruction of the aquatic environment (eg. in-stream activities), although the relative impact of natural catchment characteristics must also be determined. It is unwise to attempt to address too many issues at once, because the process of assessment becomes overwhelming. Issues which are not addressed initially can always be included at a later stage.

Guideline 8.6

The understanding of the catchment gained during the assessment process should be synthesised and captured on an accessible and dynamic information and integrated catchment modelling system to support future decision making.

Spatial and temporal data on the administrative, socio-economic and physical catchment must be collected and compiled in such a way that the information required for effective decision making can be easily accessed. Geographic Information Systems (GIS) should provide the basis for spatially referenced data. Procedures for processing and ongoing capture of monitored data should be developed as part of the information system. Various numerical quantification tools may support the information system.

Hydrological catchment models that are configured to allow water balance calculations and water quality and quantity impact assessments for all major natural components of the catchment, as well as all major human impacts on the hydrological cycle, should be considered as a natural part of such an information system.

Guideline 8.7

Representatives on the catchment management structure should be involved throughout the assessment process, in order that they gain a sound understanding of the catchment with which to make effective decisions.

Gaining a sound understanding, achieving consensus and making decisions do not make a linear sequence. A central feature of understanding and consensus is trust. Such trust happens over a period of time and through honest, open interaction. The assessment phase must contribute to this trust.

Guideline 8.8

A water use, conservation and protection policy must be drawn up by all the major water users within the catchment, for both current and future conditions and embedded in the management plan.

Man's ability to expand the water resources of any catchment is limited. Increasing attention will therefore have to be paid to the more efficient use of water. One of the first steps ensuring the allocation and continued assurance of supply of water into the future is to reduce the current use of water within the catchment.

Guideline 8.9

The water allocation required for the "Reserve", i.e. Basic Human Needs and Environmental Reserve, must be quantified.

The National Water Policy makes provision for reserving sufficient water to meet basic human needs and the environmental requirements, as the Reserve, which should get priority of allocation. One of the first steps in allocating water within the catchment is to quantify the water required for this Reserve. The quantity of water required to meet basic human needs in the catchment will have to be based on census figures and local knowledge of the catchment, and take into consideration the expected population growth in the area. The environmental reserve will have to be established within the water resources classification procedure outlined in Guideline 9.7.

Guideline 8.10

In catchments which straddle international borders, South Africa's legal obligations with respect to water allocations, or to any other agreements about shared water basins will have to be estimated and allowed for.

South Africa is bound, as are all countries, to the requirements of the Helsinki Rules. In addition, South Africa is a signatory to the SADC Protocol on Shared Water Course Systems, and has also established bi-, and multi-lateral commissions with neighbouring states. Obligations in terms of these agreements will have to be met prior to allocating water to other users.

Guideline 8.11

The available water resources in a catchment must be quantified, after providing for allocations to the Reserve and international obligations, and taking into account the social and economic benefits of use.

The National Water Policy for South Africa specifically recognises the previously unequal access to water resources, and makes provision for existing water users to apply for registration of their water use within a set time period. This allows for the reallocation of water specifically to redress the inequalities of the past. This process will be phased in on a priority area basis, and catchments under water stress would be addressed first. Should water use reallocations under the new Act not yet have been executed prior to commencement of the catchment management process, the catchment should be designated for reallocations. The White Paper on A National Water Policy for South Africa lists a number of guidelines for this process.

Guideline 8.12

The catchment management structure should provide adequate funding for catchment assessments at suitable levels of detail.

Both phases of the assessment process (see Guideline 8.2) have real cost implications that have to be recognised by all parties involved in the catchment management process. Guidelines 7.1 to 7.8 cover financing arrangements that are relevant.

9. Planning

Guideline 9.1

The key catchment management issues and their associated primary causal factors should be prioritised for both immediate and longer-term management.

The success of catchment management in addressing the key catchment issues will ultimately depend upon changes in behaviour, activities or development within the catchment. The assessment of the socio-economic and physical conditions, together with the dominant cause-effect relationships governing a particular issue, should highlight the main contributing factors to the issue. Examples may include pollution sources contributing to a water quality problem, afforestation resulting in reduced catchment runoff or instream construction activity causing aquatic habitat destruction. The stakeholders (through the catchment management structure) should use information about the contribution and manageability of these factors to prioritise them in terms of management of that issue in that catchment (see also Guideline 8.4 and Guideline 5.2).

Guideline 9.2

Integrated decision-making should be based on an holistic view of the various contributing elements to an issue gained during individual investigations.

Catchment management is about implementing management actions throughout the catchment, to address one or more critical issues in an integrated manner, based on a thorough understanding of the causes and effects of those issues. However, this requires that decisions be made about what needs to be managed as a priority, how it should be managed and who will take responsibility. It is critical that all the elements which were investigated (possibly separately) during the assessment stage are addressed in an integrated manner during the planning stage, because the interactions between elements are as important as the nature of the separate elements

Guideline 9.3

The development of consensus and agreement should be encouraged during decision-making, in order to assist the implementation and administration of decisions through voluntary compliance.

