

Principles and processes for supporting stakeholder participation in integrated river management

Lessons from the Sabie-Sand catchment

(January 1999 – March 2002)

Water Research Commission Project K5/1062



FINAL REPORT

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Project team:

B.W. van Wilgen¹ (project leader), C.M. Breen², J.J. Jaganyi², K.H. Rogers³,
D.J. Roux⁴, T. Sherwill³, E. van Wyk⁴ and F. Venter⁵

¹. CSIR, Environmentek. PO Box 320, Stellenbosch, 7599

². Institute of Natural Resources. Private Bag X01, Scottsville, 3209

³. Centre for Water in the Environment. Wits University. Private Bag 3, Wits, 2050

⁴. CSIR, Environmentek. PO Box 395, Pretoria, 0001

⁵. Conservation Services, Kruger National Park. Private Bag X402, Skukuza, 1350

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Environmentek



Centre for Water in
the Environment -
Wits University



Institute of
Natural
Resources



South African
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***'We are proud custodians of our rivers.
They sustain our economy and heritage.
We protect and manage them so that they can
continuously bring benefits equitably to our people, the
nation, and our neighbours.'***

Vision statement generated by stakeholders from the Inkomati catchment for their rivers. July 2000.

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EXECUTIVE SUMMARY

This document constitutes the final report to the Water Research Commission on the project entitled "Protocol for developing, implementing and maintaining the biophysical component of catchment management plans as developed by catchment management agencies". The project proposed a technical solution to develop 'protocols' to guide the management of biophysical resources in a catchment area.

The study was based in the Sabie-Sand catchment, which we chose as a study site for this project for a number of reasons. These included the fact that much research had been done there, providing a solid base for understanding of the ecosystem, and that there was an existing and active catchment working group (the Sabie River Working Group) representing all major players, that could act as a "surrogate client" for our work.

Our original approach called for the development of protocols in a three-phase approach, outlined below.

- Document the current state of the Sabie-Sand catchment, as a baseline for understanding and a starting point from which to build a protocol for current state reporting, visioning and strategy development for river management (to be conducted in 1999).
- Work with stakeholders, through the surrogate client, to define a desired state of the environment that would be acceptable to, and meet the needs of, all of the stakeholders represented by the surrogate client (to be conducted in 2000).
- Develop a set of protocols that would build on scientific best practice, and enable and empower stakeholders to work towards the achievement of the desired state of the environment (to be conducted in 2001).

A change in the project objective (and subsequent direction) came about in phase 2 of the project. At this time, when we engaged (as planned) a group of multi-sectoral "stakeholders" with the aim of designing a process for describing a "desired state". During this phase, it became clear that participants in the process are ill-prepared to engage one another. Therefore, a technical focus was less important than finding a way to help stakeholders to interact with government and government with civil society in a way that promotes cooperative decision-making as it relates to the resource. In view of this realization, we started to reconsider the research priorities, and to realign the project focus and objectives with our new understanding and with what we believed the water law intends to achieve.

The aim of the project was modified at a project team workshop held in early 2001. The title of the project be changed to read as follows:

"Developing principles and processes for supporting stakeholder participation in integrated river management".

This report has three parts. In Part 1, we address the question of how best to support stakeholder participation in integrated river management and it provides details on the constitutional and legal context underpinning stakeholder participation. It discusses the principles that arise from this context, as well as the processes that would be needed to achieve sustainable and equitable outcomes through integrated management. The lessons that we have learnt from this project are also outlined here.

Part 2 provides an overview of the detailed findings of the project. These findings are based on a range of papers and reports that were produced as the project progressed.

Part 3 addresses the issue of capacity-building. Capacity building is a vitally important aspect of research investment. As our project sought ways of empowering people to participate in the management of water resources, we paid particular attention to this issue. We have documented both the theoretical understanding of capacity-building, and we have provided a list of people in whom capacity has been built, and a list of products (outputs from capacity building) that have been produced by the project.

Scientists, especially those engaged in natural resource management in support of sustainable development, should strive to adapt (where appropriate) their approaches to implementation projects. In the first place, it seems that by encouraging a structured “bottom-up” approach, the benefits of stakeholder wisdom and empowerment will be brought to the fore. This will require a mind-shift, from one of “telling”, or “teaching”, to one of sharing knowledge, influencing wise decision-making, and facilitating the identification of problems as well as solutions. This seems to be the most important lesson arising from this study, and it should go some way towards directing the way forward.

A second, and far-reaching, issue that should guide us in the way forward lies in the way in which we address capacity building. To date, there has been a realization that South Africa's transition to democracy will require transformation and capacity building, but there has been little appreciation, both by administrators and practitioners, of how this should be done or measured. This project has highlighted that capacity-building is a long-term process, that it cannot and will not be hurried, and that it will require a long-term, and structured approach if it is to be effective and successful. Given the importance of this issue, the development of a structured and long-term approach should become prominent on the agenda of scientists, research managers, and implementation agencies.

Lastly, we have seen in this project that it is indeed possible for people to modify their own perceptions and behaviour, willingly, in support of a cooperative process that is likely to deliver equity, sustainability and efficiency in the water resource management process. The willingness of participants in this process to learn (and change) together, combined with the fact that water issues are likely to organize people around the debate for years to come, suggest that these interactions can form a platform to promote the principles, values and ethics that underpin democratic behaviour.

The realization of true democracy in South Africa is a goal shared by almost all of the inhabitants of the country. The realization of true democracy in South Africa is a goal shared by almost all of the inhabitants of the country. Much progress has been made in this respect, but much remains to be done. This project has shown that people are still struggling with the realities of how to participate meaningfully in the management of shared resources. Rivers are one of the most important of our shared resources. The constitutional and legislative instruments that are in place provide a framework within which to develop people's abilities to play meaningful roles in this respect. We suggest that the political and environmental rewards that would arise from the empowerment of people to participate in resource management processes are immense. What is needed now is to develop working examples of how this can be achieved. This can be done by building on the significant advances in understanding that have been made in this project. South Africa's fledgling democracy stands to benefit immensely if we can demonstrate effective empowerment through examples from the river management process.

PART I: INTRODUCTION

Background to the project

This document constitutes the final report to the Water Research Commission on the project titled "Protocol for developing, implementing and maintaining the biophysical component of catchment management plans as developed by Catchment Management Agencies". The idea for initiating this project had its origin in a suggestion that scientists working in the Kruger National Park Rivers Research Programme should interact with the Working for Water programme, with the aim of coordinating upstream and downstream activities relating to river and catchment management. The project was a result of follow-up on this suggestion, and it proposed a technical solution to develop 'protocols' to guide the management of biophysical resources in a catchment area.

South Africa's new water law makes provision for an integrated and adaptive process of resource management, with the ultimate aim of satisfying the socio-economic and empowerment needs of people as these needs relate to the water resource. In addition, the law requires that the resource management process be decentralized and participatory. This is based on the recognition (by both the National Water Act and the National Environmental Management Act) that successful allocation and management of a scarce, vital, and stressed natural resource in a complex socio-economic and political setting would require effective participation and cooperation between various resource users.

The intent of the legislation is clear – people must take ownership of their own future, and they must collaborate with each other to find equitable and sustainable solutions to the utilization and conservation of scarce resources. This must be done at a level that is appropriate to management at the level of catchments, and not governed by a centralized "command-and-control" approach. This significant shift in the approach to water management will require many changes to approaches and mind-sets that have become entrenched over the past decades, and there are many problems that must be overcome. These include:

- The fact that communities are simply not geared to engage with each other, and with government, to be able to develop coherent and locally-designed approaches to shared river and catchment management;
- The fact that scientists have focused on technical and biophysical issues, and are poorly equipped to deal with the issue of technology transfer (this will be needed to ensure that the investment in scientific research can support informed decision-making); and
- The fact that government is ill-equipped to deal with the new approach because of the legacy of control which continues to keep bureaucracy in business.

When this project was conceptualised, it was clear to us that overcoming these problems was going to require optimal use of the limited expertise available. South Africa invested in the development of a small core of trained scientists during the apartheid years. The scientific community is small, but has significant local knowledge and experience. If the country is going to be able to capitalise on this investment, it is imperative that scientists from different disciplines collaborate to find integrative solutions to the problems of resource management. Our project sought to do this by bringing together scientists from differing backgrounds to address the problems of water resource management in a case study area.

We chose the Sabie catchment for a number of reasons. These included the fact that much research had been done there, providing a solid base for understanding of the ecosystem, and that there was an existing and active catchment working group representing all major players, that could act as a surrogate “client” for our work. A full explanation of our original approach is provided in **Appendix 1**. The project followed a learning-by-doing approach and as our understanding advanced, the project made a purposeful move away from the original goal of protocol development. The area of project focus changed considerably as project participants engaged with stakeholders in the case study area.

