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Water Research Commission

Annual Report 2001/02

water */'wɔ:tə/ n. & v.* •*n.* **1** a colourless transparent odourless tasteless liquid compound of oxygen and hydrogen. Chem. formula: H_2O. **2** a liquid consisting chiefly of this and found in seas, lakes, and rivers, in rain, and in the fluids of living organisms. **3** an expanse of water; a sea, lake, river, etc. **4** (in *pl.*) part of a sea or river (*in Icelandic waters*). **5** (often as **the waters**) mineral water at a spa etc. **6** the state of a tide (*high water*). **7** a solution of a specified substance in water (*lavender-water*). **8** the quality of the transparency and brilliance of a gem, esp. a diamond. **9** *Finance* an amount of nominal capital added by watering (see sense 10 of *v.*). **10** (*attrib*) **a** found in, on, or near water. **b** of, for, or worked by water. **c** involving, using, or yielding water. **11 a** urine. **b** (usu. in *pl.*) the amniotic fluid discharged from the womb before childbirth. •*v.* **1** tr. sprinkle or soak with water. **2** *tr.* supply (a plant) with water. **3** *tr.* give water to (an animal) to drink. **4** *intr.* (of the mouth or eyes) secrete water as saliva or tears. **5** *tr.* (as **watered** *adj.*) (of silk etc.) having irregular wavy glossy markings. **6** *tr.* adulterate (milk, beer, etc.) with water. **7** tr. (of a river etc.) supply (a place) with water. **8** *intr.* (of an animal) go to a pool etc. to drink. **9** *intr.* (of a ship, engine, etc., or the person in charge of it) take in a supply of water. **10** *tr. Finance* increase (a company's debt, or nominal capital) by the issue of new shares without a corresponding addition to assets.

The Concise Oxford Dictionary Ninth Edition

Water Research Commission

Our Vision

To be a globally recognised leader in providing innovative solutions for sustainable water management to meet the changing needs of society and the environment.

Our Mission

The WRC is a dynamic hub for water-centred knowledge, innovation and intellectual capital. We provide leadership to research and development through the support of knowledge creation, transfer and application. We engage stakeholders and partners in solving water-related problems which are crucial to South Africa's sustainable development and economic growth, and are committed to promoting a better quality of life for all.

ISBN: 0-601-33181-3
RP Number: 137/2002

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From the Chair

Dr HC Kasan
General Manager:
Water Treatment Technology
Rand Water

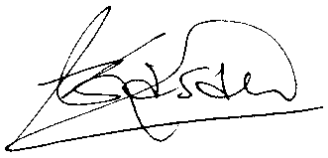
This year marked the 30th anniversary of the WRC. In the last three decades the WRC made notable contributions towards improving the quality and the capacity of South Africa's research base and its ability to undertake water-related research and development (R&D) initiatives. The WRC has mobilised the development of research expertise over a wide range of disciplines, resulting in a significant expansion and upgrading of expertise in the South African water sector. The R&D initiatives supported by the WRC have been of importance to our water sector, providing the scientific basis for the development of new policies and strategies as well as process- and product-directed technologies.

While the year 2001/2002 marks a year of reflection on the achievements of the past, it was mostly a year of 'strategic re-thinking', a year of review and assessment of the external and internal environment, and a period of looking forward. During the period under review, a number of changes, both in the leadership of the Board and the management of the WRC, took place. A new Chief Executive Officer (CEO), Dr Rivka Kfir, was appointed in July 2001 with a clear mandate to transform the organisation. Her appointment ended a long period of uncertainty, internally and externally. Thereafter, in December 2001, the Chairperson of the Board resigned and I was appointed as the new Chairperson. I view my appointment as a great honour and its timing as a challenge, coinciding as it did with a crucial period for the WRC, given the immediate need to make key strategic decisions for the future well-being of the organisation.

During this year the foundation for a strategic journey of organisational transformation was laid. This journey commenced with the development of a new strategic direction, the establishment of a new mode of operation and organisational design, as well as the introduction of new supporting processes, systems and culture. Building on its sound foundation formed over the past 30 years, the WRC developed a new core strategy which took into account the changing needs of its dynamic environment, both locally and globally, the aim being to improve the organisation's provision of support in solving the complex and challenging problems facing the South African water sector. The WRC's new strategy emphasises the organisation's role as a hub for water-centred knowledge, innovation and intellectual capital, providing leadership for R&D through the support of knowledge creation, transfer and application. Through its new strategy, the WRC will focus on initiating new drives and linking up to existing channels that would support appropriate dissemination and application of the new knowledge created by investing in R&D. Through its various funding- and networking-based activities, and by aligning itself with national priorities and presidential imperatives, the WRC aims to engage stakeholders and partners in solving water-related problems which are crucial to South Africa's sustainable development and economic growth, while assisting in positioning the country in the African Continent through the WRC's involvement in the New Partnership for Africa's Development (NEPAD).

As indicated above, the new strategy required the formulation of new structures, processes and supporting systems within the organisation, while re-establishing existing external relationships and building new networks. The WRC underwent an internal process of consolidating its activities into eight functional groups under the leadership of the CEO, Deputy CEO and six Directors. Throughout this period of transition and building its new mode of operation, the WRC maintained continuity by serving South Africa via its existing structures. Under the leadership of an active and dynamic Board and with much energy, motivation and commitment of its senior staff members, the WRC revised its funding strategy and developed a new mode of operation, transforming its 17 research fields into five key strategic areas with an additional four crosscutting domains. A key issue was timing and readiness of the organisation to embark on a new cycle of investment in knowledge creation, as well as to maintain its support of knowledge dissemination and application. During this period the WRC also developed and worked towards attaining goals in five key performance areas, having clear targets for transformation of the organisation and for fulfilment of its roles in creating knowledge and strengthening the knowledge base.

In closing, I would like to thank the previous Chairperson of the Board, Prof Kingston Nyamapfene, for his long-term commitment to and support of the WRC. I would also like to thank all the members of the Board and Management for their active leadership and support during this past financial year (2001/2002). Finally, I extend my thanks to the water sector, practitioners, decision-makers and researchers for their understanding, support and guidance during this period of change. I hope that the WRC will continue to serve you (the water sector) and our nation as a strong 'hub' for water-centred knowledge.



Dr HC Kasan
WRC Board Chairperson

Board Members

Dr HC Kasan
General Manager:
Water Treatment Technology
Rand Water

Prof K Nyamapfene
(WRC Board Chairperson until December 2001)
Advisor to CEO: Foundation for Education, Science and Technology

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Environmental Management:
Department of Environmental Affairs and Tourism

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Pretoria

Ms MM Molala
Matshipsana Consultants
Lebowakgomo

Prof CG Palmer
Director: Centre for Aquatic Toxicology,
Institute for Water Research,
Rhodes University

Highlights

The WRC provides South Africa with applied knowledge and water-related innovation. Needs are translated into research and, in turn, research results are disseminated and knowledge and new technology-based products and processes are distributed to end-users.

The findings of research carried out with the leadership and support of the WRC have resulted in the development of new policies, strategies and guidelines, and have improved water and waste management.

Some recent examples of such research initiatives are:

Water Resource Management

A protocol for facilitating integrated water resource management (IWRM)

A Multi-Criteria Decision Analysis (MCDA) protocol has, over the past six years, been refined and used successfully as a tool for identifying and addressing many issues of importance for the successful application of integrated water resource management (IWRM), thereby shifting the philosophy of IWRM from a highly theoretical to a practical, implementation level. An increasing number of water resource experts and decision makers now value MCDA as the ideal vehicle to improve water management processes. MCDA is currently being used in a DFID-funded project on Strategic Environmental Assessment (SEA) involving the Department of Water Affairs and Forestry (DWAF). In projects on the Ecological Reserve determination (see p 7), MCDA is being used to develop manageable scenarios. MCDA is also contributing to improved flood management. Through different phases of flood management assessment in South Africa, the management perspective has changed from one focusing on cost associated with physical damage, to a more acceptable one focusing on socio-economic and environmental impacts. The MCDA approach, which considers other criteria besides economic efficiency, is highly applicable in this regard. It will, for instance, capture fully the knowledge, information, wisdom and needs of local riparian communities, allowing for more comprehensive flood management.

Commercial afforestation, decision-making and modelling

The ACRU model, a conceptual hydrological model which is sensitive to land use, is presently being used in combination with results from a limited number of paired catchment experiments to provide DWAF with a national information base on the impacts of commercial afforestation. Model-generated data are at the quaternary catchment scale and will allow resource managers to make decisions, identify how commercial forestry reduces streamflow, develop a consistent method for licensing afforestation and develop an acceptable pricing strategy for catchment management. The ACRU model is also being used increasingly to provide consultants, farmers and government agencies with answers to a number of complex land- and water-related questions.

Community participation in IWRM

Research on community participation in the IWRM process has shown that participation is entirely dependent on empowerment of a generally wide variety of stakeholders through the building of appropriate community organisations. In the Mlazi catchment, for example, communities have been empowered to practise crafts using reeds harvested from wetlands, thereby earning cash incomes and, at the same time, contributing to the sustainable management of the wetlands. In the Kat River Valley it has been learnt how previously disadvantaged communities can work with one another and with citrus farmers and small municipalities to establish an effective Water User Association (WUA). This, one of the first properly constituted WUAs, was established as part of a WRC-funded research project. The process for setting up this WUA has provided a framework for the establishment of future WUAs by Government. One of the main lessons learnt from research on community participation is that a certain level of professionalism is needed in dealing with community interests. Failing this, sustainable solutions may not be achieved. In this regard, professionalism refers to the standards and personal commitment of facilitators involved in stakeholder participation projects in South Africa.

Groundwater and IWRM

Understanding of the environmental functions of groundwater is being increasingly improved through studies supporting the implementation of the National Water Act (NWA). This improved knowledge contributes to the integration of groundwater into the broader water management framework. Research findings to date have enhanced the understanding of groundwater/surface water linkages and promoted the development of integrated classification systems which support the protection of water resources by linking delineated hydrogeological systems with eco-region classification systems. Research has helped in establishing reference conditions (conditions prior to impact) for determining management protection classes as required by the NWA. It has supported the building of appropriate resource quality objectives (RQOs) and the design of adequate monitoring systems, which are needed to address ecosystem and groundwater resource integrity. Research on groundwater exploration, which is of relevance to IWRM, has also enhanced knowledge on how to integrate techniques such as geophysics, remote sensing, geographic information systems (GIS) and structural geology. This has resulted in significant successes in targeting groundwater in aquifers which have traditionally been regarded as low-yielding, while the integration of existing structural- and hydro-geological knowledge bases and petroleum technologies offer further exciting opportunities for the assessment of fractured-rock aquifers.

Artificial recharge for sustainable water supplies

This research aims at enhancing supplies to large towns as well as to rural communities through the application of artificial recharge techniques. Water can frequently be stored more effectively in suitable aquifers underground than on the surface where losses through evaporation may be considerable. Knowledge concerning application of artificial recharge in fractured-rock aquifers has been acquired through pilot case studies funded by the WRC. A full-scale artificial recharge system based on results of a pilot study will be developed by the city of Windhoek during the next few years, thereby creating security of water supply, especially during drought conditions.

Managing non-point source pollution

A guide to assess the magnitude of non-point source pollution has been finalised. This will enable the quantification and management of non-point sources, which are often of greater magnitude than point sources. A study on the identification of the policy options available to DWAF for managing non-point sources of pollution is also available. These, together with enabling clauses in the NWA, have put the management of this important source of water quality degradation on a solid base.

Climate change and hydroclimatology - the use of the past to predict the future

Knowledge concerning past and potential future climate change is being expanded significantly. Previously, palaeoflood research revealed the occurrence of Orange River floods greatly in excess of those experienced during the period of observational record. A current palaeoclimate project, focusing on cave speleothems, is promising to reveal pre-record hydroclimatic variations with unprecedented temporal resolution, possibly better than five years. Knowledge of past climate change provides the necessary context for assessing the significance of predictions of future climate change. Predictions of climate change at the global scale, as produced by global climate models, require downscaling in order to be meaningful at regional or finer scales. Empirical downscaling procedures have been developed and knowledge on how to bring about refinement of these scenarios using dynamic modelling approaches is being acquired. The results of these studies will provide South African planners with the means of generating climate-change scenarios at the regional, country and local (catchment) scales for use in assessing climate-change impacts.

An integrated rainfall monitoring system

Building on previous projects, current projects, aimed at establishing an integrated rainfall monitoring system to replace the declining rain-gauge network in South Africa, have contributed to the enhancement of a fundamental understanding of radar-rainfall relationships and advances in quantitative rainfall measurement by radar. There is a better understanding of hardware, software and signal processing requirements for transforming meteorological radars from severe weather warning devices to "areal rain gauges", each sampling an area of up to 10 000 km^2 with a spatial resolution of 1 km^2. Projects have also contributed to a growing ability to network radars and use them to produce merged digital maps of real-time, radar-derived rainfall over large parts of South Africa, and have improved the understanding of how best to integrate radar and rain-gauge measurements in the interests of greater coverage and data reliability. The integration of satellite information to further enhance coverage is under investigation. The research has provided useful information on cost structures, both for network running expenses and maintenance requirements. Initial experience is being gained in the use of data products, which include forecasts of short-term behaviour of rain-bearing systems for real-time applications in river flow prediction and flood warning. The national integrated rainfall monitoring system resulting from this research is expected to meet all the rainfall data requirements of water resource managers, both in terms of spatial coverage and spatial and temporal resolution.

Water-Linked Ecosystems

River's right - the ecological reserve

The reserve means that South Africa has acknowledged that rivers are a resource and has made provision, through the NWA, for a portion of the mean annual runoff to be reserved to sustain river systems.The knowledge generated by WRC-funded research in the area of in-stream flow requirements allowed this concept to be incorporated in the NWA of 1998. Follow-on research relating to the ecological reserve is continuing to support the development of management competence that is required for implementing the Act. The World Bank has recommended the method that has been developed and is being refined in these studies as its chosen methodology for environmental flow determination. Research is currently under way to incorporate economic considerations into the quantification and management of the environmental reserve. This will ensure optimising the net benefits of services forthcoming from environmental functions.

The rivers research programme

Rivers research has enhanced the national appreciation of rivers as a resource and the ability to manage them. The completed Kruger National Park Rivers Research Programme improved the understanding of the riverine and riparian ecosystem processes and established a framework for strategic adaptive management and its implementation. A coherent biomonitoring programme (the River Health Programme), developed in conjunction with DWAF and Department of Environmental Affairs and Tourism (DEAT), has been implemented nationally by government and industry. The current programme, River System Research, is making an important contribution to the interface between science and management in that it is proposing and testing the use of ecosystem goods and services as a way of communicating ecosystem health concepts and information to managers and the wider public.

