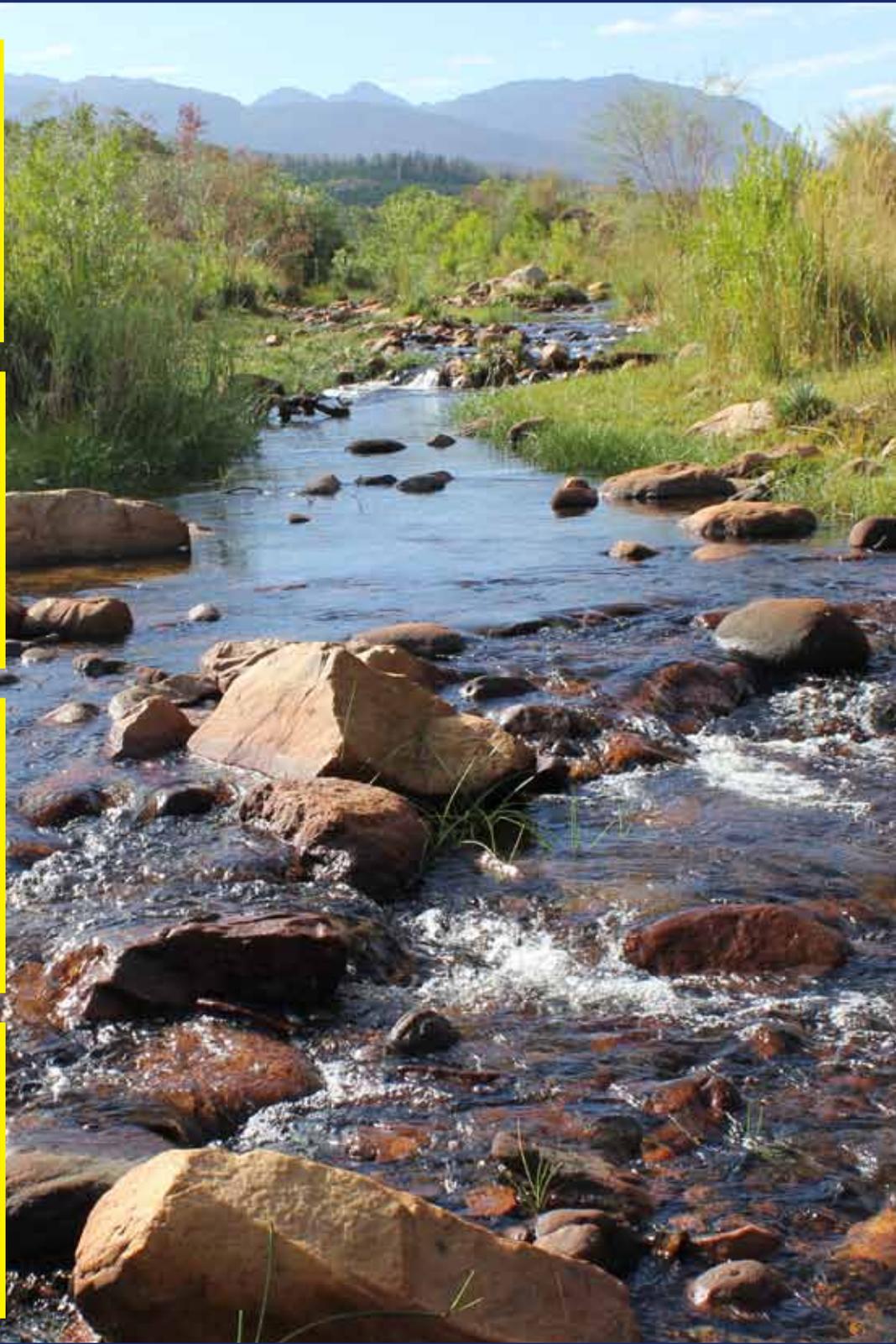


South Africa's Environmental Programmes

Supporting natural resource management through public employment programmes



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



EXPANDED PUBLIC WORKS PROGRAMME
CONTRIBUTING TO A NATION AT WORK

CONTENTS

- 2 South Africa takes action
- 3 Ruinous eco-damage through invasions
- 4 Water, climate change and invasive species
- 6 Taking action against invasive species
- 7 Fighting invasives with biocontrol
- 8 Using biomass to create jobs
- 9 Carbon farming in the Eastern Cape
- 10 Integrated Fire Management Services
- 12 Securing our wetlands for all
- 14 Recycling and waste management
- 16 Communities help to build parks
- 18 Preserving our coastal environment
- 20 Creating jobs in the wildlife economy

South Africa takes action

Using labour-intensive interventions, South Africa seeks to upgrade its environmental infrastructure and protect its biological diversity.

With leadership and substantial political will, South Africa's Department of Environmental Affairs (DEA) is tackling the critical challenge of natural resource management, environmental protection and infrastructure in two multi-faceted programmes.

Natural Resources Management (NRM) programmes address threats to the productive use of land and water, and the functioning of natural systems, by invasive alien species, wild fires and land degradation. In doing this work, they also promote opportunities for value-added industries (including fibre and eco-furniture production), whilst ensuring meaningful livelihood opportunities for those employed from marginalised communities.

The two largest NRM programmes are Working for Water and Working on Fire. Working for Water sub-components include Working for Land, Working for Forests and Working for Wetlands.



The Deputy Minister of Environmental Affairs, Rejoice Mabudafhasi.



