

NEWS

Cape Town South Africa's first 'wetland' city



The City of Cape Town is South Africa's first city to be accredited as a Ramsar Wetland City.

The announcement was made at the 14th Conference of Parties to the UN Convention on Wetlands, known as the Ramsar Convention, being held in Geneva, Switzerland from 5 to 13 November 2022.

Because of the threats posed by urbanisation and the increased demand for land on wetlands, the Convention in 2015 introduced Wetland City Accreditation for cities that have recognised the importance of protecting urban or peri-urban wetlands. Urbanisation is a globally acknowledged problem that has an impact on the health

and efficiency of wetland ecosystems. The voluntary wetland accreditation system adopted by the Ramsar with the aim of promoting sustainable urbanisation and the conservation of urban and peri-urban wetlands within urban and peri-urban areas.

Cities that have taken exceptional measures to protect their urban wetlands or a wetland of international importance (known as a Ramsar Site) within their city may apply to be accredited as a Ramsar Wetland City. The Wetland City Accreditation programme provides international recognition for cities that uphold a solid and favourable relationship with wetlands through creating public awareness on wetland benefits, incorporating wetland protection into municipal planning and decision-making, and promoting wetland benefits for local people.

The City of Cape Town is home to over 11 000 hectares of wetlands which provide essential services such as disaster risk reduction and contribute to climate change adaptation and mitigation. The city is recognised as a global hotspot of biodiversity and thus has a corresponding number of rare and threatened wetlands supporting many endemic fauna and

flora species. These wetlands include the Rietvlei and Milnerton Lagoon (part of the Table Bay Nature Reserve), the Zandvlei Estuary, Edith Stephens Wetlands, False Bay Nature Reserve (a wetland of international importance), the Noordhoek wetlands and many others. Over the past 20 years, the city has implemented several initiatives, both inside and outside of protected areas, with the aim of rehabilitating wetlands and conserving these natural assets.

Wetlands in and around urban settlements have historically been considered impediments to development. Drainage, filling in and pollution have long been a feature of planned and unplanned urbanisation.

Through the Ramsar Accreditation system those living in urban areas are now being encouraged to regard their wetlands as spaces which contribute to the liveability of cities through improving water quality, regulating the climate and reducing the effects of urban heat islands, providing space for recreation and leisure, and mitigating the effects of extreme events such as floods and resulting infrastructure damage.

SA to play host to earth observation summit in 2023

South Africa is set to host the Group on Earth Observations (GEO) Ministerial Summit in 2023.

According to a statement by the Department of Science and Innovation (DSI), South Africa has been an active executive committee member of GEO since 2005. "Climate change is a cross-cutting challenge and, in this interconnected world, the impact of a single event can have cascading consequences in locations further away

and across borders," said DSI Minister, Blade Nzimande.

According to the minister, global action such as the GEO was needed to respond to societal challenges and improve living conditions for all people, especially the world's poorest citizens.

GEO consists of more than 113 national governments, 31 of which are in Africa. These countries voluntarily contribute towards the common goal of building

the Global Earth Observation System of Systems (GEOSS). GEOSS aims to integrate observing systems and improve data sharing by connecting existing infrastructures using common standards. GEO addresses issues such as climate change, biodiversity, agriculture and health. Its systems encompass technologies from satellites and its comprehensive scope makes it possible to leverage resources and cut across disciplines.

SA university makes a clean sweep at international parasitology congress

Parasites may be viewed by many as pesky organisms, but understanding them and their impact on ecological systems is crucial in nature studies. The researchers and students at the North-West University (NWU) excel as experts in this field.

The NWU made history during the recent International Congress of Parasites of Wildlife by not only winning all the medals for postgraduates but also receiving the most coveted award for a researcher.

The congress was hosted by the Parasitological Society of Southern Africa (PARSA) at the Kruger National Park late last year. "It is the first time in the history of PARSA that a single university received all four the available medals that are presented annually to postgraduates and researchers," says Prof Nico Smit from the School of Biological Sciences, who received the highest honour from PARSA.

