ECOSYSTEM HEALTH STATUS AND BIODIVERSITY MONITORING OF WALVIS BAY LAGOON

WORLD PORTS SUSTAINABILITY PROGRAM

THEME: ENVIRONMENTAL CARE

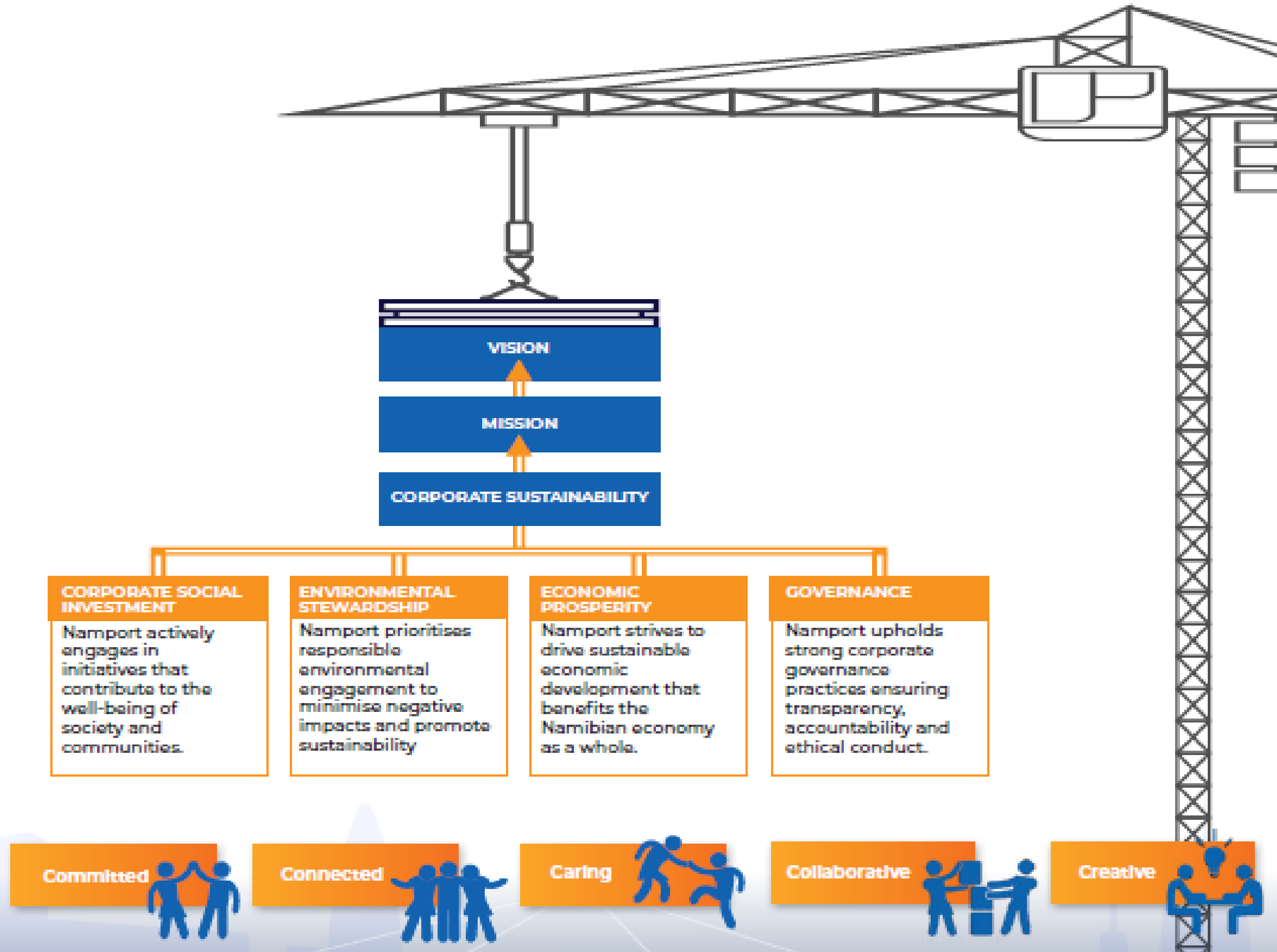
NAMIBIAN PORTS AUTHORITY

NAMPORT AT A GLANCE

PORT OF WALVIS BAY

- 13 Commercial berths including **New Container Terminal** & **Tanker Jetty**
- Syncrolift ship repair facility
- Passenger vessel berth
- Informal Waterfront
- Bulk terminal (private)
- Cold storage (private)
- Floating dock ship repair facility (Namdock)
- Dry Port Facilities (Zambia, Zimbabwe, Botswana and DRC)

