4. ACEP Phuhlisa Programme

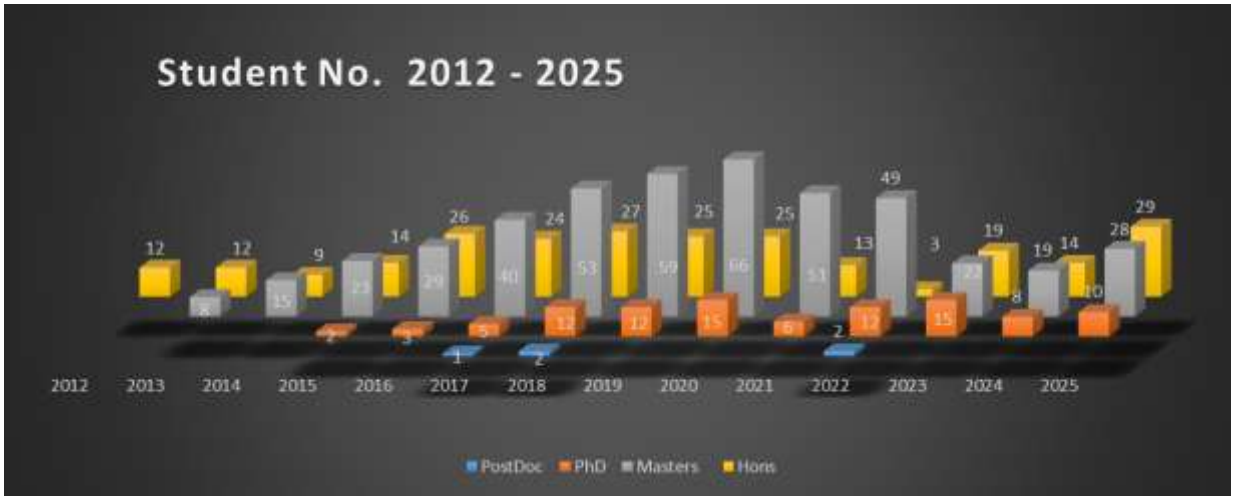
4.1 Introduction

The ACEP Phuhlisa Programme is a targeted initiative under the DSTI transformation strategy, designed to strengthen Marine Science capacity at Historically Disadvantaged Universities (HDIs) and accelerate diversity within the marine research community. Through collaboration between NRF-SAIAB, the University of Fort Hare (UFH), the University of Zululand (UNIZULU), the University of the Western Cape (UWC), and Walter Sisulu University (WSU), this structured programme supports Marine Science researchers at HDIs by leveraging NRF-SAIAB's expertise to enhance research capabilities at these institutions. This initiative plays a crucial role in training black and female South African postgraduates in the marine sector, ensuring that Marine Science is firmly embedded within HDIs.

The ACEP funding is strategically allocated, with two-thirds directed toward an open call and the remaining third specifically reserved to support Marine Science researchers and students at Historically Disadvantaged Universities. This initiative plays a crucial role in strengthening research capacity at HDIs by granting access to National Facility research platforms and specialized expertise—resources that have traditionally been available primarily to scientists at historically white or research-intensive institutions. These resources include offshore research vessels in Durban and Gqeberha, skilled boat skippers, 4x4 vehicles, estuary boats, dive teams, and submersible Remotely Operated Vehicles (ROVs). Additionally, the programme provides financial support, covering operational costs for student research projects and offering bursaries where needed, ensuring that emerging researchers have the resources they need in order to thrive.

To address the articulation gap of students coming from a disadvantaged background, the Phuhlisa programme facilitates custom training courses to help students catch up on writing, presentation and other life skills courses. Students and their supervisors are provided academic and professional development opportunities including supervisory, scientific and life skills courses such as swimming, driving and skippers' lessons as well as first aid training. The success of the programme hinges on our commitment to an HDI researcher-centred approach, recognizing that true capacity building happens when we invest directly in emerging researchers at these HDIs.

Phuhlisa student numbers 2012 – 2025: Phuhlisa student numbers increased steadily after the inception of the programme in 2012 to reach a peak of 107 in 2020. Student numbers declined after the COVID pandemic to only 56 in 2023. Numbers in 2024 (41) were further affected by the new NRF postgraduate bursary policy implemented in that year, as a result of which fewer students were approved to receive NRF support. However, in 2025 numbers show an encouraging increase to 67.



