

CHAPTER 3 - STRATEGIES FOR WATER RESOURCES MANAGEMENT

This chapter describes the strategies, objectives, plans, guidelines and procedures, and the institutional arrangements necessary for the protection, use, development, conservation, management and control of South Africa's water resources.

The chapter is divided into nine parts as follows -

- Part 1 : Protection of Water Resources
 - Part 2 : Water Use
 - Part 3 : Water Conservation and Water Demand Management
 - Part 4 : Water Pricing and Financial Assistance
 - Part 5 : Water Management Institutions
 - Part 6 : Monitoring and Information Systems
 - Part 7 : Disaster Management
 - Part 8 : Anticipated Programme of Implementation Activities
 - Part 9 : Financial Implications
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CHAPTER 3

PART 1 – PROTECTION OF WATER RESOURCES

(Provisions relating to the protection of water resources are found in Chapter 3 of the National Water Act)

3.1.1 INTRODUCTION

It was noted in Chapter 1 that the fundamental objectives for managing South Africa's water resources are to achieve equitable access to water resources and their sustainable and efficient use. In Chapter 2 it was concluded that, although they are limited and highly variable, the country's water resources will be sufficient to support social and economic development for the foreseeable future provided they are judiciously managed, and wisely allocated and utilised.

Equitable access has both a short-term and long-term dimension. It is important that the needs of present and future generations are considered in the management of water resources.

To give effect to the interrelated objectives of sustainability and equity an approach to managing water resources has been adopted that introduces measures to protect water resources by setting objectives for the desired condition of resources, and putting measures in place to control water use to limit impacts to acceptable levels.

The approach comprises two complementary strategies as follows -

- **Resource-Directed Measures:** These measures focus on the quality of the water resource itself. Resource quality reflects the overall health or condition of the water resource, and is a measure of its ecological status. Resource quality includes water quantity and water quality, the character and condition of in-stream and riparian habitats, and the characteristics, condition and distribution of the aquatic biota. Resource quality objectives will be defined for each significant resource to describe its quality at the desired level of protection. (See Note 3 in Chapter 1 and Part 2 of this chapter for the definition of water use).
- **Source-Directed Controls:** These measures contribute to defining the limits and constraints that must be imposed on the use of water resources to achieve the desired level of protection. They are primarily designed to control water use activities at the source of impact, through tools such as standards and the situation-specific conditions that are included in water use authorisations. Source-directed controls are the essential link between the protection of water resources and the regulation of their use. (Conditions of use are discussed in Part 2 of this chapter).

Coherent and integrated approaches to balancing the protection and use of water resources will therefore require the collective application of resource-directed measures and source-directed controls in respect of water quantity and quality, as well as the biological and physical dimensions of the resource.

Although the Act promotes, among other things, resource protection to support long-term sustainable use and development, water resources are sometimes polluted or damaged through accident, negligence or deliberate actions. In such cases the Act holds the parties responsible for the pollution or damage liable for any clean-up or rehabilitation that may be necessary.

3.1.2 RESOURCE-DIRECTED MEASURES

The system for classifying water resources, the process to determine a class for each significant water resource, and the process to determine the Reserve and resource quality objectives for the resource in accordance with its class are still under development.

*These measures will **not** be established via the National Water Resource Strategy (NWRS), because the Act requires the following -*

- The classification system for water resources is to be established (prescribed) in terms of section 12 of the Act by means of regulations after mandatory public consultation and consideration by Parliament^[1].*
- The determination of the class, the Reserve and resource quality objectives for a water resource are to be established by Government Notices in terms of sections 13 and 16 of the Act respectively, following mandatory public consultation.*

It is anticipated that the Department will invite comments on these proposals, in accordance with the Act's requirements for consultation, by the end of 2004.

Information on possible approaches to resource protection is provided in the NWRS to present as complete an account as possible of the Department's intentions for water resources management.

An important consideration in the development of resource-directed measures is that they should be technically sound, scientifically credible, practical and affordable.

3.1.2.1 A national water resources classification system

A water resource classification system is being developed that will provide a consistent framework within which water resources can be classified, each class representing a different level of protection. The desired level of protection will be considered to have been achieved if the conditions appropriate to the designated class are achieved. The system will provide specifications against which management decisions can be made about the nature and extent of permissible, sustainable resource use. Increasing restrictions on use will apply as the level of protection increases. Water users and stakeholders will be involved during the development of the classification system, and the system will also provide guidance on the involvement of water users and other stakeholders in the process of classifying water resources.

The classification of water resources is designed to protect aquatic ecosystems, as well as terrestrial ecosystems that are dependent on groundwater, in order to ensure sustainable utilisation and protection of the resources. The classification of water resources will therefore assist in achieving a balance between the long-term ecological health and integrity of all water resources and the continuing availability of water for social development and economic activities.

Three management classes are being considered, representing three conditions of use as described below.

Natural

A resource classified as Natural will be one in which –

- human activity has caused no or minimal changes to the historically natural structure and functioning of biological communities (animals and plants), hydrological characteristics and the bed, banks and channel of the resource; and
- chemical concentrations are not significantly different from background concentration levels or ranges for naturally occurring substances.

An approach being considered is that, for a resource to be classified as Natural, one of the following criteria should apply -

- The resource is situated in a national or international heritage site or wilderness area;
- It has compelling biodiversity characteristics;
- It is a protected site under the Ramsar Wetlands Convention;
- It is situated in an area that has economic importance for tourism or the harvesting of medicinal plants;
- It has social and/or cultural significance; or
- It is an area designated as Natural under other legislation.

The Natural class will provide a reference condition for other resources classified at greater levels of impact, that is, resources in other classes will be defined in terms of the degree of deviation from the Natural class.

Moderately used / impacted

This class represents resource conditions that are slightly to moderately altered from the Natural class reference conditions due to the impacts of human activity and water use.

Heavily used / impacted

This class represents resource conditions that are significantly changed from the Natural class reference conditions due to the impacts of human activity and water use, but that are nonetheless ecologically sustainable.

Water resources will normally be managed in order to achieve the long-term goals of the management class. When there are pressing social and economic reasons to permit uses that will cause limited, short-term and reversible degradation of the resource, these cases will be considered on their merits, within the framework of resource protection for long-term sustainability.

Unacceptably degraded resources

As a result of over-exploitation or major alteration to their physical structure, some resources are already in a condition that can be described as unacceptably ecologically degraded. In these cases the management class will be set as a minimum of heavily used / impacted and management will aim to rehabilitate the resource at least to this status.

Specific provisions may be developed to accommodate permanently modified rivers (such as some urban rivers) in the classification system in order to ensure appropriate conditions for the management of these resources to achieve an acceptable state.

In some cases the present levels of resource use (existing lawful use) may fail to comply with the resource quality objectives. These situations will need to be addressed progressively, over realistic periods of time, to allow users to adjust their activities, by attaching appropriate conditions of use to licences. Regular monitoring will be required to assess changes in the condition of the resource, and to determine the extent to which resource quality objectives are being achieved. (Part 6 of this chapter provides details of the monitoring and information systems that will be required). Successful resource rehabilitation will therefore require the application of source-directed controls, embodied in licences as conditions of use, that are guided by the resource quality objectives derived from the determination of resource-directed measures. Physical rehabilitation such as restoration of physical structure and removal of alien vegetation may also be required.

The classification system will apply to all surface water resources in South Africa, but will provide for the different characteristics of rivers, wetlands, impoundments and estuaries. The

classification system for groundwater will be generically similar to that for surface water but, because of the nature of groundwater, it will have its own unique features (see 3.1.4 following).

The quantitative and/or descriptive characteristics that will be used to classify surface water resources may include chemical and physico-chemical, biological and hydro-geomorphological attributes^[2]. Social and economic considerations will be included in the classification process to ensure a decision that provides a balance between protection and utilisation.

Each management class will allow for a range of values for each parameter as well as for different resource types. The boundaries between classes will be determined in the classification system and represent points selected along a continuum of change.

For certain resources, water use requirements (for agriculture, for instance) may require stricter standards than those required for ecological protection, and these standards will be captured in the resource quality objectives for that water resource.

3.1.2.2 Biodiversity conservation

It is not possible for all resources throughout the country to be given a high level of protection without prejudicing social and economic development. Equally it is not desirable for all resources to be classified at a uniformly low level so as to permit maximum use. An *ad hoc* approach to resource protection would not address the variability among living organisms and their habitats required to represent all aspects of biological diversity. Accordingly a systematic and strategic approach is being developed to ensure that biodiversity conservation - required to conserve representative diversity and ecological functioning of South Africa's water resources - is achieved.

3.1.2.3 Classification of water resources, determination of the Reserve and resource quality objectives

The class of a resource, the Reserve and its resource quality objectives are intimately related to one another.

- The Reserve (see Note 1 in Chapter 2) includes the quantity and quality of water to meet basic human needs and to protect aquatic ecosystems.
- Resource quality objectives provide numerical and/or descriptive statements about the biological, chemical and physical attributes that characterise a resource for the level of protection defined by its class. Thus resource quality objectives might describe, among other things, the quantity, pattern and timing of instream flow; water quality; the character and condition of riparian habitat, and the characteristics and condition of the aquatic biota.
- Resource quality objectives must take account of user requirements and the class of the resource.

Accordingly, the determination of the management class of a resource and the related Reserve and resource quality objectives (jointly, a *resource-directed measures determination*) will usually be undertaken as an integrated exercise. This will be done once the resource classification system is established. At present, until the classification system is established, all determinations are "preliminary" in terms of the Act (see Box 3.1.1).

Because water use authorisations may be considered before the class and the Reserve have been determined for the resource in question (see Box 3.1.1 and Part 2 of this chapter), the appropriate procedures will be applied on an *ad hoc* basis when required for individual and *ad hoc* applications for water use.

Resource-directed measures may be determined for a localised area or for a larger area such as a whole catchment area. In a larger area, resource units that require individual attention will be identified on the basis of different biophysical characteristics.

Box 3.1.1: Determinations and preliminary determinations

The Act speaks of *determinations* of class and resource quality of the Reserve objectives (section 13(1)), and of the Reserve (section 16(1)), as well as of *preliminary* determinations (sections 14(1) and 17(1) respectively).

"Preliminary" in this context refers to a determination carried out before the formal prescription of the classification system. This is a transitional measure that makes it possible to license water use while the classification system is being developed and established in terms of the Act.

Preliminary does not refer to the method used for the determination, the resolution of the determination or to the level of confidence in the results. A preliminary determination may be carried out using any method and at any resolution.

Authorisation of water use is however always subject to the preliminary determination, and considering the requirements of the Reserve.

The Act does not require a process of public consultation for preliminary determinations, nor does it require them to be published. In practice, however, in the interests of openness and transparency, the Department will as far as possible consult with the public in respect of major preliminary determinations.

3.1.3 SOURCE-DIRECTED CONTROLS

Source-directed controls were implemented to a limited extent under the 1956 Water Act, notably in respect of the waste discharge permit system. Source-directed controls are now incorporated into conditions in water use licences and general authorisations. The conditions that may be imposed on water use are described in section 29 of the Act, and cover all aspects of all types of water use. They are closely associated with the resource quality objectives discussed previously, and are intended to ensure that the cumulative impact of water use, in respect of quantity and quality, does not exceed the limits appropriate to the class of the resource.

Source-directed controls for all water use will continue to be implemented as licences are issued, and will contribute to the achievement of the objectives for the protection and use of a resource in terms of its class. Source-directed controls will also inform the drafting of regulations on water use under section 26 of the Act. Licence conditions and regulations on water use are discussed in Part 2 of this chapter.

Source directed controls may be categorised as follows -

- Best management practice measures that relate to measures and standards that apply nationally with respect to water use.
- Special measures relate to source-related requirements dictated by and/or derived from catchment management strategies and/or plans.
- Site specific measures relate to measures arising from the process of authorising water use. They take account, among other considerations, of general authorisations specified at national or regional levels, and considerations that are specific to the water use being considered in a particular location.

3.1.4 PROTECTION OF GROUNDWATER RESOURCES

Groundwater resources differ from surface water resources in that they are not confined to distinct, visible channels, move very slowly and are less prone to rapid temporal variations than surface water. Without proper monitoring and management human impacts are usually difficult to detect. As the rehabilitation of polluted or impacted aquifers is technically very difficult, lengthy and costly, a careful approach to groundwater protection is required. Because of the technical differences between surface and groundwater, groundwater management has to be

considered in its own right, although an integrated approach is required if effective water resource management is to be achieved.

Resource-directed measures will continue to play an important role in the management of groundwater resources, specifically to ensure that groundwater use is sustainable. The protection of groundwater quality will, however, mainly be achieved by source-directed controls focusing on land-based activities that impact underlying groundwater bodies. Examples of this include the siting and construction of waste disposal sites and sewage treatment plants. The widespread, but usually highly localised occurrence and use of groundwater makes it economically impossible to protect all sources to the same degree. Effective and focused protection interventions will be facilitated by a differentiated approach, based on a system of resource classification designed specifically for groundwater resources.

3.1.4.1 Classification of groundwater resources

Like surface water resources, all significant groundwater resources in South Africa will, over time, be classified using similar criteria and approaches.

3.1.4.2 The groundwater Reserve

Because of the contribution of groundwater to surface water flow in certain circumstances, the volume of groundwater that can be abstracted without impacting the ability of groundwater to sustain or contribute to the surface water Reserve has to be determined. This is done by determining recharge to a particular groundwater resource, assessing the groundwater contribution to (base) flow of a surface water resource and calculating the basic human needs to be met from groundwater supplies. It is also necessary to control the amount of water abstracted to protect the structural integrity of the aquifer and to protect terrestrial ecosystems dependant on groundwater supplies.

3.1.4.3 Resource quality objectives for groundwater resources

Resource quality objectives for groundwater resources are considered crucial for the effective protection of groundwater. Numeric or descriptive statements for a groundwater resource will be set in order to guide the use and management thereof. Typically these will relate to –

- groundwater levels or gradients (time and locality specific);
- groundwater abstraction rates;
- groundwater quality;
- spring flow; and
- targets for the health of terrestrial ecosystems that are dependent on groundwater.

Resource quality objectives will inform licence conditions for use of a particular groundwater resource.

3.1.5 WETLANDS

Wetlands are important features of water resource systems. If they are sufficiently protected they offer multiple benefits including a range of services such as flood attenuation, groundwater recharge and sediment control, and act as natural filters by trapping pollutants. However, They also “use” significant quantities of water through evaporation. They are biologically productive, and can be also important centres of biodiversity. Wetlands offer a range of resources for human use, such as reeds and grasses. Many wetlands have however been completely destroyed or severely damaged, most often by draining to provide additional croplands. Some wetlands are registered protected areas, including World Natural Heritage and Ramsar sites. The protection of wetlands will be effected by the strategies and procedures prescribed for resource directed measures, and in conjunction with the national and provincial departments of environmental affairs which have a key role in the protection of biodiversity.

Notes to Chapter 3, Part 1

¹ All regulations must be the subject of public consultation (section 70 of the Act) and must also be considered by the National Assembly and the National Council of Provinces (section 71).

² Chemical and physico-chemical characteristics include salt concentration, pH (a measure of acidity), nutrient concentrations, dissolved oxygen, temperature and toxic substances.

Biological characteristics include the composition and abundance of aquatic flora (plants) and benthic invertebrate fauna (bottom-dwelling animals), and the composition, abundance and age structure of fish.

Hydro-geomorphological characteristics include the hydrological regime (quantity and dynamics of water flow), connection to groundwater, variations in water depths and widths, the structure and substrate of the river channel, and the structure of the riparian zone.

CHAPTER 3

PART 2 – WATER USE

(Provisions relating to the use of water are found in Chapter 4 of the National Water Act)

3.2.1 INTRODUCTION

Chapter 4 is one of the most important parts of the National Water Act, 1998 (the Act) because, among other things, it describes the provisions according to which water use may be progressively adjusted to achieve the Act's principal objectives of equity of access to water and sustainable and efficient use of water.

Concerning equity of access, the Act replaces the previous system of water rights and entitlements, many of which were based on the ownership of riparian land (see Chapter 1, Note 8), with a system of administrative, limited-period and conditional authorisations to use water. These are granted to users either directly in terms of Schedule 1 of the Act, or by a responsible authority (defined in Part 5 of this chapter).

Many of the Act's sustainability- and efficiency-related measures will be applied by means of conditions of use imposed when water use authorisations are granted. Conditions of use give formal expression to the source-directed controls discussed in Part 1 of this chapter, which are themselves derived from the resource-directed measures for resource protection. Conditions of use balance the need to protect water resources with the need to use water for social and economic development.

Formal water use authorisations will also facilitate the administrative control of water use by water management institutions and form the basis upon which charges for water use may be made. They also provide for the collection of water-related data and information.

3.2.2 WATER USE

The Act's definition of water use in section 21 is very broad. It relates to the consumption of water as well as to activities that may affect water quality and the condition of the resource itself. Water use includes -

- Taking (abstracting) water from a water resource (s21(a));
- Storing water (s21(b));
- All aspects of the disposal of waste in ways that could impact on water resources, including –
 - Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall^[1] or other conduit (s21(f));
 - Disposing of waste in a manner that may impact detrimentally on a water resource (S21(g)); and
 - Disposing in any manner of water that contains waste from, or which has been heated in, any industrial or power generation process (s21(h)).
- Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people (s21(i)).
- Making changes to the physical structure of watercourses^[2], including –
 - Impeding or diverting the flow of water in a watercourse (s21(c));
 - Altering the bed, banks, course or characteristics of a watercourse (s21(j)).
- Certain activities that may affect the quantity or quality of water in the resource, namely –
 - Engaging in a stream flow reduction activity contemplated in section 36 (s21(d));

The use of land for afforestation for commercial purposes is the only stream flow reduction activity declared thus far^[3]. The Department will, however, investigate other land-based activities at a local, catchment or regional level and, where these are demonstrated to result in a significant reduction in stream flow, will declare them, after public consultation, as stream flow reduction activities in accordance with section 36.

- Engaging in a controlled activity identified as such in section 37(1) or declared, after public consultation, under section 38(1) (s21(e)).
- Using water for recreational purposes (s21(k)).

This broad definition of water use applies throughout the National Water Resource Strategy (NWRS). It applies to surface water wherever and in whatever form it occurs, and to groundwater where the section 21 definition is applicable.

3.2.3 AUTHORISING WATER USE

3.2.3.1 Types of authorisations

Schedule 1 of the Act^[4] permits the use of relatively small quantities of water, mainly for domestic purposes (including non-commercial gardening and stock watering), but also allows use in emergency situations and for certain recreational purposes.

Users must have lawful access to the resource in order to exercise the Schedule 1 entitlement. Use is also subject to any restrictions or prohibitions imposed by other relevant laws, ordinances, bylaws and regulations.

The Act does not specify generally applicable numerical limits to any of the Schedule 1 uses. However, the extent of such uses must be reasonable with regard to users' needs and not be excessive in relation to the capacity of the resource and the needs of other users. The Department will regularly assess the extent of use under Schedule 1 with a view to specifying limits for the various aspects of the schedule. The limits will differ for different parts of the country. Item 2(e) of Schedule 3 allows a catchment management agency (see Part 5 of this chapter) to place limits on the taking of water after having notified and consulted Schedule 1 users.

There is no formal requirement for users to register a Schedule 1 use. Catchment management agencies may impose limits on them where it is necessary in particular areas.

A general authorisation allows limited, but conditional, water use without a licence.

Limits are placed on water use under general authorisations depending on the nature of the use and the capacity of the resource to accommodate the use without significant degradation. For most water uses the extent of use differs in different parts of the country, since the quantity of water available for use and its quality varies widely across the country. Certain parts of the country may be excluded from general authorisations because water resources are already fully utilised. For instance, permissible rates of abstraction of groundwater under general authorisation - see below - varies from zero in catchments in the west and north to as much as 750m³ per hectare per annum in some catchments in the southern and eastern parts of the country.

In addition to the limits placed on use, additional conditions relating, for instance, to monitoring and reporting requirements may be attached to general authorisations in terms of section 29 of the Act. General authorisations may require the use to be registered with the relevant responsible authority, but may exempt some users from the requirement to register.

General authorisations must be made widely available for comment before they are established by means of a Notice being published in the *Government Gazette* and by taking whatever other steps are necessary to bring the Notice to the attention of users and other interested persons. General authorisations apply for a limited time period and may be reviewed and amended during this time. After expiry they may be revised to suit changed circumstances, or they may be extended.

Progress with general authorisations is as follows -

- Following a programme of public consultation, general authorisations were established by Government Notice No. 1191 on 8th October 1999 for the following water uses:
 - The taking of water from a water resource (section 21(a)) and storage of water (section 21(b)). Valid for five years after the date of publication with review at intervals of two years.
 - Engaging in a controlled activity (section 21(e)): Irrigation of any land with waste or water containing waste generated by any industrial activity or by a waterwork (section 37(1)(a)). Valid for three years after the date of publication with review at intervals of one year.
 - The discharge of waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit (section 21(f)), and the disposing in any manner, of water that contains waste from, or which has been heated in, any industrial or power generation process (section 21(h)). Valid for five years after the date of publication with review at intervals of two years.
 - Disposing of waste in a manner that may detrimentally impact a water resource (section 21(g)). Valid for five years after the date of publication with review at intervals of two years.

Following a programme of public consultation revisions to the above general authorisations were published in the *Government Gazette* on 26th March 2003 under Notice No. 399. The validity of the revised general authorisations after the final date of publication in the Government Notice is five years in all cases, with review at intervals of three years.

- Following a programme of public consultation, general authorisations were established by Government Notice No. 398 on 26th March 2003 for the following water uses. The validity of the revised general authorisations after the final date of publication in the Government Notice is five years in all cases, with review at intervals of three years.
 - Impeding or diverting the flow of water in a watercourse (section 21(c)).
 - Altering the bed, banks, course or characteristics of a watercourse (section 21(i)).
 - Removing, discharging or disposing of water found underground (section 21(j)).
- Following consideration of the necessity for and practicality of general authorisations for the following uses, draft general authorisations may be published for comment in due course:
 - Commercial afforestation activities as a stream flow reduction activity (section 36(1)(a) and section 21((d)).
 - Recreational use (section 21(k)).

A licence to use water

The Act's provisions in respect of Schedule 1 use and use under general authorisations are primarily intended to reduce the administrative effort of authorising every use in the country individually. However, any water use that exceeds a Schedule 1 use, or that exceeds the limits imposed under general authorisations, must be authorised by a licence.

As a transitional measure the Act permits water use that was lawfully exercised under any law preceding the introduction of the Act, termed *existing lawful water use*, to continue under existing conditions until such time as it is formally licensed.

3.2.3.2 Water use licences

A licence to use water^[5] -

- May only be issued by a responsible authority, to which a prospective user must apply;
- Replaces all previous entitlements, if any, to use water for the purpose specified in the licence;
- Is specific to the user to whom it is issued and to a particular property or area;
- Is specific to the use or uses for which it is issued;
- Is valid for a specified time period, which may not exceed 40 years;

- May have a range of conditions attached to it; and
- Must be reviewed by the responsible authority at least every five years.

Box 3.2.1: Water for productive livelihoods

The objectives of the Act are, among other things, to meet the basic human needs of present and future generations, to promote equitable access to water, and to redress the results of past racial and gender discrimination. The Department is committed to achieving these objectives, and particularly to ensuring that water management strategies contribute to the eradication of poverty.

Although significant progress has been made in addressing the backlogs in water services, the provision of water to meet basic human needs does not make allowance for water for income-generating activities.

Similarly, whilst prioritising allocations of water for emerging farmers and small grower forestry schemes, and revitalising defunct irrigation schemes has the potential to provide livelihoods for many people in rural areas, these do not address the needs of the large numbers of people who require water for small-scale activities such as, for instance, brick making, rearing poultry and growing produce for local sale. The quantities of water required are relatively small - research in small villages indicates that livelihoods can be significantly enhanced by the availability of 50 to 100 litres per household day.

