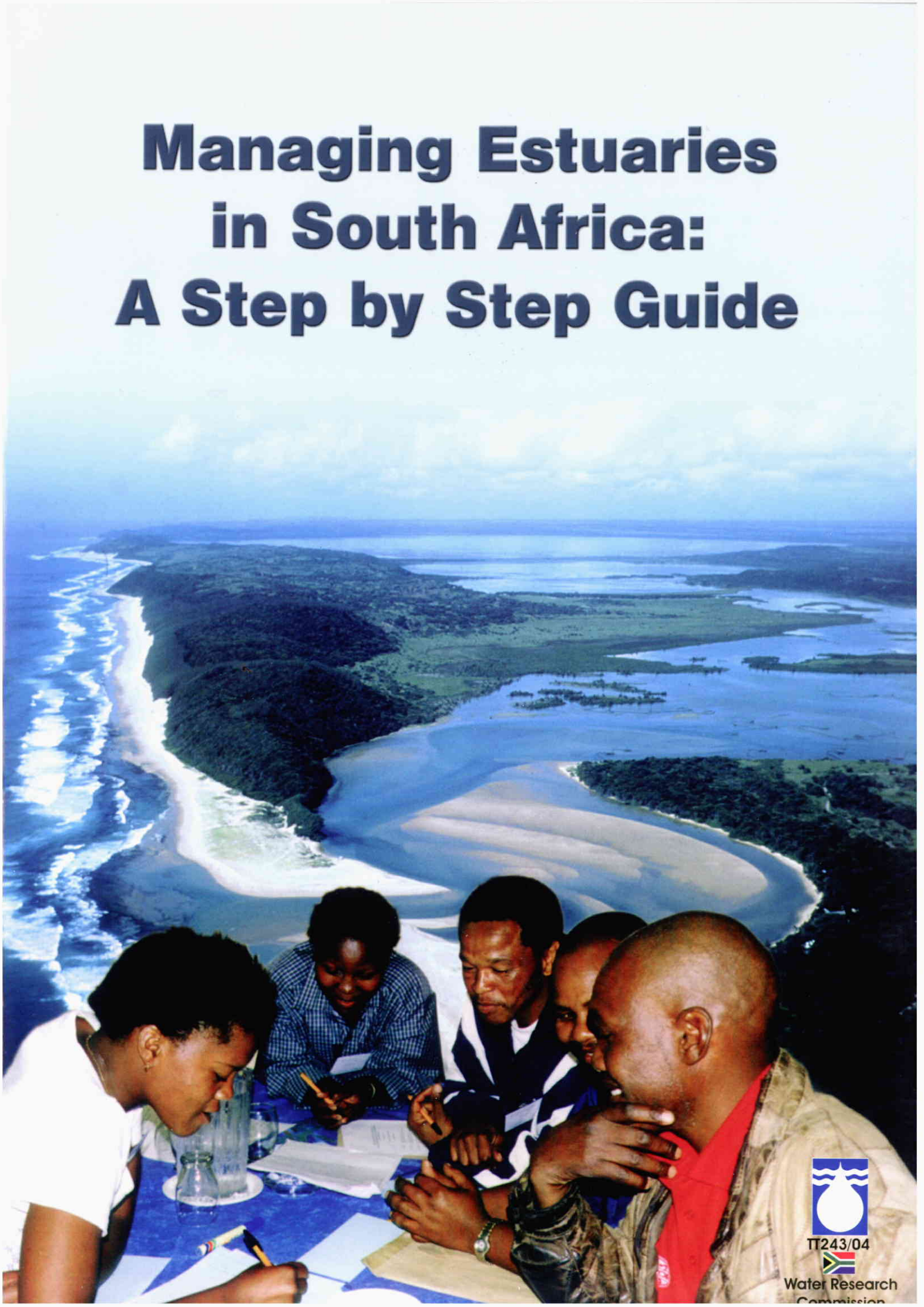
Managing Estuaries in South Africa: A Step by Step Guide



TT243/04
Water Research Commission

Managing Estuaries in South Africa: A step by step guide

Report to the Water Research Commission
by
The University of KwaZulu-Natal

Compilers

Duncan Hay
Margaret McKenzie

Contributors

Janine Adams
Allan Batchelor
Charles Breen
Paul Cowley
Duncan Hay
Pearl Maponya
Gary Marneweck
Lesley McGwynne
Margaret McKenzie
Steve Mitchell
Patrick Ngulube
Angus Paterson
Nhlanhla Sihlophe
Susan Taljaard
Jane Turpie
Amanda Uys
Lara van Niekerk
Aidan Wood.

WRC Report No. TT 243/04

March 2005

Obtainable from:

Water Research Commission
Private Bag X03
Gezina
0031

The publication of this report emanates from a project entitled:
"Estuary research programme to facilitate and enhance management for the sustainable use of Eastern Cape estuaries" (K5/1246)

ISBN 1-77005-277-1
ISBN Set No: 1-77005-233-X
Printed in the Republic of South Africa

Contents

Acknowledgements

This handbook draws largely on the experiences of the Eastern Cape Estuaries Management Programme. We wish to thank all stakeholders who have contributed to this learning process particularly those at the Mtentu, Mzintlava, Mngazana, Tyolomnqa, Bushmans and Kowie estuaries.

Funding from the following organisations is acknowledged with gratitude:

- Department of Environmental Affairs and Tourism
- Water Research Commission
- Tony and Lisette Lewis Foundation – South Africa
- Nedbank Foundation
- Norwegian Government
- South African Breweries
- Ndlambe Local Municipality

In the interest of conserving and managing South Africa's critical estuarine resources, the contributors encourage the further dissemination of the contents of this guide. We simply request that the use of information contained in the guide be acknowledged.

Chapter 1: The purpose of this guide

An estuary is the meeting place of a river or lake system and the sea. Here, freshwater and seawater mix, water flow is influenced by the tides, wave action is reduced, and sediment and nutrients are deposited during normal conditions and eroded during floods. This combination of processes creates a unique and rich ecosystem of considerable value to us.

The Kosi Estuary and lake system (Drummond Densham)

In South Africa estuaries are important assets that supply us with numerous beneficial goods and services. They provide opportunities for property, marina and harbour development; fishing and mariculture; raw material harvesting; boating and swimming, and are important tourist destinations. As ecosystems they also act as nurseries for numerous marine fish and invertebrate species contributing significantly to the health of our coastal fisheries.

Given their value it is not surprising that there is competition between estuary users. Because of this competition and, in order to ensure that the estuaries remain healthy so that they can continue to supply benefits, active management of the activities in and around estuaries is required.

The purpose of this guide is to assist us in managing the activities associated with estuaries so as to improve co-operative use and reduce the conflict that results from competing uses. It is divided into five sections.

- Chapter 1 (this section) sets out the purpose of the guide.
- Chapter 2 explains the management process.
- Chapter 3 provides advice on areas that can support the management process.
- Chapter 4 describes a series of tools or guidelines that can be used to assist in the management process for specific issues.
- Chapter 5 deals with estuary management at the national and provincial levels.
- Chapter 6 provides an introduction to the laws regulating estuary use.
- Chapter 7 provides a list of additional references that can assist managers.

If you are new to estuaries and their management it would be useful to start by reading Managing Estuaries in South Africa: An Introduction. It is available from the Institute of Natural Resources (tel: 033-3460796 and e-mail: inr@ukzn.ac.za.)

Chapter 2: Cooperative estuary management

2.1 Getting organised

Cooperative management, or co-management as it is more commonly known, is when people with a common interest or problem get together to plan and act in order to achieve a common purpose or solve a problem. So, in an estuaries context, it is when people with an interest in an estuary or a group of estuaries get together to plan and act in order to achieve certain goals related to an estuary or group of estuaries.

In South Africa there are numerous recent examples of the establishment of co-management structures. EstuaryCare was established in 1998 with the purpose of managing and conserving the Bushman's and Kariega estuaries. Its particular focus is the removal of marine sediment which, in its view, is clogging up the lower reaches of the estuary. At Mngazana there is concern over the harvesting of mangroves and so, in 2003, the Mngazana Mangrove Management Forum was established to tackle this issue. The Tyolomnqa Estuary Management Forum was established in 2000 with the purpose of improving economic benefits for local residents and to regulate recreational fishing pressure. So, the primary aim of co-management is to facilitate effective, sustainable and equitable management of the use of estuary resources. This is achieved through sharing of knowledge, skills, resources and comparative advantages by a variety of stakeholders.