4.2 Transformation – The imperative for a better future: Training the next generation of Researchers

4.2.1 Science Communication Workshop UNIZULU 17-20 June 2025

Science communication plays a vital role in bridging the gap between scientists and society, ensuring that research findings are accessible, understandable, and impactful. For young researchers, especially at the Honours level, mastering these skills not only improves academic performance but also enhances their ability to share knowledge with diverse audiences, influence policy, and contribute to solving societal challenges.

A Science Communication Workshop was hosted at the University of Zululand (UNIZULU) through a collaboration between the ACEP Phuhlisa Programme and the NRF-SAIAB Science Communication Department. The workshop was specifically designed for nine (9) Honours students, aiming to strengthen their ability to effectively communicate their research.

The workshop focused on equipping Honours students with practical tools and strategies to present their research in clear, engaging, and relatable ways. Through interactive sessions, students were guided on:

- Understanding their audience and tailoring messages accordingly.
- Developing concise and impactful oral and written presentations.
- Using digital platforms and storytelling techniques to share scientific findings.
- Building confidence in communicating complex concepts to non-specialist audiences.

The workshop is valuable for Honours students as it lays the foundation for postgraduate studies, publications, and professional careers in science and beyond.

4.3 Human Capacity Development and Throughput: Graduations

University of Fort Hare - Zoology and Biochemistry Department 08 May 2025

At a Graduation ceremony for the Zoology Department, degrees were conferred upon students who successfully completed their studies at various levels, including Honours, Masters, and Doctoral degrees. Their research and academic achievements have contributed significantly to the advancement of knowledge in zoology and related fields.

Honours Degrees in Zoology and Biochemistry were conferred on the following students:

Zoology

- Dengana Thimna
- Nasiphi Samantha
- HlaleLeni Aphelele
- Mavundla Sindisiwe
- Mngoma Siyahluma
- Mphatsoe Bohlokwa Vuyo Cyril
- Zwezwe Alungile

Biochemistry

- Asemahle Manqeyi

MSc degrees in Zoology were conferred on three (3) students. These students made valuable contributions to research through their dissertations, as outlined below:

- **Ayabulela Mrubata**: *Dissertation Title: Salinity and temperature tolerance of the caridean shrimp,* Palaemon peringueyi *(Cardiae: Palaemonidae).*
- **Sibusiso Yokwana:** *Dissertation Title: Genetic stock assessment of the Blue Bream,* Pachymetopon aeneum *(Pisces: Sparidae) – a South African linefishery species, using microsatellite markers.*
- **Bongi Langa Mngqushu:** *Dissertation Title: The effect of water-off events on the growth, survival, and biochemical stress indicators of the South African abalone* Haliotis midae.

PhD Degrees: Doctor of Philosophy in Zoology was conferred upon **Ziyanda Brightness Mzozo**. Her thesis, titled *"Factors influencing the larval settlement of abalone (Gastropoda:* Haliotis midae*): considerations for stock enhancement and ranching,"* was supervised by Associate Professor Niall Vine.

Ziyanda Mzozo (photo top right – front row in red gown) has three DHET-accredited journal articles that have been published from this research, one article is under review, and another is in the final stages of preparation for submission.

In September 2025, a further two students under the ACEP Phuhlisa programme proudly graduated. One achieved a Doctor of Philosophy (PhD) in Biochemistry from the University of Fort Hare, while the other completed her MSc degree at Walter Sisulu University. Their accomplishments reflect the dedication and excellence fostered within the programme.

UFH – Faculty of science and agriculture: **Faith Mshiywa** (photo right middle) successfully completed her Doctor of Philosophy (PhD) in Biochemistry after a remarkable academic journey. She has been part of the ACEP Phuhlisa Programme since her BSc Honours in Biochemistry, continuing through to her MSc degree and ultimately her doctoral studies.
In 2023, she also published her first research paper, marking an important milestone in her academic career. Her PhD research, titled "Exploring the Antioxidant Activity and Anti-Cancer Potential Against Triple-Negative Breast Cancer of Red Algae Species Found Along the Coastline of the Eastern Cape Province," highlights both her dedication and the scientific significance of her work.

WSU - Department of Zoology (26th September 2025):

Mrs Aphiwe Lugongolo-Mpayipheli (photo right bottom) successfully completed her MSc degree, demonstrating exceptional research capability and academic excellence. Upon completion of her MSc studies, she subsequently registered for her Doctor of Philosophy (PhD) within the same department.