OUR APPROACH TO SUSTAINABILITY

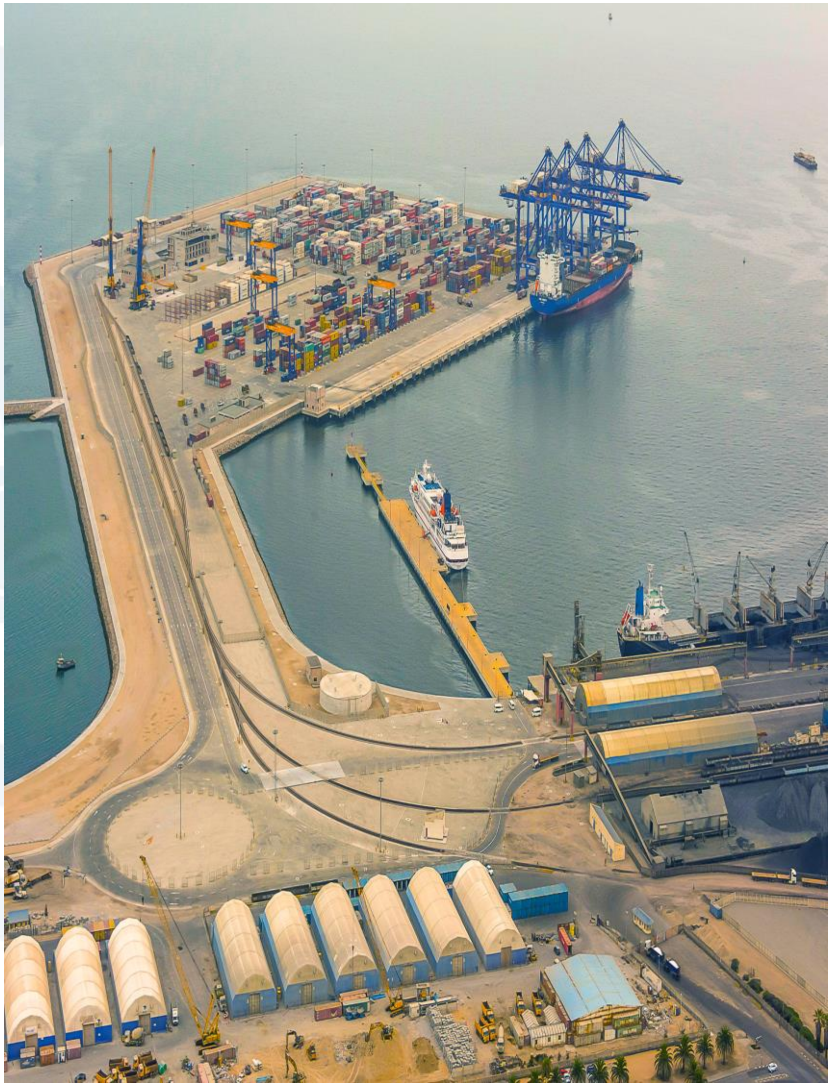


ESG & Sustainability Policy : framework for realising Namport's commitment to creating a sustainable organisation.

Implementation Plan: Initiatives to be implemented under each sustainability Pillar.

OUTLINE

- INTRODUCTION
- PROJECT OBJECTIVES
- STUDY AREA AND METHODOLOGY
- EXPECTED OUTCOMES
- IMPLEMENTATION PLAN AND CONCLUSION



1. INTRODUCTION

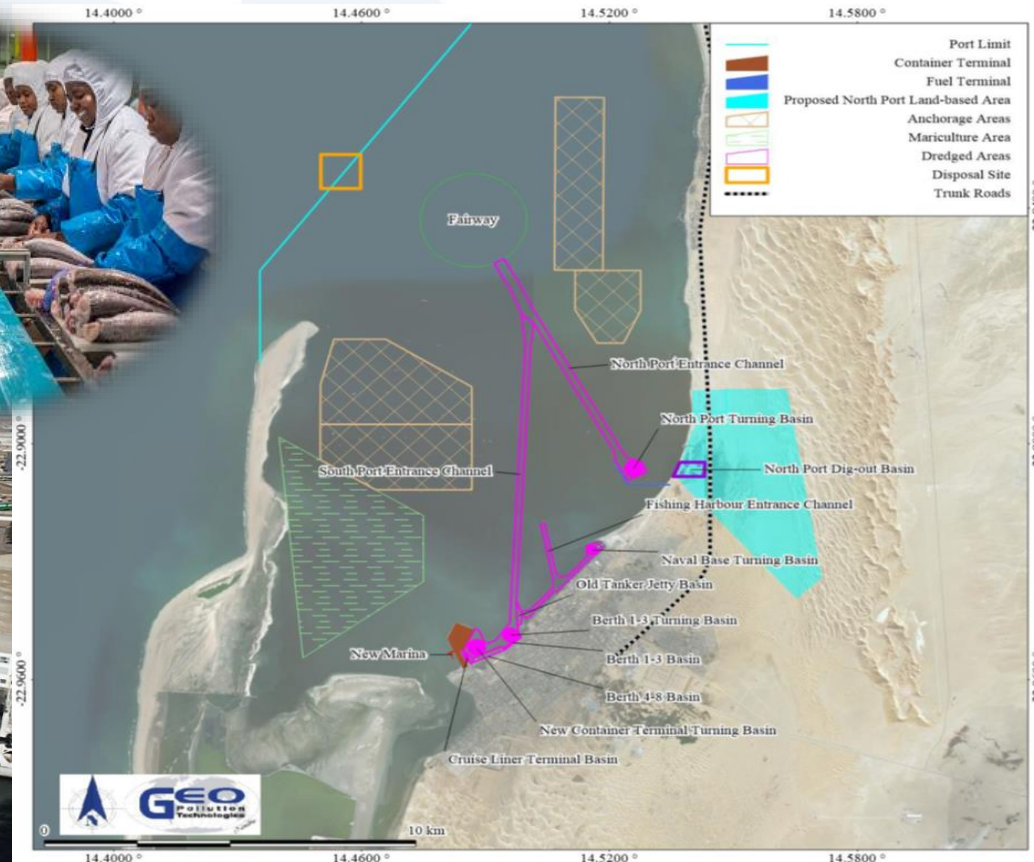
- The **Walvis Bay Lagoon (WBL)** is a Ramsar-designated wetland recognized by UNESCO for its ecological significance.
- The lagoon supports a wide range of marine biodiversity and provides socio-economic value through tourism, fishing, and recreational activities.
- Increasing threats include:
  - Shipping operations and ship repair activities in the Bay Area;
  - Urban development (Walvis Bay town) and increasing population;
  - Fish processing facilities.