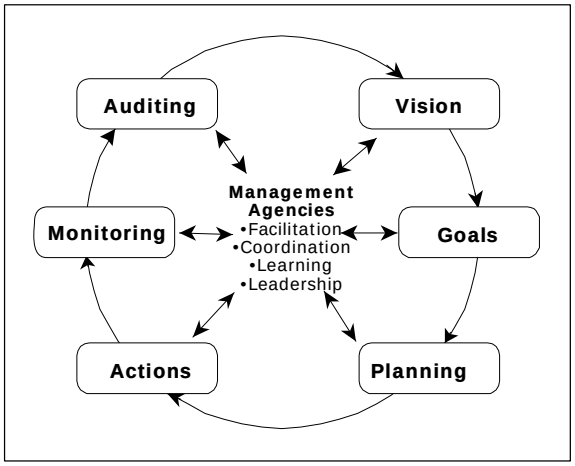
Who should be involved? As a starting point it is important to have the right people and organisations contributing to management. Starting with government, it is the custodian of the nation's natural resources, including estuaries, and it regulates development activities. In this regard, government departments with a legal responsibility to participate in the management of estuary resources are the Department of Environmental Affairs and Tourism (DEAT), Department of Water Affairs and Forestry (DWAF), Department of Land Affairs (DLA), various provincial government departments, local and district municipalities and traditional leadership. Depending on management issues it might also be necessary to involve the Department of Minerals and Energy, Department of Transport, Department of Agriculture and the Department of Public Works. Parastatals would include the local water authority, the harbour authority and the provincial conservation authority. Civil society, including residents and rate payers, tourism operators, developers, fisherfolk and harvesters, boat operators, environmental organisations, and community-based organisations also need to be involved.

Members of the Tyolomnqa Estuary Management Forum at work (Margaret McKenzie)

How do we organise this co-management group? There are variety of options depending on the number of stakeholders and the issues that need addressing. Ideally the group should be organised into a formal forum with a constitution that contains its vision and goals and that guides its behaviour. Often these groups are quite large and unwieldy so it is useful to elect an executive committee that would meet monthly or every two months. The full forum might meet once or twice a year. The need to organise is often the result of conflict around a particular issue. This conflict makes organisation difficult as groups are polarised. Ideally, one needs an independent party with strong credibility to assist with the organising process.

2.2 The management process

The adjacent figure illustrates a typical management cycle – a process of establishing a vision and goals, planning, carrying out the necessary actions, monitoring and auditing to determine the result of the actions and then refining the system. It is an adaptive process which allows for adjustments as we move forward. The following sections explain this process in more detail.



The Estuary Management Process

2.3 Vision and goals (Establishing direction and purpose)

As a starting point, those getting together need to establish a broad and shared vision for the state of the estuary or section of the estuary of interest. This vision should be a broad statement of intent that looks into the future. The vision of the Tyolomnqa Estuary Management Forum is a good example:

> *Present and future generations are able to appreciate and share the unique natural, historical and cultural heritage of the Tyolomnqa Estuary whilst enjoying in peace the benefits of development founded on the protection and sustainable use of its resources.*

This vision also serves the purpose of resolving conflict. Conflict is usually about the here-and-now. The vision forces people to think long term and work back to the current issues. With a long-term view it is usually easier to resolve differences and gain consensus.

In order to realise the vision a co-management forum needs to set itself some practical goals. These goals should be objective and measurable. As examples here are three of the seven goals of the Tyolomnqa Estuary Management Forum:

1. *To establish the desired state for the Tyolomnqa Estuary and its surrounds and develop a practical management plan that is able to achieve this desired state.*
2. *To link the management plan to other planning and management processes, particularly the Integrated Development Plan of the Buffalo City Municipality.*
3. *To identify and establish economic opportunities that benefit local communities and, at the same time, maintain or improve the ecological, historical and cultural integrity of the estuary and its surrounds.*

It is critical that sufficient time and effort be given to this process. Not only does it build collective direction and purpose but it is at this stage where relationships and trust begins to build between group members.

2.4 Planning

Once a co-management structure is established and functioning, and the vision and goals have been defined it is necessary to develop a management plan for the estuary as a basis for action. A generic structure for the plan is as follows:

Part A: Policy, Legal and Institutional Context

Policy: Overview of policies impacting on the area
Legislation: Overview of the legislation impacting on the area
Institutions: Overview of the organisations involved in management

Part B: General description of the Estuary and its Surrounds

Biophysical Context
Social Context
Economic Context

Part C: Strategic Plan

Vision for the estuary and surrounds
Principles underpinning the management of the estuary and surrounds
Goals (and objectives) to achieve the vision for the estuary and surrounds
Institutional Arrangements for Estuary Management

Part D: Spatial Plan

Zonation of the estuary and its surrounds: For each zone we should include: title of zone, location of zone, statement of intent for the zone, preferred activities and land/water use, activities and land use allowed with consent, prohibited activities and land use, additional controls.

Part E: Sector Plans (Optional section: for sectors that require specific management measures)

Examples of sector plans

- Harvesting of mangroves
- Recreational fishing
- Subsistence fishing
- Agricultural practices

Part F: Implementation Plan

For each goal in the strategic plan there should be a list of actions required to achieve the goal. Each action should outline:

- What is going to be done (in specific terms)
- Who is going to do it and how it is going to be done
- When it is going to be done and how long it will take
- What it will cost
- Ways of determining whether we are succeeding or not (indicators of success)

It is useful to get all stakeholders to sign off in agreement with the management plan and there is provision within legislation for this to happen. However, it is important to realise that the success of co-management and of the plan is determined largely by the extent to which trust, credibility, legitimacy and empathy are developed and nurtured among stakeholders during the management planning process. If formal agreements are to be negotiated they should not precede the planning process but should be an outcome of the planning process.

Once the agreement or the constitution for the co-management structure has been finalised, the co-management arrangement can then be launched. Ideally, the launching of the co-management effort should be marked by an important ceremony for purposes of demonstrating a shared commitment to the management of the use of estuary resources. The sector agreements can also be signed and publicised on the same occasion or at a later date. However, if to be signed at a later stage, stakeholders should be informed of the intention to enter into such agreements.

2.5 Action

While management issues vary from estuary to estuary our experience has shown that there are five major issues which usually require a management response:

- Poverty amongst people living at and around an estuary.
- The harvesting of marine living resources. This includes fishing, bait collection, and mangrove and reed harvesting.
- Recreational use of the water such as boating, swimming and skiing.
- Physical development in and around estuaries which includes jetties, groynes and training walls in the estuary and at its mouth; infrastructure such as roads, railways and bridges around and across the estuary; residential (marinas) and commercial development; and numerous other land-uses around the estuary.
- Changes to freshwater inflow into an estuary caused by activities in the catchment such as dam and weir construction, irrigation and plantations, commercial and residential development, waste water treatment works and inter-basin transfers of water. This directly effects sedimentary processes such as erosion and deposition and the mouth condition of intermittently open estuaries, and directly and indirectly influences the health of the ecosystem.

While the specific responses of a forum and its constituents will vary from estuary to estuary our experience has also shown that there are certain actions that are common to most:

- Zone the estuary and its surroundings into different activity areas and determine the range of activities that may take place in each area. This would include recreational boating areas, fishing areas, conservation zones, and land-use planning around the estuary.
- Regulate commercial, recreational and subsistence fishing, and the harvesting of other natural resources such as mangroves and reeds.
- Ensure compliance with existing legislation and/or assist authorities in drafting regulations that improve sustainable use.
- Ensure the safety of people active in the area.
- Build the capacity of the forum and those it represents to manage more effectively through education, training, raising awareness and the generation and sharing of knowledge.
- Support development opportunities which promote sustainable use of the estuary and surrounds and also provides economic opportunities for residents.
- Lobby upstream residents in the catchment to ensure that water reaching the estuary is of the required quality and quantity to sustain the system.
- Rehabilitate areas that have been degraded.
- Ensure that the management plan and its implementation links to other planning and management processes particularly the IDPs of local municipalities, coastal management plans and catchment management plans.
- Establishing a mouth management system for those estuaries that are intermittently open.
- Co-ordinate research to increase understanding of the system and/or to help answer specific questions for improved management.
- Monitoring that determines progress in achieving the forum's goals.

The success of carrying out these actions and others will depend largely on:

- The comprehensive nature and detail of the planning that precedes the action. If we know precisely what we have to do and how to do it we are more likely to do it.
- The enthusiasm and commitment of forum members to engage in the doing.
- The capacity to act which includes the skills of people who are tasked with various activities and the resources they have to work with.

In deciding on how to act it is very important to recognise the limits of our ability. While a forum might be able to plan and carry out certain actions itself specialist assistance is often required. The critical issue is to recognise when specialist assistance is required. For more information and guidelines on appropriate management responses see Chapter 4.

2.6 Monitoring & auditing

A management decision for an estuary and the resulting action is as good as the information on which it is based. This information is collected through monitoring key elements and processes within the management process. Key elements at the broadest level would cover ecological, socio-economic and organisational systems. Achieving a balance between these elements will result in sustainable use.

Monitoring programmes are as diverse as the questions they aim to address; there is no 'one size fits all'. A long term generic monitoring programme could thus include indicators that measure some or all of the following issues:

- hydrological and sedimentary processes
- water quality
- biodiversity
- human population growth
- control of human activities
- planning and development
- law enforcement
- co-operative governance and co-management
- effective management and
- satisfying basic human needs.

In most circumstance it is not possible and too costly to monitor everything. We need to find key indicators that will help tell us a story. We also need to try and find indicators that other individuals or groups are measuring anyway. As an example, the conservation authority might be recording recreational fishing contraventions (under-sized fish or exceeding bag limits) at a particular estuary as part of their normal administrative procedure. If the forum decides to introduce an educational programme for fishermen then it already has an indicator against which the success of the education can be measured.