This report sets out to provide an overview of the history and evolution of the project, and of our current understanding of how water resources should be managed in an integrated, equitable and sustainable manner. It provides an overview of the outcomes of our research, which has been presented in a series of papers published, or to be published, in the peer-reviewed literature, and it draws on the results of these studies to provide a brief synthesis of our current understanding.

Aim of the project, and original terms of reference

Initially, the project was titled “Protocol for developing, implementing and maintaining the biophysical component of catchment management plans as developed by catchment management agencies”. The original terms of reference are given in Box 1. The original aim of the project was to develop protocols that would support catchment stakeholders in the development of strategies to promote cooperative river management within a catchment context. These strategies should aim to promote agreement on the equitable distribution of expected costs and benefits associated with the use of rivers and to promote the sustainable and efficient utilization of benefits derived from rivers.

The original intention was for the project to develop protocols using a three-phase approach, outlined below. The timeframe for the project was three years (January 1999 to March 2002), and each of the phases below was planned to provide the bulk of the work in consecutive years.

- Document the current state of the Sabie-Sand catchment, so as to provide a baseline for joint understanding by the project team and a starting point from which to build a protocol for current state reporting, visioning and strategy development for river management (to be conducted in 1999).
- Work with stakeholders, through the surrogate client, to define a desired state of the environment that would be acceptable to, and meet the needs of, all of the stakeholders represented by the surrogate client (to be conducted in 2000).
- Develop a set of protocols that would build on scientific best practice, and enable and empower stakeholders to work towards the achievement of the desired state of the environment (to be conducted in 2001).

Box 1. Original terms of reference for the project to develop, implement and maintain the biophysical component of catchment management plans.

- Assess the present state of the environment in the Sabie catchment as a baseline for the study.
- Design a process for describing the desired state of the environment, in terms that would be required to ensure the equitable and sustainable conservation of water

resources in the Sabie catchment. The process used to arrive at the desired state of the environment will be critically evaluated.

- Build capacity in all stakeholders and parties participating in the research project. The establishment of a CMA and its functions will be a new and developmental process which will necessitate capacity building in several fields. The project aimed to develop this capacity in the researchers themselves, the potential members of the CMA, in local land users and in DWAF.
- Develop a set of principles by which existing techniques can be integrated into the activities of catchment management agencies to ensure sustainable and equitable conservation of water resources.
- Demonstrate through practical application how these principles can be implemented and to document the lessons learnt during the process, so that practical application can easily be extended to other catchment areas.
- Provide a generic model for water resources management on a catchment basis for use and application by DWAF and CMAs.

Context and assumptions

Fundamental changes in legislation coupled with growing demands on the resource have created an imperative for management practices to be different from those of the past. There is a new requirement for the wider public to participate cooperatively and effectively in resource management in order to deliver a range of goods and services sustainably and equitably to people. The new approach also requires that water should no longer be considered in isolation, but that the entire river ecosystem, and interactions between ecosystem components, be considered when management is carried out. The implication is that management will need to adopt a more integrated approach, one which integrates social, economic and political (those relating to the power to participate) concerns with biophysical aspects of river management. The requirement for this new approach to management contributed substantially to the context within which this project developed.

The proposal for this project was formulated prior to the promulgation of the new water act in 1998. Although the context and intent of the law were broadly understood, it was necessary to make a number of assumptions in order to proceed with the project, as the new approaches that would follow promulgation of the act were not clearly understood, either by the project participants, the government department responsible for the implementation of the act, or the people that would be expected to participate. Our assumptions included:

- The project would not focus on the past or present, but on the future. In order to address these new challenges, we formed a project to develop “protocols” based on achieving a desired future state. (**see Appendix 1 for details**).
- We would be guided by our interpretation of the constitution and policies (such as the White Paper on a national water policy for South Africa) that were forerunners of the new water law. These assumptions included the recognition that water resources cannot be effectively managed from the top-down alone, and that the responsibility should and would eventually be delegated to a level where stakeholders would be empowered to make informed decisions about the shared management of a scarce resource.

- It would take a while for Catchment Management Associations to be established but in parallel to this process, research could make a meaningful contribution through the development of protocols (comprising principles and processes that would support the management of a sustainable resource) with what the project team regarded as a precursor Catchment Management Agency (the Sabie River Working Group).

The resource management framework

As a step towards achieving an integrated and adaptive process for river management, the Department of Water Affairs and Forestry (the government department responsible for the implementation of the water law) designed a prototype management framework that links an ecosystem protection strategy (termed 'Resource Directed Measures') and a water allocation strategy (licensed water use) in an iterative sequence. This management framework includes aspects such as vision-building, action, monitoring and review. Resource Directed Measures make provision for needs associated directly with the river ecosystem in the same way that licensing procedures are set to make provision for needs associated with the extraction and use of water from the river ecosystem. The essence of Resource Directed Measures is to maintain river ecosystems in a state that will provide a preferred set of river-based benefits to people over the long term and in an equitable fashion. The environmental Reserve, one component of the Resource Directed Measures process, is, in turn, an amount of water of specified quality to be allocated to the river ecosystem in order to support the maintenance of a specified level of ecosystem functioning (and associated provision of goods and services to people)¹.

In addition, in order to facilitate devolved decision-making at all levels of society to support the management process, legislation also made provision for the establishment of Catchment Management Agencies (CMAs).

The new approach to water resources management and accompanying new management requirements presented unfamiliar ground to all participants in the process. How would the water law's ambitious ideals be achieved in practice? There was no existing recipe for achieving the new management objectives. How can we establish and maintain the Reserve to achieve a balance between resource protection and resource use whilst at the same time ensuring that all of the processes deliver equitable, sustainable and efficient outcomes? What is the role of, and processes for, public participation, in a diverse civil society that has never before been able to participate meaningfully in decisions around the water resource? How should the components of the new management framework be developed and how should they link with one another and with the participatory process?

At the same time, it was imperative that management should proceed despite many uncertainties.

Conceptual framework to guide research

As this project progressed, the Department of Water Affairs and Forestry embarked on the development of a bureaucratic process for the implementation of the law. Our thinking in the project was naturally influenced by this parallel process, which impacted on the relevance and applicability of the protocols that we aimed to develop. The department's proposals for river management involved a "resource management cycle", which can be summarised in the following steps:

¹ Where mentioned in the outputs of this project, the word 'Reserve' refers to the environmental Reserve (as opposed to the basic human needs Reserve) unless specified otherwise.

- A **current state** is described.
- A **vision** is described. The vision relates to the articulation of stakeholder needs and preferences as they relate to the resource. One component of achieving this vision has to do with defining the ecological state of the resource (called the ecological management class) that would support the socio-economic vision associated with the river ecosystem.
- The **ecological management class**, the ecological state that must be maintained in order to support the desired range of benefits from the resource, is then defined.
- The **reserve** is the amount, quality and regime of water allocated to the river ecosystem that will maintain the desired ecosystem state that will, in turn, support the desired range of benefits to people. The Reserve determination process is the process of quantifying the Reserve.
- A river management **strategy** and associated actions will promote progress from the current ecological to the desired ecological state with the objective of achieving progress from the current socio-economic to the desired socio-economic state.

The steps above show that the reserve determination process (although a statutory requirement) is merely a technical component of a wider process that includes stakeholder articulation of needs and the translation of these needs into the ecological state that would support those needs.

One of the challenges that we faced was to understand, and then to present, how the different processes could happen at and across different scales, and at different levels of management from local to national. We thus needed a model that would also account for different scales, because we expected that some features of a process or product might be scale-specific while others may be generic across scales. For example, capacity to engage the resource management process at the level of local community may be quite different from the level of the Catchment Management Agency. On the other hand, adhering to certain principles such as commitment to effective cooperation and the acknowledgement of environmental limits and the precautionary principle (associated with the delivery of goods and services) may be applicable across and between all scales of resource governance.

We developed a conceptual framework (Figure 1) to guide our thinking in this respect. The component boxes in Figure 1 represented a basis for the development of individual protocols. Our interpretation of the relevance and significance of these rudimentary protocols is shown in Table 1. This framework was important in guiding the evolution of this project, and is presented here as background to readers who wish to be able to follow the evolution of thinking in the project.

Figure 1. A conceptual framework showing the links between rudimentary protocols and statutory processes for river management (protocols are indicated by the letter 'p').