Although Schedule 1 provides for the use of small quantities of water without the need for further administrative authorisation it is restricted to domestic uses such as food gardens and domestic stock watering. As the Act currently stands water use under Schedule 1 supports subsistence activities but does not allow water to be used for commercial purposes

The requirements for water for small-scale uses in rural areas will be quantified during compulsory licensing (see below), and the Department will investigate ways of making secure and cost effective supplies of water available without placing unnecessary administrative burdens on the users.

The requirements for water need not necessarily be met via piped supplies or using water abstracted from rivers. Rainwater harvesting from roofs or other hardened surfaces, using tanks, small check dams or catchpits can supplement more conventional sources of supply, and more use can be made of groundwater. Soil moisture can be retained on cultivated land and infiltration can be increased by contouring or constructing other micro water retaining structures, which have limited effects on water resources or downstream users.

The Department will work closely with other government agencies, particularly agricultural extension services, and in partnerships with non-governmental organisations and the private sector to explore possible options and ensure that appropriate interventions are implemented.

3.2.3.3 Water use and the Reserve

It is important to note that the Reserve (see Part 1 of this chapter) has priority over all water uses and that the requirements of the Reserve must be allowed for before any use is licensed. Authorisation of all water use in terms of a licence is therefore conditional on a Reserve determination being carried out, and the requirements of the Reserve being taken into account when determining the water available for allocation. However, where water is already allocated for use, the requirements of the ecological Reserve may be met over time by progressively adjusting allocations.

Unlike the ecological component of the Reserve that remains in the water resource, the basic human needs Reserve^[6] will be abstracted from the resource in order to be used. Although a water services institution requires a licence for the total quantity of water it takes from a resource to supply its consumers, the responsible authority may not refuse to authorise the quantity required to meet basic human needs, although it may specify the resource from which it is to be obtained. One of the purposes of the licence is to identify the source of the water for basic human needs^[7], particularly where the source is remote from the point of use, as is the case in some of the larger, multi-catchment water supply systems.

No Reserve determinations are required for Schedule 1 use, and the requirements of the Reserve are taken into account in determining the limitations on and conditions for use under general authorisations.

3.2.3.4 Applications for licences

Water use licences give existing or prospective water users authorisation to use water, or to access water resources, for beneficial purposes. Applications may either be made individually or generally as part of compulsory licensing, as discussed in the next section.

In general, licences will be applied for individually by new users, by existing users who wish to increase or change their use (for instance, in areas where compulsory licensing is not scheduled for some time, where existing water use has not yet been verified, and where there is sufficient available water) and by existing users who wish to continue their use in terms of an existing limited-duration authorisation (for instance, a permit to discharge waste or water containing waste into a water resource). Most existing users will acquire licences during compulsory licensing.

A person who wishes to use water must apply to a responsible authority for a licence to do so. A detailed procedure for individual licence applications has been established, which begins with discussions with the applicant about the proposed use and culminates in a decision to issue a licence or to refuse the application. Applicants can request technical, administrative and financial assistance from the responsible authority to make their applications. Responsible authorities may make a reasonable administrative charge for processing applications, but they may dispense with this charge at their discretion in deserving cases.

3.2.3.5 Compulsory licensing

The general, compulsory licensing of existing and potential new water users will be undertaken in accordance with the requirements of Chapter 4, Part 8 of the Act. Section 43(1) sets out criteria for assessing the necessity for compulsory licensing^[8] and provides for such exercises to be carried out progressively over time, in different parts of the country and according to the circumstances prevailing in particular areas or water resources. Because all the types of water use described in section 21 are inter-related to some degree it will in most cases be desirable to consider calling for licence applications for all water uses in each identified area at one time, rather than dealing with each individual type of water use separately.

Compulsory licensing will be carried out in areas defined by catchment or groundwater aquifer boundaries. Approximately 100 surface and groundwater areas have been identified across the country as a whole and a multi-year programme based on the water-related needs of each area indicates the likely order in which the Department intends to proceed with compulsory licensing (see Part 8 of this chapter).

The process for compulsory licensing as it is described in the Act is as follows:

- Existing use and its lawfulness is verified (see below).
- The responsible authority issues a notice calling for licence applications, which is also sent to all water users who took part in the registration process (see below). The responsible authorities must also identify other prospective users, especially from marginalised or disadvantaged groups and communities who have not previously had access to water resources, but who may wish to do so, to ensure that available water is allocated fairly.
- Users and prospective users prepare and submit licence applications. The Act *requires* users to submit applications, and failure to do so could result in the loss of any entitlement enjoyed under previous legislation.
- The responsible authority evaluates all licence applications.

- The responsible authority develops possible solutions to balance or reconcile water requirements with water availability, whilst meeting requirements for the Reserve and water quality (See Box 3.2.2).
- The responsible authority invites public comment on a proposed allocation schedule, ensuring that it is brought to the attention of all interested persons and giving them an opportunity to object to the proposed allocations.
- After considering all comments and objections the responsible authority must prepare and publish a preliminary allocation schedule. Anyone whose objection to the preliminary allocation schedule was unsuccessful has the right to appeal to the Water Tribunal in terms of Chapter 15 of the Act (see Part 5 of this chapter). If an appeal is successful, the preliminary allocation schedule must be amended.
- The responsible authority publishes the final allocation schedule in the *Government Gazette*.

As soon as reasonably practicable after the final allocation schedule has been published the responsible authority must issue licences to water users in accordance with its provisions.

Procedures to implement the process are being developed. Users will be consulted throughout the process.

Box 3.2.2: Development of solutions to balance water requirements and water availability

In each surface and groundwater area it is likely that there will be a number of possible solutions to balance or reconcile water requirements with water availability.

The determination of water availability (see Chapter 2) must take account of the requirements of resource quality objectives and the Reserve, which will be determined for each possible management class, water to meet international rights and obligations, a "contingency" to meet projected future water requirements including possible transfers of water to another water management area, and water use of strategic importance, all of which are the Minister's responsibility (see Part 5 of this chapter).

Water requirements include water use authorised by licences already issued under the Act, existing lawful uses that have been verified and for which applications have been received, and new water uses for which applications have been received. It may, however, be necessary to allow for additional water requirements to achieve equity of access (to support rural development, for instance) if the responsible authority has reason to believe that insufficient provision has been made for this purpose in applications received from users during the call for licence applications.

The process will be relatively complex, and it will be necessary to develop practicable approaches to modelling reconciliation options and their implications. Models will require detailed, up-to-date information on water use and water availability at a scale equal to or less than the quaternary catchment¹. The Department will establish norms and standards for modelling to ensure a consistent approach by all catchment management agencies.

The process of determining reconciliation solutions for compulsory licensing is closely related to the process of compiling a catchment management strategy, in that much of the information required for the latter must be compiled and analysed in the former. The Department will therefore ensure that the two processes are closely co-ordinated.

The output from the compulsory licensing process will, in most cases, be the publication for comment of a proposed allocation schedule, representing the preferred reconciliation solution, the associated management class(es), the Reserve(s) and resource quality objectives for the resource, and a proposed catchment management strategy.

¹ South Africa is divided into approximately 1 950 quaternary catchments.

3.2.3.6 Evaluation of licence applications

All licence applications, whether individual or compulsory, must be evaluated against the factors specified in section 27 of the Act. The responsible authority must carefully consider all of these factors to determine the extent to which a proposed water use satisfies the Act's requirements

for equity, sustainability and efficiency. A detailed procedure is being developed to enhance the evaluation of licence applications.

Although the application procedure requires users to provide information about the proposed use, it may become clear during the evaluation process that more information is needed. The responsible authority may, to the extent that it is reasonable to do so, require the applicant to obtain and provide the information, or it may itself undertake the necessary investigations to obtain such information. In certain cases the applicant may be granted financial assistance for the investigations.

In addition, at any time during either the individual or compulsory application process, the responsible authority may require the applicant to make the details of the application known to relevant organs of State, all interested persons and the general public, and to invite objections to the application. This is aimed at determining the extent to which the proposed use may be in conflict with other government policies or laws, or may adversely affect the interests of other parties.

3.2.3.7 Requirements for licences and licence conditions

Sections 28 and 29 of the Act respectively describe the essential information that must be included in a licence and the conditions under which the water use is authorised.

One of the most important attributes of a licence is its period of validity. Limited-period licences are intended to provide water users with a level of security appropriate to the nature of their water use, whilst at the same time providing responsible authorities with the flexibility to manage changes in water availability, or water use needs and priorities.

Whilst the evaluation procedure for licence applications will contain broad guidelines for determining the licence period, each water use is unique and the guidelines must not be regarded as a rigid prescription or recipe. Considerations in determining a licence period include the following:

- For agricultural activities, the nature of the proposed crop, particularly whether it is annual or perennial.
- The physical infrastructure necessary to use the water or in which water will be used, its life span, the capital investment and associated loan redemption period.
- The extent to which infrastructure has been established to process the products of water use and whose continued viability depends on the water use continuing. Examples are timber processing plants, sugar mills and canning factories.
- The social benefits of the water use, such as the extent to which people depend on the water use for employment.

Under certain circumstances water may be available in excess of current requirements and the responsible authority may issue short-term licences until demand increases. For instance, where a dam or an inter-basin transfer scheme has been commissioned to augment water supply for anticipated growth in urban and industrial requirements, water may be available in the short term for agricultural use until the increased demand in the target sector(s) occurs.

In addition to the licence period, water use may be subject to a range of other conditions, described in section 29 of the Act. Together these are intended to ensure that the total use from a particular water resource does not unreasonably prejudice the integrity of the resource, that individual uses do not unreasonably prejudice other users, and that water resources are effectively managed.

Some conditions place limits on certain water uses, such as the volumes and timing of abstractions, the volume that may be stored, or composition of discharges. Other conditions are specific to particular uses, for example measures to limit stream flow reduction due to land-

based activities and methods to quantify stream flow reduction. Others relate to resource or infrastructure management, for instance adherence to certain management practices, the requirement to prepare and adhere to a water management plan, or the establishment of monitoring systems and the provision of information.

As far as possible, conditions of use will be determined by negotiation and agreement with users. Every case will be decided on its individual merits. The conditions described in section 29 may also be attached to general authorisations.

3.2.3.8 Compliance with conditions of water use

All water users are required to adhere to the conditions of use attached to general authorisations and licences, and the responsible authorities are required to ensure that they do so.

There are a number of provisions in the Act that enable responsible authorities to enforce compliance, briefly as follows:

- A responsible authority may, when a contravention of a condition of water use comes to its attention, issue a notice directing the user to rectify the contravention.
- If the user fails to comply with the notice the responsible authority may suspend or withdraw the entitlement to use water. The user must, however, be afforded the opportunity to make representations on the intention to withdraw or suspend the entitlement.
- Failure to comply with any condition of use is an offence under the Act and the responsible authority may choose to prosecute an offending user who, if convicted, may be liable to a fine or imprisonment.

It will, however, be preferable for water users to comply voluntarily with reasonable conditions of use, which have been co-operatively determined and mutually agreed to by users and responsible authorities. Under these circumstances it will be necessary for responsible authorities to resort to enforcement by legal command-and-control measures only in exceptional cases.

A comprehensive compliance management strategy will be developed during the course of the first compulsory licensing exercise (see Part 8 of this chapter) and implemented when a significant number of licences have been issued in terms of the Act

3.2.3.9 Review and amendment of licences

It is important to note that the conditions attached to licences will not necessarily remain unchanged throughout the life of the licence. Any condition, except the licence period, may be amended on review, if such amendments are necessary to maintain the integrity of the water resource, achieve a balance between available water and water requirements, or accommodate changes in water use priorities (section 49). A licence must be reviewed at the times specified in the licence and review periods may not exceed five years.

Licence conditions for all similar uses from the same water resource must, however, be amended in an equitable manner. Reviews must therefore be general and must be undertaken in consultation with users. Users whose licence conditions are changed will be afforded sufficient time to adjust their water use to the revised conditions, the adjustment period being appropriate to the nature of the use and the magnitude of the change(s). At each general review the responsible authority may, after considering all relevant factors, extend the licence, but only by the length of a single review period.

Where a user considers that a reduction in existing lawful use, the refusal to grant a licence during compulsory licensing, or an amendment to her or his water use on review will severely prejudice the economic viability of the water use activity, a claim for compensation of financial loss may be made to the Water Tribunal. The amount of compensation must be determined in accordance with section 25(3) of the Constitution. However, no compensation will be paid where

changes in water use are necessary to provide for the requirements of the Reserve, to rectify an over-allocation of water from the resource, or to rectify an unfair or disproportionate water use (section 22(7)).

3.2.3.10 Registration of use

Authorisation of all water uses throughout the country that require licences is a considerable task and will take some time to complete (see Part 8 of this chapter). As an essential preliminary step towards licensing, and to enable water pricing to be implemented^[9], a countrywide process has been undertaken to register existing water uses. The registration process will ultimately capture information about the location and extent of all section 21 uses. However, because water use charges under the pricing strategy may at present only be made for abstraction, storage and stream flow reduction activities (commercial afforestation), registration has concentrated on these three water uses. Other water uses will be registered in due course.

The formal time period for the registration of water use closed at the end of June 2001. As more than 80 per cent of the total volume of water used in the three water use categories for which charges could be made had been registered at that time, the Department was satisfied that a sufficiently high number of users had been captured to enable water use charges to be made equitably. Unregistered users may now be liable for a penalty charge for late registration, and risk losing their existing entitlements.

The registration data is currently being captured on the Water Authorisation and Registration Management System (WARMS - see Part 6 of this chapter) and registration certificates are being issued. A registration certificate is not, however, a licence to use water, and does not confer legitimacy on an unlawful water use.

3.2.3.11 Verification of existing water use

In due course, before undertaking compulsory licensing, responsible authorities will verify the extent and lawfulness of all existing water uses. Verification will be prioritised in areas where registration information indicates that existing use exceeds the capacity of the resource. However, *ad hoc* verifications of individual uses may also be undertaken if it is necessary to license the existing use in order, for instance, to facilitate the transfer of a water use authorisation (see below). In the event that a water use is found to be unlawful, steps will be taken to remedy the situation.

Existing use will also be verified to extend registration to all water users. Various techniques will be used for verification, including site inspections, aerial surveys and, where appropriate, satellite imagery.

3.2.3.12 Transfer of water use authorisations

In section 25 the Act provides for two distinctly different circumstances under which water use authorisations may be transferred.

The first refers to the temporary transfer of water authorised for irrigation, either on the same property for a different use or to another property for the same or a similar use. In the latter case, the two properties may, but need not necessarily be owned by the same person. Although every case will be considered on its merits and within its local context, in general temporary transfers will be granted for one year only, but the user will have the option of applying for an extension of a further year. Applications for permission to effect a transfer must be made to the water management institution that has jurisdiction in the area.

The second circumstance refers to permanent transfers, which may be effected by one user offering to surrender all or part of an allocation to facilitate a licence application by another prospective user. Transfers of this nature constitute trade in water use authorisations, and require new licence applications, which will be subject to all the relevant requirements of the Act

relating to applications for licences, including the need for a Reserve determination if one has not already been carried out. Permanent transfers become effective only when the new licence is granted. They may be authorised only by a responsible authority, which may attach different conditions to the new licence than were attached to the surrendered licence. One such condition may be that the new user must pay compensation to the original licence holder.

Transfers, whether temporary or permanent, will only be permitted where both the original and the transferred water use are from the same water resource. Procedures have been developed to deal with such transfers and section 26 regulations may be written to provide a nationally consistent basis for transfers of this nature.

In addition, when land owned by a person to whom a licence has been issued changes ownership, section 51 of the Act permits the successor-in-title to continue with the water use under the conditions attached to the licence, provided the responsible authority is promptly informed of the new licensee's name.

3.2.3.13 Water use of strategic importance

Section 6(1)(b)(iv) of the Act requires the NWRS to make provision for water uses of strategic importance. These are uses that are considered to be of such critical importance to the nation that they must be authorised by the Minister (see Part 5 of this chapter) rather than by a catchment management agency.

One water use the Minister must authorise is the transfer of water from one water management area to another. The Minister may reserve water for such purposes once the quantities of water have been determined in respect of which a catchment management agency may, when empowered to do so, issue general authorisations and licences in its area of jurisdiction. Determination of the quantities of water for allocation in each water management area will also account for the quantities of water that must be made available in different areas on the same river - the areas along the Vaal and Orange Rivers, for instance. Indicative requirements for inter-water management area transfers in the future are provided in Appendix D.

The continued availability of electricity throughout the country from the national grid is essential for both social and economic development. Accordingly, all water that is taken from a water resource for the purpose of generating electricity for the national supply, or is stored at Eskom power generation facilities, wherever these are located, is regarded as water use of strategic importance, and will therefore also be authorised by the Minister, after the relevant catchment management agency or agencies and water services authority or authorities have been consulted.

It is important to note that this water use is limited to taking water from a water resource and storing water, that it will be evaluated against the same considerations as any other use, and that it will be subject to all relevant conditions. The discharge of waste or water containing waste into a water resource from Eskom facility, and all other water uses, will be authorised locally by the responsible authority (see Part 5 of this chapter).

These provisions do not relieve Eskom of the responsibility to acquire the necessary approvals from the relevant water services authorities to obtain water for industrial use^[10] at, and to dispose of industrial effluent from its generating facilities.

3.2.3.14 Using water for recreational purposes

The use of water for recreational purposes is a defined water use in the Act (see section 3.2.2 above) and is therefore subject to all relevant provisions that relate to water use, including the purpose, manner or extent of the use being limited or restricted by regulations in terms of section 26.

The recreational use of water resources has significant potential to contribute to national social and economic development. Accordingly, an approach is being developed^[11] to ensure that the use is equitable and sustainable, compatible with other water uses and within the capacity of the resource. The approach will include the development of the following -

- A Policy on Using Water for Recreational Purposes, which provides overall guidance and direction, and takes into account the requirements of other relevant policies and legislation.
- An Implementation Programme, which will include the creation of awareness and education, the establishment of representative management institutions, the preparation of guidelines on, for example, financial aspects (including charges for access and use) and benefit streams and co-operative governance, and the development of performance management and compliance measures.
- A Sustainable Utilisation Planning Procedure for the preparation of access and utilisation plans and management structures aimed at ensuring that all stakeholders, including affected communities, users and resource managers, have the opportunity to participate in planning and implementation.

The use of government waterworks for recreational purposes

Section 113 of the Act empowers the Minister to make the water of government waterworks and the surrounding State-owned land, particularly at State-owned dams, available for recreational purposes^[12]. Special attention will be given to policies governing access to and use and development of the water surface of State-owned dams and surrounding land for recreational purposes in these cases.

Regulations are being prepared in terms of section 116 of the Act relating, among other things, to the safety and protection of government waterworks and the safety and security of persons using such waterworks for recreational purposes. Existing regulations made under the 1956 Water Act will continue in force until they are replaced by the new regulations.

3.2.3.15 Regulations on water use

The Act is the broad legal framework for water resource management, but it generally does not provide all the details that enable its requirements to be implemented in practice. Implementation details are found in regulations which, when they are formally established by Government Notice, become part of the law. The Act empowers the Minister to make regulations on a wide range of matters specified in the Act. All regulations must be published for public comment and they must subsequently be reviewed by committees of the National Assembly and the National Council of Provinces.

Regulations that may be made relating to water use are described in section 26. Progress in this regard is as follows -

- Government Notice No. 704 of 4 June 1999, National Water Act, 1998 (No. 36 of 1998): Regulations on the use of water for mining and related activities aimed at the protection of water resources.
- Government Notice No. 1352 of 12 November 1999, National Water Act, 1998 (No. 36 of 1998): Regulations requiring that a water use be registered. (Related document: Delegation of powers and duties in terms of regulation No. R. 1352 of 12 November 1999 requiring that a water use be registered in terms of the National Water Act, 1998).
- Government Notice No. 1228 of 29 August 2003, National Water Act, 1998 (No. 36 of 1998) invited written comments to be submitted on the following proposed regulations -
 - Impeding or diverting the flow of water in a watercourse (section 21(c));
 - Altering the bed, banks, course or characteristics of a watercourse (section 21(i)); and
 - Removing, discharging or disposing of water found underground it is necessary for the efficient continuation of an activity or for the safety of people (section 12(j)).

The proposed validity of the regulations after the final date of publication in a Government Notice is five years in all cases, with review at intervals of three years.

Other regulations that are in preparation, or are contemplated in the near future, concern the following issues -

- Limiting or restricting the purpose, manner or extent of water use in respect of using water for recreational purposes.
- The outcomes or effects of management practices for waste treatment, aimed at encouraging the reduction of wastes at source, recycling, detoxification and neutralisation.
- Transactions in respect of authorisations to use water (trade).

3.2.4 WATER QUALITY

This section gives an overview of the approaches to authorising water use that are specific to the water quality aspects of water resources, including all aspects of the disposal of waste or water containing waste, either directly into water resources or in ways that may detrimentally impact on water resources.

Sources of pollution are broadly categorised as point sources, such as discharges from sewage treatment works or industrial sites, and diffuse sources, for example settlements without a sewerage system, and surface runoff from agricultural land to which fertilisers are applied. In addition, because of their potential to impact on surface and groundwater resources, the Department is, in terms of Section 20 of the Environmental Conservation Act, 1989, and by agreement with the Department of Environmental Affairs and Tourism, responsible for overseeing the management of sites where waste is disposed onto land. However, Parliament has approved an amendment to the ECA that transfers this responsibility to DEAT. The transfer of the function will take place according to a timeframe agreed between the departments, with the intention of effecting the transfer by April 2005. Issuing of permits by DEAT requires concurrence by the Department with regard to water quality aspects.

Specific actions in terms of resource directed measures that require attention at national level in respect of water quality management include the following -

- Formulation of objectives for managing sources of pollution and associated single source interventions (see Part 1 of this chapter for a discussion of source-directed controls).
- Benchmarking water resource quality.
- Identification of emerging threats to the water resource and prioritisation for action.
- Establishing priorities in relation to, for instance, remediation of water resources and degraded land as a focus for regulation using source-directed controls.

3.2.4.1 Implementing source-directed controls

Decisions about the nature and extent of permissible water uses and developments that may pollute water resources are guided by a structured decision-making framework that balances the need to protect water resources and the need for social and economic development.

The preferred approach is to prevent the pollution of water resources. In those cases where the discharge of pollutants into water resources is unavoidable the emphasis is on minimising the pollution and its effects. Decisions to authorise such discharges are based on consideration of their social, economic and ecological impacts. Where pollution has already caused degradation of water resources, or where contaminated land areas pose a threat to water quality, improvements (remediation) will be effected as appropriate.

Each application for authorisation to discharge wastes into water resources will therefore be preceded by an assessment of the probable impacts of the discharge on the water resource and

other water users. In the case of hazardous wastes the aim is to prevent discharge altogether or, if this is not possible, to minimise the extent of the discharge and its impacts. For non-hazardous wastes the risk-based resource water quality objectives approach will continue to be used. This approach assumes that the water environment has a finite and quantifiable capacity to assimilate non-hazardous wastes discharged into it without violating predetermined water quality objectives in accordance with its class. The assimilative capacity will be different for each water resource and for each management class. Where, after all relevant factors have been considered, assimilative capacity is sustainably available it must be equitably shared among all water users.

Source-directed controls that may be applied to prevent or minimise pollution include recycling or re-use of waste, water recovery, detoxification, neutralisation and treatment, and the introduction of cleaner technology and best management practices.

Preventing pollution

Wherever possible, source-directed controls will be promoted to prevent water resources being polluted or degraded, particularly for hazardous wastes.