The Minister of Environmental Affairs, Edna Molewa

Environmental Protection and Infrastructure (EPI) programmes manage the identification, planning and implementation of focal areas such as Working on Waste, Working for the Coast, People & Parks, Eco-Furniture Factories, a component of Working for Land and finally, Greening and Open Space Management.

All environmental programmes work to the employment prescripts of South Africa's Expanded Public Works Programme using labour-intensive methods which target the unemployed, youth, women, people with disabilities and small to medium size enterprises (SMMEs).

ON THE COVER



Saving the Fynbos fish.

A pilot project in February 2012 removed invasive small-mouth bass from a 4 km stretch of the Rondegat River in the Cederberg Mountains of the Western Cape, thereby increasing the habitat of endangered indigenous fish.



Working for the Coast.

South African National Parks (SANParks) workers pick up litter along a stretch of the country's coastline.



Working for Land.

Rehabilitating degraded land to support ecosystem services, prevent erosion and promote carbon farming.



Working on Fire.

Training young men and women as wildland fire fighters stationed in 170 teams throughout South Africa.



Working for Water.

Aquatic teams clear tonnes of water hyacinth from rivers, lakes and dams in South Africa every year.

Ruinous eco-damage through invasions

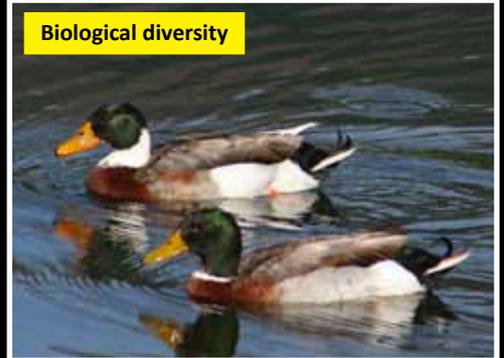
Invasives, climate change, genetic pollution and habitat destruction form a lethal cocktail.

Food security



The invasive South American pompom weed (*Campuloclinium macrocephalum*) threatens the agriculture of the entire grassland biome.

Biological diversity



Mallard ducks (*Anas platyrhynchos*) threaten indigenous yellow-billed ducks.

Habitat destruction



The balloon vine (*Cardiospermum grandiflorum*) smothers and kills indigenous trees.