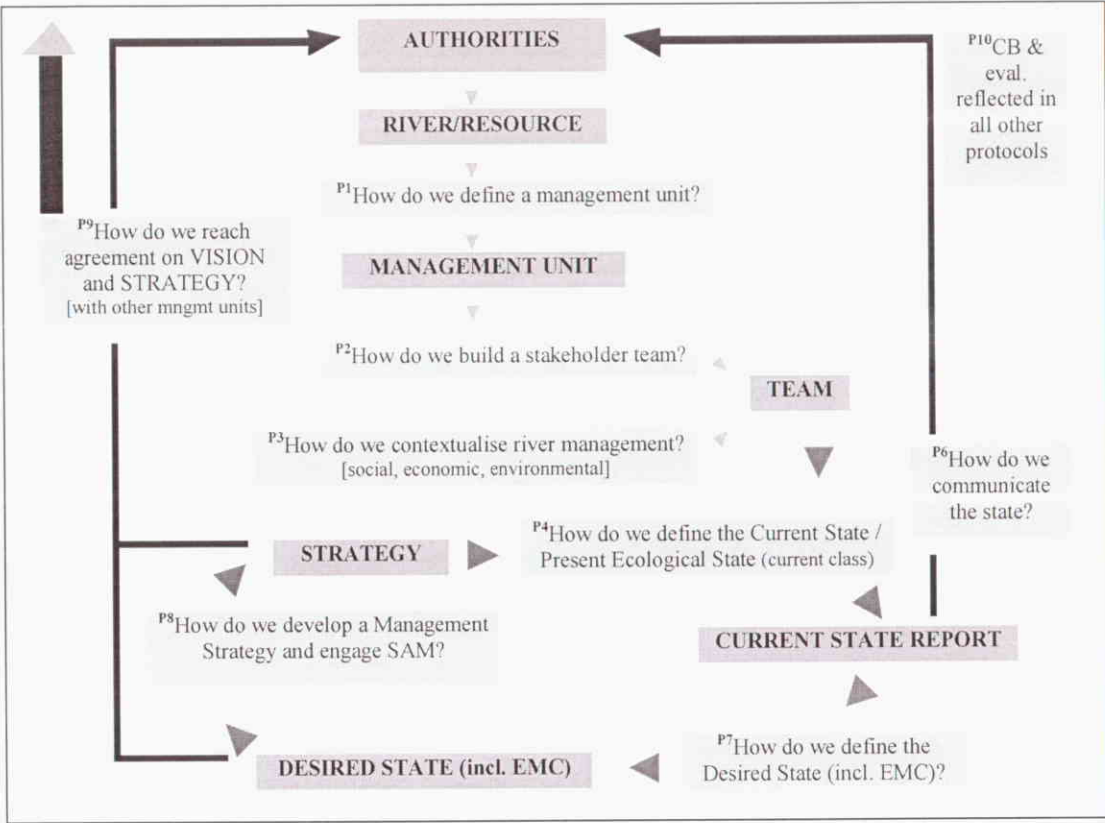


Table 1. Description of components of the conceptual framework (Fig. 1).

Process (roadmap component)	Associated product	Interpretation and questions
Authorities	None	Fora, Water User Associations, local government, Catchment Management Committees, Catchment Management Agencies, Water Affairs, Environment Affairs. Is representation an adequate mechanism to ensure equitable participation?
Define a management sector/unit	Defined management sector	How do we define a management unit? Which boundaries (e.g. ecological, social, administrative) do we use to define them? Do the boundaries co-incide? Currently only ecological classification system used for Reserve determination.
Build a stakeholder team	Team with spirit of cooperation	Team should reflect full spectrum of costs, benefits and opportunities associated with resource. What affects willingness to participate?
Contextualize river management	Team that has built a shared context	How to build a shared context? What is the role of context?
Define Present Ecological State (Current State)	Current State report and reporting process	How do we define current state? Which aspects of current state should it include? How can Environment Affairs' environmental reporting needs be accommodated?
Communicate the Current State	Current State understood	What is the most appropriate way of communicating the current state in support of effective decision-making?
Define Preferred Management Class	Management Class	How do we get competing sectors to negotiate effectively and agree on a Management Class?
Engage Strategic Adaptive Management	Iterative, adaptive and goal-directed management cycle	What are the prerequisites for Strategic Adaptive Management? How can we ensure that the iterative management cycle is future-focused?
Reach agreement on preferred Management Class and strategy	Agreement achieved through consensus (win-win result), not compromise.	Step at which scales are transferred, i.e. complementary goals and strategies are negotiated at a higher level.
Capacity building	All levels of participants empowered to participate and cooperate towards meaningful decisions with regard to the resource	What is the meaning and definition of capacity building? What capacity building can be expected of research projects during a project's life span? Can we formulate a strategy through which research projects can support capacity building?

We felt that one or more protocols could be developed for each of these components. However, it was beyond the scope and time frame of this project to address all of the questions in Table 1. The task at hand was then to develop and test selected components of this framework.

Evolution of the project

The scope, approach and focus of the project changed considerably throughout the course of the project. At the time the project was conceived, the new water law had not been promulgated. We assumed that our surrogate client would be the Sabie River Working Group, an organized catchment-based forum consisting of various sectors and their interests in the river ecosystem and associated goods and services. The intent of policy was to devolve the management of water resources to catchment management agencies, and in the absence of such an agency, the Sabie River Working Group provided a useful surrogate. However, when the water law was passed, the Department of Water Affairs and Forestry, became the *de facto* management agency, and was regarded as the new surrogate client. The project team attempted to engage the department, but had difficulties, as the department's focus was held by the pressures and needs of immediate implementation.

We assumed we would focus on biophysical aspects, with stakeholder inputs (social aspects) to help us design a process to describe the desired state. Originally, the team planned for all of the products to be of a technical nature. A change in the project objective (and subsequent direction) came about in phase 2 of the project. At this time, when we engaged (as planned) a group of multi-sectoral "stakeholders" with the aim of designing a process for describing a "desired state".

During this phase, the role of technical tools - in relation to the participatory process - became apparent. Technical tools and processes should be support systems and tools to the social, participatory aspects of management and associated decision-making processes (i.e. should be used to support people, their thinking, actions, interactions and decisions in relation to the resource; and the factors that drive these aspects). It also became clear that participants in the process are ill-prepared to engage one another. Therefore, a technical focus was less important than finding a way to help stakeholders to interact with each other and with the implementation process and to assist government to engage with civil society in a way that promotes cooperative decision-making as it relates to rivers. In view of this realization, we started to reconsider research priorities, and to realign the project focus and objectives with our new understanding with what we believed the water law intends to achieve.

Thus, initially we were concerned with trying to develop a technical solution to what is fundamentally a social problem. We cannot manage rivers, we can only manage what they deliver to people by managing people's behaviour in relation to rivers.

The process of engaging stakeholders contributed significantly to our understanding of this and other components of the project. As a result of the learning gained through this process, the project team revisited and modified the role (and contribution) of this project in serving the intentions of the Department of Water Affairs and Forestry's resource management process.

The interaction with stakeholders led to:

- A better understanding of the importance of a direct and explicit focus on the more social, participatory aspects of the resource management process. River management and decision-making is a social process. It is about mobilizing people's energy for participation and for the benefits from joint management. Sustainability in river management will benefit by a more people-centred, cooperative, participatory process and this process should be the primary driver for cooperative resource management and decision-making. The development of an effective governance system around rivers, in which people are truly empowered to shape their river management strategies, is therefore an urgent necessity.

- An understanding that technical products and processes should not form the primary focus of the water resources management process but that it is critical that we know how and when to integrate them appropriately with the social, participatory process.
- An understanding of the sort of principles and processes that would support the ability of both civil society and government to better engage one another in the river management process. They will tend to strengthen cooperative relationships between various levels of governance that will in turn support better informed decisions around river management.
- An understanding that the manner in which things get done (i.e. the principles and philosophies that support the processes people engage in) is as important as what gets done (i.e. processes and emerging products). The successful pursuit of sustainable development requires a mixture of principles relating to values, and process-oriented considerations (those that are more concerned with the strategies that are followed to achieve the desired outcomes).
- Realization that the project should not attempt to serve the needs of a particular group or institution. Thus, the products would be generic and supportive of the participatory governance process at, and across, various levels of organization and across various catchment scales.
- Realization that people seldom adopt a protocol they did not develop or help to develop. A protocol developed in isolation of the people and processes that a protocol is meant to serve, will not be accepted and is contrary to the spirit of the law. As a result, we decided to not develop a step by step protocol, but rather to develop a set of principles and processes that people could adopt and use according to their individual needs and circumstances.

In essence, the original project model of defining a current state, a process for a desired state and actions to achieve the desired state, was maintained. However, the nature and focus of these components changed substantially from what was originally envisaged. As the project progressed, the team developed an understanding that what was needed as a matter of priority was not a technical outcome, but one which would be more focused on aligning human interactions and behaviour to achieve a common goal; (the common goal being a sustainable and equitable process to ensure the fair distribution of costs and benefits associated with the use of goods and services provided by rivers).

Final project aim

A project team workshop (held in early 2001) followed the stakeholder workshops, where the aim of the project was modified:

“Developing principles and processes for supporting stakeholder participation in integrated river management”.

Stakeholders in this context were seen to be residents and water users, government, and scientists. This new aim, based on the project team’s evolved understanding of the project’s intended outcomes, was communicated to the Water Research Commission in a letter along with the final revised work programme. The contents of this report provide an account of these outcomes.