Minimising pollution

The discharge of waste or water containing waste to water resources, or the disposal of waste, will be permitted only under the following conditions -

- Pollution costs are, as far as possible, to be borne by the discharger (internalised), and not passed on (externalised) to the water resource or to other water users.
- Applicable national norms and standards will apply. The current General and Special Effluent Standards for discharge of waste or water containing waste and the Minimum Requirements for Waste Disposal will continue to apply until new standards are developed and implemented
- For other water uses that may impact on water quality, such as impeding or diverting the flow of water in a water course, measures to meet resource quality objectives will be stipulated in guidelines and directives.
- If, in specific situations, the applicable minimum requirements or standards are not sufficient to ensure suitable water quality, standards stricter than the minimum requirements or standards will be prescribed.

Standards for discharges will be prescribed by regulation. Relaxation of standards will be contemplated only where there are pressing social or economic reasons to do so, and will be considered in situations where it is evident that -

- The enforcement of the measures could result in notable impairment of social or economic development or related environmental values; and
- The relaxation of requirements or standards could facilitate or contribute to enhanced participation and benefit-sharing arising from water use by those who were historically disadvantaged by racial and gender discrimination; but
- Where resource quality will not be unacceptably degraded.

Whilst the overall intention is to prevent further degradation of the quality of the country's water resources and to effect improvements where possible, limited and short-term degradation of the water quality of specific water resources could be allowed if it can be demonstrated with confidence that the degradation will not cause irreversible damage, and that pollution costs will not be externalised to other users of the resource.

Decision-making in this regard will also be guided by the following principles -

- Strict controls to protect human health will be applied.
- Concessions will apply for a defined period of time.
- Relevant stakeholders must be involved in the decision-making process.

Remediation

Remediation strategies will be developed to effect improvement in the condition of degraded and impaired water resources, or contaminated land areas such as abandoned mines, as required by the resource quality objectives adopted for the water resource.

Clean-up levels and targets, remediation approaches and measures, and the prioritisation of remediation focus and effort will be dictated primarily by appropriate risk-based approaches. However, rule-based best management practice measures could be appropriate and a requirement in some cases. Implementation of the relevant financial provisions of the Act to cover remedial actions will form part of the remediation strategy.

Until the remediation strategy has been developed and implemented, the Department will apply the regulatory instruments that are currently available to handle situations requiring remediation.

Notes to Chapter 3, Part 2

¹ The Department is developing a Policy for the Treatment and Disposal of Land-Derived Waste and Water Containing Waste in the Coastal Areas of South Africa, and is preparing an amendment to the National Water Act to facilitate control of waste discharged into the sea.

² "Watercourse" means a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which, or from which, water flows, and any collection of water which the Minister may, by notice in the *Gazette*, declare to be a watercourse. (Section 1(xxiv)).

The Conservation of Agricultural Resources Act (No. 43 of 1983) has as one of its objectives " ... the combating and prevention of erosion and weakening or destruction of the water sources ... " that also relates to alterations to the riparian zones of watercourses.

³ The use of land for afforestation which has been or is being established for commercial purposes was declared a stream flow reduction activity in the Act to retain the water-related control over commercial afforestation under the Afforestation Permit System that was introduced in 1971. The system was reviewed and revised in consultation with the forest industry and other stakeholders shortly before the Act was promulgated.

⁴ Schedule 1 - Permissible Use of Water [Sections 4(1) and 22(1)(a)(i) and Item 2 of Schedule 3]: (1) A person may, subject to this Act - (a) take water for reasonable domestic use in that person's household, directly from any water resource to which that person has lawful access; (b) take water for use on land owned or occupied by that person for - (i) reasonable domestic use; (ii) small gardening not for commercial purposes; and (iii) the watering of animals (excluding feedlots) which graze on that land within the grazing capacity of that land, from any water resource which is situated on or forms a boundary of that land, if the use is not excessive in relation to the capacity of the water resource and the needs of other users; (c) store and use run-off water from a roof; (d) in emergency situations, take water from any water resource for human consumption or fire fighting; (e) for recreational purposes - (i) use the water or the water surface of a water resource to which that person has lawful access; or (ii) portage any boat or canoe on any land adjacent to a watercourse in order to continue boating on that watercourse; and (f) discharge - (i) waste or water containing waste; or (ii) run-off water, including stormwater from any residential, recreational, commercial or industrial site, into a canal, sea outfall or other conduit controlled by another person authorised to undertake the purification, treatment or disposal of waste or water containing waste, subject to the approval of the person controlling the canal, sea outfall or other conduit. (2) An entitlement under this Schedule does not override any other law, ordinance, bylaw or regulation, and is subject to any limitation or prohibition thereunder.

⁵ Licences to use water should not be confused with the licences required in terms of Chapter 12 of the Act - Safety of Dams, which relate to the construction, enlargement and abandonment of and alterations to dams, and to impounding water before putting dams into operation.

⁶ In determining the Reserve an allowance of 25 litres per person supplied from the resource per day is made for the basic human needs component, in accordance with prevailing water services policy. This is equivalent to free basic water, provided by water services institutions in terms of government policy, of six kilolitres per month for a household of seven to eight people. Should this quantity be increased in future, the Reserve will be re-determined.

- ⁷ Section 6(1)(b) of the Act - Contents of the national water resource strategy - requires the NWRS to "provide for the Reserve and identify, where appropriate, water resources from which particular requirements must be met".
- ⁸ Section 43 - Compulsory licence applications: (1) If it is desirable that water use in respect of one or more water resources within a specific geographic area be licensed - (a) to achieve a fair allocation of water from a water resource in accordance with section 45 - (i) which is under water stress; or (ii) when it is necessary to review prevailing water use to achieve equity in allocations; (b) to promote beneficial use of water in the public interest; (c) to facilitate efficient management of the water resource; or (d) to protect water resource quality, the responsible authority may issue a notice requiring persons to apply for licences for one or more types of water use contemplated in section 21.
- ⁹ Registration of a water use in terms of a section 26 regulation renders the user liable to pay water use charges in respect of the use: see section 59(2).
- ¹⁰ This is required in terms of section 7 of the Water Services Act, 1997, in which the definition of industrial use (section 1(ix)) includes the use of water for generating electricity.
- ¹¹ The approach to using water for recreational purposes is being developed in consultation with key stakeholders including the departments of Environmental Affairs and Tourism, Land Affairs, Public Works, Trade and Industry, and Transport, and National Treasury and Sport and Recreation South Africa.
- ¹² The part of this provision that relates to the use of the land surrounding State-owned dams for recreational purposes is in conflict with legislation administered by the Department of Land Affairs and, accordingly, the use of such land for these purposes will be authorised with the concurrence of the Minister of Agriculture and Land Affairs.

CHAPTER 3

PART 3 - WATER CONSERVATION AND WATER DEMAND MANAGEMENT

(There is no specific Chapter or Part of the National Water Act in which there are explicit provisions for water conservation and demand management. However, the Act's definition of conservation^[1] makes it clear that water conservation and water demand management measures are an essential component of water resource management)

3.3.1 INTRODUCTION

The options for further augmentation of water supply by the development of physical infrastructure are limited (see Chapter 2) and in future attention will have to be on managing the increasing demand for water in order to achieve a sustainable long-term balance between water availability and water requirements. Although there will be further construction of dams and related infrastructure in some parts of the country (see Chapter 2 and Appendix D), problems of water availability will in future be addressed by using an appropriate mix of supply- and demand-side measures.

Water conservation and water demand management relate to the efficient and effective use of water and to the minimisation of loss and wastage of water, and are important elements of the approach to the care and protection of water resources. Many of the Act's provisions and requirements are thus either directly related to or refer to water conservation, for instance -

- Resource protection measures (discussed in Part 1 of this chapter).
- Conditions for water use in general authorisations and licences (discussed in Part 2 of this chapter).
- Water pricing as an incentive for efficient use (discussed in Part 4 of this chapter).
- Management of land-based activities via stream-flow reduction and controlled activities (discussed in Part 2 of this chapter).
- Control of invasive alien vegetation (discussed later in this part).

3.3.2 THE NATIONAL WATER CONSERVATION AND WATER DEMAND MANAGEMENT STRATEGY

The Department is developing a National Water Conservation and Water Demand Management (WC/WDM) Strategy, and subsidiary strategies for three identified water use sectors, namely water services, agriculture, and industry, mining and power generation. The strategies will outline measures and interventions aimed at encouraging and supporting water institutions and water users to increase the efficiency of their water use and reduce their demand for water. They are based on the premises that, first, many water users can maintain their quality of life, and achieve the desired outcomes or products from their water use, whilst using less water and, second, that significant reductions in water use can be achieved by minimising wastage and increasing the efficiency of water use by changes in behaviour and adopting water-saving technologies.

The strategies will not present rigid prescriptions to water institutions and users. The core objective of the strategies is to create a WC/WDM culture within all the water management and water services institutions defined in the National Water Act and the Water Services Act (catchment management agencies, water user associations, water services authorities, and bulk and retail water services providers such as water boards) and among water users. The Department will provide support to water institutions and help them to develop and implement strategies that suit their own circumstances and which are economically coherent and financially sound with regard to the costs and benefits of the proposed measures. Accordingly, an essential component of the National WC/WDM Strategy is a programme of communication, education, awareness creation and promotion, and the development of supportive networks.

Water demand management is not, however, concerned merely with reducing water use as an end in itself, as there are social, economic and environmental advantages to be gained from programmes designed to achieve sustained reductions in water use, such as -

- Water users are empowered to understand the value of water as a scarce resource, and to adopt a responsible attitude to its use.
- Water is made available for allocation to other uses, either within the particular sector or for competing uses, and for the Reserve.
- The necessity for capital investments in new infrastructure can be postponed, and increases in the cost of water to end-users delayed.
- The financial security of water institutions can be improved by reducing non-revenue demand - that is, unaccounted-for water caused by leakage from supply and distribution systems, and water wasted by non-paying consumers.

3.3.3 THE PRINCIPLES OF WATER CONSERVATION AND WATER DEMAND MANAGEMENT

The National WC/WDM Strategy is based on three fundamental principles, namely -

- **Water institutions should strive to supply water efficiently and effectively, minimise water losses and promote WC/WDM among their consumers.**
Water institutions responsible for supplying water to users should take steps to reduce leakage in their systems, and develop and implement measures to promote WC/WDM.
- **Users should not waste water and should strive to use it efficiently.**
Wasted water is water used without any direct benefit being derived. Inefficient use of water is water use that exceeds the accepted benchmark for the particular purpose, or water used where the derived benefit is sub-optimal. The Department will work closely with water institutions and representatives of water use sectors to develop benchmarks to enable users and institutions to understand and quantify their water requirements better, and to facilitate better management and regulation of water use.
- **WC/WDM should be an integral part of the planning processes for water resources management, water supply and the provision of water services.**
In situations of water shortage demand-side solutions will be considered alongside supply-side augmentation options. The participatory and consultative approaches to implementing WC/WDM will extend the planning process down the supply chain to the end user by requiring water institutions and water users to share the responsibility for ensuring the efficient use of water. In particular, where an inter-basin transfer of water is contemplated, there is an explicit requirement in the National Water Policy^[2] for water currently available in the receiving area to be used optimally, and for reasonable measures to be taken to conserve water before the transfer is effected.

3.3.4 SECTORAL STRATEGIES

3.3.4.1 Water services

An effective WC/WDM programme for the water supply and sanitation services sector is essential because, although it accounts for only about 15 per cent of total national water use (excluding water supplied to industries by water services authorities), it is the sector with the highest expected growth in demand. More efficient use of water will reduce the costs of purifying and distributing water to consumers and of the subsequent treatment of wastewater.

Water services institutions will be expected to determine their own targets and benchmarks for efficient water use. These will be included in their Water Services Development Plans^[3] and will be reviewed by the responsible authority (the Department or the relevant catchment management agency - see Part 5 of this chapter) during the water use licensing and review processes.

Measures to facilitate achievement of the strategy outputs for the water services sector will include the requirements for -

- Water services authorities to develop a WC/WDM strategy as part of their Water Services Development Plans in accordance with the model strategy developed by the Department; and
- Water boards to develop their WC/WDM strategies according to the model strategy developed by the Department and to submit them as part of their business plans^[4].

3.3.4.2 Agriculture

Irrigated agriculture accounts for about 62 per cent of water used in South Africa. Although there are areas where water use is highly efficient, there are significant losses in many distribution and irrigation systems, whilst substantial improvements can be achieved in others. Efficiency gains in the sector will make water available for the Reserve and for other uses.

The strategy will provide a framework of regulatory support and incentives designed to improve irrigation efficiency. It promotes the equitable and efficient use of water in the sector in order to increase productivity and contribute to reducing income inequalities among people supported by farming activities. The framework of action defined by the strategy is briefly described in the following outputs:

Strategy outputs

- Appropriate measures are implemented that bring about a reduction in water wastage.
- Water user associations and end users understand and appreciate the need to progressively modernise their water conveyance systems and irrigation equipment.
- Water allocation processes to promote the equitable and optimal utilisation of water.
- Preventive maintenance programmes are in place.
- Sufficient irrigation information is generated and is accessible to all stakeholders.
- Water management institutions and service providers implement audits from the water source to end users and beyond.

To facilitate achievement of the objectives consideration will be given to requiring water users in the agriculture sector who apply for water use licences to develop and submit to the responsible authority a water management plan in accordance with the *Implementation Guidelines for Water Conservation and Demand Management in Agriculture: Development of Water Management Plans*.

3.3.4.3 Industry, mining and power generation

The wellbeing of this sector is crucial to South Africa's economic development and it requires a high assurance of supply. The sector accounts for approximately 15 per cent of the total water used, including water used by industries supplied by water services authorities. There is nevertheless scope for more efficient use of water without impacting adversely on economic activity. The sector is also a major source of waste discharges into water resources. The strategy for the sector defines a framework of action that is briefly described in the following outputs:

Strategy outputs

- Ongoing water audits and water balances.
- Benchmarks for water use for various processes and industries.
- Reports on performance against benchmarks.

To facilitate the achievement of the above, industrial users who require a licence to use water (that is, users who draw their water direct from a water resource) may be required to develop

and submit to the responsible authority a Water Management Plan in accordance with guidelines that will be developed and made available by the Department. For those users who have to submit such a plan as part of their Environmental Management Plan, the Department may waive this requirement. Large industrial or commercial users who draw their water from a municipal supply system and do not have to obtain a water use licence from any water management institution will not have to submit a water management plan unless required to do so by the relevant water service authority or water services provider

3.3.4.4 Communication, community awareness, education and marketing

The Department has a unique role to play in programmes of education, developing community awareness and communication of WC/WDM. The Department will continue to implement projects in these areas to highlight the necessity of public participation in achieving the objectives of WC/WDM. The community awareness component will promote an understanding of and support for WC/WDM among the general public including communities and tertiary institutions. A schools-based education component will promote WC/WDM primarily among learners and school educators. A communications component will co-ordinate special campaigns, resources and events around WC/WDM in the various water sectors including water management and water services institutions.

3.3.5 CONTROL OF INVASIVE ALIEN VEGETATION

Recent estimates indicate that about 10 million hectares of land in South Africa are infested with invasive alien plants that out-compete and replace the natural vegetation. They are undesirable because they impact on biodiversity, ecological functioning and the productive use of land. There is evidence that they use more water than the natural vegetation they replace. The effect on runoff is similar to the deliberate planting of trees for commercial use, which is a declared stream flow reduction activity (see Part 2 of this chapter). Commercial forestry is regulated to minimise the extent of the runoff reduction, whilst alien vegetation is regulated by the Conservation of Agricultural Resources Act, 1983 (No. 43 of 1983), which does not adequately address the situation in State and communal land.

Preliminary estimates, largely based on the results of commercial afforestation catchment experiments, are that water use by alien plants is greater than that used by natural vegetation, and can result in significant reductions in runoff in some of the catchments where they occur. Clearing infestations, especially from the riparian zone, can increase stream flow. There are however considerable variations between sites, and also between species and growth types. Further work is being done to improve the accuracy of the estimates of both the extent of infestation and runoff reduction. The effects on groundwater also need to be quantified to obtain a complete picture of the hydrological effects. It is clear, however, that the problem is already significant and will worsen if no action is taken.

Since invasive vegetation affects the productive use of land it is a land management issue, with strong environmental considerations owing to its impact on biodiversity, its management must be approached in a co-ordinated multi-sectoral way. The approach to be used will be determined jointly by the Department of Environmental Affairs and Tourism, the National Department of Agriculture, and the Department of Water Affairs and Forestry.

Currently, under the Working for Water programme, clearing work is undertaken on State-owned land, such as in nature conservation areas, as well as on privately-owned land. Agreements are sought with landowners to ensure that the land is kept free of infestations of invasive alien vegetation after initial clearing has been completed. In cases where landowners are unwilling to enter into such agreements, regulations under the Conservation of Agricultural Resources Act are used to enforce follow-up work by the landowners. These regulations list the alien plants that must be removed from land, those that may be grown only with a permit and those that may not be sold or propagated. Enforcement is done in co-operation with government agriculture agencies.

In future land owners, custodians and managers, both private and public, should take responsibility for the control of alien vegetation in their areas. It is therefore the intention to move to a situation in the medium term in which the land managers, especially provincial conservation and agriculture departments, as well as private land owners, undertake alien vegetation control as a core element of their activities, with oversight by and support from the national programme. It will be the responsibility of public sector land managers to ensure that these activities are adequately funded.

From a water resource management perspective, alien vegetation control in specific catchments may be prioritised in catchment management strategies by considering the balance between water availability and water requirements, and the probable increase in runoff that will result from clearance. Where vegetation clearing activities contribute to improved water security the costs may be funded by water management institutions using water resource management charges on water users (see Part 4 of this chapter). This will be done in consultation with the relevant water resource managers, water users and other stakeholders.

Notes to Chapter 3, Part 3

¹ "Conservation" in relation to a water resource means the efficient use and saving of water, achieved through measures such as water-saving devices, water-efficient processes, water demand management and water rationing (NWA section 1(1)(v)).

² National Water Policy, 1997 - see section 6.6.3, final paragraph.

³ Each Water Services Authority is required, by section 12 of the Water Services Act, to prepare a Water Services Development Plan. Such a plan forms part of the Integrated Development Plans that municipalities must prepare in terms of the Municipal Systems Act, 2000 (No. 32 of 2000).

⁴ Each water board is required, by section 40 of the Water Services Act, to prepare a five-year Business Plan and submit it to the Minister.

CHAPTER 3

PART 4 – WATER PRICING AND FINANCIAL ASSISTANCE

(Provisions relating to water pricing and other financial aspects of water management are found in Chapter 5 of the National Water Act.

3.4.1 WATER PRICING

3.4.1.1 Introduction

The National Water Act (the Act) empowers the Minister, in consultation with the Ministry of Finance, and after consulting with the public, to establish a pricing strategy for any water use described in section 21. The Act provides for three types of water use charges as follows -

Funding water resource management. Activities such as information gathering, monitoring water resources and controlling their use, water resource protection (including waste discharge and the protection of the Reserve) and water conservation.

Funding water resource development and use of waterworks. The costs of the investigation, planning, design, construction, operation and maintenance of waterworks, pre-financing of development, a return on assets and the costs of water distribution.

Resource management and resource development charges are financial charges, which are directly related to the costs of managing water resources and supplying water from schemes and systems.

Achieving the equitable and efficient allocation of water. Economic incentives to encourage more efficient use of water, water conservation and a shift from lower to higher value uses.

This is an economic charge and relates to the value of water to particular users.

The objective of the pricing strategy is to contribute to achieving equity and sustainability in water matters by promoting financial sustainability and economic efficiency in water use. One objective is to ensure that the real financial costs of managing water resources and supplying water, including the cost of capital, are recovered from users. Provisions are, however, made for a range of subsidies for water users from historically disadvantaged groups to promote equitable access to the use of water resources.

3.4.1.2 The pricing strategy for water use charges

Important Note: *The pricing strategy, which relates to charges for any water use, is established in terms of the process described in section 56 of the Act, and **not** via the NWRS.*

Information on the water pricing strategy is provided in the NWRS so that as complete an account as possible of the Department's approach to water resources management is presented.

One component of the pricing strategy has already been established - see 3.4.1.3 below. In accordance with the Act's requirements for consultation, the Department will invite comments on other components of the pricing strategy as they are developed.

The full pricing strategy will apply to the uses of water described in section 21 of the Act (see Part 2 of this chapter), that is, taking water from a resource, discharging waste into the resource, storing water and other uses such as the recreational use of water. It also addresses the setting of tariffs by the Department and water management institutions established in terms of the Act. It does not deal with treated water supplied in bulk by, for instance, water boards, and distributed to households via water services authorities, as this is dealt with in the Water Services Act, 1997. There is, nevertheless, an explicit requirement in the Act to ensure that the pricing strategy supports the establishment of tariffs for water services in terms of the Water Services Act.

The water uses described in section 21 are very different and require specific approaches to determining charges. The overall pricing strategy will therefore comprise a number of distinct components, as described below, each of which will be established separately and implemented progressively over time.

3.4.1.3 Pricing strategy for abstracting and storing water, and stream flow reduction activities

Important note: *Following public consultation, this component of the pricing strategy has already been established by the publication of Government Notice No. 1353 of 12 November 1999 and is therefore no longer open for comment.*

A consultative review of the pricing strategy began in mid-2004, and will consolidate water use charges for abstracting, storage, stream flow reduction activities and waste discharge.

In this component of the water pricing strategy charges apply to three consumptive uses of water that can be expressed in terms of annual volumes of water used. These are -

- Abstracting (taking) raw water directly from surface and groundwater resources (section 21(a)).
- Storing water (section 21(b)). This refers to the abstraction of water from storage or, in the case of dams constructed to enhance property values or for recreational use, the initial filling and annual refilling^[1].
- Engaging in a stream flow reduction activity (section 21(d)). Thus far only the use of land for afforestation that has been established for commercial purposes has been declared to be a stream flow reduction activity. Other land-based activities are being considered and may, after public consultation, be declared in future in terms of section 36.

3.4.1.4 Charges for waste discharge

This component of the pricing strategy is currently being developed. It will deal with charges for all aspects of waste discharge, as follows -

- Engaging in a controlled activity (section 21(e) – section 37(1)(a) and (d) also refer).
- Discharging waste or water containing waste into a water resource (section 21(f)).
- Disposing of waste in a manner which may detrimentally impact on a water resource (section 21(g)).
- Disposing of water which contains waste from any industrial or power generating process (section 21(h)).
- Aspects of removing, discharging or disposing of water found underground (section 21(j)) where this has an impact on water quality.

The charging system will be based on the polluter pays principle and will address point and diffuse sources of pollution. It will supplement the more traditional regulatory approach to water quality management, in which standards and objectives are set and enforced, by introducing financial and economic incentives and disincentives to –

- ensure that the costs of polluting activities are, as far as possible, borne by the polluter (internalised) and not passed on (externalised) to other water users who could be disadvantaged by the detrimental impacts of waste on water resources, or to the environment;
- encourage the minimisation of waste discharge; and
- promote sustainable, efficient and effective water use.

Charges made under the system are intended to reflect and recover from users the direct and indirect costs associated with the discharge or disposal of waste. It is likely that key representative pollutants and the costs for reducing the impacts of various categories of

pollutants will be identified and methods for determining the direct costs of impacts will be developed.

The structure of tariffs currently being considered includes -:

- A basic charge per volume of water discharged, independent of the concentration of pollutants in the discharge.
- A load-based charge proportional to the waste load, where waste load is the product of the volume of the discharge and the concentration of pollutants. Initially this charge will relate to salinity, nitrogen compounds (ammonia, nitrates and nitrites) and phosphorous.
- Charges in cases where waste loads exceed the maximum permissible levels of pollutants for the resource in question. The charges are intended to encourage self-monitoring and accurate reporting of waste loads, and reduction in waste loads.
- Incentives (rebates) for returning water to the resource of a better quality than was originally abstracted

Tariff structures will be subject to ministerial approval

Revenues from the charges will be used to fund water quality management activities related to waste discharge or disposal, such as impact monitoring and mitigation, the provision of assistance to users to reduce the impacts of their discharges or disposal activities or as subsidies to downstream users to deal with discharges from upstream if this is more effective, as well as rehabilitation of degraded areas, dealing with the effects of spills, and system management and administration.