Environmental toxicology

New methods relating to the testing of water quality at both acute and chronic toxicity levels have been developed during research done within the Toxicology Research Programme. These include methods for the setting of site-specific water quality guidelines using indigenous organisms and methods for detecting low levels of pollutants using physiological techniques. Toxicity testing has been included in DWAF policy on effluent discharge. In addition, ecotoxicology using indigenous organisms has enabled site-specific water quality to be more comprehensively characterised for ecological and other management purposes.

Water ecosystems - controlling 'problem' organisms from flies to algae

The problems caused by blackfly (*Simulium spp.*) stem from the fact that water resources along the Orange River are increasingly regulated as they are developed, and the natural flow variation which existed previously and exerted a degree of control, has been removed. Initial research investigated the use of the microbial larvicide *Bacillus thuringiensis* var. *israelensis* (B.t.i.) and an organophosphate larvicide. While these were found to be effective, control was costly. Further ways of increasing the efficiency of integrated control of blackflies were investigated by studying the relationship between population dynamics and variations in the ecosystem. A model was developed to assist in the decision of when to apply larvicide to achieve effective control at the lowest cost. Another issue of concern is algal growth. Two problem species of filamentous algae have been identified: *Oedogonium capillare* occurs in the lower pH water in the canals of the Breede River System, and *Cladophora glomerata* occurs in alkaline waters elsewhere in the country. A satisfactory method of monitoring the time and rate of algal invasions has been developed. A technique has also been developed to allow laboratory work on basic growth requirements of algae, as well as determining the relationship between copper uptake and environmental variables. This, in turn, has enabled specific recommendations to be made regarding the use of copper sulphate in the control of the algae.

Water Utilisation in Agriculture

Improved irrigation scheduling

Irrigation scheduling has been improved dramatically through ongoing research over the past decade. A number of computer programs/models have been developed for various crops. These include BEWAB, which can be used for planning and management of irrigation at farm level. BEWAB has been extended and refined to also manage irrigation under controlled water-stress conditions. Another example is the soil-water balance (SWB) model. The latter is a mechanistic, real-time, generic crop irrigation-scheduling model. It simulates water dynamics in the soil-plant-atmosphere water continuum, making use of weather, soil and crop management data. The SWB model requires parameters which are specific to a crop before water requirements are determined. A number of studies have focused on testing and validating the above models *in situ*. End-users, based on their experience in scheduling irrigation with the models, maintain that both water and money can be saved.

A user-friendly model for farmers assisting in the management of water utilisation

In previous research projects, separate models were developed for calculating the cost of irrigation, for assessing the risk attached to variable water supply and crop yield and for doing short-term whole-farm planning for irrigation farming. These sub-models have now been successfully linked through the FARMS model (Firm-Level Agricultural Management System), user-friendly adjustments have been made and practical applications demonstrated through interactions with farmers on a case-study basis.

Soil water management - a software package

Information on the water balance of agricultural land in the semi-arid regions of South Africa has been enhanced and integrated. Procedures have been developed to estimate the evaporation and runoff of water from the soil surface, water uptake by crops associated with specific target (or actual) yields, and water loss by drainage below the deepest roots. Applying these procedures requires information that is readily available like soil depth and texture, rainfall, an estimation of soil wetness and the target or actual yield. The amount of rain stored in the soil from harvesting of the previous crop, to planting of the present crop can be calculated. The procedures for quantification of each component of the soil water balance were linked in a single computer program. This software package under the title *Soil-Water Management Program (SWAMP)* is available to farmers and agricultural advisors to estimate the obtainable crop yield and to decide whether to plant or not.

Poverty reduction and empowering the poor

Traditional cropping systems have been improved through the introduction of efficient and practical technologies resulting from WRC-funded research projects. In this way poverty and food security are being addressed effectively. Research geared towards social and technical considerations within a poverty-reduction programme has empowered the poor. Scientifically-based improvements of traditional production systems guarantee adoption of technology. The involvement of the end-users of technology in the early stages of the project has added value to interventions. This ensures that research receives guidance, leading to more applicable and beneficial outcomes. The dynamics underlying the establishment of government "upliftment" irrigation schemes have been investigated. The results indicated that it is not only technical difficulties that lead to poor performance of the schemes, but that social and economic factors are probably the most influential reasons for non-performance. The institutional development and management of irrigation schemes in relation to poverty levels and productivity have also been investigated. Research results have indicated that an increase in the size of land holdings tends to be accompanied by a shift in the objectives of farmers from subsistence to market-oriented production. This "shift" exposes farmers to a number of other challenges, including production practices, marketing, finance and management. Investigation has shown that food plots are not recommended as a livelihood option for settlement schemes. The size of food plots is just too small to make irrigated farming viable. At least 2 ha is the minimum plot size required for irrigated farming to become the source of income for farming households.

Water utilisation in small-scale farming

Irrigation techniques commonly used by smallholder irrigation farmers have been evaluated for appropriateness. Guidelines for on-scheme water distribution design (flood & furrow), including the layout of plots and secondary canals, have been compiled. Sprinkler irrigation can be surprisingly flexible, but its design for the specific circumstances encountered in small-scale farmer irrigation requires refinement and application of certain basic principles.

Water Use and Waste Management

A framework for waste discharge charge system

In collaboration with DWAF, a framework is being developed for the introduction of a waste discharge charge system for South Africa. As required by the NWA, provision is being made for a system of economic incentives to encourage reduction in pollution and raise funds for the protection of the water resource and the management of resource quality. In addition, guidelines are being formulated for a tariff structure which is applicable to industrial effluent.

Guidelines for sewage sludge disposal

An Addendum to the 1997 guide for *Permissible Utilisation and Disposal of Sewage Sludge* was produced. The Addendum serves to clarify certain issues of confusion that arose from the 1997 document and expands on the various routes and options that may be taken for sludge utilisation. This Addendum provides user-friendly guidance to negotiate the complex network of current legislation governing the disposal of sewage sludge. Ambiguities that appeared in the original document have, as far as possible, been removed and the way is now clear for the guidelines to become a working document as was originally intended.

BioSURE - a sulphate reduction process

The WRC/Rhodes BioSURE® process (a biological sulphate reduction process) is a core technology for mutually beneficial treatment of saline wastewaters and domestic sewage (and sludge), thereby addressing two waste disposal problems simultaneously. In this process, complex organic material is broken down at an accelerated rate to provide the carbon source for bacteria which reduce sulphate to sulphide forms. The process is also being applied to mining and industrial waste, for example in treating high-volume saline wastewaters such as acid mine drainage. A full-scale plant is presently being built by ERWAT at Ancor Sewage Works. Current research is aimed at adding value by recovering elemental sulphur from the biological oxidation of sulphide. To date, a number of patents have been registered.

Improved management of industrial wastewater

Pinch technology has been successfully adapted from thermal pinch theory to water pinch in the water-scarce South African situation, offering a powerful water-conservation (demand-management) tool. Pinch technology is being progressively applied by industry to optimise water and effluent management (current users include Sasol, AECI and Polyfin). Another aid to demand management is the development of life-cycle assessment methodology for application in the South African situation. This promises to be very valuable in formulating policy and making design decisions in industry.

Improved water and waste management by using new process technologies

A number of industries, utilities, metros and smaller municipalities have introduced or are considering the full-scale implementation of processes developed with the support of the WRC to reduce the impact of effluents and waste materials on receiving water quality. Examples of these processes are:

- Biotechnology (bio-pulping and bio-bleaching) alternatives, which are being considered by SAPPI for full-scale trial.
- Bulking control of activated sludge effluents, introduced by the Cape Metro Council at Mitchell's Plain Sewage Works.
- External nitrification in activated sludge systems, resulting in reduced operating costs and improved effluent quality, introduced by Cape Metro Council at Milnerton Sewage Works

- Practicable treatment of wastewaters with high nutrients but low carbon levels (for example, septage, landfill leachates and anaerobic digester supernatants).
- Co-disposal to landfill of non-toxic wastes with municipal refuse, resulting in leachate reduction and community benefits, introduced by Cape Metro Council at Coastal Park Landfill.
- Removal of algae from oxidation pond effluents using the low-cost PETRO® process, applied by a number of local municipalities to reduce eutrophication potential.
- Treatment of sewage and a variety of industrial effluents by means of algal high-rate ponding systems, used by Grahamstown Municipality and Western Tanning Company.
- Accelerated hydrolysis of sewage sludge in association with biological sulphate reduction, introduced by ERWAT at Ancor Sewage Works with a view to reaping major benefits in terms of sludge disposal and water renovation for beneficial reuse.

Treating acid mine drainage (AMD)

In the past three years research studies have made large contributions to the growth in awareness of the gravity of the mine-water threat (both short- and long-term) to the environment, if left unattended. Equally beneficial progress has been made in acquiring knowledge and tools which can be used to begin to address this problem. For example, an effective measure to prevent the formation of AMD in coal discard dumps involves covering the dumps with soil in order to exclude oxygen and stop the bacterial action which produces AMD. Multi-layered soil covers exceeding 1 m in thickness were found to improve drainage water quality significantly, although drought-induced soil cracking temporarily allowed oxygen to pass through the covers. Another innovative approach, whereby irrigation with gypsiferous water allowed gypsum to be precipitated in the soil profile, was demonstrated on a commercial scale. By precipitating gypsum in the soil, it is removed from the water environment and an otherwise polluting water is used beneficially. In other research, acid-base accounting procedures for static and kinetic tests (which are used to predict the likelihood that a material will produce AMD) have been evaluated and agreement reached on a standardised methodology/approach for South Africa.

Membrane technology - a strong source of intellectual property and promising commercial ventures

In the field of membrane technology 12 patents have been registered, nine of which are owned by the WRC. Three patents on membrane materials and systems and a new membrane bioreactor configuration were registered by the Institute for Polymer Science (IPS), University of Stellenbosch. A patent on the modification of membrane surfaces to reduce fouling was registered by UNISA, three patents on functionalised ceramic electromembranes by the University of the Western Cape, two patents on operation and cleaning of membrane bioreactors by Rhodes University and one patent on the use of powdered activated carbon with the local hose-type microfilter by ML Sultan Technikon. Two patents have been provisionally registered on a new immersed membrane system developed by IPS, Stellenbosch. A licence has been granted to a private organisation to produce high-value enzymes using a WRC patent on membrane biotechnology developed at Rhodes University and the University of Stellenbosch. A potential exists for an income to the WRC of a few hundred thousand Rand per year within the next four years.

Reduced fouling of membranes

A number of new methods have been developed to assist in either preventing or monitoring membrane fouling and 'cleaning' fouled membranes. These include the development of polysulphone membranes (patented) that are more hydrophilic and less sensitive to fouling. An ultrasonic-based method has been developed to monitor the fouling layers on the surface of a membrane in a non-invasive way (patent pending). Ultrasonication combined with backflushing has shown considerable promise in cleaning fouled membranes while a new enzymatic method has been developed and patented to break up fouling layers on a membrane from the inside, as and when required. Invaluable knowledge has also been obtained on the prevention of fouling of membranes used in the treatment of paper effluent and on the enzymatic cleaning of these membranes. The innovative ultrasonic monitoring and cleaning techniques being developed show good potential for helping to expand the practical use of membranes to a range of new applications, especially for wastewater treatment. Capital costs will be lowered significantly because of the higher fluxes achievable. Practical application is, however, some years away.

Rural water supply and sanitation - tools and guidelines for a better quality of life

Research studies have resulted in decision-support tools, development and evaluation of appropriate technology, and the preparation of guidelines for supporting the delivery of services to rural communities. Examples include the guidelines on appropriate technologies for water supply and sanitation in developing communities which provide a valuable guide for agencies responsible for implementing water and sanitation projects in rural areas. These guidelines also form the basis of a training guide for engineers. In addition, a comprehensive report entitled 'A Socio-Biological Study of the Aquatic Resources and their Utilisation in an Underdeveloped Rural Region, the Mutshindudi River Catchment', was published. This report provides a very good picture of resources available in this catchment. It forms a valuable resource for catchment managers, rural development agencies and the tourism industry in this area.

Pricing of urban domestic water

A method for supply pricing of urban domestic water has been developed during the course of a WRC-sponsored project. The method allows decision-makers to study the feasibility of different subsidy and tariff structure options. This method has also been expanded for application in the case of industrial and commercial water use. In another study the effectiveness of influencing water consumption in residential areas through levying of water tariffs has been tested by means of the contingent valuation method. This is the first such study done in South Africa since 1973 and has confirmed the international observation that water demand is relatively price- or tariff-inelastic.

Water services - institutional and management issues

Research studies contributing to a better understanding of the water services business recently culminated in two WRC publications addressing management and financial issues, which are indicative of their critical importance in the municipal environment. The importance of institutional relationships and processes for the sustainability of water services has also been emphasised by various research studies. Key achievements of such studies include the development of two user-friendly models, the *Water Supply Services Model (WSSM)* and the *Sanitation Services Model (SSM)*, which assist Water Service Authorities in financial planning of their services. The models provide a systematic and standard protocol for developing a Water Services Development Plan, as required by the Water Services Act of 1997. The methodology for implementation of the retail (third-tier) water tariff policy builds on the WSSM and the existing set of management guidelines for setting urban water tariffs in South Africa. It provides a set of practical guidelines for tariff design by Water Service Authorities or Water Service Providers in respect of residential, industrial and commercial water use. The WRC also initiated a study on Benchmarking and Performance Indicators, which has proved to be of great interest to the water sector.

New concepts for leakage detection and demand management

New concepts of leakage detection and water loss management have been developed, with South Africa being considered an international leader in this area. Research outputs in the form of appropriate software and user manuals directly support water institutions in applying these concepts to reduce losses. Outcomes of research in the area of water loss management have had two main benefits linked to water savings: firstly, more efficient use of existing infrastructure and the postponement of new schemes; secondly, greater service coverage and elimination of historic backlogs in services. Overall, the contribution has been to ultimately reduce the cost of water supplied to the consumer and to make services more affordable to South Africans, as well as to reduce impacts on the water environment, thus contributing to increased quality of life and economic growth.

Improved drinking water distribution infrastructure and processes

Improved drinking water distribution infrastructure and control of processes within distribution systems have been addressed by WRC-funded studies promoting more reliable delivery of high quality water to the customer's tap. These studies have been guided by the analogy of water in the distribution system being a perishable product, which has a shelf life (the time it spends in the distribution system), which is appropriately packaged (within piping and storage facilities) and which contains a preservative (secondary disinfectant). Research has benefited understanding of how potable water should be handled after treatment. Outcomes include a better ability to deal with aggressive acidic waters and corrosion of piping, the inhibition of biogrowth and the management of water quality and post-precipitation.

