STAYING AHEAD OF CLIMATE CHANGE

MARCH 2020

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THE OFFICIAL SADC-GMI NEWSLETTER

GROUNDWATER MANAGEMENT INSTITUTE
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The Well was established as SADC-GMI’s official newsletter, and has since grown to become the flagship publication dealing with groundwater, and water sector issues in the region. Today, The Well is printed in hundreds and is found in receptions, boardrooms and offices across SADC, wherever decisions about water resource management are made.

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For more information please get in touch with:

Thokozani Dlamini
Communication and Knowledge Management Specialist
SADC-GMI

Tel: +27 (0) 51 401 7722
Cell: +27 (0) 82 990 4308
Email: thokozani@sadc-gmi.org
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Welcome to another yet exciting edition of The Well, our SADC Groundwater newsletter. This edition coincides with the beginning of a brand new year which promises great opportunities and endless possibilities—as it has been dubbed 20-plenty. This is our fourth instalment of the publication since its inception, through which we endeavour to communicate groundwater breaking innovations, success stories, challenges and solutions related to groundwater issues in the SADC region.

In this issue of The Well you can look forward to the spectrum of diverse issues and ideas that have been carefully selected and crafted to meet your needs. The newsletter looks into the Impact of Climate Change (droughts) in the SADC region, Owning Groundwater Investments and Threats from Salt Water Intrusion Investigation, the Fourth Industrial Revolution in Groundwater, and much more.

2020 promises to be very busy for SADC-GMI as we will be wrapping up the World Bank funded project - The Sustainable Groundwater Management in SADC Member States. Since the SADC-GMI inception in 2016, we, and other cooperating partners, have made strides in advancing the groundwater agenda in the region. However, significant gaps remain and concerted efforts will be required to close these gaps. We shall surge ahead to execute our mandate by leveraging on the power of partnership!

Our efforts this year will be centred around a myriad of activities designed to ensure that we successfully complete the World Bank project, and also complete it in the best interest of our Donors and stakeholders, inclusively. As part of the project closure, we anticipate to commission a number of pilot infrastructure projects implemented in 10 SADC Member States through the sub-grant scheme. Already to this date, two projects were successfully commissioned, namely: on the 30th of January 2020 the Botswana Government and SADC-GMI commissioned the project entitled the 'Integrated Groundwater Resources Data Management System'.

On the 13th of February 2020, the project 'Exploring a Deeper Groundwater Source' which also facilitated the supply of potable water to about 15 000 inhabitants of Chimbiya village was also commissioned by the Malawian Government and SADC-GMI and the water supply scheme was officially handed over to the community at Chimbiya. The fast-growing Chimbiya village, which lies some 60km south of the capital, Lilongwe was seriously water stressed prior to the installation of this water supply scheme.

In fulfilling our core mandate which is to promote sustainable groundwater management and provide solutions to groundwater challenges across the SADC region, through partnerships, we have embarked on a number of important initiatives which we strongly believe will aid resolving some of the major challenges faced by the water sector in the region:

- Expansion of the SADC Groundwater Information Portal (SADC-GIP) project
- The development of the Operational and Maintenance Manual for groundwater infrastructure in the region
- Identification of groundwater priority areas (Groundwater Assessment) in the region
- Research project on the Eastern Kalahari Karoo Transboundary Aquifer

I hope even in this year as we continue to deliver impactful solutions for the region, you will continue to partner and be our support.

Since it is still early in the year, I believe it is still appropriate to wish you all the best for the year, and trust that we will have a fruitful year filled with great results.

Enjoy reading ‘The Well’

Executive Director’s Note
Bienvenue à une nouvelle édition de The Well, notre bulletin d’information sur les eaux souterraines de la SADC. Cette édition coïncide avec le début d’une toute nouvelle année qui promet de formidables opportunités et des possibilités infinies – comme on l’a surnommé 20-plenty (20-plein). Il s’agit de la quatrième édition de cette publication depuis sa création. Grâce à elle, nous nous efforçons de faire partager les innovations, les réussites, les défis et les solutions liés aux problèmes des eaux souterraines dans la région de la SADC.

Dans ce numéro de The Well, vous pouvez vous attendre à l’éventail de questions et d’idées diverses qui ont été soigneusement sélectionnées et élaborées pour répondre à vos besoins. Le bulletin d’information se penche sur l’impact du changement climatique (sécheresses) dans la région de la SADC, sur la possession d’investissements dans les eaux souterraines et sur une enquête relative à l’intrusion d’eau saline, sur la quatrième révolution industrielle en matière d’eaux souterraines, etc.


Cette année, nos efforts se concentreront sur une myriade d’activités destinées à garantir que nous menons à bien le projet de la Banque mondiale, et cela dans le meilleur intérêt de nos donateurs et des parties prenantes, de manière inclusive. Dans le cadre de la clôture du projet, nous prévoyons de commander un certain nombre de projets d’infrastructure pilotes mis en œuvre dans 10 États membres de la SADC par le biais du programme de sous-victions. Déjà à cette date, deux projets ont été commandés avec succès, à savoir le 30 janvier 2020, le gouvernement du Botswana et le SADC-GMI ont commandé le projet intitulé Integrated Groundwater Resources Data Management System (Système intégré de gestion des données sur les ressources en eaux souterraines).

Le 13 février 2020, le projet Exploring a Deeper Groundwater source, qui a également facilité l’approvisionnement en eau potable à environ 15 000 habitants du village de Chimbiya, a également été commandé par le gouvernement malawite et le SADC-GMI et le projet d’approvisionnement en eau a été officiellement remis à la communauté de Chimbiya, le village de Chimbiya, qui connait une croissance rapide et qui se situe à environ 85 km au sud de la capitale, Lilongwe, était déja en situation de stress hydrique avant l’installation de ce système d’approvisionnement en eau.

En remplaçant notre mandat principal, qui est de promouvoir la gestion durable des eaux souterraines et de fournir des solutions aux problèmes liés aux eaux souterraines dans toute la région de la SADC, par le biais de partenariats, nous avons lancé un certain nombre d’initiatives importantes qui nous en sommes convaincus, contribueront à résoudre certains des principaux problèmes rencontrés par le secteur de l’eau dans la région :

- Expansion du projet de portail d’information sur les eaux souterraines de la SADC (SADC-GIP)
- L’élaboration du manuel d’exploitation et de maintenance des infrastructures d’eaux souterraines dans la région
- Identification des zones prioritaires en matière d’eaux souterraines (évaluation des eaux souterraines) dans la région
- Projet de recherche sur l’aquifère transfrontalier du Karoo du Kalahari oriental

J’espère que même cette année, alors que nous continuons à proposer des solutions efficaces pour la région, vous continuerez à être notre partenaire et notre soutien.

Comme nous sommes encore au début de l’année, je crois qu’il est encore approprié de vous souhaiter le meilleur pour l’année, et j’espère que nous aurons une année fructueuse remplie de grands résultats.

Bonne lecture de The ‘Well’.

Directeur exécutif de la SADC-GMI
NOTA DO DIRECTOR EXECUTIVO DA SADC-GMI! (MR JAMES SAURAMBA).

Bem-vindo a mais uma edição emocionante do The Well, o nosso boletim informativo da SADC sobre águas subterrâneas. Esta edição coincide com o início de um novo ano que promete grandes oportunidades e infinitas possibilidades - como já foi apelidado de 20 muitas. Esta é a nossa quarta edição da publicação desde o seu início, através da qual nos esforçamos por comunicar inovações revolucionárias, histórias de sucesso, desafios e soluções relacionadas com as águas subterrâneas na região da SADC.

Nesta edição de The Well você pode olhar para o espectro de diversas questões e ideias que foram cuidadosamente selecionadas e elaboradas para satisfazer as suas necessidades. Um boletim informativo analisa o Impacto das Mudanças Climáticas (secas) na região da SADC, Propriedade de Investimentos em Águas Subterrâneas e Ameaças da Investigação de Intrusão de Água Salgada, a Quarta Revolução Industrial nas Águas Subterrâneas, etc.

2020 promete estar muito ocupado para a SADC-GMI, uma vez que vamos encerrar o projecto financiado pelo Banco Mundial - A Gestão Sustentável das Águas Subterrâneas nos Estados Membros da SADC. Desde o início da SADC-GMI em 2016, nós, e outros parceiros de cooperação, fizemos progressos no avanço da agenda das águas subterrâneas na região. No entanto, continuam a existir lacunas significativas e serão necessários esforços concertados para preenchê-las. Vamos avançar para executar o nosso mandato, abrindo, no entanto, o poder da parceria!