He was awarded the Elsdon-Dew Medal for his significant research contributions

to the advancement of parasitology in Africa. Only 24 researchers have received this prestigious medal in the 50-year history of PARSA.

Dr Marliese Truter and Linda van der Spuy received the Senior Neitz Medal for the best PhD thesis and the Junior Neitz Medal for the best MSc dissertation respectively. Dr Anja Erasmus was awarded the Angela Davis Russell Medal for the best publication in parasitology by a postgraduate student.

Phase 2 of 'Blue Deal' kicks off between SA and Dutch governments

The Department of Water and Sanitation alongside the Dutch Water Authorities has officially set wheels in motion for Phase 2 of the Blue Deal Programme which seeks to enhance access to sufficient, clean and safe water for all by 2030 and beyond.

This was done through the signing of a partnership commitment between the two parties during the Blue Deal Conference, held at the end of last year, under the theme 'Leadership deck on successes and learnings to date'. The Conference aimed to support water management worldwide by exchanging knowledge and experiences in the water sector, while expanding its footprint.

Speaking at the Conference, Deputy Minister of Water and Sanitation, David Mahlobo expressed appreciation to the Dutch Water Authorities for the

collaborative efforts with the department being implemented to ensure water security by 2030 and beyond. "South Africa welcomes the exchange of views, identification of mutual interests, ensuring involvement of stakeholders and linking up ideas across institutional boundaries through the Programme."

He further applauded the knowledge exchange between the two parties which is focused on the improvement of water governance, climate resilience and social inclusion. "I am informed that the Blue Deal South Africa Partnership wants to take the next step in the development of water management, I am impressed that the learning component will bridge and interconnect with water colleagues and other domains to catalyse the change that is rapidly needed."

Head of Blue Deal Worldwide, Hein Pieper and Deputy Ambassador of the Netherlands, Janneke Vrijland, shared Deputy Minister Mahlobo's sentiments while expressing the need to ensure effective and collaborative implementation of the programme.

"We need to continue working collaboratively for the programme to yield positive results. The Blue Deal Programme is a big deal, and we need to treat it as such," said Pieper.

The Blue Deal Programme is between the Netherlands Ministries of Foreign Affairs, infrastructure and Water Management and all the Dutch water authorities to support regional and national governments worldwide.

WATER DIARY

Water reuse 15-19 January 2023

The 13th International Water Association Conference on Water Reclamation and Reuse will take place in Chennai, India. The central theme of the conference is 'Water reuse: overcoming challenges of growth and climate change'. *Visit: <https://iwareuse2023.com/>*

Resource recovery 15 – 18 January 2023

The 8th International Water Association

Water Resource Recovery Modelling Seminar will be held in Stellenbosch. Topics will include activated sludge and biofilm processes, advances in sludge treatment and management of solids, resource recovery, separation processes, and aquatic chemistry (including micropollutants of concern), among others. *Visit: www.iwawrrmod2022.co.za*

World Wetlands Day 2 February 2023

World Wetlands Day will be celebrated

around the world on 2 February. *Visit: <https://www.worldwetlandsday.org/en/>*

Hydrogeology 17-22 September 2023

The 50th Congress of the International Association of Hydrogeologists will be hosted at the Cape Town International Convention Centre. *Visit: <https://iah2023.org.za/>*

GLOBAL

Recycled water found to be cleaner than conventional potable water



Recycled wastewater is as safe to drink as conventional potable water, and may be less toxic than many sources of water we already drink daily, researchers say.

“We expected that potable reuse waters would be cleaner, in some cases, than conventional drinking water due to the fact that much more extensive treatment is conducted for them,” says William Mitch, senior author of the study in *Nature Sustainability* comparing conventional drinking water samples to wastewater purified as a drinking water, also known as potable reuse water.