Water and Health

Detection of protozoan parasites in water

The detection of the water-borne parasites *Cryptosporidium* and *Giardia* has been greatly improved as a result of a number of WRC-funded research studies aimed at developing detection methods and associated technical skills. The various methods developed and evaluated have been used in projects to address the occurrence of these protozoan parasites in catchments and their removal from water during treatment-plant processes. Another important outcome has been a simple, cheap and reliable test kit to enable rural communities to visually screen for *Cryptosporidium* in the field.

Safety of domestic water supplies

A series of user-friendly guidelines on 'Quality of Domestic Water Supplies', available in five volumes, has been completed. These guidelines address the assessment, sampling, analysis, treatment and management of domestic water supplies and have already proved useful to water service providers, communities and educators in promoting the safe use of domestic water. A copy of the first volume (the assessment guide) was distributed to every high school in South Africa to build an understanding of the importance of water quality and its relationship with health. Not all communities have access to treated water, which makes information on microbial quality of water sources crucial. Resulting from research supported by the WRC, a national microbial monitoring programme and corresponding implementation manual have been developed for DWAF. These are currently being refined in a pilot implementation study. The monitoring programme initially addressed only surface water but has now been extended to cover groundwater also.

Genetic engineering - making routine tests for E.coli possible

Two-multiplex Polymerese Chain Reaction (PCR) methods, developed for the detection of pathogenic *E.coli*, can now be used in laboratories for routine monitoring of water samples. The presence of pathogenic *E.coli* can provide an early warning to water suppliers of a potential for outbreak of water-borne disease and enable timely decisions regarding routes to prevent the spread of disease. Routinely obtained data on this water-borne disease-causing organism will add to general knowledge concerning the spread of water-borne disease among water authorities and the general public. Data will also aid in determining possible health risks associated with exposure of communities to the organism.

Capacity-building and competency development

Besides research results, another important product in the research process is the building of capacity at individual and institutional levels.

An initial review of capacity-building achievements indicated that about 730 post-graduate students were linked to project work funded by the WRC through research contracts during 2001/2002. As indicated in the table below, most students are at M.Sc. level while the reflected demography clearly indicates an appropriate balance in terms of equity and redress.

Capacity-building - competency development (ongoing WRC projects 2001/2002)

	Honours	M.Sc.	Ph.D	Technikon	TOTAL
Black Males	18	142	41	6	207
Black Females	32	82	25	17	156
White Males	6	78	61		145
White Females	18	62	38	8	126
Not specified	45	15	1	20	81
Foreign		12	7	1	20
TOTAL	119	391	173	52	735

Besides the building of capacity among individuals, building and maintaining the competencies of institutions and organisations to enable them to serve the water sector is also of the utmost importance. The participation of various categories of institutions in the 303 research projects supported by the WRC during 2001/2002 is shown in the Table below.

Participants in WRC-funded research projects

Category	Number of projects	% of funds
Consultants	64	20.45
Government departments	2	0.51
Industries	4	1.79
Local authorities	2	0.79
Non-Government Osrganisations (NGOs)	2	0.69
Science councils	49	13.78
Technikons	11	3.02
Universities	156	54.73
Water boards and water utilities	13	4.24
Totals	303	100

Directors' Report

Water Research Commission Directors' Report
01 April 2001 - 31 March 2002

MANDATE

The WRC was established in 1971 (the Water Research Act, Act No 34 of 1971) following a period of water shortage. It was deemed to be of national importance to generate new knowledge and to promote the country's water research purposefully, owing to the view held that water would be one of South Africa's most limiting resources in the 21st century. In 1971, water research and development (R&D) in South Africa was limited to a few institutions and the extent of funding was moderate. There was no research co-ordination and an apparent neglect of some key research fields. In addition, there was little strategic direction or leadership that would provide the identification of priority areas or appropriate technology transfer. Being a water-stressed country, South Africa progressively needs to find innovative ways of managing water resources to ensure that the basic needs of its citizens are met, that social and economic development are not restricted through a lack of or a poor quality of water, and that sustainability of water resources and of water-dependent ecosystems is achieved.

The WRC has the mandate to perform the following functions:

- *Promoting co-ordination, co-operation and communication in the area of water research and development*
- *Establishing water research needs and priorities*
- *Stimulating and funding water research according to priority*
- *Promoting effective transfer of information and technology*
- *Enhancing knowledge and capacity-building within the water sector.*

The Minister of Water Affairs and Forestry appointed the Board of Commissioners of the WRC on 01 June 1999 for a period of three years. At the beginning of the financial year, Board membership included Prof K Nyamapfene (Chairperson), Dr N Tsengwa (Vice-Chairperson), Ms ER Hay, Dr CT Johnson, Dr HC Kasan, Ms MM Molala,Dr BM Molope, Mr RJC Nay and Dr CG Palmer. Mr AM Muller, Director-General of Water Affairs and Forestry, and Dr George Green, in his position of Acting Executive Director of the WRC, were *ex officio* members. A new CEO, Dr Rivka Kfir, was appointed at the beginning of July 2001 and replaced Dr Green as an *ex officio* member. Later in the year, Prof Nyamapfene resigned from the Board owing to career changes and Dr Kasan was appointed as Chairperson of the Board. The Board met on 15 May 2001, 01 December 2001, and 05 February 2002.

During the financial year, and in addition to the Executive Committee (EXCO), three Committees of the Board were established in order to address various strategic, auditing and control functions as required by various Acts, e.g. the Public Finance Management Act (PFMA) and associated Treasury Regulations and the Water Research Act.

Audit and Finance Committee

Members

Until 30 June 2001 the Committee was known as the Audit Committee and the members were:

Prof EM Stack (Chairperson, co-opted)
Dr GC Green (acting Executive Director)
Mr DM Maleka
Mr JT Motsepe
Mr CHH Scheepers (co-opted)
Mr J Venter (in attendance)

On 1 July 2001 the Committee was re-constituted as the Audit and Finance Committee with the following members:

Mr RJC Nay (Chairperson)
Dr R Kfir (CEO)
Prof K Nyamapfene
Mr DM Maleka
Mr CHH Scheepers (co-opted)
Prof EM Stack (co-opted)
Mr J Venter (in attendance)

Prof Nyamapfene resigned as member of the Committee on 31 December 2001

Meetings

17 July 2001, 30 July 2001, 26 November 2001 and 29 January 2002.

Functions

- Ensure compliance with the PFMA and advise on applications for exemption deemed necessary in the interests of enhancing the WRC's performance
- Monitor and advise on the collection of revenue due to the WRC.
- Evaluate short-, medium- and long-term plans and budgets
- Assess requests by Management for adjustments in water research rates and charges (levies) and make recommendations to the Board
- Review the external audit process at key stages of planning and execution, in terms of addressing (i) critical risks areas (ii) scope and (iii) effectiveness
- Review external audit results, and make recommendations to the Board on acceptability of financial statements and on addressing significant differences between management and the external auditors
- Review, from time to time, the WRC's financial policies and accounting procedures and controls, *inter alia* in the light of external audit results
- Advise on labour dispute strategies
- Monitor the scope and effectiveness of the internal audit function from the financial perspective
- Monitor the ethical conduct of the WRC, its management and senior officials, from the financial perspective
- Report to the Board on an ongoing basis.

Executive Committee

Members

Prof K Nyamapfene (Chairperson)
Dr N Tsengwa (Vice-Chairperson)
Ms ER Hay Dr HC Kasan

Upon Prof Nyamapfene's resignation, Dr Kasan, as new Chairperson of the Board, assumed the position of EXCO's Chairperson.

Meetings

31 July 2001

Functions

The main function of the EXCO is to perform specific tasks on occasions when the Board, due to special time constraints or urgency, delegates such tasks to the EXCO.

Human Resources Committee

Members

Dr CT Johnson (Chairperson)
Ms MM Molala
Dr H Kasan
Dr N Tsengwa
Dr R Kfir

Meetings

27 August 2001 and 15 November 2001

Functions

- Draft the Executive Director's performance agreement and assess performance on an annual basis.
- Advise on the structure and composition of Top Management
- Review transformation and employment equity plans and assess progress with respect to milestones and targets.
- Review career pathing and personnel development strategies and monitor implementation of skills development programmes.
- Review and advise on job level assessment policy and procedures.
- Advise on amendments to the conditions of employment and remuneration structure.
- Review and monitor the effectiveness of the WRC's performance management system.
- Advise on labour dispute strategies.
- Monitor the scope and effectiveness of the internal audit function from the human resource perspective.
- Report to the Board on an ongoing basis

Research Policy and Strategy Committee

Members

Prof CG Palmer (Chairperson)
Dr HC Kasan
Dr BM Molope
Ms ER Hay
Dr R Kfir
Dr GC Green (in attendance)

Meetings

27 June 2001, 28 August 2001,
13 November 2001, and 17 January 2002.

Functions

- Review and advise on the alignment of research goals and plans with national policy and priorities and the mission of the WRC
- Assess and advise on the balance and appropriateness of research strategies (short-, medium- and long-term) in meeting such goals
- Ensure that research plans and strategies are aligned with the WRC's policy for capacity-building and are appropriately designed to meet capacity-building objectives
- Advise on the partitioning of research funds among primary application areas
- Review and make recommendations regarding the acceptability of proposed research programmes
- Monitor progress at the level of research programmes and primary application areas and evaluate outcomes with regard to stated goals, including those concerned with capacity-building, technology transfer and knowledge management
- Review policies and procedures for ensuring beneficial exploitation of research products
- Monitor the scope and effectiveness of the internal audit function from the research perspective
- Report to the Board on an ongoing basis.



Research funding

The WRC invested about R51.3 million in research projects during the year under review (2001/2002). This reflects an increase of about 14% from the previous financial year (a 15-month transition year corrected to a period of 12 months). There was also a significant increase in the amount invested in mobility funds for capacity-building and development of competencies of either individuals or institutions that had been historically disadvantaged. The decrease in the amount of other grants reflects the phasing out of the activities of the Computing Centre for Water Research (CCWR) at the University of Natal prior to its closure during 2002/2003.

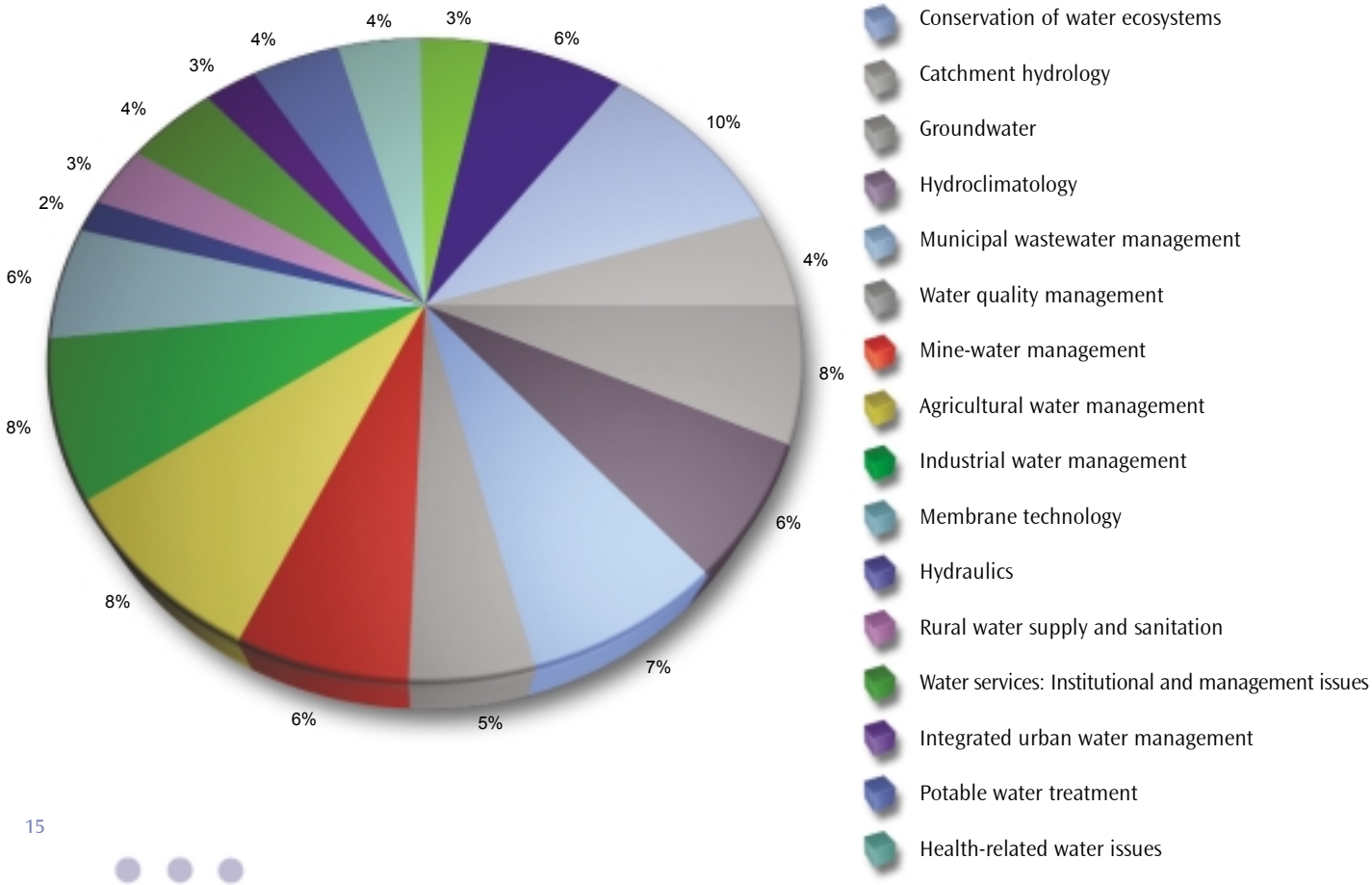
Distribution of Research Funds (2001/2002)

Research Funds	2001/2002	2000/2001 (15 months)
Research Projects	51 349 947	56 250 519
Mobility Funds	125 130	45 186
Research Constancies	2 133 148	2 985 641
Other Grants	86 419	221 576

During 2001/2002 the WRC funded 18 research fields. The WRC investment (funding) in various aspects of water-centred R&D, with a view to realising relevant research products for South Africa (in terms of benefits and applicability) and contributing to new knowledge, is reflected against these fields (see diagram below). These research fields were used by the WRC as focal areas for funding of R&D. In the year under review a new approach was introduced to presenting achievements in each of these research fields. Achievements were assessed against a number of key objectives (per field) which tie in with the new strategy of the WRC (see p 16). Overviews of the outcomes/impact of research in the various fields were presented with regard to the following strategic objectives: new knowledge; benefits to South Africa; innovation/application of knowledge; capacity/competency development; knowledge dissemination; leveraging; and international linkages.