Os nossos esforços este ano serão centrados em torno de uma miríade de actividades destinadas a garantir que completamos com sucesso o projecto do Banco Mundial - A Gestão Sustentável das Águas Subterrâneas nos Estados Membros da SADC. Compartilhamos o objectivo de completar o projecto de forma eficaz e eficiente, ao mesmo tempo que nos certificamos de que atendemos às necessidades e expectativas dos nossos Doadores e parceiros de cooperação.

No cumprimento do nosso mandato principal que é promover a gestão sustentável das águas subterrâneas e fornecer soluções para os desafios das águas subterrâneas em toda a região da SADC, através de parcerias, embarcamos numa série de iniciativas importantes que credemos que vão ajudar a resolver alguns dos maiores desafios enfrentados pelo sector da água na região:

- Expansão do projecto do Portal de Informação de Águas Subterrâneas da SADC (SADC-GIP)
- O desenvolvimento do Manual Operacional e de Manutenção das infra-estruturas de águas subterrâneas na região
- Identificação das áreas prioritárias de águas subterrâneas (Avaliação das águas subterrâneas) na região
- Projecto de investigação sobre o Aquífero Transfronterizo Kalahari Karoo do Leste do Kalahari

Espero que mesmo neste ano em que continuamos a oferecer soluções impactantes para a região, vocês continuarão a ser nossos parceiros e a serem nosso apoio.

Uma vez que ainda é cedo no ano, acredito que ainda é apropriado desejar-vos tudo de bom para o ano, e confio que teremos um ano frutífero cheio de grandes resultados.

Aproveite a leitura de ‘The Well’. Director Executivo da SADC-GMI
CLIMATE CHANGE AND DROUGHT: A DOUBLE WHAMMY FOR SOUTHERN AFRICA

With millions of people facing a serious drought compounded by the effects of climate change, the management of water resources has never been so important.
Tens of millions of people across southern Africa are now exposed to drying conditions caused by climate change, the more immediate effect of extensive drought.

The role of groundwater across the region has never been so pronounced, with what is being called a crisis in some parts of the region where at least 11 million people are facing critical food shortages due to the drought which is caused by climate variability.

The International Federation of Red Cross and Red Crescent (IFRC) reported in December 2019 that grain production is down by 30 percent across the region.

In Zimbabwe, for example, the country is close to running out of its staple crop of maize where production in the vital commodity is down by 53 percent year on year. Next door, in Zambia, an estimated 2.3 million people are in danger of starvation as climate change and drought take hold.

This combined with accelerating death of livestock due to water shortages has led to increased culling forced by shortages of water and feedstock.

“This year’s drought is unprecedented, causing food shortages on a scale we have never seen here before,” said Dr Michael Charles, Head of the International Federation of Red Cross and Red Crescent Societies (IFRC) Southern Africa cluster.

“We are seeing people going two to three days without food, entire herds of livestock wiped out by drought and small-scale farmers with no means to earn money to tide them over a lean season.”

The countries with the most significant increase in food insecurity from last year are Zambia and Zimbabwe, with 2.3 million and 3.6 million people respectively suffering from acute food shortages.

The critical situation has been tracked from space by NASA which uses what is known as the Moderate Resolution Imaging Spectroradiometer (MODIS) instruments on their Terra and Aqua satellites. Images from the 1st of December 2019, of one of the world’s largest reservoirs of water, Lake Kariba, shows a considerable contraction of the size of the lake since the same month in 2018.

When the rains have fallen, according to Meteorologists, they have been both late and far below the annual average. Persistently lower rainfall has been recorded for several years and each dry season has experienced progressively higher temperatures – all caused by climate change.

According to the World Food Program, southern Africa has received normal rainfall in just one of the past five growing seasons. Red Cross teams across Botswana, Eswatini, Lesotho, Mozambique, Namibia, and Zambia are scaling up their response to emergency and crisis levels of food insecurity.

Botswana, Lesotho, and Namibia have this year declared drought emergencies. In Eswatini, 24 percent of its rural population is suffering from food shortages. The situation is set to worsen due to late or no rain in the region and crop production is down by 30 percent for the 2019/2020 harvest.

And in South Africa, the bread-basket of the region, agricultural output contracted by 9.2 percent year-on-year in 2019 compared with 2018. The drought has put hundreds of thousands of workers at risk, as the sector employs more than 880,000 people and contributes 2 percent to the country’s gross domestic product.

The government has also announced it will be spending R900 billion ($61 billion) to upgrade its water-supply and storage infrastructure as well as plans to deal with a shortage of the resource.

According to experts at the University of the Witwatersrand’s Global Change Institute in Johannesburg, South Africa, temperatures in southern Africa have risen dramatically by twice as much as the global average. “We estimate that, based on current emissions, temperatures in the regional interior could climb 5 to 6 degrees Centigrade by the end of the century, well above the anticipated global temperature rise. Warming of that magnitude would be potentially disastrous,” warns Global Change Institute.

The University of the Witwatersrand paper published in late 2017 entitled ‘Understanding the evolution of the 2014–2016 summer rainfall seasons in southern Africa: Key lessons’ found that the summer rainfall season in the Southern African Development Community (SADC) region was in those two years the driest on record since the droughts of the early 1980s and 1990s. The authors conclude that the future is likely to be characterised by even higher temperatures, and less rainfall.

“The occurrence of low seasonal rainfall totals together with high seasonal temperatures during preceding seasons are likely to be more frequent under future climate change and some may, indeed, already be more frequent,” it reports.

This has put additional pressure on SADC to accelerate its emergency preparedness projects.
Des dizaines de millions de personnes en Afrique australe sont maintenant exposées à des conditions de sécheresse causées par le changement climatique, l’effet plus immédiat d’une sécheresse étendue.

Le rôle des eaux souterraines dans la région n’a jamais été aussi prépondérant, avec ce que l’on appelle une crise dans certaines parties de la région où au moins 11 millions de personnes sont confrontées à de graves pénuries alimentaires en raison de la sécheresse causée par la variabilité climatique.

La Fédération internationale de la Croix-Rouge et du Croissant-Rouge (FICR) a indiqué en décembre 2019 que la production de céréales avait diminué de 30 % dans la région.

Au Zimbabwe, par exemple, le pays est sur le point d’épuiser sa culture de base, le maïs, dont la production de cette dernière vitale a diminué de 53 % par rapport à l’année précédente. Dans le pays voisin, la Zambie, on estime à 2,3 millions le nombre de personnes qui risquent de mourir de faim en raison du changement climatique et de la sécheresse.

Ceci, combiné à l’accélération de la mort du bétail due aux pénuries d’eau, a conduit à une augmentation des abattages forcés par des pénuries d’eau et de nourriture.

«La sécheresse de cette année est sans précédent, provoquant des pénuries alimentaires à une échelle que nous n’avons jamais vue ici auparavant», a déclaré le Dr Michael Charles, chef du groupe Afrique australe de la Fédération internationale des sociétés de la Croix-Rouge et du Croissant-Rouge (FICR).

«Nous voyons des gens passer deux à trois jours sans nourriture, des troupeaux entiers de bétail anéantis par la sécheresse et des petits agriculteurs qui n’ont pas les moyens de gagner de l’argent pour les faire vivre pendant une période de soudure.»

Les pays où l’insécurité alimentaire a le plus augmenté par rapport à l’année dernière sont la Zambie et le Zimbabwe, avec respectivement 2,3 millions et 3,6 millions de personnes souffrant de graves pénuries alimentaires.

La situation critique a été observée à partir de l’espace par la NASA qui utilise des instruments connus sous le nom de Spectroradiomètre imageur à résolution moyenne (MODIS) sur ses satellites Terra et Aqua. Les images du 1er décembre 2019 de l’un des plus grands réservoirs d’eau du monde, le lac Kariba, montrent une contraction considérable de la taille du lac depuis le même mois de 2018.

Lorsque les pluies sont tombées, selon les météorologues, elles ont été à la fois tardives et bien en dessous de la moyenne annuelle. Depuis plusieurs années, on enregistre des précipitations toujours plus faibles et chaque saison sèche a connu des températures progressivement plus élevées - tout cela en raison du changement climatique.