“But we were surprised that in some cases the quality of the reuse water, particularly the reverse-osmosis-treated waters, was comparable to groundwater, which is traditionally considered the highest quality water.”

As drinking water sources become scarcer, the discovery is promising news for a thirsty public and utility companies struggling to keep up with demand. Water utilities, particularly those in the drought-stricken western US, are scrambling to find reliable water supplies. Traditional water sources from places such as the Colorado River and Sierra Nevada snowmelt have dried up. Instead, utilities have set their sights on potable reuse as a dependable water supply—one that utilities already conveniently manage and own.

Regulators demand more extensive treatment at potable reuse treatment plants. They specify that treatment systems must remove harmful pathogens, such as viruses and amoebas, and utilities flush out other contaminants using

reverse osmosis, ozonation, biofiltration, and other cleaning techniques.

Reverse osmosis treatment pushes water at high pressure through a filter that’s so small, it squeezes out even sodium and chloride. Mitch and his colleagues discovered the process cleans wastewater as much if not more than groundwater, the gold standard.

Even when reverse osmosis wasn’t applied, reuse waters were less toxic than the samples of conventional drinking waters sourced from rivers across the United States.

To view the original study, visit: <https://www.nature.com/articles/s41893-022-00985-7>

Mangroves – Environmental guardians of our coastline

They are the salt-tolerant shrubs that thrive in the toughest of conditions, but according to new University of South Australia research, mangroves are also avid coastal protectors, capable of surviving in heavy metal contaminated environments.

The researchers found that grey mangroves (*Avicennia marina*) can tolerate high lead, zinc, arsenic, cadmium and copper in contaminated sediment -- without sustaining adverse health impacts themselves.

The study tested the health of grey mangroves living around the Port Pirie smelter. Using leaf chlorophyll content as a proxy to plant health, mangroves were found to be unaffected by metallic

contaminants, despite lead and zinc levels being 60 and 151-fold higher than regulatory guidance values. The findings highlight the vital role of mangroves in stabilising polluted regions, and the importance of protecting these ‘coastal guardians’ around the world.

The study also coincides with a \$3 million federal government initiative to restore mangrove forests in Adelaide’s north.

Dr Farzana Kastury from UniSA’s Future Industries Institute says that ability of mangroves to withstand high metal concentrations make them invaluable in managing polluted environments. “Mangroves are the ideal eco-defender: they protect our coastlines from erosion

and sustain biodiversity, but they also have an incredible ability to trap toxic contaminants in their sediments,” Dr Farzana says. “Grey mangroves are known for their tolerance of potentially toxic elements, but until now, little has been known about the health of these plants in the Upper Spencer Gulf.

“Our research found that grey mangroves were able to adapt and survive exposure to very high levels of lead and zinc – without adverse health effects in their chlorophyll content – demonstrating how valuable they are to coastal ecosystems.”

• To view the original study, visit: <https://linkinghub.elsevier.com/retrieve/pii/S0048969722066025>

Magnetic material mops up microplastics in water



Researchers at RMIT University, in Melbourne, Australia, have found an innovative way to rapidly remove hazardous microplastics from water using magnets.

Lead researcher Prof Nicky Eshtiaghi, said existing methods could take days to remove microplastics from water, while their cheap and sustainable invention achieves better results in just one hour. The team says they have developed adsorbents, in the form of a powder, that remove microplastics 1 000 times smaller than those currently detectable by existing wastewater treatment plants.

The researchers have successfully tested the adsorbents in the lab, and they plan to engage with industry to further develop the innovation to remove microplastics from waterways. The research results are

published in the *Chemical Engineering Journal*.

"The nano-pillar structure we've engineered to remove this pollution, which is impossible to see but very harmful to the environment, is recycled from waste and can be used multiple times," said Eshtiaghi from RMIT's School of Environmental and Chemical Engineering. "This is a big win for the environment and the circular economy."