Ecosystem service disruption



Water hyacinth (*Eichhornia crassipes*) creates a dense mat across dams and rivers.

Water security



Black wattle (*Acacia mearnsii*) chokes river valleys and depletes water resources.

Invader pathogens



Phytophthora results in a root-rot invasion that can destroy trees in forests and plantations.

Aquatic invaders



The red water fern (*Azolla filiculoides*) covers water bodies in a dense mat.

Health security



Indian house crows (*Corvus splendens*) carry at least eight human enteric diseases.

Water nightmare



River red gum (*Eucalyptus camaldulensis*) invades perennial and seasonal water courses.

Economic devastation



The inedible triffid weed (*Chromolaena odorata*) threatens to engulf entire nature parks in KwaZulu-Natal. If it succeeds, there will be no food for wildlife and tourism will collapse.

Water, climate change and invasive species

Working for Water is an internationally recognised showcase for South Africa.

Established in 1995, Working for Water (WfW) is a globally acclaimed programme which aims to remove invasive alien plants (IAPs) and mitigate their effects on water quantity and quality, biological diversity and the functioning of natural ecosystems.

Removing invasive species promotes ecosystem resilience in an era of climate change, and is achieved through a public employment programme.

The facts that underpin the WfW programme:

- Of the estimated 9 000 alien plant species introduced to our country, 198 are legally classified as invasive. It is estimated that these plants cover about 20% of the country's surface area and the problem is growing exponentially. A further 150 alien plant species are to be added to the list.

- Experts maintain that more than 7% of all water run-off is lost to invasive alien plants which use 3,3billion cubic

metres of water in excess of that used by indigenous vegetation, every year. Uncontrolled, invasive plants could eventually use as much as 20% of South Africa's annual run-off.

“ Mitigation and adaptation strategies require interventions which build and sustain South Africa's social, economic and environmental resilience. Water is considered to be the medium through which climate change impacts will be felt by most people, ecosystems and economies. ”

South African National Climate Change Response Green Paper (2010)

- Clearing invasive plants along rivers typically results in stream flow increase of 800 to 12 000ℓ /ha/day in the

winter rainfall region and up to 34 000ℓ /ha per day in the summer rainfall region, regardless of location and species.

- IAPs have devastating and destructive impacts on water quality, soil health, estuary systems, human health and food security. They also increase soil erosion and the risk of wild fires.

- Between 1995 and 2011, WfW teams cleared over 2,1million ha of alien plant invasion. This clearing has yielded an estimated release of 48million to 56million cubic metres of additional water for alternative uses annually.

- Since 1995, South Africa has invested R5,6billion in WfW, and a further R2,85billion has been budgeted over the next three years.

- Scientists have estimated that 71% of grazing in South Africa could be lost to invasive alien plants. This is an unthinkable risk in terms of food



Targeted invasive species. Teams remove pampas grass (*Cortaderia selloana*) from roadsides in Cape Town.



Water security. Thick, dense clumps of Indian shot (*Canna indica*) are removed from rivers in West Lake, Cape Town.



Invisible menace. Hydrilla (*Hydrilla verticillata*) destroys fishing tourism and alters oxygen levels and water chemistry.

Controlling invasives through public works programmes

security, jobs lost, biological diversity and tourism threatened.

- If WfW had not invested in the removal of IAPs, scientists estimate that South Africa would have lost R48,2billion a year in ecosystem services.
- Using a people-centred approach, WfW annually manages more than 300 projects across all nine provinces. Between 22 000 and 27 000 work opportunities have been created annually since 1995. (185 686 job opportunities were created between 2004/5 to 2008/9)
- By creating an enabling environment for skills training, WfW invests in the development of communities through the Peer Educator Programme, which is aligned to national health days. Weekly information is distributed on issues as wide ranging as personal safety, rape awareness, breast cancer, eyesight awareness, HIV/Aids and tuberculosis.