The essence of the revised project objective was to develop, describe and communicate principles and processes that would support effective, integrated and cooperative participation in river management. These principles and processes would lead to the equitable and sustainable distribution of costs and benefits associated with the use of goods and services provided by the water resource. These objectives were more in line with the intended priorities and outcomes of the water law, compared with what a collection of technical products could contribute.

Structure of this report

This report has four parts. In Part I, we address the question of how best to support stakeholder participation in integrated river management. This section provides details on the constitutional and legal context underpinning stakeholder participation. It discusses the principles that arise from this context, as well as the processes that would be needed to achieve sustainable and equitable outcomes through integrated management. The lessons that we have learnt from this project are also outlined here.

Part II provides an overview of the detailed findings of the project. These findings are based on a range of papers and reports that were produced as the project progressed.

Part III addresses capacity building. Capacity building is a vitally important aspect of research investment. As our project sought ways of empowering people to participate in the management of water resources, we paid particular attention to this issue. We have documented both the theoretical understanding of capacity building, and we have provided a list of people in whom capacity has been built, and a list of products (outputs from capacity building) that have been produced by the project.

The reports and papers that were produced during the course of this study are provided as appendices to this document. Some of the papers have been published, accepted for publication, or submitted to journals. The publication status of each paper is indicated.

Part IV draws conclusions and makes recommendations as to how the knowledge and concepts developed in this project can be leveraged for further application in support of social transformation via the river management process.

PART I: SUPPORTING STAKEHOLDER PARTICIPATION IN INTEGRATED RIVER MANAGEMENT

Constitutional and legal context

The project took place at an exciting period in South African history, with the first democratically elected government coming into being in 1994. The adoption of a new constitution in 1996 and subsequent changes to legislation held fundamental implications for the way in which people manage, access and use natural resources:

- The new constitution requires the establishment of an open society based on democratic values and social justice; the right to an environment that is not harmful to human health and well-being. This is to be achieved through measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources that is balanced with optimal ecological and social development (Chapter 2 of the Constitution). Moreover, the Constitution also requires effective, transparent, accountable and coherent governance and co-operation between various spheres of government (Chapter 3).
- The National Water Act was promulgated in 1998 and it spells out the goals of sustainable use and equitable distribution and access, and provides guidelines for the decentralized management of the resource through Catchment Management Agencies and other water resource management institutions.
- The White Paper on a National Water Policy for South Africa, which preceded the National Water Act, contains an explicit requirement for civil society to be responsible participants in the water resource management process. (Principle 23)
- The National Environmental Management Act of 1998 also requires co-operative governance, public participation and a mutually supportive spirit to achieve integrated and sustainable environmental management.

During the duration of this project, the Department of Water Affairs were also on a steep learning curve with regard to the implementation of the newly promulgated law, and many of our ideas developed in parallel with, but often quite independently of, this process.

This project was therefore conducted at a time of major changes in the legislation and institutional set-ups that govern river management. This sort of environment was bound to present a collection of new challenges, in particular related to the implementation of the new water law. These challenges would be faced by not only DWAF and the new institutions that would be required to participate, but also by research and research managers to understand their role in supporting the implementation and maintenance of the outcomes intended by new legislation. This research project aimed to seek opportunities to both learn from and contribute to this process.

Principles and processes

We developed a number of principles that will support stakeholder participation in integrated river management. Commitment to these principles, together with the application of guiding processes will support a governance system around the sustainable use and management of rivers.

The **principles** are:

- People first: the Reserve provides the water that enables the delivery of goods and services to people (not water for river ecosystem animals and plants).
- The resource is the ecosystem and; stakeholders define type and level (desired state) of goods and services to be delivered.
- Co-operative stewardship between all stakeholders delivers and allocates river goods and services.
- A “public good” ethic and acceptance of resource limits determine distribution of costs and benefits of goods and services delivery.
- Create an environment that enables formal institutions at all levels (local level through to national government) and sustains dialogue.
- Optimise use of skills, knowledge (including indigenous knowledge) expertise and wisdom at all levels.
- Use learning-by-doing and creative, issues-based conversation and bargaining to move from communities of disinterest to communities of co-creation of vision/desired state of goods and services delivery.

Guiding **processes** include:

- Participatory processes to understand people's basic needs and preferences.
- Capacity building to empower people to manage the state (includes personal understanding, communication skills and institutional structures).
- Strategic adaptive management for the continuous achievement of a desired state of rivers that will deliver goods and services.
- Effective devolution of responsibility from the Department of Water Affairs to Catchment Management Agency to Catchment Management Committee to any appropriate local level and the acceptance of responsibility and accountability at these levels.
- Facilitation, capacity building and extension support.
- Effective, honest and sustainable public participation.
- Integration of management systems, research of the river as an integrated system.
- Integrated research that identifies goods and services and creates awareness of them.
- Research to understand the relationships between the state of rivers and their ability to deliver goods and services.
- Knowledge management, learning-by-doing and communicating new insights.
- Prototyping, which refers to the acceptance and use of the results from most current developmental prototypes (concepts, tools or methods), until an improved version is available.
- Demonstration. A new concept or technology is rarely accepted without some demonstration of its worth. Results obtained through prototyping could be used to demonstrate the potential of a new concept or technology. Effective demonstration has a reinforcing effect on recognition and acceptance, resource allocation and capacity creation.

Achieving desired outcomes

The project team envisaged a dynamic outcome that would result from adopting the principles and applying the processes as suggested above. We assumed that this (dynamic) end-state would be aligned with what the water policy intends to achieve. A characterization of the end-state is summarized below:

- Participants in the water resource management and decision-making process have a clear understanding of goods and services.
- A clear understanding of basic human needs for the goods and services.
- A clear understanding of the relationship between the state of the resource and the changing levels of desired goods and services.
- An understanding of what interventions can be effected to influence the maintenance of the desired state, in relation to the ability of the system to meet the supply of goods and services.
- Maintenance of the desired state through maintenance of biodiversity in terms of composition, structure and processes.
- Public energy and resources are harnessed for integrated river management. Voluntary compliance, societal responsibility and lawfulness.
- The Department of Water Affairs is seen as a catalyst of social change in the new South Africa.
- Public participation in integrated river management promotes socio-economic transformation.
- Involved, committed and satisfied people with a sense of public good.
- Happy, proud, prosperous people, with equitable access to river resources
- Healthy rivers delivering desired goods and services sustainably.
- Maintenance of biodiversity in terms of composition, structure and processes.
- Public opinion is effectively and efficiently integrated into integrated river management.
- Social capital is built.
- A “some, for all, forever” mindset in all people.
- A strong and trusted scientific basis for integrated river management.
- Appropriate institutional structures and capacity, through decentralised and participatory governance.

Lessons and the way forward

Through the testing of ideas and the learning that resulted from this, we were able to distil 12 key project lessons:

Lesson 1

People have a lot of knowledge. Much of this knowledge is untapped because in the past, different types and sets of knowledge were valued while other sets (and the values that underpin them) were not acknowledged. It is not difficult to extract this knowledge and to use it to support co-operative management of river systems. Using all (as opposed to selected) knowledge sources can promote equitable resource use, by accounting for all stakeholder needs values that influence decisions. Knowledge can be sourced effectively in an environment where all participants are given an equal opportunity to express their needs and perceptions around the resource.

Lesson 2

Communication between stakeholders and government is mostly ineffective. Since dialogue and shared understanding are essential for effective co-operative governance, a

lack of communication at and between different levels of society and government is a key deficiency in a cooperative decision-making system. We need to invest greater effort into understanding and facilitating communication interfaces between different groups and individuals as well as understanding what hinders effective communication. The aspect of communication most lacking is structured dialogue during which people listen to and develop an understanding of each others' perspectives.

Lesson 3

Defining the correct/best levels at which government and society engage can enhance governance. We know that government's impact and ability to engage different levels of civil society decreases with 'distance' away from the national level. We also know that civil society is least responsive to policy and policy implementation at the level of the individual. If we can identify and understand better when, where, whom and how different levels of government and civil society can communicate and cooperate most effectively, these interactions can be leveraged for more effective communication around policy intentions and expectations as they relate to river management.

Lesson 4

People sometimes feel helpless and unable to contribute or to even engage others for an opportunity to contribute. However, people at all levels can make a pro-active (not just a responsive) contribution to the wise management of the resource. They must just be empowered (and not necessarily by government) to do so.

Lesson 5

Joint governance for river management is a social process that is supported by technical tools and expertise. The nature and quality of relationships between individuals and groups in the governance system creates the platform from which needs and aspirations can be articulated, jointly understood and addressed in a structured way. Technical tools and processes must serve these joint decisions.

Lesson 6

Success in cooperative resource management will depend on developing a shared understanding of the context within which we operate – we must co-evolve an understanding of a shared future. Stakeholders must not only understand, but be able to contribute to the continual development of, the overall river management context. This context has considerable power in itself - whoever determines the context determines the relevance and importance of the various issues that participants bring. Recognising the importance of context, at the broadest possible scale, is critical to a truly integrated and holistic approach. Resource management issues are not just ecological, but social and economic as well. Externalising any of these factors will lead to inappropriate or ill-informed and most likely inequitable decisions which are unlikely to gain public acceptance.