The proposed system is the subject of detailed consultation with stakeholders. It is anticipated that it will be established in terms of section 56 of the Act in 2006.

The system will be designed to ensure that there is no duplication of charges between charges for waste discharge and water use charges for funding water resource management (see below).

3.4.1.5 Other components of the pricing strategy

The Department is considering the necessity for and practicality of introducing further components of the pricing strategy for impeding or diverting flow in a watercourse (section 21(c)), altering the physical characteristics of a watercourse (section 21(i)) and the use of water for recreational purposes (section 21(k)). Any proposals will be published for comment in terms of section 56.

3.4.2 WATER USE CHARGES

3.4.2.1 Water user sectors

All charges will be specific to each of four end-user sectors, namely -

- Municipal (water services authorities).
- Industry, mining and energy.
- Agriculture.
- Stream flow reduction activities.

Charges may be different for each user sector, depending on the costs of and benefits from water resource management services, or from the use of a particular supply scheme.

3.4.2.2 Setting charges, collecting and disbursing revenue

Catchment management agencies will be established in each of the 19 water management areas (see Part 5 of this chapter). Each agency will be progressively empowered to undertake

water resource management responsibilities, including the setting of charges and the collection of revenue for water use in its area of jurisdiction. Depending on the socio-economic circumstances and physical and demographic characteristics and attributes of each area, charges may differ between water management areas.

However, until catchment management agencies are established, the Department will continue to determine charges and collect revenue. When the agencies are established, the Department will work with them to set charges. In respect of charges for water resource management activities, which are intended to fund the agencies, the Department will ensure that revenue is divided in such a way as to meet the needs of the agencies and the Department as far as possible.

After budgets have been prepared and proposed charges determined, consultations will be held with key stakeholders and the charges announced and made known to users prior to the start of the financial year in which the charges are to be imposed.

3.4.2.3 Charges for funding water resource management

The charges will be based on the budgeted^[2] annual costs that include the following activities, which will eventually become the responsibility of catchment management agencies -

- The planning and implementation of catchment management strategies.
- The monitoring and assessment of water resource availability and use, and resource quality.
- The management of water allocation and utilisation.
- Water quality management, including waste control and pollution control in respect of mines, industries, agriculture and dense settlements. Charges will not include costs related to waste discharge, or the capital costs of abandoned mine rehabilitation, until a waste discharge charge system is implemented.
- Dam safety control.
- Water conservation and demand management, including the control of invasive alien vegetation, education and awareness creation by the Water Education Programme, and control of aquatic weeds where these activities are included in the catchment management strategy. Costs related to poverty relief activities, which do not directly contribute to improving water availability, are excluded from the charge.

3.4.2.4 Application of water resource management charges

Water resource management charges relate to all water used or intercepted by stream flow reduction activities within the water management area, irrespective of whether water is taken direct from the resource or supplied from a government or water management institution scheme. Charges will be imposed in a water management area only when the majority of water use is either licensed or registered.

Unit charges (cents per cubic metre) for each sector will be determined for each user sector and water management area. For billing purposes these unit charges will be applied to the annual water use registered by or licensed to each user. Volumes are based on estimated long-term average annual use (or reduction in runoff in respect of stream flow reduction activities), thereby taking assurance of supply into account. Charges will be based on recovering the costs of managing the total volume of water that may be allocated for use in each water management area. This is determined by deducting the requirements of the Reserve, water required to meet international obligations, water required for use by downstream water management areas, and any water specifically reserved for transfer via new water works to neighbouring areas from the total volume of water available in the area (see Chapter 2 and Appendix D).

Some aspects of the charges will apply to user sectors in different ways, as follows -

- Because there is no requirement for water use to be registered in terms of Schedule 1, such use will not be charged for.
- The municipal sector attracts all charges relating to water resource management.

Important Note: *The Pricing Strategy for Raw Water Use Charges provides for that portion of a municipality's annual raw water demand that comprises the basic human needs component of the Reserve to be free of charge. However, since the Pricing Strategy for Raw Water Use Charges was established, government has indicated that equitable share grants, made to municipalities in terms of the annually-enacted Division of Revenue Act, should enable water services authorities to fund the provision of free basic water. The subsidisation of raw water for domestic use in terms of the pricing strategy, described above, will therefore not be implemented.*

- The industrial, mining and energy sector attracts all charges relating to water resource management.
- The commercial agricultural sector will normally attract all charges after the phasing-in period has come to an end.
- Charges for emerging farmers^[3] using water from government water schemes will be subsidised for five years at a progressively decreasing rate.
- The stream flow reduction activity sector attracts all water management activity costs *except* those related to dam safety control. Where costs are incurred for the removal of invasive alien vegetation in terms of catchment management strategies these will not apply to the forestry sector. Charges for 2002/2003 for the forestry sector were capped at a maximum of R 10 per hectare per annum, and annual increases thereafter will be restricted to the producer price index. The Department is investigating the possibility of limited period subsidies for small-scale emerging tree growers.

In water management areas where there is an over-allocation, that is total registered use exceeds the total water available for allocation, charges for each sector will be based on the registered sectoral use.

Box 3.4.1 Water use charges and inter-catchment transfers of water

Transfer of water from one water management area to another will result in a reduced quantity of water on which charges can be made in the source area and a corresponding increase in the receiving area. Some of the charges raised in the receiving area from those user sectors that benefit from the transferred water will revert to the source area for water resource management purposes. The Department has determined a framework for the calculation and disbursement of the relevant amounts. The percentage of the water resources management budget of the source area to be borne by the receiving area will be determined by the ratio of yield^[4] transferred to total local yield in the source area. The funds transferred between water management areas will be audited by the Department.

This arrangement refers only to engineered transfers of water such as from the Thukela River into the Vaal River system, and not to those that occur naturally such as between the Upper and Lower Vaal water management areas.

3.4.2.5 Charges for funding water resource development and the use of waterworks

Specific charges will be imposed on users of water from government water schemes and systems, and from schemes funded by other water management institutions such as catchment management agencies and water user associations to cover the costs of such schemes. Charges will be based on volumes of water used, and fixed and/or variable charges may be implemented.

(i) Government water schemes

• Water resource development charges

In accordance with generally accepted accounting procedures, charges for water resource development on government water schemes will be based on the rate-of-return-on-assets approach, with allowance being made for the depreciation of asset value. A return on assets will ensure efficient use of capital and generate funding for new developments, whilst asset depreciation will fund the refurbishment of infrastructure at the end of its useful life. Capital cost charges on government water schemes will consist of two components. First, a charge based on a four per cent return on the depreciated replacement value of assets and, second, a charge based on the annual depreciation cost.

The depreciable portion of the value of infrastructure on government water schemes will be depreciated in a straight line over the asset's remaining economic life. For the purposes of initial price setting the replacement values, depreciable portions and useful lives of assets have been determined by means of an assets inventory undertaken by the Department. Full technical revaluation of assets will be undertaken at intervals not exceeding 10 years. Desktop revaluation will be undertaken annually by applying the producer price index to asset values and adjusting the depreciation amount. The relevant charges will be adjusted accordingly.

On multipurpose government water schemes, capital costs will be divided between sectors on the basis of water allocations. Charges may be different for different sectors depending on the assurance of supply required (in respect of the use of water from storage), or on peak demand rates (in respect of water received from conveyance structures such as canals and pipelines).

• Charges for the use of waterworks

Charges for the use of waterworks are based on the budgeted annual costs^[5] of operating and maintaining the works. Users of water from specific government water schemes pay all the direct scheme-related costs plus an equitable portion of the indirect, non-scheme-specific costs related to managing all the waterworks in the region. The division of costs among sectors is sector-specific, while in the case of under-utilised schemes the cost of joint works is shared in proportion to volumetric use or allocations.

(ii) Waterworks owned and/or managed by other water management institutions

Charges set by catchment management agencies and water user associations in terms of the pricing strategy must be based on the legitimate functions of the institution (initial, delegated and assigned in the case of catchment management agencies and, in the case of water user associations, according to their constitutions). These charges must make provision for the full recovery of capital costs (including the costs of servicing loans), the depreciation of assets, all management, operation and maintenance costs, including associated overheads, and any other charges imposed by law, such as water resource management charges and Water Research Commission levies.

3.4.2.6 Application of water resource development and use of waterworks charges

Charges will be phased in progressively over time, and the target of achieving full cost recovery will therefore be achieved at different times for different sectors, as follows -

- **Municipal sector and Industrial, mining and energy sector:** On government water schemes charges will include depreciation, return on assets^[6], and operations and maintenance. Annual tariff increases will be limited to the producer price index plus 10 per cent until target recovery has been achieved, whereafter increases will be limited to the rate of inflation unless there are new investments or other costs incurred. All costs must be recovered in respect of waterworks owned by other water management institutions.
- **Irrigation sector:** On existing government water schemes charges for commercial farmers include depreciation and the full operating and maintenance cost. Tariff agreements with

commercial farmers came to an end in March 2001, whereafter new agreements were concluded with organised agriculture. A depreciation charge was introduced from April 2001 and will be phased in until the full depreciation cost plus the operating and maintenance costs are fully recovered in terms of the agreements.

- **Emerging farmers:** The operating and maintenance charges for water supplied to emerging farmers from government water schemes will be subsidised on a reducing scale over a five year period. Depreciation charges will be phased in over a further period appropriate to each case until all costs are fully recovered.
- **Stream flow reduction sector:** These charges do not apply to the sector, except in cases where new developments are required, when charges will be negotiated with users.

3.4.2.7 Charges for achieving the equitable and efficient allocation of water

(i) Administratively determined charges, public tender or auction

Once other charges have been fully phased in, economic charges may be determined administratively by basing them on the opportunity cost of water, as reflected in the price paid for water in transactions taking place between users.

In areas where compulsory licensing has been completed, any remaining water may be allocated for use by public tender or auction. Regulations to facilitate this measure will be introduced in due course.

(ii) Water trading

Tradable water use entitlements promote the shift from lower to higher value uses of water, and may obviate the need for the application of administratively determined prices. The Act allows water users to engage in such transactions in terms of a policy developed under section 25 of the Act (see Part 2 of this chapter), subject to the balance being maintained between the general public interest and the interests of water users who wish to trade. The extent of authorised water use, in terms of quantity, quality and assurance of supply, that may be traded across water use sectors is carefully considered and defined before such trading is permitted. Regulations to be introduced in due course will specify the conditions under which trade will be permitted after the compulsory licensing process has been completed. In the interim, applications for trade between user sectors are considered in terms of the provisions of the Act.

3.4.2.8 Application of charges for achieving the equitable and efficient allocation of water

This charge will be determined by the Minister and will be introduced only when the effects of full financial pricing of water on resource use have been evaluated.

3.4.3 FINANCIAL ASSISTANCE

Financial assistance to water users may be provided in two ways, namely -

3.4.3.1 Via the pricing strategy

Current policy is that all charges for water provided from government water schemes to emerging farmers will be subsidised on a reducing scale over a period of five years and depreciation charges phased in over a further period appropriate to each case.

3.4.3.2 Via section 61 of the Act

Capital cost subsidies for the construction or refurbishment of communal waterworks are available to emerging farmers who are members of water user associations. At present the subsidies are limited to the lesser of R10 000 per hectare, R50 000 per person or a person's actual share of the cost of the scheme if it is less than R50 000).

Operational subsidies are available to water user associations that take over the operations and maintenance of government water schemes. The subsidies comprise –

- a once-off subsidy of 50 per cent of the operations budget;
- exemption from payment for depreciation charges in respect of canals; and
- a subsidy to phase in tariffs for emerging farmers over five years.

These policies are currently the subject of an inter-departmental review.

Notes to Chapter 3, Part 4

- ¹ The calculation of the volume of water required for annual refilling will be based on a scientific assessment of losses due to evaporation.
- ² Until catchment management agencies become responsible for these charges, the Department will continue to undertake budgeting and revenue collection by means of the Integrated Catchment Management component of the Water Trading Account created for these purposes.
- ³ An emerging farmer is one who is a member of the historically disadvantaged population groups, and who is regarded as being resource-poor. There is no widely accepted definition of resource-poor, but it could include consideration of factors such as total family income and assets, and participation in land reform and other programmes of corrective action.
- ⁴ The reduction in yield in the source area resulting from the transfer is not necessarily equal to the increase in yield in the receiving area, and neither are equal to the physical volume of water transferred: see box 2.5 for an explanation of why this is so.
- ⁵ Until the management of assets is transferred to other institutions, the Department will continue to undertake budgeting and revenue collection by means of the Bulk Water Supply and Integrated Systems components of the Water Trading Account created for these purposes.
- ⁶ For government water schemes the portion of the charge relating to return on assets will apply only to the municipal and the industrial, mining and energy sectors as these are the sectors for which the demand for water from government schemes is expected to increase. Historical growth rates in demand in these sectors indicate that an annual average rate of return of four per cent applied to the current depreciated replacement value of water infrastructure will achieve a breakeven return.

CHAPTER 3

PART 5 – WATER MANAGEMENT INSTITUTIONS

(Provisions relating to water management institutions are found in a number of places in the National Water Act, as follows -

General powers and duties of the Minister and Director-General – Chapter 6

Catchment Management Agencies – Chapter 7

Water User Associations – Chapter 8

Advisory Committees – Chapter 9

International water management – Chapter 10

The following Schedules also refer to institutional matters:

Schedule 3: Powers which may be exercised and duties to be performed by catchment management agencies on assignment or delegation

Schedule 4: Management and planning of water management institutions

Schedule 5: Model constitution of water user association

Schedule 6: Water Tribunal

3.5.1 INTRODUCTION

The institutional framework is one of the most important aspects of water resources management since it determines the effectiveness of policy implementation. Institutions are also important because they are the focus for requirements in the National Water Act (the Act) to consult widely with water users and other interested persons before policies relating to the management and use of natural resources are implemented (see Chapter 4).

One of the Act's main objectives is to progressively decentralise the responsibility and authority for water resources management to appropriate regional and local institutions in order, among other things, to enable water users and other stakeholders to participate more effectively in the management of water resources. Some of these institutions will have to be created, whilst some of the existing institutions – including the Department – will have to be changed to reflect new or changed responsibilities in terms of the new approach embodied in the Act.

The importance of creating and sustaining an effective institutional framework is reflected in the large body of documentation that has been developed to describe the establishment and operation of water management institutions (see Appendix G).

The Act provides for a fundamental transformation of water resources management. The requirement for transformation, especially with regard to service delivery and representivity, extends to all existing water management institutions, while new institutions must be created with these imperatives firmly in mind. The Act requires, in section 2, that all institutions must have "appropriate community, racial and gender representation" and the Department will see to it that this requirement is extended to include representivity in respect of disability. In addition, in accordance with generally applicable policies and laws, all institutions must adhere to acceptable recruitment, employment, procurement, administration and financial management practices.

3.5.2 THE INSTITUTIONAL FRAMEWORK FOR WATER MANAGEMENT

3.5.2.1 The Minister of Water Affairs and Forestry

The Minister of Water Affairs and Forestry (the Minister), as the public trustee of water resources on behalf of the national government, has overall responsibility for all aspects of water resources

management in South Africa. All water management institutions are subject to the Minister's authority.

For practical reasons the Act allows the Minister to delegate most of her or his powers and duties to departmental officials or office holders, water management institutions as they progressively build their capacity, advisory committees and water boards. Four of the minister's responsibilities may not be delegated^[1]. The Minister may also assign^[2] powers and duties to catchment management agencies.

The Minister will, however, retain the responsibility for -

- Determining the class of water resources in accordance with the prescribed classification system, and determining the Reserve in accordance with the class.
- Specifying water requirements for international rights and obligations.
- Specifying a "contingency" to meet projected future water needs.
- Authorising any transfers of water between water management areas.
- Authorising other water uses of strategic importance.

The first four of the above responsibilities relate to the Minister's authority, in terms of section 23, to determine the quantity of water in respect of which a responsible authority may issue a general authority or licence to use water in each water management area. See Part 2 of this chapter for the definition of water use of strategic importance.

3.5.2.2 The Department of Water Affairs and Forestry

At present the Department is responsible for administering all aspects of the Act on behalf of the Minister. The Department is responsible for the development and implementation of strategies and internal policies, plans and procedures, and regulatory instruments relating to the Act. It is also responsible for planning, developing, operating and maintaining State-owned water resources management infrastructure, and for overseeing the activities of all water management institutions.

The Department's role will, however, progressively change as regional and local water management institutions are established and the responsibility and authority for water resources management are delegated and assigned to them. The Department's eventual role will mainly be to provide the national policy and regulatory framework within which other institutions will directly manage water resources, and to maintain general oversight of the activities and performance of these institutions. The Department will continue to manage South Africa's international relationships and activities in water matters, although some aspects of this may eventually also be handled through institutions established with neighbouring countries.

The Department's organisational structure will also continue to change in accordance with its new role and functions under the Act, and to facilitate the development of well-defined relationships with other water-related institutions. The following principles and approaches are guiding the transformation process -

- The Department will progressively adjust its role in water resources management to concentrate on policy and strategy issues, overall regulatory oversight, and institutional support, co-ordination and auditing. Its Regional Offices are currently responsible for direct service provision and their transformation will be particularly profound.
- The Department may progressively withdraw from direct involvement in the development, financing, operation and maintenance of water resources infrastructure as this is at odds with the regulatory role. Alternatively, if the Department retains the development function, this role will be clearly separated from its policy and regulatory functions. The question of which institution(s) should be responsible for infrastructure development and operation is still under discussion, and is discussed below.

- The Department will transfer the responsibility for operating and maintaining some infrastructure to water management institutions and water services institutions, but catchment management agencies may take on these responsibilities only if their regulatory role is not prejudiced.
- The establishment, capacitation and empowerment of catchment management agencies for all water management areas should proceed as rapidly as possible. The transitional period during which an agency and the relevant Regional Office are jointly responsible for water resources management must be carefully managed to reduce uncertainties around the division of functional responsibilities and accountability. Once the governing board is in place, ideally no more than five years should elapse until the agency is able to take on the duties of a responsible authority (see below). However, the pace of the process must take account of the limitations of financial and human resources, the necessity for a process in which all interested parties may participate and the time needed to build the capabilities of the agencies.

The new organisational design for the management of water resources in the Department was finalised early in 2003 and details have been publicised. Time scales for the implementation of the new organisational structure will be co-ordinated with the closely related process of establishing and empowering catchment management agencies.

3.5.2.3 Water management institutions and responsible authorities

Section 1(1)(xxvi) of the Act defines a water management institution as a catchment management agency, a water user association, a body responsible for international water management, or any person who fulfils the functions of a water management institution in terms of the Act.

The powers and duties of a water management institution relate to water resources management in general. The Act also defines a responsible authority, whose duties relate specifically to water use (section 1(xx)) and particularly to the authorisation of water use by general authorisation or licence. The Act's provisions for authorisation of water use make it clear that only the Minister, or a catchment management agency to which the appropriate powers and duties have been assigned may authorise the use of water. Other water management institutions may not authorise water use.

There are, however, limits to a catchment management agency's power to authorise water use. The Minister retains responsibility for authorising certain uses at national level (see 3.5.2.1 above) and a catchment management agency may not issue a licence to itself without the Minister's consent (section 27).

3.5.2.4 Water management areas

After a countrywide process of public consultation, 19 water management areas covering the entire country were established in October 1999 by Government Notice No. 1160. The boundaries of the water management areas (that is, those boundaries that are not defined by international boundaries or South Africa's coastline) lie mostly along the divides between surface water catchments^[3] and are shown on Fig. 3.5.1.

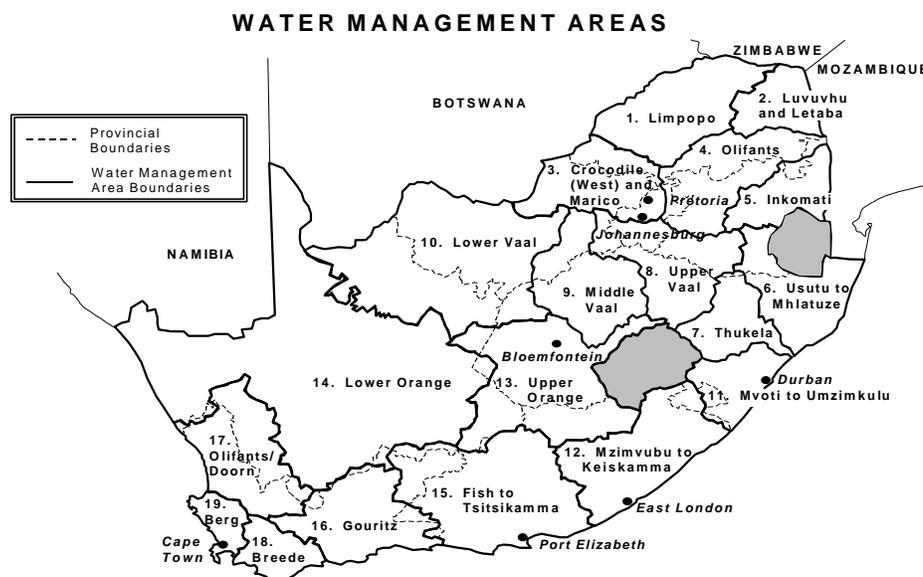
The number of water management areas and the location of their boundaries were determined by considering factors such as -

- the institutional efficiency of creating a large number of catchment management agencies, each managing a relatively small area, compared with a small number of agencies, each managing a larger area;
- the potential for a catchment management agency to become financially self-sufficient from water use charges;
- the location of centres of economic activity;
- social development patterns;

- the location of centres of water-related expertise from which the agency may source assistance; and
- the distribution of water resources infrastructure.

The boundaries of the water management areas are described in Appendix E. It is important to note that the boundaries, firstly, do not coincide with the administrative boundaries that define the areas of jurisdiction of provincial and local government authorities. Secondly, the boundaries are not irrevocably fixed for all time, and can be changed if necessary as management experience and understanding of hydrologic systems grows, to achieve greater efficiency or effectiveness. Operational experience and interactions with water users and other stakeholders since the water management area boundaries were established in 1999 have indicated that minor amendments to the Gazetted boundaries will have benefits in terms of water resources management in general, and for billing for water use charges in particular. The proposed amendments address cases where, for instance, the area covered by a water user association, a groundwater aquifer or even an individual farm falls into two water management areas and where, without the amendments, charges would eventually be payable to two catchment management agencies. The amendments, which will be established when the NWRS is established, are not evident from the figure but they are described in detail in Appendix E.

Fig. 3.5.1: Water management areas (numbered 1 to 19)



3.5.2.5 Catchment management agencies

Catchment management agencies are statutory bodies that will be established by Government Notice. They will have jurisdiction in defined water management areas, and will manage water resources and co-ordinate the water-related activities of water users and other water management institutions within their areas of jurisdiction. An agency begins to be functional once a governing board has been appointed by the Minister (see also Advisory Committees below) and is then responsible for the initial functions described in section 80 of the Act^[4], as well as any other functions delegated or assigned to it. The governing board must represent all relevant interests in the water management area and must have appropriate community, racial and gender representation.

The initial functions of the agencies include the important responsibility of developing a catchment management strategy. This strategy, which may not be in conflict with the National Water Resource Strategy (NWRS) and must give effect to its provisions and requirements,

provides the framework for managing the water resources of the area. In particular, it must determine the principles according to which available water will be allocated among competing user groups.

Additional functions may be delegated or assigned to an agency or establishment according to a strategy described in the proposal for establishment (see below), which addresses the resources required to undertake the additional functions. After its establishment, the agency may acquire further powers and duties following consultation with the Minister, who must be satisfied that the agency has developed the necessary capacity to undertake the additional functions.