Long-term monitoring programmes generally operate at the macro scale in terms of time, space and biological organisation. Their value lies in:

- highlighting trends (surveillance monitoring),
- documenting ecosystem variability that is important for the interpretation of trends,
- generating hypotheses on fundamental ecological relationships, and
- measuring compliance to legal limits, for example fish and bait quotas and restrictions imposed on effluent discharge.

Short-term monitoring programmes can be designed to monitor compliance to legislated limits, such as quotas for mud-prawn harvesting and fish catches, and for testing the effectiveness of particular management interventions.

Co-management forums working together with managers can successfully implement monitoring programmes by allocating the responsibilities of data collection, analysis, storage and communication between them. However caution needs to be exercised when using unskilled or semi-skilled volunteers to collect data even if the methods appear relatively simple. Training needs to occur prior to data collection to ensure the reliability of information.

2.7 Refinement

Any management plan needs to improve as it progresses and to be able to adapt to changing circumstances. This is commonly known as adaptive management. The monitoring and auditing will indicate whether our actions are having the desired effect. As an example, monitoring of fish catches might indicate the introduction of bag limits

on fish removed from the water has improved recreational fishing but only slightly. In order to achieve the desired state of fish stocks we might need to reduce the bag limit further or only have catch-and release fishing. This is refinement in order to meet our goals. Monitoring at a later date might indicate that fish stocks have improved to such an extent that limits might be relaxed slightly. So the process continually adapts to changing circumstances.

Refinement can take place at a number of levels. At the most profound monitoring and auditing might show that the vision for the estuary is unrealistic and requires modification. Or, it might simply be a refinement to a specific action which improves performance and allows us to achieve a desired goal.

Practically it is often difficult to distinguish between cause and effect in an estuary because of the large range in natural variability. In refining our vision, goals and actions we should always be cautious and give priority to maintaining a healthy ecosystem. Why? Because it is a healthy ecosystem that provides the foundation for our current and future use and enjoyment of the system and its surrounds.

2.8 Linking to other processes

Managing the activities in and around an estuary does not happen in isolation. There are laws and regulations that provide a legal framework in which estuary management must take place (See Chapter 6). In addition there are other planning and management activities going on at different scales which can affect our own activities both positively and negatively. The two most important of these are:

- Integrated Development Plans (IDPs) established by local and district municipalities
- Catchment Management Plans (CMPs) being or to be established by Catchment Management Agencies (CMAs).

Integrated Development Plans (IDPs)

An IDP is the plan that a local or district municipality uses to manage all activities within its area of authority and against which its performance is judged. Within the IDP there are numerous other plans including:

- Spatial Planning Frameworks and Land-use Management Systems which determine what development and what activities should happen and where they should happen
- Finance and investment plans that detail the resourcing of programmes and projects.
- An Integrated Environmental Management Plan dealing with the management of a municipalities natural resource base
- Infrastructure plans that deal with the provision of housing and services such as water, electricity, roads and railways.
- Sector plans that deal with issues such as coastal management, tourism and special projects.

Generally our experience has shown that, despite their importance to local economies, estuaries do not feature in most IDPs or their various plans. The first step to changing this is to ensure that municipal officials and politicians, particularly those who have key decision making roles are included in the estuary management forum. They provide an immediate link to the IDP process. The second step, in consultation with the

municipality, is to decide where to locate the estuary management plan in the IDP. It might be a sector plan in its own right or all the estuaries in the municipality might form a sector plan, or it might form part of the municipality's Coastal Management Plan or Integrated Environmental Management Plan. The options will depend on a number of factors that will vary from municipality to municipality. The third step is to ensure that the estuary management plan either aligns itself with the broad objectives of the IDP and/or influences the direction of the IDP.

It is important to note that, in many instances, there is limited capacity within municipalities and that while a forum is building its own capacity to manage that the municipality is an integral part of the process.

Catchment Management Plans

The Department of Water Affairs and Forestry (DWAF) established the National Water Act in 1999. In the Act are two important provisions that affect estuaries. The first is the intention to establish Catchment Management Agencies to manage our water resources on a catchment basis. The second is that an estuary is recognised as a legitimate water user and that sufficient freshwater is reserved in the river system and allowed to flow into an estuary so that it can sustain its ecological functioning.

At a practical level very few Catchment Management Agencies have been established as yet (2004). The intention is that regional offices of DWAF will establish them and then devolve authority to the agency as it builds the capacity to manage. The important point here is to ensure that a regional representative of DWAF is part of the forum and keeps everyone informed of the catchment planning process as it unfolds. This regional representative can also keep the forum informed on various initiatives that might impact on the estuary such as dam construction or timber plantation development. The second point is to lobby government to conduct a technical analysis of the amount of freshwater required by the estuary, a process commonly known as "reserve determination". When this has been determined a forum an exert influence over the behaviour of upstream water users to ensure an adequate supply of freshwater to the estuary.

2.9 Some key rules of management

1. Ecosystems are complex and people are complex so the management that takes place at the interface between people and ecosystems is very complex.
2. There are no substitutes for good leadership and good planning
3. The world is not perfect – be firm on the vision but flexible and adaptable in the mechanisms you use to achieve the vision
4. The more you know and understand the better your decisions will be.
5. Know the law, follow it and make it work for you.
6. Management is a process of learning and doing. Learning without doing gets you nowhere and doing without learning results in costly mistakes.
7. You cannot manage alone. Gather people around, establish trust, build relationships, obtain commitment and communicate, communicate, communicate.
8. Start small, practice the management process and be realistic in your expectations.
9. In empowering others we empower ourselves.
10. Think ahead and try to predict the consequences of your actions.
11. Everything takes longer than you think.

Chapter 3: Supporting the management process

3.1 Introduction

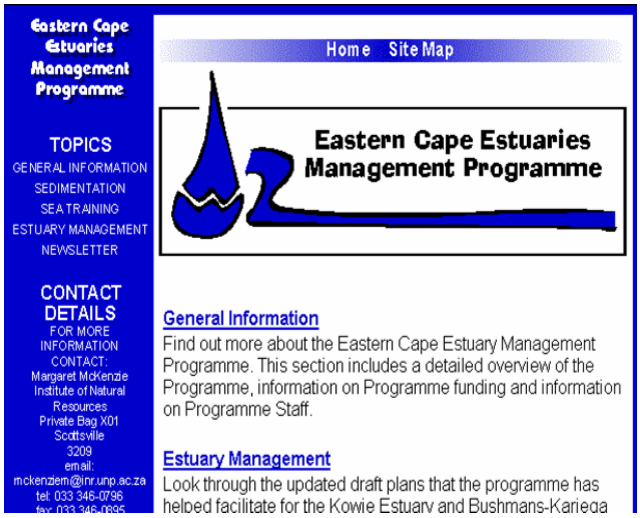
As discussed in Chapter 2 the estuary management process is complex and in undertaking that process stakeholders face many challenges. In order to assist the management process this chapter discusses three areas of intervention that will assist the management process and that can increase the impact of estuary management efforts at a local level. These are:

- Managing knowledge
- The value of integrating estuaries into land use planning
- The contribution of economic evaluation to estuary management

3.2 Managing knowledge

Management requires organisation and decision making. The better we understand an estuary and how it functions, the more knowledge and expertise we have access to and the better information is pulled together, the better our organisation and decision making will be.

Currently knowledge on the management of estuaries is fragmented, difficult to locate and share, and therefore not effectively used. Knowledge is developed and used independently. Stakeholders function like rivals and compromise the sustainable use of estuary resources. As stakeholders we should rather be motivated to contribute our knowledge as well as be encouraged to use it. There is a need to develop a culture for the sharing of knowledge which should, ideally, be enabled by information and communication technology (ICT).



An estuaries management programme website

The goal of a knowledge management tool for estuaries should be to improve the use of knowledge by estuary users and managers. Thus, the tool should aim at creating knowledge pools or knowledge networks and communities of practice. Knowledge pools can break down geographic barriers and boost collaboration.

Knowledge pools may lead to the efficient and effective creation, location, capturing and sharing of knowledge and expertise. Knowledge pools may lead to the sustainable use of estuaries because it would make knowledge available more quickly and easily, empower the users and managers to contribute to the management of estuaries, reduce duplication in knowledge-based activities, and avoid the repetition of mistakes.

The first and most important component of the knowledge management tool is the creation of communities of practice: Communities of practice are groups of people who come together to share and to learn from one another face-face-to face and virtually. The rationale for establishing communities of practice for estuaries would be to facilitate the solving of real problems, and the sharing of information, experiences and knowledge through face-to-face interactions and through information and communication technologies. In that way people from different estuaries dealing with the same issues would be able to learn from one another. Communities of practice can promote the development of expertise and a culture of using information, create a knowledge repository and serve as hubs from which to communicate knowledge on a variety of issues. Communities of practice interact through meeting, collaborating, computing and using e-mail. Communities of practice build mutual trust and continually improve processes, recognise and reward knowledge contribution, use and re-use knowledge and entrench knowledge sharing into organisational life.

