WATERNET news

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Welcome Note

As 2024 has started; it's a time to reflect on progress made towards goals and targets set for 2023 in general and Phase V in particular. WaterNet wishes to thank all members, partners, and stakeholders who contributed to the success of the network since the beginning of 2023. The WaterNet Management Board calls on all members to work together in order to ensure the success of Phase V which will run up to 2026.

In this issue:

The 24th WaterNet/WARFSA/GWP-SA Symposium was successfully held at the Hotel Verde Zanzibar, Tanzania from 25th - 27th October 2023. The theme for the event was "**Accelerating change: Fostering innovation and integration for sustainable water resources management in Eastern and Southern Africa**"

The annual Symposia remains a platform for water professionals to share advances in research and education related to Integrated Water Resources Management in the Eastern and Southern African regions and beyond. Water professionals concerned with the wise use of water regard this as a key annual event. To date, 24 Symposia have been organized attracting an average 400 water professionals.

The 24th Symposium's programme, just like in other years consisted of scientific presentations highlighting the latest research achievements as well as more general conceptual papers and special sessions .

The 24th Symposium was officially opened by His Excellence, Dr. Hussein Ali Mwinyi, the President of the Island of Zanzibar >>> Page 2.

24th Symposium Opening Ceremony

The opening ceremony of the 24th Symposium was attended by over 500 delegates both physically, at the venue and online. The participants as well as the President of Zanzibar, His Excellence Dr Hussein Ali Mwinyi, invited guests from various government Ministries and organisations from Tanzania and Zanzibar.

The Chairperson of the Local Organising Committee of the 24th Symposium, Dr Augustina Alexander (see picture below) started by introducing members of the committee which organised the symposium.

The Vice-Chancellor of UDSM, Prof. William-Andy Lazaro Analgise, welcomed all delegates to the **24th WaterNet/WARFSA/GWP-SA** Symposium to Tanzania and Zanzibar in general and UDSM in particular. Prof Analgise highlighted that as a University, they were particularly delighted to be hosting the event for the third time and the first time in Zanzibar. He went on to thank the gust of Honour, HE, Dr Hussein Ali Mwinyi for accepting to officiate during the event. Prof. Analgise commended the Local Organising Committee (LOC) led by UDSM for the excellent work done in the planning of the event. He acknowledged all the organisations which provided different forms assistance, human and financial towards the hosting of the event. He went on to highlight that USDM through the Department of Water Resources Engineering was glad to be a key player in the water sector both in Tanzania and in the SADC region. At the regional level, UDSM has, since 2002, been running the Regional Masters Programme in Integrated Water Resources Management, which has to date seen over 500 graduates successfully completing the programme. He extended his appreciation to all the donors who have supported the programme over the years. He concluded his speech by wishing the delegates a successful symposium and a memorable stay in Zanzibar.

The Chairperson of the WaterNet Trust, Prof. Nnenesi Kgabi, highlighted that the theme of the symposium was timely as it is important to develop and scale up new products, services and solutions in order to ensure sustainable and safe water supply. She further said that the emphasis on integration resonates well with the world today as this is the direction that is being taken today together with inter-disciplinarity and artificial intelligence. Prof Kgabi emphasized that integration in this sense is the much needed piece which is needed to unite the water research, innovation and entrepreneurial sectors. There is need to work together with entrepreneurs for the uptake of the different innovations.

Dr Jennifer Molwantwa, the Chief Executive Officer of the Water Research Commission of South Africa, highlighted that, the WRC was proud to be a co-convener of the 24th Symposium. She emphasized that the WRC and WaterNet are currently being guided by a Memorandum of Understanding establishing a framework for collaboration in capacity building, outreach and knowledge management exchange in the water sector. The WRC is excited by the fact that for the first time, their participation at the 24th Symposium was that of a co-convener where they are profiling more than 50 years of existence. She went on to highlight that the WRC was supporting five physical participants, ten students from eight universities and twenty online participants.

24th Symposium Opening Ceremony

The Executive Secretary of the Global Water Partnership Southern Africa, Mr Alex Simalabwi (see picture below), highlighted that as an organisation they were very encouraged by the progress made by Zanzibar which was the first country to launch the Water Investment Programme in Africa on 11 March 2022. This is a programme under the African Union. The step by Zanzibar influenced the Government of Zambia to launch the same programme valued at six billion dollars. The Government of the United Republic of Tanzania was also encouraged and will be launching fifty billion dollar Tanzania Water Investment Programme under which the country will contribute six billion dollars from domestic resources. Mr Simalabwi went on to urge HE, the President of Zanzibar to mind the gap and invest in water. He said 51% of African countries do not invest in water mainly because of lack of capacity and as a result, the investment gap continue to increase because of inadequate water governance. He went on further to say that 71% of governments in Africa are unable to implement effective plans on water management even when the finances are provided. This is as a result of lack of capacity. Mr Samalabwi said that he was very pleased to see the 24th Symposium coming to Zanzibar as this is part of the capacity building process as there is a need to agree on curriculum and trainings to be designed for Tanzania.

The Deputy Minister of Education, Science and Technology, Hon. Omari Kipanga, congratulated the University of Dar es Salaam for successfully bidding to host the 24th Symposium. He highlighted that the country is prepared to support education curricular, research and innovation that address all the challenges being faced by the country including the water sector. Hon. Kipanga congratulated HE, Dr Mwinyi for the water related initiatives, specifically the blue economy that Zanzibar has taken.

The official opening address for the 24th Symposium was delivered by the HE, Dr Hussein Ali Mwinyi who highlighted that it was his pleasure to join the participants for the official opening of the event. He welcome all the participants to Zanzibar. Dr Mwinyi highlighted that our environment is constantly changing and the changes can be attributed to climate change, population growth and changing lifestyles leading to deterioration of water sources, pollution, biodiversity loss and loss of general health. He emphasized that these challenges call for sustainable water resources management approaches so as to meet current ecological, social and economic needs without compromising the ability to meet these needs in the future. There is, thus, an urgent need to have a solid position and develop strategies aimed at securing water for people, economies and the environment. HE, Dr Mwinyi said that the 24th Symposium came at the right time as they are looking forward to accelerating change through innovation and integration approaches for sustainable water resources management. He said that sharing of experiences and expertise during the symposium will bring new ways for harnessing and managing the limited freshwater resources through innovation and integration approaches. He highlighted that Zanzibar has developed a Water Investment Programme for 2022 - 2027 which aims at mobilizing resources or water security investments for the implementation of long term sustainability of water supply for basic and economic needs. There are five focus areas in the programme:

- Water Investments Scorecard and Finance for improved water and sanitation services;
- Building climate resilience;
- Gender equality and social inclusion;
- Strengthening institutional arrangements;
- Blue economy and sustainable water resources management;

He said that the symposium sub-themes are timely and relevant for the Zanzibar Water Investment Programme. He highlighted that he has the hope that discussions that will take place in the different sub-themes will strengthen their investment programme. HE, Dr Mwinyi wished the participants fruitful discussions and networking with the aim of forging ahead with accelerating change and fostering innovation for sustainable water resources management. He concluded his speech by declaring the 24th WaterNet/WARFSA/GWPSA Symposium officially open.