Decisions or agreements about the management of a catchment only have a purpose if they are applied. Implementation may be voluntary or enforced. Either way, the importance of agreement and consensus building during the catchment management decision making and planning process should not be underestimated. Voluntary application is by far the most cost-effective method of catchment management

and should therefore be promoted throughout the catchment management process, whether or not the results are legally formalised. A decision support system consisting of a GIS-linked catchment model and computerised data base may provide a useful tool to foster consensus.

Guideline 9.4

Appropriate management units throughout the catchment should be agreed, together with the definition of a final vision and goals for each unit, in order to provide the basic unit for planning.

The identification and definition of management units should be based on the understanding of physical, socio-economic and administrative characteristics of different catchment areas gained during the assessment process, taking account the interests of relevant stakeholders. Representative stakeholder sub-committees representing each of these management units will need to be constituted to guide the planning, implementation and administration of catchment management within these areas. The elements of the planning process discussed below should be oriented around these management units, taking account of inter-connections and relationships between units.

Guideline 9.5

Measurable management objectives should be agreed for the priority catchment management issues.

The catchment vision and goals should be translated into management objectives against which the success of catchment management may be evaluated. These objectives should represent quantifiable and measurable indicators associated with the priority management issues. It is critical that these objectives are the result of a negotiated process between all relevant stakeholders and that they are agreed by consensus (or at least a majority) of the stakeholders.

Guideline 9.6

Management strategies reflecting the approach and expected reduction in contribution by the relevant causes of the priority catchment issues must be agreed.

The catchment management strategies outline the measures which need to be taken to alter people's behaviour, activities and actions to address the significant causes of the priority issues in the catchment. Management strategies should be detailed enough to ensure that the intended positive impact will be realised (i.e. reduction of contribution and/or improvement of the problem), but should not directly impinge on people's constitutional rights in terms of freedom of activity, and should allow enough flexibility to encourage adoption of the most cost-effective response given the site-specific conditions.

The specification of management strategies should also take consideration of:

- criteria (guidelines) for selection of associated management actions;
- responsibility for implementation of the strategy (and associate actions);
- time frame for selecting and implementing the associated actions;
- responsibility and resources for administration and auditing the implementation;
- expected positive impact on the priority water resource issue(s);
- performance criteria against which implementation will be audited (this must include items such as quality of communication between participants; barriers to communication; levels of trust; "interests"-based rather than "rights"-based negotiations);
- possible catchment-specific regulations which should be legislation to enforce the strategy.

Guideline 9.7

Water resources within the catchment will have to be classified according to their desired protection status, striving for consensus between the water users, national priorities and other stakeholders.

The National Water Policy for South Africa specifically outlines a policy for the protection of water resources to ensure their sustainable utilisation. While implementation of this policy will be coordinated at national level, the implementation of the policy must occur at a catchment level, within the catchment management process. Water resource protection must not only be based on meeting the needs of traditional quantitative users, but also the sustainable utilisation of other "silent services" provided by the water resource. The objective of the catchment classification process is to arrive at a series of narrative and/or numerical objectives, which will be required to maintain the resource within some desired state, reflecting the local communities' interests, as well as national priorities for the protection of our water resources. These resource quality objectives must be based both on the requirements of water users, and on the need for the healthy functioning of whole aquatic and associated ecosystems, and must contain objectives for the plant and animal communities, the habitats required by these communities, as well as the quantity and quality requirements of the aquatic ecosystem.

Guideline 9.8

The implementation and success of national source-directed control measures should be evaluated and catchment or site specific source-directed measures formulated where necessary

Water resource protection will be based on resource-directed measures which set clear objectives for the desired state of the resource, and source-directed controls which aim to control impacts on the resource at

their point of origin. The White Paper specifically indicates source-directed control planning must be based on catchment boundaries. Actions to introduce source control will be effected via a system of licences/ permits, standards and codes of practice which limit the impact of land-use activities on the water resource. While such standards will be set by National Government, local conditions may require the implementation of more stringent catchment or site specific standards to ensure the water environmental objectives are met. The catchment management planning process must make provision for the formulation of such standards. Such site specific standards may also be based on the desired level of protection for a particular water resource.

Guideline 9.9

Provision should be made to influence or prevent land-use planning decisions which could lead to unacceptable impacts on the water resource.

Such influence may be based on the expected environmental hazard posed by the proposed land-use, or the existing intensity of land-use in the catchment. The National Water Policy for South Africa specifically indicates that the agency responsible for water resource protection must be able to influence or prevent land-use planning decisions which could lead to unacceptable impacts on the water resource. Effective, and holistic management of the catchment must make provision for this, and land-use planning should be integrated with the catchment water resources management plan.