Le Botswana, le Lesotho et la Namibie ont déclaré cette année des situations d’urgence causées par la sécheresse. À Eswatini, 24 % de la population rurale souffre de pénuries alimentaires. La situation devrait s’aggraver en raison de plus de précipitations inexistantes dans la région et la production agricole est en baisse de 30 % pour la récolte 2019/2020.

Et en Afrique du Sud, le grenier à blé de la région, la production agricole a diminué de 9,2 % en 2019 par rapport à 2018. La sécheresse a mis en danger des centaines de milliers de travailleurs, car le secteur emploie plus de 880 000 personnes et contribue à hauteur de 2 % au produit intérieur brut du pays.

Le gouvernement a également annoncé qu’il allait dépenser 900 milliards de rands (61 milliards de dollars) pour améliorer ses infrastructures d’approvisionnement en eau et de stockage, ainsi que des plans en vue de faire face à la pénurie de cette ressource.

Selon les experts du Global Change Institute de l’Université du Witwatersrand à Johannesburg, en Afrique du Sud, les températures en Afrique australe ont augmenté de façon spectaculaire, deux fois plus que la moyenne mondiale. «Nous estimons que, sur la base des émissions actuelles, les températures à l’intérieur de la région pourraient augmenter de 5 à 6 degrés centigrades d’ici la fin du siècle, ce qui est bien supérieur à l’augmentation de la température mondiale prévue. Un réchauffement de cetteampleur serait potentiellement désastreux», prévient le Global Change Institute.


Les auteurs concluent que l’avenir sera probablement caractérisé par des températures encore plus élevées et des précipitations plus faibles.

«L’apparition de faibles précipitations saisonnières associées à des températures saisonnières élevées au cours des saisons précédentes sera probablement plus fréquente dans le cadre du futur changement climatique et certaines pourraient même être déjà plus fréquentes», indique le document.

Cela a mis une pression supplémentaire sur la SADC pour qu’elle accélère ses projets de préparation aux situations d’urgence.
Duzentas milhões de pessoas em toda a África Austral estão agora expostas às condições de seca causadas pelas alterações climáticas, o efeito mais imediato de uma seca prolongada.

O papel das águas subterrâneas em toda a região nunca foi tão pronunciado, com o que está a ser chamado de crise em algumas partes da região, onde pelo menos 11 milhões de pessoas estão a enfrentar escassez crítica de alimentos devido à seca que é causada pela variabilidade climática.

A Federação Internacional da Cruz Vermelha e do Crescente Vermelho (IFRC) informou, em dezembro de 2019, que a produção de grãos sofreu uma queda de 30% na África Austral.

No Zimbabué, por exemplo, o país está perto de esgotar a sua cultura de milho, onde a produção do produto vital está a diminuir 53 por cento ano a ano. Ao lado, na Zâmbia, estima-se que 2,3 milhões de pessoas correm o risco de passar fome, onde pelo menos 2,3 milhões de pessoas estão enfrentando escassez alimentar devido às mudanças climáticas e a seca que se instalaram.

Isto combinado com a aceleração da morte do gado devido à escassez de água levou a um aumento dos abates forçados pela escassez de água e pela matéria-prima.

“A seca deste ano é sem precedentes, causando escassez de alimentos numa escala nunca antes vista aqui”, disse o Dr. Michael Charles, Chefe da Federação Internacional das Sociedades da Cruz Vermelha e do Crescente Vermelho (IFRC) da África Austral.

“Estamos a ver pessoas passando de dois a três dias sem comida, rebanhos inteiros de gado sendo dizimados pela escassez alimentar e pecuaristas sem meios de ganhar dinheiro durante a estação de escassez”.

Os países com o aumento mais significativo da insegurança alimentar em relação ao ano passado são a Zâmbia e o Zimbabué, com 2,3 milhões e 3,6 milhões de pessoas a sofrerem, respectivamente, de escassez alimentar aguda.

A situação crítica tem sido acompanhada pelo espaço pela NASA, que utiliza o que é conhecido como o Espectrômetro de Imagem de Resolução Moderada (MODIS) nos seus satélites Terra e Aqua. Imagens de 1 de Dezembro de 2019, de um dos maiores reservatórios de água do mundo, o Lago Kariba, mostra uma considerável contração do tamanho do lago desde o mesmo mês em 2018.

Quando as chuvas caíram, de acordo com os meteorologistas, elas foram tanto tardias quanto muito abaixo da média anual. A precipitação persistente mais baixa tem sido registrada por vários anos e cada estação seca tem experimentado temperaturas progressivamente mais altas - todas causadas pelas mudanças climáticas.

De acordo com o Programa Mundial de Alimentação, a África Austral tem recebido uma precipitação normal em apenas uma das últimas cinco estações de crescimento. As equipas da Cruz Vermelha do Botswana, Eswatini, Lesoto, Moçambique, Namíbia e Zâmbia estão a aumentar a sua resposta aos níveis de emergência e crise de insegurança alimentar.


E na África do Sul, o celeiro da região, a produção agrícola contraiu 9,2% em 2019, em comparação com 2018. A seca colocou centenas de milhares de trabalhadores em risco, já que o sector emprega mais de 880 mil pessoas e contribui com 2% do produto interno bruto do país.

O governo também anunciou que irá gastar 900 bilhões de R$900 (61 bilhões de dólares) para melhorar a infra-estrutura de abastecimento e armazenamento de água, bem como planos para lidar com a escassez do recurso.

O documento da Universidade de Witwatersrand publicado no final de 2017 intitulado “Compreender a evolução das estações de chuvas de verão 2014-2016 na África Austral”: Lições chave foi descobrir que a estação das chuvas de verão na região da Comunidade para o Desenvolvimento da África Austral (SADC) foi, nesses dois anos, a mais seca registrada desde os anos 80 e 90. Os autores concluem que é provável que o futuro seja caracterizado por temperaturas ainda mais elevadas, e menos precipitação.

... a ocorrência de chuvas sazonais baixas, juntamente com temperaturas sazonais altas durante as estações precedentes, são provavelmente mais frequentes sob futuras mudanças climáticas e algumas podem, de facto, já ser mais frequentes”, relata.

Isto colocou pressão adicional na SADC para acelerar os seus projectos de preparação de emergência.
BOTSWANA LAUNCHES THE INTEGRATED GROUNDWATER RESOURCES DATA MANAGEMENT SYSTEM PROJECT TO IMPROVE DATA SHARING

Shared data systems is imperial in reducing the effects of climate change in the SADC region.
Sharing of groundwater data between the Botswana Department of Water and Sanitation and other key stakeholders such as decision makers, policy makers and other institutions who have interest in groundwater management has been a challenge due to lack of digital integrated systems to facilitate the sharing of data between various stakeholders for timely and effective use.

This shortcoming made it difficult for water practitioners to timeously share data on water quality, borehole information and water availability which becomes key information for water planning in the country. Previously the department had six different databases which resided in different divisions which hampered data harmonization and effective planning. Due to climate change impact, water becomes scarcer and having accurate as well as timely data is becoming more important.

In addressing the growing data sharing and harmonisation problem, the government of Botswana, Department of Water and Sanitation and the SADC- Groundwater Management Institute (SADC-GMI) collaborated in implementing the Integrated Groundwater Resources Data Management System project for Botswana. The project was commissioned on 29 January 2020 and its objective was to integrate the National Geoscience Information system (NIGIS) database model with the HydroGeo Analyst (HGA), load all the data from NIGIS (Water module) into HGA and develop a web-based application to access the HGA customized solution.

The integrated system will provide water practitioners with the capacity to interpret groundwater data timely and be able to serve instant access to data for those who require it for decision making purposes. Although the system is housed at the Department of Water and Sanitation in Gaborone, it will serve a wide spectrum of stakeholders who have interest in water resources management. Before this integration project, business people and farmers who required water related data drove to the Department to physically request data they required. However, through this new platform, they will be able to access data at the click of the button, without having to waste time that could have been invested elsewhere.

Speaking at the launch of the system at the Department of Water and Sanitation (DWS) Headquarters in Gaborone, DWS Geospatial System Analyst, Mr Bochengedu Somolekae, said this digital system will provide the Department with the capacity to integrate all data systems into one single platform, and that will aid decision making processes relating to water resources management and water planning for the country, thus doing away with fragmented systems used in the past.

More than 50 key stakeholders from the government representatives, NGOs and private organizations attend the launch of the project.
The world is heating up, sea levels are rising and Island states and coastal cities in the SADC region are at risk of experiencing groundwater degradation.