Working for Water. Using sophisticated mapping tools, infestations are identified and work teams are appointed to systematically remove invasive plants.



Water security. High-altitude invasive plant teams are used to remove invasive pines from fragile mountain ecosystems.



BEFORE



AFTER

Tourism. Water lettuce (*Pistia stratiotes*) is removed from a dam in Plettenberg Bay by releasing insects in a biocontrol programme.

Taking action against invasive species

A number of management strategies are implemented across South Africa to deal with invasive species.

A host of strategies are implemented nationwide to manage invasions in line with international best practice:

- **Prevention** is paramount in stopping invasive species from entering the country. Prevention includes implementing, regulating and enforcing national, provincial and municipal laws aimed at preventing the introduction of invasive species. Risk assessments of potentially harmful species guide preventative actions.

“Since 1995, Working for Water teams cleared over 2,1million ha of invasive plants. This has yielded an estimated release of 48million to 56million cubic meters of additional water for alternative uses annually.”

- **Early Detection & Rapid Response (EDRR):** The second line of defence is detecting and removing invasive species

that survived the preventive process. The national Early Detection and Rapid Response (EDRR) programme is implemented by the South African National Biodiversity Institute which has staff trained to identify and control newly established invasive alien plant species before their populations spread.

- **Eradication** refers to situations where every single plant or animal must be removed from an area. Total eradication is only achievable with a very small number of species. Examples include the Australian kangaroo wattle (*Acacia paradoxa*) which was targeted for eradication on Table Mountain and the Indian house crow (*Corvus splendens*).

- **Containment:** Forestry plantations of invasive species such as *Pinus* spp. or *Eucalyptus* spp. are continuously surveyed to detect and control plants that spread out of the demarcated zone. Containment of dense stands of invasive plants is also used as a management strategy when budgets are limited.

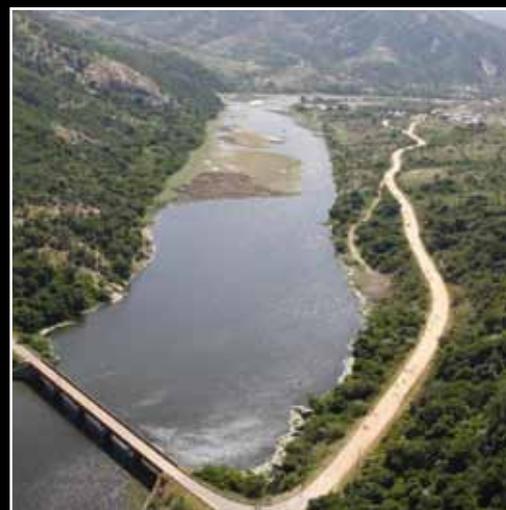
- **Control** is a long-term process

to remove invasive species through an integrated control programme, using mechanical removal, manual removal, biological control, herbicides and fire. Regular follow-up operations ensure effective control and prevent reinvasion of cleared areas are necessary.

“ Clearing invasive plants along rivers, typically results in stream flow increase of 800 to 12000ℓ/ha per day in the winter rainfall region and up to 34000ℓ /ha per day in the summer rainfall region, regardless of location and species. ”

- **Restoration** is an integral part of most control programmes. Restoration happens through natural succession or active reseedling and planting. Where invasive plants are removed, every effort is made to replace them with suitable plants.

Clearing water hyacinth from the Duzi River



An integrated management approach including biocontrol, aerial herbicide spraying and manual removal was used to clear water hyacinth (*Eichhornia crassipes*) from the Duzi River in KwaZulu-Natal.

Fighting invasives with biocontrol

Celebrating a highly successful programme that introduces host-specific insects, mites and fungi to suppress invasive alien plants.

South Africa is a world leader in the field of biological control (biocontrol) and with support from the Department of Environmental Affairs celebrates its centenary in March, 2013.

