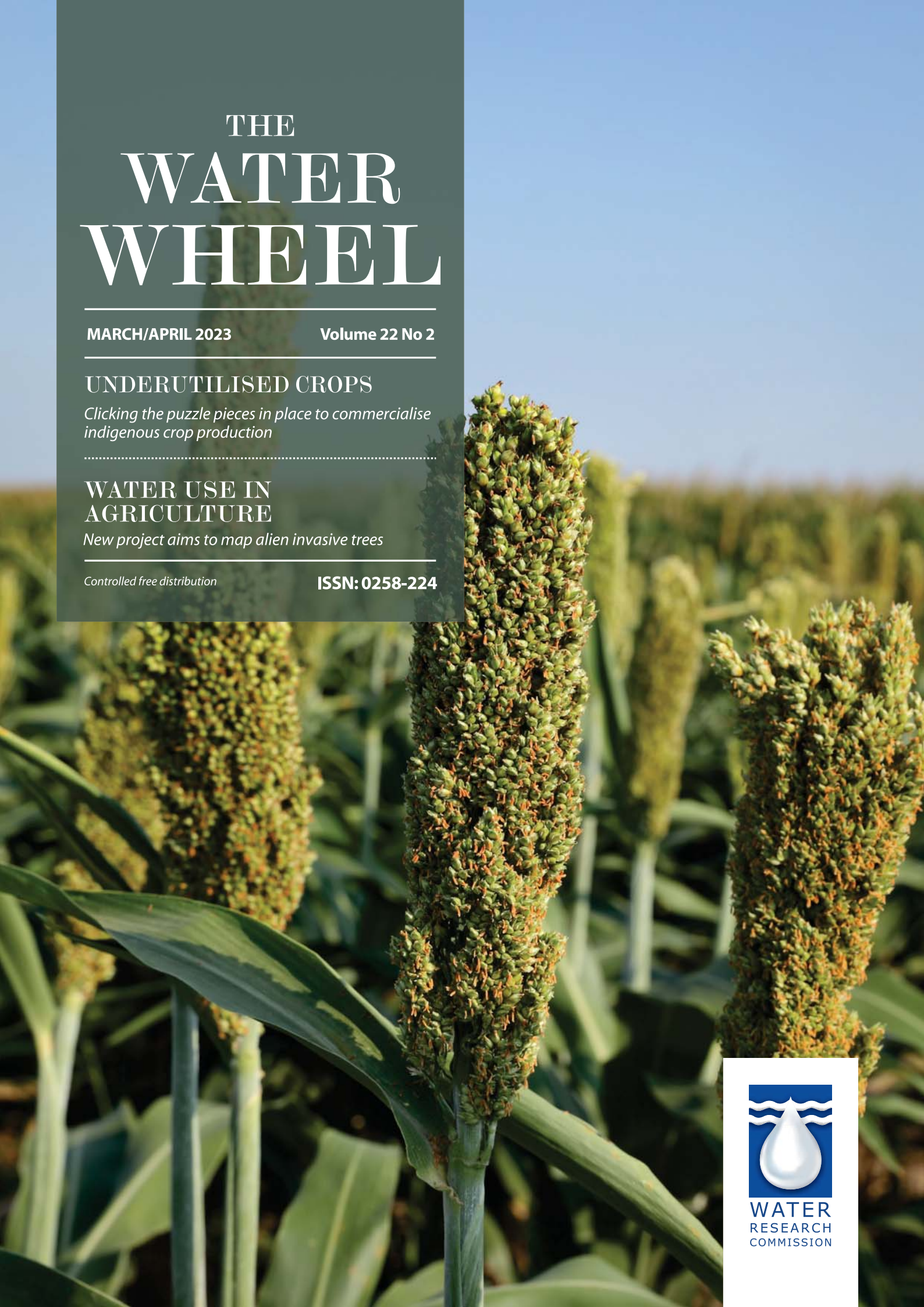

THE WATER WHEEL

MARCH/APRIL 2023 Volume 22 No 2

UNDERUTILISED CROPS

Clicking the puzzle pieces in place to commercialise indigenous crop production

WATER USE IN AGRICULTURE

New project aims to map alien invasive trees

Controlled free distribution

ISSN: 0258-224

WATER RESEARCH COMMISSION

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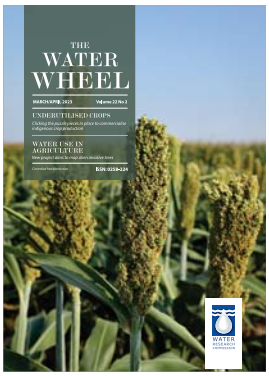

A study funded by the Water Research Commission has provided another key piece to the puzzle in understanding underutilised crops. See article on page 10.