The delegation and assignment of duties and responsibilities will include the financial and administrative responsibilities of setting and collecting water use charges, the technical water resources management functions based on the issues identified in the catchment management strategy, and the responsible authority functions relating to the authorisation of water use. The timing of the delegations and assignments will depend on the capacity of the agency to undertake the functions.

An agency may, with the Minister's written consent, delegate powers to another statutory body, but it may not delegate the power to delegate, and the power to authorise water use may be delegated only to a committee established by the governing board on which a minimum of three board members serve. Agencies may contract public water management institutions or private sector organisations to carry out specified activities, but preference must be given to local organisations, taking into account their capacity and representivity, and efficiency, quality, time and cost considerations.

Each water management area is different, with different requirements for water resource management, and the Act gives the governing board considerable flexibility in the approach it adopts to carrying out its duties, for instance -

- The board may appoint a suitably qualified chief executive officer and appropriate supporting staff. It may choose to appoint a relatively large staff complement, enabling it to carry out all of its functions in-house, or it may appoint fewer staff members and engage contractors for specific tasks.
- The board may establish committees, to which it may delegate its powers and duties, to carry out any of its functions either for the whole water management area, or in specific sub-areas.
- An agency may contract another catchment management agency to perform some of its functions, but only if the contracted agency has the capacity to provide external services without prejudicing its ability to undertake its responsibilities in its own area. Such arrangements must, however, not be to the detriment of other water management institutions.

In areas where agencies have not yet been established, or where they are not yet fully functional, all powers and duties vest in the Minister, and the Department will undertake the agencies' functions on the Minister's behalf (section 72).

Catchment management agencies may be established either on the Minister's initiative, or as a result of a proposal, submitted to and approved by the Minister, by those wishing to establish the agency. The proposal must include, among other information, details of the boundaries within which the proposed agency will operate, information about the water resources and existing infrastructure in the area and the ways in which they are managed. However, the Minister's intention to establish 19 agencies was indicated when the water management areas were defined and established. (The water situation assessments described in Chapter 2 and Appendix D have been carried out based on these boundaries). Accordingly, the Department is taking the lead in the establishment process and, in most cases, providing the bulk of the funding for it. The process will, however, also involve the submission of a proposal to the Minister, which will be prepared through a process of public participation that will involve water user sectors and stakeholders.

Public involvement in this process is essential, because it contributes to establishing the legitimacy of the institution, assists the advisory committee in making nominations to the Minister for the governing board by identifying representative stakeholder groups, and builds a foundation for the agency to promote public involvement in water resource management. Accordingly, the extent to which stakeholders have been involved in the development of a proposal to establish an agency is one of the most important criteria against which the Minister will judge the merit of the proposal.

Stakeholder participation can be initiated by distributing information to create awareness. The establishment of representative forums helps to develop constructive and trusting relationships between water resource managers and the public, with the aim of forming a common vision and understanding of the future agency's role and functions. The relationship can be strengthened by involving the forums in progressing the development of a proposal to the Minister by, for instance, assisting with the compilation of the required water resources information and participating in the investigation to determine the financial viability of the agency. This study comprises an assessment of the functions to be undertaken by the agency and the level of staffing required to undertake them, from which the agency's operational and staff costs can be derived. Comparing these costs with the anticipated revenue from water resource management charges, determined in accordance with the pricing strategy (see Part 4 of this chapter), enables the likelihood of the agency becoming financially self-sufficient to be determined.

Ministerial approval of the proposal will pave the way for the appointment of the governing board and for the board to appoint the necessary staffing structure.

Establishment and full empowerment of catchment management agencies in all water management areas will take some time to achieve. In the meantime the Department will manage the areas on the Minister's behalf.

The Department will provide support for the agencies, initially during their development, and subsequently when they are fully established. During the transition period between the establishment of the agencies and their empowerment as responsible authorities, the Department and the agencies will work closely together. The respective roles will change as powers and duties are delegated and assigned to the agencies and it will be essential for roles and functions to be clearly defined at each stage of the transition. Eventually the Department will be responsible only for ongoing oversight and general support of the agencies.

3.5.2.6 Water user associations

Water user associations are also defined in the Act as water management institutions, but the scope of their objectives and their geographical extent are more restricted than those of catchment management agencies. They are in effect co-operative associations of individual water users who wish to undertake water-related activities at a local level for their mutual benefit, and they operate in terms of a formal constitution as set out in guidelines prepared by the Department. The associations are expected to be financially self-supporting from income derived from water use charges determined and made in terms of the pricing strategy and payable by members.

A water user association falls under the authority of the catchment management agency in whose area of jurisdiction it operates to the extent that the agency has received delegated powers from the Minister to direct the association's activities. An association may receive delegated powers and duties from, or be contracted by, the catchment management agency to undertake activities that are within its capacity to perform. The scope of the association's constitution must, if necessary, be amended to reflect the delegated or contracted activities.

Existing irrigation boards, subterranean water control boards and water boards established for stock watering purposes^[5] in terms of the 1956 Water Act must be transformed to become water user associations, or be disestablished in terms of the law under which they were established. A

proposal to transform an existing body to a water user association, which should be developed in consultation with individuals and organisations likely to be affected, must be submitted to the Minister. The proposal must contain, among other things, information about the proposed activities and the area in which they will be undertaken, a proposed constitution and details of proposed members of the association. Almost 300 existing organisations are to be transformed into water user associations^[6] and the intention is to complete this process by the end of 2006. In some cases the management responsibilities may be extended to include all water uses, resulting in multi-sector water user associations.

New water user associations may be established for any purpose, such as, for example, the use of water for recreational purposes. Local management by water user associations may also be appropriate in areas where there is extensive reliance on groundwater, especially where the systems are stressed. It is, however, expected that the majority of associations will continue to focus on the use of water for agricultural purposes. The Department will support the establishment of new associations to build the capacity of emerging farmers in this sector, which will permit them to access subsidies in terms of the pricing strategy.

New associations may be established on the Minister's initiative or, as a result of a proposal submitted to the Minister, by parties interested in establishing the association. A submission to establish a new association must be identical in content to that required for the transformation of irrigation boards discussed above. Whichever establishment route is followed, the Minister must ensure that a public consultation process (see Chapter 4) is undertaken before the association is established. The Department will provide special support and facilitation where new water user associations are being established for previously disadvantaged groups.

3.5.2.7 Advisory committees

The Act empowers the Minister to establish advisory committees with different purposes and functions. Although primarily advisory in nature, such committees may also exercise any powers the Minister delegates to them. Advisory committees are responsible to the Minister, who may make regulations concerning their terms of reference, membership, powers, duties and operation.

The National Water Advisory Council, the Advisory Committee on Safety of Dams and any advisory committee established under section 68(1) of the 1956 Water Act are regarded as advisory committees in terms of the Act.

Although in most cases the establishment of an advisory committee is at the Minister's discretion the Act obliges the Minister to establish an advisory committee to make recommendations on the composition of the governing board of a catchment management agency. The advisory committee must consult widely in the water management area to ensure that its nominations represent all relevant interests. The Minister must have good reason not to appoint the members nominated by the advisory committee, but the Minister may appoint additional members to ensure both full representation and the availability of sufficient expertise on the board for it to carry out its duties.

3.5.2.8 Forums

There is no specific provision in the National Water Policy or the Act for creating forums for water resource management purposes. However, in the Department's experience such voluntary bodies have proved to be of great value in initiatives leading to the creation of catchment management agencies, and in addressing local water management issues. They have provided a focus for public consultation and for integrating the water-related activities of other non-governmental and community-based organisations. There is, however, a need to establish co-ordination mechanisms in each water management area to ensure that there is clarity of functions among the various forums and that issues of local concern are effectively and coherently communicated to the catchment management agency. Meaningful local participation in water matters must also be facilitated.

In the past, forums have also made significant contributions to water resources management at a local level by, among other things, providing essential local knowledge, expertise and information. In this respect they may eventually be expected to play an important role in the operation of catchment management agencies. Examples for such a role already exist in the multi-sector forums that have been established in the four provinces where there is extensive commercial afforestation to review applications for the establishment of commercial plantations. The Department will continue to support existing forums and encourage the creation of new ones where the need arises.

3.5.2.9 Institutions for infrastructure development and management

The Department has developed and owns, operates and maintains a number of water resources schemes comprising dams and related infrastructure such as pumping stations, pipelines, tunnels and canals. The schemes vary greatly in size. The infrastructure has an estimated (March 2001) replacement value of some R38 000 million and occupies some 2 500 departmental staff in its management.

The Department has developed and maintained considerable specialist design and construction capacity, which is of strategic importance given the high level of specialist expertise required for such activities and the limited alternative sources.

The responsibility for operating and maintaining schemes that are of local importance, or mainly serve one user sector, such as agriculture or a single municipality, are being transferred to the appropriate water user associations and water services institutions. Subject to the agreement of National Treasury, the schemes may eventually be transferred into the ownership of the operating institution.

This will, however, not be the case for schemes that are of wider importance because they transfer water across national boundaries or between water management areas, serve multiple user sectors or large geographic areas, comprise several interconnected catchments, or serve a strategic purpose, such as the generation of electricity for the national grid. Examples are large systems such as the Vaal, Umgeni, Amatole and Riviersonderend-Berg River systems, major water transfer schemes such as Thukela-Vaal and Orange-Fish, and major dams such as Gariep and Van der Kloof. These schemes are regarded as national water resources infrastructure. In consultation with other role players - the National Treasury, the Public Service Commission, the Department of Public Enterprises, the Ministry of Transport, Eskom, the South African Association of Water Utilities, The Department of Provincial and local Government, the South African Local Government Association and organised labour (NEHAWU and the PSA) - an investigation has been undertaken to determine the most appropriate institutional arrangement for their development and management.

Two options have been investigated, namely -

- The Department separates, or "ring fences", the development and management of national infrastructure from its other activities and creates a separate and distinct organisational entity within the Department. The disadvantage of this option is that the Department has no powers to borrow money, and may finance its infrastructure-related activities only from allocations from the National Treasury or through special purpose vehicles established for the purpose.
- The establishment of a new national organisation, or a small number of sub-national organisations - a national water resources infrastructure agency or regional agencies - to manage national infrastructure and to develop new infrastructure as required. This option is in accordance with the trend towards executing the State's role in direct service provision through appropriately structured public organisations. This would also have the advantage of providing greater flexibility in the financing of infrastructure development projects. It is important to note that as such an agency (or agencies) would be a public entity, its establishment would not constitute the privatisation of state-owned infrastructure. An agency

(or agencies) of this nature could possibly be contracted to develop and operate infrastructure required by catchment management agencies or water user associations.

Of the above alternatives, the preferred option is to establish a single agency with four regional operating units. A business case will be prepared for the agency, which will be evaluated by the Ministries of Finance, and Public service and Administration and, if the establishment of the agency is supported, the proposal will be submitted to Cabinet in 2004.

The Act empowers the Minister to direct the Trans-Caledon Tunnel Authority (see below) to undertake specific activities related to its core business of financing major water infrastructure. In this context the Authority is already supporting Umgeni Water's treasury and is leading the implementation of the Berg Water Project in the Western Cape.

3.5.2.10 Institutions for international water management

Internationally shared river basins comprise about 60 per cent of South Africa's land surface. The Act, together with the Revised Protocol on Shared Watercourses in the Southern African Development Community, commits South Africa to sharing water in international river basins with neighbouring countries in an equitable and reasonable manner. Accordingly, the Minister may, in consultation with the Cabinet, establish institutions to implement international agreements in respect of the development and management of shared water resources and to pursue regional co-operation in water matters.

Three existing bodies, the Trans-Caledon Tunnel Authority (RSA portion of the Lesotho Highlands Water Project), the Komati Basin Water Authority (RSA-Swaziland), and the Vioolsdrift Noordoeuw Joint Irrigation Authority (RSA-Namibia), are regarded as international water management bodies in terms of the Act. The roles of the Trans-Caledon Tunnel Authority and the Komati Basin Water Authority in funding infrastructure development are discussed in Part 9 of this chapter.

Although not established in terms of the Act, the following international structures have been established to further the development and management of the four international river basins that South Africa shares with neighbouring countries -

- Lesotho Highlands Water Commission (LHWC) (Lesotho, RSA).
- Swaziland/RSA Joint Water Commission.

These were originally project-related and focused on the Lesotho Highlands Water Project and the Komati River Development Project respectively, but both now deal with other matters of common interest.

- Orange/Senqu River Basin Commission (Botswana, Lesotho, Namibia and RSA).
- Limpopo Basin Permanent Technical Committee (LBPTC) (Botswana, Mozambique, RSA and Zimbabwe).

The former is a river basin commission in terms of the Revised Protocol on Shared Watercourses in the Southern African Development Community. The Agreement to establish the Limpopo Watercourse Commission was signed in Maputo in November 2003. This will replace the LBPTC^[7].

- Botswana/RSA Joint Permanent Technical Water Committee.
- Mozambique/RSA Joint Water Commission.
- Permanent Water Commission (PWC) (Namibia, RSA).
- Swaziland/Mozambique/RSA Tripartite Permanent Technical Committee (TPTC).

These deal with matters of common interest.

River basin commissions

The role of the river basin commissions is to foster sustained dialogue between countries, leading to cohesive and effective co-operative management and optimal utilisation of shared resources. They will provide focal points for the joint formulation of development plans for the basin, co-ordination of joint basin studies, and collection and sharing of information.

The commissions are not water management institutions in terms of the Act, and the responsibility for implementing jointly developed projects will normally remain with the domestic institutions. The commissions will, however, have an important role to play in promoting the implementation of regional projects.

International co-operation in water matters is discussed further in Chapter 5.

3.5.2.11 Monitoring institutional performance

The Act provides for various formal instruments by which the performance of institutions may be monitored and assessed, as follows:

- **Catchment management agencies and water user associations** are required to prepare business plans and annual reports. The first business plan must be for a period of not less than three years. Thereafter the business plan must be updated every year. It must at least cover the objectives of the institution, its strategies and policies, services to be provided and service standards, financial and performance indicators and targets, details of financial strategies, and revenue and expenditure forecasts. A copy of the plan must be provided to the Minister who may, after consultation with the relevant agency or association, direct that changes be made to the plan.

Catchment management agencies and water user associations will have to comply with the general requirements for public finance management. Specific requirements are also contained in the Act. These include that the annual reports of institutions must contain details of their operations and financial statements, and that the report must be submitted to the Minister and be made available to the public for inspection or purchase. A catchment management agency's annual report must be tabled in Parliament, whilst that of a water user association must be copied to the Secretary to Parliament.

- **An institution for international water management** established in terms of the Act is required, unless the particular international agreement provides otherwise, to submit a report each year to the Minister and any other party specified in the international agreement. The report must contain sufficient details to enable the Minister to assess the institution's performance against the objectives of the agreement, as well as audited financial statements for the financial year. The report must be submitted to the Secretary to Parliament via the Department

3.5.2.12 The Water Tribunal

The Water Tribunal was established when the Act was promulgated in October 1998. It replaces the Water Court, which ceased to exist when the 1956 Water Act, in terms of which it functioned, was repealed.

It is not a water management institution in terms of the Act, but an independent body with a mandate to hear and adjudicate appeals on a wide range of water-related issues^[8], mainly against administrative decisions made by responsible authorities and water management institutions. It will also adjudicate claims for compensation where a user considers that the economic viability of her or his water-use activity has been severely prejudiced by a refusal to grant a licence, or a reduction in water use when a licence is granted or reviewed. However, some alleged breaches of administrative procedures will be adjudicated by the courts in terms of the Promotion of Administrative Justice Act (also see Chapter 5). The Tribunal has jurisdiction everywhere in the country and it may hold hearings in the areas where the cause of action arose. Its operations are funded from the National Treasury.

Procedural rules for the Tribunal are in preparation and will be published in the *Government Gazette* when they have been approved by the Minister. Appeals are being dealt with relatively quickly and inexpensively. It is not, for instance, necessary for a person making an appeal to the Tribunal to have legal representation. The Tribunal can subpoena any person to provide information on any matter before it. Records of its decisions will be made available on request. A person who is not satisfied with the Tribunal's decision may, on a question of law, appeal against the decision to a High Court.

The Minister, after receiving nominations from the Judicial Services Commission (in respect of persons qualified in law) and the Water Research Commission (in respect of persons qualified in water resources management, engineering and related fields of expertise), appointed the first members of the Tribunal in May 2001. Members of the Tribunal serve a three-year term, after which they may be re-appointed.

3.5.3 RELATIONSHIPS AMONG WATER MANAGEMENT INSTITUTIONS

The institutional relationships based on statutory authority are explicit in the Act. The Minister has overall authority over all water management institutions, which gives her or him the following powers:

- The Minister empowers institutions, including the Department, by delegating (and, in the case of catchment management agencies, assigning) powers and duties to them.
- The Minister has general oversight of the plans and performance of institutions through the requirement for them to submit business plans, financial strategies and targets, and annual reports for approval.
- The Minister may exercise control over institutions by issuing directives to them on a wide range of matters concerning their performance in exercising any of their duties or powers, including those that have been delegated or assigned to them.

In addition, catchment management agencies may, when empowered to do so, delegate powers and duties to their own committees and to water user associations.

However, the vertical, hierarchical relationships defined in the Act are not sufficient to ensure that the institutions will operate successfully, as this will depend heavily on all institutions building co-operative and supportive working relationships with each other.

This is particularly the case for catchment management agencies, which, as the focus for regional water resources management, will need to establish strong relationships with stakeholders, administrative authorities, and other water management and water services institutions, including water user associations since these are not only water users, but also have responsibility to the agencies for water resources management functions exercised under delegated authority. The administrative authorities in question are local and provincial government departments responsible for, amongst others, land and agriculture, environmental management, housing, health, provincial planning and social development. It will also be important for those catchment management agencies that operate in internationally shared river basins to establish working relationships, via the Department, with the river basin commissions.

Local government is a constitutionally distinct sphere of government. Those local authorities that are designated as water services authorities are, either directly or indirectly via water services providers, responsible for the provision of water services^[9] in their areas of jurisdiction and are therefore also water users. This use, including the treatment and disposal of waste water, will eventually be authorised and regulated by the agencies. Relationships between the agencies and local authorities will need to ensure that there is a high degree of integration between water resources management and water services provision.

The relationships between water management institutions and water services institutions are discussed more fully in Chapter 5. The inclusion of local and provincial government representatives on the governing boards of catchment management agencies is intended to facilitate these relationships.

Notes to Chapter 3, Part 5

- ¹ The Minister may not delegate the power to: (i) make a regulation; (ii) authorise a water management institution to expropriate property; (iii) appoint a member of the governing board of a catchment management agency; and (iv) appoint a member of the Water Tribunal (see NWA section 63(2)).
- ² In delegating powers and duties the Minister remains accountable for the consequences of actions carried out under the delegated authority. When powers and duties are assigned to institutions or individuals, the assignee becomes accountable.
- ³ In some flat areas in the north-west and west of the country, where the boundaries of surface water catchments are difficult to determine and where groundwater is the principal source of water, parts of the water management area boundaries are based on aquifer boundaries. In other areas, however, the water management area boundaries cut across the boundaries of groundwater aquifers, the dolomitic aquifer in the North West Province for instance.
- ⁴ The initial functions of catchment management agencies (section 80 of the Act) are to: (a) investigate and advise interested persons on the protection, use, development, conservation, management and control of the water resources in its water management area; (b) develop a catchment management strategy; (c) co-ordinate the related activities of water users and of the water management institutions within its water management area; (d) promote the co-ordination of its implementation with the implementation of any applicable development plan established in terms of the Water Services Act, 1997 (Act No. 108 of 1997); and (e) promote community participation in the protection, use, development, conservation, management and control of the water resources in its water management area.
- ⁵ Stock-watering water boards to be transformed to water user associations are the Kalahari West Water Board, the Karos-Geelkoppen Water Board and the Kalahari East Water Board (see NWA section 98(1)).
- ⁶ At the end of March 2004 51 irrigation boards had been transformed into water user associations, and 237 remained to be transformed. One board had been disestablished, and eight remain to be disestablished.
- ⁷ River basin commissions for the other two internationally shared river basins will be established in due course (see Part 8 of this chapter and Chapter 5).
- ⁸ The matters on which a person may make an appeal to the Water Tribunal are described in section 148 of the Act, which, together with Schedule 5, also outlines the procedure for making an appeal.
- ⁹ Water services means water services provision and sanitation services (see Water Services Act, section 1(xix)).

CHAPTER 3

PART 6 - MONITORING AND INFORMATION

(Provisions for monitoring and information systems for water resources and responsibilities for providing water-related information are found in Chapter 14 of the National Water Act)

3.6.1 INTRODUCTION

The availability of reliable data and information on all aspects of water resources management is fundamental to the successful implementation of strategies under the National Water Act (the Act). No proper decision on any matter can be made unless it is informed by reliable, relevant, up-to-date information.

Information for decision-making should reflect the integrated nature of water resources, in which the quantity and quality of surface and ground water are all inextricably interrelated. For instance, decisions about the licensing of proposed water uses require data and information on, among others: the management class of the resource and the associated Reserve and resource quality objectives; international obligations that have to be satisfied; the quantity of water available in the resource and its quality; the extent and nature of other lawful and authorised uses from the resource; the potential for efficiency gains through managing demand; and the potential for augmenting supply by dam construction. If there are information deficiencies in any of these aspects, the decisions reached will not necessarily be optimal.

To meet the requirement for integrated information the Department is reviewing and, where necessary, revising all data acquisition, monitoring and information arrangements to ensure that all relevant data is collected, verified and stored, and that there is consistency in the data that are common to the various water resources management functions. At the same time, the facility to analyse data and provide information in different ways to meet specific requirements will be retained and improved.

National systems will be designed in such a way that catchment management agencies, once established, will be able to take an appropriate level of responsibility for managing information relevant to their water management areas and, where necessary and feasible, have access to information from adjacent areas with which there are links. Information systems in a water management area will nevertheless remain part of the national system so that information is available at national level.

The national information system for water services, as required by the Water Services Act^[1], will be linked to information systems for water resources.

The Act empowers the Minister to require any person to provide data and information on either an *ad hoc* or a regular basis for the national monitoring and information systems, to facilitate the management and protection of water resources. Regulations may be written in this respect. Water management institutions are also obliged to make information on any water-related matter held in the national systems about which the public needs to know available to the public, particularly if it concerns an actual or potential disaster, or an emergency situation.

3.6.2 MONITORING SYSTEMS

The Act requires the Minister to establish national monitoring systems for water resources to collect appropriate data and information that is necessary to assess -

- the quantity, quality and use of water in water resources;
- the rehabilitation of water resources;

- compliance with resource quality objectives;
- the health of aquatic ecosystems;
- atmospheric conditions that may influence water resources; and
- other data and information that may be necessary.

The Department already operates a number of monitoring systems that collect some of the required data and information. However, the systems were developed and are being operated largely in isolation from one another. Spatial coverage is incomplete and as a result little or no information is collected in some areas. Problems are also being experienced with the quality and reliability of information. The dissemination of and access to information is not as effective or as comprehensive as it might be. Access to relevant data collected by other organisations, including other national government departments, provincial and local governments, water boards, private sector organisations and water users, is problematic in some cases.

The Department is addressing these shortcomings by amalgamating all existing and planned monitoring and assessment systems into a coherent and structured monitoring, assessment and information system. Monitoring systems may be grouped into logical subsystems, each comprising three functional components: data acquisition; data storage, maintenance and dissemination; and data analysis, information generation and reporting.

Improvements in efficiency and effectiveness are expected through sharing logistics and infrastructure in data collection and storage, by adhering to common standards and guidelines, and by refining analytical techniques to maximise the information derived from available data.

An important component of the monitoring and assessment strategy will be to develop co-operative and collaborative relationships between the Department and other organisations that also operate water-related monitoring, assessment and information systems. These include national, provincial and local government, water management and water services institutions, the South African Weather Services, private sector organisations and water users and the aim will be to ensure that appropriate mechanisms and procedures are implemented to co-ordinate the monitoring of water resources.