Lesson 7

The manner in which the facilitator in the participatory process extracts knowledge has a large influence on the willingness of stakeholders to participate. It is critical that the facilitation process should strive for consensus, not compromise. Compromise is a lose-lose outcome, reached by confrontation; consensus is a win-win outcome, reached through cooperation and mutual learning. It is the facilitator's responsibility to create an enabling environment for 'learning together' through inclusive and open discussion. It is only when participants are able to hear and understand each other's views, needs and values that

'coevolution' of these perceptions and preferences toward a shared vision for the future can take place. Good facilitation is goal-directed, but process-oriented. This recognises that the *process* of stakeholder interaction is as important as the *product*.

Lesson 8

Focus on the future – don't get bogged down in conflicts of the present or the past. Developing a collective vision and seeking its expression in reality, gives partnerships common purpose. Visions for river management must be developed and used with reticence and humility, lest they become someone's ambition and, consequently, everyone's burden.

Lesson 9

Capacity building is a process that can be understood and managed, but it is a long-term process. It should be made explicit and should be integrated with research efforts from the onset.

Lesson 10

Rivers are variable, unpredictable ecosystems and provide goods and services that tend to be scarce, vital and unevenly distributed. Their use therefore tends to attract contention and debate, with people investing energy and effort in the debate based on their individual and/or collective interest in the resource. The river management process therefore offers opportunities for forging quality relationships (and the adoption of principles that underpin democracy) and developing community characteristics that support cooperation around river management decisions. Research, being a social service, has a significant role to play in this process.

Lesson 11

A combination of institutions (and therefore a diversity of ways of thinking and doing) participating in the project has enriched results.

Lesson 12

Science is necessary to develop understanding that will inform people's behaviour, directing it towards the sustainable use of the resource. In order to achieve this, science must consider perceptions of the state of the resource, the behaviour that drives that state and the influence of the policy/regulatory environment on behaviour as it relates to the resource. Communication of science must and can be improved.

Scientists, especially those engaged in natural resource management in support of sustainable development, should strive to benefit from these lessons by adapting (if necessary) their approaches to implementation projects. In the first place, it seems that by encouraging a "bottom-up" approach, the benefits of stakeholder wisdom and empowerment will be brought to the fore. This will require a mind-shift, from one of "telling", or "teaching", to one of sharing knowledge, influencing wise decision-making, and facilitating the identification of problems as well as solutions. This seems to be the most important lesson arising from this study, and it should go some way towards directing the way forward. A second, and far-reaching, issue that should guide us in the way forward lies in the way in which we address capacity-building. To date, there has been a realization that South Africa's transition to democracy will require transformation and capacity-building, but there has been little appreciation, both by administrators and practitioners, of how this should be done, or

measured. This project has highlighted that capacity-building is a long-term process, that it cannot and will not be hurried, and that it will require a long-term, and structured approach if it is to be effective. Given the importance of this issue, the development of a structured and long-term approach should become prominent on the agenda of scientists, research managers, and implementation agencies.

PART II: OVERVIEW OF DETAILED FINDINGS

State of the Sabie-Sand environment.

Phase 1 of this project focused on gaining an understanding of the current state of biophysical features of the Sabie-Sand catchment, and resulted in the production of a detailed report (**Appendix 2**). The report provides an account of the biophysical state of the Sabie-Sand catchment, with special reference to river ecosystems. This product was in line with the project's original approach and objective to produce a collection of technical products.

The approach used in the report follows the Department of Environmental Affairs and Tourism's approach for state of the environment reporting. A "cause and effect" logic is developed by analyzing the driving forces, pressures, the resultant state, impacts and the responses around a particular environmental issue.

The key driving forces of environmental condition and change within the catchment are global climate change, population growth and distribution, and changes in land use. External driving forces include the Mpumalanga-Maputo Development Corridor initiative within South Africa, market forces arising from the increasing global nature of trade, and policy development.

The potential and actual pressures and impacts imposed on the Sabie and Sand rivers and their tributaries include forestry, agriculture, the municipal and industrial sectors and tourism. Alien plants also have a significant impact on water use and riparian zone health, although this use will decrease if current clearing programmes continue. Although forestry is the largest water user at present, growth in agricultural water use is expected to surpass this in the near future. Urban and industrial water demand in the catchment is also expected to grow significantly, although even with growth in this sector, it is predicted to use still less water than forestry and agriculture.

We expect that future socio-economic growth in the area will depend on the trade-offs that will have to be made in order to achieve desired types and levels of goods and services as well as the ability of the water resource to supply them.

The current state of aquatic systems needs to be interpreted against the background of the dynamic nature of river systems. Generally, the Sabie River is in good condition, although forestry in the catchment has reduced flows, and concerns are raised about adequate flows in the Kruger National Park, especially during low-flow periods. Instream flow requirements have been set for the Sabie and Sand Rivers, but whether these are being met is still being assessed. However, in general, the catchment of the Sand River is in worse condition than the Sabie. The Sand River frequently stops flowing during low flow periods and natural resources in this sub-catchment are under heavy pressure from over-utilization.

The responses to the pressures and impacts are also outlined in this report. The international and national policy and legislative environment is sketched briefly, and is followed by an outline of the organizational responses by the Department of Water Affairs and Forestry and the future Catchment Management Agencies. Thirteen catchment-based research initiatives are described, and they are dealt with in more detail in **Appendix 3**. The relevance of the research initiatives to a variety of water resource management needs is then examined as a first step towards the selection of useful research products and approaches.

Overview of biophysical research projects

In the current state report, current and historic research initiatives in the Sabie-Sand catchment were described as part of identifying society's response to catchment and river management needs. This presented an opportunity to view the value of this research in the light of new policy and management needs and to identify gaps in the research framework.

A review of the historic research initiatives in the Sabie-Sand catchment was carried out (see **Appendix 3**). The aim of this review was to investigate the extent to which biophysical research has generated the kind of information that is required by current management approaches. We show that all of the research initiatives provide useful information at different temporal and spatial scales, but that there are conspicuous gaps in the research framework. Management in the Sabie-Sand catchment will benefit from greater focus on integrative, interdisciplinary research and on the ecology of restoring degraded land and water resources. Research initiatives need to make better use of opportunities for capacity building and to advance understanding of the interface between biophysical and social research, given the requirement for participatory management and for research to support the country's social transformation processes. It is hoped that the kind of evaluation provided by this paper will be used elsewhere to identify knowledge gaps in the framework for water resource research and, in doing so, enable decision-makers to direct future research investment more effectively.

Processes and principles for describing the current state of the resource

The original objective of the current state exercise was to create a catchment-focused baseline on which to build a biophysical catchment management strategy. (The argument was that ecologists can construct a strategy, once the current and desired states had been articulated). During the workshop series for describing the desired state, we developed a better understanding of the objectives and process for the current state and how the current state relates to the desired state within the context of the water law.

Given the new insights following the series of workshops with catchment stakeholders, we realized that the definition and analysis of the current state was as much a social and participatory process as the desired state exercise. The current state should not constitute just a technical desk-top study, but should integrate the collective perception of stakeholders of what the current state is. A collective development and expression of what the current state is forms the basis for a collectively designed change strategy for management. Moreover, goods and services can be an effective 'language' in which stakeholders can express their perception of the current state. Based on these and other insights, we were able to suggest changes in the way that a current state report could be constructed to better serve the needs and objectives of resource management (**Appendix 4**).

Engaging stakeholders

The project team conducted a series of workshops with a group of stakeholders drawn from the greater Inkomati catchment area. This was done as part of what was originally the second phase (designing a process for describing the desired state for a river) of the project.

The legislation recognises that to develop effective, decentralized governance of the resource, the wider public must participate in the decision-making that relates to the resource. Following from this, the project team recognised that realistic principles and processes (in line with project objectives) would need to be developed in partnership with the people whose needs and values management must serve.

Desired state and visioning processes have been developed for and tested in certain sectors, but this sort of process had not been designed for or tested in a much more complex and inclusive, multi-sectoral set-up, where participants may have vastly different backgrounds, power-bases and capacities to participate. The requirements were thus very new and experience thin and, as a result, the project team started out on the assumption that the process would have to be developmental. The approach to the workshops was therefore experimental and quite flexible with a focus on maximising learning.

The objective of the workshops was set broadly and the initial aim was to learn about the capacity of Inkomati stakeholders to participate effectively in a visioning and decision-making process for their rivers.

The participants were mainly volunteers drawn from the public participation process that had been conducted by the Department of Water Affairs for the establishment of the Inkomati Catchment Management Agency. Additional participants were more specifically invited to ensure that the participant group brought a wide and relatively representative range of backgrounds, perspectives and issues to the workshops.

The approach, principles adhered to and the workshop processes and outcomes are summarised in **Appendix 5**.