4.4 Conferences – networking is key to students' academic growth and professional development

Conference attendance provides valuable opportunities for students and supervisors to network with peers and experts in their fields and contribute to their academic growth and professional development. During 2025 students had the opportunity to attend and present their research at five (5) local and international conferences:

1. 29 June- 03 July – Southern African Society of Aquatic Scientists (SASAqS)
2. 8-12 September - South African Marine Science Symposium (SAMSS)
3. 28 Sept – 03 October – Western Indian Ocean Marine Science Association (WIOMSA)
4. 21 November – NRF-SAIAB Student Symposium
5. 10-13 November – Research Week of Excellence – East London International Convention Centre

4.4.1 Southern African Society of Aquatic Scientists (SASAqS) - 29 June - 03 July 2025

The Southern African Society for Aquatic Scientists (SASAqS) hosted its 2025 conference from 29 June – 03 July in Pietermaritzburg, KwaZulu-Natal.

The SASAqS conference was held under the theme *"Aquatic Science and Practice"* and aimed to bridge the gap between research and implementation by creating a platform where researchers, industry professionals, government officials and students could engage on sustainable solutions to the challenges facing aquatic ecosystems.

Eight (8) ACEP Phuhlisa students from UNIZULU and UFH attended the conference. Of these, five MSc students delivered oral presentations: Khanyisile Mdutyana and Sinesipho Gom from UNIZULU, and Anelisa Mpumza, Thina Skolpad, and Sinelizwi Diko from UFH.

Sazi Nzame (PhD student) and Muzi Cele (MSc student) presented their research in the form of posters. Their work was highly commended, with the poster presentation by Muzi Cele being awarded 1st place for Best Student Poster Presentation.

The participation of these students highlighted the quality of research being conducted at UNIZULU and UF and enabled them to meet and network with peers and experts in the field.

4.4.2 South African Marine Science Symposium (SAMSS) 8 - 12 September 2025

The 2025 Southern African Marine Science Symposium (SAMSS) was hosted from 8 – 12 September 2025 at the Southern Sun Cape Sun in Cape Town. Organised by the Department of Conservation and Marine Sciences at the Cape Peninsula University of Technology (CPUT) under the auspices of the South African Network of Coastal and Oceanic Research (SANCOR), the symposium was held under the theme *"The triple planetary crisis – resilience and conservation of ocean and coastal ecosystems."*

In an era where biodiversity loss, pollution, and climate change continue to pose complex global challenges, SAMSS 2025 served as a crucial platform for scientists, practitioners, educators, policymakers, and community leaders to exchange knowledge and strategies for safeguarding marine and coastal ecosystems. The event not only highlighted innovative research but also emphasised the importance of collaboration in shaping sustainable solutions.

ACEP Phuhlisa was proudly represented by a delegation of 18 MSc and PhD students and eight (8) supervisors from the four Universities (UWC, UFH, UNIZULU and WSU). The participation of students through oral and poster presentations showcased their growing contribution to marine science, while strengthening their professional development.

The symposium provided invaluable opportunities for networking, collaboration, and visibility, ultimately fostering the growth of emerging researchers within the broader marine science community.

4.4.3 13th Western Indian Ocean Marine Science Association (WIOMSA) Scientific Symposium – 28 September - 03 October 2025

The 13th WIOMSA Symposium took place from 28 September to 3 October 2025 in Mombasa, Kenya, under the theme *"One Ocean, One Future: Connecting People, Policy, and Science for a Thriving Western Indian Ocean."*

The ACEP Phuhlisa Programme was proudly represented by two of its Principal Investigators, who showcased ongoing research conducted by their postgraduate students.

Oral Presentation:

Dr. Anusha Rajkaran delivered an oral presentation on behalf of Siyanda Buthelezi, an MSc student. The presentation was titled: "Critically Important Yet Understudied: Contributions of Microplastics to Carbon Storage in Mangrove Sediments."

Poster Presentation

Dr. Ntuthuko Masikana supported Lungelo Nsibande, a PhD student who presented a poster entitled: "The Ecology of Macrozoobenthic Invertebrate Fauna in Algoa Bay, South Africa: The Past and the Present Becomes One."

Overall, the symposium provided an important platform for ACEP Phuhlisa researchers to contribute to regional scientific dialogue, strengthen collaborations, and promote innovative marine and coastal research within the Western Indian Ocean region.

4.4.4 NRF-SAIAB Student symposium - 21 November 2025

Prof Anusha Rajkaran from UWC was the first keynote speaker at the 7th Annual NRF-SAIAB Student Symposium. She delivered a Session 1 keynote address entitled, "Aquatic Research in the Anthropocene: What Estuaries Teach Us About Resilience."