10. Catchment Management Strategy/ Plan

Guideline 10.1

The Catchment Management Strategy/ Plan provides a formal representation of the decisions and agreements made to address the critical management issues in the entire catchment.

The Catchment Management Strategy/ Plan (CMS/P) has a specific role within the context of catchment management. It formalises the catchment vision, the mission of catchment management and the understanding of the management objectives and issues. These will be addressed through agreed management strategies within a specified time period in the individual management units of the catchment. Such agreements should be the outcome of "interests-focused" bargaining as opposed to "rights-focused" bargaining. The CMS/P allocates roles, responsibilities and accountabilities to stakeholders and outlines an associated legislative and procedural framework for implementation. As an illustration, a hypothetical CMS/P is presented in Part III of this document.

Guideline 10.2

The Catchment Management Strategy/ Plan is a part of the ongoing wider catchment management process, and therefore requires periodic review and updating to reflect changing priorities and circumstances.

A clear distinction needs to be made between the Catchment Management Process and the Strategy/ Plan, which represents a single, but important element of the wider process. The formulation of a CMS/P should reflect the decision making during the planning process, based on the understanding developed during the assessment process. Furthermore, the CMS/P should guide the implementation and administration of catchment management, with a built-in requirement for Review (and revision) at some time in the future. However, this does not imply that assessment or planning cease once the CMS/P is formulated, nor that implementation may not begin before the CMS/P. The ongoing nature of catchment management requires that all of these elements continue, at a greater or lesser intensity, and that the CMS/P may be adapted and reformulated as catchment conditions change, understanding of the catchment improves and/or additional management issues and priorities are incorporated into the process.

Guideline 10.3

The Catchment Management Strategy/ Plan for the entire catchment should be:

either *gazetted as a statutory regulation to be implemented and administered by an established Catchment Management Agency with devolved (or delegated) powers;*

or *gazetted as a statutory regulation to be implemented and administered by an existing regulatory authority, until the establishment of a Catchment Management Agency;*

or *adopted as a legal contractual agreement between the existing catchment management structure and the relevant stakeholders, with the cooperation of the appropriate regulatory authorities.*

Not all stakeholders are likely to voluntarily implement potentially costly management strategies. In these cases, the possibility of enforcement and prosecution is critical, because a single non-compliance may result in further non-compliance by otherwise committed stakeholders. If the CMS/P is promulgated as a statutory regulation for a specific catchment, jurisdiction for its application must be given to an existing authority. The Catchment Management Agency (CMA) represents the most appropriate authority to which powers for implementation and administration of the CMS/P could be delegated or preferably devolved. The capacity and representivity conditions for a CMA may not be met in some catchments, by the time a

CMS/P could be formulated and promulgated. Another authority (such as the regional DWAF) would then be delegated with the responsibilities for the plan, in association with the stakeholder's catchment management structure, until the latter evolves into an established CMA. In the situation, where no statutory CMS/P exists, a legal contract representing the conditions of the CMS/P may be entered into between the existing Catchment Management Structure and relevant stakeholders. Under this option, the cooperation of the regulatory authorities in application of their powers is critical to support the ongoing catchment management process. This contract would then be legally binding under civil law, which represents a possible option for catchment management, before the establishment of a CMA.

Guideline 10.4

The Catchment Management Strategy/ Plan should include a regulatory framework reflecting the vision, goals, objectives and strategies for each management unit agreed to during the catchment management process, up until that time.

The agreements resulting from the planning stage of the process should be formalised in the Strategy/ Plan. The stakeholder-driven vision and goals to address the key issues for each management unit, together with the agreed management objectives and strategies to address the critical causal factors associated with these issues, should be explicitly specified within the CMS/P, to provide the basis for a regulatory framework.

Guideline 10.5

A programme for managing the translation of the strategies outlined in the Catchment Management Strategy/ Plan into a coherent Programme of Actions need to be specified.

The strategies outlined in the CMS/P need to be translated into implementable actions. The final set of actions associated with all the management strategies will form a Programme of Actions for implementation. The procedures, time frame and responsibilities for this programme need to be outlined in the CMS/P to facilitate the effective and transparent implementation and administration of the Strategy/ Plan. As an illustration, a hypothetical Programme of Actions (allied with a hypothetical CMS/P) is provided in Part III of this document.

Guideline 10.6

A procedural framework for ongoing implementation, administration and review of the Catchment Management Strategy/ Plan should be specified.