24th Symposium Keynote Address by Dr. Ade Freeman, FAO

The title for the keynote address by Dr Ade Freeman was **Science and Innovation for accelerating transformation of agri-food systems in Africa.** He started by highlighting that Africa is not on track in meeting the SDG targets for food security and water. Some of the factors behind this are as a result of conflicts, climate change which are pushing more people into poverty and food insecurity. He said that the COVID 19 pandemic, the war in Ukraine and all external head wings continue to exacerbate food insecurity and nutrition situation on the continent. He mentioned that Africa's agri-food systems are highly vulnerable to climate change, reducing agricultural yields, disrupting food supply chains and posing a great threat to lives and livelihoods. Dr Freeman said that despite the challenges being experienced in Africa, recent trends in driving agri-foods trends in Africa are providing new global opportunities such as grain food markets, integrated markets from the African Continental Free Trade Area Agreement, a growing youth population, rapid urbanisation and a growing number of households with discretionary income and technology and innovation are all creating new opportunities for the transformation of agri-food systems in Africa. Dr Freeman emphasised that keeping these opportunities in mind, there is a great need to take action now in order to ensure that the transformation of agri-food systems in more efficient, inclusive, more resilient and more sustainable.

Dr Freeman said that the shape of the above-mentioned food systems, will largely be a product of science and innovation. There will be a need for integrated efforts by all, i.e. governments, research, academia, private sector, civil society and development partners to translate the growth potential from Africa's mega trends into more better jobs and opportunities. He said that FAO is working with partners to support integrated solutions that promote science and innovation to accelerate transformation of agricultural systems. The FAO Science and Innovation Strategy and Action Plan highlights the activities, investments and choices that play a part enhancing agricultural production. The following areas can play a part in transforming agricultural systems in Africa:

Provision of data statistics and information platforms are an integral part of evidence based decision-making. Policy makers and decision makers need reliable data for decision-making purposes. FAO database and software support evidence based decisions in water including Aquastat, which is FAO's global water decision system, Aqua crop, a productivity software model and Aqua maps, a global spatial database of water and agriculture.

Dr Freeman said that there must be provision for strengthening capacity to support vigorous analysis of studies and assessments and models. Currently, African food systems are failing to produce the foods that are necessary for affordable healthy diets and also driving the degradation of the natural environments. FAO, through its various strategies is providing long term forward looking efforts aimed at strengthening strategic thinking to drive agri-foods systems towards sustainability, resilience

He went on to say that ongoing strategic foresight exercise in the African region will help to contextualize alternative scenarios for the future of agricultural systems and related strategic policy actions to move the region to a long-term sustainability and resilience.

Dr Freeman highlighted that there is a great need to share knowledge on science and innovation experiences through specific stakeholder platforms and networks. FAO has a science and innovation forum which is an excellent example of a multi-stakeholder platform for sharing knowledge and innovative solutions and technologies that can accelerate technological transformation of agri-food systems. The symposia also provides platforms for sharing knowledge, technologies, innovations and policy actions that can accelerate transformation of agri-food systems in Africa.

24th Symposium Opening Ceremony: Hand over of WaterNet Shields

Prof Jean-Marie Kileshye Onema (in picture below), the WaterNet Executive Manager, reminded HE, Dr Hussein Ali Mwinyi, the President of Zanzibar, that the annual Symposia was also a platform for recognising institutions that would have excelled in the area of human capacity building in IWRM. He highlighted that WaterNet is currently made up of 79 member institutions and seven of them have been jointly delivering the Regional Masters Programme in IWRM. However, there are two specific institutions that have joined the league of institutions delivering the MSc Programmes.

These include the Mbeya University of Science and Technology which launched a MSc Programme focussing in Water Supply and Sanitation. The Vice-Chancelor of the Mbeya University of Science and Technology, Prof. Aloys Ntanturo Mvuma received the WateNet shield from HE, Dr Hussein AliMwinyi, the President of Zanzibar.

Prof. Aloys Ntanturo Mvuma (left) receiving the WaterNet Shield from HE, Dr Hussein Ali Mwinyi.

The second university that excelled in the same area is the National University of Lesotho which established an MSc Programme in Integrated Catchment and Water Resources Management. HE, Dr Hussein Ali Mwinyi was requested to hand over the WaterNet shield to the representatives of the National University of Lesotho, Dr Khahliso Leketa (in picture below).

Dr Khahliso Leketa (front) receiving the WaterNet Shield from HE, Dr Hussein Ali Mwinyi.

Handover of the WaterNet Appreciation Gift to HE, Dr Hussein Ali Mwinyi

The Chairperson of WaterNet, Prof Nnenesi Kgabi handed over the WaterNet shield of appreciation to HE, Dr Hussein Ali Mwinyi as a way of appreciating his presence at the official opening of the 24th WaterNet/WARFSA/GWPSA Symposium.

Prof. Nnenesi Kgabi handing over the shield of appreciation to HE, Dr Hussein Ali Mwinyi

24th Symposium Scientific Plenary Session

The Scientific Plenary of the 24th WaterNet/WARFSA/GWPSA Symposium was a High level Panel: **Implementation and operationalization of integrated water resources management for accelerating change in the water sector.** The panelists were:

- Dr Fungai Makoni, Senior Director WASH Global Operations, World Vision International.
- Mr Alex Simalabwi, Executive Secretary of Global Water Partnership Southern Africa;
- Dr Jennifer Molwantwana, Chief Executive Officer of the Water Research Commission of South Africa;
- Prof Jean-Marie Kileshye Onema, WaterNet Executive Manager,

The high level panel discussion was preceded by a presentation which set the tone for the discussions done by Prof. Graham Jewitt.

The panelist highlighted and acknowledged the capacity building initiatives that have taken place within the eastern and southern African regions spearheaded by organizations such as WaterNet since the late 1990s. The was highlighted as part of implementation and operationalization of IWRM.

The panelists highlighted issues related to the current state of water security in Africa in general and in eastern and southern Africa in particular and this included factors underpinning water crisis. There was a discussion on the progress made to date in enhancing water management in Africa in general and eastern and southern Africa in particular through the adoption of IWRM. Progress in effective operationalization of IWRM was said to be heavily affected by challenges related to building human capacity at different levels. It was shown that human capacity building is what organizations such as WaterNet are addressing through education, short professional training, research and outreach.

There is currently a water investment gap which has to be addressed in order to close it. There is a critical need for funding and investments required for both human and infrastructural capacity building in Africa in order to enhance water security and governance. The Africa Water Investment Programme is much about mobilizing resources for the continent to close the water investment gap. About $30 billion is estimated for this task.

Natural disasters such as floods and drought have had negative impacts on the most vulnerable in society and this has also affected the implementation and operationalization of IWRM. Disasters destroy water infrastructure and there is need for a holistic and multisectoral approach in developing climate resilient infrastructure. Organizations such as the World Vision endeavor to protect the most vulnerable particularly children during natural disasters. In order to enhance water resources management and protect lives and livelihoods, World Vision has worked towards the development and implementation of coherent programmes in dealing with natural disasters. There is, therefore, a need for involving relevant stakeholders such as governments and communities. Voices of the communities are key during disaster management projects. World Vision, always explore the appropriateness of designs for women, children and the disabled. It is, thus, important to listen to the main stakeholders. The missing link rest on the involvement of the main beneficiaries.

The panel discussion was facilitated by Ms Rennie Munyayi.

Launch International Association of Hydrological Sciences (IAHS) East Africa Chapter

The International Association of Hydrological Sciences (IAHS) East Africa Chapter was launched during the Scientific Plenary of the 24th Symposium. Prof. Hodson Makurira, the Chair of the IAHS Africa Regional Committee highlighted the history of IHAS which dates back to 100 years ago. Historically, representation was by country this was based on payment of annual subscriptions. South Africa and Nigeria have been the two African countries paid up. IHAS also has individual membership option and anyone can be potentially be a member. In 2018 it a draft policy was which considered water challenges in different parts of the world and it was agreed that African challenges should be viewed holistically. South Africa then put a motion for the creation of the Africa Regional Committee and this was approved in July 2023 during the IAHS Administrative Plenary in Berlin. The Committee is composed of Chair, Vice Chair and Secretary and their tenure is for four years.