Saltwater intrusion - the movement of saline water into freshwater aquifers - is one of the ways the SADC region is experiencing groundwater degradation. Globally, water salinity threatens the livelihood of close to a billion people who live in coastal areas, according to a United Nations ocean fact-sheet.

“Saltwater intrusion occurs when an aquifer close to the sea is overpumped, creating drawdown below sea level and drawing saltwater into the aquifer,” explained Dr Kym Morton, a water strategist, consulting mining hydrologist and CEO of KLM Consulting Services.

The Climate Change Adaptation Strategy in SADC: a strategy for the Water Sector predicts that sea-level rise is expected to affect low-lying coastal areas with large populations, with “associated costs estimated at least 5 to 10 percent of gross domestic product (GDP)”.

The climate change adaptation strategy also said the Island States and Mozambique, where more than 60 percent of the population lives within 50km of the coast, are at high risk of experiencing saltwater intrusion.

“Once the aquifer is contaminated with salt, it is very difficult to clean and therefore becomes unusable,” Morton said, adding that it puts a strain on water sources in a water insecure region.

Morton said islands such as Mauritius and smaller ones like the Beguerra Archipelago in Mozambique have small freshwater aquifers which “float” on seawater aquifers.

“Any pumping of the freshwater produces a change in the groundwater gradient and sucks saltwater into the aquifer. Some of the smaller islands like Portuguese Island off Mozambique have already lost their fresh groundwater from over-pumping,” said Dr Morton.

Mozambique’s capital and most populous city Maputo also lies on the coast. An article highlighting water salinization written by water researchers who include Guilherme Emídio Horta Nogueira, Tibor Yvan Stigter and Yangxiao Zhou, says “access to freshwater in this semi-arid area is limited”.

Nogueira and colleagues also say scarce surface waters, prolonged droughts, and ballooning population growth push people to groundwater dependability.

“As the levels of surface water supplies decrease, people are turning to groundwater,” explained Dr Roger E. Diamond, a hydrogeology and geochemistry lecturer at the University of Pretoria.

However, while groundwater has a large potential to enhance water security, it is poorly managed and understood and therefore exploited.

“Groundwater occurrence and movement are poorly understood by most people. Unlike surface water, groundwater is a hidden resource and therefore requires explanation.”

“Most SADC countries have aquifers and boreholes are seen as a cheap way to supply small communities or irrigate crops in semi-arid areas,” Morton said.

South Africa’s coastline is not greatly affected by saltwater intrusion, as compared to Mozambique.
Diamond said South Africa has a steep coastline with narrow coastal plains resulting in limited development in steep areas such as the Wild Coast in the Eastern Cape province.

Diamond gave the example of Namaqualand in the drought-stricken province of the Northern Cape saying it has a low population because of its arid climate.

“However, there are coastal developments where people use groundwater, particularly in KwaZulu-Natal and the Western Cape, and saline intrusion can definitely be an issue in those areas.

“But, these areas also have fairly steep topography, and reasonable rainfall, both of which drive groundwater towards the sea and keep the saline water at bay,” Diamond said.

Diamond added that many coastal villages are supplied by municipal water schemes using surface water inland.

“So the need for boreholes is less than in Mozambique. However, there are still areas where this could be an issue. There are known instances of saline intrusion, such as at Plettenberg Bay, [in the Western Cape]” he said.

Saltwater intruded coastal aquifers not only affect the water for consumption or irrigation but also affect aquifer dependent ecosystems. This includes wetlands and springs.

“Distinct ecosystems rely on coastal aquifers and can easily be damaged,” Morton said, adding that aquifers fringe at the coast and as a result, iSimangaliso Wetland Park Area and Richards Bay have dune lines which are very easy to disrupt.

While saltwater intrusion has dire effects on livelihood, Morton said overpopulation is an even larger threat to water security in the region.

“Pit latrines continuously contaminate aquifers. Urban development prevents aquifer recharge. Removing more water than is recharge in a wet season is over-pumping and destroys the freshwater aquifers,” she said.

As a result, Morton said people must not pin the deteriorating quality and quantity of groundwater on climate change either.

“Saying it is a consequence of climate change is a diversion from the truth. People are the ones destroying the environment,” she said.

“The most important remediation is to reduce population growth, particularly in semi-arid and arid areas with insufficient surface water to support people, agriculture and livestock,” she said. Morton said there should be strategic siting of boreholes away from dry areas saying that “encourages” settlement in unfit areas.

“Drought is the norm in semi-arid areas, therefore, the land should not be settled or used for irrigation and livestock. I strongly disagree with siting and drilling boreholes in areas where the land cannot sustain cropping, people or livestock. It leads to overpopulation and dependence on a fragile ecosystem,” Morton concluded.
Social media platforms such as Twitter are becoming more pertinent for people to engage in hot topics such as water. Africa is burning up due to climate change and water will be a pressing issue in coming decades.

After North Africa, southern African countries such as Botswana, South Africa, Namibia, Lesotho and Kingdom of Eswatini are likely to have insufficient water levels for its inhabitants. This is according to non-profit organisation Water Aids’ ‘Beneath the Surface: The State of the World’s Water 2019’ report. We have compiled a list drawn from various Twitter user profiles expressing their concerns about dwindling water levels in the continent and how we can conserve water.

ARE WE HAVING ENOUGH CONVERSATION ABOUT WATER? THESE PEOPLE DO NOT THINK SO.

**Diaspora AI**
@diasporatech

"Generally speaking, issues of water conservation in Africa have not been given proper attention." - Diaspora Centre

How do we get proper attention? By spreading the word. Help our mission to improve water security in #Kenya and across the Diaspora by sharing our message.

**Dwinding Water Resources Is Not Only a Threat to Humans’ Livelihoods But They Also Affect Animals.**

**Madison Laker**
@laker_madison

This article is about a drought in Zimbabwe Africa. Due to the lack of water there elephants have died from food and water shortages. This connects to me because we are wrapping up our unit about water conservation and how our world is using water irresponsibly. @bahssennl twitter.com/GibiCtzn/status…

**Global Citizen**
@GibiCtzn

200 elephants have already died as a result of food and water shortages. gibbonzme/3Q9TCXB

WHAT CAN BE DONE? ONE USER POINTED OUT THAT GOVERNMENTS NEED TO BE MORE INVOLVED IN EDUCATING PEOPLE ABOUT WATER CONSERVATION.

**Antonio Guterres**
@antonioguterres - Oct 28, 2019

More than 820 million people face hunger today. By threatening food security around the world, the climate crisis could make this shocking number worse.

Achieving a ZeroHunger world is possible - but we must urgently change how we produce and consume. bit.ly/ZeroHunger

Another Twitter user points out that the youth, the inheritors of tomorrow’s SADC region, needs to play their part.

**Tshiamo Otukile**
@BeEnvironment

It’s #ClimateAction summit day!!! Botswana is one of the countries that have been hit hard by climate change effects. With this year already declared a drought year by HE @OfficialMasisi it calls for immediate action.

Let’s talk youth involvement in water conservation measures

**The Sustainability Times**

Shared Advantage Y&R’s “Don’t Wash Me” Project Campaign on their website. The campaign sought to bring attention to freshwater conservation in Africa.