The researchers have developed an adsorbent using nanomaterials that they can mix into water to attract microplastics and dissolved pollutants. Muhammad Haris, the first author and PhD candidate from RMIT's School of Environmental and Chemical Engineering, said the nanomaterials contained iron, which enabled the team to use magnets to easily

separate the microplastics and pollutants from the water. "This whole process takes one hour, compared to other inventions taking days," he said.

Co-lead researcher Dr Nasir Mahmood said the nano-pillar structured material was designed to attract microplastics without creating any secondary pollutants or carbon footprints. "The adsorbent is prepared with special surface properties so that it can effectively and simultaneously remove both microplastics and dissolved pollutants from water," said Mahmood from Applied Chemistry and Environmental Science at RMIT.

• To view the original study, Visit: <https://www.sciencedirect.com/science/article/abs/pii/S1385894722058703?via%3Dihub>

SOUTH AFRICAN AGRICULTURE WELL REPRESENTED AT GLOBAL LEVEL

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ICID President, Prof Ragab Ragab, congratulates Prof Sylvester Mpandeli after he was endorsed by the International Executive Council as the first Vice President of ICID on 10 October 2022 in Adelaide, Australia.

Water Research Commission (WRC) Executive Manager responsible for the Water Utilisation in Agriculture, Prof Sylvester Mpandeli, attended the 24th International Commission on Irrigation and Drainage (ICID) Congress and the 73rd International Executive Council (IEC) Meeting in Adelaide, Australia from 3 to 10 October 2022. At this event he was appointed Vice President of the ICID.

ICID is a leading international organisation working in the field of irrigation, drainage and flood management to promote sustainable agriculture water management. As a scientific, technical and professional platform, the organisation is dedicated to improving the status of agricultural water management practice around the world. The ICID congress covered several issues, including agricultural water management, climate change, water use efficiencies, food and energy securities, dams and drainage issues.

Prof Mpandeli and his team presented four papers at the congress, namely on 'Adapting crop production to increased water stress in southern Africa', 'Water use of indigenous grain and legume food crops', 'Operationalising the water-energy-food (WEF) nexus through the theory of change', and 'An integrated geospatial and multi-criteria decision approach and factors required in irrigation suitability mapping'. This offered a comprehensive showcase of the stellar agriculture- and irrigation-related research work being undertaken by researchers in South Africa.

Prof Mpandeli was endorsed as Vice President of ICID during the IEC meeting of the organisation. As Vice President, he will be a member of the Permanent Committee on Strategy and Organisation (PCSO), where he will participate in developing strategies, building activities and coordinating all the working



Prof Sylvester Mpandeli with Chair of the African Regional Working Group, Dr Mohammed Wabha from Egypt during the last day of the IEC meeting in Adelaide, Australia.

bodies across the globe. These include, among others, the African Regional Working Group (AFRWG), American Regional Working Group (AMRWG), Asian Regional Working Group (ASRWG), and European Regional Working Group (ERWG). He will also review reports of working groups/committees and the ICID Young Professional's e-Forum (IYPEF) while being an office bearer's committee member and leading one of the strategic theme areas.

The next ICID event is the 4th World Irrigation Forum (WIF), which will take place in China in 2023. The forum aims to bring together all stakeholders involved in irrigation of multi-disciplines and all scales, including the policy-makers, experts, research institutions, non-governmental organisations and farmers. It provides a platform for the world irrigation community and interested development professionals to find solutions to problems plaguing irrigated agriculture, especially in times of depleting freshwater resources and climate change. ICID provides a unique platform for stakeholders in the WIF for sharing and learning by engaging in issues of interest at global level. WIF also gathers a wide range of experts from various fields to discuss important issues highlighted.

The WIF stimulates and promotes multi-disciplinary discussions towards sustainable solution to water management in agriculture through:

- Exchange of latest irrigation and drainage policies, practices, innovations and technologies;
- Exploring and formulating concrete inter-disciplinary proposals;
- Development of liaison/ collaboration among various national / international institutions/ organisations/ private sector working for irrigated agriculture; and
- Advocacy for political commitments.