Prof. Makurira, highlighted that the main objective of the Africa Regional Committees is to build common vision of hydrological research, promote capacity building and strengthen collaboration among hydrologists in Africa and beyond, with the aim of understanding hydrological systems and enhance water security on the continent. He further said that the current Regional Committee for Africa board members are: Chair Hodson Makurira of Zimbabwe, Vice Chair Bertil Nlend of Cameroon and Secretary Moctar of Dembélé Burkina Faso

Prof Jean-Marie Kileshye Onema, the Secretary General of IAHS highlighted that the mandate of IAHS is to support hydrological sciences around the world. He said that IAHS has 10 000 individual members and representation in 150 countries. Prof Onema said that the first time in the history of IAHS, he become the first person from Africa to be voted as the Secretary General of the association. He had previously served as a Vice-Chair in one of the commissions for four years. He said that his election is a significant milestone for Africa.

Prof Onema appraised the audience about the second IAHS Scientific Decade, 2013–2022, entitled "Panta Rhei – Everything Flows", which was dedicated to research activities on change in hydrology and society. The purpose of Panta Rhei was to reach an improved interpretation of the processes governing the water cycle by focusing on their changing dynamics in connection with rapidly changing human systems. He further said that practical aim of Panta Rhei was to improve our capability to make predictions of water resources dynamics to support sustainable societal development in a changing environment.

Prof Onema highlighted that the current IAHS Decade running from 2023 is dedicated to local solutions under the global water crisis. The short name is **HELPING**, and stands or **H**ydrology **E**ngaging **L**ocal **P**eople **IN** one **G**lobal world. Read more on the Concept Note. HELPING underpins solutions for the water crisis, leaving no catchment or hydrologist behind, in search for scientific evidence to:

- Accelerate the understanding of the linkages between hydrological processes at local and global scales and their interaction with water resources.
- Engage with local scientists and societies to learn from local experience, differences in hydrological processes and change around the world, and transfer solutions globally.
- Synthesize hydrological understanding across the globe and underpin the management of current crises by finding holistic solutions to mitigate future crises.

Dr Afua Owusu the IAHS West Africa Regional Coordinator spoke about the IAHS Special Issue Journal which is one of the key programmes of the Africa Regional Committee. Dr Owusu highlighted that submissions to the journal on any topic related to water are welcome. The submission portal opened in November 2023 and will close in November 2024.

24th Symposium: Summary of Sessions

The symposium had a total of 31 planned sessions, of which 3 were plenaries, 16 thematic sessions and 12 special sessions.

Plenaries included the opening, scientific and closing sessions.

The following special sessions were convened by various institutions:

- **Enhancing Transboundary Cooperation Between Mozambique and Zimbabwe in the Buzi, Pungwe and Save (BUPUSA) Shared Watercourses:** Convener: Global Water Partnership.
- **Strategic Engagement: Working with the Youth as the Future Leaders of the Water Sector.** Conveners: WRC, WaterNet, IUCN, UKZN & UDSM.
- **The SADC Water Research Agenda - Sharing Results of Review and Update:** Convener: AUDA-NEPAD SANWATCE.
- **Water Resources Development and Management for Sustainable Agriculture:** Convener: Food and Agricultural Organization.
- **Remote Sensing for Water Accounting in Africa: Spotlighting the WaPOR Database: Convenors:** IHE Delft, FAO, IWMI.
- **Knowledge management approaches to informed transboundary planning in the Limpopo Basin -** Conveners: LIMCOM & GWPSA.
- **Water Governance and Economics as enablers for Innovation and Integration in Sustainable Water Resource Management –** Conveners: Cape Peninsula University of Technology et al .
- **Strategic Engagement: Strengthening Research Development and Innovation (RDI) Transboundary River Basin Organisation Cooperation:** WRC, WaterNet et'al .
- **Development of Groundwater Policy, Legal and Institutional Enabling Environment Roadmaps Towards Sustainable groundwater Management and Socio-Economic Development in Southern Africa:** Convener: SADC-GMI.
- **The past, present and future Water Resources Management Approaches.** Convener: NTWAM Water and Environment Initiative .
- **Integration of Catchment Planning Processes for Successful implementation of ICM in Lesotho.** Conveners: RENOKA, GIZ, WaterNET.
- **Innovative Approaches, Practice and technologies for Affordable and sustainable WASH services: Bridging Theory, practice and Impact.** Convener: World Vision.
- **Catalyzing the WEF Nexus for relevance and operationalization:** Conveners: IWMI, IHE-Delft, UKZN & GWPSA.

Summary of Presentations of Sub-themes

Theme	Planned	Actual
Changing hydro-climatic regimes and planning tools for climate resilient pathways	25	21
Water, Land , Energy and Agriculture	16	15
Innovative approaches, practices and technologies for affordable water supply, and sanitation services	25	26
Water, Ecosystems and the Environment	25	31
Water Governance and the Human Right to Water	25	21
Posters	16	20

Summary of Emerging Issues by oral theme

Water, Land, Energy and Agriculture

- Irrigation technologies: Enhanced systems and precision methods save water and boost yields.
- Climate-Smart Agriculture: Empowering women on adaptation, diverse crops and resilient varieties can combat climate challenges.
- Smart Drought Early Warning Systems: Integrating current systems with 4IR can provide proactive disaster readiness.
- Land Use and Cover: Responsible planning and reforestation aid sustainability.
- Soil Stabilization: Modern techniques combat soil degradation.
- Changing hydro-climatic regimes and planning tools for climate resilient pathways

Water, Ecosystems and the Environment

- Common pollutants that are a problem in the SADC region and Africa at large include pharmaceuticals, dyes, heavy metals and microbes.
- Proposed methods and techniques for the removal of the pollutants.
- The importance of monitoring water pollution throughout the year.
- None of the presenters have pointed out if they have already prepared an end-use product in which the techniques they proposed were used or patented their work.

Innovative approaches, practices & technologies for affordable water supply, & sanitation services

- Hydraulic modelling and GIS can be used to reduce real losses in areas where the infrastructure is dilapidated.
- The need for an integrated water resources management, cases where water is available as a resource but the public does not have access to water.
- Engaging children, and use of play and systematic handwashing techniques assists in improved hygiene in communities.
- Open defecation is a major regional problem. There is need for the implementation of measures to stop this at a large scale.
- Faecal sludge is a resource not waste.

Water Governance and the Human Right to Water

- The longevity and durability of traditional water management practices demonstrate the interval motivation of community dwellers to optimally use and conserve their water resources for sustainable Development;
- There is a need for full operationalization for IWRM and ICM in eastern and southern Africa in order to promote water governance;
- Enhance capacity building and incentives for meaningful stakeholder participation in water resources management.
- Hormanization laws across government institutions and create a conducive environment for collaboration.

2023 Young Scientists Winners of Various Categories

Theme	Winner	Picture	Title of Paper
Water Governance and the Human Right to Water	**Sascher Tinashe Wagoneka** (University Zimbabwe)		Groundwater monitoring and advisory system for Upper Manyame Subcatchment: A case study of Upper Manyame Zimbabwe
Water, Ecosystems and the Environment	**Murendeni Ravele** (North-West University)		Photocatalytic removal of ibuprofen from water using CuO nanoparticles incorporated into graphitic carbon nitride
Water, Land, Energy and Agriculture	**Teboho Masupha** (Agricultural Research Council)		Utilizing Innovative Technologies to Enhance Drought Prediction and Management for South Africa's Agriculture
Changing hydroclimatic regimes and planning tools for climate resilient pathways	**Naima A.M. Hersi** (University of Dar es Salaam)		Getting ready for the impact of climate and land use change on groundwater recharge in Internal Drainage Basin, Tanzania
Innovative approaches, practices and technologies for affordable water supply, and sanitation services	**Noel Zimpita** (World Vision)		Assessing Factors Contributing to Open Defecation Slippage in Malawi; The Case of Traditional Authority Onga in Chiradzulu District
Best Poster	**Stephen Mbewe** (University of Zambia)		Vulnerability of Zambezi Headwaters to Potential Contaminants: A Case Study of Ikelenge District, North- Western, Zambia

Lewis Jonker Award for the Best Presentation by a Young Water Scientist

The winner of the 2023 Lewis Jonker Award for the Best Presentation by a young water scientist at the 24th Symposium is Naima A.M. Hersi, a PhD student at the University of Dar es Salaam and Assistant lecturer at the University of Dodoma, Tanzania.