Groundwater, like any water source, is not infinite so use it sparingly. Join in on the conservation conversation with SADC-GMI on Facebook and on Twitter @sadc_gmi using #TheWell.
1. Provision of clean drinking water and adequate sewage disposal (10)
2. A city environment (5)
3. Air-like fluid substance which expands freely to fill any space available (3)
4. More scarce than hen’s teeth (5)
5. With the seasons (8)
6. An atom or molecule with a net electric charge due to the loss or gain of one or more electrons (3)
7. H₂O (5)
8. Degree to which water exhibits toxic effects (8)
9. The river flows … the hill (3)
10. Having a pH greater than 7 (8)
11. Body of permeable rock which can contain water (7)
12. Gradually wear away (5)
13. Drain away from soil (5)
14. Expanse of salt water (3)
15. Causing water to run out (5)
16. Immense (4)
17. Unwanted or unusable material (5)
18. Change in global climate patterns (7-6)
19. Cloudy liquid (9)
20. Goals (7)

1. SANITATION
2. URBAN
3. GAS
4. RARER
5. SEASONAL
6. ION
7. WATER
8. TOXICITY
9. VIA
10. ALKALINE
11. AQUIFER
12. ERODE
13. LEACH
14. SEA
15. DRAIN
16. VAST
17. WASTE
18. CLIMATE CHANGE
19. TURBIDITY
20. TARGETS

1. Increase in amount of inorganic salts in water (12)
21. River in West Africa (5)
22. Procedure to establish quality (4)
23. Substance that provides nourishment for life (8)
24. Hen’s teeth (4)
25. Excavation to access liquid resources (4)
26. Emission of ionizing radiation (13)
27. Condensed moisture of the atmosphere falling in separate drops (7)
28. Waste water and excrement conveyed in sewers (6)
29. Tourism directed towards natural environments (7)
30. Aquatic plants (5)
31. Venice experienced an … from high sea levels (9)
32. Relating to water (6)
33. Prevention of wasteful use of a resource (12)
34. Relating to or resembling faeces (6)
35. A violent disturbance of the atmosphere with strong winds and usually rain, thunder, lightning (5)
36. Effort, loss, or sacrifice or payment needed to obtain something (4)
37. Coordinated development and management of water, land and related resources to maximise economic and social welfare (4)

1. ACQUAFLOOD
2. NIGER
3. TEST
4. NUTRIENT
5. RARE
6. WELL
7. RADIOACTIVITY
8. RAINING
9. SEWAGE
10. ECOTOUR
11. ALGAE
12. AQUAFLOOD
13. ACQUATIC
14. CONSERVATION
15. FAECAL
16. STORM
17. COST
18. IWRM
19. EQUITY
20. ACQUAFLOOD
21. NIGER
22. TEST
23. NUTRIENT
24. RARE
25. WELL
26. RADIOACTIVITY
27. RAINING
28. SEWAGE
29. ECOTOUR
30. ALGAE
31. AQUAFLOOD
32. ACQUATIC
33. CONSERVATION
34. FAECAL
35. STORM
36. IWRM
37. EQUITY
Dr Kym L. Morton’s groundwater footprint is mapped across the world where she has worked in over 300 mines during a career spanning forty years.

As a water, sustainability and mining strategist, Morton is also a woman of firsts. “I was the first woman appointed to the South African Council of Geosciences,” she said.

Morton also sits on the Boards of Groundwater Relief and UNESCO’s Scientific and Technical Committee for the World Heritage and Ramsar Convention on Wetlands.

She is also part of the International Association of Hydrogeologists, the International Mine Water Association, and a fellow for both the South African Institute of Mining and Metallurgy and the Geological Society of South Africa.

Morton’s hydrogeology career started at Aecom acquired URS Corporation, then known as Dames and Moore, as a hydrogeologist for mine water and water supply investigations and later as a senior consultant during the early 1980s. She has worked extensively throughout southern Africa in countries including Botswana, Lesotho, Namibia, Malawi, South Africa, Eswatini, Tanzania, Zambia, Zimbabwe.

During that time, Dames and Moore were consultants to the diamond company De Beers and Morton and the rest of the team were tasked to find a water source for the Orapa and Letlhakane diamond mines. The team then discovered the Ntane sandstone aquifer.

“Below it; is the Mosolotsane aquifer and below that the Mea aquifer. They occur below the Stormberg basalts and are the same sequence as the Cave sandstones in SA,” she said.

Morton added that they are buried in Botswana at about 150-250 metres below ground level and stretch across Zimbabwe, Namibia and the Democratic of Congo.

Morton has also done original dewatering design and water supply for the Orapa Diamond Mine, Letlhakane Diamond Mine, and the Damtshoa Diamond Mine also in Botswana.

She eventually started her own company, KLM Consulting Services (KLMCS), in 1989 where she is the CEO today. KLMCS is an international groundwater consulting company that specialises in supporting mining and power operations worldwide.

The company’s head office is in Johannesburg, South Africa with offices in Botswana and the United Kingdom. KLMCS has worked throughout sub-Saharan Africa and Europe. Apart from being a mine dewatering expert, her work experience includes looking at semi-arid water management and investment and increasing profitability for her company’s clients.

Morton’s work is backed by her mining hydrology background. In 2008, she earned her PhD in hydrology and mining from Imperial College London. She also holds an MBA from the same university. Morton’s PhD was on a hydrogeology and dewatering design for the Finsch Diamond Mine in the Northern Cape Province in South Africa.

As a founding member of the groundwater division of the South African Geological Society, Morton wrote ‘The Introduction to Groundwater’ offered by universities including the University of Cape Town, the University of Pretoria, Rhodes University and Stellenbosch University.

“Some students come up to me and tell me they decided to become hydrogeologists after that course, it is quite fulfilling to hear that,” Morton said.

Morton urges people in the industry to have the self-confidence to explore new and alternative ideas of what is going on around them in the water sector.

“Always look at the evidence and not just what you read in the newspaper,” Morton said.

“For example, what is going on in Cape Town isn’t a drought, it’s mismanagement,” she said, adding that long-term planning is necessary in sustainable water management.

“Money that is allocated to water management must not be spent on boards. That is wastage. Managing water isn’t difficult. It just needs to be managed properly, void of corruption,” Morton said.
Karen Villholth is a Research Group Leader at the International Water Management Institute for southern Africa and is in charge of resilient and sustainable groundwater solutions. She is also the Sub-Theme Leader and Coordinator of the Groundwater Solutions Initiative for Policy and Practice, an initiative which focuses on sustainable groundwater management. Villholth is armed with a PhD from the Technical University of Denmark and over 20 years of experience in groundwater research.

Having been born and raised in Denmark, how did you end up working in the SADC Region?

After my studies, I developed an interest in working for the development space. I was following the discussions about water scarcity which started about 20 years ago. Denmark is 100% reliant on groundwater and is well developed in that area, so I thought, “They don’t need me here.” There was not much conversation about groundwater in the developing world’s water sector so that is why I decided to move.

How is the harnessing of groundwater effective?

It actually has to go beyond harnessing it. When faced with a water crisis, groundwater is often thought of as an alternative source yet it should be used in conjunction with other water sources. Groundwater is not an infinite resource, so it has to be used wisely. That way, an area’s water challenges can be addressed effectively.

Why is there not much discussion about groundwater?

It has to do with it not being visible. As it is an underground source, it often slips people’s minds. However, drought issues such as Cape Town’s water crisis has helped people talk more about it and saving water.

Why should the general public be part of groundwater conversations?

People use groundwater both directly and indirectly. Most often, it is the people who use it directly who care about its sustainability. Bringing people into groundwater management can be beneficial through what we call “citizen science”. It helps them think about water conservation. It is not rocket science; someone with a well can simply put a metre into it to monitor the well’s water levels.

What are some of your highlights of having worked towards the sustainable use of groundwater?

It has been such a rewarding experience. While I have gotten some recognition, it is the contribution I have made to communities. Working on transboundary aquifers, I see strong developments which bring various countries together to talk about the responsible use of groundwater.
ONE YEAR IN REVIEW: THE BIG DATA AND TRANSBOUNDARY WATER COLLABORATION

SADC Research teams have been working with big data on the Ramotswa Aquifer to add value to water management.
Regional collaboration research teams have spent a year exploring how to improve managing southern African transboundary aquifers through the use of big data analytics.

The teams were led by the University of the Western Cape, the University of the Witwatersrand, as well as private sector companies Delta-H and Umvoto Africa. Together, they have been focusing on the Ramotswa Aquifer which is shared between Botswana and South Africa.

Clara Bocchino, the programme coordinator for the Big Data & Transboundary Water Collaboration Southern Africa project, said the team has to work collaboratively and simultaneously to achieve optimum results.

“This is to ensure that we obtain a full picture of the potential for big data analytics applied to the transboundary water sector in our region,” Bocchino said.

IBM’s website describes big data as a term referring to data sets beyond the means of traditional relational databases to capture, manage and process data.


“This first initiative was conceived as a seed grant. Through the organic creation of a Community of Practice, we also hope to increase the partnership and funding available to improve on the outcome of this first phase,” she said.

For that reason, the team plans to attend the 2020 Water Institute of Southern Africa’s conference where they would like to host idea jams with academia and government, expand its network in the sector and socialise the importance of using big data for transboundary water management.

“In the water sector, using new data and coding technology will mean improved governance, and with it an increase in water security, especially for the most vulnerable segments of our society,” Bocchino said.
Bilan d'une année de la quatrième révolution industrielle: Les grandes données et la collaboration transfrontalière dans le domaine de l'eau

Des équipes de recherche en collaboration régionale ont passé un an à étudier comment améliorer la gestion des aquifères transfrontaliers d'Afrique australe grâce à l’analyse des big data.