In the estuary context communities of practice can be established at national, provincial, regional and local level. Estuary management forums established at local level can form the community of practice at a local level and can participate in community of practices established for larger areas.

The second component of the model is storytelling. Storytelling is a powerful tool for sharing knowledge that can be used by the communities of practice. Storytelling gives the community the opportunity to tell their stories in the language they understand. In that way they would be able to build a common vocabulary in the execution of their activities as well as in their practices.

The third component of the model is participative sharing of knowledge. Knowledge management activities should be participatory and collaborative in nature. Collaboration and participation of all the stakeholders is pivotal to the development of new, shared and common knowledge that can bring about change and improve practice. Sharing knowledge in a participative manner promotes ownership of any initiative. Knowledge constructed without the active participation of all role players can be only partial knowledge. Thus, knowledge management programmes should give individuals in a community the opportunity to share knowledge and power, responsibility and decision-making. Participating in knowledge management initiatives makes communities conscious and aware of their potential to make deliberate choices and makes them actively involved in the management of estuaries. Knowledge sharing should also encourage the creation of partnerships between stakeholders who are concerned with the management of estuaries.

3.3 The value of integrating estuaries into land-use planning

Land use planning in South Africa is becoming more strategic and forward thinking with its increasing inclusion in new legislation such as the National Environmental Management ACT (NEMA) and the Land Use Management Act. Land-use planning is now an integral part of the development planning process, and all municipalities are required to draw up Spatial Development Frameworks (SDFs) and Land Use Management Systems (LUMS) as part of their Integrated Development Plans (IDPs). These SDFs will be plans that show amongst other things desired patterns of land use,

directions of growth, urban edges, special development areas and conservation worthy areas. In drawing up these plans, municipalities will be obliged to consider sustainability issues and safeguarding the environment in terms of the Constitution and NEMA. Thus instead of following the somewhat ad hoc process of the past, it is envisaged that land-use planning will ultimately encompass all areas of the country. Moreover, planning at the municipal level will be integrated with spatial and development planning conducted at broader scales, as they will be obliged to align these plans with national and provincial strategies on socio-economic development, sustainable development and bioregional planning. In addition, it may soon become a legal requirement for local level planning to take regional conservation planning initiatives into account. Indeed, conservation of biodiversity is a prerequisite for sustainability.

The development of IDPs is well under way, but relatively few municipalities have completed their SDFs or LUMS. This is currently an advantage to the estuary management planning process because it allows stakeholders the opportunity to influence what land-uses take place around an estuary or in the catchment before they become "cast in stone" by a spatial plan. Also, in many cases the inclusion of environmental issues in IDPs has been somewhat superficial. This provides the opportunity for stakeholders to lobby for their inclusion and participate in determining which environmental issues are most important.

An example of poor land-use planning at Sezela (DEAT)

Estuaries provide an excellent opportunity for demonstrating the value of integrating environmental considerations into land-use planning. This is because they are affected by land-use management over the entire planning domain at any planning scale. The economic value of estuaries is affected by land use in their catchment areas, as well as in the coastal zone. In other words, there is no corner of the country in which land use management does not potentially affect estuaries.

Up to now the value of estuaries has not been appreciated, and has thus not been taken into account in planning, with the result that many estuaries have become degraded. For example, certain land uses use more water than others, lead to more soil erosion, or yield more polluted freshwater inflow. These affect the functioning of estuaries by altering the quantity and quality of freshwater inflows into estuaries. This functioning, in turn, affects the provision of goods and services by estuaries that contribute to peoples' livelihoods and to the economy as a whole. It does not make a great deal of sense to plan for developments in the catchment areas whose benefits are negated by losses of values in downstream areas. A better understanding of the impacts of different land-uses on the value of estuaries is thus a fundamental prerequisite for their integration into

these planning processes. After all, development planning should lead to increasing economic welfare without incurring costs on any sector of society.

At a broader spatial level, development planning will have to take into account the effect on overall water demands in relation to supplies across the country. Decisions about water allocation will ultimately take the economic costs to aquatic ecosystems, including estuaries, into account. Local level development initiatives will thus eventually need to take these broader scale constraints into consideration.

Apart from catchment-level considerations, land-use planning also has important implications for land use within and adjacent to estuaries. Planning affects the extent to which estuaries can be developed. There is huge demand for the construction of marinas and housing developments which alter hydrological patterns and require the hardening of the estuary edge. The level of development around estuaries also affects the numbers and types of users that impact directly on estuarine biodiversity. Of paramount importance is the overall level of access to estuaries. For example, increased road access to estuaries along the Wild Coast might facilitate the development of mining operations and tourism developments that will greatly alter these estuaries.

In many cases it will be shown that such developments enhance an estuary's value and provide significant opportunities for economic growth, simply because the demand for these types of facilities and opportunities is so high. However, there is also a significant demand for the ecosystem goods, services and attributes that are compromised by these types of developments. The problem is that the value of the latter is far more difficult to demonstrate, and is in some cases intangible. Resource economics provides a suite of methods which allows these values to be expressed in a common currency, making them comparable with development alternatives. Ultimately, it should be possible to establish a balance in terms of the estuaries that should be developed to different degrees, in such a way that maximizes the overall value of these systems.

3.4 The contribution of economic valuation to estuary management

Estuaries are recognised as being one of the most valuable habitats on earth with their global value having been estimated as in the region of US$4.1 trillion per year[1] (see adjacent table). This is some 12% of the total value of ecosystem services provided by the world's natural capital. The most highly valued services provided by estuaries include nutrient cycling, disturbance regulation through protection and control of storm and flood damage, food production and recreational value as shown in the table.

Summary of the estimated average global value per hectare of annual ecosystem services provided by estuaries. All values are in 1994 prices.

Service	1994 US$ $ha^{-1}yr^{-1}$
Disturbance regulation	567
Nutrient cycling	21 100
Biological control	78
Habitat/ refugia	131
Food production	521
Raw materials	25
Recreation	381
Cultural	29
Total	22 832

[1] Costanza R, d'Arge R, de Groot R, Farber S, Grasso M, Hannon B, Limburg K, Naeem S, O'Neill RV, Paruelo J, Raskin RG, Sutton P, van den Belt M 1997, 'The value of the world's ecosystem services and natural capital', Nature, vol. 387, p. 253 - 260

Yet estuaries are increasingly under threat from activities that undermine their ability to provide these goods and services. The root cause of this problem largely lies in the fact that the economic value of estuaries is not recognised by decision-makers, whereas that of the damaging activities is relatively well understood. The economic benefits generated by estuaries, and the costs associated with their degradation, are frequently overlooked by users and decision-makers. This results in activities being carried out which have negative impacts, and limits the potential for estuaries to generate income, subsistence and other benefits. Attaching monetary values to actual and potential benefits associated with the conservation and sustainable use of estuaries makes these activities directly comparable with alternative options.

Valuation thus provides important information that can guide the management of estuaries and lead to their more sustainable use. Estuary valuation serves to:

- Demonstrate the high value associated with estuary conservation. This is achieved by showing how they contribute quantifiable economic benefits to households, the national economy and even the international community. Estuary conservation must compete with or be shown to be compatible with national priorities for economic development and growth, poverty alleviation and equity considerations. Valuation emphasises the fact that estuaries contribute to national income, export earnings, employment and subsistence, and fiscal revenues.
- Highlight the significant costs associated with their degradation. Valuation studies can show the long term costs that estuary degradation can have to all of the values highlighted above.
- Justify estuary conservation as an economically beneficial investment and land-use option. This can be demonstrated both at a local and national scale.
- Improve and rationalise estuary management. Valuation highlights the role of ecosystem functioning and integrity in contributing to socio-economic goals, and thus promotes integrated management of estuaries and ecological-economic systems.
- Identify incentives for sustainable use. Valuation studies identify the stakeholders that benefit from and those that bear the costs of their conservation, and vice versa. This helps to identify measures that need to be implemented to achieve the optimal and sustainable use of estuaries.
- Help identify financing mechanisms for conservation. Estuary conservation, and the groups who bear its costs, require funds. Valuation ascertains the magnitude and distribution of costs and benefits associated with conservation efforts, and also highlights conservation financing needs. It identifies the stakeholders that benefit freely or at low cost from estuaries, or who carry out activities which degrade estuaries without being penalised. These all present opportunities for capturing additional revenues which can be redistributed to those who bear the costs associated with estuary conservation.

The basic aim of valuation is to determine people's preferences, and how they would be affected by a change in the supply of goods and services provided by estuaries. Valuation provides a means of quantifying the benefits that people receive from estuaries, the costs associated with their degradation, and the relative value of land and resource uses which are compatible with estuary conservation versus those which contribute to estuary degradation. Valuation also helps to predict and understand why

people engage in activities which are damaging to estuaries, and hence to develop measures that encourage people to engage in more sustainable activities.

The valuation of estuaries involves:

- Identifying the goods, services and attributes provided by estuaries that generate, or potentially generate, value to society, and how they relate to economic production, consumption and welfare;
- Choosing appropriate techniques for valuing these services. A host of techniques are available to practitioners that are suitable for different types of values and under different circumstances; and
- Investigating how changes in estuary management and condition affect the supply of these services and their value. The costs of management also need to be taken into account.