The following is the summary for the presentation by Naima A.M. Hersi

Title of presentation: Getting ready for the impact of climate and land use change on groundwater recharge in Internal Drainage Basin, Tanzania.

Spatiotemporal studies of groundwater recharge lay a foundation for understanding impacts of climate and land use and land cover (LULC) change on groundwater resources. Especially on areas where groundwater is a main water source such as Internal Drainage Basin (IDB), Tanzania. Therefore, groundwater recharge quantification for year 2100 was performed using the Soil and Water Assessment Tool (SWAT) in G1, G2 and G3 sub-catchments in IDB. Shared Socioeconomic Pathways (SSPs) climate scenarios in particular SSP245 and SSP585 were used since they cover medium to high emission scenarios. Long Ashton Research Station Weather Generator (LARS-WG) version 6.0 for downscaling rainfall data was used. The results indicated annual rainfall change is expected to decrease by 6.2% to 20.3% for SSP245 and decrease by 8.4% to an increase of 4.6% for SSP585 in year 2100. LULC change results from 1985 to 2021 showed a significant increase of 12.2% in agricultural land which mostly transformed woodland and bushland, and it is expected to further increase by 3.03% from 2021 to 2100. Monthly calibration/validation (CV) of SWAT model performed with a NSE of 0.79 and 0.67. Results from SWAT estimated slight increase in annual average groundwater recharge from 2.885mm in 1980s to 4.099mm under SSP245 and 8.577mm under SSP585 in 2100. Delineated groundwater recharge zones from this study provides vital information to basin managers to emphasize on artificial groundwater recharge. Additionally, the findings will help in optimizing crop production as well as preparation and implementation of National Adaptation Plans.

Naima A.M. Hersi had the following to say about the award that she won:

I am deeply honored to receive the 2023 Lewis Jonker Award for the overall Best Presentation at 24th WaterNet symposium. It is truly humbling to be recognized for my work in the field of hydrology. My heartfelt thanks to the selection committee for this recognition. I am grateful to my mentors and colleagues at the University of Dar es Salaam and the University of Dodoma for their support. This award is a testament to our collaborative efforts in understanding hydrology in the face of climate change and land use. I am excited about the future of groundwater research and its implications for sustainable water management. Thank you for this incredible honor and for the opportunity to contribute to the field.

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Sponsored Students for the 24th Symposium

WaterNet and the Water Research Commission (WRC) of South Africa fully funded a total of 25 post-graduate students to attend the 24th WaterNet/WARFSA/GWPSA Symposium in Zanzibar, Tanzania. The students were drawn from the Democratic Republic of Congo (i.e. University of Kinshasa), Malawi (i.e. Mzuzu University), Mozambique (i.e. Erduardo Mondlane University), Namibia (i.e. Namibia University of Science and Technology), South Africa, (i.e. North West University, University of the Western Cape, Vaal University of Technology, University of Kwazulu Natal, University of South Africa, University of Pretoria, University of Free State and the University of Johannesburg), Tanzania (University of Dar es Salaam), Zambia (University of Zambia) and Zimbabwe (University of Zimbabwe).

The students had an opportunity to share their research work with a wider audience which included academics, policy makers and development practitioners. The following summarizes some of the presentations by the students:

Tavonga Takawira (MSc Student, University of Zimbabwe)
Theme: Innovative approaches, practices and technologies affordable water supply and sanitation services
Title: Application of hydraulic modelling and GIS for Real losses
Summary: The research seeks to assist the water utilities with reduction and management of real water losses through pressure management and use of hydraulic modelling software and GIS. This improves revenue collection and finances can be channeled to maintenance of the infrastructure and the public will have access to water.

Teboho Masupha (PhD Student) Agricultural Research Council and UNISA, South Africa
Theme: Water, land, energy and agriculture
Title: Utilizing innovative technologies to enhance drought prediction and management for South Africa's agriculture
Summary: The study addressed South Africa's vulnerability to frequent droughts, emphasizing the importance of drought early warning systems for risk reduction.

Ms. Feziwe B Mamba (PhD Student) University of Johannesburg
Theme: Water, Ecosystems and the Environment
Title: Improving the Efficiency of Dye and Heavy Metal Removal from Wastewater using Carrageenan Graphitic Carbonitride Bimetallic Decorated Biopolymeric Nanocomposites.
Summary: The study presents a promising approach to achieving efficient water treatment through the use of the carrageenan-decorated g-C3N4/ZnO/Ag2O nanocomposite. The material's enhanced removal capabilities for dyes and heavy metals provide a sustainable solution to the challenges posed by water pollution.

Catherine Tlotlo Kerapetse ((PhD Student) Namibia University of Science and Technology (NUST)
Theme: Changing Hydro-Climatic Regimes and Planning Tools for Climate Resilient Pathways
Title: Hydro-climate variability assessment of water stressed semi-arid areas: Rainfall & Temperature analysis of Notwane Sub-Catchment, Botswana
Summary: The use of simple Spatio-temporal analysis of hydroclimate data, remotely sensed significantly contribute to climate vulnerability assessments where in-situ data is a challenge. A key policy priority should therefore be research advancements through quality assured Spatio-temporal analysis of climate indices in data-scarce catchments towards development of climate resilient tools for adaptation.

Sascher Tinashe Wagoneka (MSc Student, University of Zimbabwe)

Theme: Water governance for sustainable, equitable and affordable water services

Title: Groundwater monitoring and advisory system; A case study for Upper Manyame Sub catchment Zimbabwe
Summary: This study looked at the effects of land use/ landcover changes from 1980 to 2020 on groundwater potential and recharge zones within the Upper Manyame Sub catch-

Fortunate Kayira (MSc Student) Mzuzu University, Malawi

Theme: Changing Hydro-Climatic Regimes and Planning Tools for Climate Resilient Pathways

Title: Hydro-geochemical Modelling of Groundwater Quality in Salima and Lilongwe districts in Malawi.

Summary: Borehole water continues to be abandoned in Malawi due to high level of salinity, turbidity and odour, hence the need for scientific research on hydrogeochemical modeling of groundwater quality to locate usable water supplies.

Petrus Tuhafeni Paulus (PhD Student) Namibia University of Science and Technology (NUST)

Theme: Water, Land, Energy and Agriculture

Title: Application of water quality indices to characterise the physico-chemical properties of irrigation water in Namibia

Summary: The study is aimed to characterise the physico-chemical properties of irrigation water using water quality indices. The findings of this research will contribute to pollution control of agricultural water resources in Namibia.

2nd International Summer School on Integrated Water Resources Management

WaterNet in partnership with the University of Dar es Salaam, Water Research Commission and Earth Observation Africa organized the 2nd International Summer School on Integrated Water Resources Management for post-graduate students which focused on **Enhancing Innovative Approaches for Watershed Management**. The summer school took place at the UDSM campus, 9 - 23 October 2023**.** This was a hybrid, interactive, transdisciplinary summer school that Enhancing innovative approaches for watershed management". The summer school aimed at promoting sustainable water resources management in the Southern African regions. The programme was designed to train young professionals from various water sectors to address the water challenges facing the eastern and southern African regions and to promote sustainable watershed management.