A great deal of the learning by the project team came from the interaction with stakeholders. This experience led to insights of relevance to all other components of the project which subsequently led to the revision of overall project objectives. Some of the key lessons learnt during this interaction are:

- Negotiation around and management towards the desired state of the resource has to be a joint learning (capacity building) process, where both researchers and stakeholders continuously develop their understanding to support a common goal. (i.e. not a situation where researchers arrive and instruct stakeholders on what to do, and how to do it).
- The importance of understanding and building context together as a prerequisite step to decision-making.
- Co-evolution of ideas for consensus-building (listening and changing viewpoints)
- The potential value of expressing needs in terms of goods and services provided by the resource to link ecological and social objectives of the Reserve, i.e. will help to translate socio-economic needs and preferences into ecological objectives that will support socio-economic objectives.
- Sustainability of a healthy and collaborative management process will depend on commitment by all to a central stakeholder process. This central participatory process should be initiated prior to stakeholder exposure to technical tools, the participatory process should be continuous and sustained through dialogue and technical tools should serve this process - not vice versa.

Public participation in integrated water resource management

South Africa's new national water policy aims to achieve a new system of participatory and proactive water resource management. Stakeholders are required to reach agreement on the 'desired state' of a particular resource, as represented by the combination of 'Management Classes', and the associated 'Reserve' that is set to achieve this for a particular river system. The resulting requirement for stakeholders to organize themselves to participate in a structured way, and for ecologists and engineers to interact with stakeholders, is both new and challenging.

Interaction with various stakeholders throughout the project duration provided an opportunity to better understand the role of public participation in achieving the intentions of the resource management process. **Appendix 6** investigates the interaction of these technical and social aspects of a 'desired state' process. The ideas presented have been developed through a variety of experiences: workshops held with stakeholders from the Inkomati Water Management Area, observation of the Department of Water Affairs and Forestry's participation processes in various catchments, and ongoing interaction with other researchers and practitioners in this field. A variety of approaches may currently be adopted to satisfy the Water Act's demands for 'participation'. These range from chiefly top-down, technocratic, and product-oriented procedures, to a more bottom-up, process-oriented and flexible approach. A key distinction lies in the way stakeholders' needs, values, perspectives and preferences are elicited and incorporated into the decision-making process. Consulting various interest groups separately, whose preferences are then combined in 'optimal', compromise scenarios, will fail to achieve the 'buy-in' and inter-sectoral cooperation required. The participation process is instead a vital means toward achieving the 'co-evolution of stakeholder preferences' toward a shared vision and consensus decision. It is more important that participants talk and listen to each other, rather than to a facilitator or technical team.

Experiences of current participatory practises and results have highlighted the danger of the overall consultation process being dominated by technical demands. Consultation is intended to make provision for civil society's needs and aspirations, not for the implementing agent to place their needs and technical solutions on the table. Participation then becomes fragmented around particular technical products and stakeholders are unable to achieve an understanding of the overall context within which their issues, and the various technical processes and products, fit. Building a shared context for water resource management is an important process in itself, often overlooked in a 'top-down' approach.

The extent to which the potential benefits of participation are ever achieved is highly dependent on the nature of the process that takes place. The new water law in itself is powerless in the absence of voluntary compliance - effective stakeholder involvement is the only means to achieve equity and sustainability. But, applied in haste and without due care and skill, 'participation' may simply become a new way to perpetuate the inequities and resource degradation of the past.

Fundamentals of cooperative governance for water management in South Africa

Both the National Water Act and National Environmental Management Act pay much attention to the need for cooperative management of natural resources. This aspect of new policy recognizes that the successful redistribution and management of scarce and complex natural resources cannot happen effectively through centralized control. New management approaches will require everyone to participate and to make trade-offs that must result in equitable, sustainable and efficient resource allocation and use. Thus, what is needed is the collective governance of a common property resource.

This project has seen that the social/participatory process of resource management will require much stronger and more explicit focus than what is currently given. It is the relationships and manner of cooperation between the people making trade-offs in this process, that will form the backbone of the cooperative process for resource management, and not the application of technical tools and products. Unless we recognize and engage this need, we are unlikely to succeed in achieving the intentions or spirit of the water law.

For many the notion of co-operative governance is too daunting to contemplate but we are of the opinion that the basic ingredients are quite simple and readily available. There is no need for government to create a fully functional new system for water resource management which they can present to the people in one go. As much as professional pride would steer us in this direction, it is probably unwise because it will take too long, people will become (indeed are becoming) disillusioned. Furthermore, since it won't solve the citizens' day-to-day decision making dilemma, their higher level desire to improve their lives will force any democratic management system to change/evolve anyway. Instead of "forcing" a new water management system on the people they should be assisted in the evolution of a new means of dealing with water; one which incorporates their values, meets their needs and ensures their commitment.

This is not unrealistic. It is pragmatic! History shows this evolution has happened so many times before, especially with common property resources such as water. However, modern society wants everything done before the next election and evolution sounds like a long tedious process. We believe all society needs is some guidance and some wise counsel to keep change on a sensible and sustained course. We also need people, citizens and civil servants, to act as facilitators of the change process (e.g. finding agreement with neighbours on how to share water). The new Water Act, under the umbrella of our constitution, provides all the guidance we need and there are all manner of people available to facilitate. It is the new mind set of evolutionary co-operative governance that needs to be developed'.

Appendix 7 sets out to explain why the vision of cooperative governance for water resource management is realistic and achievable. This vision includes building, enhancing and sustaining democratic behaviour through a process whereby people do not simply respond to policy, but organize themselves and are empowered to participate and design their own agenda. Appendix 7 describes the obstacles to achieving the vision as well as the premises, principles, processes and expected outcomes, that can be followed towards achieving the changes in mindset that is needed to achieve this vision.

The definition, intent and interpretation of the Reserve: achieving common understanding for river management in South Africa

One of the challenges in the project was to help stakeholders express the current and desired states of the resource, in line with the need to arrive at an Ecological Management Class (essentially the ecological desired state) that reflects societal needs. Civil society cannot be fairly expected to express their needs in ecological terms, and we had to find a more appropriate way of getting people to articulate their needs and preferences related to the resource.

As part of this process, we asked stakeholders to express their needs in terms of benefits they derived from the use of the resource. This exercise was very effective as stakeholders were able to express their needs and preferences in terms of goods and services. They were able to relate to these concepts, compared to an ecological statement about desired state. At the same time, we realized that goods and services concepts could be potentially useful in adding clarity to the intentions of the Reserve. Clarification is necessary, given that there has been much confusion and misinterpretation of the intention of the Reserve by many participants in the water law implementation process.

Many of the difficulties in the implementation of the water law arise from differing interpretations of terms and definitions. As mentioned, there is much confusion around the intentions of the Reserve and the purpose of allocating water to aquatic ecosystems. The discrepancies in understanding are rooted, in turn, in the absence of a common paradigm, a

state of affairs which is preventing clear communication around the objectives of the Reserve.

It is imperative that we come to a common understanding around what the legislation intends to achieve with the Reserve and how this relates to other types of water allocation. The alternative is for different groups to disagree over and therefore serve different, diverging and sometimes conflicting objectives and, as a consequence, to never achieve the cooperative and sustainable processes and outcomes that policy intended for water management.

The project team pulled together some of these concepts in a paper (**Appendix 8**) with the aim of outlining the intentions of the Reserve explicitly within the context of other types of water allocations; and to examine whether goods and services concepts can be linked constructively with Reserve concepts.

The main findings include:

- The intention of the Reserve is to secure an ecological state of the resource that is able to provide the desired set of goods and services (socio-economic state) to society - and not to protect ecosystems *per se*. The ecological Reserve is therefore an ecological means to a socio-economic end.
- As a result, it becomes clear that it is not the Reserve that stakeholders will negotiate, but rather the state of the ecosystem that will deliver the desired mix of goods and services as expressed collectively by stakeholders. The Reserve will then be set to support the reasonable desired delivery of goods and services.
- Goods and Services concepts provide us with a conceptual framework that helps us to understand the objective of the Reserve in relation to other types of water allocations and what the implications are for people. This way of thinking can help participants to structure a more meaningful and less confused dialogue around the Reserve. It also highlights resource-based goods and services which had been overlooked and undervalued in the past.
- Because it acts as a simple 'language' relatable to everyone, goods and services terminology can be used by stakeholders from different backgrounds, capacity and skills to generate a shared, common vision around the resource. Goods and services concepts can also be used by ecologists to translate the socio-economic expression of what stakeholders want from the resource into the Reserve (the statutory ecological parameters) that must support the desired ecological state of the resource.

PART III CAPACITY BUILDING

Theoretical understanding

This project has a responsibility to report on capacity built as a product of participation in the project. The project team identified the need for a capacity building strategy and set out to learn what was expected, so that the project could measure its performance around capacity building against these expectations.