The information provided by valuation studies is then used to carry out further economic analyses which aim to identify the most productive, sustainable and equitable management options and inform management decision processes. An important aspect of this process is to assess how the benefits and costs of alternative management options are distributed among different stakeholder groups. Ultimately, the analysis should be able to describe the trade-offs involved in choosing different management alternatives. The analysis should be sufficiently sophisticated to be able to determine the best mix of uses, and not only all-or-nothing alternatives.

Note that resource economics is a complex field and that economic valuation exercises on estuarine resources need to be conducted by an expert. However, stakeholders under supervision can play an active role in data collection.

Chapter 4: Tools to address specific issues

4.1 Introduction

For estuary co-management to succeed it needs support in the form of additional tools and guidelines that address specific issues. In addition local estuary management needs broad support from national and provincial stakeholders. This section outlines some specific tools and guidelines to address four specific issues of concern at local level:

- Sustainable Use of Living Resources
- Biodiversity Protection
- Rehabilitation
- Enterprise Development

Although some detail is supplied this is largely an overview. The main detail in these sections can obtained from *Protocols contributing to the management of estuaries in South Africa with a particular emphasis on the Eastern Cape* available from the Water Research Commission or the Institute of Natural Resources. The detail of some of these tools and guidelines is still being developed and it might be necessary to interact directly with relevant researchers to obtain the necessary information.

4.2 Sustainable use of living resources

Due to increasing demands on estuarine living resources (fish, invertebrates and plants), the development of an environmentally and socially acceptable strategy to ensure long-term sustainability is probably the biggest challenge facing fisheries managers in South Africa. Ultimately the sustainable utilisation of estuaries and their resources hinges on improved law enforcement, compliance with regulations, and dedicated research and monitoring efforts through the development and implementation of an effective management system.

Catch-and-Release - properly practiced, a sustainable use of the natural resource (Paul Cowley)

Following is a process to assist managers in promoting sustainable use of marine living resources in estuaries.

Firstly the estuary must be classified. There are two main criteria used to classify an estuary. Firstly the mouth state (is the estuary open or closed). Secondly the dominant user group (recreational, subsistence, mixed, unused, protected). Arising from this are nine possible classifications:

- Open Recreational (OR)

- Open Subsistence (OS)
- Open Mixed User (OM)
- Closed Recreational (CR)
- Closed Subsistence (CS)
- Closed Mixed User (CM)
- Closed Unused (CU)
- Open Unused (OU)
- Protected.

The following management guidelines were then formulated in the form of actions that managers need to take to address specific issues and fulfil their objectives in order to achieve the goals and vision formulated for a particular estuary. The guidelines are grouped into four broad categories that incorporate the main issues, namely those applicable at the resource level, the ecosystem level (together comprising the environment) and those pertaining to the socio-economic and institutional domains.

Resource

1. Control access to bait collecting areas.
2. Rotate bait collection areas on an annual basis to allow for recovery.
3. Restrict collection of mud prawn, sand prawn, bloodworm, pencil bait and tapeworm only during daylight hours and using only legal implements.
4. Control tropical fish collection.
5. Prohibit capture of fish (irrespective of methods) during mouth breaching events in temporarily open/closed systems.
6. Prohibit capture of linefish species (e.g. grunter) with cast nets, seine nets, gill nets and traps.
7. Reduce the number of fishing competitions.
8. Develop key indicators and implement effective monitoring programmes dedicated to individual species.
9. Undertake directed research aimed at stock status and sustainable yields.
10. Reduce bag limits on all threatened estuarine angling species.

Ecosystem

1. Minimise impacts on associated sensitive habitats found adjacent to bait collection areas (e.g. salt marshes), by the construction of walkways.
2. Restrict number of boats and access according to carrying capacity of the estuary.
3. Establish sanctuary areas where threatened invertebrate and floral species occur.
4. Adopt an holistic approach to estuarine management (i.e. incorporate issues related to the catchment and adjacent terrestrial and marine environments).
5. Identify potential Estuarine Protected Areas (EPA) for the conservation of over-exploited linefish species (e.g. dusky kob and white steenbras). The area must include the mouth and adjacent marine environment.
6. Ensure that artificial breaching of estuary mouths (how and when) is done in accordance with guidelines and regulations in the Sea Shore Act No 21 of 1935 and the National Water Act No 36 of 1998 (NWA).
7. Protect sensitive and riparian habitats with reference to the use of vehicles, boat mooring sites and agricultural activities.

8. Assess and monitor accumulative impacts using tools such as Ecosystem Based Methods and Strategic Environmental Assessments.

Socio-economic

1. Establish exclusive subsistence bait fisheries on selected systems.
2. Apply zonation, through consultation with all Interested and Affected Parties (IAPs), of estuaries for recreational and subsistence fishing activities and non-consumptive activities to reduce user conflict.
3. Prohibit power boating or impose engine size restrictions.
4. Restrict recreational activities such as skiing and powerboating to certain times of the day to avoid user group conflict.
5. Promote estuarine awareness and instil a feeling of social responsibility towards estuaries through advertising and marketing, and education of managers, user groups and the general public.
6. Promote co-operative management through community involvement.
7. Funds raised from estuary activities to be used for estuary management in the same region.
8. Identify and mitigate against impacts resulting from industrial and mining activities, and urban development.
9. Promote alternatives to consumptive exploitation. For example, catch and release fisheries and eco-tourism or alternative livelihood options such as mariculture ventures and job creation for subsistence users.
10. Reduce fishing effort by controlled access or increased access costs.
11. Prioritise and increase funding for research and enforcement.
12. Recognise and involve tribal authorities and indigenous social structures.
13. Address the cause (e.g. poverty) and not the symptom (over-exploitation) in estuary management plans.

Institutional

1. Identify and quantify (monitor) consumptive resources, their value, and the present levels of exploitation in all systems.
2. Enforce, through compliance monitoring, existing legislation under the MLRA, e.g. permits, catch restrictions, use of cast nets etc. Penalties need to be severe and convictions need to be secured.
3. Prevent illegal syndicates from using local communities to poach estuarine resources, in particular linefish, swimming prawns and mud crabs.
4. Eliminate illegal activities (e.g. gill netting, crab trapping and netting of swimming prawns).
5. Promote communication and co-operation between local, provincial and national authorities.
6. Generate a database on historic and current biophysical and socio-economic characteristics to facilitate the monitoring programme.
7. Control pollution and waste emissions including sewage, detergents, agricultural runoff, urban runoff, industrial waste, solid waste and fossil fuels.
8. Control erosion and runoff associated with infrastructure development (roads, residential and industrial).
9. Enforce existing legislation under the NWA, e.g. water abstraction and catchment management.
10. Control harvesting of mangroves.

11. Enforce legislation pertaining to activities that impact on estuary ecosystems and their functioning (e.g. National Environmental Management Act No 107 of 1998 (NEMA), Environmental Conservation Act No 73 of 1989, Agricultural Resources Act No 43 of 1983, etc.).
12. Empower and encourage local authorities (managers) to enforce National legislation (e.g. MLRA) as well as municipal by-laws.
13. Return custodianship of estuaries (from MCM) to local authorities and forums to manage within a national framework.
14. Incorporate findings and recommendations arising from research programmes into management plans.
15. Police user groups equally and consistently between and within the different groups.
16. Establish a lead agent Non Governmental Organisation (NGO) to market estuaries and sell their value to government and the general public.
17. Address estuaries specifically in all forms of legislation (e.g. Coastal Bill, NWA and MLRA), and do not include under an all encompassing banner such as 'coastal zone'.
18. Improve capacity through employment of competent staff and the concentration of effort in priority areas or estuaries.

The management guidelines were allocated to the nine estuary classes, with many being applicable to more than one class of estuary. The following table indicates the guidelines that are applicable to which estuary class.

	Guidelines			
Estuary class	**Resource**	**Ecosystem**	**Socio-economic**	**Institutional**
Closed – subsistence	1, 3, 5, 6, 8, 9, 10	3, 4, 5, 6, 7, 8	3, 5, 6, 7, 8, 9, 10, 11, 12, 13	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 16, 17, 18
Closed – recreational	1, 3, 5, 6, 8, 9, 10	2, 3, 4, 5, 6, 7, 8	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 16, 17, 18
Closed – mixed user	1, 3, 5, 6, 8, 9, 10	2, 3, 4, 5, 6, 7, 8	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 16, 17, 18
Closed – unused		6, 7	8	6, 7, 8, 16, 17
Open – recreational	1, 2, 3, 4, 6, 7, 8, 9, 10	1, 2, 3, 4, 5, 7, 8	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18
Open – subsistence	1, 2, 3, 4, 6, 7, 8, 9, 10	1, 2, 3, 4, 5, 7, 8	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18
Open - mixed user	1, 2, 3, 4, 6, 7, 8, 9, 10	1, 2, 3, 4, 5, 7, 8	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18
Protected		5, 7	5, 6, 8, 11, 12	2, 3, 4, 6, 7, 8, 9, 10, 11, 15, 16, 17, 18
Open – unused		7	8	6, 7, 8, 16, 17

It is important to note that due to the unique nature of each estuary and the user groups, not all guidelines allocated to a class of estuary will be applicable to each system in that class.