More than 30 Masters and PhD students, post-doctoral fellows and emerging researchers in water related fields of study/research attended the summer school physically and online. Topics covered included:

- Water resources management Challenges and global and regional development frameworks
- Groundwater Modelling and Management
- Climate change prediction, adaptation and resilience
- Citywide Inclusive Sanitation
- Innovation in water resources e.g., SMART
- Academic scientific writing
- Practical applications of Earth Observation tools and datasets for Water Resource Management

Reflections by Students from NUST on the International Summer School

Two PHD students from the Namibia University of Science and Technology (NUST) attended the summer school, i.e. Petrus Tuhafeni Paulus and Catherine Tlotlo Kerapetse.

SUMMER SCHOOL DELIVERABLES

The 2023 summer school which was also the 2nd WaterNet summer School held at the University of Dar es Salaam, Tanzania was a success. The blended approach of face to face and online learning ensured a smooth content delivery and conducive learning environmemt.

Of note, was the face to face delivery of the Earth Observation course on Soil Moisture and Inland Water monitoring with Satellite Radar by Earth Observation Africa Research Development Facility

Involvement of Industry practitioners and experts in the water sector including esteemed lecturers made learning real, fun and worthwhile!

SUMMER SCHOOL FIELD EXCURSIONS

Two field excursions were planned and executed for the summer school. The first excursion was a trip to the Msimbazi River catchment where a reconnaissance survey was carried out, capturing anthropogenic activities and their impact on the river health and the riparian community.

On the second excursion, we had the opportunity to appreciate the operations at the Lower Ruvu Water Treatment Plant supplying portable water to about 3/4 of Dar es Salaam's population.

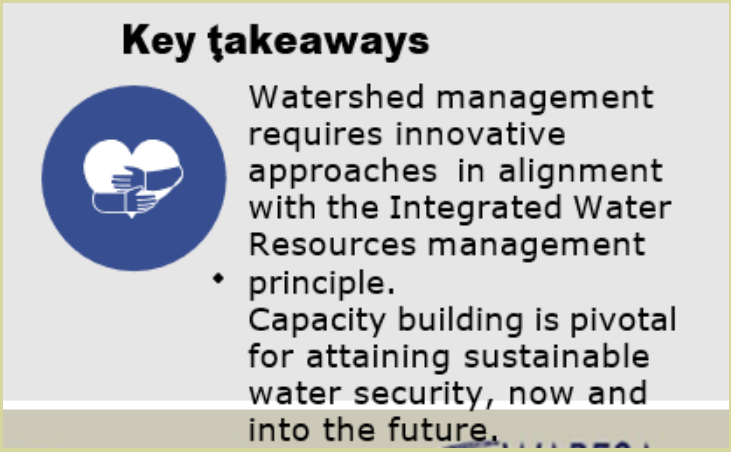
It was enlightening to note that effective watershed management can play a key role in meeting the demand for portable water supply.

SUMMER SCHOOL COMPETITIONS & AWARDS

NUST students participated in the various competition planned for the summer school which included the science competition, Three (3) minutes competition and the Innovation pitching idea.

The best presenters in innovation pitching idea was won by a team that comprised of Catherine Tlotlo Kerapetse, Sikelela Mqhayi, Fortunate Kayira, and Sascher Tinashe Wagoneka.
Catherine won first place in best innovation idea presenter.

All participants were acknowledged for participation in the summer school.



Reflections by Students from University of Zimbabwe on the International Summer School

Two students from the University of Zimbabwe, Tavonga Takawira and Sascher Tinashe Wagoneka attended the 2nd International Summer School in Dar es Salaam. They provide their reflections of the school below:

The Summer School was a hybrid, interactive, transdisciplinary program which included interactive lectures, engagement of the participants in art and performance for outreach to local communities, practical sessions, fieldwork/ excursions, a science competition, pitching of innovative idea, three-minute thesis competition, and an award ceremony.

During the first week we had indoor lectures focusing on watershed management challenges in global and regional development frameworks, groundwater management, climate change adaptation and resilience, citywide Inclusive sanitation. We had field visits to one of the primary schools in Dar es Salaam practicing rainwater harvesting to reduce floods because the area in which the school is located is prone to floods. We also visited DEWATS a decentralized waste water treatment plant in a high-density area in Dar es Salaam. The DEWATS has a biodigester onsite that is producing gas used for cooking, this shows that at large scale they can produce gas for commercial uses.

The summer school students also had an opportunity to visit the Lower Ruvu water treatment plant which is supplying three quarters of Dar es Salaam and the Msimbazi catchment, which feeds into a river that is discharging directly into the ocean. They had any opportunity to observe challenges being encountered at the different sites which they visited. They were required to depict the challenges and problems they observed and solutions using art.

During the second week with the assistance of Dr. Paul Vermunt and Dr. Roelof Rietbroek from the University of Twente we had practical lesson on Earth observation for Water Resource, Use of EO for Water level and waterbody monitoring, Introduction to Microwave Remote Sensing of Soil Moisture, Earth observation for Water Resource Management, Soil moisture retrieval from active microwave sensors, Remote sensing of rivers and lake water heights and Getting started with altimetry inland water products. After the lectures and practical we obtained a certificate in Soil moisture and inland water monitoring satellite radar

Tavonga and Sascher took part in the science competition, innovative ideas competition and the 3 minutes pitch thesis competition. The goal of the 3minutes presentation is to present your research in three minutes in a way that any audience can understand. They both won in different groups.

The two UZ students receiving awards

The summer school accorded us with knowledge, skills and awards and it was a very good opportunity to network. Africa is facing the same issues with old infrastructure, water pollution, little knowledge on groundwater, sanitation related diseases and climate change. Having a chance to share ideas and peer to peer discussions allowed students to collaborate on innovative solutions.

Reflections on the International Summer School by Students from the University of Zambia

The two students from the University of Zambia who attended the summer school are Misheck Chundu and Conceptor Siafwanzya. The two provided their reflections of the event in this article.

The summer school event covered a wide range of topics related to watershed management, including global and regional development frameworks, as well as earth observation for water resources management. The program was an incredible journey and its success was unquestionable. Excursions to Msimbazi Catchment (Figures 1 and 2) and DEWASA sub-treatment plant (Figures 3 and 4) provided practical insights into the impact of human activities on local rivers and wastewater treatment processes.

Polluted Msimbazi River

Banks of Msimbazi River

Conceptor Siafwanzya at DAWASA

Performing arts activities were incorporated to explore solutions within the Msimbazi catchment.

Closing ceremony art performances

Lessons learned from the Summer School:

- The importance of collaboration and multidisciplinary discussions in addressing complex issues such as watershed management.
- Practical insights gained from excursions and field visits, provided a deeper understanding of the real-world impact of human activities on water resources.
- The significance of incorporating arts and innovative approaches in finding solutions to environmental challenges.
- The value of presenting ongoing research findings, highlights critical challenges and opportunities in water supply, sanitation, and land use management.

Reflections on the International Summer School by Students from Mzuzu University

Two students from Mzuzu University attended the summer school, Fortunate Kayira (MSc student) and Mussa Kamanuala (PhD student). They provided their reflections on the event in this article.

Enhancing Innovative Approaches for Watershed Management was the focus of an international IWRM summer school that WaterNet, the University of Dar es Salaam, and Earth Observation Africa organized. The goal of the hybrid, interactive, transdisciplinary summer school was to support sustainable management of water resources in Southern African regions. The program's goal was to prepare young people from the water sector to handle the region's water-related issues and advance sustainable development.