NEWS

Government remains main funder of research in South Africa

Government remains the main funder of research and development (R&D) activities in South Africa. This is according to the 2020/21 National Survey on Research and Experimental Development, which was released in January.

The government sector (including science councils and universities' own funds) contributed 56.3% of R&D funding in the country, while business contributed 26.9%, foreign funding 13.3% and other South African sources 3.5%. Higher education and the science councils are the main beneficiaries of government funding.

The R&D survey is undertaken annually by the Human Science Research Council on behalf of the Department of Science and Innovation. The resulting statistics provide important evidence on the size, growth and composition of R&D expenditure and human resources devoted to R&D.

Gross domestic expenditure on research and development (GERD) for 2020/21 was R33.541 billion. GERD as a percentage of gross domestic product was 0.61%. Medical and health sciences account for the majority of R&D expenditure (22.1%), followed by social sciences (19.7%) and engineering sciences (12.9%). Research in environment-related areas showed gains along with space science research. Research on communicable diseases (TB, HIV/AIDS and malaria) continued to increase.

- To download the survey, Visit: https://www.dst.gov.za/index.php/documents/r-d-reports/13-rd-statistical-report-2020-21/file

UCT study delves deeper into Khayelitsha's water woes

Doctoral research from the University of Cape Town (UCT) found that treating water as an economic good creates an unjust distribution pattern in which paying customers are prioritised over those who cannot. Consequently, it socially affects how the residents in informal housing engage with the city when complaining about a broken communal standpipe.

"Commodification of water goes hand in hand with the capitalist mode of production on natural resources and treats residents as consumers instead of beneficiaries of the state's provision of a fundamental human right," maintains PhD graduate Minga Mbweck Kongo. Kongo graduated in December with a PhD in Social Anthropology.

By framing residents as consumers and users, Kongo said the city creates a hierarchy whereby the residents who meet their obligations by paying for water are prioritised over those who cannot afford to pay for water. "In areas such as Khayelitsha, this social structure is complicated by the challenges caused by inadequate infrastructure."

Titled 'Water and sociality in Khayelitsha: an ethnographic study', the research looked into how inequalities related to access to water in Cape Town are produced by inequitable development patterns. It also explored the challenges of inadequate water access experienced by residents in less-provisioned areas.

Due to economic challenges, noted Kongo, households in the formal area also struggle to meet their financial obligations for water. "They are forcefully equipped with water management devices that make access to water impossible without payment. For those residents in informal areas, the commodification of water enforces a culture of complacency where the residents do not feel entitled to services because they are not consumers. As such, they feel alienated that they cannot hold the local authorities accountable for poor water service delivery because they are not paying for these services."

To access Kongo's study, visit: https://open.uct.ac.za/handle/11427/37360

Source: UCT

New Deputy Vice Chancellor for Sol Plaatje University

Prof Debra Meyer has been appointed the new Deputy Vice-Chancellor: Teaching and Learning at Sol Plaatje University.

She will be responsible for the management of the core academic functions of the university over the next five years.

To fill this position, the university sought an outstanding and experienced academic leader who understands the local and international higher education arenas; who has the leadership abilities to devise sophisticated curricular and co-curricular strategies; and who has the capabilities to design and develop innovative systems and approaches in the university context, said the university in a statement. "We are fortunate that Prof Meyer, who meets all these requirements, has agreed to fulfil this role for Sol Plaatje University."

She holds a PhD degree in Biochemistry and Molecular Biology from the University of California, Davis and a Master of Science degree in Biochemistry from the former Rand Afrikaans University (now University of Johannesburg). Prof Meyer leaves her current position as Executive Dean of the Faculty of Science at the University of Johannesburg.

DBSA launches water and sanitation project in Zambia

The Development Bank of Southern Africa (DBSA) – as the implementing agent of the South African Development Community (SADC) Water Fund – has launched an €8.8-million basic water and sanitation project in Kazungula.

The Zambian Government, with the support and cooperation of the German government and Kreditanstalt für Wieferafbau (KfW) is co-financing the project. "This is a significant investment towards sustainable development of the water sector in SADC," noted Chuene Ramphele, Group Executive of the Infrastructure Delivery Division at the DBSA.

