

PASS NETZERO

Student Research Advancement Report

March 2026

REPORT OVERVIEW

Report Period	March 2026
Reporting Date	March 26, 2026
Universities	NUST Namibia • LUANAR Malawi
Active Students	5 (3 NUST Namibia, 2 LUANAR Malawi)
Programme Coordinator	Claude Martinet, President — Pass NetZero

PROGRAMME CONTEXT & COORDINATOR'S OVERVIEW

Pass NetZero's student research programme currently supports five Master's students across two African universities — three at the Namibia University of Science and Technology (NUST) and two at the Lilongwe University of Agriculture and Natural Resources (LUANAR) in Malawi. The programme focuses on aquatic plant-based carbon sequestration, phytoremediation, and water bioremediation, combining field research with local scholarships and publication pathways.

March 2026 marks a transition point for the programme: all five students now have formally approved research proposals, and the majority are entering or are about to enter active data collection. This report captures the status of each student as of end of March 2026, drawing on individual progress reports, the February 26 LUANAR group meeting, and the March 5 NUST group meeting.

Programme Highlights — March 2026

- All 5 research proposals formally approved. Ellen Kachulu's proposal (LUANAR) was the last to be approved, on 10 March 2026.
- University of Botswana research agreement signed, opening a sixth research site with Dr. Dikabo Mogopodi (PI) focused on the Okavango Delta.
- Namibian Police Special Reserves Division confirmed as a sampling partner for Goreangab Dam — a significant logistical and institutional milestone enabling representative water sampling by boat.
- Veruschka Dumeni's 3-month phytoremediation trial at Goreangab Dam commencing March 2026.
- Steven Chirwa's implementation phase beginning at Kauma Sewage Treatment Plant (Malawi), with full site approval granted.
- Documentary filming in progress (Takondwa Senzani); filming already started in Malawi.
- New volunteers onboarded in Malawi and Namibia for community outreach, fundraising, and social media.

Items Requiring Coordinator Attention

■ **HIGH — Hilia Hatutale (NUST):** Plant species procurement is blocked. Water hyacinth cannot be used (invasive species in Namibia) and *Cyperus papyrus* seedlings have died. A native replacement species with equivalent heavy metal uptake capacity must be identified and approved by the supervisor before experimental design can be finalised. Equipment delivery expected April. Overall timeline at risk without prompt resolution.

- **MEDIUM — Fenni Amadhila (NUST):** Research direction shift from biobrick to cement additive was flagged by Prof. Omoregie as a potential deviation from the approved MSc proposal. A raw data review with both supervisors is needed by end of March before further experimental steps. 28-day compressive strength results still pending.
- **MEDIUM — Steven Chirwa (LUANAR):** Dr. Gondwe recommended extending the study to a full year to capture seasonal variability. Steven should discuss feasibility with supervisors and PNZ — a timeline extension could affect scholarship planning, next advancement report scheduling, and the PhD proposal pathway.

NAMIBIA — NUST (Namibia University of Science and Technology)

1. Fenni Amadhila — Carbon Sequestration via Ulva Biomass & Cement Applications

Research Topic	Evaluating the potential of <i>Ulva</i> sp. for carbon capture and its application as a biomass additive in cement
Supervisor	Prof. Habauka M. Kwaambwa (NUST) Co-Supervisor: Prof. Edosa Omoregie
Institution	NUST, Namibia

Current Progress

Fenni has made significant experimental progress this month, completing two key workstreams:

- Biomass characterisation: FTIR (Fourier Transform Infrared Spectroscopy) analysis and CHNS elemental analysis completed to determine functional groups and carbon content of *Ulva* biomass.
- Cement substitution experiments: *Ulva* powder partially substituted for cement at varying percentages (up to 5%). Standard cube specimens prepared and cured under controlled conditions. Compressive strength tests conducted at 2-day and 7-day curing periods; 28-day results still pending.
- Preliminary findings: Low-percentage substitution maintains acceptable compressive strength values. Biomass source location, fineness, and elemental composition were found to influence cement strength.