The reality is that there are currently no capacity building guidelines to support researchers in their attempts to support the intentions of legislation and policy. It has been assumed that researchers have the understanding and expertise to effectively promote capacity building. Under such conditions the expectations of research administrators are commonly neither clearly structured nor are they understood by researchers. Not surprisingly, researchers commonly fail to meet the expectations of administrators with regard to capacity building.

The project recognized that providing opportunities for individuals from previously marginalized sectors alone is not sufficient for preparing people for more informed decision-making. Also, assuming that we understand the objective of capacity building, we do not know in what manner research projects could contribute meaningfully to the capacity building process.

In an attempt to contribute towards developing a structured approach, the project produced a paper (**Appendix 9**) that interprets what is meant by capacity building in the context of research projects. Based on this interpretation, reasonable and unreasonable expectations with respect to the extent to which capacity building can be achieved within a given project duration are discussed. A model which would improve understanding and delivery and in doing so, achieve better congruence between expectations and outcomes, is suggested.

We assumed that building theoretical understanding of the capacity building process within a research context would assist us, and hopefully other similar research projects, in designing a strategy for capacity building that is realistic and which contributes meaningfully.

Human resources.

A research project such as this one will primarily build capacity in the project team members. Our project was structured so that experienced scientists worked closely with other project team members in order to transfer skills where possible. The team members, and the skills developed during the course of this project, are indicated below.

Table 2. Skills developed by research team members during the course of the project.

Team member	Experience level	Skills developed	Gender	Race
Brian van Wilgen	Senior science manager	Interaction with peers led to new levels of understanding and the generation of ideas	Male	White
Ernita van Wyk	Professional research practitioner	Developing networks and profile through presentation at conferences. Enhanced integrative writing and project management skills. Developed skills in the design of conceptual frameworks. Collaboration with and learning from research partners.	Female	White

Charles Breen	Senior academic	Interaction with peers led to new levels of understanding and the generation of ideas	Male	White
Kevin Rogers	Senior academic	Interaction with peers led to new levels of understanding and the generation of ideas. Facilitation of multi-sectoral stakeholder group.	Male	White
Joan Jaganyi	Professional research practioner	Developing networks and profile through presentation at conferences. Enhanced integrative writing and project management skills. Learning from research partners. Testing capacity building concepts in a case study environment.	Female	Black
Tamsyn Sherwill	Professional research practioner and MSc student	Teamwork, collaboration, developed network, through interaction with a variety of people in workshops, conferences, meetings and interviews, organising workshops, writing skills	Female	White
Stemmer Ndala	Professional research practioner	Interaction with regional DWAF to source relevant information. Integrative writing skills.	Male	Black
Freek Venter	Professional research practioner and resource manager	Increased confidence to communicate with other scientists as well as stakeholders; increased capacity to do visioning and goal setting; listening and better understanding of the needs of stakeholders; improved understanding of how competing sectors can work together toward the same vision.	Male	White
Dirk Roux	Professional research practioner	Enriched personal capacity and peer network through active collaboration and sharing of knowledge in a heterogeneous team	Male	White

We also built capacity by involving stakeholders in a series of workshops. At this time, the project team was at the early stages of developing ideas around how a research project such as this could contribute meaningfully to the capacity building process. As a result, we are not able to present capacity building outcomes here as the output from a structured capacity evaluation exercise. However, we had gained sufficient understanding about the capacity building process to conduct preliminary evaluation exercises as part of the workshops. These evaluations captured some of the learning* as experienced and expressed by stakeholders and is reported here.

(Stakeholders in this instance refers to all participants, including the research team;
*Learning forms a part of building capacity, if we accept that capacity is a learning and growth process that leads to enhanced performance).

Table 3 lists the workshop participants over the three workshops held, the sector each participant is from and area of residence in the Inkomati water management area.

Table 3. List of workshop participants and sectors represented.

Participant	Sector	Organization	Sub-catchment
Japie Lubbe	Agriculture: commercial	Sabie River Working Group	Sabie-Sand (Hazyview)
Lazarus Zitha	Agriculture: emerging		Crocodile (Malelane)
Strydom Shakoane			Sabie-Sand (Hazyview)
Knox Nyathi		Land Care/emerging farmers	Sabie-Sand (Mkhuhlu)
Enas Selowe			Sabie-Sand (Acornhoek)
Jerry Mhlongo			Sabie-Sand
Stevens Sambo			Sabie-Sand
Abarate Chiloane	Agriculture: emerging/Tribal authority	Represents farmers and traditional leaders	Sabie-Sand (Acornhoek)
Charles Pentz Hubert Naumann	Irrigation Boards		Crocodile (White River)
Henry Maboia	Agriculture/forestry/conservation	Council for Development and Cooperation	Sabie-Sand (Inyaka)
Lanios Malapane	Tribal authorities/ traditional leaders	Kgarudi Tribal Authority	Sabie-Sand (Hazyview)
Oupa Nyathi	Civil society	SANCO	Sabie-Sand
Robert Ndlovu			
Patience Nyakane	Water Boards	Bushbuckridge Water Board	Sabie-Sand (Bushbuckridge)
Peta Hardy	Forestry	Sappi	Sabie-Sand
Shaun McCartney	Forestry	Mondi/Global Forest Products	Sabie-Sand
Andre van Tonder	Forestry	Sappi	
Dominic Moyane	Community Forestry		
Leonard Bert	Tourism		Crocodile (Dullstroom)
Freek Venter	Conservation	Kruger National Park	
Rodwell Mnisi	Northern Province government	NP government/Bushbuckridge Water Board	
Tony Leske	Industry	Sappi Ngodwana	Crocodile (Ngodwana)
Magda Ligthelm	Government (DWAF)	DWAF regional office (Nelspruit)	Crocodile (Nelspruit)
Saineth Makoena	Local government	Injaka	(Sabie-Sand) Injaka

Stakeholders were asked (by means of questionnaires, aligned with predetermined capacity building objectives, immediately following each workshop and through verbal and written feedback) to express what they learnt during their involvement in the workshops.

Learning to learn together (mutual learning)

From the notes stakeholders submitted following the second workshop, it is evident that stakeholders had become highly aware of other sectors' activities and views related to the

resource. They, together with the research team, have been able to experience that their growing understanding is based partly on an opportunity to listen to others express their view of the world. In this way, the participant group learnt to build a shared context and a shared understanding of each other's needs and values within this context. During this process, they developed an understanding of the notion that it is possible (and not difficult, despite the complexity of the problems) to hear and understand each other and to develop a joint strategy, despite diverse and sometimes conflicting interests around the resource. Stakeholders learnt about learning together and how this learning process forms a platform for dialogue that helps people to articulate their own needs and to strategize, with others, to meet these needs.

Acknowledgement of capacity needs

There has been strong recognition of (and expression around) the lack of capacity and the need for information to support improved understanding, to make decisions and to take action. (for example *Lanios Malapane* wrote: "I ask to arrange the workshop to give the TLC a capacity training so that our future will go all right at Sabie, Lydenburg, Graskop and Injaka").

There has also been some expression from participants that the workshops helped to provide information and to build understanding of issues.

Realization of civil society's responsibilities

New legislation for the management of water resources was developed in response to civil society's demands for an improved resource management and allocation system. Participants learnt that there is an expectation that stakeholders should support the new governance system through bottom-up strategy and action. Within this context, participants appeared to have developed an understanding that:

- There is an opportunity to contribute and act, given the appropriate capacity.
- There are benefits of acting/working together (collaborating) to achieve a common goal. (discussions at one workshop led to stakeholders' suggestion to establish a Section 21 company as a platform for organization to work together on issues. This took place independent of the research team's activities).
- Being organized is a requirement for coordinated strategy and action that is to be heard and understood by the Department of Water Affairs and other levels of governance (*Saineth M.*)

Key lessons learnt by participants

These were derived in a formal exercise designed so that stakeholders achieved some level of consensus around the key lessons learnt through the workshopping process and to express these.

Key lessons as expressed by stakeholders include:

The value of our rivers and other water resources. e.g. rivers are more than just the water in the system, but includes other components such as the riparian zone. The combination of components of the resource provides society with a variety of goods and services.

Everything in the catchment is linked. Land use and rivers are linked and decisions about water have to be integrated with decisions about land and development. Activities upstream have an impact on downstream users. One type of resource use affects other types of resource use in terms of quality and/or quantity.

The need for communication and cooperation. Communication and collaboration are vital to successful resource management. Understanding others' needs and values can cause us to change our views and therefore our behaviour.

The value of vision. Focussing on the future helps us to reach agreement without conflict. Even where there are big differences in people's needs and values, they can find common ground and develop a common vision.

The importance of a people-centred, 'bottom-up' approach to management.

- Everyone has a role to play and all people can do something for themselves, and to engage 'top-down' governance or management processes.
- Local people have daily contact with their resource, and need to participate in decision-making about its management.
- We need to generate a sense of ownership of water resources. Ownership implies responsibility and requires accountability. Sound responsibility and accountability relationships are likely will support the joint 'resource care' and governance process.