Les équipes étaient dirigées par l’Université de Western Cape, l’Université du Witwatersrand, ainsi que par les entreprises du secteur privé Delta-H et Umvoto Africa. Ensemble, elles se sont concentrées sur l’aquifère de Ramotswa, qui est partagé entre le Botswana et l’Afrique du Sud.

Clara Bocchino, la coordinatrice du programme pour le projet Big Data & Transboundary Water Collaboration Southern Africa, a déclaré que l’équipe doit travailler en collaboration et simultanément pour obtenir des résultats optimaux.

«[Cela] vise à garantir que nous obtenons une image complète du potentiel d’analyses des big data appliquées au secteur des eaux transfrontalières dans notre région», a déclaré M. Bocchino.

Le site web d’IBM décrit les big data comme un terme faisant référence à des séries de données dépassant les moyens des bases de données relationnelles traditionnelles pour saisir, gérer et traiter les données.


«Avec notre équipe en mouvement, les partenaires collaborateurs ont également expérimenté lors de webinaires sur des questions connexes et la Commission géologique des États-Unis a achevé une formation de deux mois sur leurs applications, outils et approches méthodologiques aux aquifères transfrontaliers et/ou pauvres en données», a déclaré M. Bocchino.

Les systèmes géographiques et d’information jouent un rôle essentiel dans la gestion des ressources en eau mais, associés à l’analyse des big data, ils apportent une plus grande valeur ajoutée à la gestion de l’eau.

«Cela crée des systèmes sophistiqués qui sont presque “autonomes”, avec des données constamment mises à jour, affichées par un outil qui crée une image holistique d’un système d’eau », a déclaré M. Bocchino.

Elle a ajouté que le monde évolue vers un nouveau type de changement socio-économique, rendant plus importantes des technologies telles que l’intelligence artificielle et les big data. Bocchino a déclaré qu’un des points forts de l’équipe en 2019 était la présentation du projet lors de la 2e Conférence sur les eaux souterraines de la SADC organisée par le SADC-GMI en septembre 2019, qui s’adressait à une audience plus large de décideurs et de chercheurs de la région et d’ailleurs.

Cette année, l’équipe se concentrera sur les étapes restantes du projet, a déclaré Bocchino.

«Cette première initiative a été conçue comme une subvention de démarrage. Grâce à la création organique d’une communauté de pratique, nous espérons également accroître le partenariat et les fonds disponibles pour améliorer les résultats de cette première phase», a-t-elle déclaré.

Pour cette raison, l’équipe prévoit d’assister à la conférence de 2020 de l’Institut de l’eau d’Afrique australe, où elle aimerait organiser des sessions de brassage d’idées avec le monde universitaire et le gouvernement, étendre son réseau dans le secteur et faire connaître l’importance de l’utilisation des big data pour la gestion des eaux transfrontalières.

«Dans le secteur de l’eau, l’utilisation de nouvelles technologies de données et de codage permettra d’améliorer la gouvernance et, de ce fait, d’accroître la sécurité de l’eau, en particulier pour les segments les plus vulnérables de notre société», a déclaré M. Bocchino.

«Dans le secteur de l’eau, l’utilisation de nouvelles technologies des données et de codage permettra d’améliorer la gouvernance»

- Clara Bocchino, coordinatrice du programme pour le projet Big Data & Transboundary Water Collaboration Southern Africa
As equipes de investigação de colaboração regional passaram um ano a explorar como melhorar a gestão de aquíferos transfronteiriços da África Austral através do uso de grandes análises de dados.

As equipas foram lideradas pela Universidade do Cabo Ocidental, pela Universidade de Witwatersrand, assim como pelas empresas do sector privado Delta-H e Umvoto África. Juntos, elas têm-se concentrado no Aquífero Ramotswa que é partilhado entre o Botswana e a África do Sul.

Clara Bocchino, a coordenadora do programa do projecto Os Grandes Dados e a Colaboração Transfronteiriça da Água, disse que a equipa tem de trabalhar em colaboração e simultaneamente para alcançar os melhores resultados.

"[Isto] é para assegurar que obtenhamos um quadro completo do potencial para a análise de grandes dados aplicados ao sector de águas transfronteiriças na nossa região", disse Bocchino.

O site da IBM descreve grandes dados como um termo que se refere a conjuntos de dados além dos meios das tradicionais bases de dados relacionais para capturar, gerenciar e processar dados.


"Com a nossa equipa em movimento, os parceiros colaboradores também fizeram experiências em webinars sobre questões relacionadas e o Inquérito Geológico dos Estados Unidos completou uma formação de 2 meses sobre as suas aplicações, ferramentas e abordagens metodológicas para aquíferos transfronteiriços e/ou pobres em dados", disse Bocchino.

Os Sistemas Geográficos e de Informação são instrumentais na gestão de recursos hídricos, mas aliados a grandes análises de dados, agregam mais valor na gestão da água.

"Ele cria sistemas sofisticados que são quase “auto-condução” com a constante actualização de dados mostrando através de uma ferramenta que cria uma imagem holística de um sistema de água", disse Bocchino.

Ela acrescentou que o mundo está a passar para um “novo tipo de mudança sócio-económica”, tornando tecnologias como a inteligência artificial e grandes dados mais importantes.

Bocchino disse que um destaque de 2019 da equipa estava a apresentar o projecto na 2ª Conferência de Águas Subterrâneas da SADC organizada pela SADC-GMI em Setembro de 2019, que foi para uma “audiência mais vasta de decisores e investigadores da região e não só”.

Este ano, a equipe se concentrará nos marcos restantes do projecto, disse Bocchino.

"Esta primeira iniciativa foi concebida como um subsídio de semente. Através da criação orgânica de uma Comunidade de Prática, esperamos também aumentar a parceria e o financiamento disponível para melhorar o resultado desta primeira fase", disse Bocchino.

Por essa razão, a equipe planeia participar da conferência do 2020 Instituto de Águas da África Austral, onde gostaria de hospedar os engarrafamentos de idéias com a academia e o governo, expandir a sua rede no sector e socializar a importância do uso de grandes dados para a gestão transfronteiriça da água.

"No sector da água, o uso de novos dados e tecnologia de codificação significará uma melhor governação, e com isso um aumento da segurança da água, especialmente para os segmentos mais vulneráveis da nossa sociedade”, disse Bocchino.

"No sector da água, o uso de novos dados e tecnologia de codificação significará uma melhor governação"

- Clara Bocchino, coordenadora do programa do projecto Os Grandes Dados e a Colaboração Transfronteiriça da Água.
MICRO-PLASTICS IN GROUNDWATER

Pieces of plastic so small that you need an electron microscope to see them are now reported in ground water across southern Africa.

Photography by Hanno Langenhoven SA Wild Trust
If you drink water anywhere in the world in 2020 you are likely to be imbibing microplastics in some form or other. This terrible truth means the management of the plastics industry and the petro-chemicals processing, as well as dealing with billions of plastic bags in southern Africa has become more urgent than ever.

According to Martin Wagner and Scott Lambert who produced a book in 2018 called Freshwater Microplastic: Emerging Environmental Contaminants, tiny plastic particles have been found in aquatic, terrestrial, and atmospheric systems globally. There was shock in late 2019 when scientists discovered a large quantity of microplastics imbedded in ice in the Antarctic and the deepest ocean depths, when it was realised that the extent of the problem of plastic has been under-investigated.

The reason for plastic and its successful use in various applications is also its downfall. Plastic is highly durable and malleable. But the proper disposal of plastic is a major problem, particularly in southern Africa where plastic bags are the preferred carryall of most retailers and wholesalers. Some of these bags will only degrade over 500 years which dooms the ecosystem unless a sustainable solution is found.

In a study conducted in the Great Lakes region of Africa for example, local fish species gastrointestinal tracts were examined by scientists which found evidence of microplastics. The Journal of Great Lakes Research led by Fares John Biginagwa found traces in both the Victoria Nile perch and Nile tilapia as long ago as 2015.

Then a detailed study on the size and type of microplastic pollution from five estuaries on the Eastcoast of South Africa around Durban found a concentration of 745.4 + 129.7 particles per 500ml sediment. That is well above average according to the scientists involved.

At the end of 2019, heavy rains caused inland plastic refuse to be washed into the Indian Ocean along the same oceanfront, leading to video and social media shared pictures of vast patches of plastic rubbish in the waves loved so much by domestic and international tourists.