Challenges

- Original biobrick approach abandoned due to high binder costs; research direction successfully pivoted to cement additive application.
- Cultivation experiment delayed: UNAM facility in Henties Bay visited (March 2) but seawater extraction system was non-operational. Fenni has since secured an alternative facility at the Ministry of Agriculture, Fisheries, Water and Land Reform in Swakopmund.

Next Steps

- Continue compressive strength tests at 28-day curing to assess long-term strength development.
- Initiate *Ulva* cultivation experiment at Swakopmund facility (Ministry of Agriculture).
- Explore compressive strength tests using crushed old building materials as sand replacement.
- Share raw data document with supervisors Prof. Kwaambwa and Prof. Omoregie by end of March.
- Send concrete block samples to Prof. Kwaambwa for testing on NUST's material strength instrument.

2. Veruschka Dumeni — Phytoremediation of Goreangab Dam

Research Topic	Phytoremediation capacity of <i>Typha capensis</i> , <i>Cyperus papyrus</i> , and <i>Vetiveria zizanioides</i> for pollutant and heavy metal removal from Goreangab Dam
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Supervisor	Prof. E. Omoregie (NUST)
Co-Supervisor	Prof. H. Kwaambwa (NUST)
Institution	NUST, Namibia

Current Progress

- All procurement finalised: drums, plant pots, analysis standards (COD and BOD) received; gas and equipment components secured.
- Floater structure: A working prototype using upcycled plastic bottles (instead of costly PVC pipes) successfully developed and tested. Design is light-coloured to minimise heat absorption and does not fully cover the drums, allowing evaporation and oxygen dissolution.
- Plants: Replacement shipment received after first delivery suffered ~80% mortality due to improper packaging. Plants transplanted and showing rapid growth; Vetiver species growth noted as particularly strong. Plants now being acclimatised to dam water.
- Sampling frequency adjusted: from weekly to bi-weekly over the 3-month trial period (reducing from 12 to 6 sampling events) to align with lab analysis capacity.
- Namibian Police collaboration confirmed: Lieutenant General and Chief Inspector granted formal approval for use of the Special Reserves Division boat for sampling. This is a key milestone enabling representative sampling away from the shoreline.
- Pre-trial dam profiling and bulk water sampling planned for early March; experimental set-up at secured yard (~250m from dam access) in second week of March.
- Chapters 1 and 2 write-up ongoing.

Challenges

- Delays in end-of-2025 procurement carried into January 2026.
- Delays in delivery of analysis standards and equipment repairs; timeline now also dependent on Namibian Police schedule.

Next Steps

- Pre-trial sampling and dam water profiling (first week of March).
- Full experimental set-up and commencement of 3-month phytoremediation trial (second week of March).
- Film Namibian Police team during sampling for social media and Pass NetZero website content.

Preliminary Baseline Note (end of March): Pre-trial physicochemical characterisation of Goreangab Dam and the Gammams Wastewater Treatment Plant primary effluent has been completed for in-situ parameters (DO, pH, turbidity, conductivity, TSS, salinity). Both source waters show severely impaired conditions across most parameters, confirming the sites are appropriate for the study and validating the three-treatment experimental design. The treatment gradient from dam water to primary effluent is physically confirmed. Chemical analyses (TN, TP, COD, heavy metals) are pending — the ICP machine is under maintenance and TN/TP samples are in the analysis queue. Full baseline data will be incorporated into the T0 reference matrix before trial removal efficiency calculations are performed.

3. Hilia N. Hatutale — Heavy Metal Phytoremediation via Native Aquatic Plants

Research Topic	Evaluating the potential of <i>Cyperus papyrus</i> in heavy metal removal from wastewater: A comparative study of native plants for phytoremediation and wastewater treatment
Supervisor	Prof. Habauka M. Kwaambwa (NUST)
Co-Supervisor	Prof. Edosa Omoregie (NUST)
Institution	NUST, Namibia

Current Progress

- Experimental equipment procured and paid for.
- Compiling write-up for the documentary interview with Takondwa Senzani (project film crew).
- Preparing presentation for next group meeting to update on research progress.
- Catching up with backlogged academic work.