4.3 Biodiversity protection

Estuaries are highly dynamic ecosystems which occur throughout the cold temperate, warm temperate and subtropical coastal zones of South Africa. Moreover, within each of these zones there is substantial variability in estuary size and type. Hence it is not surprising that each of our over 250 estuaries can be considered unique in terms of its physical characteristics and biodiversity. Our estuaries support numerous species which are uniquely adapted to estuaries, as well as a large number of species which also occur in other (e.g. freshwater or marine) habitats, but which are dependent on estuaries for part of their life cycles. In addition to these the biodiversity of estuaries is augmented by numerous more cosmopolitan species, many of which are tolerant of wide salinity ranges.

The protection of the Mtentu Estuary has led to a dramatic recovery of Giant Kingfish in the system (Ben Pretorius)

If biodiversity is considered in its broadest sense to be "the richness, abundance and variability of plant and animal species and communities and the ecological process that link them with one another and with soil, air and water", then how do we go about its adequate protection in estuaries?

Protection of biodiversity is necessary due to past damage and present and future threats, most of which are caused by the actions of people. Most major threats to estuaries have only arisen in the past few decades. At the local scale, immediate threats to biodiversity include habitat alteration, overexploitation, recreational disturbance and pollution. Much of this can be attributed to the massive increase in coastal development and populations in recent years. In addition, biodiversity is threatened by reductions in the quality and quantity of freshwater entering an estuary, which affects mouth dynamics, salinity regimes and sedimentation patterns. The latter is due to increased national demands on water supply and increased agricultural pressures on catchments. It is thus important that the problem of biodiversity protection is tackled at the catchment scale as well as at the local estuary management scale.

Following is a strategy to assist managers with the implementation of biodiversity protection of estuaries at a local level.

Firstly, as with the broader estuary management plan a biodiversity protection strategy needs a set of goals. These are ideally:

- to maintain the ecological integrity of estuaries, such that interactions among estuaries and between estuaries and other ecosystems are maintained, and

- To maintain the health of estuaries in a good to excellent condition, assuring that a representative set of estuaries is maintained in as close to their natural state as possible.

There should be at least five core components of the strategy. These are discussed in more detail below:

Component One - Research and Knowledge Management: A biodiversity protection strategy and management action needs to be informed by relevant research. Optimal management decisions rely on a good understanding of estuarine biodiversity and functioning, the value of goods and services supplied, and the demand for these. At the estuary level, research is urgently needed on a number of issues for example: The distribution patterns, structure and functioning of estuarine biodiversity; The status and productivity of stocks of utilised resources; The demand for estuarine goods and services and factors influencing this; The ecological functioning behind service provision by estuaries; The impact of disturbance on biodiversity; and Optimal levels of use of resources (estuary-specific), taking ecosystem effects and socio-economic factors into account.

Component Two - Regulation and Enforcement: Regulation should take place at both an estuary level, and at a catchment, or national, level. Regulation at the national level, regarding water supply and catchment management, is already appropriate, and should be supported. At an estuary level, regulation mechanisms should be sufficiently variable to cater to the uniqueness of each estuary in terms of its combination of biodiversity, use value, threats and socio-economic context. Thus a combination of regulatory mechanisms is advisable and it is proposed that least three types of estuaries should be considered from a regulatory perspective. ***Estuarine Protected Areas (EPAs):*** EPAs would provide the state-owned core of the conservation strategy. The main aim of the set of protected areas would be to safeguard a portion of estuarine biodiversity within formal protected areas that contain viable populations of a representative set of taxa, and a representative set habitats, communities, and estuarine types. ***Estuarine Conservation Areas (ECAs):*** These would be estuary areas that are not strict protected areas, but more akin to conservancies. ECAs would differ from ordinary estuaries in that they would make provision for additional regulation. They would differ from formal protected areas in that they could be initiated by local communities or the state, and would emphasise participation of local communities in setting regulations or accepted codes of conduct. ***Estuarine Management Areas (remaining estuaries):*** Estuarine Management Area is the regulatory category that applies to all estuaries not designation as an ECA or EPA (see above). They are thus named because it implies that all estuaries are managed (as they should be). There should be a basic set of regulations that pertain specifically to estuaries that restrict consumptive activities, limit disturbance of sensitive habitats, restrict pollution, limit surrounding development, limit stabilisation and limit mouth management activities.

Component Three - Conditions and incentives: Creating conditions and incentives that support conservation is essential to remove or alleviate some of the threats, especially where regulatory mechanisms are weak due to lack of enforcement. In some cases, government has created disincentives to conservation in the past, such as subsidisation of water, and these need to be removed or altered to be more compatible with conservation. Conditions and incentives need to be improved at the national level, catchment level, estuary level, and at the institutional level. Conditions and incentives should include economic incentives, poverty alleviation and education.

Component Four - Monitoring and Adaptive Management: Monitoring is an essential element of any conservation strategy. It contributes to basic understanding and research, as well as alerting managers to situations where conservation strategies have not been entirely successful. Coarse level monitoring using available local capacity, so that management authorities are alerted to major changes should be seen as the

minimum requirement for estuarine monitoring. In the case of ECAs, monitoring should involve the ECA committees as far is possible given the abilities of the people involved. Where capacity or willingness is lacking, support should be available from conservation agencies or other institutions. Coupled with monitoring, mechanisms should be in place that allow the findings from monitoring programmes to be used to influence the revision of management strategies at all levels. Adaptation occurs at a local level, but should occur in consultation with regional-level representatives to facilitate learning processes across estuaries.

Component Five – Rehabilitation: Rehabilitation is an option for degraded estuaries which require immediate attention, either because the value of the goods and services they can provide to society has been compromised or because they are of conservation importance at a national or provincial scale. In addition, rehabilitation is an important fall-back option in the event of misguided management resulting in estuary degradation in future. Nevertheless, there should be very little emphasis on rehabilitation as part of the overall estuary biodiversity conservation strategy on the grounds that it is better to promote proactive research and management rather than to rely on the availability of retroactive measures.

4.4 Rehabilitation

Rehabilitation is about promoting the recovery of ecosystem functions and values in a degraded system to regain some of the lost value the system had to society. Rehabilitation is as much about influencing people and their activities as it is about engineering. Unfortunately, in many instances, due to the extensive land- and resource-use changes in the catchments and along the coastline, there is limited opportunity for re-instating many of the natural landscape processes that influence estuaries. This does not imply that nothing should be done to improve the current situation, but means that the factors responsible for the degradation and the constraints and opportunities imposed by these factors must be understood. Sound planning is therefore essential to the rehabilitation process to ensure an understanding of what caused the degradation in the first place, identify and design appropriate intervention strategies as well as to see to their implementation. As with general estuarine management, rehabilitation must be undertaken within a legal and management framework. No such framework currently exists for estuarine rehabilitation and general guidance in this regard must be gleaned from a range of legislation.

Mdloti Estuary required significant rehabilitation following inappropriate development and flooding (Ken Breetzke)

Following is a guide to assist managers in developing a rehabilitation plan at the local estuary scale. The steps involved include:

- Establishing a vision for the rehabilitation of the estuary: The first step in the approach is to develop a vision for the estuary. This should have some sense of

an end-point, or a clear target and it must be inspiring. Although the vision should include a recognisable end point, it does not have to be completely achievable and can be an ideal to work towards. The vision should also relate to some 'template' of how the estuary should function, what it should look like, and what type of resources it should provide.