Brief details of existing monitoring systems and plans to improve and/or extend them to meet the Act's requirements are provided below.

3.6.2.1 Surface water - flow monitoring

Flow in rivers is monitored at 800 national monitoring stations, each of which can be a combination of all or some of the following -:

- A gauging point or points at which river flow is measured directly.
- One or more flood monitoring points.
- Meters measuring flow in reservoir off-takes or outlets.
- A gauging point or points at which reservoir water levels are measured.
- A meteorological station at which rainfall and evaporation are measured.

Data collected at national monitoring points is assessed and interpreted to derive catchment hydrological characteristics, and to obtain customised information for water resource managers and other users.

The present spatial density of national monitoring points - an average of one station per 1 500 square kilometres - is considered to be inadequate for a country that, by international standards, has a relatively low per capita availability of water and that is approaching full utilisation of available water. Based on the best practice standards described in the World Meteorological Organisation's *Guide to Hydrological Practices*, and considering the characteristics and probable requirements in each water management area, the station density should, assuming the continued use of existing monitoring methods and technology, be increased to an average of

one national monitoring point in less than 1 000 square kilometres. To achieve this station density an additional 500 national monitoring points will likely have to be established during the next 20 to 25 years. The number of meteorological stations may also need to be increased from 275 to 350, possibly more if the South African Weather Service decides to reduce its network.

There are also 625 operational flow monitoring sites at reservoirs, in transfer schemes and at major irrigation schemes. Anticipated future operational requirements in the water management areas, including the necessity to establish stations to monitor compliance with Reserve requirements, indicate that the number of operational sites may need to be increased to between 1 500 and 2 000.

The monitoring network is continuously reviewed to ensure optimal coverage for existing and new data needs. The expansion of the monitoring network is a long-term project, which could take between 20 and 25 years to accomplish. In view of the high cost of the expansion (see Part 9 of this chapter) and the requirement for ongoing operation, a review will be undertaken of technological trends in this area to determine if more cost-effective options are available and appropriate.

3.6.2.2 Surface water - water quality monitoring

Various water quality parameters are monitored. These include -

Physico-chemical monitoring: The National Chemical Water Quality Monitoring Network comprises approximately 850 monitoring points in rivers and at reservoirs. Monitoring is undertaken by the Department's regional offices, as well as by water boards and private sector organisations. The size of the network is considered to be adequate.

Microbial monitoring: The National Microbial Monitoring Network is operational in eight water management areas.

Eutrophication monitoring: The National Eutrophication Monitoring Programme, which includes cyanobacterial surveys, is operational in 50 reservoirs.

Biological monitoring: The National River Health Programme, which monitors biological indicators, operates in selected catchments in all 19 water management areas in partnership with the Department of Environmental Affairs and Tourism and the Water Research Commission. The Programme produces State of the Rivers Reports.

Toxicity monitoring: The National Toxicity Monitoring Programme is in its planning and design phase.

Radioactivity: The National Radioactivity Monitoring Programme is being tested in three areas where mining activity takes place.

Estuary monitoring: A National Estuarine Monitoring Programme is planned.

The structure and co-ordination of these programmes will be reviewed as part of the implementation of the overall monitoring, assessment and information system, the various substructures will be prioritised and their implementation and expansion will be programmed in accordance with available resources.

3.6.2.3 Groundwater monitoring

Groundwater was regarded as "private" water under the 1956 Water Act, and as a result its status was not monitored or assessed to the same extent as surface water. However, groundwater has the potential to contribute significantly to meeting the needs for water in rural areas, particularly for domestic supply. Existing monitoring networks will need to be expanded and refined, and surveys undertaken to improve understanding of the quantities and quality of water available if this potential is to be mobilised, and the use of groundwater integrated with surface water use.

Groundwater levels and water quality are currently recorded on a continuous basis at 150 points and at regular intervals at about another 1 000 points. Continuous monitoring at an estimated 460 points is required for an effective national network. The intention is to refine and develop the present system to create an integrated monitoring network at three levels, namely -

- National monitoring by the Department in relatively unimpacted areas to provide background and baseline information on water levels and water quality. The establishment of this part of the network has the highest priority and its expansion is planned for completion by 2006.
- Monitoring of major aquifers by catchment management agencies to determine trends in water levels and water quality resulting from human activity. This will initially only cover physico-chemical monitoring, although the scope will eventually need to be expanded to microbial, toxicity and radioactivity monitoring. The Department will continue with this monitoring until the catchment management agencies can take over the responsibility. Pilot networks have been established in the water management areas that have been prioritised for compulsory licensing under the programme for major activities to implement the Act (see Part 8 of this chapter). This will also inform priorities for the expansion of the network.
- Local impact monitoring. Information provided by users in terms of the conditions attached to general authorisations and licences will be an important source of information on groundwater use. Additional information will be derived from reports on conditions encountered during borehole drilling.

3.6.2.4 Resource requirements for monitoring

The resources that are currently available for monitoring - staff, funding, physical infrastructure, instrumentation and information technology equipment - are generally inadequate throughout all existing systems. The proposed expansion of monitoring activities will require additional resources and the Department is assessing and quantifying the requirement for additional resources as part of its overall implementation planning. The training of water resources management practitioners will also need a significant investment, especially where new technologies are introduced.

3.6.3 INFORMATION SYSTEMS

The Act requires the Minister to establish national information systems, including -

- A hydrological information system.
- A water resource quality information system.
- A groundwater information system.
- A register of water use authorisations.

Brief details of the major existing and new information systems are provided below.

3.6.3.1 Surface water hydrology

The Department's existing mainframe-based Hydrological Information System and a number of peripheral and related systems were replaced with a new system in 2002. The new system is a server-based commercial system that is already in use in several countries. It is user-friendly, has extensive graphics capabilities, supports data analysis, can provide a range of information and makes use of GIS mapping to display systems and networks. It can be used as an independent system by, for instance, hydrological practitioners providing services to water management institutions. It can also be used as an integrated, web-enabled system with inter-connections between the Department and catchment management agencies.

After installation in the Department's National Office in 2002 and following the transfer of data from the existing system and extensive staff training, the new system is expected to be operational in all regional offices by 2004.

3.6.3.2 Water quality

The Department is developing its Water Management System to handle the operational management of water quality monitoring systems and to store, process and disseminate the results. The system facilitates the consolidation of monitoring activities to reduce or eliminate duplication through the auditing of monitoring schedules and quality assurance of the monitoring process.

The Water Management System is already functional and operational in the Department's national office and one regional office, and is expected to be fully operational throughout the Department in 2007.

3.6.3.3 Groundwater

The mainframe-based National Groundwater Database has been replaced with a server-based system as a bridging solution until the web-enabled National Groundwater Archive becomes operational. The development of the system and the transfer of data is expected to be completed during 2004.

The archive will be linked to a proprietary information system that can provide management information on the quantitative and qualitative aspects of groundwater and surface water, as well as precipitation data. The system will also be linked to a package that models groundwater recharge, and the impacts of abstraction and aquifer contamination on groundwater systems.

The system has been installed in the Department's national office and three regional offices, and is expected to be fully operational in all regions during 2004.

3.6.3.4 Water use registration and authorisation

The Water Use Authorisation and Registration Management System (WARMS) is a comprehensive system designed to do the following -

- Manage the process of registering water use by storing the information needed to uniquely identify a water user, and characterise the location, nature and extent of the use.
- Manage the authorisation of water use by incorporating the workflow requirements for the licensing process from application, through evaluation, issue or refusal, to review. The information captured will include details of the evaluation of the application, any appeals against licensing decisions, licence conditions, licence and review periods, and any waivers granted on water use charges.
- Invoice water users based on established tariff structures, issue receipts and statements, account for revenue received and track outstanding water use charges. The financial component of WARMS is a secure system based on accepted accounting principles and includes an audit trail for every data item. Data security and stability is ensured by continuous data replication and updating between the systems at the Department's national and regional offices.
- Establish links with other national databases, such as the National Deeds Register, to facilitate validation of data and information.
- Produce reports on all of the above dimensions.

The registration component of the system has been in use since 2000. The cost recovery functions became operational on a pilot basis in 2002 and, after further development, were fully operational in 2003. The licensing capabilities are to follow in 2004 and establishing links with national databases operated by other departments will commence in 2004.

Note to Chapter 3, Part 6

¹ Section 67(2) of the Water Services Act states that the national information system for water services may form part of a larger system relating to water generally.

CHAPTER 3

PART 7 - DISASTER MANAGEMENT

(Provisions relating to actual or potential emergency or disaster situations are found in four places in the National Water Act, namely -

Section 67 allows the Minister to dispense with the requirement for public consultation in emergency situations or in cases of extreme urgency.

Part 3 of Chapter 14 requires township developers to indicate the 100 year flood line on plans, requires water management institutions to make information relating to floods, droughts and potential risks available to the public, and requires the Minister, where practicable, to establish early-warning systems.

Item 5 of Schedule 3 permits catchment management agencies to issue directives concerning waterworks to protect, among other things, the public or property.

Chapter 12 covers provisions relating to the safety of dams.)

3.7.1 INTRODUCTION

One of the objectives of the National Water Act (the Act) is to contribute to public safety and security in water matters. This Part gives a brief description of some of the water resources management activities that contribute to preventing the occurrence of water-related disasters and emergencies, and mitigating their effects when they do occur. Water-related disasters must be managed within the broad framework of national disaster management policy and legislation, and these requirements are also described.

3.7.1.1 Water-related disasters

Water-related disasters take many forms, and range in the extent of their influence from local to national. They threaten life, health and livelihoods, especially among the poor, and damage valuable infrastructure.

Floods occur naturally as a result of South Africa's highly variable climate, but they may also be caused by dam failures. They often cause loss of life and destruction of dwellings in communities living in the flood plains of rivers, and disrupt the provision of water by damaging dams, water and sewage treatment works, and water distribution systems. Floods damage roads, railways and bridges, and electricity and telecommunications infrastructure, inundate valuable agricultural land and destroy crops. Extreme rainfall events, often accompanied by high winds, not only cause floods, but also damage property, especially the less substantial dwellings in poorer communities.

Droughts can occur at any time, anywhere in the country, and often last for a number of years. They reduce the availability of water to all sectors of society, but their effects are particularly severe where people do not have access to piped potable water, or where they rely on run-of-river flows for their water supplies. Droughts prejudice food security by affecting production from irrigated and rain-fed agriculture, and disruptions in electricity generation and industrial output can have negative economic consequences.

Another threat is the pollution of water resources from spills of hazardous or toxic materials. These can render water unfit for use and damage the ecological functioning of water resources. Bacteriological pollution can cause outbreaks of diseases such as cholera. Communities that are not serviced by water supply schemes, and draw water direct from streams and rivers, are particularly vulnerable to the effects of pollution.

3.7.2 NATIONAL DISASTER MANAGEMENT POLICY AND LEGISLATION

3.7.2.1 The White Paper on Disaster Management

In the past, disaster management in South Africa was largely reactive, with disastrous events being handled as they were in progress, or the consequences being dealt with when the disaster was over. Dealing with disasters diverts resources from and retards the pace of social and economic development. There are clear advantages in preventing disasters or mitigating their effects.

National government began the process of developing a more holistic and proactive approach in 1994. In January 1999 the Department of Provincial Affairs and Constitutional Development (now the Department of Provincial and Local Government) published the White Paper on Disaster Management. The principal emphasis of the policy is on preparedness, prevention and mitigation: that is, reducing the potential for loss of life and injury, and the economic and environmental costs that result from disasters by taking appropriate steps aimed at -

- Increasing preparedness for disasters and improving response capacity among all sectors of society by, among other things, disseminating relevant information and undertaking programmes of awareness creation, education and training;
- Reducing the probability of disasters occurring and reducing the severity of the consequences when they do occur; and
- Reducing the vulnerability of communities, especially the poor and disadvantaged, to the hazards and threats posed by disasters.

To achieve these objectives the policy proposes that risk reduction strategies should be incorporated in all development planning and actions undertaken in the public and private sectors. Development plans will be prepared within the framework of coherent and integrated disaster management frameworks at national, provincial and district municipality levels. Responsibility for development of the frameworks will lie with disaster management centres established to co-ordinate all disaster management activities.

The policy recognises that the responsibility for disaster management rests primarily with government and that successful execution of its proposals will depend on co-operation among all spheres of government, as well as the development of co-operative and supportive relationships with civil society and the private sector.

The policy also reviews the prevailing funding arrangements in respect of disasters. It proposes a new financial framework to fund prevention, mitigation and preparedness actions and activities, to streamline and accelerate the provision of immediate relief to the victims of disasters, and to fund infrastructure repair work. The provision of government resources should not, however, discourage self-help or community involvement in disasters, nor should it replace the use of commercial insurance schemes.

3.7.2.2 The National Disaster Management Act

The disaster management policy proposals were given legal effect when the National Disaster Management Act (No. 57 of 2002) was promulgated in January 2003.

This Act established the National Disaster Management Centre (which formalises the Interim Disaster Management Centre, which has been in operation since 1997) as the national focal point for all disaster management activities. The Centre is mandated, among other things, to develop a National Disaster Management Framework and to establish communication links and information exchange arrangements with all disaster management role players. The National Disaster Management Act empowers the centre to require any organisation or person to provide information. The Department has been working closely with the Interim Disaster Management Centre for some time, providing support for the development of information systems and will continue this relationship with the .National Disaster Management Centre The Department's

anticipated responsibilities and obligations in terms of the new legislation are discussed below and also in Chapter 5.

3.7.3 THE DEPARTMENT'S ROLE IN DISASTER MANAGEMENT

The Department's responsibilities for disaster management under the Act, as summarised in section 2, concern the management of floods and droughts, the reduction and prevention of pollution and degradation of water resources, and the promotion of dam safety. The Department has additional responsibilities in terms of the National Disaster Management Act.

3.7.3.1 Disaster management planning

The Department, in common with all other organs of State with disaster management responsibilities, will be required to prepare a disaster management plan within the National Disaster Management Framework. The Department will also need to ensure that disaster management planning is included in catchment management strategies and the business plans of water user associations. It will have to see to it that provisions for water-related disasters in respect of water services are incorporated into the Water Services Development Plans of water services authorities and the business plans of water boards.

3.7.3.2 Floods

South Africa's climate is highly variable and largely unpredictable, and the primary purpose of most dams is to store water during periods of above-average rainfall to provide water during dryer periods that may follow. Dams can, however, also play an important role in flood management since they reduce high flow rates entering the dam to lower flow rates exiting the dam to the river downstream. This is known as flood attenuation, and it occurs in every dam, even when the reservoir is full when the floodwaters enter. The attenuation effect can be increased by deliberately releasing water from storage prior to the onset of the flood to provide additional storage to accommodate floodwaters before the dam starts to spill. A small number of dams are equipped with crest gates to provide flood storage above the normal full supply level, whilst a few have high capacity outlets that could facilitate pre-flood releases.

In general, though, most dams are not equipped to release water from storage sufficiently rapidly to significantly increase their attenuation effect. However, as the purpose of dams is to store as much water as possible for as long as possible against an uncertain future, pre-flood releases can, in most cases, only be made when there is reasonable certainty that the dam will be full again when the flood has passed. This requires sound information and predictive capability on the probable extent of the incoming flood, which is not available in most catchments. (Information requirements for disaster management are discussed below).

A few dams have been designed specifically for flood attenuation - the Qedusizi Dam on the Klip River upstream of Ladysmith in KwaZulu-Natal, for example. Such dams remain empty for most of the time, containing water only during flood events. Whilst such structures are effective for flood management, they are costly and inefficient as far as water resources management is concerned. It is preferable, where it is necessary to contemplate structural solutions to flooding problems, to operate multi-purpose water supply dams to maximise attenuation during flooding events, and to ensure that effective warning systems are in place.

The National Disaster Management Centre has established a number of working groups, each of which will prepare a component of the National Disaster Management Framework. The Department leads the working group to develop a national flood management policy. It is anticipated that the group will interact closely with representatives of, among others, the urban, transport, agriculture and services (telecommunications and power supply) sectors.

The flood management policy will include proposals on guidelines and standards, and institutional responsibility with regard to the following -

- The operation of large storage dams in a manner that optimises the conflicting requirements of providing security of water supply and protection of downstream areas.
- The safe and sustainable use of the floodplains of rivers. Much of the risk to life and property associated with floods is the result of the inappropriate occupation and use of floodplains and other flood-prone areas. This is especially so in urban areas, where floodplains are often the only available land where people - usually the poor - are able to establish residences close to employment opportunities.
- Design criteria for services infrastructure such as roads, bridges and waterworks situated on or adjacent to rivers, to achieve an optimal balance between affordability and the need for structural robustness to resist damage during floods.
- Effective flood warning systems for all flood-prone areas, combined with programmes for public and institutional education, training and awareness creation.
- Interactions and co-operative relationships with countries with which South Africa shares river systems.

3.7.3.3 Dam safety

Dam failures and incidents such as the failure or unauthorised opening of a gate can cause devastating floods. The Act places the responsibility for ensuring the structural and operational safety of dams on the dam owners.

The Dam Safety Office, located in the Department's national office in Pretoria, administers the Act's provisions relating to the safety of all new and existing dams with a safety risk in South Africa^[1]. These provisions are intended to ensure that such dams are designed, constructed, operated and maintained to minimise the risk of loss of life or damage to property and the quality of water resources as a result of dam failure or operational shortcomings. All dams with a safety risk must be registered with the Department.

The design, construction and abandonment of Category II and III dams with a safety risk (see Note 1) must be carried out by suitably qualified people, defined in the Act as approved professional persons. The owners of such dams, including the Department, are also required to have their dams inspected regularly by an approved professional person, and to make any necessary repairs or alterations to ensure the safety of the dam. Alterations, and in certain cases maintenance and repairs, must be supervised by an approved professional person.

Owners of Category II and III dams with a safety risk are also required to prepare and submit to the Dam Safety Office an operation and maintenance plan and an emergency preparedness plan. The latter must detail the actions to be taken in the event of an actual or imminent dam failure, or any other emergency situation relating to the dam. The plan must contain details of the downstream areas that would be affected by dam failure and the ways in which warnings would be given to people at risk.

The Department is preparing new regulations relating to the safety of dams in terms of section 123 of the Act. These will replace the regulations made under the 1956 Water Act. The drafting process is substantially complete and, after public consultation and approval by Parliament, the regulations are expected to be established during 2004.

When these regulations are in place, the existing regulations governing the activities of the Advisory Committee on Safety of Dams^[2] (see Part 5 of this chapter) will be reviewed and revised where necessary to accord with the provisions of the Act. Regulations may also be prepared relating to financial assistance in matters relating to the safety of dams.

The functional responsibility within the Department for compliance with dam safety legislation in respect of dams owned, operated and maintained by the Department is clearly separated from the responsibility for dam safety regulation.

3.7.3.4 Droughts

Drought management from a water resources perspective is concerned mainly with mitigating the effects of prolonged periods of lower-than-average runoff in streams and rivers, referred to as "hydrological droughts", by providing water to users from storage dams. However, because the duration of droughts cannot at present be predicted with any certainty, water in storage dams must be used judiciously and it may be necessary to impose restrictions on water use when there are indications that drought conditions are imminent or when a drought continues longer than expected. Where restrictions are necessary, water to meet basic human needs will always receive priority in allocations, followed by strategically important uses such as power generation and key industries. In general, water for irrigation is restricted first. However, recognising the negative impacts of such restrictions, the Department will aim to provide notice to organised agriculture of their need as early as possible.

Most of South Africa's agricultural land is under rain-fed cultivation, which is dependent on sufficient rainfall to maintain adequate levels of soil moisture for plant growth. Water stored in dams offers no protection against "soil moisture deficit" drought conditions caused by lower-than-average rainfall. Even so, this situation is of concern to water resource managers since the degradation of vegetal cover can result in soil erosion, which will lead to sediment being deposited in rivers and dams, and a consequent reduction in storage capacity. The Department will therefore co-operate with the national Department of Agriculture, which leads the drought working group established by the National Disaster Management Centre, in developing measures aimed at mitigating the effects of drought. The Department's interest in this regard lies particularly in the area of information management (see below). It is anticipated that the working group will clarify the institutional responsibilities for dealing with the various dimensions of droughts.

3.7.3.5 Pollution of water resources

The Department's approach to water quality management (see Part 2 of this chapter) is to promote the reduction of discharges of waste or water containing waste into water resources. Where waste discharges are unavoidable, the impact on other users, water resources and the general public are controlled by specifying the permissible levels and concentrations of the constituents of the discharge in the conditions of use authorisations.

In emergency situations, where harmful substances are accidentally or negligently discharged into water resources, the Act makes those who have caused the pollution responsible for remedying its effects. However, catchment management agencies may, where necessary, accelerate the clean-up process by arranging for the work to be done by others and recovering any costs incurred from the responsible party. At present all pollution incidents must be reported to the Department so that appropriate responses can be co-ordinated, in conjunction with the National Disaster Management Centre, with the relevant emergency services and disaster management centres. Ultimately this responsibility will be passed to the catchment management agencies.

Pollution from diffuse sources such as informal settlements is extremely difficult to control at source. Inadequate sanitation facilities in such areas can result in the bacterial pollution of water resources, which may cause outbreaks of diseases such as cholera among people who use water directly from rivers. Until water supply and sanitation services can be improved throughout the country, this situation may lead to outbreaks of disease whose management will require close co-operation between the Department, water services authorities, and health and other emergency services. The National Disaster Management Centre has co-ordinated the development of an inter-departmental strategy to deal with cholera, and this provides the framework for dealing with such disease outbreaks.

3.7.3.6 Information for disaster management

The timely availability of information about potential, imminent or actual hazards is an essential requirement if institutions and the public are to be prepared for disaster situations. The information is needed to enable managers to decide on the most effective responses, including giving informed warnings to the public that may be at risk.

Two specific requirements of the Act in this regard are -

- section 144^[3] requires township developers to indicate the 100 year flood lines on their plans; and
- section 145^[4] requires all water management institutions, including the Department, to make information they have at their disposal available to anyone who may be affected by water-related incidents and events.

The requirements of section 145, together with the new requirements of the national disaster management legislation, emphasise the importance of improving and extending existing monitoring systems, and the development of information systems (see Part 6 of this chapter).

In respect of relatively rapid-onset events such as floods, dam breaks and pollution incidents, special attention will be given to improving facilities at strategic monitoring sites so that data can be transmitted as rapidly as possible to the Department and other relevant agencies. The Department will also strengthen its capacity to analyse the data and distribute it, either direct or via the National Disaster Management Centre, to communities threatened by an event.

With regard to floods, only the Vaal and Orange River Systems are considered to have adequate infrastructure to monitor rainfall and river flows that make it possible to provide acceptable flood warnings. The Flood Office at the Department's national office is called into operation when potential flood conditions arise in these river systems. It is planned to expand the capability of this office by introducing the use of river-flow forecasting models that can incorporate real-time rainfall information from the South African Weather Service's C-band radar installation network.

Elsewhere in the country flow gauging stations will be improved to enable them to measure and record flood flows, especially where infrastructure developments and residences are at risk on flood plains. Similar steps will be taken on rivers that are shared with neighbouring countries downstream.

The ability to predict the onset of floods and droughts requires rainfall data as well as stream flow information, but the size and extent of South Africa's rain gauge network has progressively decreased in recent years. The Department will work closely with the National Disaster Management Centre, the South African Weather Services and the Agricultural Research Council, all of whom collect rainfall data, to ensure that adequate rainfall data continues to be available to water resources and disaster managers.

Pollution incidents, especially those involving microbiological pollution and the presence of toxic matter in water resources, are a threat to human health. Attention will be given to improving water quality monitoring networks to detect such contamination and to ensure that relevant information is rapidly available to those at risk.