Knowledge generated

Capacity has two forms – human skills and the development and exchange of knowledge. Knowledge generated as part of a project such as this is very difficult to quantify as it resides “within and between” the minds of knowledge workers. As a result, this knowledge is very difficult to capture and organise as part of a formal research or management process. It is best exploited through informal networking where issues such as good relationships, respect and trust enhance the flow and sharing of this knowledge. This project provided the milieu for a multi-organisational team to network in this fashion. Knowledge was shared freely and as a result new knowledge was generated. At the same time, each participant could take the newly acquired knowledge back to his or her workplace and enrich a much wider community.

PART III: CONCLUSIONS AND RECOMMENDATIONS

This report marks the conclusion of a three-year project that did not follow the exact path that was planned for it at the outset. The project followed an evolutionary path that, while not delivering the protocols originally envisaged, did deliver a number of important outcomes that should be highlighted in conclusion.

The first of the key outcomes is represented by the capacity built in the project participants themselves. Ours was a relatively large team, made up largely of natural scientists, and all of us learnt a great deal about the application of our scientific knowledge in support of sustainable development. This capacity can and will be deployed in the field of catchment management in the future.

The second key outcome of this project was the confirmation of the futility of trying to manage natural resources by dividing them up into separate themes. This is the traditional approach of centrally-controlled resource management, which is entirely inappropriate in a devolved, democratic and “bottom-up” approach that needs to be adopted by empowered stakeholders. People need to be empowered to decide on their own solutions to resource management, and government needs to facilitate this process rather than to direct it.

A third key outcome was the realisation that the results of this project will need to be linked to broader initiatives if they are to have effect. For example, the Water Research Commission has recognised the imperative to work more closely with the Department of Water Affairs and Forestry, to ensure that research results (such as the lessons learnt in this project) are effectively taken up by the probable implementers of the results. The WRC should explore means to facilitate this process.

Project team members have presented the lessons learned in this project at several fora overseas, where the lessons were enthusiastically received, and recognised as being at the “cutting edge”. The question is sometimes asked as to why South African scientists, with relatively few resources, manage to remain at the forefront of such fields as “protocol development”. The answer, it seems, lies in the fact that we have enough, but not too many, scientists. Given their relatively low numbers, scientists in South Africa find that they are able to communicate relatively well in workshop environments. In addition, the numbers are too small to generate the competing schools of thought that so often lead to time-consuming academic debate that seems to characterize scientific activity in wealthy countries. In addition, South African scientists are characterized by a philosophy of “social contracts” with their work. This is further assisted by the transition to democracy that is still taking place, and by the ongoing and topical review of environmental policy.

The unique contribution of this project has not been to generate new tools or information. For example, adaptive management, visioning processes, state of the environment reporting and capacity building are not new concepts. The value of this project has instead been in developing a better understanding of these tools and approaches and how they can be integrated and applied, through a process of collaborative research, within the context of new legislation and within the context of the social processes that determine the ecological state of a common property resource. The combination of these learning grounds provided a platform for the generation of new knowledge. As a consequence of new understanding, the research team and other participants have developed the capacity to act meaningfully in the highly complex river management environment. The team’s collective knowledge may currently not be widespread, but it is likely to have significant influence on the future thinking and actions of both the research team and wider (research, implementation and resource user) community.

One of the key findings of this study, is the need for commitment to a single, integrative, stakeholder consultation process that could provide the platform for building a genuine 'team', which is able to take responsibility for the management of their shared resource. Successful implementation of the water law will depend largely on the realization of truly cooperative relationships and joint resource stewardship where the quality of human interactions will determine the nature of the outcome.

We have seen in this project that it is indeed possible for people to modify their own perceptions and behaviour, willingly, in support of a cooperative process that is likely to deliver equity, sustainability and efficiency in the water resource management process. Moreover, we have seen that this cooperative process need not be complicated or delayed.

The willingness of participants in the river management process to learn (and change) together, combined with the fact that water issues are likely to organize people around the debate for years to come, suggest that these interactions can form a platform to promote the principles, values and ethics that underpin democratic behaviour. The process and outcomes of this research project have therefore evolved in such a way as to expose an exciting opportunity for the water resource management process to provide a vehicle for deepening democracy.

The realization of true democracy in South Africa is a goal shared by almost all of the inhabitants of the country. Much progress has been made in this respect. Apartheid has been dismantled, and a new democratically-elected government was installed in 1994 at national and provincial levels, for the first time in 350 years. A new constitution followed, entrenching the rights of people to play a meaningful part in shaping their own destiny. Furthermore, new legislation, such as the water law, has entrenched the concepts of collaborative management, requiring that people engage one another in a cooperative spirit, in designing their future together. Finally, local government elections have resulted in democracy being devolved to local municipal levels.

However, much remains to be done. This project has shown that people are still struggling with the realities of how to participate meaningfully in the management of shared resources. Rivers are one of the most important of our shared resources. The constitutional and legislative instruments that are in place provide a framework within which to develop people's abilities to play meaningful roles in this respect. We suggest that the political and environmental rewards that would arise from the empowerment of people to participate in resource management processes are immense. What is needed now is to develop working examples of how this can be achieved. This can be done by building on the significant advances in understanding that have been made in this project, and we would urge that politicians, bureaucrats, researchers and members of society accept this challenge. South Africa's fledgling democracy stands to benefit immensely if we can demonstrate effective empowerment through examples from the river management process.

Another issue that emerged from this project and which needs some attention is that of technology transfer. The successful dissemination of learning from a research project of this nature (where concepts and approaches are being developed and tested within a specific context) relies heavily on the ongoing and often intimate involvement of the individuals and organizations whose needs the research is attempting to meet. The point is that with this sort of process, the dissemination of new insights is an ongoing process - not an event, and learning should happen jointly between the research group and the client.

Technology transfer is therefore not a one-way process with researchers sharing information with the client only, but is a collection of complimentary activities of technology diffusion into the organisation by researchers and adoption of the technology by the organisation. This

more complex process is beyond the scope of what researchers can be held accountable for, and should be the responsibility of both the researcher and the client.

In this project, although the research team and DWAF met on several occasions to discuss the project and its potential impact on the water law implementation process, both parties felt a fair amount of frustration. This is a symptom of several causes. For example, without explicit understanding, DWAF could not have known that action research requires ongoing participation rather than review, on the part of the client. At the same time, it also showed that research (and in particular the research process) tends to be undervalued by implementers. Researchers, on the other hand, need to pay more attention to communicating their research in appropriate formats, in particular to managers, who do not have time to read long research manuscripts. Add to this that, during the course of the project, DWAF was preoccupied with gaining momentum with the water law implementation process, while at the same time the research project brief evolved and changed rapidly to inform the implementation process in a more meaningful way. Both DWAF and the research team would have benefited from a much closer association.

The struggle to create a healthy and ongoing exchange of new knowledge and insights has, in itself, been a learning process for all involved, and we would like to make the following recommendations in this regard:

- Target users of new technology should act as a third signatory to a contract to ensure that technology transfer will happen and the level of handover responsibility is specified (e.g., for a modeling based project would it constitute a report, scenarios generated from the model, an installed modeling system, or a running software product with training given).
- Funding agencies, such as WRC, that espouse technology transfer as an objective must ensure that an appropriate reward system exists for research and user agencies.
- The client (end-user of the new technology) should be part of the research project planning process and should commit to the process through ongoing participation, in particular in the case of action research. In other words, even the project design process should be a collaborative exercise.

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APPENDICES

APPENDIX 1. Van Wyk, E, Jaganyi, J, van Wilgen, BW, Breen, C, Rogers, K, Roux, D and Venter, F (2000). Developing a protocol for managing the biophysical condition of a water management area: the Sabie catchment case study. *African Journal of Aquatic Science* 25, 162 – 168.

APPENDIX 2. van Wyk, E, Breen, CM, Jaganyi, JJ, Ndala, S, Rogers, KH, Roux, D, van Wilgen, BW and Venter, F (2000). Environmental pressures, status and responses in the Sabie-Sand catchment, with special reference to river management. Report to the Water Research Commission, Contract K5/1062.

APPENDIX 3. van Wyk, E, van Wilgen, BW and Roux, DJ (2001). How well has biophysical research served the needs of water resource management? Lessons from the Sabie-Sand catchment. *South African Journal of Science* 97: 349-356.

APPENDIX 4. Principles and processes for describing a current state in support of river management.

APPENDIX 5. Summarised synthesis of stakeholder workshops.

APPENDIX 6. Sherwill, T and Rogers, KH (2002). Public participation in setting the goals for Integrated Water Resource Management: a means to equity and sustainability? (in prep)

APPENDIX 7. K H Rogers, C M Breen, J Jaganyi, D Roux, T Sherwill, B van Wilgen, E van Wyk and F Venter (2002). Fundamentals of Co-operative Governance for Water Management in South Africa . (in prep)

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