During 2001/2002 the WRC called for new project proposals to be funded as from 2002/2003. The call was done against 17 research fields. The field addressing Hydraulics was closed, with the two on-going projects being re-allocated to related fields. Details regarding already committed funds and funds allocated for new projects are shown, per field, on the following page.

Distribution of Project Funds Among 18 Research Fields: 2001/2002



A summary of committed and new funding per field: 2002/3			
Research field	**Committed for approved projects**	**New projects proposals**	**Total**
Water policy	198 300	1 397 500	1 595 800
Integrated water resource management	2 035 600	1 533 000	3 568 600
Conservation of water ecosystems	3 506 300	2 807 650	6 313 950
Catchment hydrology	642 200	2 147 000	2 789 200
Groundwater	2 016 900	3 037 000	5 053 900
Hydroclimatology	2 556 500	799 000	3 355 500
Municipal wastewater management	2 111 000	1 480 700	3 591 700
Water quality management	1 100 400	1 291 400	2 391 800
Mine-water management	2 446 000	1 305 000	3 751 000
Agricultural water management	2 383 200	2 855 550	5 238 750
Industrial water management	1 363 000	2 015 700	3 378 700
Membrane technology	1 102 600	1 518 500	2 621 100
Rural water supply and sanitation	1 191 900	1 503 200	2 695 100
Water services: Institutional and management issues	282 700	1 970 000	2 252 700
Integrated urban water management	75 000	795 000	870 000
Potable water treatment	443 000	980 000	1 423 000
Health-related water issues	1 497 050	2 767 000	4 264 050
	24 951 650	**30 203 200**	**55 154 850**

Year of transition

During the financial year under review (2001/2002), the WRC began a journey of transformation, a strategic journey with a clear target of turning the organisation into a dynamic and innovative 'hub' for water-centred knowledge; a networking organisation linking the nation's stakeholders in water and working through partnerships. This is being achieved via a process of 'business transformation'. The need for transformation was based on the findings of a transformational audit undertaken by an external consultant group, views of individuals and internal and external stakeholders (including individual members of the WRC's Board).

The aims of this transformation are to establish the WRC as a key South African organisation, well-positioned to provide the water sector with leadership through strategic advice regarding research needs and applications of research results, and to serve South Africa as an innovative organisation that is continuously providing novel (and practical) ways of packaging and transferring knowledge into technology-based products for the water sector and the community at large, both locally and globally.

New strategy

The WRC's new core strategy focuses on the need for the WRC to strategically address the issues of relevance, effectiveness and efficiency.

Adapting and responding to a changing, dynamic environment, yet maintaining relevance and providing South Africa with value for the money invested in water R&D, is an immense challenge.

The WRC has to be proactive in addressing society's needs for problem-solving initiatives. The medium- to long-term (three to five years) strategy of the WRC aims to transform the organisation into a dynamic hub of water-centred knowledge, providing leadership locally (in South Africa) as well as globally.

Mission

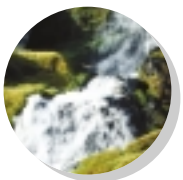
The WRC is a dynamic hub for water-centred knowledge, innovation and intellectual capital. We provide leadership for research and development through the support of knowledge creation, transfer and application. We engage stakeholders and partners in solving water-related problems which are crucial to South Africa's sustainable development and economic growth, and are committed to promoting a better quality of life for all.

Vision

To be a globally recognised leader in providing innovative solutions for sustainable water management to meet the changing needs of society and of the environment.

Values

- Service orientation
- Care for people, society and the environment
- Fairness to all
- Dedication to quality
- Integrity and ethical behaviour
- Respect for human and individual rights
- Innovation and learning


TRANSFORMING THE WRC

The main objective set by the WRC for this financial year (2001/2002), was the *successful transformation of the organisation into a dynamic hub for water-centred knowledge*. As indicated, this year was a year of transition. The WRC reviewed and revised its strategy and initiated a process supporting the implementation of its new strategy.

The new strategic direction called for a new (revised) mode of operation, organisational design, systems and processes.

Key strategic areas (KSAs)

Based on the new strategic direction of the WRC, the organisation established KSAs aimed at achieving:

- An integrated approach to meeting South Africa's society/water sector's R&D needs
- Integrated solutions to invariably complex, interdisciplinary problems
- On-going, strategic identification of needs (short-, medium- to long-term needs as well as explicit and implicit).

The KSAs for investing in water-centred knowledge provide integrating frameworks for investment and are based on a portfolio of key water-related needs. These KSAs allow for multidisciplinary studies and are focused on problem-solving while addressing national needs and supporting the community and the water sector. While each of the KSAs is unique and mutually exclusive (minimal overlaps), they collectively cover the complete spectrum of water-related topics which are of strategic importance.

A crucial characteristic of a KSA is its *modus operandi*. In order to function effectively, each of the KSAs forms a strategic management unit aligned with the WRC's mission and vision. Each KSA has to develop a business plan and key performance areas, which are reviewed and approved by the management of the WRC and the WRC's Board. Each KSA is regarded as an impact area where outputs and impacts can be assessed. As a management unit addressing strategic issues, each KSA has to develop strategic management initiatives addressing marketing, positioning and networking activities as well as financial issues and human resource management. A KSA forms a portfolio of key thrusts while each thrust is based on a portfolio of programmes. Programmes could be addressed as a primary call for 'investment' or be built around a portfolio of projects. Each of the KSAs provides for pilot or seed investigations, R&D projects/programmes and capacity-building initiatives. The KSAs support technology transfer, commercialisation and pilot implementation projects as well as other knowledge dissemination drives.

The five key strategic areas

Of the five KSAs, four are water-centred and address investment focused mainly on knowledge creation, while the fifth addresses mainly knowledge dissemination and information management. The four water-centred KSAs build portfolios around the unique roles of water in our world. These include:

- The role that water plays as a limiting resource where economic, social, management and political issues are key
- The role of water as a habitat (i.e. the ecosystem and the natural water-linked environment)
- The role of water as source for human activities (water uses) and the implication of the use of water for potential pollution (land use). This will include the development of technologies for the treatment of water and wastewater
- The role that water plays in agriculture and forestry. Agriculture and forestry are key users of water and land. Issues such as water for production of food and food security as well as water quality and quantity issues will be addressed.

The fifth KSA addresses the dissemination of water-centred information and knowledge. It serves the water sector and society through various channels, concentrating on scientific communication as well as public understanding of science.

KSA: WATER RESOURCE MANAGEMENT

The overall objective of research in this KSA is to ensure that water resources are protected, used, developed, conserved and managed to achieve environmental, social and economic sustainability. Sustainable water resource management requires a holistic approach that balances the competing demands of domestic needs, agriculture and industry with the requirements of the environment, i.e. water-linked ecosystems. An integrated approach to water resource management is adopted; this approach takes water resource as a starting point. It analyses how this resource can be managed in an integrated and sustainable way by building institutional capacities to satisfy human needs, promote food security and protect the environment.

Dr N Mjoli
Director: Water Resource Management

KSA: WATER-LINKED ECOSYSTEMS

Water-linked ecosystems are defined as in-stream (fully aquatic), riparian (dependent on water stored in the river banks and linked to the river) and water table (dependent on a water table, but not on surface water). This KSA focuses on the protection and sustainable utilisation of the aquatic environment and biota (in-stream, riparian and groundwater). This includes the research needs around the international conventions on environmental management (e.g. biodiversity) as well as human needs from the environment (e.g. sustainable management for equitable ecosystem resource utilisation, recreation and ecotourism). This will be done by developing technologies and methodologies, adaptive management processes and capacity to protect the resource and to sustain the flow of goods and services in a time of both demographic and climatic change in the southern African context. This KSA supports the implementation of the national water policy and the National Water Act provisions for the protection of water resources so as to ensure sustainable resource use.

Dr S Mitchell
Director: Water-Linked Ecosystems

KSA: WATER USE AND WASTE MANAGEMENT

This KSA focuses its knowledge management activities on supporting water institutions to provide water services in an equitable, efficient and affordable manner and to manage the waste and other water-polluting products in such a way that water quality is sustained at a level suitable for all water uses. As technology alone cannot provide solutions, the emphasis of this KSA is to provide solutions that are integrated in nature and will contribute to the building of strong local institutions, processes and management structures. The main focus of this KSA will be on providing research support for sustainable provision of water services to rural and urban areas to improve public health and water management for commercial, mining and industrial activities linked to economic growth.

Mr J Bhagwan
Director: Water Use and Waste Management

KSA: WATER UTILISATION IN AGRICULTURE

The strategic focus in this KSA is on increasing the efficient use of water for production of food, fibre, fuelwood and timber; ensuring sustainable water resource use; and improving the livelihoods of people involved in agriculture. The challenge for applied research and knowledge transfer is to provide solutions to practical problems which are experienced for utilisation, development and protection of water resources within the following subsectors of agriculture namely:

- *Irrigated agriculture*
- *Rainfed agriculture*
- *Woodlands and forestry*
- *Grasslands and livestock watering*
- *Aquaculture*

The needs and requirements of present and future generations of subsistence, emergent and commercial farmers are addressed through creation and application of water-efficient production technologies, models and information systems which would contribute to productivity improvement in agriculture

Dr G Backeberg
Director: Water Utilisation in Agriculture

KSA: WATER-CENTRED KNOWLEDGE

This KSA addresses the management of knowledge related to water research and focuses on the widest possible dissemination of knowledge and information. It encompasses knowledge created via the support of the WRC as well as other sources of water-centred knowledge. This KSA serves the research as well as the wider community by disseminating knowledge through various channels, including the use of different vehicles for increasing public understanding of issues related to water and water research.

It addresses knowledge-sharing through building of a culture, systems, networks and tools that will support free flow of knowledge between individuals and organisations supporting the WRC's mission and reflecting its role as a 'hub' for water-centred knowledge. It also supports the internal WRC's key performance area of 'innovation and learning' by providing an environment where new knowledge is built on the basis of existing knowledge through synergistic processes and support systems. In addition, this KSA will address issues of knowledge quality, providing for quality assurance and evaluation procedures and practices (regarding the core business of the WRC).

Dr I Msibi
Director: Water-Centred Knowledge

The scope of this KSA is threefold, i.e. it addresses:

- *Internal needs of the WRC regarding knowledge management, e.g. information and communication technology (ICT) - enabling systems and tools; e-business; a management model; the Intranet; and developing a culture of sharing, support and community of practice (achieving higher quality by sharing knowledge)*
- *Internal/external interface, e.g. supporting the core process of funding (creation of new knowledge) by improved support systems, evaluation tools, building research information databases and networks, and supporting information regarding research on research (who has been funded for what), and*
- *External leadership role at a national/global level, e.g. driving water-centred knowledge dissemination; linking external databases while in the long run building nation-wide knowledge engines/networks; and increasing public understanding of water-related issues.*

Crosscutting domains

The new strategy of the WRC, with its KSAs forming strategic portfolios of investment in the creation of knowledge, also calls for specific mechanisms to address key strategic issues of national importance. These issues are to be dealt with in a number of crosscutting domains which form integrating frameworks across the KSAs. The crosscutting domains support programmes and projects which address key issues within the portfolio of each KSA and also drive specific programmes/projects that are overarching and relate to all KSAs in a general manner.

The crosscutting domains, which are selected to focus on the role of water with regard to major strategic issues, are the following:

- Water and Society
- Water and the Environment
- Water and the Economy
- Water and Health.

Dr S Mkhize
Head: Water and Society

Mr HM du Plessis
Head: Water and the Economy

Mr K Pietersen
Head: Water and the Environment

Ms A Oelofse
Head: Water and Health

New organisational design

The WRC conducted its transformation process with the support of an external human resources transformation specialist and a legal specialist (specialist in Labour Relations Act). The process conformed to the WRC's Conditions of Employment and included strong involvement of the WRC's staff association. Profiles of competencies of each staff member and a framework of functions and required competencies for each post within the new structure were developed. The members of the transformation task team included members of the staff association. The process included internal advertisements of all posts followed by the assessment of applications and a selection procedure. The appointments of the leadership core and other senior staff (research managers) were completed by the end of January 2002 and the full appointment process was completed by the end of February - early March 2002.

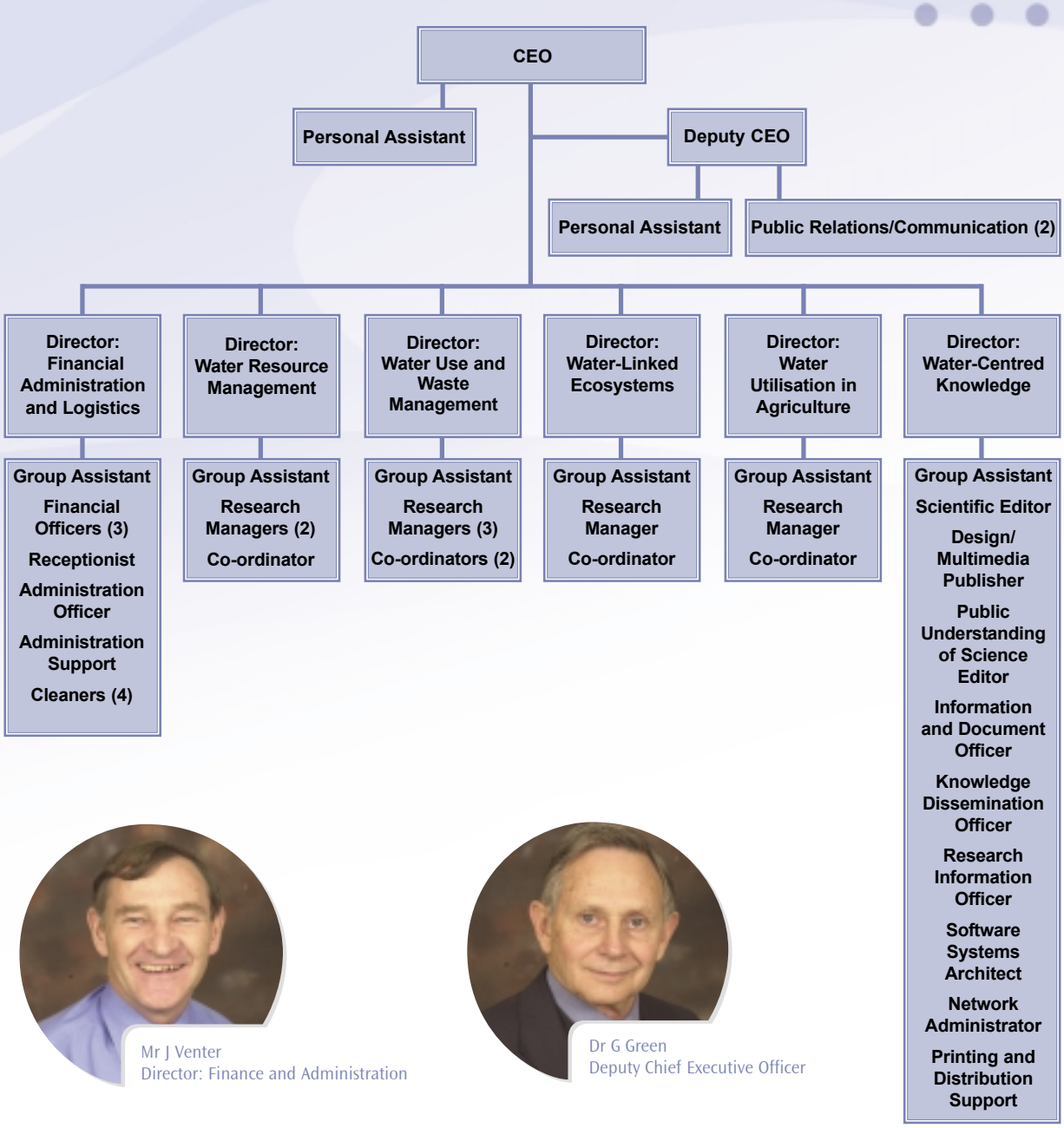
Core and non-core functions and outsourcing strategies

In accordance with the new strategic direction of the WRC, the core business of the WRC is to serve as a water-centred knowledge 'hub' through the investment in water-related R&D studies, in capacity and competence development, in the dissemination of knowledge and in the application of knowledge (innovation and commercialisation). The new design aims to strengthen the WRC's core functions related to the above, while outsourcing non-core support services in a cost-effective manner that will provide the organisation with high quality services at an increased level of efficacy and effectiveness. Continued and new outsourcing includes strategic management of IT (infrastructure and architecture), IT-based system development, legal and specialist financial support, building administration and strategic HR. The outsourcing of these activities has a limited effect on current costs while providing for high quality service. It has, however, affected the WRC's structure through the elimination of certain posts.