As part of its work with the National Disaster Management Centre the Department is leading the development of a disaster vulnerability atlas. This will capture and display all relevant information, for example topography, land use, rainfall and demography. that is required to support decision-making in emergencies and disaster situations. The development of a standard precipitation index as part of the atlas will provide a means of monitoring trends in soil moisture and surface and ground water to facilitate predictions of impending drought and flood conditions.

3.7.3.7 Departmental disaster management structures

The Department is in the process of developing internal organisational structures to deal with its responsibilities relating to disasters and emergencies in water resources management, water services and forestry.

During recent years the Department has had to deal with a series of potential or actual disaster situations and circumstances, as follows -

- In 1997/98 many parts of the country experienced drought conditions as a result of the Equatorial Pacific Ocean El Niño phenomenon. This necessitated the provision of emergency water supplies to communities that experienced water shortages and a review – and the acceleration, where necessary – of water services projects to reduce future vulnerability.
- At the end of 1999 all computerised and other date-dependent electronic systems used in the Department were reviewed against the threat of disruption by the Year 2000 (Y2k) rollover event. The Department also co-ordinated the preparation of emergency and contingency plans for the entire water sector, and monitored the date rollover.
- Devastating floods occurred in the north and north-east of the country in February/March 2000, disrupting water supplies to millions of people and causing damage to property and infrastructure estimated at a total of about R3 500 million, including damage of about R350 million to State-owned waterworks.
- In August 2000 a cholera epidemic caused many deaths in the eastern parts of the country, prompting the Department to accelerate programmes for the provision of basic water supply and sanitation services.
- A drought that began with below average rainfall in the summer rainfall areas in the 2002/2003 season persisted into the following year, necessitating emergency programmes to maintain basic water supplies.

Although the events were dealt with satisfactorily, they highlighted the need for a more integrated and focused approach to co-ordinating departmental activities and responses. It is anticipated that responsibilities in this respect will include -

- Ensuring that the Department meets its obligations under the National Disaster Management Act (see Chapter 5).
- Representing the Department in and co-ordinating all departmental interactions with relevant structures established by the new disaster management legislation, including the National Disaster Management Centre.
- Ensuring a two-way flow of relevant information between the Department and the National Disaster Management Centre.
- Contributing to the development of the National Disaster Management Framework and the preparation of the Department's disaster management plan as required by the National Disaster Management Act.
- Co-ordinating the activities of existing departmental units that are responsible for aspects of public safety.
- Ensuring that disaster management planning is incorporated into all catchment management strategies and the business plans of water user associations.
- Ensuring that contingency plans for water-related disasters are included in all Water Services Development Plans and business plans prepared by water services authorities and institutions.
- Ensuring effective communication with water user sectors in respect of possible supply restrictions due to drought.

Notes to Chapter 3, Part 7

¹ "Dam with a safety risk" means any dam (i) which can contain, store or dam more than 50 000 cubic metres of water, whether that water contains any substance or not, and which has a wall of a vertical

height of more than five metres, measured as the vertical difference between the lowest downstream ground elevation on the outside of the dam wall and the non-overspill crest level or the general top level of the dam wall; (ii) belonging to a category of dams declared under section 118(2) to be dams with a safety risk; or (iii) declared under section 118(3)(a) to be a dam with a safety risk (section 117(c)).

It should however be noted that regulations in terms of Section 9C(b) the Water Act, 1956 relating to dams with a safety risk (Government Notice R.1560, 25th July 1986) categorise dams with a safety risk into three category classes, I, II and III, which relate to the size class of the dam and its hazard potential rating, and where Category III represents the highest hazard potential rating.

² Regulations governing the establishment, constitution and functions of the Advisory Committee on Safety of Dams, made under the Water Act, 1956, Government Notice R.1876, 23rd August 1985.

³ Flood lines on plans for the establishment of townships - section 144: For the purposes of ensuring that all persons who might be affected have access to information regarding potential flood hazards, no person may establish a township unless the layout plan shows, in a form acceptable to the local authority concerned, lines indicating the maximum level likely to be reached by floodwaters on average once in every 100 years.

⁴ Duty to make information available to public - section 145: (1) A water management institution must, at its own expense, make information at its disposal available to the public in an appropriate manner in respect of (a) a flood which has occurred or which is likely to occur; (b) a drought which has occurred or which is likely to occur; (c) a waterwork which might fail or has failed, if the failure might endanger life or property; (d) any risk posed by any dam; (e) levels likely to be reached by floodwaters from time to time; (f) any risk posed by the quality of any water to life, health or property; and (g) any matter connected with water or water resources, which the public needs to know. (2) The Minister may, where reasonably practicable, establish an early warning system in relation to the events contemplated in subsection (1).

CHAPTER 3

PART 8 - ANTICIPATED PROGRAMME OF IMPLEMENTATION ACTIVITIES

3.8.1 INTRODUCTION

In this Part an indicative multi-year programme is presented for the implementation of the National Water Act (the Act) throughout the country. The programme is closely related to the Strategic Plans that the Department is required to prepare in terms of the Public Finance Management Act (see Chapter 5).

Given the size and complexity of many of the activities described, the programme is only indicative and should not be regarded as a rigid master plan. The programme will be reviewed in the light of experience gained during the currency of the First Edition of the National Water Resource Strategy (NWRS) and amended as necessary when the NWRS is reviewed.

Activities are grouped under three broad headings: operational activities; activities relating to water sharing arrangements with neighbouring countries; and the development of physical infrastructure.

This Part should be read with Part 9 of this chapter, which provides indicative costs of the activities discussed.

3.8.2 OPERATIONAL ACTIVITIES

Operational activities relate to all ongoing activities required for the protection, use, development, conservation, management and control of South Africa's water resources. There are two broad groups of activities: routine operational activities; and commissioning or establishment activities.

3.8.2.1 Routine operational activities

This group comprises activities that will be routinely undertaken for as long as the Act remains in force, and includes -

- The reconciliation of water requirements and water availability.
- The planning and design of capital works.
- The operation and maintenance of bulk water supply systems and schemes.
- Control of water use.
- Water conservation and demand management.
- The setting of tariffs and the collection of revenue.
- The collection, storing, analysis and dissemination of water-related information.
- Dam safety control.
- The control of invasive alien vegetation.

The individual programmes against which these routine activities are undertaken are not presented in this document.

3.8.2.2 Commissioning/establishment activities

This group comprises activities, all of which are new requirements of the Act, which will be undertaken only once and will have a finite (although in some cases rather long) duration. These are referred to as commissioning or establishment activities and they are intended to create an environment in which the efficiency and effectiveness of water resources management can be

progressively improved. They are of considerable magnitude and neither financial nor human resources are available to undertake them simultaneously in all 19 water management areas. Accordingly, they have been prioritised to reflect the needs and circumstances in each area. The activities included in this category are the following -

- Compulsory licensing.
- The establishment of catchment management agencies.
- The delegation of operational responsibility for physical infrastructure and transfer of the ownership of infrastructure to water management institutions.
- The establishment of new water user associations.
- The expansion of existing monitoring networks and information systems, and the establishment of new ones.

A further three operational activities require immediate attention and will be undertaken simultaneously in all water management areas -

- The introduction of revenue collection in terms of the water resources management charge.
- The completion of the transformation of irrigation boards into water user associations.
- The streamlining of the individual licence applications process so as to reduce delays.

The intention is to complete these three activities in all water management areas over a period of about two years.

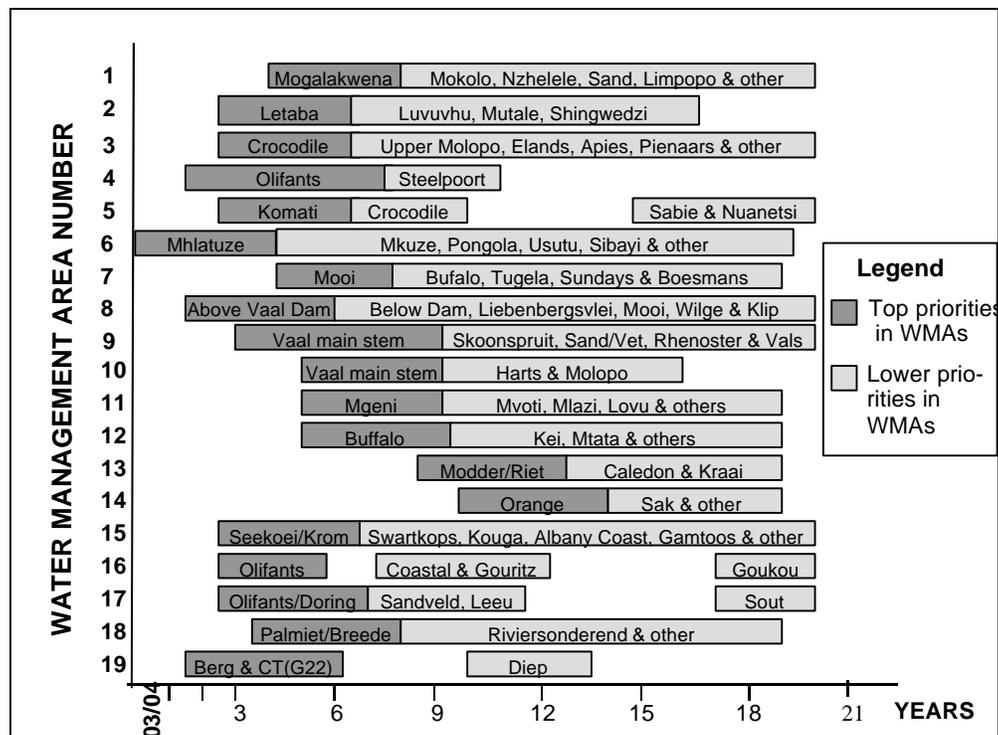
The indicative programmes for compulsory licensing, the establishment of catchment management agencies and the transfer of responsibilities related to infrastructure to water management institutions are presented in Figs 3.8.1, 3.8.2 and 3.8.3 respectively. A revised programme may be presented in the Second Edition of the NWRS.

Compulsory licensing

The process of compulsory licensing comprises -

- Verification of existing water use.
- Determination of water resource availability.
- Classification of the water resource.
- Setting of resource quality objectives.
- Determination of the Reserve.
- Development of components of the catchment management strategy.
- Calling for and evaluation of licence applications.
- Preparation of water allocation schedules and undertaking public consultation on them.
- Announcing water use allocations in the *Government Gazette*.
- Issuing licences.

Fig. 3.8.1: Indicative programme for compulsory licensing



The country has been divided into approximately 100 surface and groundwater resources at catchment scale for the purposes of compulsory licensing.

The criteria used for prioritising water resources for compulsory licensing included -:

- The extent to which water resources are under stress from over-utilisation.
- The need for water for rural development and poverty eradication.
- The urgency of implementing the Reserve requirements for ecological functioning.
- The need to satisfy international requirements and obligations.
- Projected increases in the demand for water.
- Water quality problems.
- Interactions between surface and groundwater.

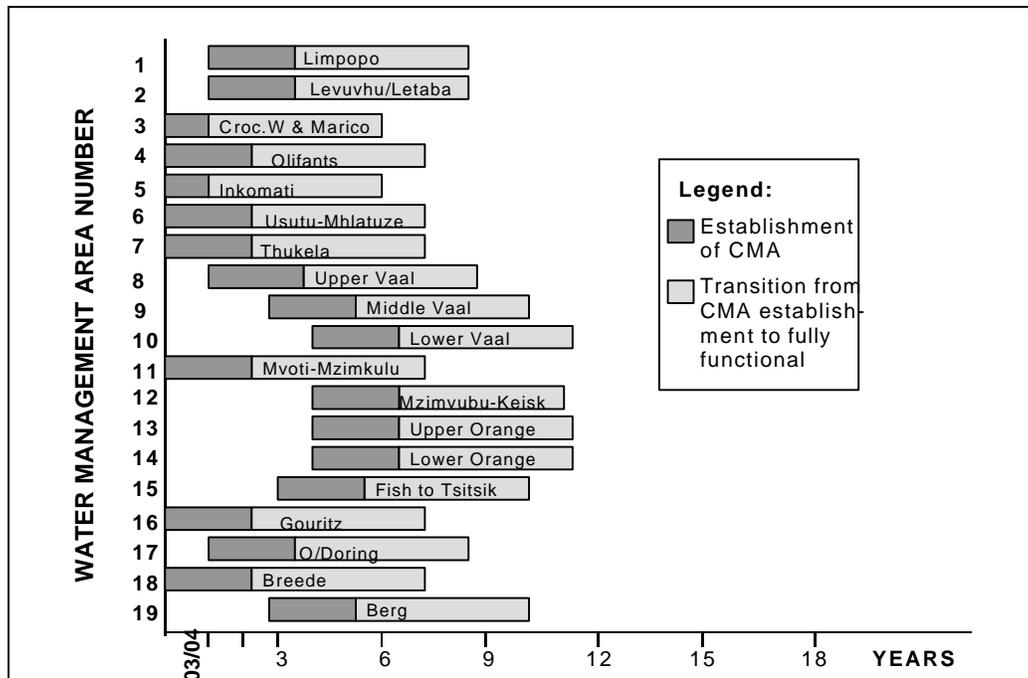
Compulsory licensing will be carried out in a number of catchments on a pilot basis. The experience gained at each stage will inform the ways in which compulsory licensing is carried out in the other areas. In addition, a number of stressed groundwater systems will be prioritised for compulsory licensing to prevent the continuation of current over-utilisation and the possibility of long-term damage to the systems.

Establishment of Catchment Management Agencies

Five water management areas have been identified where the establishment of catchment management agencies is urgent. These are the Inkomati, Olifants, Breede, Crocodile West and Marico, and Mvoti to Mzimkulu. The process of preparing an establishment proposal to the Minister is farthest advanced in the Inkomati water management area.

Depending on the complexity of the water management area, a period of two to three years has been allowed for the process of establishing the agency and appointing the governing board. A further five years will most likely be required for developing and establishing the executive structure of the agency.

Fig. 3.8.2: Indicative programme for establishing catchment management agencies



The following criteria were used for prioritising the establishment of catchment management agencies -

- The extent to which service delivery will be enhanced by the establishment of an agency.
- Anticipated revenue from water resource management charges to fund the agency's operations.
- Stakeholder expectations and their preparedness to participate in and progress with the establishment process.
- Priorities under the Integrated Rural Development Programme and other government programmes.
- Priority for compulsory licensing in the area.
- Anticipated developments that will require licensing. .

Delegation of functions and transfer of infrastructure to water management institutions

There are two distinctly different types of transfer to be considered, namely -

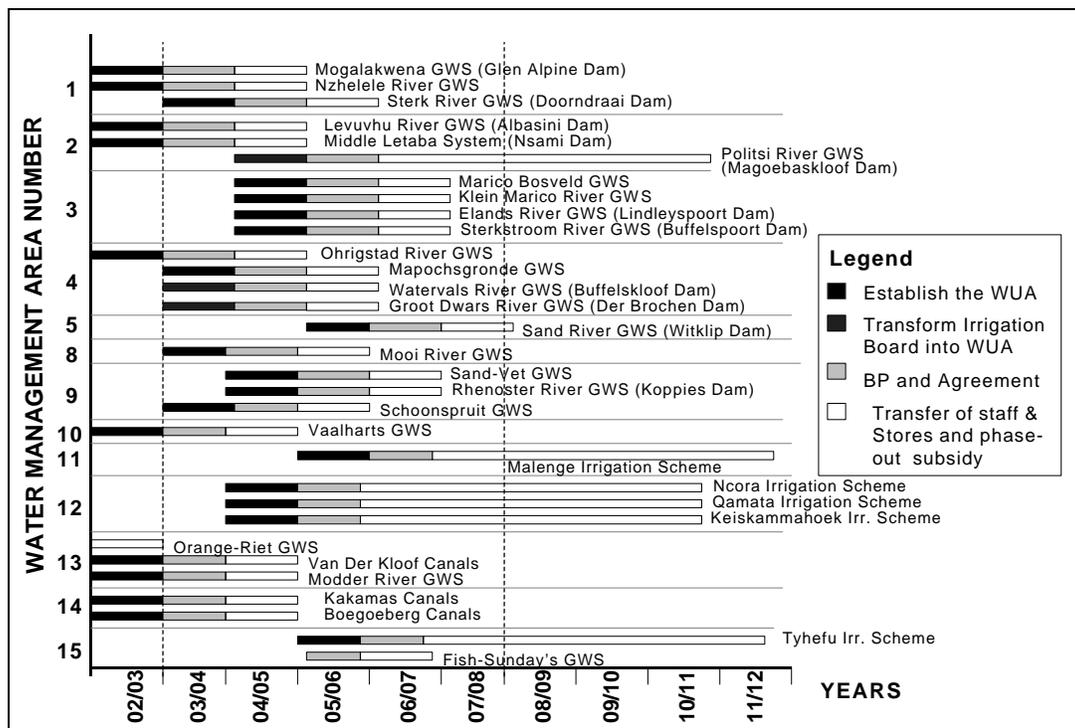
- The transfer, by delegation, of the operation and maintenance functions.
- The transfer of the ownership of the physical infrastructure (dams, canals, pipelines) to the institution.

The policy for transferring the ownership of existing State-owned and operated infrastructure is being developed. The optimal institutional arrangements for the development of new water resources infrastructure in general, and the development and management of schemes that include dams in particular, is under investigation.

At this stage, therefore, the programme provides information only on the proposed transfer of operation and maintenance responsibilities for irrigation schemes with distribution infrastructure - canals and pipelines - to water user associations. Where a dam forms part of an irrigation scheme, the operation and maintenance functions in respect of distribution infrastructure only will be delegated to associations, while the Department will continue to operate the dam. The associations' performance in carrying out the operation and maintenance responsibilities will be

monitored for up to five years before consideration is given to transferring the ownership of the assets.

Fig. 3.8.3: Indicative programme for delegating operation and maintenance functions to water user associations



There are five water user associations for which a five-year transfer phase is indicated because of the need to phase out subsidies to emerging farmers in terms of the pricing strategy (see Part 4 of this chapter). For the others the transfer period could be as little as one year.

The criteria that were used to prioritise the transfer of operation and maintenance responsibilities to water user associations included the following -

- The capacity of an association to take on the responsibilities.
- The extent to which service delivery would be improved by the transfer.
- The extent to which the infrastructure had been valued and appeared on an asset register.
- The effects of the transfer on the Department's staffing levels.

Responsibility for scheme operation and maintenance has already been delegated to water user associations on the following schemes -

- Crocodile River GWS (Hartbeespoort Canals) in WMA 3 (Crocodile West and Marico).
- Krokodilpoort GWS (Malelane Canals) in WMA 4 (Inkomati).
- Olifants River (Loskop) GWS in WMA 5 (Olifants).
- Pongola River GWS in WMA 6 (Usutu to Mhlathuze).
- Orange-Vaal GWS (Douglas Canals) in WMA 10 (Lower Vaal).
- Vaalharts GWS in WMA 10 (Lower Vaal).
- Leeu River GWS (Armenia) in WMA 13 (Upper Orange).
- Riet River GWS (Kalkfontein Canals) in WMA 13 (Upper Orange).
- Orange-Riet GWS in WMA 13 (Upper Orange).
- Gamtoos River GWS in WMA 15 (Fish to Tsitsikamma).

- Olifants River (Van Rhynsdorp) GWS (Clanwilliam and Vredendal Canals) in WMA 17 (Olifants/Doring).
- Elands River GWS (Villiersdorp) in WMA 18 (Breede).
- Korente Vette GWS in WMA 16 (Gouritz).
- Kammanassie River GWS in WMA 16 (Gouritz).
- Olifants River (De Rust) GWS in WMA 16 (Gouritz).
- Goukou GWS in WMA 16 (Gouritz).

Establishment of new water user associations

New water user associations will be established as the need arises. (see Part 5 of this chapter). It will however be necessary to establish new water user associations for some schemes so that the responsibility for operation and maintenance can be delegated to them and, ultimately, when the policy is established, the physical assets transferred to their ownership. The process of establishing an association in the Kat River (WMA 15 - Fish to Tsitsikamma) is in progress, and an association will be needed, for instance, for the operation and maintenance of the Sterk River GWS (WMA 1 – Limpopo).

Expansion of monitoring networks

- **Surface water - flow monitoring:** The proposed expansion of the monitoring network - national flow points, operational flow monitoring sites and meteorological stations - is expected to take between 20 and 25 years. Some infrastructure, such as gauging weirs, will be required. Improvements in the national flow point network are required in the following water management areas, in order of priority: Crocodile West and Marico (WMA 3); Berg (WMA 19); Olifants (WMA 4); Mzimvubu to Keiskamma (WMA 12); Usutu to Mhlathuze (WMA 6); Limpopo (WMA 1); Breede (WMA 18); Luvuvhu/Letaba (WMA 2); Gouritz (WMA 16); Inkomati (WMA 5); Thukela (WMA 7); and Olifants/Doring (WMA 17).
- **Surface water - water quality monitoring -**
 - Microbial monitoring:** Expansion of the network to cover all water management areas is expected to be completed by 2007.
 - Eutrophication monitoring:** Expansion of the network from 50 to 100 reservoirs is scheduled for completion by 2012.
 - Biological monitoring:** The programme is expected to be operational in at least one major catchment in each province by 2006, and to produce a State of the Rivers Report for all major river systems by 2008.
 - Toxicity monitoring:** Programme planning and design is expected to be complete by 2010.
 - Radioactivity:** Programme planning, design and implementation is scheduled for completion by 2012.
- **Groundwater monitoring:** Guidelines for the expansion of the national monitoring network from its present 150 points to the required 460 points will be available during 2004 and the planned expansion is expected to be completed by 2006. Implementation will be prioritised to accord with the programmes for compulsory licensing and provision of water services from groundwater sources.

Development of information systems

- **Surface water hydrology:** The new system was installed in the Department's national office during 2002 and is expected to be fully operational in all departmental regional offices during 2004.
- **Water quality:** The Water Management System is functional and operational in the Department's national office and in one regional office. The system is expected to be fully operational throughout the Department in 2007.

- **Groundwater:** The national groundwater information system was installed in the Department's national office and three regional offices by the end of 2002, and is expected to be fully operational in all regions by 2004.
- **Water use registration and authorisation (WARMS):** The registration component of the system has been in use since 2000. The cost recovery functions were operationalised in early 2002, with the licensing capabilities followed in 2003. Links with national databases operated by other departments should be established in 2004.

3.8.3 INTERNATIONAL WATER-SHARING AGREEMENTS

An indicative programme for the establishment of international institutions, the completion of basin studies and the establishment of water sharing agreements is presented in Table 3.8.1. In addition to the major initiatives outlined in the Table, the various bi- and multi-lateral committees and commissions also negotiate agreements concerning such matters as information sharing among States and the necessity for water resources management interventions to ensure that the interests of all relevant countries are safeguarded. Water resources management interventions may deal with issues such as water quality, extreme flow events or ecological issues.