The first biocontrol project in South Africa was against the drooping prickly pear, *Opuntia monacantha* (previously called *Opuntia vulgaris*), which was a menace along the coast from Cape Town to KwaZulu-Natal. A cochineal species (*Dactylopius ceylonicus*) was introduced in 1913 and had a dramatic impact on the cactus, virtually wiping it out. This project is an example of a completely successful biological control project.

In 1987, predecessors of the Agricultural Research Council (ARC) introduced a gall rust fungus (*Uromycladium tepperianum*) from Australia to combat the Port Jackson willow (*Acacia saligna*) problem. The fungus causes galls on the leaves, stems and flowers of the host plant rendering it sterile. The introduction of host specific insects and fungi is managed by stringent legislated controls.

More recently, a seed-feeding weevil (*Melanterius compactus*), also from Australia, was released to neutralise seeds that might have escaped the fungus.

In an effort to stem the invasion of rooikrans (*Acacia cyclops*), the ARC released an Australian seed-feeding weevil (*Melanterius servulus*) into the Cape Peninsula in 1994. The weevil destroys up to 90% of rooikrans seeds, which has a major impact on seed banks. An Australian gall-forming midge (*Dasineura dielsi*) which affects the developing pods and drastically reduces seed production has also been released for rooikrans.



A worker at Yamorna Weir on the Letaba River in Limpopo inspects damage to water lettuce plants by the *Neohydronomus* beetle.

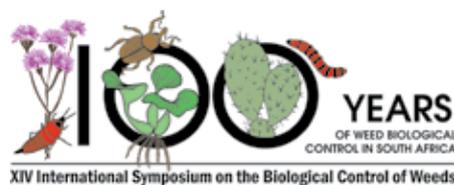


Port Jackson willow (*Acacia saligna*)

Biocontrol units at ARC and Rhodes University have developed a number of highly successful agents to curb the spread of aquatic weeds. Rearing stations established around the country now release a range of insects, mites and fungi for the control of aquatic and terrestrial alien plant invaders.



Biocontrol training on a cactus on a ridge in Pretoria, Gauteng.



Using biomass to create jobs

A Value-Added Industries (VAI) programme seeks to use cleared invasive wood to create jobs.

Environmental Programmes have supported job creation initiatives linked to the by-products of cleared invasive plant biomass since 1995.

Products manufactured have included eco-coffins, wattle screens, garden décor items, fencing, a range of interior décor for game lodges, wooden flash drive cases, charcoal, lampshades and basket-ware.

- **Eco-furniture**

A more recent initiative is the proposed development of 20 Eco-furniture Factories around the country which will use the wood of felled invasive trees to make school desks and benches. Work opportunities for over 3 000 workers in twenty EFFs will be created, but teams of 160 workers per factory are envisaged going forward.

The venture hopes to create long-term jobs, make useful products and simultaneously help Working for Water to address the problem of invasive plants.

- **Biomass**

A Working for Energy pilot project in the Eastern Cape focuses on using invasive alien plant biomass and bush-encroachment biomass for the generation of energy (gasification, pellets for power-stations and other options). Biomass is cheaper than coal and is regarded as part of South Africa's green economy agenda.



Using biomass to create green energy and carbon credits



A pilot project in the Eastern Cape harvests invasive alien biomass and bush encroachment biomass for the generation of electricity.

Carbon farming in the Eastern Cape

The restoration of 1,4million hectares of degraded spekboom-rich thicket aims to mitigate climate change through carbon sequestration.

Addressing the rehabilitation of degraded land to support the optimal ecosystem services is an important focus of Environmental Programmes in South Africa. Projects focus on carbon sequestration, erosion, and the impact on water quantity and quality.

“South Africa has the climate change response objective of making a fair contribution to the global effort to achieve the stabilisation of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system.”