Core leadership

The new (transformed) core leadership or the Executive of the WRC encompasses eight positions. The members of the Executive include the Heads (Directors) of each of the KSAs, a Director of Administration (including finance and logistics), a Deputy Chief Executive Officer (DCEO) and the CEO. The transformation process took into account all aspects of cost and the Labour Relations Act. In addition to better alignment to the new strategy, the new structure also resulted in a reduction in the cost structure.

New Structure of the WRC



Mr J Venter
Director: Finance and Administration

Dr G Green
Deputy Chief Executive Officer

The new structure

The figure presented above provides a view of the new structure of the WRC. It should be noted that the past structure (as at the beginning of the financial year) was highly hierarchical and provided for a number of managerial positions. The new organisation is based on a flat structure and processes that provide for direct links between the organisation's support and the core functions. The staff complement in the past structure comprised 60 posts, including three vacant posts (see Human Resources information p 27). The new structure includes 49 staff members, providing for core and direct support functions. Under the new structure a number of posts became redundant. However, many of the individuals affected were re-located into new positions internally. More details about the WRC staff demographic composition is provided on p 28.

The dual role of leadership

Each of the members of the new Executive has a line and a strategic role, the former addressing the management needs of the specific KSA they are heading, and the latter championing a strategic drive at organisational level. The line functions involved in heading a KSA include issues such as research portfolio management, capacity-building, innovation (technology transfer, commercialisation), knowledge dissemination, human resource management and finance. The corporate (organisational) role of each of these executives encompasses, for example, the championing of a strategic area such as capacity-building, business development, and innovation.

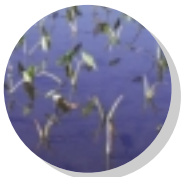
KEY PERFORMANCE AREAS (KPAs), OBJECTIVES AND ACHIEVEMENTS

As part of the strategic process of transformation and as a route for translating the organisation's vision into strategic measures, the WRC (in 2001/2002) identified a set of strategic key performance areas (KPAs). These KPAs were developed to serve the organisation as a roadmap. Many of the objectives presented for each of the KPAs are of a medium- to long-term nature, and were established with the aim of developing clearer, more refined, shorter-term objectives for the following financial year, i.e. 2002/2003. Notwithstanding this, significant progress was already made against many of these objectives during 2001/2002, especially those related to the new strategy and transformation of the organisation. The key objectives and achievements for each of the KPAs were as follows:

KPA: Customer/stakeholder relationships

The progress against this KPA is clearly reflected in the new core strategy of the WRC that aims to build close relationships with all WRC stakeholders. The need for ongoing, in-depth needs analysis as well as customer satisfaction surveys has been identified. During the year the WRC developed a number of strong alliances and links, both locally and globally. Some examples of achievements in relation to objectives identified for this KPA are shown in the following table:

Customer/stakeholder relationships: Stated objectives	***Progress and achievements***
• To develop and implement a process/system for analysing stakeholders' and providers' needs • To apply a customer satisfaction survey and measure progress against a satisfaction index • To effectively disseminate knowledge created through the support of the WRC • To communicate the WRC's business effectively with targeted stakeholder groups • To improve public understanding regarding water-related issues	• The WRC played a role in supporting the Department of Water Affairs and Forestry (DWAF) as well as other Government Departments, e.g. Department of Environmental Affairs and Tourism (DEAT) and the National Department of Agriculture in their preparation of South Africa's position paper for the World Summit for Sustainable Development (WSSD) • The WRC, in preparing for its strategic transformation, carried out informal discussions with key stakeholders with regard to their views and needs concerning water research • The WRC supported many local conferences/workshops related to water research (e.g. the organisation of the conference on Appropriate Technology in November 2001) • The WRC's new structure caters for a public relations (PR) and communications group. This group has already been instrumental in the development of new promotional material • The WRC developed and edited an edition of *Archimedes* specifically addressing water (in co-operation with the Foundation for Education, Science and Technology, FEST). Copies of this youth magazine were distributed to all high schools during Water Week (March 2002) • The WRC in partnership with DWAF and the Water Institute of South Africa (WISA) initiated the Women in Water Award which was also linked to Water Week (March 2002). This award will become an annual event • A number of articles addressing the role of the WRC were published in the technical and daily press (e.g. *Engineering News, Water 21*, various newspapers), both locally and internationally • The WRC was invited to join two global research partnerships, i.e. the Penta-party group addressing membrane research, and the Global Water Research Coalition addressing key global research issues (e.g. algal toxins, origin and fate of pathogens in water, endocrine disruptive agents) • The WRC established close working relationships with a number of international organisations, including the International Water Management Institute (IWMI) and the Water Supply and Sanitation Collaborative Council (WSSCC).



KPA: Financial perspectives

During 2001/2002 the WRC developed a number of financial practices that support a business-like culture. With the move into a KSA-based structure, the WRC carried out an in-depth investigation into the way in which budgeting and reporting will allow for rational delegation of powers and accountability. The aim was to establish decentralised budget and budgetary control systems, and to re-position the financial group as a key group for consolidating and auditing the financial undertakings of the KSAs. This coincided with establishing financial targets for income and expenditure in a decentralised manner for each KSA, to allow management of budgets at KSA level in the new financial year (2002/2003). This change required adjustment and upgrading of the current financial system and the mode of operation of the 'new' financial group.

In addition, during this financial year (2001/2002), emphasis was placed on meeting income targets (levy and other sources of income) as well as performance targets, with success being measured against a set of financial indicators based on the percentages of total income which is due to income from various other sources and the ratio (percentage) of expenditure on administrative support functions to total expenditure. The forecast and actual (achieved) ratios of all the above financial indicators are presented in the following table. It should be noted that most of the targets set were within the achievable range and, in some cases, the actual year-end result exceeded the target, an example being the increase in income (growth of 17% vs. a forecast growth of only 11%). This is even more significant as growth in levy income percentage (of total income) was about 2% lower than forecast, while an increase of 2% was recorded for other sources of income. This is indicative of an organisation that not only strives to meet its set objectives, but also excels in its operations or undertakings, given that a modest percentage of the expenditure serves to support the administration of the organisation. The major part (about 90%) of the funds are used for investment in R&D and knowledge dissemination activities, through the new mission of the organisation.

Financial indicators and financial targets for the period 2001/2002 (forecast vs. actual)

Indicator (%)	Forecast	Achieved
Growth in income*	11	17
Levies percentage of total income	92.97	90.25
Other sources of income/ total income	7.03	9.75
Research project funding as % of total expenditure	65.35	63.15
Research support /(projects and knowledge dissemination)/ total expenditure	76.01	69.593
Manpower core functions/ total expenditure	12.81	13.80
Total core functions/ total expenditure	88.81	83.24

**Calculated as the increase of actual income for 2001/2002 from the actual achieved for the previous year 2000/2001 (corrected to a 12-month period), without taking into account as part of the income, the transfer of unutilised research project's funds or any transfer from fixed investment; total income for 2001/02 (no transfer) has exceeded the forecast income by about 5.6 %, i.e. R89.6 million (actual) vs. R84.9 million (forecast).*

A number of achievements against the various stated objectives of this KPA are shown in the table on p 24.

Financial perspectives: Stated objectives	*Progress and achievements*
• To maximise impact of financial investment • To develop a five-year budget plan and assess performance against budget • To optimise overheads relative to core business expenditure • To grow levy and other external income • To increase return on commercialisation of research findings (intellectual property)	• The budget submission and five-year budget plan, which were prepared on time and in accordance with provisions of the PFMA, was approved by the Minister of Water Affairs and Forestry • The allocation of funds to research fields was approved by the Board, based on Strategic Frameworks prepared for each field • The allocation of funds for research projects was approved by the Minister • A new process regarding the decentralisation of the budget was developed • The WRC has been restructured to allow for decentralisation of financial accountability • A PFMA work group was established and has been working closely with the internal auditors • A procurement policy was developed and approved by management and the Board, and a procurement committee is functional • A fraud prevention policy, plan and a new Code of Ethics were developed and approved by the Board; a fraud prevention committee is now functional • The financial system was upgraded to allow for decentralisation of the budget and the establishment of internal control with regard to project finances • Recovery of long-standing debts against projects was undertaken by the Finance group • A no delivery - no payment policy was introduced with new rules regarding the finalisation of research projects • A levy (rates) increase was approved by the Minister

KPA: Learning and innovation

This KPA has a number of internally- and externally-focused objectives. Internally, the process of transformation continuously addressed the issues of shared understanding of the new vision, mission and values of the organisation. This happened through formal and informal presentations and discussion, and by building a new organisational 'language', addressing the new structure and mode of operation and placing emphasis on knowledge sharing. A review, carried out to evaluate the WRC as a learning organisation, clearly showed WRC staff to have a strong inclination to further their formal education and to undergo continuous learning. The WRC supported a number of staff (at different post levels) in their endeavours to obtain various degrees and diplomas (for further details, see p 28). The process of transformation has renewed the culture of innovation and learning in the organisation through the collective building of new posts, groupings, support systems and processes. During the process, a gap analysis was carried out with regard to available competencies and the need for training of staff. Results will be further translated into training initiatives in the next financial year; these will be reflected in each of the KSA business plans.

The new structure of the WRC also emphasises the importance of 'community of practice' or working forums across the WRC, e.g. the crosscutting domain forum.

Significant progress was achieved against the WRC objectives to build competencies and to promote the application of knowledge and the commercialisation of intellectual property (IP). The framework documents developed for each of the research fields of the WRC indicate in detail the achievements with regard to these objectives.

An initial review of capacity-building achievements indicated that about 730 post-graduate students were linked to project work funded by the WRC through research contracts during 2001/2002. As indicated in the table below, most students are at M.Sc. level while the reflected demography clearly indicates an appropriate balance in terms of equity and redress.

Capacity-building - Competency development (ongoing WRC projects 2001/2002)

	Honours	M.Sc.	Ph.D.s	Technikon	TOTAL
Black males	18	142	41	6	207
Black females	32	82	25	17	156
White males	6	78	61		145
White females	18	62	38	8	126
Not specified	45	15	1	20	81
Foreign		12	7	1	20
TOTAL	119	391	173	52	735

The WRC's investment in the protection of IP has borne fruit. This financial year was a turning point in that royalty income, resulting from licensed technology, has materialised for the first time. Although limited (i.e. R5 000), a marked increase in royalties relating to the specific technology (of about 200%, i.e. from R5 000 to R1 million) is expected by 2005/2006, based on the specific licensing agreement.

Other highlights in terms of progress made against the set objectives are indicated in the table below.

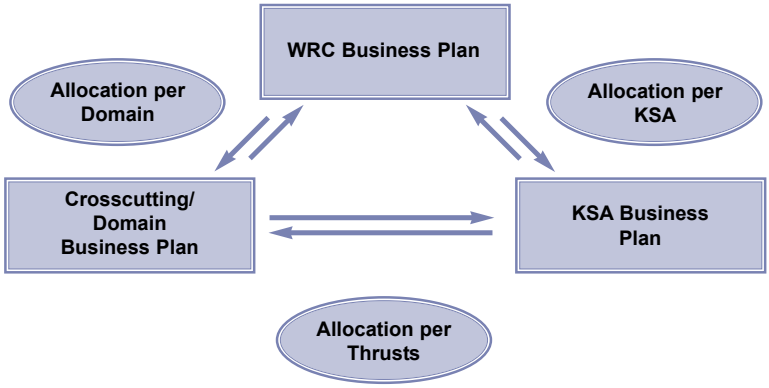
Learning and innovation: Stated objectives	*Progress and achievements*
• To support capacity-building and competency development for the water sector • To develop a shared vision, mission and core values • To install a culture of innovation and learning • To develop key competencies and skills • To develop and provide appropriate mechanisms for achieving personal growth of staff members • To develop internal processes and systems to support learning and knowledge sharing • To establish cross-cutting forums supporting new strategic initiatives	• A director was appointed to lead capacity-building initiatives • A strategic IT consultant prepared a report on the WRC's IT needs and a strategy was devised to address these needs • The new structure, specifically through the Knowledge KSA, places strong emphasis on knowledge management and access to information, as well as on knowledge sharing • An external HR consultant studied the level of available skills and competencies in preparation for re-appointment of staff. An initial gap analysis done simultaneously served to identify some development needs • A number of staff members completed their studies (supported by the WRC) while others will be starting new courses, e.g. MBA: Marketing, MBA: Water Management • Monthly staff meetings include sharing of information on strategic and operational matters • A number of internal forums have been established, e.g. WRC Executive, Research Managers, Group Assistants, Co-ordinators, PR/Communications, Crosscutting Domains • Strategic frameworks provided knowledge about achievements to date and capacity-building drives per field (November 2001) • The WRC, in response to a request by DWAF, will lead a study on gender issues relating to the water sector in South Africa • The WRC played a key role in FET-Water (a UNESCO/DWAF initiative regarding a framework for an education and training network in the water sector) • Two research managers attended a training course addressing IP • Two Directors were appointed to respectively lead the drives for commercialisation and for research output and impact assessment in terms of application of knowledge.