Table 3.8.1: Indicative programme for international water sharing agreements

Shared watercourses	Neighbouring countries sharing the watercourse	Programme for studies and agreements	Date
Orange	Botswana Lesotho Namibia	• Orange-Senqu Basin Commission (established)	2000
		• Lower Orange River Management Study (RSA/Namibia) initiated	Mid-2003
		• Lesotho Highlands Water Project – Further Phases Pre-Commitment Study	2005
		• Feasibility study for the sustainable development of Molopo-Nossob Watercourse	2004
		• Integrated water resources management plan for Orange-Senqu Basin	2005
Limpopo	Botswana Mozambique Zimbabwe	• Treaty to establish the Limpopo Basin Commission signed	2003
		• Limpopo Basin Study	2004
Inkomati	Mozambique Swaziland	• Joint Inkomati Basin Study completed	2002
		• Interim Water Sharing Agreement signed	2002
		• Treaty to establish Inkomati Basin Commission	2004
		• Comprehensive Water Sharing Agreement	2009
Maputo	Mozambique Swaziland	• Interim Water Sharing Agreement signed	2002
		• Treaty to establish Maputo Basin Commission	2004
		• Maputo Basin Study	2005
		• Comprehensive Water Sharing Agreement	2010

3.8.4 DEVELOPMENT OF PHYSICAL INFRASTRUCTURE

3.8.4.1 Major government waterworks

In terms of its current mandate the Department has investigated the necessity for the construction of a number of major government waterworks comprising dams and, where necessary, associated infrastructure such as pumping stations, pipelines and canals, to meet projected future water needs. The investigations formed part of the integrated approach to finding solutions to problems of water availability described in Chapter 2, which includes water demand management and conservation. These schemes are listed in Tables 3.8.2 and 3.8.3 at the end of this part. The following should be noted -

- **Inclusion of a scheme as a possible development does not constitute a commitment to proceed with the scheme.**
- In general, only schemes that may be required by or before 2025 are mentioned. The preferred options are listed with, where relevant, an indication of alternative options that were investigated.
- More details about the need for and alternatives to the schemes are provided in Chapter 2 and Appendix D. Other possible developments that may be required after 2025 are mentioned in Appendix D.
- More detailed investigations will be undertaken for schemes that impact only at catchment level or within a single water management area when catchment management strategies are developed. The Department (or an agency to manage such infrastructure, if it is established - see Part 5 of this chapter) will remain responsible for schemes that affect more than one water management area, schemes of a strategic nature and schemes with international implications.
- All developments will be the subject of social and environmental impact assessments as well as economic feasibility studies.

Schemes intended primarily for irrigation purposes

The schemes listed in Table 3.8.2 have been proposed either to enable new irrigation areas to be established, or to improve the reliability of supply to existing irrigation schemes during times of water shortage. New irrigation areas could include the development of irrigation farming among emerging farmers.

The feasibility of many of the schemes has not yet been determined and it is possible that they will not prove to be economically viable in terms of irrigators being able to pay all water use charges relating to establishment (capital), operating and maintenance costs. Some schemes may only be economically feasible if capital subsidies are made available to cover the cost of establishing the infrastructure. However, although subsidies will continue to be provided to support the establishment of merging farmers, at present it is not government policy to subsidise large-scale irrigated agriculture. The environmental and social impacts of these schemes have not yet been fully investigated.

Accordingly, no firm required completion dates are proposed for any of the schemes. However, should government policy with regard to the development of irrigated agriculture change, the schemes could be completed by the possible completion dates indicated. These dates make allowance for the time required to plan, design and construct the schemes and take into account any preparatory work that has already been carried out. The possible completion dates do not, however, make allowance for the often considerable period it takes for the impoundment to fill after completion of the dam wall.

Schemes intended primarily for domestic, urban, industrial or mining purposes

The schemes listed in Table 3.8.3 are being or will be investigated because the base water demand scenarios (see Chapter 2 and Appendix D) indicate that requirements for water in the relevant water management areas already exceed water availability, or will do so before 2025. Only a possible completion date is indicated for each scheme. As for irrigation schemes, the possible completion dates allow for the time required for planning, design and construction and take account of any investigations that have already been carried out, but do not allow for the simultaneous planning, design and construction of all the schemes.

It should be noted that the demand scenarios make allowance for the immediate provision of water to meet ecological Reserve requirements. This will take some time to implement fully. In addition, the demand scenarios make no allowance for the implementation of water conservation and demand management measures. The combined effect of the progressive implementation of ecological Reserve requirements and successful water conservation and water demand

management measures could, in many cases, serve to delay the requirement for supply augmentation well beyond the possible completion date. In most cases the possible delay has not yet been reliably quantified, and is receiving the Department's attention.

The following other two important schemes have been investigated, but are not included in Table 3.8.3 because demand scenarios indicate that supply augmentation is unlikely to be required during the planning period to 2025 -

- The Thukela Water Project for the transfer of water from the Thukela River to the Vaal River System to meet increasing urban and industrial demand in Gauteng and surrounding areas. The scheme under investigation, with an anticipated yield of 510 million m³/a, comprises the construction of dams on the Thukela River (at the Jana site) and the Bushmans River (at the Mielietuin site) and transfer aqueducts. Possible alternatives to meet rising demand in the Vaal System are transfers of water from the proposed Mashai Dam in Lesotho (Phase 2 of the Lesotho Highlands Water Project) and a dam at the Orange/Kwaai confluence (at the Boskraai site) in the Upper Orange water management area.
- The Thukela-Mhlathuze Transfer Scheme, which could transfer a maximum of an additional 54 million m³/a from the Thukela River into the Mhlathuze water management area for possible mining and industrial developments. Water could be abstracted from sites on the Thukela at Mandini for use at the Fairbreeze mine, or at Middeldrift, via Goedertrouw Dam, for use at Richards Bay and surrounding areas.

Table 3.8.2: Possible future large-scale water resource developments, primarily for irrigation purposes

WMA	Name of dam site / scheme ⁴	River	Province	Use	Required completion date	Possible completion date	Estimated yield or increase in yield ⁵ (mill m ³ /a)	Comments
2	Tzaneen Dam raising and a dam at nWamitwa	Letaba	Limpopo	Irrigation, domestic	Undefined	2007	50	The need for the development will depend on growth in requirements and the socio-economic impacts of ecological Reserve requirements. Possible impacts on Mozambique must be considered.
6	Dam at Embiane	Black Mfolozi	KwaZulu-Natal	Irrigation, domestic	Undefined	2009	10	Development proposed for settlement of small farmers, subject to feasibility. dam at Sikwebezi is a possible alternative.
14	Dam at Violsdrif	Orange	Northern Cape	Irrigation, improved operation of Orange River System	Undefined	2012	150	Possible joint development with Namibia. Study in progress.
17	Raising of Clanwilliam Dam	Olifants	Western Cape	Irrigation	Undefined	2009	10	Study underway. Improvements required to the existing dam wall for safety reasons could make simultaneous raising viable.
17	Dam at Melkboom	Doring	Western Cape	Irrigation	Undefined	2011	121	Study underway. Dam at Aspoort is an alternative.

Notes:

1. See explanatory text in section 3.8.2.1.
2. Only schemes that may be required by or before 2025 are listed.
3. **The listing of an option does not imply any commitment to proceed with the development of the scheme.**
4. The name of dam site usually refers to the name of the farm on which the dam wall is to be situated.
5. Except where indicated, estimates of yield or increase in yield are current at February 2003 and are consistent with water availability figures elsewhere in the NWRS. They will be refined as necessary should work on the project be progressed.

Table 3.8.3: Possible future large-scale water resource developments, primarily for domestic, urban, industrial or mining purposes

WMA	Name of dam site / scheme ⁴	River	Province	Use	Possible completion date	Estimated yield or increase in yield ⁵ (mill m ³ /a)	Comments
4	Raising of Flag Boshielo Dam	Olifants	Mpumalanga	Mining, urban, industrial in Olifants and Limpopo WMAs	2005	16	Includes possible transfers to Limpopo WMA. The raising has been approved, and construction is in progress.
4	Dam at De Hoop	Steelpoort	Mpumalanga	Mining, domestic (urban and rural)	2010	90 ⁶	To meet growth in mining and domestic requirements in the Polokwane, Mokopane (WMA 1), Steelpoort, Burgersfort, Lebowakgomo and Nebo areas (WMA 4).
4	Dam at Rooipoort	Olifants	Limpopo	Mining, domestic (urban and rural)	2010	45 ⁶	Possible future phase to follow De Hoop when yield is fully utilised, serving the same areas.
5	Dam at Mountain View	Kaap	Mpumalanga	Domestic, irrigation	2012	64	Possible joint development with neighbouring countries
5	Dam at Boekenhoutrand	Komati	Mpumalanga	Power generation, irrigation	2012	50	Will depend on the impact on the existing system of implementing the Reserve.
7	Dam at Springgrove and aqueduct	Mooi	KwaZulu-Natal	Transfer to Umgeni system. Urban, industrial.	2010	88	Implementation may be required by 2005. Successful water demand management could delay the need for augmentation until 2014. Dams at Impendle and/or Smithfield are possible future options.

Notes:

1. See explanatory text in section 3.8.2.1.
2. Only schemes that may be required by or before 2025 are listed.
3. **The listing of an option does not imply any commitment to proceed with the development of the scheme, unless it is clearly stated as "approved".**
4. The name of dam site usually refers to the name of the farm on which the dam wall is to be situated.
5. Except where indicated, estimates of yield or increase in yield are current at February 2003 and are consistent with water availability figures elsewhere in the NWRS. They will be refined as necessary should work on the project be progressed.
6. Estimates of yield current at May 2004.

Table 3.8.3 (continued): Possible future large-scale water resource developments, primarily for domestic, urban, industrial or mining purposes

WMA	Name of dam site / scheme ⁴	River	Province	Use	Possible completion date	Estimated yield or increase in yield ⁵ (mill m ³ /a)	Comments
8	Klip River Dam	Klip River	Free State / Mpumalanga	Urban, industrial, power generation on the Eastern Highveld	2009	50	Transfers from Usutu-Mhlathuze WMA is an alternative and/or dam at Boekenhoutrand.
11	Dam at ISithundu	Mvoti	KwaZulu-Natal	Multi-purpose	2011	47	The Stanger area is experiencing water shortages. The dam will be required if other interventions do not provide a solution.
19	Berg River Project	Berg	Western Cape	Urban, industrial	2008	81	The dam has been approved for construction. Diversion from Molenaars River in Breede WMA is a possible further extension.
19	Voëlvlei Dam Augmentation	Berg	Western Cape	Urban, industrial	2015	30	Augmentation for West Coast and Greater Cape Town Metropolitan Area. Mitchells Pass Weir diversion to Voëlvlei is a possible future extension. Lourens River and Eerste River diversions and groundwater development are other alternatives being considered for future supply augmentation for the Greater Cape Town Area.
19	Table Mountain Group Aquifer	Berg and Breede	Western Cape	Urban, industrial	2016	70	Augmentation for Greater Cape Town Metropolitan area. Pre-feasibility study in progress.

Notes:

1. See explanatory text in section 3.8.2.1.
2. Only schemes that may be required by or before 2025 are listed.
3. **The listing of an option does not imply any commitment to proceed with the development of the scheme, unless it is clearly stated as "approved".**
4. The name of dam site usually refers to the name of the farm on which the dam wall is to be situated.
5. Except where indicated, estimates of yield or increase in yield are current at February 2003 and are consistent with water availability figures elsewhere in the NWRS. They will be refined as necessary should work on the project be progressed.

CHAPTER 3

PART 9 - FINANCIAL IMPLICATIONS

3.9.1 INTRODUCTION

Implementation of the strategies described in this First Edition of the National Water Resource Strategy (NWRS) will require extensive financial resources. The purpose of this part is to summarise the broad financial implications of the main activities required to implement the provisions of the National Water Act (the Act) and to indicate the arrangements for funding them.

All quoted costs and revenues, which must be regarded as indicative, are given at 2002 price levels unless otherwise indicated. They relate to costs that will be incurred by and revenues that will accrue to the Department and water management institutions as they progressively assume duties and responsibilities under the Act.

It is, however, acknowledged that individual users and water management and water services institutions will also incur costs in complying with the requirements of the Act. For instance, capital expenditure may be required to provide for activities such as the storage and transmission of water, investments in the treatment of waste or water containing waste before it is discharged into a water resource, the refurbishment or replacement of distribution systems as part of loss control programmes, and the purchase of water use entitlements to increase the economic efficiency of water use. Monitoring activities to comply with licence conditions may necessitate additional operational expenditure. The necessity for and magnitude of such expenditure has not yet been assessed.

Costs are grouped into two broad categories. First, the costs of operational activities relating to the protection, use, conservation, management and control of the nation's water resources, and, second, the capital costs of developing water resources infrastructure.

This part should be read in conjunction with Part 8 of this chapter, which discusses the anticipated programme for the activities for which indicative costs are provided.

3.9.2 OPERATING COSTS

Operating costs include the costs of all ongoing activities for the protection, use, conservation, management and control of the nation's water resources. Indicative costs are presented for the two broad groups of operational implementation activities, that is, routine activities and activities relating to commissioning or establishment, described in Part 8 of this chapter. It should be noted that many of the commissioning/establishment activities will extend into the next decade.

3.9.2.1 Routine operational activities

The total estimated annual funding requirement for routine operational activities is R 1 800 million.

This is R 200 million more than the Department's budget allocation for financial year 2002/3. The additional amount is needed to ensure that certain activities carried out under the Integrated Catchment Management component of the Water Trading Account (see below) - the development of catchment management strategies, the control of water use, water quality management, water conservation and water demand management, dam safety control and functional support to water management institutions - can be optimally carried out.

preferred option, nor that it is still viable, since circumstances may have changed since the investigation.

In all cases the estimates include the full costs of bulk storage and the costs associated with environmental and social impact mitigation but, unless indicated, exclude the costs of raw water transfer and conveyance works. Estimates exclude the costs of the “downstream” developments needed to use the water, such as the infrastructure required to treat the water, to pump or otherwise convey water to the point of use and, in the case of irrigation schemes, to prepare land.

Table 3.9.1: Indicative costs of major government water schemes

WMA	Name of dam / scheme ¹	River	Stage of Investigation ²	Indicative Cost ³ (R million)
Schemes primarily for irrigation purposes				
2	Tzaneen Dam raising and Dam at nWamitwa	Letaba	Feasibility	847
6	Dam at Embiane	Black Mfolozi	Pre - Reconnaissance	110
14	Dam at Vioolsdrif	Orange	Pre-feasibility	200
17	Clanwilliam Dam raising	Olifants	Pre-feasibility	160
17	Dam at Melkboom	Doring	Pre-feasibility	815
Sub-total				2 132
Schemes primarily for domestic, urban, industrial or mining purposes				
4	Flag Boshielo Dam raising	Olifants	Construction ⁴	270
4	Dam at De Hoop and bulk raw water conveyance infrastructure	Steelpoort	Feasibility	4 000
4	Dam at Rooipoort	Olifants	Feasibility	782
5	Dam at Mountain View	Kaap	Reconnaissance	381
5	Dam at Boekenhoutrand	Komati	Pre-Reconnaissance	691
7/6	Thukela-Mhlathuze Transfer ⁵	Thukela/ Mhlathuze	Pre-feasibility	339
7	Thukela Water Project ⁶	Thukela	Feasibility	6 736
7	Dam at Springgrove and aqueduct	Mooi	Feasibility	362
8	Klip River Dam	Klip River	Pre-feasibility	371
8	Vaal River Eastern Sub-System Augmentation (pipeline from Vaal Dam to Secunda)	Vaal	Feasibility	2 979
11	Dam at iSithundu	Mvoti	Feasibility	532
19	Berg River Project	Berg	Construction ⁴	1 188
19	Voelvrei Dam Augmentation	Berg	Feasibility	225
Sub-total				18 856
Total				20 988

Notes:

- 1 The name of dam site usually refers to the name of the farm on which the dam wall is to be situated.
- 2, 3 Except for projects under construction (see Note 4) indicative costs (some of which were estimated some years ago) have been adjusted to 2003 levels. Confidence in the estimates depends on the stage of investigation as follows -
 - Pre-reconnaissance: The need for a project is identified and a number of options are investigated at a very low level of detail to select potentially feasible options
 - Reconnaissance: Potentially feasible options are studied at a low level of detail to identify feasible options and to determine the scope of further investigations.

- Pre-feasibility: Feasible options are studied in more detail to select one option for detailed investigation.
 - Feasibility: Detailed investigations, including extensive fieldwork, are carried out to confirm the technical, environmental, social, economic and financial viability of the selected option.
4. Indicative costs for schemes under construction are tender prices.
 5. Indicative costs are included for transferring water from the Thukela River into the Usutu to Mhlathuze water management area for possible mining and industrial development in the Richards Bay area.
 6. The Thukela Water Project is included to represent the indicative costs of a transfer scheme to bring additional water into the Upper Vaal Water Management Area. This could also be achieved via Phase 2 of the Lesotho Highlands Water Project, or by transferring water from the Upper Orange River.

3.9.3.2 Expansion of national monitoring networks

Capital expenditure on infrastructure development will also be required to expand national monitoring systems, as described in Part 7 of this chapter.

Using present monitoring technologies, the capital expenditure required to expand the network to optimum levels may be as high as R1 300 million over the next 20 to 25 years, or about R60 million a year. (Provisions for this purpose in the allocation for 2002/3 amounted to only about R 2 million).

3.9.3.3 Other capital expenditure

Capital expenditure is also required for refurbishment works (betterments) on existing government water schemes, the redemption of existing loans, financial assistance to statutory bodies (transfer payments) and movable assets such as computer and monitoring equipment.

It is estimated that approximately R 530 million a year will be required for these activities for the foreseeable future, equal to the allocation in 2002/3.

3.9.3.4 Total capital costs

Total estimated capital expenditure over the next 20 to 25 years could therefore amount to a total of approximately R1 430 per year, as follows -

- Major new government waterworks	R 20 988 million	Av. ±R 840 million a year
- Expansion of national monitoring networks	R 1 300 million	Av. ±R 60 million a year
- Other capital items		R 530 million a year

3.9.4 EXISTING FUNDING

At present the Department's water resources management activities are mainly funded from two sources: allocations from the government's Exchequer Account; and revenue from the sale of water via the Water Trading Account. The Department also benefits from some international donor funding.

3.9.4.1 Revenues from water use charges - the Water Trading Account

The Department recovers revenue from water use charges made in terms of the water pricing strategy via its Water Trading Account. The intention is to recover all costs incurred, but the Water Trading Account currently operates at a loss. The deficit is made good by an augmentation allocation from the Exchequer Account.

The Department will continue to operate the Water Trading Account until such time as water management institutions - catchment management agencies, water user associations and any

future infrastructure management agency or agencies that may be established - are empowered to collect revenue from water users in terms of the pricing strategy.

The Water Services component of the Trading Account is concerned with schemes that supply water mainly for domestic use. It is scheduled to be closed in 2005/6 following the transfer of water services schemes to local government in terms of the Division of Revenue Act, 2002, and is not discussed here.

3.9.4.2 Donor funding

From time to time other countries assist the Department by providing donor funding. Usually this is provided to finance specific projects. Some donors have made multi-year commitments. The Department is regularly involved in negotiations for assistance with international partners, but the amount of donor funding has been declining in recent years and this trend can be expected to continue. The exception may, however, be in respect of co-operative programmes of regional scope that support the global public goods such as the protection of biodiversity and hydrological monitoring.

3.9.5 FUTURE FUNDING ARRANGEMENTS

During the next 10 to 15 years the majority of the Department's operational and development responsibilities will be delegated or assigned to water management institutions. These institutional changes will profoundly affect the Department's funding requirements and revenue streams.

3.9.5.1 Operational activities

The progressive transfer of water resources management responsibilities to catchment management agencies will include the transfer of all costs and revenues associated with the Integrated Catchment Management component of the Water Trading Account. This component currently runs at a deficit. Similarly, the progressive transfer of operation and maintenance responsibilities for irrigation schemes to water user associations will include the transfer of all costs and revenues associated with the Bulk Water Supply component. This component also runs at a deficit.

Water use charges in terms of the water pricing strategy will improve revenue streams with time by progressively introducing tariffs that more closely reflect the actual costs of water resources management activities, and broadening the user base from which financial contributions are drawn. The Department introduced water resources management charges in terms of the water pricing strategy in 2002 and will continue to implement the strategy in a phased manner. Vigorous efforts will be made to improve and sustain the level of revenue collection so that there will eventually be no need for allocations from the Exchequer to augment revenue.

The Department will support water management institutions as they take over the responsibility for revenue collection. Nevertheless, until such time as water management institutions become financially self-sufficient provision will be made for Exchequer funding to cover deficits.

The processes of establishing and developing catchment management agencies and compulsory licensing will require ongoing Exchequer allocations, an investment in the development of institutional self-sufficiency in water resources management.

The duration and extent of continuing financial support for water management institutions will become clear as the Department gains experience through pilot implementation processes. The objective is, however, to implement the activities described in the Strategy without any substantial increases in Exchequer funding.

3.9.5.2 Infrastructure development

In terms of national policy, the majority of infrastructure development required to support economic activity should be funded off-budget through payments by users. One of the objectives of the current review of arrangements for developing and managing water-related infrastructure is to make recommendations for a coherent approach to the financing of capital investments. The establishment of a national water resources infrastructure agency or a number of regional agencies (see Part 5 of this chapter) could significantly reduce the need for direct government expenditure on capital works by facilitating off-budget funding flows.

The review is also investigating funding mechanisms for investments where long payback times or financially weak consumers do not make it possible for a project finance approach to be adopted. Some government funding may continue to be required for the development of schemes of this nature, intended primarily for irrigation, social, disaster mitigation or environmental purposes, or to meet international obligations. Exchequer funding will also continue to be required for the capital costs of expanding the monitoring network.

If all the irrigation-orientated schemes identified in Table 3.9.1, as well as the structures required to expand the monitoring network, are built in the next 20 to 25 years, and if none of these are financed off-budget, the average annual capital funding requirement from the Exchequer will amount to around R145 million; R85 million for water supply schemes and R60 million for monitoring infrastructure.

If a water resources infrastructure agency is established it should be possible to implement a self-funded programme aimed at developing the required infrastructure. However, if a separate organisational entity is established within the Department for the development and management of major infrastructure new projects and capital expenditure will have to be funded directly from the Exchequer under the present financial management arrangements. If all the schemes identified in Table 3.9.1 as being primarily for domestic, urban, industrial and mining purposes are built in the next 25 years, the average annual capital funding requirement would be R755 million.

It should be noted that a substantial proportion of capital investment in the past decade has been financed off budget from sources other than the National Treasury. These include the following -

- The water transfer component of the Lesotho Highlands Water Project was financed by loans arranged by the project authorities and managed by the Trans-Caledon Tunnel Authority, the statutory body established for this purpose. The Authority also undertook the construction of the delivery tunnel from Lesotho into South Africa and associated infrastructure in South Africa. The loans, which are guaranteed by the South African government, are serviced from charges made by the Department on water users in the Vaal System and remitted to the Authority.
- The Trans-Caledon Tunnel Authority, acting as an agent for the Department and the City of Cape Town, is responsible for raising the finance for the construction of the recently approved Berg River Project in the Western Cape Province, including a dam on the farm Skuifraam^[1]. Loans for the project will not be guaranteed by the government.
- The Komati Basin Water Authority was responsible for arranging finance for and undertaking the construction of water resources infrastructure in the Komati River Basin in South Africa and Swaziland, and is now responsible for servicing the loans from grants (subventions) received from the governments of Swaziland and South Africa.
- Dam development in the Usutu River to facilitate power generation and current projects to increase the transmission capacity of the system are largely financed by the principal user, Eskom.
- Similar arrangements with mining interests have been put in place to finance the raising of the Flag Boshielo Dam on the Olifants River (north).

Similar arrangements will not necessarily be possible for other projects scheduled to be built within this First Edition NWRS review period, and a substantial increase in Exchequer funding may be required for the projects if institutional restructuring is not undertaken.

3.9.6 CONCLUSION

From the above it appears that the Act's provisions can be implemented within the existing financial framework. The future size of the Exchequer allocation will depend on the Department's success in raising and maintaining the level of payments for water in terms of the national water pricing strategy, and on it being allowed to retain existing Exchequer allocations and revenue from water use charges to finance commissioning/ establishment activities.

The initial review suggests that the requirement for capital expenditure on new government waterworks could average approximately R900 million a year. A large proportion of this amount could be funded off budget if institutional restructuring is implemented. Should this not occur, the Exchequer's allocations for major capital investments may have to be increased.

Note to Chapter 3, Part 9

¹ In addition to the financing arrangements TCTA is also responsible for the implementation of the Berg Water Project, including engineering, construction, environmental (natural and social) and communications issues.