The first phases of the project include the construction of a new intake structure to abstract water from the Zambezi River upstream of the Kazungula bridge. This phase will also include construction of a new treatment plant, larger storage reservoirs, construction rehabilitation and the extension of water transmission and distribution pipelines. This infrastructure is set to significantly improve access to potable water and ensure reliability of supply to Kazungulu town. The second and third phases will focus on improving the sanitation system.

"We are excited to launch the start of the construction of this regional project as it will make a positive impact on the lives of the people in Kazungula," said Ambassador Margi Hellwig-Boette, German Ambassador to Botswana and Special Representative to SADC.

Added Ramphele: "This project highlights the importance of developmental financial partnerships in the realisation of SADC's regional integration agenda, which seeks to provide quality water and sanitation service," Ramphele concluded.

SA launches new agriculture-focused microsatellite

Minister of Higher Education, Science and Innovation, Dr Blade Nzimande, has welcomed the successful launch of the EOS SAT-1 (AgriSat-1/ZA-008), the first imaging satellite to be built by South African company Dragonfly Aerospace. The satellite was launched in the USA on 3 January.

The launch of the 170 kg microsatellite follows last year's successful launch of three locally produced nano-satellites by the Department of Science and Innovation and its partners. The EOS SAT-1 satellite is the first of a seven-satellite constellation in low-Earth orbit for customer EOS Data Analytics. The remaining six satellites of the constellation will be deployed over the next three years.

EOS-SAT is reported to be the world's first agriculture-focused satellite constellation, providing the agriculture and forestry industry with high-quality data to support efficient and sustainable practices. Images from the satellites will deliver valuable information for applications such as harvest monitoring, seasonal planning and assessments to analyse information such as soil moisture, yield prediction and biomass levels. This data will support growers with reducing carbon dioxide emissions and help them to develop (and implement) sustainable agriculture methods.

Source: DSI

GLOBAL

2022 confirmed as one of warmest years yet

The year 2022 has been declared the sixth warmest year on record by the World Meteorological Organisation (WMO).

According to the agency, 2022 was also the eighth consecutive year that global temperatures rose at least one degree Celsius above pre-industrial levels, fuelled by ever-increasing greenhouse gas concentrations and accumulated heat. The cooling effect of the La Niña phenomenon – now in its third year – prevented 2022 from being the warmest ever.

"This cooling impact will be short-lived and will not reverse the long-term warming trend caused by record levels of heat-trapping greenhouse gases in our atmosphere," the WMO warmed in a statement, adding that there is a 60% chance that La Niña will continue until March 2023.

The past eight years were the warmest on record globally, fuelled by ever-increasing greenhouse gas concentrations and accumulated heat, according to six leading international datasets consolidated by the WMO.

Dams to lose more than a quarter storage capacity by 2050 due to sedimentation

Trapped sediment has robbed roughly 50 000 large dams worldwide of an estimated 13% to 19% of their combined storage capacity, and total losses will reach 23% to 28% by 2050, UN research warns.

The global loss from original dam capacity foreseen by mid-century – from around 6 300 billion m^3 to 4 650 billion m^3 in 2050, a difference of around 1 650 billion m^3 – roughly equals the annual water use of China, India, Indonesia, France and Canada combined.

UN University's Canadian-based Institute for Water, Environment and Health applied previously-determined storage loss rates in various areas worldwide to large dams in 150 countries to forecast cumulative reservoir storage losses by country, region and globally. The United Kingdom, Panama, Ireland, Japan and Seychelles will experience the highest water storage losses by 2050 – between 35% and 50% of their original capacities – the study shows. By contrast, Bhutan, Cambodia, Ethiopia, Guinea and Niger will be the five least affected countries, losing less than 15% by mid-century.

"The decrease in available storage by 2050 in all countries and regions will challenge many aspects of national economies, including irrigation, power generation and water supply," says Dr Duminda Perera, who co-authored the study published in the journal, ***Sustainability***.

"The new dams under construction or planned will not offset storage losses to sedimentation. This paper sounds an alarm on a creeping global water challenge with potentially significant development implications."

In Africa, 2 349 dams across 44 countries have lost about 702 billion m^3 or 15% of their original storage capacity. By 2030 and 2050, cumulative storage losses are estimated at 17% and 24%, respectively.

- To view the original article, Visit: https://www.mdpi.com/2071-1050/15/1/219

New water safety plan manual available

The second edition of the water safety plan manual is now available from the International Water Association (IWA).