Challenges

- Work overload causing a decline in research pace and availability for meetings — scheduling conflicts with group meeting time slots.
- *Cyperus papyrus* seedlings drying up and dying; transport to source plants from a farm in Otjiwarongo has been difficult to arrange.
- Water hyacinth (originally planned) cannot be used as it is classified as an invasive species in Namibia. A native alternative with equivalent heavy metal removal capacity needs to be identified and approved by the supervisor.
- Supply delays and untimely supplier feedback regarding availability of desired species.

Next Steps

- Await April for delivery and installation of experimental equipment.
- Successfully procure *Cyperus papyrus*.
- Propose replacement native plant species to supervisor and obtain approval.
- Adjust Standard Operating Procedure (SOP) and submit to supervisor.
- Design experimental technique to successfully spike wastewater with heavy metals Ni, Cd, and Pb.
- Film experimental trial with TK for the Pass NetZero website.
- Use school holiday period to catch up on academic work.
- Commence testing phase once equipment is installed and plant procurement is resolved.

■ **Coordinator's Note:** *Hilia's situation requires attention. The combination of work overload, plant procurement failures (water hyacinth ban, *Cyperus* die-off), and equipment delays puts her timeline at risk. The invasive species issue in particular requires an action: a native species with equivalent Cd/Pb/Zn uptake profile must be agreed with the supervisor before experimental design can be finalised. A one-on-one check-in before the next group meeting is recommended.*

MALAWI — LUANAR (Lilongwe University of Agriculture and Natural Resources)

4. Steven Chirwa — Wastewater Treatment and Carbon Sequestration via Macrophytes

Research Topic	The role of <i>Phragmites australis</i> and <i>Typha latifolia</i> in wastewater treatment and carbon sequestration
Supervisor(s)	Dr A. Mtethiwa Prof J. Kang'ombe (LUANAR)
Study Site	Kauma Sewage Treatment Plant, Malawi

Current Progress

- Research proposal formally approved by LUANAR (Faculty of Natural Resources, Department of Aquaculture and Fisheries Sciences) as of February 2026.
- 8 m × 6 m microphyte plot established and fully matured for experimental use.

- Market survey completed; all experimental units and research equipment procured and secured.
- Official permission to conduct research at Kauma Sewage Treatment Plant granted.
- Project fully ready for transition to implementation phase.

Next Steps (February 28 – April 2026)

- Commence full experimental implementation at Kauma Sewage Treatment Plant.
- Begin systematic data collection covering plant efficiency in wastewater treatment and carbon sequestration.
- Engage continuously with supervisors throughout implementation to ensure methodological rigour.
- Monitor environmental and operational conditions at the treatment plant.

Note: Dr M. Gondwe recommended extending the study to a year-round format to capture seasonal variability in nutrient uptake and plant productivity. Steven will assess feasibility of this adjustment.

5. Ellen Christabel Kachulu — Spirulina Carbon Sequestration & Fish Growth Performance

Research Topic	Efficacy of <i>Spirulina</i> (<i>Arthrospira platensis</i>) in carbon sequestration and growth performance of <i>Oreochromis shiranus</i>
Supervisor(s)	Dr A. Mtethiwa Prof J. Kang'ombe (LUANAR)
Study Site	Bunda Fish Farm, Lilongwe, Malawi (8-week trial)

Current Progress

- Research proposal approved by LUANAR on 10 March 2026 (Aquaculture and Fisheries Sciences Department).
- Approved methodology addresses carbon sequestration under open culture systems in Malawian climatic conditions — a previously unquantified area. Dual focus on carbon capture and fish growth (*Oreochromis shiranus*) addresses a gap in the integration of biological carbon capture with aquaculture outcomes.
- Ellen visited Bunda Fish Farm to source experimental units and identify study location (reported in February meeting).
- Experimental set-up underway.