The program included interactive lectures, practical sessions, fieldwork/Excursions, cultural activities, three minutes' thesis competition and a closing with awards ceremony.

Topics covered during the summer school include the following:

- Watershed management Challenges in global and regional development frameworks
- Climate change adaptation and resilience
- Groundwater Management
- Citywide Inclusive Sanitation
- Innovation in water resources: SMART
- Earth observation for Water Resource Management
- Use of EO for Water level and waterbody monitoring
- Earth observation for Water Resource Management
- Earth observation for Watershed Management
- Earth observation for Water Resource Management

The following lessons were learnt during the summer school:

- By learning from various experienced professors and water resource experts, we were exposed to a variety of teaching approaches, perspectives, and academic approaches in integrated water resources management.
- Interacting with students from diverse backgrounds promoted cultural exchange and a broader understanding of other cultures.
- By immersing ourselves in a setting where the language of teaching was English, which is distinct from our home languages, over the 16 days of the summer school, we were able to improve our language skills.
- Furthermore, we succeed in creating a worldwide network of friends, mentors, and colleagues. the connections we made during the summer school will be useful for upcoming projects and employment prospects in the water industry.

SHORT PROFESSIONAL TRAININGS

The Water – Energy – Food Nexus Winter School for Southern Africa

The Water Energy Food Nexus in-person Advanced School was successfully held at the University of Pretoria's Future Africa Campus from 14 to 18 August 2023. This in-person Advanced School is a capacity-building initiative to support early career researchers, postgraduate students, managers, and practitioners in understanding the nexus thinking as a transformative approach to sustainable natural resources management and socio-economic development.

The participants were exposed to this rapidly developing and critically important way of thinking. Participants improved their knowledge of the WEF nexus concepts, how to facilitate discourse, and new frameworks, tools, and methods for analyzing the WEF nexus. The online WEF Nexus Masterclass, held in June 2023, is a feeder and preparation for the face-to-face in-person Advanced School.

The in-person Advanced School was attended by a total of 32 participants mainly from Southern Africa and some from West and East Africa.

Activities of the WEF Nexus in-person Advanced School
The objective of the WEF Nexus in-person Advanced School which has been running since 2022 is to build on the understanding of the WEF nexus in order to improve evidence-based decision-making capacities of early career researchers (< 5 years post Ph.D.), postgraduates (Master and Ph.D.), managers, and practitioners towards:

Particular emphasis is set on developing transdisciplinary professional competencies to prepare participants to address complex grand challenges through transformative approaches.

The in-person Advanced School was preceded by a Masterclass which was held online on 13—15 June 2023 and attended by more than 150 participants. The other Masterclasses were held in May 2021 and 2022 and attended by more 100 participants, combined. The three Masterclasses introduced participants to the WEF Nexus thinking, initiatives, and the link to global challenges such as Climate Change and achieving the SDGs.

The in-person Advanced School focused on:

- Improving the ability to conceptualize the WEF Nexus linkages and potential impact on resources
- Management and regional policies,
- Strengthening skills and knowledge about tools and methods for WEF Nexus assessments, planning, monitoring, and evaluation; and

- Networking and mentoring, i.e., improving international communication between practitioners, postgraduates, early career researchers, senior researchers, and experts to build and consolidate a WEF network in southern Africa.

WEF Nexus in-person Advanced School Organizers
The Winter School was organized by the following institutions:

- IHE-Delft taught participants on WEF nexus frameworks, tools, and indicators, linking them to achieving SDGs, sustainable food systems, and a circular economy and nexus relationships using a case study of selected southern African cities
- Global Water Partnership Southern Africa - provided a WEF nexus discourse in Southern Africa, to participants and how the WEF nexus can be used to facilitate multi-partner and multi-level discourse
- Water Research Commission - exposed participants to real-life interlinkages and how the WEF nexus can be applied to informing solutions to real-life challenges
- University of KwaZulu Natal and the International Water Management Institute - provided a background and introduction to the concept of nexus thinking and how it has emerged, as well as various other nexus that exists. Together with IHE-Delft the role of UKZN was also to develop a WEF nexus framework.
- WaterNet - coordinated the planning of the in-person Advanced School, with material and technical support from regional and international strategic partners.

WaterNet Funded Masters Programme Students

WaterNet is part of the project on **Management of competing water uses and associated ecosystems in Pungwe, Buzi, and Save Basins** which is being implemented by the International Union for the Conservation of Nature and executed by the Global Water Partnership Southern Africa on behalf of the Governments of Mozambique and Zimbabwe. The project targets the conservation, sustainable use, and risk mitigation of the transboundary water resources shared by Mozambique and Zimbabwe: Pungwe, Buzi, and Save River Basins. These three basins are located along the Beira corridor, an important economic corridor that links the Beira harbour to the hinterland, with associated impacts on the environment. WaterNet has five students, two from the University of Zimbabwe and three from the University of Eduardo Mondlane, Mozambique who are undertaking research projects focusing on different areas. The following are some of the summaries of the projects being undertaken by students:

Catchment rehabilitation in order to reduce siltation in the Middle Pungwe River

Edny A. Mucavel

Department of Chemical Engineering, [2]Department of Civil Engineering, Faculty of Engineering, Eduardo Mondlane University

Mozambique is vulnerable to the effects of extreme events such as floods and droughts. Forecasts of future climate change scenarios show that this vulnerability will increase with trends towards an increase in the frequency of extreme events. The Pungwe River is shared by Zimbabwe and Mozambique. The river rises in Zimbabwe and flows through Mozambique to enter the Indian ocean at Beira town. The Pungwe River drains an area of 31,000 km² and 95% of the basin is situated in Mozambique (Manica and Sofala Provinces). The rainfall over the Pungwe catchment is relatively high. Average annual mean precipitation ranges from 1000 mm, in the centre of the flats, to more than 2000 mm in the highlands on the border with Zimbabwe. The Pungwe Basin in the central region of the country has a fundamental function in terms of conservation, preservation of nature, the environment, and socio-economic activities. However, the significant negative impact resulting from the lack of appropriate land use and occupation planning instruments in the country and the region, which would allow communities and local authorities to make the right decisions about infrastructure development and land occupation for various uses in the basin, contributes to increased siltation in the Pungwe River. The natural characteristics of the basin have been altered due to the siltation, although the river is not fulfilling its main functions. The field visit to the basin showed that its geomorphological, topographical and land use characteristics have been significantly altered. To estimate the effects of this alteration and its contribution to silting up the river, the Revised Universal Soil Loss Equation (RUSLE) was used. The equation or model combines several factors, such as: rainfall data (R.Factor), soil data (K.Factor), topography (LS.Factor) land use (C. Factor) land management (P. Factor) to estimate the loss and erosion soils that contribute to the siltation in the basin. The modelling estimated that around 10 (min) up to 150 (max) ton/ha/year of soil is lost and eroded in the basin. All this amount of soil contributes to the transportation of sediment, which forms banks along the river, hinders navigability, decrease the flow for the communities in the downstream region, which affects the environment and economic activities undertaken. In order to reduce siltation and rehabilitate the basin in the middle Pungwe, structural and non-structural measures are needed. Non-structural measures include Implementing and enforcing strict environmental regulations for activities and plans designed for the basin, ensuring effective cooperation between academic research institutions (e.g. universities and research institutes), ensuring that activities carried out in the basin and plans implemented carry out comprehensive Environmental Impact Assessments (EIA), local communities and indigenous peoples are involved, corporate responsibility and international cooperation. The structural measures consist of building development infrastructures based on the use and occupation plans for the Pungwe basin.