KPA: Internal processes

Two major achievements can be linked directly to the objectives set for this KPA. These include the review and revision of the process of strategic planning and the core process of funding.

The core process of strategic planning and its link to the funding process

The new core process of strategic planning, as illustrated below, links the KSAs/crosscutting domains' business plans to the organisational business plan, thus providing for the development of an over-arching research portfolio for the WRC that reflects the WRC's KPAs and objectives. Each KSA is considered as an impact area where outputs and impacts can be assessed. The KSAs will initiate strategic management initiatives addressing marketing, positioning and networking activities, as well as financial issues and human resource management.



The link between business planning and fund allocation

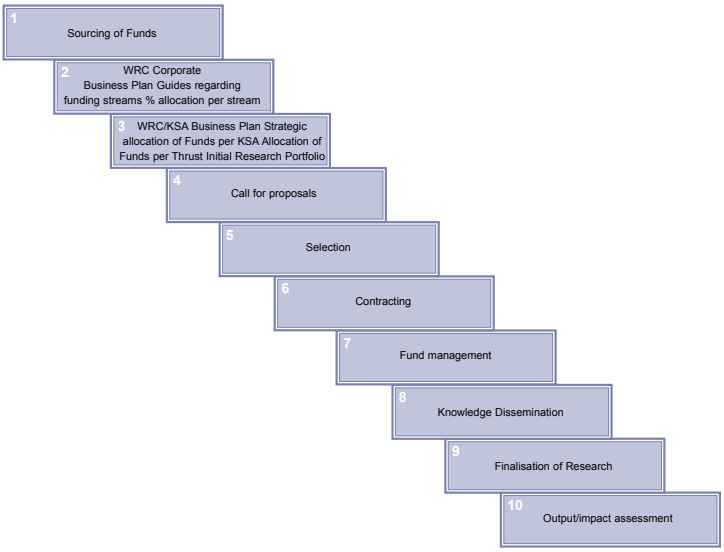
The KSAs support technology transfer, commercialisation and pilot implementation projects as well as other knowledge dissemination drives.

Progress was also made with regard to the project approval procedure. The initial strategic change was from the traditional procedure of obtaining approval at project level to a procedure whereby approval was obtained at the level of the research field (portfolio of projects), on the basis of the framework documents developed for each field. A further change in procedure was to obtain approval at the KSA level, as illustrated below.

The Process of Strategic Approval of Investment in R&D

Redesigning the core business of funding

During 2001/2002, the funding process, which was identified as the core business process of the WRC, was analysed and reviewed. The analysis indicated 10 sub-processes that needed to be addressed. The objectives of reviewing this process focused on improved efficacy, the provision of a strategic, pro-active approach for investing in R&D (relevance) and the enhancement of the impact of WRC (effectiveness). As illustrated below, the core business process of funding consists of 10 building blocks addressing various subprocesses from the sourcing of funds to output/impact assessment.



The core process of funding

Other achievements related to this KPA's stated objectives are shown in the table below.

Internal processes: Stated objectives	*Progress and achievements*
• To identify, develop and apply key business processes (financial, funding, human resource management) • To develop a process of effective and efficient translation of inputs into desirable outputs/outcomes • To refine methods for selection of 'projects' • To develop and apply forecasting/scenario-building techniques for assessing long-term research needs • To put in place an integrated/team approach to problem-solving and programme development • To develop and apply an appropriate project management system.	• Budget submissions included a number of key strategic ratios (see KPA Financial Perspectives) • The strategic framework document reflected improved investment management • The Board approved the strategic move to approving allocation of funds on the basis of a process of business planning • The core business process of funding was reviewed and revised • Details of the subprocesses of funding addressing the 'call for proposals' and selection of projects were documented • An external expert completed a needs analysis regarding the upgrading of IT tools and systems • New financial processes provided for clear responsibilities and accountability • A PFMA working group was established (see KPA - Financial perspectives) • The financial system was upgraded to allow for budget decentralisation during the next financial year.

KPA: Organisational transformation

This KPA is linked directly to the main objective of transforming the organisation, and many of the achievements described above are relevant in this regard. The skills gap that needs to be addressed in order to provide functional excellence (through competency and skills development) was identified. A process of improvement of internal and external communication with both staff and stakeholders was initiated. This is also reflected in the appointment of the PR/Communications group. In addition, there was a clear transition to equity and redress in the new structure of the organisation (also see HR issues).

Other highlights regarding progress against this KPA's objectives are shown below.

Organisational Transformation: Stated Objectives	*Progress and Achievements*
• To promote functional excellence through competency and skills development • To position information and knowledge management initiatives strategically (both internal and external drives) • To provide training in leadership and management for the core leadership of the WRC • To accelerate movement towards equity and transformation.	• Improved communication with staff (see above KPA innovation and learning) • The flat structure which provides for direct communication between core leadership and staff • The new structure of the Executive reflects transformation (see above) • The new structure addresses issues of gender and equity across functional barriers; e.g., the first black Group Assistant was appointed; a balanced mix of Black/White, female/male among KSA Co-ordinators was achieved • A Code of Ethics was developed and accepted by the Ethics Committee and by Management and an ethics awareness workshop was held.

Human Resources

The post structure of the WRC at the beginning of 2001/2002 reflected a staff complement of 60, which included three vacant posts. The transformation process resulted in a change in post structure with a staff complement of 49 members (with no vacancies) at the end of the year under review. Within the context of transformation of the organisation, the composition of staff did not change significantly, as no external recruitment took place. The staff complement after transformation reflects a balance in the number of male and female employees, with a 1% higher employment ratio for females. In terms of composition by race, there was an increase of 2% in the number of Black staff after restructuring. The result of the transformation process was a clear, flat structure with an increased percentage of employees in managerial positions and a clear trend towards an increased number of Black and female staff at Executive (top management) level. This level had previously been the domain of White males only.

Post structure

	On 1/4/2001	After transformation
Number of posts	60	49
Number of posts filled	57	49

Staff composition by gender

	On 1/4/2001	After transformation
Male	46%	49%
Female	54%	50%

Staff composition by race

	On 1/4/2001	After transformation
Black	39%	41%
White	61%	59%

Job levels by race

	On 1/4/2001	After transformation
Black Executive	0%	6%
White Executive	5%	10%
Black Managerial	11%	6%
White Managerial	10%	8%
Black Administration & Support	30%	29%
White Administration & Support	44%	41%

Job levels by gender

	On 1/4/2001	After transformation
Male Executive	5%	12%
Female Executive	0%	4%
Male Managerial	18%	12%
Female Managerial	4%	2%
Male Administration & Support	25%	24%
Female Administration & Support	48%	46%

WRC support for staff education and training

The WRC has supported the development of its staff members via formal tuition and shorter-term training courses. About 10 staff members have been engaged in studies, supported by the WRC, for an array of degrees and diplomas as well as pre-university education. In addition, a large number of staff attended various training courses, with topics ranging from life skills to basic adult education, leadership and strategic management of IP (see below).

Formal studies at various educational institutions

Studies	No of Individuals	Status
Ph.D. (geo-hydrology)	1	Ongoing
MBA	2	Completed
Fundamental Management	1	Completed
Market Research	1	Ongoing
B.Com	1	Ongoing
Office Administration	1	Ongoing
Matriculation	1	Ongoing
Personnel Management and Labour Law	1	Completed
Transformational Strategy	1	Completed

Training courses (2001/2002)

Course	No of Individuals	No of Courses Attended
Adult basic education Training	7	1
PC software	12	23
PC skills	2	4
Life skills	19	1
Legal issues (contracting & IP)	14	1
Management of IP	2	1
Leadership	4	1

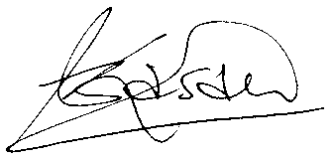
Looking ahead

While the year under review (2001/2002) was a year of transition, the WRC is facing the challenges of effective and efficient implementation of its new strategy and of consolidating the new structure and support systems while continuously assessing stakeholder needs and developing appropriate routes for the creation, dissemination and application of water-centred knowledge.

Board approval

The annual financial statements of the WRC and wholly owned company for the year ended 31 March 2002, which appear on pages 32 to 41 of this report, were approved by the WRC Board at its meeting held on 2 July 2002. The Board is of the opinion that the WRC is financially sound and operates as a going concern.

These statements are signed on behalf of the WRC Board by:



Dr HC Kasan
WRC Board Chairperson

Dr R Kfir
WRC Chief Executive Officer

Consolidated Financial Statements 2001/2002

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Report of the Auditor-General to Parliament on the Financial Statements of the Water Research Commission for the year ended 31 March 2002

Report of the Auditor-General to Parliament on the Financial Statements of the Water Research Commission for the year ended 31 March 2002

1. AUDIT ASSIGNMENT

The financial statements as set out on pages 32 to 41, for the year ended 31 March 2002, have been audited in terms of section 188 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996), read with sections 3 and 5 of the Auditor-General Act, 1995 (Act No. 12 of 1995), and section 14(1) of the Water Research Act, 1971 (Act No. 34 of 1971). These financial statements, the maintenance of effective control measures and compliance with relevant laws and regulations are the responsibility of the accounting authority. My responsibility is to express an opinion on these financial statements, based on the audit.

The performance information contained in the director's report for the year ended 31 March 2002 set out on pages 13 to 28 is the responsibility of the accounting authority. My responsibility is to provide an assessment of the fairness and consistency of the Water Research Commission's performance information. My role is not to evaluate or comment on the entity's actual performance.

2. NATURE AND SCOPE

2.1 Audit of financial statements

The audit was conducted in accordance with Statements of South African Auditing Standards. Those standards require that I plan and perform the audit to obtain reasonable assurance that the financial statements are free of material misstatement.

An audit includes:

- examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements,
- assessing the accounting principles used and significant estimates made by management, and
- evaluating the overall financial statement presentation.

Furthermore, an audit includes an examination, on a test basis, of evidence supporting compliance in all material respects with the relevant laws and regulations which came to my attention and are applicable to financial matters.

I believe that the audit provides a reasonable basis for my opinion.

2.2 Audit of performance information

The audit of the performance information embraced the standard for assurance engagements issued by the Auditing Standards Board.

I assessed the performance information against the criteria of fair and consistent performance information.

I believe that the audit provides a reasonable basis for my opinion.

3. AUDIT OPINION

3.1 Audit of financial statements

In my opinion, the financial statements fairly present, in all material respects, the financial position of the Water Research Commission and the group at 31 March 2002 and the results of its operations and cash flows for the year then ended in accordance with generally accepted accounting practice and in the manner required by the Public Finance Management Act, 1999 (Act No. 1 of 1999).

3.2 Audit of performance information

In my opinion, the performance information furnished in terms of section 55(2)(a) of the Public Finance Management Act, 1999 (Act No. 1 of 1999) fairly presents, in all material respects, the performance of the Water Research Commission for the year ended 31 March 2002 against predetermined objectives on a basis consistent with that of the preceding year.

4. EMPHASIS OF MATTER

Without qualifying the audit opinion expressed above, attention is drawn to the following matter:

As stated in note 4 to the financial statements the Water Research Commission has invested R29 400 166. In terms of sections 31.3.3 and 31.3.4 of the treasury regulations exemption should be obtained from the National Treasury if the Water Research Commission intends to invest some of their surplus funds with investment institutions other than the Corporation for Public Deposits. The National Treasury did not grant the Water Research Commission exemption to invest with other investment institutions although exemption was granted in 1992 by the then Minister of Water Affairs and Forestry.

5. APPRECIATION

The assistance rendered by the staff of the Water Research Commission during the audit is sincerely appreciated.

N Puren
for AUDITOR-GENERAL
Pretoria
26/07/2002

Balance Sheet as at 31 March 2002

Water Research Commission and Wholly Owned Company

	Water Research Commission			Consolidated	
	For the year ending 31/03/2002	For the 15 month period ending 31/03/2001		For the year ending 31/03/2002	For the 15 month period ending 31/03/2001
ASSETS	R	R	NOTES	R	R
Non-current assets					
Fixed assets	849 817	1 069 624	2	5 813 512	5 272 111
Investment in subsidiary	3 076 423	2 417 500	3	-	-
Other investments	29 400 166	26 403 257	4	29 400 166	26 403 257
Other loans	1	1	5	1	1
Intangibles	-	-	6	680 344	718 141
	33 326 407	29 890 382		35 894 023	32 393 510
Current assets	73 970 107	72 758 724		74 560 669	73 917 149
Debtors	27 055 964	26 432 687	7	27 357 250	25 904 581
Deposits and amounts immediately recoverable	16 333 871	21 869 334		16 421 630	21 882 094
Cash and cash equivalents	30 580 272	24 456 703		30 781 789	26 130 474
Total Assets	107 296 514	102 649 106		110 454 692	106 310 659
EQUITY AND LIABILITIES					
Capital and reserves					
Accumulated fund	78 731 475	73 344 617		81 634 521	76 652 481
Non-current liabilities					
Provisions	12 500 000	14 344 182	8	12 500 000	14 344 182
Current liabilities					
Creditors	16 065 039	14 960 307	9	16 320 171	15 313 996
Total equity and liabilities	107 296 514	102 649 106		110 454 692	106 310 659

Income Statement for the year ended 31 March 2002

Water Research Commission and Wholly Owned Company

	Water Research Commission			Consolidated	
	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R	NOTES	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R
INCOME					
Water research levies	80 899 490	86 608 630		80 899 490	86 608 630
Income on investment	5 145 794	6 213 653	10	4 867 977	5 953 188
Under provision for interest on investments	-	530 799		-	-
Other interest	487 701	591 782		503 668	611 571
Rental	-	-		-	756 259
Profit on sale of fixed assets	46 600	41 942		46 600	42 117
Other income	924 922	559 219		982 223	245 719
Provision for creditors written off	-	977 108		-	977 108
Over provision for bad debts	1 989 565	-		1 989 565	-
Over provision (previous year VAT)	85 827	-		85 827	-
Total income	89 579 899	95 523 133		89 375 350	95 194 592
EXPENDITURE					
Administrative services	3 998 426	4 307 020		4 093 366	4 343 208
Interest paid	903	1 244		903	1 244
External audit fee	132 538	98 284		135 858	106 284
Internal audit fee	305 889	279 839		305 889	279 839
Municipal services and security	-	-		237 366	414 704
Rental and maintenance	1 869 583	844 797		1 634 112	365 242
Staff expenditure: Administrative	3 403 665	4 833 547		3 403 665	4 850 719
Directors emoluments	243 484	326 755	11	243 484	326 755
Depreciation of fixed assets	414 595	353 566		477 005	434 855
Fixed assets written off	41 882	7 319		41 882	7 319
Amortisation of intangibles	-	-		37 797	37 797
Bad debts	-	995		-	995
Provision for bad debts	-	2 774 449		-	2 774 449
Technology transfer	6 535 248	5 783 743	12	6 535 248	5 783 743
Research projects and research support services	62 900 560	70 125 069	13	62 900 560	70 125 069
Over provision of levy income	4 346 268	-		4 346 268	-
Total expenditure	84 193 041	89 736 627		84 393 403	89 852 222
Income/Loss before provisions	5 386 858	5 786 506		4 981 947	5 342 370
PROVISION FOR					
Medical aid: Pensioners	-	(2 500 000)		-	(2 500 000)
Value added tax on levy receipts	-	(1 844 182)		-	(1 844 182)
Net income for the period before taxation	5 386 858	1 442 324		4 981 947	998 188
Taxation	-	-	14	-	(300 069)
Net income for the period after taxation	5 386 858	1 442 324		4 981 947	698 119