As a leading researcher in aquatic and estuarine ecology, Prof Rajkaran highlighted how estuaries respond to human pressures and what they reveal about ecological resilience.

4.4.5 Research Week of Excellence - 10-13 November 2025

The Research Week of Excellence, held from 10–13 November 2025 at the East London International Convention Centre, brought together leading researchers, postgraduate students, postdoctoral fellows, and partners from across Africa and beyond. Guided by the theme "Empowering minds and transforming communities through research," the event highlighted UFH's expanding research footprint and the strength of its academic community.

During this prestigious gathering, Ms Nolizwi Diko was honoured as the Best Master's Student Presenter under the Faculty of Science and Agriculture—an achievement that reflects her dedication to scholarly excellence and the quality of research emerging from the institution.

4.5 Field trips – data collection contributes to the knowledge enterprise

4.5.1 UFH: Supervisors: **Dr Ntombekhaya Nqumla and Prof Graeme Bradley**

13-15 July - Using standardized field-to-lab protocols for the collection and handling of macroalgae, Phuhlisa students collected some 10 red algae samples from coastal rock pools. These samples were sorted in the laboratory for storage in freezers to preserve their morphology and DNA quality. The samples were then identified using both genetic and physical factors. After identification, the availability of medically relevant compounds in each species was quantified, and their ability to inhibit disease-related enzymes was tested. Finally, the extracts were evaluated in tissue-culture to determine whether they could effectively manage disease processes and whether they were toxic to human cells.

4.5.2 UNIZULU: Supervisor: **Dr Ntuthuko Masikane**

ACEP Phuhlisa students at UNIZULU have conducted three (3) field trips ranging from sand prawn sampling to microplastics sampling and collecting water and sediment samples.

1. 25 July – Determine the health status of the **Richards Bay Harbour** using the abundance and biomass of the sandprawn *Kraussillichirus kraussi***:** Three sites were sampled and of the three sites, one site showed evidence of high disturbance whilst the other two sites showed low disturbance. ThesSite with evidence of high disturbance is also a popular recreational site.
2. 31 July – Determine the distribution of microplastics in sediment and water along the length of the **uMlalazi Estuary** (right)**:** Microplastic samples were collected from nine (9) sites along the length of the estuary and the physico-chemical environment of the estuary monitored. So far, water samples have been analysed, and preliminary results show that sites in the lower reaches of the estuary (towards the mouth) had the highest number of microplastics (33 particles per litre). Sites in the upper reaches had the lowest number of microplastics (4 particles per litre). Microplastics were dominated by fibres (87%).
3. 25 August 2025 – Determine the ecology and health status of the benthic environment in **Algoa and St Francis Bays** using benthos sampling: Sediment samples are currently being processed. Water and sediment samples will also be analysed for nanomaterials at CSIR and organics (PAH) at the University of Johannesburg.

4.5.3 UWC: Supervisors: **Prof Anusha Rajkaran and Prof Gavin W. Maneveldt**

ACEP Phuhlisa students at UWC conducted three (3) field trips:

1. 2 July – **Berg River Estuary**: The purpose of this trip was to assess the biomass of *Phragmites australis* at a control site and three areas that have been planted in April 2025. The control site had higher biomass and species richness compared to the planted site. This is part of an ongoing honours project (Student David Rispel) and in collaboration with Birdlife South Africa (Phillip Grundlingh and Giselle Murison). At the time of sampling, David Rispel, Anusha Rajkaran and Phillip Grundlingh were present.

2. 28 July - **Mossel Bay**: The purpose of this trip was to collect water from Mossel Bay area to determine microplastics abundance and characteristics. Ten sites were sampled to represent

nearshore and far shore samples. Sampling was done by Stephanie Nicolaides for honours student, Lesego Kgatlo. Samples are being analysed.

3. 12-15 September – **Durban Bay Harbour**: The purpose of this trip was to assess the plastic litter dynamics at the Bayhead Mangroves in Durban Bay Harbour. Prof Anusha and the students were correlating this with mangrove tree dynamics and in the future sediment organic carbon and microplastic concentrations. They found higher amounts of plastic litter in the landward areas, where it covers pneumatophores and sediment, decreasing the establishment of seedlings. The registered student involved is Siyanda Buthelezi, accompanied by Anusha Rajkaran and Tashreeqah Nero.