NEW WRC REPORTS

Nature-based solutions for water management in the peri-urban: Ecological, social and economic nexus

Nature-based solutions (NBS) are defined by the IUCN as “actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.” This research aimed to move beyond the state of the art by taking a systemic perspective on nature-based solutions for water, with an emphasis on complexity, uncertainty, resilience and adaptation for different peri-urban contexts. It focused on the need to ensure the involvement of multiple stakeholders and combine multi- and transdisciplinary knowledge as key elements in the implementation and assessment of nature-based solutions as local responses with replicability potential. This is intended to make progress towards a new management paradigm for peri-urban areas. This WRC-funded project part of an international research project called: ‘Nature-Based Solutions for Water Management in the Peri-Urban (NATWiP): Linking ecological, social and economic dimensions’, which is part of the Water Joint Programming Initiative.

WRC report no. 3036/1/22

Web link: <https://bit.ly/3Fv8ASw>

The use of non-potable water in road construction

Construction of a new bitumenised road typically requires upwards of 1 Mℓ per day of freshwater, enough for 20 000 people at the Cape Town drought ration of 50 litres per person per day. Only freshwater is normally permitted because of certain poor experiences in the past such as damage to the primed base course when even slightly brackish water was used and damage to the bituminous surfacing when salt water was used. The water used cannot be recovered and is lost forever. The causative damage factors have been identified and it is shown that, provided certain design and construction precautions are taken, even seawater can be used in all layers of most roads and other flexible pavements. A short, practical users’ guide is also provided. Although the use of salt water cannot be considered in isolation from the inherent salinity of the pavement layer material itself, the scope of this project does not fully include this aspect and it is assumed that the materials initially comply with those of the conservative national salinity specifications for state roads.

WRC report no. 3035/1/22

Web link: <https://bit.ly/3has3ye>



Including the fate of chemical precipitants and other products of waste resource recovery facilities in their strategic design and operation

The overarching aim of this project was to apply mathematical models for investigating the fate of chemical contaminants and useful byproducts from the waste treatment plant (i.e. biogas, treated water, recovered nutrients, mineral precipitates and stable organics) and to determine whether the

industrial utilisation of these recovered resources could impact tactical decision-making in design and operation optimisation of waste treatment systems. The development of evaluative mathematical models for unit process systems of future water and resource recovery facilities (WRRFs) have a significant role to play in defining operational strategies that shall support resource recovery from waste at minimum cost. Progress to date, towards modelling the entire WWTP system includes the completion of steady state and three-phase dynamic simulation plantwide model for South Africa for nitrification denitrification activated sludge and anoxic-aerobic or anaerobic digestion of primary and waste activated sludge from N removal systems.

WRC report no. TT 879/22

Web link: <https://bit.ly/3F7uoCg>

Understanding of surface water-groundwater interactions from headwaters to lowlands or catchment scale sustainable water resources management

There is generally limited knowledge about the nature and spatiotemporal dynamics of interactions between surface water and groundwater, especially in areas with fractured aquifers. Several studies have been carried out about these interactions at the river reach scale. However, extrapolating site-specific results to different parts of the river from headwaters, midslope, to lowlands often leads to an inaccurate representation of the interactions. Changes in topography, the composition of the hyporheic zone, riparian vegetation, and hydrogeological characteristics along a river affect surface water-groundwater interactions. In regions with distinct wet and dry seasons, these interactions may vary at event-, seasonal- and annual time scales. Knowledge about the nature of the interactions, and factors accounting for their spatiotemporal dynamics at the catchment scale is required to inform integrated water resources management approaches. Without this knowledge, water managers embrace IWRM but are constrained from translating policy into practice. This study aimed to contribute knowledge about the spatiotemporal dynamics of surface water-groundwater interactions at the catchment scale from headwaters to lowlands along the Nuwejaars River in Cape Agulhas.

WRC report no. 2855/1/22

Web link: <https://bit.ly/3P5NcX5>

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