The CMS/P should outline the procedures for ongoing management of the catchment by the relevant catchment management structure (agency, regulatory authority or advisory committee). Mechanisms to

ensure consultation, transparency, information dissemination and appeal for administrative decisions must be developed and specified with the CMS/P. The institutional responsibilities, resource allocations, financing and legal ramifications should also be outlined in this procedural framework. Guidelines for future decision making, should be formulated to be consistent with the vision, objectives, strategies and resource opportunities and constraints (reflected in the management information system). Issues addressed in this framework may include:

- the administration and auditing of the Programme of Actions (and fine-tuning where necessary),
- flood management and control,
- surface and ground water allocation and permits
- water conservation and demand management,
- water quality management, and discharge permits,
- water environmental protection of the aquatic ecology,
- development, operation and maintenance of catchment and reservoir systems,
- the registration and control of land-use and evaluation of development permits,
- an integrated waste management strategy (including accidents),
- monitoring of the catchment,
- emergency response/ disaster management (including floods, droughts, contaminant spills)
- training, capacity building and public communication
- auditing of implementation of the Strategy/ Plan by an independent organisation,
- the review and revision of the Strategy/ Plan (and associated strategies).

Guideline 10.7

A single Catchment Management Strategy/ Plan should be derived for the catchment or river system, but with a regulatory framework for each management unit.

The administrative and procedural frameworks should be consistent for the entire catchment, to streamline the administrative process, but the regulatory framework for management of catchment issues should be at the management unit level, where they are most appropriately addressed by the relevant stakeholders represented on the sub-committees of the management structure.

Guideline 10.8

The Catchment Management Strategy/ Plan and its regulatory frameworks should be systematically communicated to stakeholders and the catchment residents.

The outcome of the catchment planning and the roles and the responsibilities of stakeholders, communities and their representatives should be communicated with the broader public. Emphasis needs to be laid on suitable communication channels and formats which will make it easier to communicate complex technical issues.

Guideline 10.9

Both the Catchment Management Strategy/ Plan and its regulatory frameworks should be "kept alive" and updated regularly, in a form that is transparent to all stakeholders and participants. (See Guidelines 13.1 - 13.3)

11. Implementation

Guideline 11.1

The strategies outlined in the Strategy/ Plan should be translated into implementable actions by the responsible stakeholders, to make up a Programme of Actions for implementation.

Selection of the particular management actions or practices required to implement the CMS/P should be the delegated responsibility of the affected group, thereby introducing flexibility in the individual's management of a problem, with the onus on those responsible. However, these actions must reflect any criteria associated with particular management strategies and must achieve the agreed catchment management objectives. The Catchment Authority should be responsible for evaluating the proposed actions against the requirements of the CMS/P, and accepting them or proposing any alterations. The agreed actions may be formalised into a Programme of Actions, and should be implemented by the responsible parties within the time-frame specified in the CMS/P.

Guideline 11.2

The catchment management structure and relevant sub-committees should facilitate and ensure the implementation of these actions as specified, through an appointed secretariat.

12. Administration

Guideline 12.1

The ongoing administration of the process should be based on the procedures outlined in the Strategy/ Plan, supported by the information system and managed by the Catchment Agency.

The success of any catchment management initiative depends upon the administration of the process. This requires timeous decision-making by the relevant sub-committee of the Catchment Management Structure (preferably the CMA) responsible for each management unit. It requires fine-tuning of remedial and preventative actions and assessment of new development applications, based on appropriate information. Such information is provided by ongoing monitoring , by a catchment management framework reflected in the CMS/P, and by the understanding gained through the catchment assessment and planning stages. Information dissemination, stakeholder involvement and maintenance of the information system are major components of this process.

Guideline 12.2

The monitoring programme and information system outlined in the Strategy/ Plan should be maintained.

The National Water Policy for South Africa specifically recognises that the ongoing monitoring and assessment of the use, and the response of the resource to use is critical to the success of any water resources management plan. The CMS/P must make provision for the maintenance of a monitoring programme to audit the success of the Strategy/ Plan in terms of the Resource Quality Objectives set, and the implementation of national and catchment specific standards. The monitoring programme must also allow for the ongoing assessment and reporting of the water environmental quality in the catchment. The resulting data should be compiled and captured on the catchment information system to support ongoing administration of the process.

Guideline 12.3

Catchment management structures, including stakeholder representatives, must comply with the "freedom of information" legislation.

The sustainability of the stakeholder and public "buy-in" to the catchment management process is dependent on the building of trust and credibility through communication and regular disclosure of decisions, actions, catchment assessment findings, successes and failures.

13. Review

Guideline 13.1

The effectiveness, relevance, implementation and administration of the Catchment Management Strategy/ Plan should be audited at specified time-periods to determine the need for its revision.

Progress in implementing strategies (and associated actions) as specified in the CMS/P must be monitored. Furthermore, the effectiveness of management strategies to achieve the specified objectives, given foreseen and unforeseen impacts and new development, should be reviewed, as well as the adequacy of the objectives in meeting the goals and vision of the catchment management process. Additional to a review of the "state-of-the-catchment" and technical and financial matters, the audit must include strategic items such as communication, trust and the "atmosphere" during any past or current negotiations about implementation responsibilities, etc. Additional to external reviews, stakeholder groups should jointly audit their own performance as a learning exercise. The effectiveness of the institutional arrangements should also be independently reviewed.