South Africa’s Water Research Council has studied microplastics across the region specifically in freshwater concentrating on the industrial centre, Gauteng.

The study was published in 2018 and reported a growing danger: “Only fragments in the two lowest size classes were found in soil water, but fibres occurred in all size classes. However, in many places, people get their prime household consumption of water from groundwater” said the authors.

While the study has called for more research into the possible health implications, water pollution and its effects are growing more pronounced as climate change affects the distribution and access to water.
SADC BOREHOLES SAVING MANY

As rivers dry up many are turning to an age-old solution – that is trying to access underground aquifers across southern Africa.
There is a growing need to access aquifers across southern Africa as droughts become more frequent, largely due to El Niño and the effect of climate change. Citizens have instituted their own self-help processes where locals are developing skills on searching and finding hidden wells and underground streams.

One of these is Zambian smallholder farmer Elias Ndlovu who is an example of a traditionally rural person who has developed an understanding of how to access groundwater as surface water continues to dry up due to drought and climate change.

Elias spends his days farming onions, okra and tomatoes near his smallholding where he built his own well in the village of Chongwe about 47km north-east of Lusaka. It took him less than 24 hours to follow the possible underground water which he discovered directly under his homestead and then dug the shallow well.

“We don’t have to go down very far, we don’t put any pipe here, we just dig and if you find the water, we use rope and tie it to a container and draw water like that.”

“I dug it myself,” he said, pointing to a hole covered with a car tire and a piece of corrugated iron. “I was using a pick and a hoe, it’s almost five meters deep. From the well, we just draw with a tin, a gallon or five-litre container.”

The underground water flows directly under Ellis’ house, from South to North, on a slight slope downhill. Asked about how they know there is water in this small village, Elias answered “We all know there is water everywhere” but he is underplaying what has become a much sought after local skill. How to spot where the water flows underground.

He did not need a hydrologist to assist with detecting the flow but he remains one of the lucky few who can access water from inside his own property.

The well in his village is shallow. But he needs a solar powered pump and borehole for his farm nearby or he would not be able to grow his vegetables.

He sells most of his crop at a nearby market, while his large family consume the rest. But Elias is one of the lucky farmers who has water close to the surface.

Two thousand kilometers away in Lesotho, boreholes are being drilled as a matter of urgency because rivers have dried up after four years of drought. Drilling companies have been hired by the government through funding from UNICEF and USAID in order to reach aquifers that can be more than one hundred meters or more underground.

Luckily for the residents of Mpharane village north-east of the small town of Mohale’s Hoek for example, the driller struck water earlier than expected. It took two days to drill down to 70 meters and locate water when the original hydrologists report suggested they would be forced to drill at least 80 meters. This is a project sponsored by UNICEF and this has been a life-saving measure as the local rivers have all dried up.

This is pure water and requires no filtering once it is brought to the surface. Residents can drink directly from the tanks and hundreds line up every day from the nearby village.

There is a major challenge however in southern Africa as SRK principal hydrologist Ismail Mohamed outlines.

“Start with boreholes, often there are varying levels of expertise within SADC. The mining industry can afford expertise so they import skills, or even locally they have a bigger regional or international footprint, so access to expertise is easier,” he told The Well.

However, identifying where water lies underground and then drilling deep into rock is both expensive and requires years of experience and high level of expertise.

“Across southern Africa the cost of drilling comes from various quarters. In the DRC for example it would be sponsored by an NGO or a donor, whereas in Botswana the government would be directly involved. However Mozambique would have a mixed model, some government and some donor,” said Mohamed.

That has led to an increase in the aquifers being sourced to replace other water sources as southern Africa feels the brunt of climate change. The challenge for authorities is that this source of water is finite and once exhausted, it takes decades to recharge.

The use of boreholes across the Southern African Development Community (SADC) region is extensive. The examples cited above are also indicative of just how different parts of SADC are when it comes to its geology and this has a significant effect on the actions of humans on the surface. The Lesotho drought means the drilling required is going deeper and deeper to tap the all-important aquifers and in Zambia there is also a growing fear that climate change will mean accessing water close to the surface will become more complex.

But with the increased drilling comes a responsibility.

“Groundwater is not an infinite resource and if it’s not sustainably managed, it can be depleted,” warned Mohamed.
“If you take Gauteng [in South Africa] for example, it’s an urban setting, probably lots of boreholes and in more recent times with municipal supplies being less reliable both commercial and industry as well as residential sites are having boreholes installed,” he points out.

“So what would happen in years to come, if and when all these boreholes are pumping and we have a prolonged drought, then more and more people would be pumping from these aquifers, but they’re not being properly managed?”

MAINTENANCE

One of the other challenges facing SADC-based borehole operators is maintenance and theft of the equipment.

“It’s a problem trying to access the best equipment and even if they’re tapping shallower aquifers, some of these remote villages don’t have access to power for pumps,” said Mohamed. “Diesel pumps are also an additional expense. That’s where solar energy is used a bit more. In Zambia there were solar panels near wells, so this is being used more. But you put a solar panel near a pump then people steal it, they use it for other things too.”

Another characteristic of boreholes is the propensity to drill these when there is a time of crisis, which indicates a lack of foresight and disaster planning.

“Even in South Africa, during drought people start drilling boreholes as a quick solution to the problem,” said Mohamed.

“Then the rains fall and those boreholes fall into disrepair and are vandalised, or are drilled too shallow and go dry.”

The management of these resources is crucial according to SADC-GMI.

In response to the maintenance problem, the SADC Groundwater Management Institute is developing an Operation and Maintenance Training Manual for groundwater related infrastructure in the SADC region. The training manual will be shared with technical groundwater practitioners, students and decision-makers in the SADC region. This could offer solution to poor maintenance of groundwater infrastructure which impacts on water security in particular during the drought season.

TRAINING DRILLERS

Shallow drilling is one of the major problems facing borehole developers in the region. It costs a great deal of money to drill a 70 meter deep borehole. Often the wells should be deepened but developers are pressured to keep the costs down.

“Then the rains fall and those boreholes fall into disrepair and are vandalised, or are drilled too shallow and go dry.”

“Groundwater is not an infinite resource and if it’s not managed it can be depleted”

- Ismail Mohamed, Principal hydrologist, SRK.
CONJUNCTIVE MANAGEMENT OF SHARED SURFACE AND GROUNDWATER SYSTEMS IN THE SADC REGION, AFRICA

Patience Mukuyu (IWMI) & Thokozani Dlamini (SADC-GMI)
 Conjunctive water management in shared water resources of the Southern African Development Community (SADC) region is steadily gaining ground, as the understanding of the benefits of coordinated use and management of surface and groundwater increases. Changing climatic conditions and concerns around water scarcity in the region has made this approach a critical option to mitigate against water variability and possible food insecurity. Conjunctive water management helps to maximise the benefits arising from the innate characteristics of surface and groundwater use, providing complementary and optimal productivity and water use efficiency outcomes.

Work is now being advanced by the International Water Management Institute (IWMI), SADC-Groundwater Management Institute (SADC-GMI) and other partners to foster collaboration in shared surface-groundwater systems for effective transboundary water management. With USAID support for a three-year project, the primary geographic focus within the SADC region is the Tuli Karoo Aquifer-Upper Limpopo System, shared between Botswana, South Africa and Zimbabwe.

Prior to the Tuli Karoo project, extensive work has been completed in the two aquifer systems in the SADC region: the Ramotswa (Botswana and South Africa), the Shire (Malawi and Mozambique).

IWMI presently works with governments in three transboundary aquifer-river systems in SADC: the Ramotswa (Botswana, South Africa), the Shire (Malawi, Mozambique) and now the Tuli-Karoo.

Having this knowledge of the transboundary aquifers in the region, puts collaborating partners in a strategic position to leverage knowledge gained from these projects into the conjunctive management of shared surface and groundwater systems throughout the region.

“SADC-GMI is cognisance of the fact that sustainable management of TBAs requires that the characteristics of the TBAs are known, that is why SADC-GMI is partnering with regional and international partners in ensuring that studies are undertaken on more transboundary aquifers in the SADC region to understand their physical/institutional and socio-economic dynamics for sustainable water management,” remarked Mr Brighton Munyai, Senior Groundwater Specialist at SADC-GMI. He also cited that a lot of work still needs to be done on Transboundary aquifers in the region given that only four of the 30 TBAs shared amongst SADC Member States have been studied in detail.