Statement of Change in Equity for the year ended 31 March 2002

Water Research Commission and Wholly Owned Company

	Water Research Commission	Consolidated
	ACCUMULATED FUND R	ACCUMULATED FUND R
Balance at 01/01/2000	71 902 293	75 954 455
Net income for the period	1 442 324	698 119
Balance at 31/03/2001	73 344 617	76 652 574
Net income for the year	5 386 858	4 981 947
Balance at 31/03/2002	**78 731 475**	**81 634 521**

Cash Flow Statement for the year ended 31 March 2002

Water Research Commission and Wholly Owned Company

	Water Research Commission			Consolidated	
	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R	NOTES	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R
Net cash flow from operating activities	3 950 284	15 648 067		2 717 631	15 924 878
Cash receipts	83 276 527	100 202 386		82 504 436	101 226 876
Cash payments	(82 630 929)	(89 039 151)		(82 829 641)	(89 546 154)
Net cash generated by/ (outflow from) operating activities	645 598	11 163 235	15	(325 205)	11 680 722
Interest received	3 305 589	4 486 076		3 043 739	4 245 400
Interest paid	(903)	(1 244)		(903)	(1 244)
Net cash outflow from investing activities	(1 517 996)	(4 518 913)		(1 682 598)	(3 954 520)
Purchase of fixed assets	(236 669)	(446 427)		(1 060 195)	(518 085)
Proceeds from sale of fixed assets	46 600	46 844		46 600	47 018
Increase in investment	(669 003)	(4 119 330)		(669 003)	(3 483 453)
Increase in investment of subsidiary	(658 924)	-		-	-
Transfer from fixed assets	-	-		-	(755 938)
Increase in intangibles	-	-		-	755 938
Net cash outflow from financing activities	(1 844 182)	-		(1 844 182)	-
Realisation of provision	(1 844 182)	-		(1 844 182)	-
			-		
Net increase/(decrease) in cash and cash equivalents	588 106	11 129 154		(809 149)	11 970 358
Cash and cash equivalents at the beginning of the year	46 326 037	35 196 883		48 012 568	36 042 210
Cash and cash equivalents at the end of the year	46 914 143	46 326 037	16	47 203 419	48 012 568

1. Accounting policies

The financial statements are prepared in accordance with generally accepted accounting practice on the historical cost basis and incorporate the following principal accounting policies which are consistent with those applied in the previous year, unless stated otherwise. In order to comply with requirements of the Public Finance Management Act (Act No 1 of 1999) the financial period of the Water Research Commission was extended in the previous year by 3 months to end on 31 March 2001.

1.1 Fixed assets and depreciation

Land and buildings are not depreciated. Depreciation on office equipment (20%), office furniture (10%), photo copying equipment (25%) and computer equipment (33,33%) is calculated annually on the straight-line method at the rates indicated. Motor vehicles are depreciated on a pro rata basis calculated on the basis of kilometres travelled annually as a portion of the expected useful life of the vehicles. The rates are appropriate to reduce each asset to its estimated residual value over the period of its useful life.

1.2 Capital assets purchased by organisations with research grants are written off in the year purchased. These remain assets of the Water Research Commission until the project for which they were acquired has been concluded and the Water Research Commission has decided on the disposal thereof. For these assets, the Water Research Commission maintains an asset register.

1.3 Research projects and research support services

Payments made by the Water Research Commission are accounted for as advances. In cases where audited statements are not received on time, the payments are accounted for as expenditure. It is the policy of the Water Research Commission that its management may allow overspending on a project budget in a given year, only if acceptable reasons are given, provided the total contract amount is not exceeded.

1.4 Investments

1.4.1 Share and unit trust investments are reflected at cost price plus dividends that have been capitalised or net realisable value, whichever is the lower.

1.4.2 Policies are reflected at accounting values as valued by the insurance companies. Annual increases in the values are accounted for as investment income.

1.5 Intangible assets

No value is attributed to internally developed patents. Costs incurred on patents, whether purchased or created by the Water Research Commission, are charged to the income statement during the period in which they are incurred.

1.6 Consolidation principles

The consolidated financial statements incorporate the financial statements of the Water Research Commission and its wholly owned company. The results of the subsidiary are included from the effective date of acquisition. Goodwill, being the excess of the cost of an acquisition over the fair value of the net assets of the acquired subsidiary at the date of acquisition, is amortised on a straight-line basis over the period of expected benefit. Inter-group transactions and balances are eliminated on consolidation.

1.7 Post employment pension benefit cost

The Water Research Commission participates in a defined benefit plan. The pension scheme is managed by ABSA.

1.8 Post employment medical aid costs

Provision is made for the actuarially calculated liability of the Water Research Commission for future medical aid contributions of retired staff. The actual contributions paid on behalf of the retired staff are charged to the income statement in the year to which they relate.

1.9 Revenue

The Department of Water Affairs and Forestry, the Rand Water and Umgeni Water Boards collect levy income. Levy income is recognised when received and provided for according to returns received from the collectants. The rate of the levy is approved by the Minister of Water Affairs and Forestry on an annual basis. All other revenue is recognised on an accrual basis.

	Water Research Commission		Consolidated	
	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R
2 Fixed assets				
2.1 Fixed property				
CARRYING VALUE: Beginning of year	-	5 000	4 072 532	4 828 470
MOVEMENTS during the year	-	(5 000)	821 219	(755 938)
CARRYING VALUE: End of year	-	-	4 893 751	4 072 532
2.2 Motor vehicles				
CARRYING VALUE: Beginning of year	128 074	148 525	128 074	148 525
- Cost	215 931	215 931	215 931	215 931
- Accumulated depreciation	(87 857)	(67 406)	(87 857)	(67 406)
MOVEMENTS during year	(55 734)	(20 451)	(55 734)	(20 451)
- Acquisitions/(Disposals)	(41 881)	-	(41 881)	-
- Depreciation	(13 853)	(20 451)	(13 853)	(20 451)
CARRYING VALUE: End of year	72 340	128 074	72 340	128 074
- Cost	146 956	215 931	146 956	215 931
- Accumulated depreciation	(74 616)	(87 857)	(74 616)	(87 857)
2.3 Office furniture				
CARRYING VALUE: Beginning of year	139 100	139 309	152 864	159 846
- Cost	323 448	298 014	377 636	352 201
- Accumulated depreciation	(184 348)	(158 705)	(224 772)	(192 355)
MOVEMENTS during year	13 397	(209)	7 978	(6 982)
- Acquisitions/(Disposals)	43 625	27 314	43 625	25 434
- Depreciation	(30 228)	(27 523)	(35 647)	(32 416)
CARRYING VALUE: End of year	152 497	139 100	160 842	152 864
- Cost	367 073	325 328	421 261	377 635
- Accumulated depreciation	(214 576)	(186 228)	(260 419)	(224 771)
2.4 Office equipment				
CARRYING VALUE: Beginning of year	362 043	481 653	478 233	600 701
- Cost	839 630	838 627	1 442 670	1 393 896
- Accumulated depreciation	(477 587)	(356 974)	(964 437)	(793 195)
MOVEMENTS during year	(121 089)	(119 610)	(175 680)	(122 467)
- Acquisitions/(Disposals)	18 623	27 846	21 023	72 661
- Depreciation	(139 712)	(147 456)	(196 703)	(195 128)
CARRYING VALUE: End of year	240 954	362 043	302 553	478 234
- Cost	858 253	866 473	1 463 694	1 466 557
- Accumulated depreciation	(617 299)	(504 430)	(1 161 141)	(988 323)
2.5 Computers				
CARRYING VALUE: Beginning of year	440 407	214 497	440 407	214 497
- Cost	1 017 323	878 614	1 017 323	878 614
- Accumulated depreciation	(576 916)	(664 117)	(576 916)	(664 117)
MOVEMENTS during year	(56 381)	225 910	(56 381)	225 910
- Acquisitions/(Disposals)	174 421	384 046	174 421	384 046
- Depreciation	(230 802)	(158 136)	(230 802)	(158 136)
CARRYING VALUE: End of year	384 026	440 407	384 026	440 407
- Cost	1 191 744	1 262 660	1 191 744	1 262 660
- Accumulated depreciation	(807 718)	(822 253)	(807 718)	(822 253)
2.6 TOTAL FIXED ASSETS	849 817	1 069 624	5 813 512	5 272 111
2.7 Fixed property consists of:				
Erf 706 Rietfontein, Pretoria with improvements	-	-	4 893 751	4 072 532
	-	-	4 893 751	4 072 532

		Water Research Commission		Consolidated	
		For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R
3	Investment in subsidiary				
3.1	Shares at cost	755 939	755 939	-	-
	Loan to subsidiary	2 320 484	1 661 561	-	-
		3 076 423	2 417 500	-	-

3.2 The following information relates to the Water Research Commission's interest in its subsidiary:
Erf 706 Rietfontein (Proprietary) Limited, is incorporated in South Africa. The total issued ordinary share capital of the company is held by the
Water Research Commission and amounts to R1.

4	Other investments				
	Policy Old Mutual	25 546 054	22 804 811	25 546 054	22 804 811
	Funds managed by Momentum Wealth and Franklin Templeton NIB	3 854 112	3 598 446	3 854 112	3 598 446
		29 400 166	26 403 257	29 400 166	26 403 257
	Market value				
	Policy Old Mutual	25 546 054	22 804 811	25 546 054	22 804 811
	Funds managed by Momentum Wealth and Franklin Templeton NIB	4 994 601	4 252 883	4 994 601	4 252 883
		30 540 655	27 057 694	30 540 655	27 057 694
5	Other loans	1	1	1	1
		1	1	1	1

Company for Research on Atmospheric Water Supply: This loan was advanced in terms of an agreement for the purchase of research equipment. The remaining assets and equipment were sold and the income derived was transferred to the WRC, thereby meeting all outstanding obligations to the WRC.

6	Intangibles				
6.1	Goodwill				
	Opening carrying amount	-	-	718 141	755 938
	Amortised for the year	-	-	37 797	37 797
	Closing carrying amount	-	-	680 344	718 141
	Gross carrying amount	-	-	755 938	755 938
	Accumulated amortisation	-	-	75 594	37 797

	Water Research Commission		Consolidated	
	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R
7 Debtors				
Water research levies	15 766 116	12 877 823	15 766 116	12 877 823
Project advances	11 515 030	14 017 133	11 515 030	14 017 133
Value added tax	-	-	285 870	-
Hydrological Information Centre	43 226	41 572	43 226	41 572
Personal computer loans	15 148	37 665	15 148	37 665
Motor scheme	258 083	818 721	258 083	818 721
Other	243 245	1 414 222	258 661	886 116
	27 840 848	29 207 136	28 142 134	28 679 030
Provision for bad debt	784 884	2 774 449	784 884	2 774 449
Total debtors	27 055 964	26 432 687	27 357 250	25 904 581

8 Provisions

8.1 Provisions were made for the following:

	Water Research Commission			Consolidated		
	Opening balance beginning of year	New provisions	Closing balance end of year	Opening balance beginning of year	New provisions	Closing balance end of year
31/03/2002						
VAT on water research levies - Umgeni	1 844 182	(1 844 182)	-	1 844 182	(1 844 182)	-
Medical aid : Pensioners	12 500 000	-	12 500 000	12 500 000	-	12 500 000
	14 344 182	(1 844 182)	12 500 000	14 344 182	(1 844 182)	12 500 000
31/03/2001						
VAT on water research levies - Umgeni	-	1 844 182	1 844 182	-	1 844 182	1 844 182
Medical aid : Pensioners	10 000 000	2 500 000	12 500 000	10 000 000	2 500 000	12 500 000
	10 000 000	4 344 182	14 344 182	10 000 000	4 344 182	14 344 182

8.2 The provision made for the VAT on water research levies related to an excess amount paid over by the Umgeni Office to the Water Research Commission.

8.3 The present value of the obligation as actuarially valued on 31 March 2000 amounts to R9 977 210. The actuarial valuation determined the liability to be R13 351 758 and R17 867 664 in five and ten years respectively.

The actuarial valuation was based on:

- the future value
- retirements in the interim
- 12,5% of the members retire within the following five years and 10% of the members retire in the following five years.

8.4 Actual post-retirement medical aid benefits paid for the year amounted to R422 822 (previous 15-month period R393 155).