South African National Climate Change Response Green Paper (2010)

A Working for Land project, with high returns on investment, is the Subtropical Thicket Restoration Project (STRP), which aims to restore degraded thicket by replanting indigenous spekboom (*Portulacaria afra*) cuttings. This spekboom carbon farming initiative is a partnership between farmers, communities, government, ecologists, soil scientists, botanists, ecologists and economists in the Eastern Cape and to a lesser extent in parts of the Western Cape.

The aim is to restore large tracts of

the nearly 1,4million ha of degraded veld which was previously covered with spekboom-rich thicket prior to overgrazing by livestock. The implementing agency, the Gamtoos Irrigation Board (GIB), based in Patensie, is currently overseeing large-scale planting in degraded sites in the Baviaanskloof Nature Reserve, Addo Elephant National Park (Darlington Dam) and the Fish River Reserve. To date, over 3000ha of degraded veld have been replanted.

South Africa is now ready to sell carbon credits in this project. In addition, the project's benefits range from job creation — with over 300 jobs per year — to reducing silt loads in dams and rivers, greater ecosystem productivity and biodiversity conservation.

The GIB is also responsible for the 300 'thicket-wide' experimental plots set up across a 550km east—west span of spekboom-rich thicket. Scientific monitoring and evaluation is provided by a team of scientists from Stellenbosch University and the Nelson Mandela Metropolitan University.

R24million has been spent in the period 2010/2011, and R18million is set aside for the 2011/2012 financial year. The project has been validated and registered through the Verified Carbon Standard and the Climate, Community and Biodiversity Standard, making it a bluechip voluntary carbon market credit.



Rehabilitated spekboom thicket.



Nurseries grow spekboom for rehabilitation.



A fence divides overgrazed degraded veld from well managed spekboom-rich thicket in the Eastern Cape.

Integrated Fire Management Services

A successful fire management programme based on the principles of international best practice.



Helicopters are used as water bombers during wildland fires.

Working on Fire (WoF) was launched in September 2003 as part of the South African government's initiative to create jobs and alleviate poverty. Today WoF employs close to 5 000 young men and women who have been fully trained as wildland fire-fighters and are stationed in 170 teams throughout SA.

WoF addresses the prevention and control of wildland fires, to enhance the sustainability and protection of life, property and the environment through the implementation of Integrated Fire Management (IFM) practices.

Integrated Fire Management is a series of actions that includes:

- fire prevention activities
- prescribed burning
- resource sharing and co-ordination
- fire detection
- fire suppression
- fire awareness activities
- fire damage rehabilitation

WoF also utilises a fleet of aerial fire-fighting aircraft ranging from purpose-built Dromader water bombers to helicopters and fixed-wing spotter planes, that act as vital 'eyes in the sky' communicating with ground based wildland fire fighting crews. WoF has a highly specialised land transport fleet which is used to deploy ground fire-fighting crews and resources into fire hotspots.

Wildland Fire Conference

WoF successfully managed, on behalf of the South African government, the 5th International Wildfire Conference held in South Africa in May 2011. The



Creating jobs and developing skills.



Above and Right: Wildland fire-fighters are stationed at bases across South Africa.

Conference accord highlighted the need for the wise use of fire in the sustainable ecosystem management for international co-operation and a strengthening of wildland fire science and management skills.

Fire and climate change

Under anticipated conditions of climate change, temperatures over parts of the interior of South Africa are projected to rise by as much as 3°C—5°C in the next few decades.

The eastern parts of South Africa are expected to experience summers with more intense rainfall events, while drier winters are projected for the south western parts of South Africa. Despite the possibility of more intense rainfall events during summer, dry spells of relatively long duration may be expected to occur more frequently in all seasons.

This expected increase in temperature and drought frequency will combine to exacerbate the risk of fire incidents.