Guideline 13.2

The understanding of the catchment issues should be reassessed, with associated replanning of management priorities and strategies, as pressures and conditions in the catchment change.

Where the review process identifies shortcomings, these should be addressed either by revisiting the Programme of Actions, restructuring the institutional framework, replanning the implementation framework, or reassessing the understanding of the catchment, based on available information. This highlights the interactive nature of the Assessment, Planning, Implementation, Administration/ Monitoring and Review stages of the catchment management process.

Guideline 13.3

The work of the catchment management structure should be audited regularly to ensure that it is fulfilling its responsibilities and following accepted procedures for financial management.

14. The Way Forward : Towards Integrated Catchment Management

Guideline 14.1

Catchment management structures should attempt increasing integration of spatial and environmental resource planning and management initiatives, as on-going steps towards "ideal" Integrated Catchment Management.

In Part I the limits to the achievement of ideal Integrated Catchment Management in South Africa are outlined. It is shown that "ideal" Integrated Catchment Management will require a restructuring of the constitutional, administrative and legal frameworks of South Africa. However, catchment management structures, operating according to the Guidelines provided in this document, can move organically in that direction.

Guideline 14.2

The opportunities presented by environmental management should be incorporated into catchment management, particularly in terms of EIA's and possible IPC permits.

Guideline 14.3

Spatial planning and land-use management should be coordinated with catchment management initiatives to provide appropriate catchment land- use control, particularly around urban areas.

Guideline 14.4

National and regional socio-economic and infrastructural development initiatives should interact with the catchment management process, which in turn should influence these initiatives.

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GUIDELINES FOR CATCHMENT MANAGEMENT TO ACHIEVE INTEGRATED WATER RESOURCES MANAGEMENT IN SOUTH AFRICA

PART III

OUTLINE OF A CATCHMENT MANAGEMENT PROCESS AND A CATCHMENT MANAGEMENT STRATEGY/ PLAN

1. Introduction

The Guidelines presented in Part II of this document are often quite abstract, as they are formulated in a generic format to ensure their general applicability . In this Section it is attempted to make the Guidelines more concrete by providing "mind-pictures" of the possible components of a Catchment Management Process, as well as of the possible elements and structure of a fairly uncomplicated Catchment Management Strategy/ Plan.

2. Mind-Picture of the Catchment Management Process

Throughout the Guideline formulation, it was accepted that the catchment management process could be either "organic" (bottom-up) or "directive" (top-down), or, as is likely to be the most common case in the near future, both processes simultaneously. Ideally, in a poorly endowed catchment, both processes would need to operate in parallel; but the "directive" process would decline as the "organic" process gained momentum. Through the *organic* approach, concerned stakeholders within a catchment would identify the need for catchment management around a few critical issues with significant social, economic or environmental impacts. The scope of catchment management and of the associated Plan then becomes issue-based, at least initially. As a result, complete authority over all water resource management activities may not be appropriate, but delegation of authority over relevant functions is required. Under the *directive* approach, the regulatory authority (such as the DWAF) may initiate a Strategy/ Plan with a wider scope, thereby capturing many of the relevant management issues in the catchment. In either case, the associated process may ultimately result in a situation whereby authority over all water resource management activities may be delegated (or devolved) to an established Catchment Management Agency.

As a mind-picture, the Catchment Management Process is loosely outlined in Table 1, in terms of the six stages referred to in the Guidelines: *initiation, assessment, planning, implementation, administration/ monitoring and review*. However, an attempt has been made to indicate the overlap between these stages and associated activities under four sets of management functions: *public and stakeholder participation; understanding of the catchment (in the widest sense); decision-making (in the widest sense); execution of decisions, programmes and strategies*. It should be noted that Table 1 is not designed as a recipe or procedure for catchment management, but rather as an illustration of the possible ingredients or components of the process, many of which may or may not be included in under specific circumstances. Little detail is provided in the Table about the content of each of these components. The reader is referred to the Guidelines in Part II and the detailed Discussion Papers listed in Part I for a more comprehensive treatment.

It is likely that under the New Water Act delegation (or devolution) of authority for catchment management would be restricted until resources, and managerial and technical expertise are available to the catchment management structure. Therefore, capacity building and catchment management experience is essential during the entire process, before the establishment of an Agency becomes viable. The composition of the catchment management structure also needs to be reflect the relevant stakeholders associated with the catchment. These will depend upon the water resource issues that are addressed during the process, but should include many of the following groups:

- National, Regional and Provincial regulatory authorities, particularly the water & forestry, environment & tourism, land & agriculture, planning, local government & housing, health, mineral & energy, trade & industry departments.
- Local authorities, such as local (municipal), metropolitan, regional, district and traditional councils.
- Statutory boards, such as Water Boards, Irrigation Boards and Housing Boards.
- Parastatals and service providers, particularly those in the electrification, housing and transport sectors which are active in the catchment.
- Community, land owner and domestic water user representatives of inhabitants of the catchment, including civics, rate payers associations and local committees.
- Environmental representatives, particularly with interests in the aquatic ecology.
- Industrial water users, land owners and waste dischargers in the catchment.
- Agricultural and forestry representatives, in terms of water use and rural washoff.
- Recreational representatives, including tourism, angling and aesthetic.
- Representation of water interests outside the catchment due to inter-basin transfers (either donor or receiving catchments).