The Tuli Karoo project seeks to bring further understanding on possible solutions that can enhance water availability and food security in the mainly rural population of the Tuli Karoo System. Strengthening the monitoring of groundwater levels is one of the first steps towards getting a grip on the dynamics of groundwater usage and availability in the Tuli Karoo system. Small scale agriculture, a key socio-economic activity in the region relies heavily on water availability, in this respect the project will endeavour to enhance water use efficiency in smallholder farmers. Further, the mapping of Managed Aquifer Recharge suitability and understanding recharge from large and small dams will be explored as well as the impacts of climate variability on groundwater dependent ecosystems.

Securing water sources has become a critical area of focus for the water stressed southern African region. In the Tuli Karoo System, dams are a common feature with large dams in the Botswana portion and both large and subsurface sand dams in the Zimbabwe portion. Moreover, the shared aquifer provides an important source of water for domestic use and irrigation. Such realities highlight the growing need to increase coordination in the management of this transboundary system.
SADC-GMI COMMISSIONS WATER SUPPLY PROJECT IN CHIMBIYA VILLAGE, MALAWI

The Chimbaya Safe Water Supply Project received a warm welcome from national and local government and traditional leaders as rain poured down — fitting for the day’s celebrations.
It was raining cats and dogs, but not even heavy rain could deter hundreds of local inhabitants including school children to come out and witness one of the historical moments in the community – the commissioning of the Chimbiya water supply project. The ceremony was also graced by the representatives from the national and local government as well as traditional leaders.

According to Mr Nixon Sinyiza, Malawi Director of Water Mission, the Chimbiya Community in the Dedza District approximately 60 km from the capital Lilongwe will no longer travel long distances to access potable water.

This follows the successful completion and commissioning of the Safe Water Supply pilot project which took place on 13 February 2020 in Dedza District.

The project explored deep aquifers by drilling a 100m deep borehole, equipping the borehole with a motorised electric pump, then reticulating the water to ten communal-style distribution points around the community. This culminated in the supply of water to approximately 15,000 inhabitants in Chimbiya trading Centre.

As she officially commissioned the project to the community, Dr Yanira Ntupanyama, Chief Director in the Malawian Ministry of Agriculture, Irrigation and Water Development said this project will benefit the community including local institutions such as schools and clinics who struggled to access water to conduct their business activities. She also emphasized that the project will improve livelihoods and ensure that the community has access to safe clean water and eliminate waterborne diseases that have been a problem in the community.

According to Director in the Malawian Ministry of Agriculture and Irrigation and Development Mr Prince Mleta, prior to this project a study was conducted which discovered that there were deeply seated aquifers at 70-100m underground. Chimbiya was one of the areas where the deep seated aquifers were discovered. With this discovery it is believed that exploring deep aquifers could make water available to the community throughout the year in the face of climate change.

Water scarcity in Chimbiya has been a huge challenge, affecting livelihoods of more than 15,000 people living in the area. The situation exposed the vulnerable community members to water bone diseases and other social ills. This project promises to be a solution to all the water challenges the community has experienced in the past. Chimbiya village has a fast-growing population that relies heavily on agricultural activities, and not having a reliable source of water was becoming a hindrance to the people’s livelihoods.

Approximately 85% of Malawi’s population, more particularly from the rural areas rely on groundwater as their major source of water for their livelihoods, therefore groundwater needs to be managed effectively and in an equitable manner. The Chimbiya experience is not unique, as many countries in the SADC region are turning to groundwater as the major source of water supply.

The Chimbiya Water supply project is part of the 12 Sub-grant pilot projects SADC-GMI is implementing in 10 SADC Member States under the Sustainable Groundwater Management in SADC Member States project, funded by the Global Environment Facility (GEF) and the Cooperation in International Waters in Africa (CIWA) through the World Bank.

During the commissioning event, the government of Malawi and the community thanked the donors, SADC-GMI and Water Mission for a successful collaboration and said they will ensure that the scheme remains sustainable way beyond the commissioning. Guests to the commissioning event were treated to lively entertainment from the community members through poems, music and drama.
A shortage of water infrastructure and sustained drought has made access to clean drinking water incredibly difficult for many in the Kingdom of Eswatini. But through collaboration, this has changed and resulted in yet another successful project improving the lives of the citizens of SADC.
Water is still a challenge in certain parts of the Kingdom of Eswatini. Approximately 400,000 people in Eswatini are still without clean and safe drinking water and children are being deprived good education due to lack of access to clean water, sanitation and hygiene. Women with disabilities and children still travel long distances to access water, which is sometimes not clean as it is shared with livestock. Climate change, growing population, shrinking water supply and rising water demand are some of the challenges facing the Kingdom of Eswatini and many other countries across the SADC region. However, Eswatini is not unique, water shortages in Southern Africa is becoming a common phenomenon, and the problem compromises food security, and people’s livelihoods at large.

The Government of Eswatini (Department of Water Affairs), in collaboration with the SADC-Groundwater Management Institute (SADC-GMI) through the World Bank funding are ready to address the water challenges facing the country, through the implementation of groundwater monitoring and installation of solar-powered pumps at selected localities in the country. This Eswatini initiative is part of the World Bank funded project – Sustainable Groundwater Management in SADC Member States. The Eswatini project focuses on resuscitating the old groundwater monitoring system that, due to climate change and drought, was converted into the water supply system. The project also acknowledges the intensified need for monitoring and increased access to water supply amidst the challenges of climate change.

The project will install six monitoring stations in hotspot areas in the Northern Hhohho region: Matsamo Boarder, Mpofu community, Mavula community, Mkhuzweni Health Centre, Piggs Peak Gold Mine, Lufafa Gold Mine. It will also install monitoring and solar-powered water systems in the four local institutions of Timphisini Primary school, St Paul’s Primary School, Mnjoli and Mseni Primary school. The region was identified as critical because it hosts new mining industry developments which have an impact on groundwater quality and other social water needs.

On the 26th of September 2019 A delegation comprising representatives from the SADC-GMI, the World Bank, the Department of Water Affairs (Eswatini), and Water Aid visited St Paul’s Primary School which is one of the beneficiaries. The school, with approximately 530 learners often goes for days without potable water and it is in dire need of water. On days without water, school children are forced to walk some 2km to a nearby river to fetch water or run to neighbours in search of water. Sibusiso Moya is a teacher at St Paul’s Primary School and he says due to water shortage, the school is sometimes forced to operate shorter hours as they can’t keep learners the whole day without drinking water or food because they also cook for the learners as the school operates a daily feeding scheme. He said the shortage of water also negatively affects children who are involved in agricultural subjects as they cannot complete their projects if there is no water for gardening.

Jabulile Yende is the Chairperson of the school’s Governing Council. She expressed her concern about the water situation at the school because it impacts on both learners and teachers.

“This project will be helpful to the school and the community at large. We can’t thank the World Bank, SADC-GMI and the Government of the Kingdom of Eswatini enough for this intervention”, she concluded.

Anna Castari the Technical Task Team Leader for the World Bank project – The Sustainable Groundwater Management in SADC Member States commended the SADC-GMI, University of the Free State (SADC-GMI host), SADC Secretariat and the sixteen SADC Member States for working cooperatively for the success of the project.
COMMISSIONING OF THE INTEGRATED GROUNDWATER RESOURCE DATA MONITORING & MANAGEMENT SYSTEM (IGWRMMS) PROJECT IN GABORONE
Gaborone, Botswana
29 January 2020

COMMISSIONING A DEEP WATER SUPPLY BOREHOLE PROJECT TO CHIMBIYA DISTRICT COMMUNITY IN MALAWI
The project will change approximately 15000.00 lives in the area
Lilongwe, Malawi
13 February 2020

ADVOCACY WORKSHOP: POLICY, LEGAL AND INSTITUTIONAL INSTRUMENTS TOWARDS RESILIENT GROUNDWATER MANAGEMENT
Johannesburg, South Africa
19 -20 February 2020

BOREHOLE SUSTAINABLE YIELD TEST FOR WATER SUPPLY TRAINING 2020: The training will provide an excellent opportunity for hands-on real life technical training on how to properly conduct a borehole sustainable yield test, data collection, processing and analysis to estimate the yield. The benefits for the participants are therefore immense
Johannesburg, South Africa
24- 27 March 2020

For more information contact SADC-GMI
+27 (0) 51 401 7734
info@sadc-gmi.org