WaterNet Funded Students Masters Programme

Impact of saline intrusion on the livelihoods of communities in the Pungue River Estuary

Neusia, L Mangujo

Department of Chemical Engineering, Faculty of Environmental Engineering Eduardo Mondlane University

Saline intrusion has become one of the major threats to the livelihoods of coastal communities, especially in countries that have agriculture and fishing as their main sources of livelihoods. Saline intrusion has been exacerbated by the occurrence of extreme weather events, which tend to increase in magnitude and frequency due to the effect of climate change. The Pungwe River is the main source of drinking water for Beira and Dondo cities and water for irrigation for the Mafambisse Sugarcane Farm. Additionally, wetlands of Pungwe River Estuarine are one of the major rice production areas of Mozambique. Mafambisse Sugarcane Farm is located about 82 km from the river mouth and in dry years, during high tide, saltwater intrusion reaches its water abstraction point. Thus, the aim of the study is to investigate the effect of saline water intrusion on the livelihoods of coastal communities in Pungwe River. The study was based on literature review and field measurements at 14 monitoring points along the river and wetlands and the main field parameters considered are temperature and electrical conductivity. Additionally, interviews were conducted with community leaders, farmers, and fishers. Electrical conductivity measured in June, beginning of dry season, (1) near the drinking water abstraction point, was about 105 µs/cm (2) Sugarcane Farm water abstraction point, was about 134 µs/cm; and (3) along the river near the rice production point, was about 2600 µs/cm. Nevertheless, the wetlands are near the area where the river water had high electrical conductivity, of about 2600 µs/cm, the electrical conductivity in the wetlands was about 500 µs/cm. Based on the results, literature review and interviews it was concluded that the Mafambisse Sugarcane Water abstraction point and rice production areas in lower Pungwe River are prompt to be affected by saline intrusion. Detailed studies are required that will allow definition of mitigation measures for saline intrusion in the Pungwe River Estuarine.

WaterNet Funded Students Masters Programme

Environmental impact of artisanal gold mining on water quality in the Buzi And Pungwe River Basins in Manica, Mozambique

Piedade, L Alexandere

Department of Chemical Engineering, Faculty of Engineering, Eduardo Mondlane University

Mozambique is a country that has a wide geological diversity characterized by the abundance of mineral resources such as coal, gold and precious stones. Manica Province, located in the central region of Mozambique, is a reference in the occurrence and exploitation of gold, which is mainly developed in the Buzi and Pungwe riverbanks. Although artisanal gold mining is essential to the economic development of the district, it is an activity that generates negative environmental impacts when carried out incorrectly. The present study was carried out in the district of Manica, in the communities of Púngue Sul, Maradzi, Mussambudzi, Nhankwarara and Chicamba. The study aimed at evaluating the impact of artisanal gold mining on water quality. Field measurements were done at 22 monitoring points along the rivers to obtain information on water quality, upstream and downstream of the mining area. Field analyses performed include pH, turbidity, temperature, and electrical conductivity. Additionally, interviews were conducted with community leaders, miners, farmers, fishers, cattle herders, and residents of the mining area. The results revealed that the measured pH values were close to 7, which may indicate that currently there is no acid mine drainage affecting the studied area. However, the neutral mine drainage with high turbidity is impacting the river waters which is expected to have high concentration of metals. The tributaries of the Búzi River with mining activity presented low values of electrical conductivity compared to the values found downstream at the inlet of Chicamba dam 20.1 and 83.3 µ.S/cm, respectively. High turbidity values were observed in Honde River and Revue River (374,7 and 477,5 NTU), tributaries of Pungwe and Buzi Rivers and these values reduce as the water flow downstream, and in the Chicamba dam the turbidity value observed is 5NTU. Interviewed people informed that agriculture and livestock is currently affected by the quality of river water in the mining area. Detailed, study that recommends evidence-based mitigation measures to the impact of gold mining in the area is urgent because it was demonstrated that gold mining is impacting the environment, thus, compromising human life.

WaterNet-ReNOKA 2023 International Internships for young Basotho

WaterNet facilitated an international internship programme for 5 young Basotho nationals that are below the age of 35. The intention was to give them an opportunity to learn the skills that are applied in institutions that are at an advanced stage in as far as natural resources management is concerned and come back to Lesotho to apply those skills and assist in the implementation of ICM.

The applicants were requested to prepare proposals which detail the skills that they would like to gain as well as the institution where they would like to be engaged outside of Lesotho in order to sharpen their skills. In the process, WaterNet was liaising with various institutions in the SADC Region to assess their willingness to host the interns prior to their engagement. The role of the host institutions was to provide office space and, most importantly, a supervisor who would be assigned to guide and mentor the interns during the period. While many institutions expressed willingness to host, those that eventually got engaged were selected based on the expertise of the interns and partly, their choice of institution.

Intern	Local Institution	Host Institution	Details of activities undertaken during the internships
 Ms Lerato Lekhera	Multi-Nodal Development Consultants (Pty) Ltd	OKACOM-Botswana	Lerato attended a Climate Risk Informed Analysis (CRIDA) and Shared Vision Planning (SVP) workshop during the internship. This training workshop was hosted by OKACOM and the US Army Corps of engineers for Okavango River Secretariat and the OKACOM Water Resources Technical Committee (WRTC) members. This was an introductory session of many to follow, to appraise attendees on these tools and the possibility of adopting them within the OKACOM's Decision Support system (DSS) to identify water security risks related to hydro-climatic events.
 Ms Poloko Letsie	Department of Water Affairs-Lesotho	ZAMCOM-Zimbabwe	Poloko managed to work on hydrological database at a basin level, learning how to uploading it into the Zambezi Water Information System (ZAMWIS), preparation of reports and dissemination to member countries on the status water resources in the basin.
 Ms Malillane Lillane	African Clean Energy -Lesotho	SACREEE-Namibia	Malillane was involved in renewable energy planning at SACREEE in Namibia. Among other activities, she participated in a workshop that was part of the International Renewable Energy Agency (IRENA) engagement processes to identify areas of collaboration and country support for Namibia to meet its Nationally Determines Contributions (NDC) and renewable energy targets. She also visited the Water-Energy-Food nexus demonstration site in Zambia and learned more about the energy related nexus approaches.
 Mr Kananelo Thamae	Ministry of Defense National Security and Environment	World-Wide Fund for Nature-Zambia	Kananelo Thamae, was among other activities, engaged with the Upper Zambezi programme which is a subsidiary of WWF Zambia. The Upper Zambezi programme focuses forestry management on two landscapes: Western province and North western province.
 Mr. Lehlohonolo Mngomezulu	Ministry of Defense National Security and Environment	World Wide Fund for Nature-Zambia	Lehlohonolo Mngomezulu in WWF in Zambia, among other activities, he learnt the applications of drone technology in forest management. He used a drone in Magoye local forest reserve as part of the forest mapping under Restoration Opportunity Assessment Methodology (ROAM). The assessment aimed to help the country to effectively contribute in the African Forest Landscape Restoration initiative (AFR100).

WaterNet-ReNOKA Short Professional Courses Implementation in Lesotho

As part of Building the Human capacity for Basotho in Integrated Catchment Management (ICM), WaterNet facilitated five (5) short professional courses in 2023 under the financial support of the European Union, the German Government as well as the Government of Lesotho. These short professional courses were designed through a wide stakeholder engagement that was advised by a capacity needs assessment of practicing natural resource management professionals. All in all, the short professional courses are meant to build the capacity of the practicing natural resources management professional to enhance the skills that enable them to effectively implement ICM in Lesotho.

During implementation of these courses, WaterNet sought experts from its member institutions to co-facilitate each course partnering with local experts while in the process, sharing knowledge and skills among themselves.