Key Methodological Points

- **Spirulina culture:** *Arthrospira platensis* will be cultured in a greenhouse using aquaculture effluent + sodium bicarbonate, at 30–35°C and pH 9–10.5, scaled up in Zarrouk's medium.
- **Carbon sequestration experiment:** 3 mixing frequency treatments (no mixing, every 24h, every 12h), 3 replicates each (9 tanks), run over 14 days.
- **Fish growth experiment:** 3 dietary treatments (0%, 15%, 30% *Spirulina* inclusion), 3 replicates, 15 *O. shiranus* fingerlings per tank, run over 3 months.
- **Water quality monitoring:** twice daily on-site (temperature, pH, DO); lab analysis (ammonia, phosphorus) at 2-week intervals.

Next Steps

- Complete experimental set-up at Bunda Fish Farm.
- Commence *Spirulina* culture and carbon sequestration phase.
- Begin fish growth performance experiment.

FUNDING & COMMUNICATIONS

Volunteer Recruitment

A new recruitment drive was conducted this month and went well. Eight new volunteers were interviewed and are joining the PNZ team across Namibia and Malawi. They are currently in an onboarding phase — learning about the organisation, its mission, and the research work — before becoming fully operational in their outreach, fundraising, and social media roles.

Social Media & Communications

- Social media posting has resumed after a period of reduced activity.
- The project documentary film has started production. Filming began in Malawi and is scheduled to continue in Namibia between March 27 and April 6, 2026.
- Communication and fundraising efforts are expected to become significantly easier once the short film is released, as it will provide a compelling narrative tool for donor outreach and public engagement.

Fundraising

Fundraising efforts have resumed but remain challenging at this stage. The current period is one of groundwork — building the volunteer base, generating content, and moving students into active field phases — all of which will underpin stronger fundraising from Q2 2026 onward. The release of the documentary short film is anticipated to be a key inflection point.

Next Funding Priorities

- UNDP SGP OP8 applications (Namibia and Malawi) — concept papers in preparation.
- Corporate/mining sector outreach — LOI template prepared; ESG and phytomining framing.
- CIEIF grant — bookmarked for ~2027 once Phase 3 pilot is operational.

SUMMARY & PROGRAMME STATUS

Student	University	Status	Key March Milestone
Fenni Amadhila	NUST Namibia	✓ Active	Cement experiments underway; cultivation pivot to Swakopmund
Veruschka Dumeni	NUST Namibia	✓ Active	Experimental set-up commencing; Police boat approved
Hilia N. Hatutale	NUST Namibia	■ At Risk	Plant procurement blocked (invasive species issue); equipment delivery April
Steven Chirwa	LUANAR Malawi	✓ Active	Proposal approved; implementation commencing at Kauma STP
Ellen Kachulu	LUANAR Malawi	✓ Active	Proposal approved 10 March; experimental set-up underway

Programme Notes

- Two new research meetings held in February and March: LUANAR (Feb 26) and NUST (Mar 5), with supervisors Prof. Kwaambwa, Prof. Omoregie, Dr. Mogopodi (UB), Dr. Gondwe, and new volunteers.
- University of Botswana research agreement signed — research at UB can now commence (Dr. Dikabo Mogopodi, PI).

- 8 new volunteers recruited and onboarded across Malawi and Namibia for outreach, fundraising, and social media.
- Documentary filming underway: Malawi already filmed; Namibia scheduled March 27 – April 6, 2026.
- Veruschka (NUST): interim baseline water quality profile available for non-heavy-metal parameters; full heavy metal baseline pending ICP machine maintenance.

Disclaimer: *This report was generated entirely by artificial intelligence (Claude, Anthropic) on the basis of student progress reports and group meeting recordings. Content has been reviewed and approved for release by the Pass NetZero programme coordinator. Source documents are retained on file.*