4.5.4 WSU: Supervisor: **Dr Thembinkosi Dlaza**

Schools' outreach and engagement is a key component of developing young scientists' communication skills and fostering scientific enquiry and curiosity among learners: ACEP Phuhlisa students were involved in two outreach initiatives with local schools:

1 August and 15 August – **Beach Cleanup and Litter Utilisation:** In collaboration with the Eastern Cape Parks and Tourism Agency (ECPTA), and Blue Wild Coast, the WSU Joint Marine Rural Coastal Sustainability Laboratory hosted schools at the Dwesa Marine Protected Area (MPA). At the first gathering, WSU JML representatives gave a background on the external factors that affect marine life, with special reference to the impact of solid waste on marine biota and the human health impacts of consuming contaminated marine species. The ECPTA members presented about the importance of marine protected areas (MPAs) and the causes of conflicts between society and marine protected areas. Thereafter, waste picking was conducted along the MPA and the scholars from each school were challenged to design a marine concept from the collected solid waste. The scholars presented their designs on the 15th of August.

28 August – **Marine Week Celebration:** WSU successfully hosted a National Marine Week programme at Zamele High School. The initiative focused on equipping learners with essential research project design skills, while also training them in the analysis, presentation, and interpretation of scientific data. As a result of this engagement, two outstanding student projects, led by Liyema Vanto and Milani Xingashe, were selected for presentation at the prestigious Blue Schools Conference in Gqeberha, Eastern Cape, scheduled for 14-17 October 2025. This achievement reflects the impact of the program in fostering scientific inquiry and enhancing youth participation in marine science.

5. DSTI/NRF Joint Marine Laboratories Programme – Taking excellence to the people

- UFH – Bioeconomy and Biodiscovery Laboratory
- UWC – Microplastics and Coastal Research Laboratory
- UNIZULU – Marine and Estuarine Ecotoxicology Laboratory
- WSU – Rural Coastal Sustainability Laboratory

5.1 Introduction

As a logical extension of ACEP Phuhlisa, the Joint Marine Laboratories Programme (JMLP) aims to advance marine research that has profound societal impact. To enhance and facilitate home-grown research, the JMLP has facilitated the establishment of state-of-the-art research laboratories at the four HDIs. These labs expand on existing research and laboratory activities at the universities and provide university staff access to ACEP infrastructure, such as coastal vessels and research equipment. The partner universities and NRF-SAIAB jointly coordinate these laboratories.

This has created a collaborative platform which merges the expertise of these universities with that of NRF-SAIAB and its extensive research network. The DSTI/NRF Joint Marine Labs Programme (JMLP) aims to address significant marine, social, and economic opportunities and challenges in South Africa. This includes developing technical skills to co-manage these joint research platforms.

These laboratories provide researchers and students access to advanced National Facility infrastructure, leading edge technology and equipment, to enhance research quality and foster continuous growth.

Each laboratory addresses key challenges such as marine pollution, good health and well-being. The UFH Bio-economy and Bio-discovery Laboratory explores marine resources for potential applications in the marine pharmaceutical economy, targeting diseases such as diabetes and cancer. The UWC laboratory focuses on understanding microplastics to improve ecosystems. The UNIZULU laboratory specialises in marine and estuarine ecotoxicology, quantifying metal concentrations in coastal environments and organisms. The Rural Coastal Sustainability Laboratory at WSU's Mthatha campus addresses challenges faced by rural communities, focusing on food security and climate change adaptation.

Background: 2022-2024

- UFH – Bio-discovery: Professor Bradley launched a tissue culture laboratory with an Ultra High-Pressure Liquid Chromatography (UPLC) system for novel compound research on 10 March 2022. TIA seed funding was secured for IP development toward potential commercialization. Prof Niall Vine leads the aquaculture/mari-culture research unit in collaboration with an industry partner at the East London Industrial Development Zone.
- UWC – Microplastics: Prof Rajkaran set up a clean lab with associated instrumentation. The lab was launched in April 2023.
- UNIZULU – Marine Ecotoxicology: Dr Masikane upgraded the laboratory to study issues such as anti-foulants, outfalls, land-based pollution and port management. JML funds have enabled the purchase of a Total Oxygen and Carbon/Total Nitrogen (TOC/TN) analyser and an Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES). The lab was launched on December 5, 2023.
- WSU – Rural Coastal Sustainability Laboratory: The Zoology department at Walter Sisulu University revamped their laboratory and equipped their rocky shore team with a mobile field station, including a 4x4 Toyota Land Cruiser, a riverboat, dissecting microscopes with cameras, and histology equipment. The lab also received general lab equipment for their research. The lab was launched on January 24, 2024.