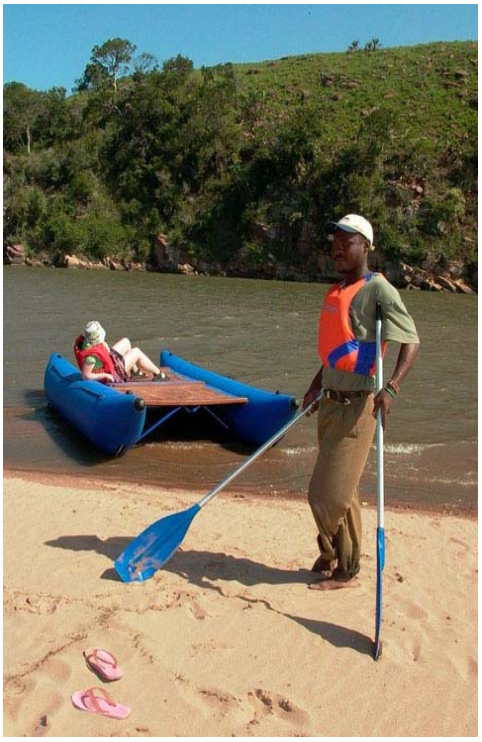
- Establishing the extent and nature of the changes that have occurred: Fundamental to the technical aspects of rehabilitation is an understanding of what state a system is in, and what has been the cause of the decline in condition of the system. In this context, defining a current state has to do with the condition of the system relative to some ecological reference state (usually taken to mean the natural or pre-impact condition of the system and the dynamics associated with this).
- Identifying the main assets of the estuary and the threats to these: One of the central problems facing anyone developing a rehabilitation plan is identifying why the system or a particular component of the ecosystem has been degraded. Knowing why a system or particular component of a system is degraded is central to effective rehabilitation.
- Identifying, screening and selecting candidate sites for rehabilitation based on the perceived threats to the assets: The aim of this step is to produce a list of sites and their problems, in order of priority for rehabilitation. This should be done when the causes of degradation of an identified asset occur in more than one locality, or where there is more than one reason for degradation, or when the main assets extend over, or occur in more than one locality.
- Setting priorities as to what should be done first: The procedure for setting priorities as to what should be done first may encompass a whole lot of considerations. For example, it could be as simple as considering how much funding is available and then realistically focusing on the budgetary constraints of tackling certain problems or sites. Alternatively, it could be considerably more complex, especially when competing for funds, or in cases where enough funds may be available for tackling a number of alternatives, or where stakeholders differ in terms of what they perceive to be priorities.
- Identifying specific and measurable objectives for the rehabilitation intervention: An essential step in the process of developing a rehabilitation plan is specifying exactly what the rehabilitation project is setting out to achieve. This requires the development of specific and measurable objectives for the intended intervention. The objectives are usually steps along the path towards achieving the vision for the estuary and should be designed to achieve the vision.
- Developing and determining the feasibility of strategies aimed at meeting the objectives: The purpose of this step is to identify a range of possible solutions for meeting the objectives and to determine the feasibility of these. It is important to point out that, at this stage, one is only interested in general strategies, rather than detailed intervention or project design. One also does not have to consider how feasible the strategy would be until later on in the process. The purpose of this step is therefore simply to identify a general strategy, or range of strategies, aimed at meeting the objectives developed with respect to the priorities identified.
- Designing projects to achieve the objectives: By this step, one should be clear about which problems are to be addressed, what strategies will be used, what options are available for protecting certain assets, and what the objectives of the rehabilitation are. During this step therefore, the general strategies above and the basic tools that will be used in the strategies are expanded upon and detailed solutions for achieving the objectives are developed.
- Establishing evaluation criteria and a monitoring programme: Establishing evaluation criteria and a monitoring programme is a critical step in any

rehabilitation project. With no formal check on the outcome of a project, it is difficult to assess whether the objectives of the project are being (or have been) met. Evaluation also allows one to improve the techniques and approach used.

- Implementing the project to specifications: This involves implement the project design above.
- Implementing the monitoring programme: This involves implementing the monitoring programme discussed above.
- Assessing the outcome of the project: During this step, one is expected to find out not only if the project succeeded or failed, but also what caused the results, and what lessons were learnt from the project and could be used to increase the success of the next project. Where necessary remedial actions should be taken if the performance standards were not satisfied

Many of the threats to estuaries are consequences of human attitudes and activities. The recognition and acceptance of this as one of the major causes of estuarine degradation is key to the identification of tools appropriate to rehabilitation, for example those required to influence or change human behaviour. A concept that confounds this issue is that no matter what tools are used, without poverty relief and effective awareness and education relating to the environment, successful rehabilitation in the long-term is unlikely. Therefore, a successful strategy should include some form of incentive-based approach. A combination of implementation tools such as cost-sharing linked to market-based or poverty relief incentives, coupled with regulatory backup and other professional and stakeholder support is likely to be more successful than one based purely on technical inputs.

4.5 Enterprise development



A canoe guide at Amatikulu Estuary (Margaret Shapiro)

Because of the significant natural asset base of estuaries there is considerable potential to establish biodiversity related small businesses. These are often proposed as mechanisms for promoting and ensuring sustainability of conservation interventions. However, the evidence of successful enterprise development of this nature occurring is very limited. There are many causes of this lack of successes. Sometimes businesses are simply not feasible and in many how the business is organised from the outset is simply not thought through.

Following are some things to consider before starting out on a biodiversity based enterprise development at an estuary involving local communities.

Institutional arrangements

Lessons coming out of successes with new generation co-operatives seem to suggest that the key to successful establishment and operation of community-based enterprises lies in careful consideration of institutional design during enterprise conceptualization and implementation. This is because careful consideration of property rights helps to overcome the problems associated with weak institutions. Some of the key issues are:

- Consider partnerships: At the outset it is fundamentally important that an assessment of management capacity is conducted so that an appropriate decision on organizational arrangement is made. Where capacity limitations exist in terms of the ability to manage the enterprise effectively and efficiently, it may be appropriate to consider a partnership with experienced and established operators.
- Formalise Rights: Where enterprise operation is dependent on the natural resource base, resource use rights and tenure rights must be formalized. With clearly defined rights communities are able to make use of the resource according to their own formulae, including using it to unlock additional capital.
- Capacity and Empowerment: It is vital to ensure that the governing body of the business comprises competent members well versed in interrogating financial records and other operations of a business arrangement. Because lack of skills is pervasive in most community owned enterprises, successes have been reported where skilled and experienced individuals occupy positions of CEO's and CFO's and have a stake in the company as share-holders. In addition there needs to be empowerment of all business participants at the very least involving training in those areas such as marketing, accounting, business management, leadership and sales.
- Consider the option of a private company: Depending on the definition of property rights, private companies may be appropriate institutions to represent community organizations. They have the ability to raise equity capital through the issue of shares and can distribute benefits such as cash dividends and funding for community infrastructure and services.
- Group Size: Many of the problems that tend to undermine sustainability of community based / owned enterprises are associated with group size. There is sufficient evidence pointing to an inverse relationship between group size and enterprise sustainability. This is because small groups are frequently characterised by shared norms, beliefs and values. The larger the size of the group, the less meaningful benefits will be.

Determining Feasibility

Once the institutional issues have been resolved it is important to determine the feasibility of the enterprise, in particular the following is required:

- Conservation assessment: The purpose of the conservation assessment is to determine the extent to which the planned business enterprise can promote conservation of biodiversity. This is because those supporting enterprise development often make many assumptions that the business, run by local community, has the potential to modify locally driven economic and subsistence practices impacting on conservation of natural resources.
- Sustainable livelihood assessment: Small businesses are generally difficult to set up and run profitably. Attempting to establish a viable and sustainable small business in poor and remote communities is particularly challenging. And, doing it in a manner that secures significant conservation impacts from such business development is even more difficult. Therefore, it is important that sustainable livelihoods assessment is conducted so as to determine how the planned enterprise could be woven into the social fabric of a local community as it pursues its livelihood needs.
- Environmental assessment: In South Africa physical development of natural uninhabited areas requires compliance with various regulations. In this regard an Environmental Impact Assessment (EIA) of the proposed business would have to be conducted, and submitted to the relevant government department for authorization. The environmental impact assessment would highlight potential

negative impacts of proposed development and provide mitigation measures that would be employed to reduce the impact of development on the natural environment.

Economic Assessment

The economic assessment will help enterprise developers determine the economic and commercial viability of a potential small business. It is about developing a business plan for the proposed enterprise. This assessment analyses the most suitable types of products and services to develop. It involves conducting a market analysis, cost and revenue projections. It should be noted that performing the economic assessment requires specialized expertise and it may be appropriate for enterprise developers who do not possess this expertise to assign the task to qualified professionals. Some of the key aspects of the economic assessment are:

- Assess market potential: Enterprise developers should ascertain that the demand for the proposed product exists in the target market, and that if a cost-effective business is developed, sales and revenues will be promising.
- Assess access to the market: Once markets have been identified, a strategy to achieve market access has to be developed. It is important to ascertain whether this can be achieved in a cost-effective manner.
- Assess infrastructure requirements and costs: Most natural resource-based enterprises are located in remote areas lacking basic infrastructure. The provision of roads, water, electricity and telecommunications need to be factored in as well as the cost of establishing the business infrastructure (and its subsequent maintenance) in a remote area. Transport costs can almost double infrastructure establishment costs particularly if it is a "bricks-and-mortar" based enterprise.
- Identify marketing channels: Identifying marketing channels enables a business to make a decision on whether to use 'middlemen' to market the products/services or to set up its own marketing system to obtain market information and to handle sales. The decision should be based on the results of research assessing the service provided by the 'middlemen' versus the cost to the business of setting up a marketing system.
- Develop a preliminary marketing strategy: A common mistake in many small businesses is thinking that marketing is less important than getting the production systems in place. This is not true because marketing is as important to business survival as the production systems are. A sound marketing strategy is essential to the success of any business.
- Estimate costs, financing, revenues and profits: Any nature-based business needs to generate sufficient profit so that it can continue to operate and motivate owners, managers and employees to not revert back to their previous environmentally damaging activities. Therefore, business developers would need a basic understanding about potential profitability of the business before developing specific strategies.
- Estimate initial capital investment costs: Estimation of the amount of investment required to meet the costs of starting the business should be done because every new business would need to invest in equipment and other required capital to start and maintain its operations. Cost estimates would require financial knowledge of the product or services to be provided.
- Estimate ongoing operational costs: Once a business is running it will incur a host of regular ongoing costs. These costs fall into two main categories, fixed costs and variable costs. Fixed costs are those costs that a business would incur regardless of the number of products or services provided. A sum of all of these

costs is generally referred to as "overhead'. Variable costs are those costs that a business incurs only when the service is provided or an output is produced.