Water safety planning is a systematic process that is widely recognised as the most reliable way to manage drinking-water supplies for the protection of public health. The manual provides practical guidance, examples and tools to support water suppliers in developing and implementing water safety plans (WSP) to help protect the health of all users.

The manual presents a broad range of examples and case studies from lower-to-higher income settings, highlighting practical solutions to real-world challenges from around the globe to help readers apply the guidance in diverse contexts.

This edition of the manual also integrates considerations of equity and climate resilience into the water safety planning approach. These aspects support access to safely managed and resilient drinking-water supplies for all users, despite future uncertainties, including those arising from climate variability and change.

To access the manual Visit: https://iwa-network.org/wp-content/uploads/2023/02/WHO_WSPManual2ndEd_final.pdf

Lead ammunition banned from European wetlands

Using lead shot ammunition in wetlands has been declared illegal in all 27 European Union (EU) countries, as well as Iceland, Norway and Lichtenstein. The law came into force in February following a two-year period given to EU countries to prepare for the change.

With this law in place, the lives of an estimated 1 million waterbirds which currently die of lead poisoning in the EU, will be saved and the perpetuation of extreme poisoning of wetlands will be tackled "once and for all", noted Birdlife International in a statement. Exposure to lead can also have severe consequences for people should they be exposed to it, especially children.

Lead shot cartridges consists of hundreds of tiny round lead projectiles. The ammunition is used to hunt waterbirds and other small animals. Lead shot is particularly problematic for waterbirds that ingest lead pellets, making them for grit. The ban will also decrease the secondary poisoning of raptors and scavengers, which are regularly poisoned while eating prey contaminated with lead shot.

"This is huge," noted Barbara Herrero, Senior EU Nature Policy Officer from Birdlife Europe. " Despite banning lead from paint, petrol and virtually everything else several decades ago, it was still allowed to poison our shared environment – even when alternatives exist. With this ban, the EU has addressed a significant part of the problem. We now call on EU countries to make sure the ban is enforced."

OBITUARIES

South African water sector mourns the passing of three doyens

David le Maitre – a giant in invasive alien plant impact

On 8 December renowned South African researcher, David Le Maitre passed away after a battle with cancer. He was 67.

Le Maitre had worked for the CSIR in the Sustainable Ecosystems Impact Area. Following his retirement in 2020, he took up the position of Professor Extraordinaire in the Department of Conservation Ecology and Entomology at Stellenbosch University. He had more than 30 years of experience in the ecology of Cape fynbos vegetation, as well as fire ecology and management. His work focused on assessing the hydrological and ecological impacts of alien plants and in the dynamics of invasion processes. In particular, his area of interest lay in the impacts of invasions on river and wetland systems and the ecosystems services they generate.

According to Prof Brian van Wilgen of Stellenbosch University, Le Maitre was "an unassuming scientist" who made significant contributions in his field. "David's most notable contributions came from switching his focus to the effects of vegetation cover on water resources. He played a leading role in the team that developed models to estimate the reductions of surface water runoff as a result of the invasion of catchments by alien trees. He went on to become one of the key scientists that provided support to the Working on Water Programme over the next 25 years."

He also contributed substantially to the identification of strategic water resource areas in South Africa, both in terms of surface and groundwater. This understanding has formed the basis for prioritising and managing the land to protect water resources, which in turn is vital in a dry country such as South Africa.

Former CSIR colleague, Dr Lindie Smith-Adao says "it was a privilege and honour to work with Le Maitre during my 18 years at the CSIR. He was an inspiration in my life, and I will never forget the valuable lessons he taught me."

Over his career, Le Maitre co-authored over 200 publications, and his work has been cited over 13 000 times. In October last year, his contributions were recognised with an Eco-Logic Gold Medal in the Water Conservation category.

He is survived by his children and grandchildren.

Geoff Pegram – Grand master of hydrometeorological engineering

On 16 January Prof Geoffrey Pegram passed away, two weeks before his 84th birthday.

At the time of his passing, he was an Emeritus Professor and Senior Research Associate in the Civil Engineering Programme of the University of KwaZulu-Natal (UKZN).

He was considered a master of hydrometeorological engineering. His work helped pave the way internationally for multifaceted advancements in the monitoring, understanding and modelling of hydrological and hydraulic processes, radar-rainfall modelling and hydrometeorology.