The following are short professional course that were implemented in 2023:

Name of course	Dates	Place held	Attendance			Facilitators
			Local	Regional	Total	Regional
Climate Change Risk and Resilience for ICM in Lesotho	15th to 17th February 2023	Mohale's Hoek, Lesotho	39 (16 F, 23M)	0	39 (16 F, 23M)	Dr Nicollete Mhlanga-Ndlovu (F), Eswatini
Policy, Legislation and Governance for Effective Implementation of ICM	25-28 April 2023	Maseru, Lesotho	30 (15F, 15M)	6 (2F, 4M)	36 (17F, 19M)	Mr Davison Saruchera (M) IUCN, Pretoria, RSA
Basics of Remote Sensing and GIS Applications for ICM	10-13 July 2023	Mohale, Lesotho	37 (14F, 23M)	3 (1F, 2M)	40 (15F, 25M)	Prof Timothy Dube (M) University of the Western Cape, RSA
Advanced Remote Sensing and GIS Applications for ICM	18-21 Sept 2023	Hlotse, Lesotho	37 (15F, 22)	2 (2F, 0M)	39 (17F, 22M)	Prof Timothy Dube (M) University of the Western Cape, RSA
Natural Capital Accounting For ICM	20 to 23 Nov 2023	Maseru, Lesotho	38 (18F, 20M)	2 (1F, 1M)	40 (19F, 21M)	Dr Amelia Buriyo (F), University of Dar es Salaam, Tanzania

Climate Change Risk and Resilience Course for ICM in Lesotho

The objective of the course on "Climate Change Risk and Resilience" was to provide the basic knowledge on climate change and definitions to related risks and resilience. It targeted the members of the Catchment Planning Unit (CPU), which is mainly the government professionals who are technical advisers and implementers of ICM interventions within the catchments of Lesotho. In this case, the CPU members that were invited were from the two catchment management areas (CMAs), which are Upper Mohokare (Caledon) and Lower Mohokare where ReNOKA was due to pilot a Climate Change Risk and Vulnerability Assessment. This training was therefore, to provide foundational knowledge in climate change risk and resilience.

Human Capacity Development for Lesotho in Integrated Catchment Management (ICM): A Focus on the Tertiary Sector and Short Professional Courses

The course on "**Policy, Legislation and Governance for Effective Implementation of ICM**" aimed to empower the senior professionals in the ministries responsible for natural resources management as well as local government structures with knowledge of the legal instruments for natural resources management in Lesotho and in the SADC and East African Regions. In alignment with the previous regional efforts of ReNOKA, the course also included participants from Kenya, Tanzania and Zambia, who were part of the host institutions during the ReNOKA Learning Journeys. The Learning Journeys were undertaken by the senior government professional from Lesotho to the three countries for them to learn the governance structures that exist in other countries and how other countries deal with their natural resources management. The course was, therefore, an opportunity for the hosts to also come to Lesotho to share their experiences and learn from Lesotho as well. The regional participants presented case studies on the governance protocol and structures in their countries. Among the activities, there was also a field visit to Mafeteng District to meet the members of the Catchment Planning Unit as well as the community watershed team members to learn their experiences and challenges.

Participants of the course on Policies, Legislation and Governance for Effective Implementation of ICM

The Basics of Remote Sensing and GIS Applications for ICM and Advanced Remote Sensing and GIS Applications for ICM

The "Basics of Remote Sensing and GIS Applications for ICM" and "Advanced Remote Sensing and Remote Sensing Applications in the Context of ICM" training courses provided participants with a solid foundation in Geographic Information System (GIS) and remote sensing, understanding their relevance in Integrated Catchment Management (ICM). Participants learned the applications of GIS and remote sensing in analysing, visualizing, and managing spatial data for improved decision-making in catchment management. They acquired practical skills in utilizing GIS software, including data capturing, visualization, spatial manipulation, and analysis. Additionally, participants gained hands-on experience in using GPS applications for accurate field data collection and integrating field data into GIS software for comprehensive analysis and mapping. This practical experience enhanced their proficiency in utilizing GIS tools and techniques, enabling them to handle and analyze spatial data effectively for catchment management purposes. The Basic course was targeting the professionals from government institutions who are responsible for catchment planning for them to learn how to create maps for their report writing processes. Among the participants in this course were four regional delegates, each from Botswana, Namibia, Tanzania and Mozambique who also provided case study presentations to further provide a regional context of the topic in addition to the experiences that were brought by the regional facilitator. The Advanced course on the other hand, targeted professionals who are responsible for data management in their institutions and who are already familiar with the concepts on GIS and Remote Sensing. While the Basic component delved more on how to place the map elements on a map for report writing purposes, the advanced version delved deeper into the remote sensing aspects. It focused on how to access data from satellites, manipulate it and deduce meaning out of it in order to support decision making processes about natural resources management.

Participants of the Basic GIS and Remote Sensing Applications for ICM and
Participants of the Advanced GIS and Remote Sensing Applications for ICM

WaterNet-ReNOKA Short Professional Courses Implementation in Lesotho: Natural Capital Accounting for ICM Course

The objective of this training on "Natural Capital Accounting for ICM" was to equip participants with essential knowledge, skills, tools, and techniques in developing natural capital accounts. In addition to building the capacity of the professionals who are actively involved in implementation of ICM, i.e., Catchment Planning Unit members, for them to implement Natural Capital Accounting (NCA) in their sub catchments, the training also aimed at setting a roadmap for establishing a framework for implementation of Natural Capital Accounting at a national level in support of an ongoing initiative by the Government of Lesotho through the Department of Environment. The regional participants in this course were from ORASECOM who shared experiences on framework on payment for ecosystem services in the context of transboundary setting as it applies to river basin organizations and their member states (Botswana, Lesotho, Namibia and South Africa). There was also a participant from Zambia (World-Wide Fund for Nature) who shared experiences on NCA in the Kafue River Basin.

Participants of the Natural Capital Accounting for ICM

Upcoming Events...

25TH WATERNET/WARFSA/GWPSA SYMPOSIUM

Enhancing Sustainability: Upscaling Innovations and Best Practices for integrated catchment and water resources management (ICWRM) in Eastern and Southern Africa – Leaving No One Behind

To be held online and at the Avani Maseru, Lesotho

30 October - 1 November 2024

Organise your registration, travel and accommodation on time

WATER-ENERGY-FOOD-NEXUS (WEF) SUMMIT

The Water Research Commission (WRC) and Partners are Convening a Regional Summit on Accelerating Progress Towards Achieving the SDGs through Broadening the Water-Energy-Food (WEF+) Nexus

Summit Theme

Accelerating progress towards sustainability through the WEF Nexus

19 - 20 August 2024, Pretoria, South Africa

SHORT PROFESSIONAL TRAINING

- Soil and Water Conservation, 14 - 17 May 2024, Lesotho
- Water-Energy-Food-Nexus (WEF) Masterclass, 11 - 13 June 2024, Online
- Land Use Planning, 16 - 19 July 2024, Lesotho
- Water-Energy-Food-Nexus (WEF) in-person Advanced School, 13 - 17 August 2024, Pretoria, RSA;
- Natural Resources Monitoring and Assessment, 16 - 20 September 2024
- The 3rd International Summer School in Integrated Water Resources Management (IWRM), from 14 – 28 October 2024, National University of Lesotho,

Congratulations are in order...

Prof. Jean-Marc Mwenge Kahinda was elected to Management Board of WaterNet as a Trustee during the 24th Annual General Meeting held online on 16 November 2023. Prof. Mwenge Kahinda is an Associate Professor of Water Engineering at the University of the Witwatersrand, Johannesburg, South Africa.

Dr Joel Kabika (left) from the University of Zambia and Prof Cosmo Ngongondo (right) of the University of Malawi were re-elected to the Management Board of WaterNet as Trustees during the 24th Annual General Meeting held online on 16 November 2023.