There are currently no guidelines on the relative composition from the different stakeholder groups, other than that the concepts of representivity and inclusivity must be adhered to. However, this will differ in each catchment, depending upon the character of the catchment and the critical problems to be addressed.

3. Mind-Picture of a Catchment Management Strategy/ Plan

The outline of the hypothetical Catchment Management Strategy/ Plan presented in Table 2 provides a structure within which the main ingredients of catchment management may be incorporated, as well as providing an indication of the elements that the catchment management process should address and find consensus upon. Following the Guidelines in Part II, the Strategy/ Plan outline has been separated into four interrelated frameworks, These are:

- *Policy framework*: indicating the context and aims of the Strategy/ Plan.
- *Administrative framework*: outlining the institutional, legal and financial arrangements.
- *Regulatory framework*: specifying the objectives and methods for managing the physical catchment.
- *Procedural framework*: outlining the programmes and procedures for ongoing catchment management.

The elements of these frameworks are illustrated by way of an hypothetical Catchment Management Strategy/ Plan which reflects the formalisation of a "bottom-up" management process. The hypothetical catchment is heavily urbanised and includes a lake that is used for recreation. The deteriorating recreational and aesthetic quality of the urban riverine environment provides the motivation for catchment management. Table 2 indicates some of the elements that such a Strategy/ Plan may include, while Table 3 illustrates how the example regulatory framework strategies may be developed to formulate a Programme of Actions.

Caution: This hypothetical Strategy/ Plan only addresses one aspect of water resources within an urban environment. Catchment management should ultimately be far broader, addressing many of the following water resource management issues:

- Surface and ground water utilisation, including allocation, permitting and registration.
- Protection/ management of the requirements of the aquatic environment and fitness-for-use.
- Water quality management, including source control and effluent discharge permitting.
- Catchment water resource infrastructure development.

- Reservoir system operation, for bulk water supply, irrigation, environmental releases and recreation.
- Water conservation and demand management.
- Flood and stormwater management and control.
- Management of land uses with significant water resource impacts, eg. afforestation, extensive dry-land agriculture, cultivation of communal lands, etc.
- Integrated waste management.
- Water quality incidents and spill management.

It is obvious that the wide range of possible management issues considerably complicates the catchment management process and the associated development of a Strategy/ Plan. An incremental approach starting with a few priority issues is thus likely to be far more appropriate in most cases.

TABLE 1. OUTLINE OF A CATCHMENT MANAGEMENT PROCESS

PUBLIC PARTICIPATION	*UNDERSTANDING*	*DECISION-MAKING*	*EXECUTION*
Initiate a catchment management process			
• the need for catchment management may be identified by the water authority (directive) and/or stakeholders (organic) based on existing and/or perceived problems			
• organise an interim stakeholder catchment management structure	• identify and define an appropriate catchment boundary		
	• scope the key catchment issues with significant socio-economic and environmental impacts		
• consult stakeholders on major decisions		• select critical catchment issues	• secure funding for the continuing process
• empower "champions" to drive the process		• formulate a catchment vision and goals	
Assess the catchment conditions			
• broaden the representivity on the catchment management structure to include all relevant stakeholders to guide and inform the process			
	• evaluate the administrative (institutional, policy, legal and financial) environment in terms of catchment management requirements		
	• understand the socio-economic and physical cause and effect relationships governing the key catchment problems		
		• identify key management areas and issues and concentrate investigations of these	
• create a representative and inclusive catchment management structure			• implement appropriate management strategies
• build capacity and understanding of stakeholder representatives on the catchment management structure			• develop a catchment information system
• inform the wider catchment community of progress and improved knowledge of the catchment through accessible information dissemination			
Plan catchment management solutions			
• decision making should be conducted by the catchment management structure through agreed consensus or voting procedures			• agree management unit boundaries
	• integrate the understanding gained through detailed investigations and provide information to support decision making		
• ensure stakeholder support for proposed arrangements		• define the administrative jurisdiction of the catchment management process	
• build managerial capacity of the catchment management structure		• specify the financial arrangements to support catchment management	
	• identify and evaluate the cost-effectiveness of management strategies to address the key management issues		
• develop stakeholder consensus about management strategies		• select a coherent set of management objectives and strategies (with responsibilities etc.)	
	• identify and define necessary legislation to support catchment management administrative arrangements and strategies		
• constitute management structure sub-committees responsible for each management unit			• formulate a Catchment Management Strategy/ Plan
• ESTABLISH A CATCHMENT MANAGEMENT AGENCY		• PROMULGATE CATCHMENT MANAGEMENT STRATEGY/ PLAN (Table 2)	