		Water Research Commission		Consolidated	
		For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R
9	Creditors				
	Amounts due to Research Contractors	8 463 635	7 220 319	8 463 635	7 220 319
	SAREP (SA Rainfall Enhancement Programme)	166 108	166 258	166 108	166 258
	Expenses payable	91 730	-	-	-
	Other	67 642	49 954	414 504	403 643
	Outstanding cheques	4 744 635	6 254 285	4 744 635	6 254 285
	Value-added tax (VAT)	2 549 452	2 229 996	2 549 452	2 229 996
	PAYE outstanding	-	16 603	-	16 603
		16 083 202	15 937 415	16 338 334	16 291 104
	Provision for creditors written off	18 163	977 108	18 163	977 108
	Total creditors	16 065 039	14 960 307	16 320 171	15 313 996
10	Income on investments				
	Interest on loan to subsidiary	277 817	260 465	-	-
	Interest on other investments	-	299 230	-	299 230
	Value adjustment of policy	2 327 906	2 319 359	2 327 906	2 319 359
	Interest on deposits and cash investments	2 540 071	3 334 599	2 540 071	3 334 599
		5 145 794	6 213 653	4 867 977	5 953 188
11	Disclosure of emoluments of all Board Members (Directors) in terms of section 28 of Treasury Regulations				
	Fees for services as Director	78 000	133 321	78 000	133 321
	Basic salary (Chairman)	119 930	129 307	119 930	129 307
	Sums paid by way of allowances	45 554	64 127	45 554	64 127
		243 484	326 755	243 484	326 755
12	Technology transfer				
	Salaries: Corporate Publications	1 198 669	1 175 177	1 198 669	1 175 177
	Salaries: Information Management	738 149	766 353	738 149	766 353
	Publications	3 491 958	2 880 598	3 491 958	2 880 598
	Conferences	507 717	542 197	507 717	542 197
	Maintenance of patents	598 755	419 418	598 755	419 418
		6 535 248	5 783 743	6 535 248	5 783 743
13	Research and research support services				
	Subsistence and travel	2 051 491	2 641 511	2 051 491	2 641 511
	Salaries: Research staff	7 651 425	7 771 046	7 651 425	7 771 046
	Salaries: Bethlehem Weather Bureau	-	209 590	-	209 590
	Research projects	50 852 947	56 250 519	50 852 947	56 250 519
	Capacity-building Mobility Fund	125 130	45 186	125 130	45 186
	Research and other grants	86 419	221 576	86 419	221 576
	Research consultancies	2 133 148	2 985 641	2 133 148	2 985 641
		62 900 560	70 125 069	62 900 560	70 125 069

		Water Research Commission		Consolidated	
		For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R	For the year ending 31/03/2002 R	For the 15 month period ending 31/03/2001 R
14	Taxation				
14.1	SA normal taxation				
	- Current year				
	- Under provision for previous years	-	-	-	37 365
		-	-	-	262 704
		-	-	-	300 069
14.2	Provision for Income Tax: No provision was made for normal tax, as the Water Research Commission is exempted from income tax in terms of Section 10(1)(cA)(i) of the Income Tax Act. The provision in respect of the wholly owned company stems from correspondence received from SARS.				
15	Reconciliation of net income with cash generated from operating activties				
	Net income	5 386 858	5 786 506	4 981 947	5 342 370
	Adjustments for:				
	Profit on the sale of fixed assets	(46 600)	(41 942)	(46 600)	(42 117)
	Fixed assets: Written off	41 882	7 319	41 882	7 319
	Depreciation	414 595	353 566	477 005	434 855
	Amortisation of intangibles	-	-	37 797	37 797
	Interest received	(5 633 495)	(7 336 234)	(5 371 645)	(6 564 759)
	Interest paid	903	1 244	903	1 244
	Net income/(deficit) before changes in working capital	164 143	(1 229 541)	121 289	(783 291)
	Changes in working capital	481 455	12 392 776	(446 494)	12 464 013
	(Increase)/Decrease in debtors	(623 277)	12 057 429	(1 452 669)	12 639 160
	Increase/(Decrease) in creditors	1 104 732	335 347	1 006 175	(175 147)
	Net cash generated by/(outflow from) activities	645 598	11 163 235	(325 205)	11 680 722
16	Cash and cash equivalents comprise cash on hand, bank balances and deposits immediately recoverable				
	Cash and bank balances	30 580 272	24 456 703	30 781 789	26 130 474
	Deposits and amounts immediately recoverable	16 333 871	21 869 334	16 421 630	21 882 094
		46 914 143	46 326 037	47 203 419	48 012 568

Financial Statements 2001/2002

Contents

General Review

(a) To review the business and operations of the company for the above accounting period generally, the directors draw attention to the balance sheet, income statement, equity statement and cash flow statement attached, where the business of the company, the results and state of affairs are clearly reflected.

(b) The Fourth Schedule to the Companies Act, 1973, requires the Directors to report on any material facts or circumstances which occurred between the accounting date and the date of their report. No such material facts or circumstances occurred.

Specific Matters

(a) The nature of the business of the company is that of owning the immovable property known as Erf 706 Rietfontein, including all permanent improvements, and using the property for the sole purpose of promoting the operations of the Water Research Commission (WRC).

(b) No shares were allotted or issued by the company during the accounting period 2001/02.

c) Improvements to the fixed property totaling R821 220 were made in this financial year and capitalised.

(d) No dividends were paid or declared during the accounting period and we have no recommendation to make (2000/01 - NIL).

(e) The Directors and certain members of staff of the Water Research Commission, for whom an administration fee is paid, managed the business of the company - no third person was involved in managing the company.

(f) The names of Directors, including the changes that have taken place in the appointments during the accounting period, are shown below. No secretary was appointed.

Dr R Kfir (appointed 1 July 2001).
Prof K Nyamapfene (resigned 31 December 2001)
New Chairperson of WRC to be appointed
Mr R Sutton
Mr JA Venter

The company is wholly owned by the Water Research Commission.

Approval of Financial Statements

Erf Sewe-nul-ses Rietfontein (Pty) Ltd

The Directors' Report and Financial Statements of Erf Sewe-nul-ses Rietfontein (Pty) Ltd set out on pages 48 to 56 were approved by the Board of Directors and were signed on its behalf by:

Dr HC Kasan
Chairperson: Water Research Commission Board

Mr J Venter
Director: Financial and Administration

31 May 2002

General Information

Directors: Dr Rivka Kfir
Prof K Nyamapfene (resigned 31.12.01)
Mr R Sutton
Mr JA Venter

Registered office: 301 Watko Building
491, 18th Avenue
Rietfontein
PRETORIA

Nature of business: Letting of fixed property

Registration number: 1984/003566/07

Main business and purpose:
To own the immovable property known as Erf 706 Rietfontein, in addition and supplementary to the aim of the Water Research Commission (WRC) and to place the property at the disposal of the WRC as their main place of business.

Report of the Auditor-General to Parliament on the Financial Statements of Erf Sewe-Nul-Ses Rietfontein (PTY) LTD for the year ended 31 March 2002

1. AUDIT ASSIGNMENT

The financial statements as set out on pages 46 to 53, for the year ended 31 March 2002, have been audited in terms of section 188 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996), read with sections 3 and 5 of the Auditor-General Act, 1995 (Act No. 12 of 1995) and the Companies Act, 1973 (Act No. 61 of 1973). These financial statements, the maintenance of effective control measures and compliance with relevant laws and regulations are the responsibility of the accounting authority. My responsibility is to express an opinion on these financial statements, based on the audit.

2. NATURE AND SCOPE

The audit was conducted in accordance with Statements of South African Auditing Standards. Those standards require that I plan and perform the audit to obtain reasonable assurance that the financial statements are free of material misstatement.

An audit includes:

- examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements,
- assessing the accounting principles used and significant estimates made by management, and
- evaluating the overall financial statement presentation.

Furthermore, an audit includes an examination, on a test basis, of evidence supporting compliance in all material respects with the relevant laws and regulations which came to my attention and are applicable to financial matters.

I believe that the audit provides a reasonable basis for my opinion.

3. AUDIT OPINION

In my opinion, the financial statements fairly present, in all material respects, the financial position of Erf Sewe-Nul-Ses Rietfontein (Pty) Ltd at 31 March 2002 and the results of its operations and cash flows for the year then ended in accordance with generally accepted accounting practice and in the manner required by the Public Finance Management Act, 1999 (Act No. 1 of 1999) and the Companies Act, 1973 (Act No. 61 of 1973).

4. APPRECIATION

The assistance rendered by the staff of Erf Sewe-Nul-Ses Rietfontein (Pty) Ltd during the audit is sincerely appreciated.

N Puren
for Auditor-General
Pretoria
26/07/2002

Balance Sheet as at 31 March 2002

Erf Sewe-Nul-Ses Rietfontein (Pty) Ltd

	For the year ending 31/03/2002		For the 15 month period ending 31/03/2001
ASSETS	R	NOTES	R
Non-current assets			
Property and equipment	4 963 696	4	4 202 486
Current assets	682 292		1 808 078
Trade and other receivables	393 016		121 546
Deposits	12 760		12 760
Cash in bank	201 516		1 598 772
Cash investment	75 000	5	75 000
Total assets	5 645 988		6 010 564
EQUITY AND LIABILITIES			
Capital and reserves	2 978 639		3 345 753
Issued capital	1	2	1
Accumulated profits	2 978 638		3 345 752
Non-current liabilities			
Long -term borrowings	2 320 482	3	1 661 561
Current liabilities			
Creditors	346 867		1 003 250
Total equity and liabilities	5 645 988		6 010 564

	For the year ending 31/03/2002 R	NOTES	For the 15 month period ending 31/03/2001 R
Revenue	2 032 109		1 357 353
Other income	15 967		19 965
Operating expenses	(2 137 373)		(992 303)
Profit/(Loss) from operations	(89 297)		385 015
Finance costs	(277 817)		(260 465)
Profit/(Loss) before tax	(367 114)		124 550
Income tax expense	-	6	(300 069)
Loss after tax	(367 114)		(175 519)
Previous year adjustment	-		(530 799)
Accumulated profits beginning year	3 345 752		4 052 070
Accumulated profits end of year	2 978 638		3 345 752

The profit from operations was determined after the following items, which require separate disclosure in terms of the Companies Act, have been taken into account:

Auditors' remuneration			
- Audit fee	3 320		8 000
- Secretarial fees	-		114
Depreciation			
- Furniture and fittings	5 419		6 773
- Equipment	56 991		74 515

Statement of Change in Equity for the year ended 31 March 2002

Erf Sewe-Nul-Ses Rietfontein (Pty) Ltd

	For the year ending 31/03/2002 R
Balance at 01/01/2000	3 521 271
Net income for the period	(175 519)
Balance at 31/03/2001	3 345 752
Net loss for the period	(367 114)
Balance at 31/03/2002	2 978 638

Cash Flow Statement for the year ending 31 March 2002

Erf Sewe-Nul-Ses Rietfontein (Pty) Ltd

	For the year ending 31/03/2002	NOTES	For the 15 month period ending 31/03/2001
	R		R
Cash flow from operating activities	(1 232 558)		793 831
Operating profit/(loss) before taxation	(367 114)		124 550
Adjustment for:			
Depreciation	62 410		81 289
Investment income	(15 967)		(19 965)
Depreciation recouped	-		(175)
Finance charges	277 817		260 465
Operating profit/(loss) before working capital changes	(42 854)		446 164
Working capital changes	(927 854)		588 167
Decrease/(Increase) in debtors	(271 469)		(67 921)
Increase/(Decrease) in creditors	(656 385)		656 088
Cash utilised/(generated) by operating activities	(970 708)		1 034 331
Interest received	15 967		19 965
Finance costs	(277 817)		(260 465)
Cash-out flow from investing activities	(823 619)		(71 483)
Additions to fixed assets	(823 619)		(71 658)
Proceeds from disposal of assets	-		175
Cash flow from financing activities			
Increase/(Decrease) in long-term borrowings	658 921		118 856
Net increase/(decrease) in cash and cash equivalents	(1 397 256)		841 204
Cash and cash equivalents beginning of year	1 686 532		845 328
Cash and cash equivalents end of year	289 276	7	1 686 532

Detailed Income Statement for the year ending 31 March 2002

Erf Sewe-Nul-Ses Rietfontein (Pty) Ltd

	For the year ending 31/03/2002	For the 15 month period ending 31/03/2001
	R	R
Income	2 048 067	1 377 317
Rent received	1 844 774	1 131 138
Municipal expenses recouped	186 296	226 215
Interest received	15 967	19 789
Depreciation recouped	-	175
Sundry income	1 039	-
Expenses	2 415 190	1 252 767
Administration and management fee	381 104	330 672
Bank charges	2 711	2 971
Depreciation		
- Equipment	56 991	74 515
- Furniture and fittings	5 419	6 773
Entertainment	5 964	3 013
Insurance	9 923	19 828
Interest paid	277 817	260 465
Membership fees	-	1 950
Municipal services and levies	237 366	317 657
Provision for audit fees		
- Fee for audit	3 320	8 000
Regional services council	1 828	2 607
Rent - meter readings	1 716	1 805
Repairs and maintenance	1 358 233	121 449
Secretarial services	-	114
Security	72 798	97 047
Telephone	-	3 901
Profit/(Loss) before tax	(367 114)	124 550

	For the year ending 31/03/2002	For the 15 month period ending 31/03/2001
	R	R

1 ACCOUNTING POLICIES

1.1 The company applies generally accepted accounting practices which are in agreement with the previous year.

1.2 Fixed Assets

Land and buildings are not depreciated and all improvements are capitalized against the fixed property.

Depreciation is provided on the straight line method at the following rates:

- Furniture and fittings @ 10%
- Equipment @ 20%

1.3 Revenue

Revenue consist of rental income excluding value added tax

2 ISSUED CAPITAL

Authorised

4 000 Ordinary shares of R1 each	4 000	4 000

Issued

1 Ordinary share of R1 each	1	1

3 LONG-TERM BORROWINGS

Water Research Commission

The loan is unsecured and repayable over 30 years. Interest was charged at 15% on the monthly balance.	2 320 482	1 661 561

	For the year ending 31/03/2002	For the 15 month period ending 31/03/2001
	R	R
4 PROPERTY AND EQUIPMENT		
4.1 Fixed property		
Erf 706 Rietfontein (Pretoria, Gauteng)		
- At cost	615 855	615 855
- Improvements and expenses capitalized: 1985 - 2002	4 277 896	3 456 676
	4 893 751	4 072 531
4.2 Furniture and fittings	8 345	13 764
Carrying value: Beginning of year	13 764	20 537
- Cost	54 188	54 188
- Accumulated depreciation	(40 424)	(33 651)
Additions	-	-
Depreciation	(5 419)	(6 773)
Carrying value: End of year	8 345	13 764
- Cost	54 188	54 188
- Accumulated depreciation	(45 843)	(40 424)
4.3 Equipment	61 600	116 191
Carrying value: Beginning of year	116 191	119 048
- Cost	603 041	555 269
- Accumulated depreciation	(486 850)	(436 221)
Additions	2 400	71 658
Depreciation	(56 991)	(74 515)
Carrying value: End of year	61 599	116 191
- Cost	605 441	603 041
- Accumulated depreciation	(543 842)	(486 850)
Total property and equipment	4 963 696	4 202 486

		For the year ending 31/03/2002	For the 15 month period ending 31/03/2001
		R	R
5	CASH INVESTMENT		
	ABSA Bank: (unsecured) 32 day deposit	75 000	75 000
6	INCOME TAX		
	Profit/(Loss) for the year	(367 114)	124 550
	Provision for income tax - current year	-	37 365
	Under provision for previous years	-	262 704
		-	300 069
7	CASH AND CASH EQUIVALENTS		
	Cash and cash equivalents consist of cash on hand and balance with bank. Cash and cash equivalents included in the cash flow statement comprise the following balance sheet amounts:		
	Deposits	12 760	12 760
	Cash in bank	201 516	1 598 772
	Cash investment	75 000	75 000
		289 276	1 686 532

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