The ACEP Phuhlisa and JML Programmes reflect transformative efforts in marine science, making ground-breaking contributions that reshape our understanding and promote effective stewardship of the oceans. The programmes also exemplify the strong partnership between the HDIs which continues to solidify and transform the marine science landscape.

5.2 UFH – Bioeconomy and Biodiscovery Laboratory – exploring marine resource application to target diseases and developing technical expertise

Principal Investigators: Professor Graeme Bradley and Dr Ntombekhaya Nqumla

The lab is fully operational and Dr Ntombekhaya Nqumla is being mentored to take over management of the lab once Prof Bradley steps down. Training of four black female lab assistants is ongoing, and laboratory work has progressed well.

Dr Ntombekhaya Nqumla and Prof Graeme Bradley's project, Anticancer/ Anti diabetic activities of Red Algae species from along the Eastern Cape Coastline of South Africa, aims to identify and isolate bioactive compounds with anti-diabetic / Anti-cancer properties from various Red Algae species found in the Eastern Cape. The focus is on the inhibition of two enzymes, alpha-amylase and alpha-glucosidase, which play key roles in carbohydrate digestion and glucose absorption, making them important targets for managing diabetes. The cytotoxicity of these compounds on cancer cell lines is tested focusing on their potential in the treatment of prostate, lung and breast cancer. The project involves both in silico and in vitro analyses to evaluate the effectiveness of these. Key activities include the collection and Identification of Red Algae Species, extraction and purification of bioactive compounds, in-vitro testing of bioactive compounds on enzymes (diabetes) and cancer cell lines, in-silico analysis (molecular docking), data analysis and evaluation.

Seven (7) Honours students (5 female and 2 male) are supported by the lab in 2025. Ongoing student projects supported by the lab in 2025 include:

1. Faith Mshiywa (PhD): Anti-cancer activities of red algae species found along the coastline of the Eastern Cape Province.
2. Sitha Ntlokwana (PhD): Assembly and Annotation of the Nuclear Genome and analyses of the Heat Shock Protein coding regions of G. pristoides obtained from the Kenton-On Sea, South Africa.
3. Anelisa Mpumza (MSc): In vitro and in silico confirmation study of anticancer activity on bioactive compounds isolated from red algae.
4. Thina Skolpad (MSc): Identification of bioactive compounds with anti-diabetic (Type 2) properties against the alpha-amylase and alpha-glucosidase activity from macro Red algae species.
5. Zizipo Pupani (MSc): In silico and in vitro characterization of anticancer bioactive compounds from red algae for investigating their effect in the treatment of prostate cancer.
6. Amen Manundu (MSc): Identification of red alga species using DNA barcoding; Antioxidant and phytochemical screening; Extraction of sulphated polysaccharides; Extraction of phenolic compounds; Purification of Bioactive compounds by column chromatography; Evaluation of the antiulcer activity of purified compounds

5.3 UWC – Microplastics and Coastal Research Laboratory - understanding microplastics to improve ecosystems

Principal Investigator: Professor Anusha Rajkaran

The Microplastics and Coastal Research (MCR) JML is fundamental to the research on microplastics. Without the equipment and funding provided, it would be difficult to undertake analysis in a low contamination environment and more expensive to send samples away for analysis. The laboratory also enables the training of students and contributes to increasing human capacity and transformation.

The MCR is set up to extract, enumerate, and describe microplastic (MP) samples collected from sediment, water and fauna. It comprises of flow cabinets, filtration apparatus with pumps, sieves, a microscope and the flag ship item, the Bruker LUMOS II compact standalone FT-IR imaging microscope, which will be used to determine the polymers of macro and microplastics. The first objective is to establish a dataset on microplastics in the estuaries of South Africa. Secondly, we aim to establish MP levels in key estuarine species. Species will be prioritised according to ecological, social and economic importance. Work has already been done on estuarine crabs and snails found in mangrove and saltmarsh areas – these species were selected as they act as ecological engineers, bioturbators and will act to remove and ingest MP from the sediment.

Prof Rajkaran and her team also work on the epiplastic community or the "plastisphere". Very little is known about the plastisphere that may exists in the marine and coastal environments of South Africa.