PUBLIC PARTICIPATION	UNDERSTANDING	DECISION-MAKING	EXECUTION

Implement decisions made during the planning process

- publicise the aims and implications of the Catchment Management Strategy/ Plan (CMS/P)
- initiate procedures outlined in the CMS/P
- responsible parties must identify and propose actions to address the management strategies specified in the CMS/P
- evaluate the integrated catchment impacts of all proposed actions in terms of the management objectives
- provide support and build capacity for the Catchment Management Agency
- formulate a Programme of Actions
- implement specified actions
- publicise and disseminate information about the Programme of Actions

Administer the continuing catchment management process

- the catchment management agency should administer the process
- monitor catchment indicators, assess the results and capture information on the information system
- provide managerial and technical support to the catchment management agency
- operate the system using monitored information
- monitor the implementation of management strategies and fine tune these where necessary
- consult stakeholders about other problems in the catchment
- formulate objectives and strategies to extend the scope of catchment management
- ensure stakeholder support for extension of the CMS/P
- update and implement the CMP
- evaluate and permit new development proposals according to the procedures in the CMS/P
- disseminate information about the state of the catchment and success of the process (and CMS/P)

Review the success of the catchment management

- periodically audit the implementation of the CMS/P and the state of the catchment
- evaluate the effectiveness and capacity of the catchment management agency
- reassess, replan and revise responsibilities, objectives and strategies based on periodic audit and review of the process
- extend the jurisdiction of the catchment management agency where appropriate
- revise and promulgate the CMS/P if necessary

TABLE 2. OUTLINE OF A CATCHMENT MANAGEMENT STRATEGY/ PLAN

A. *Policy Framework*

This skeleton framework outlines the main issues and aims for catchment management identified by the stakeholders, taking cognisance of the opportunities and constraints presented by that particular catchment context.

Catchment Vision	**Priority Issues**	**Goals / Principles**
An "ideal" which all stakeholders would like to achieve and can support.	*Prioritised water resource problems with social, economic or environmental impacts.*	*Achievable aims of the catchment management process, associated with the priority issues.*
• A safe, healthy and attractive river and lake environment to be shared and enjoyed by all inhabitants of the catchment.	• Bacterial contamination of streams • Litter in riparian zone and sediments • Algal blooms in urban impoundment • Degraded aquatic ecosystem health	• Ensure safe bathing without health risks in certain local streams • Develop an attractive riverine environment for recreation and ecological functioning • Improve the aesthetic and health quality of the impoundment for recreation • Create a healthy functioning riverine ecosystem

B. *Administrative Framework*

This enabling framework indicates the institutional, legal and financial arrangements for implementation, administration and auditing of the catchment management process, even though much of this may be addressed during the statutory establishment of the Catchment Management Agency.

Organisation	**Responsibilities**	**Authority**	**Financing**	**Legislation**
Governmental, statutory or stakeholder organisations which have a role in the CMS/P.	*The roles of that organisation as regards the CMS/P or ongoing process.*	*The legal powers with respect to those designated roles.*	*Sources of funding to provide resources.*	*Legislation to enable or support the roles.*
• Catchment Management Agency (CMA)	• Represent and commit stakeholders • Publicise and administer the CMS/P	• Local WQ Management • Operation of impoundment • Riverine maintenance	• DWAF WQM funds • C.M. Charge	• Establish CMA • Stormwater standard
• Local Authority (LA)	• Implement recommendations of the CMA	• Development planning • Service provision	• Land taxes/rates • Service charges	• Land use by-laws

C. *Regulatory Framework*

This regulatory framework specified the approach and responsibilities for managing the physical catchment, in accordance with the conditions outlined in the policy framework and the arrangements of the administrative framework.

Operational Objectives	**Causal Factors**	**Operational Strategies**	**Responsibilities**	**Performance Criteria**
Measurable objectives reflecting goals associated with the priority issues.	*Main causes of the priority issues identified for management (each factor may contribute to more than one issue).*	*General approaches to address the causal factors (each strategy may address multiple causes).*	*Stakeholders required to implement each strategy.*	*Measurable criteria to evaluate implementation of each strategy.*
• *E.coli* < 200/100ml during low flows	• Blockages in the sewer system	• Improve sewer maintenance	LA	• reduce # of blockages
• SASS4 ASPT value > 6		• Sanitation education	CMA/ Schools	
• Chlorophyll-a < 15µg/l during summer	• Use of rivers while contaminated	• Restrict or publicise health risk	CMA	• # reported illness
• Reduce riverine litter	• Settlement in riparian zone	• Relocate people from flood plain	LA	• # dwellings relocated
		• Restrict riparian development	LA	• # of dwellings
	• Inadequate sanitation in informal settlements	• Upgrade sanitation	LA	• # of households
	• Inadequate assimilation in streams	• Rehabilitate streams	CMA/DWAF/LA	• km of streams
		• Install detention ponds and traps	LA/CMA	• # of ponds
	• Urban washoff and riparian litter	• Anti-litter campaign	LA/CMA/Schools	• tons of refuse collected
		• Waste management strategy	LA/CMA/DWAF	• pollution indicators
	• Community Disintegration	• Community social developm.	ProvGov/LA/NGOs	• social indicators

D. Procedural Framework

This procedural framework dictates the way in which programmes and procedures for managing the catchment should be conducted, in accordance with the requirements of the control framework and the arrangements of the administrative framework.