Pegram started teaching at UKZN in 1968 and continued to do so for nearly forty years. He was well revered by all his students and is remembered for the clarity and beauty of his explanations. "He was an inspirational teacher whose love and enthusiasm for fluid mechanics and hydrology were infectious," noted former student and now Professor Emeritus at UKZN, Derek Stretch.

He achieved numerous awards throughout his illustrious career, including a Water Research Commission (WRC) Legend Award in 2021, a medal from the South African Society of Atmospheric Sciences in 2016, and a WRC Knowledge Tree Award in 2015, to name a few.

In 2020, at the age of 81, Pegram reached the pinnacle of his academic career when he attained a Doctor of Science degree in Engineering – a qualification that ranks higher than all previous degrees. His unsupervised DSc thesis is a selection of his published papers, summarising his

contributions to hydraulic engineering and stochastic hydrometeorology.

Among his many achievements is the adapting and synthesising of computer code for multisite reservoir modelling along the Vaal River system, developed during one of South Africa's worst droughts in the 1980s. Software developed at that time is still being used by consultants today.

He also had a lifelong interest in the application of weather radar data. His work addressed the shortcomings of the technology, including radar-rainfall image repair techniques. In addition, Pegram's work led to the extension of the useful range of radar data for rainfall estimation. His ideas on improving the information obtained from radar-rainfields has been used in European Union projects in which he partnered, helping in knowledge transfer for the beneficiation of flood prevention methodologies.

Pegram is survived by his wife and children.

To read more about Pegram and his achievements, see the Water Research Commission book, ***Legacy – Celebrating SA's water pioneers, pathfinders and mavericks,*** (Visit: https://bit.ly/3Qm4FtL)

George Ekama – World captain of wastewater treatment research

The water sector was shocked to hear of the passing of global wastewater expert, Prof George Ekama, on 19 February.

While retired at the time of his passing, Ekama had 40 years of research experience into bioprocess engineering of aerobic and anaerobic wastewater and solids treatment systems at the University of Cape Town, the last years of which was spent with the title of Emeritus Professor. He had been at the forefront of developments in biological nutrient removal (BNR) activated sludge systems modelling, filamentous bulking, secondary settling tank design and modelling and anaerobic systems, having written over 170 research papers on these subjects. Ekama was a National Research Foundation A1-rated scientist from 2006 and he was listed among the most cited academics in the world.

In 2020, Ekama co-edited the second edition of the book, ***Biological wastewater treatment – Principles, modelling and design,*** with international colleagues. The book is used worldwide, and has been translated in a number of languages.

Numerous awards were bestowed on Ekama throughout his career, including the South African Presidential Order of Mapungubwe, Silver, which he received in 2013 for his innovative solutions to enhance and improve wastewater treatment, and so helping the country find solutions to water scarcity. In 2017 he was mentioned as one of the 'Legends of South African Science' by the Academy of Science of South Africa, and in 2021 he received a WRC Legend Award. In January this year a gala dinner was held in his honour by the 8th IWA Water Resource Recovery Modelling Seminar in Somerset West.

More than his expertise and knowledge, Ekama was well known for his integrity, empathy and generosity of spirit. He always remained modest about his achievements.

To read more about Ekama and his achievements, see the Water Research Commission book, ***Legacy – Celebrating SA's water pioneers, pathfinders and mavericks,*** (Visit: https://bit.ly/3Qm4FtL)

WATER DIARY

Water
22-24 March
The 2023 Water Conference will be held in New York.
Visit: https://sdgs.un.org/conferences/water2023

Aquatic science
25-29 June
The annual Southern African Society of Aquatic Scientists (SASAqS) Congress will be held in the Western Cape with the theme 'Managing aquatic ecosystems in an age of climate uncertainty'.
Visit: www.riv.co.za

Dams and hydropower
10-12 July
The Africa conference of the International Commission on Large Dams will be held in Lake Victoria, Uganda. The theme is 'Water storage and hydropower development for Africa'.
Visit: https://www.hydropower-dams.com/africa-2023/

Urban water management
13-15 September
The International Water Association (IWA) Efficient urban water management conference, dubbed 'Efficient 2023', will be held in Bordeaux, France. The conference will gather urban water and wastewater professionals ready to share their expertise and to present solutions for the new challenges in urban water management.
Visit: https://efficient2023.org/

Groundwater
18-24 September
The International Association of Hydrogeologists will be hosting its 50th Congress in Cape Town. The theme of the event is 'Groundwater – A matter of scale'.
Visit: https://iah2023.org.za/