- Consider financing needs: In determining how to cover business costs, a business must take into account the following: the amount of external financing that will be needed, the form of financing, the cost of financing and who will supply the financing. Lack of available capital to start a business is a common barrier for entrepreneurs. A business will therefore need to obtain external finances to cover costs before it can generate sufficient internal capital.
- Estimate revenues: Estimation of revenues is important in order to determine whether the business will be able to meet expenses expected in one year, and whether wages and suppliers can be paid in a timely manner. If estimation of revenues indicates that expenses cannot be paid, a business might have to halt operations.
- Forecast profit: The profit is the excess of revenues over costs over time. It can be calculated for the lifetime of a business and on an annual basis. Forecasting profits provides real evidence of whether a business is likely to be financially viable and will meet the financial needs of owners. Therefore, whilst profits are difficult to forecast during business design, an indication of whether profits will be low, medium, high or negative is essential to justify business support.

Chapter 5: Guidelines for National Estuary Management

5.1 Introduction

The guide is intended mainly to assist management in the local sphere of government and at the single estuary level. However a guide to national estuary management is also proposed to assist in national and provincial management efforts.

The National Estuarine Management Guideline views management as an iterative process. It conforms closely to that for integrated development planning in that the thrust in both processes is strategic. The different components of the management guideline follow a cyclic, adaptive management approach and are described in further details below:

5.2 Components of the guideline

Strategic Vision and goals

Strategic vision and goals need to be set for both the biophysical and socio-economic environments. The objectives are set at two levels, namely:

- Strategic vision and goals are set at a national and/or provincial/regional level. Estuaries do not operate in isolation, but are connected, albeit indirectly, to other estuarine systems in a region and even globally (e.g. fish and bird migration). As a result, certain goals need to be set on a higher level to ensure overall sustainability (taking into account social equity, economic growth and ecological integrity). For estuaries, a strategic vision and strategic goals, therefore, need to be defined on a national, and also on a regional (or provincial) level with agreement between different departments on certain key requirements (e.g. strategic developments planned in different regions or conservation status on a national or regional level).
- Local vision and goals that are site-specific and need to be set for individual estuaries (See Chapter 2 for more details on local vision and goals). To ensure long-term sustainability of estuaries, it is crucial that the vision and goals of the local sphere of government are aligned with those of national and regional government departments.

Management Strategies

Management Strategies are defined at two levels, namely:

- National/Regional management strategies: Management strategies and plans should be developed at national and regional/provincial levels to guide management on all levels to ultimately achieve the Strategic Vision and goals set for estuaries. National/regional management strategies need to be elaborate providing the necessary guidelines for national, regional (provincial) and local initiatives.
- Local management strategies (See Chapter Two for more details): Detailed management strategies and plans must be developed on a local level to guide local managers to achieve site-specific ecological and socio-economic goals set for a particular estuary, taking into account national/regional management strategies.

National and provincial government departments have a strong regulatory role in the management of estuaries (DEAT)

Planning and Operations

Planning and operations primarily relates to the actions (categorized into water quality and quantity, land-use and infrastructure development or exploitation of marine living resources) that need to be taken into consideration in the planning and operation of activities/ developments in and around estuaries.

Monitoring

Monitoring can be divided into:

- Baseline monitoring refers to monitoring programmes through which long-term data sets are collected to establish natural variability and trends as a result of human interference. Data collected from such monitoring programmes are usually those, which are used for State-of-Environment Reporting.
- Compliance monitoring is related to specific activities or developments in and around estuaries. The primary aim of these monitoring programmes is to establish whether the operation of such activities and developments complies with pre-determined critical limits, and with the ecological and socio-economic objectives of the estuarine environment on which it may have an impact.

Assessment and evaluation

Assessment and evaluation is the feed back loop that ensures the ultimate success of the management process. Assessments and evaluations are performed at a strategic level, and also on specific activities/developments.

- Strategic assessment and evaluation is required to establish the degree of long-term natural variability, as well as the potential trajectory of change associated with human interference.
- Assessment and evaluation of specific activities/developments, on the other hand, entails compliance testing against critical limits set for processes and actions associated with the activity/development, as well as against measurable ecological and socio-economic objectives set for a particular estuary.

5.3 Institutional structure for implementation

The envisaged legal and institutional structure for implementing integrative cooperative governance in estuaries, in context of the proposed guideline is set out below.

At national scale the lead agents (Department of Environmental Affairs and Tourism and the Department of Water Affairs and Forestry), under the auspices of the Committee for Environmental Co-ordination (established under the National

Environmental Act), would have responsibility for the process. This committee would inform and be informed by national government departments and at provincial level by Coastal Committees established under the Coastal Zone Bill and by Estuary Advisory Groups.

The Coastal Committees would also inform and be informed by Catchment Management Agencies, established under the National Water Act. At the level of Local Government, interaction would be with the municipal integrated development structure and planning process established under the Municipal Systems Act, with Water User Associations established under the National Water Act and with civil society through Estuary Forums.

Finally, the effective cooperative governance of South African estuaries can only be achieved through integrating the scientific, managerial and legal initiatives currently taking place in this country. The tool to achieve this would be the National Estuarine Management Protocol.

Chapter 6: The Law

The laws that govern activities in and around estuaries are numerous and complex. Following is a list of key policies and laws, and some key points to note:

- The Constitution including the Environmental Bill of Rights ensures that, amongst other things, everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected for current and future generations.
- The Policy for Sustainable Coastal Development in South Africa is currently being developed into law. The policy recognizes that estuaries are key coastal resources and that they require active management and conservation to maintain their integrity.
- The Sea Shore Act regulates all activities in the coastal intertidal zone including any activity in an estuary below the high tide mark. However, most of what is covered here is also covered in the Environmental Conservation Act (see below).
- The Environmental Conservation Act (ECA) requires, through the Environmental Impact Assessment Regulations, that an environmental report is required for almost any development in or adjacent to an estuary and permission for development is required from the relevant authority (usually the provincial environmental department). Many activities in the catchment including the cultivation of virgin land, the building of dams and weirs, and the construction of other infrastructure also require an environmental report and permission to be obtained prior to development.
- The National Environmental Management Act contains over-arching environmental legislation. Included in this is the provision that allows members of the public to take legal action in the public interest or the interest of protecting the environment. This includes taking legal action against government departments to force them to implement laws.
- The Marine Living Resources Act regulates all activities related to the use of living resources in estuaries. This includes bait collection; commercial, recreational and subsistence fishing, and the harvesting of estuarine plant species.
- The Conservation of Agricultural Resources Act requires that, when farming, steps are taken to ensure particularly the conservation of soil and water.
- The National Water Act recognizes that an estuary is a water user and that provision needs to be made so that an estuary has sufficient freshwater inflow to sustain its ecological functions.
- The National Forest Act regulates the use of indigenous forest resources in and around estuaries and, importantly, covers the protection of mangrove forests.
- The Minerals Act requires that mining, quarrying or sand-winning are subject to an environmental report (including rehabilitation measures and dedicated fund to pay for this) prior to commencement and that the activity is permitted by the Department (Minerals and Energy).
- The Municipal Systems Act requires that municipalities establish Integrated Development Plans (IDPs). These plans need to include spatial development frameworks, land-use management systems, and environmental management plans. These all require that potential environmental impacts of development/land-use options be taken into account.
- Common Law is important and, simply stated, prevents people from engaging in activities that impinge on our fundamental rights.

In summary, there are enough laws to ensure the sustainable development and protection of estuaries and their surrounds. The trick is what combination of laws to use and how to use them to realize a particular goal. Remember always that that legal action is expensive and tends to polarize people in opposing camps. This route should only be followed when all other mechanisms have been unsuccessful.

It is important to consult with a responsible government official to determine the legal process and legal constraints if one is contemplating actions that potentially impact on an estuarine system. If the scale of intervention is considerable (e.g. dredging or marina development) consult an environmental lawyer before engaging the EIA process to make sure you have all bases covered.

Chapter 7: Additional Reading

Books

Allanson, B. R. and Baird, D. (eds.) 1999. Estuaries of South Africa. Cambridge University Press, Cambridge, 340 pp.

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Breen, C. M., and McKenzie, M., 2001. Managing estuaries in South Africa: An Introduction. Institute of Natural Resources, Pietermaritzburg. (Also available on the website: www.inr.unp.ac.za/EMHB.)

Hay, D., Huizinga, P and Mitchell S. 2005. Managing Sedimentary Processes in South African Estuaries: A Guide. WRC Report TT 241/04. ISBN 1-77005-272-0. Water Research Commission, Pretoria.

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Breen, C. M., Adams, J., Batchelor, A., Cowley, P., Marneweck, G., McGwynne, L., McKenzie, M., Ngulube, P., Paterson, A., Sihlophe, N., Taljaard, S., Turpie, J., Uys, A., van Niekerk, L., Wood, A., Lamberth, S., Boyd, A and Morant P,. 2004. Eastern Cape Estuaries Management Research Programme, Volumes I and II. WRC Report No. 1246/1/04. ISBN No. 1-77005-234-8. Water Research Commission, Pretoria.

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