Procedure	**Organisation**	**Task Responsibility**	**Time frame**
Activity which needs to be performed or supervised during implementation, administration or auditing of the process.	*Key governmental, statutory or stakeholder organisations responsible for part or all of that activity or procedure.*	*The tasks and roles of these organisations in performing the procedural activities.*	*The time period within which an activity should be completed or the frequency at which it should be repeated.*
• Develop Programme of Actions	• relevant stakeholders (as in CMS/P)	• Translate into Actions	6 months from CMS/P
	• CMA	• Supervision	during 6 months from CMS/P
		• Evaluation	during 9 months from CMS/P
		• Finalisation	9 months form CMS/P
• Implementation	• relevant stakeholders (as in CMS/P)	• Implement Actions	within 18 months from CMS/P
	• CMA	• Supervision	ongoing
		• Auditing	every 12 months
• Administration	• CMA	• Catchment management	ongoing
		• Water quality management	ongoing
		• Information System/GIS	ongoing
	• LA	• Land use zoning	ongoing
		• Stormwater management	ongoing
		• Waste management	ongoing
	• DWAF	• Water managem. not in CMS/P	ongoing
• Monitoring	• CMA/LA	• Catchment development	ongoing
	• CMA/DWAF	• Water quality & Ecosystems	ongoing
		• Hydrology	ongoing

TABLE 3. OUTLINE OF A LIKELY PROGRAMME OF ACTIONS FOR THE MANAGEMENT STRATEGY/PLAN

This Table illustrates the actions which may be associated with the operational strategies specified in the Catchment Management Strategy/ Plan (part C of Table 2).

Operational Strategy	**Action**	**Location**	**Time frame**	**Responsibility**
Selected strategies outlined in the CMS/P regulatory framework.	*Implementable actions or practices corresponding to each strategy.*	*The site at which the action will be implemented.*	*The period of implementation.*	*The organisation to implement the action.*
• Upgrade sanitation	• construct household VIP 's	• extension 101 (informal)	• within 12 months	• Province (RDP)
	• replace old trunk sewer mains	• extension 10 (formal urban)	• within 24 months	• Town Council
• Improve sewer maintenance	• institute weekly sewer monitoring	• all sewered areas in town	• ongoing after 3 months	• Town Council
	• increase maintenance department funding	• within the town council	• next financial year	• Town Council
• Sanitation education	• conduct "edutainment" drive	• informal settlements	• next 12 months	• CMA
	• implement newspaper campaign	• local paper	• next 6 months	• CMA
• Restrict or publicise health risk	• signpost results of bacterial monitoring	• along critical reaches	• ongoing after 3 months	• CMA & DWAF
• Relocate people from flood plain	• provide land and move informal settlements	• extension 101 flood plain	• within 12 months	• Province (RDP)
• Restrict riparian development	• re-evaluate 50-year flood lines	• throughout urban area	• within 6 months	• Town Council
	• enforce 50-year flood zone by-law	• throughout the urban area	• ongoing after 6 months	• Town Council
• Rehabilitate streams	• decanalise and vegetate streams	• upstream of the impoundment	• within 12 months	• CMA & Town Council
	• revegetate wetland areas	• small tributaries in extension 10	• within 12 months	• CMA
• Install detention ponds and traps	• develop an artificial wetland system	• downstream of extension 101	• within 18 months	• CMA & Town Council
	• construct litter trap	• upstream of the impoundment	• within 36 months	• CMA & Town Council
• Anti-litter & washoff campaigns	• increase street sweeping staff & frequency	• commercial districts	• next financial year	• Town Council
	• schools adopt a river programme	• local streams near school	• biweekly activities	• Area schools
	• public litter cleanup day	• riparian "green" zones	• annual	• Civics & CMA
	• link into town anti-litter programme	• throughout the town	• ongoing	• CMA & Town Council
• Waste management strategy	• improve waste disposal site management	• at the landfill	• within 24 months	• Town Council
• Community social development	• improve social amenities and outreach	• disadvantaged suburbs	• within 24 months	• LA/ProvGov/NGOs

GUIDELINES FOR CATCHMENT MANAGEMENT TO ACHIEVE INTEGRATED WATER RESOURCES MANAGEMENT IN SOUTH AFRICA

APPENDIX

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