Ongoing student projects supported by the lab in 2025 (Department of Biodiversity and Conservation Biology, University of the Western Cape):

1. Rosemary Eager (PhD): Measurement of microplastics in water, sediment and animal tissue of Western Cape systems. Collection of samples, extraction by buoyancy, characterisation and polymer. Rosemary Eager (right) presented at Society for Conservation Biology's (SCB) 32nd International Congress for Conservation Biology (ICCB) in June 2025 - *Flooding event impacting microplastics in environmental, and biological samples from the Berg River Estuary, Western Cape Province, South Africa*.
2. Stephanie Nicolaides (PhD): Investigating the impacts of plastic pollution on the coastline of Mossel Bay, South Africa: presence, knowledge, and sustainable solutions. Measurement of microplastics in water, sediment and animal tissue of Mossel Bay.

3. Tashreeqah Nero (MSc): The movement of particles into an abalone farm in Walker Bay, Hermanus. Microplastics in water samples collected from an Abalone farm and water collections made at 10 beaches are filtered through metal sieves and categorised to test the occurrence and abundance.
4. Logan Londt (MSc): Microplastics found in the fish used to feed penguins at SANCCOB are filtered through metal sieves and categorised to test the occurrence and abundance of microplastics in coastal birds.
5. Siyanda Buthelezi (MSc): Durban Bay Harbour. Siyanda Buthelezi and Prof Rajkaran will be correlating this with mangrove tree dynamics and, in the future, sediment organic carbon and microplastic concentrations. They expect to find higher amounts of plastic litter in the landward areas, where it will cover pneumatophores and sediment, decreasing the establishment of seedlings.
6. Lesego Kgatlo (MSc): Microplastics of Mossel Bay (SAMSS poster).

The following papers are expected to be published in 2025:

Manuscripts submitted:

- Integrated Environmental Assessment and Management Manuscript ID IEAM-2025-022-OA titled "Microplastics associated with shoreline marine organisms at Nature's Valley, South Africa." Major revisions recommended.

Manuscripts in preparation:

- Quantifying MP pollution in the mangrove forests of South Africa: A comparative analysis of abundance, morphotypes, polymer composition, and toxicity. Authors: Jaime Johnson, Anusha Rajkaran and Sershen Naidoo.
- Knowledge and perceptions of plastic pollution (including microplastics) within the recreational and commercial fisheries of Mossel Bay Authors: Stephanie Nicolaides and Anusha Rajkaran
- Plastic Pollution in South Africa: Current Knowledge, Research Gaps, and Future Directions in Marine and Coastal Ecosystems. Authors: Stephanie Nicolaides, others and Anusha Rajkaran.
- Crafting a Progressive Plastic Waste Management Strategy for South Africa: Drawing from Rwanda's Innovations and Global Best Practices for Legislative Action. Authors: Stephanie Nicolaides, others and Anusha Rajkaran.

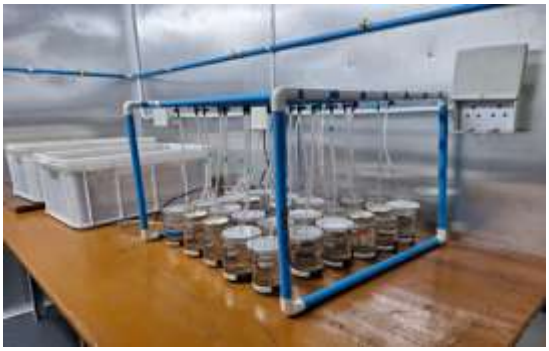
5.4 UNIZULU – JML Marine and Estuarine Ecotoxicology Laboratory – understanding toxic ecosystem by quantifying metal concentrations in coastal environments and organisms

Principal Investigator: Dr Ntuthuko Masikane

The Marine and Estuarine Ecotoxicology Laboratory is equipped to quantify metals from environmental samples (water, sediment) and biological tissues. It is also equipped for ecophysiology research.

The laboratory is split into two sections:

The Analytical Lab is where all the analysis takes place and houses all the capital equipment. Capital equipment in this lab includes the ICP spectrophotometer, the TOC analyser, microwave digester, AA spectrophotometer and a water purification system.



The Exposure Laboratory is where all the experiments (ecophysiology experiments, marine and estuarine bioassays) are conducted. The major equipment in this laboratory includes existing infrastructure (e.g. controlled environment rooms) as well as small equipment (e.g. micro-osmometer, microplate reader).