Key facts about the WoF programme:

- The programme combines sound land management principles and best practice wildland fire-fighting expertise, with the need to create jobs and develop skills.
- WoF employs the largest percentage (32%) of women fire-fighters in the fire-fighting fraternity internationally.
- WoF is mandated to implement Integrated Fire Management. This includes supporting the development of the FPA (Fire Protection Association) structure under the National Veld and Forest Fire Act of 1998.
- Visit www.workingonfire.org for more information.



Working on Fire employ the largest percentage (32%) of women fire-fighters in the fire-fighting fraternity internationally.



Close to 5 000 young men and women are trained as wildland fire-fighters.



A fleet of aerial fire-fighting aircraft act as vital 'eyes in the sky' during wildland fires.

Securing our wetlands for all

Over 800 wetlands have been rehabilitated in South Africa since 2004.

Wetlands are inextricably linked to water security, poverty alleviation and greenhouse gas emissions.

- **Water security**

With climate change predicted to alter rainfall patterns, wetlands will play an important role in reducing flood and drought impacts, purifying water and working as sponges in the landscape.

- **Poverty alleviation**

By providing highly productive agricultural land, grazing, water, fish, fibre and medicines, wetlands underpin the health and livelihoods of many rural communities.

- **Gas emissions**

Wetlands containing peat make up 30% of the world's wetlands. These peatlands are the most efficient terrestrial ecosystems for storing carbon. As carbon sinks, they can store carbon for thousands of years but their degradation is a growing source of greenhouse gas emissions. Emissions from peatland drainage, fires and exploitation are estimated at 3 billion tons per annum, equivalent to more than 10% of global fossil fuel emissions. Rehabilitating peatlands is one of the most cost-effective ways of reducing greenhouse gas emissions.

South Africa's Working for Wetlands programme addresses the rehabilitation, protection and sustainable use of South Africa's wetlands. Consider these facts:

- Studies suggest that between 35% and 60% of South Africa's wetlands have already been lost or are severely degraded.

- 10% of South Africa's wetlands contain peat.

- Since 2004, more than 800 wetlands have been rehabilitated at a cost of about R500 million.

- Working for Wetlands has created 15 000 job opportunities since 2004 for people from the most vulnerable and marginalised groups. In 2008/9, seventeen implementers were contracted to execute 43 projects across the country.

- The social benefits include employment, training, enterprise development and the dignity of decent work.

- The benefits from rehabilitated wetlands include improved livelihoods, protection of agricultural resources, enhanced biodiversity, cleaner water, reduced flood impacts, increased water security and reduction of greenhouse gas emissions.



Employment, training and development.



A cableway is erected at the Duiwenhoks Rehabilitation Project.



Building gabions to re-flood a wetland.



Wetlands drained for farmland are rehabilitated.



The Kamiesberg Wetland Rehabilitation Project team after winning the 2010/11 Best Project Award.

Rehabilitating the Manalana Wetland

The Manalana Wetland, near Bushbuckridge, Mpumalanga, was severely degraded by erosion that threatened to consume the entire system left unchecked. The wetland supports about 100 small-scale farmers, 98 of whom are women.

About 70% of the local people make use of the wetland in some way, with about 25% predominantly dependent on it as source of food and income. The wetland was considered to offer an important safety-net, particularly for the poor, contributing about 40% of the food grown locally.

A Working for Wetlands intervention stabilised the erosion and improved the wetland's ability to provide beneficial ecosystem services.



Bringing biodiversity back to Penny Park

The Penny Park Wetland in KwaZulu-Natal is an important source of high quality water for the town of Kokstad and is of critical importance for biodiversity protection.

Drained for hay making, only 42ha of the 147ha wetland was functional and a further 40ha to 50ha of wetlands along the feeder streams were non-functional.

Restoring the hydrology of the wetland took four years, included 15 concrete structures and provided employment and skills development for 44 people.

Today, the wetland is host to a rich biodiversity that includes cranes, ducks, reedbuck and small mammals. The entire wetland falls within private ownership and its landowners were important partners in this project.