Ongoing student projects supported at the Lab:

1. Ms Lungelo Nsibande (PhD): Bioaccumulation of metals, effect on neurotoxicity and energy reserves in sesarmid crabs (*Cristarma eulimene* and *Neosarmatium africanum*) of uMhlathuze Estuary.
2. Mr Sazi Nzama (PhD): Meiofauna diversity as a monitoring tool for habitat quality in Algoa Bay and St Francis Bay.
3. Ms Nokwanda Hendricks (PhD): Occurrence of microplastics in the sediments of Algoa Bay and St Francis Bay.
4. Mr Muzi Cele (MSc): Bioaccumulation of metals in Mzingazi Lake, a relict coastal lake.

The following papers are expected to be published in 2025:

Manuscripts in preparation:

Cele M, Nsibande LR, Masikane NF. Preparation. Metal accumulation and biomarker responses in the bivalve Corbicula fluminalis of Mzingazi Lake, KwaZulu-Natal, South Africa. For *African Journal of Aquatic Science.*

Manuscripts submitted:

Hendricks N, Olatunji OS, Masikane N, Gumbi BP. Submitted. Identification and occurrence of microplastics in soft subtidal sediments of Algoa Bay and St Francis Bay, South Africa. For *Journal of Hazardous Materials*.

Manuscripts under review:

Gumede X, Masikane NF, Jonnalagadda S, Hendricks N, Mpungose P, Gumbi BP. 2025. Algoa Bay sediment metal distribution and potential ecological risk assessment. *Environmental Pollutants* 37: 2557996

5.5 - WSU – JML Rural Coastal Sustainability Laboratory: addressing challenges faced by rural communities, focusing on food security and climate change adaptation

Principal Investigator: Dr Thembinkosi Dlaza

The Joint Marine Laboratory at the WSU Zoology Department conducts research on aquaculture for food security. Research is also conducted on species taxonomy, reproduction, and physiology. The last component of the laboratory is research on tissue damage and stress response. The laboratory comprises the microscope section, temperature control rooms, a histology section and aquaculture tanks. Additionally, the laboratory has a vehicle and boat.

The JMLP provided funding for three (3) high resolution camera-fitted microscopes (i.e. dissecting, inverted and upright) which enable researchers to identify invertebrates and seaweeds to species level while

capturing evidence on camera. The JMLP also provided funding to purchase a Toyota land cruiser 4x4 double cab vehicle and boat for sampling in estuaries and coastal areas. Funds were also received to purchase histology equipment (semi-automatic microtome and embedding station), tissue drying stackable oven, a spectrophotometer, and centrifuge with interchangeable rotor chambers to enable us to perform tissue analysis studies. This has expanded the scope of research in the university such that lab-based simulation experimental studies can now be conducted instead of relying solely on field observations or depending on external laboratories.

In Q3, the laboratory embarked on taxonomic studies and marine science related community outreach programmes (See item 4.5.4 above). The community outreach programmes included a meeting with small-scale fishing cooperatives, community leaders, Blue Wild Coast, Eastern Cape Parks and Tourism Agency, and DFFE on co-management of marine resources at Dwesa-Cwebe MPA. The other community engagement programme was on Marine Awareness Campaign for scholars and community members at Mbotyi Village in Lusikisiki.

The laboratory currently supports 6 PhD, 5 MSc students and 11 honours students.

The laboratory has submitted manuscripts for publication in accredited journals. The taxonomic studies included fish, seaweed, and invertebrate identification:

1. Naledi Nkohla (PhD): Application of network visualization for limpet-algal interaction strength along the South African Wild Coast intertidal rocky shore habitats.
   Publications: Responding to corrections by reviewers on paper submitted to *African Journal of Marine Science* ID TAMS-2025-0014.
2. Naledi Nkohla (PhD): Habitat-and-site dependent variations on crustaceans associated to *Ecklonia radiata* holdfast along the South African Wild Coast.
   Manuscript submitted and currently under review in *Ecology and Evolution* Journal.
3. Aphiwe Lugongolo-Mpayipheli (graduated with MSc in September 2025 and is now registered for PhD): Landmark-based geometric morphometric analysis of brown mussel, *Perna perna* (Linnaeus, 1758), in South African bay and non-bay areas.
   Paper submitted and reviewed in Marine *Ecology* journal. Currently working on reviewer comments.
4. Bradley Cockman (MSc): Morphometric analysis of the gastric mill digestive machinery in Scylla serrata from Mgazana Estuary. Currently being developed into a manuscript for submission in January 2026.

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