WALVIS BAY LAGOON – RAMSAR SITE

SHARED SPACES

The Port of Walvis Bay consists of various shared spaces by Industry:

- The Commercial Port (South Port, North Port), including Dry Ports for Botswana, Zambia and Zimbabwe
- Fishing Harbour
- Active Mariculture Areas
- Waterfront Area
- Residential Developments



1.1 NAMPORT'S ENVIRONMENTAL COMMITMENT

- Namport embraces environmental stewardship as part of its **ESG & Sustainability Strategy**.
- The lagoon's proximity to port operations necessitates a balance between development and ecological protection.
- In partnership with the **University of Namibia (UNAM)**, a three-year ecosystem health study was launched (2025–2027) to monitor and create capacity for ecological studies.
- **Investment: N$3.7 million**
- Focus: Monitoring the **physical**, **chemical**, and **biological integrity** of the lagoon ecosystem.

COLLABORATION: MOU WITH UNAM

Collaborating for sustainable partnerships

2. PROJECT OBJECTIVES

- Establish a long-term ecosystem monitoring program.
- Analyze interactions between human activities and natural processes.
- Support Ramsar Convention goals by maintaining ecological character.

Specific Objectives:

- Measure water and sediment quality.
- Assess bathymetric and sedimentological dynamics.
- Monitor biodiversity across trophic levels.
- Track beach morphology and carbon storage.
- Evaluate existing conservation and management practices.

VISUALS

3. METHODS

3.1 Study Area

- **Walvis Bay Lagoon** is a semi-enclosed coastal water body with limited seawater exchange.
- Approximately **7 km long** and up to **2.5 m deep at high tide.**
- Features:
  - **Sandy tidal shores** in the west
  - **Subtidal waters** near the southern harbour.

Walvis Bay Lagoon

METHODS Cont...

3.2 Sampling and Data Analysis

❑ **Water Quality**

- Collect water samples at set depths and locations across Walvis Bay Lagoon
- In situ measurements: temperature, salinity, pH, conductivity, DO
- Lab analysis: nutrients, organic matter, trace metals

❑ **Bathymetry**

- Seabed elevation surveys (2018, 2023, upcoming 2025/26) to monitor changes in seabed levels which may be influenced by siltation patterns.
- Tracks sediment deposition and erosion patterns

❑ **Sediment Assessment**

- Sampling using cores and surface grabs
- Grain size analysis using sieving and particle-size analyzers

METHODS Cont...

3.3 Advanced Monitoring Techniques

❑ Flow & Discharge

- Flow meters and water loggers will be installed
- Analyzed via hydrological modelling

❑ Fish Nursery Studies

- Larval and juvenile fish collection
- Otolith aging and growth analysis

❑ Turbidity

- Turbidity meters at lagoon entrance
- Data Analysis Correlated with tides and weather

❑ Biodiversity

- Biological sampling: plankton, plants, fish, birds will be collected
- eDNA analyses to identify changes in community compositions
- Stable isotope analyses to examine ecological linkages

METHODS Cont...

3.4 Additional Assessments

❑ Beach Profile Monitoring

- GPS surveys to map erosion/accretion trends

❑ Carbon Sequestration

- Dissolved Organic Carbon (DOC) and Dissolved Inorganic Carbon (DIC) levels measured in water/sediments
- Stable isotope (delta13C) tracing

❑ Conservation Practice Review

- Stakeholder interviews and community surveys will be conducted
- Policy analysis against Ramsar Convention obligations

4. EXPECTED OUTCOMES

- **Establishment of a long-term monitoring database** on key ecosystem indicators.
- **Scientific publications** and **conclusions** on the health of the Walvis Bay Lagoon ecosystem.

Key Indicators & Insights:

1. **Water Quality (Physical & Chemical):** Pollution stress and ecological suitability
2. **Bathymetric Changes**: Siltation or erosion trends
3. **Sediment**: Runoff indicators and habitat impacts
4. **Flow & Discharge Patterns**: Effects on nutrient cycling
5. **Turbidity**: Light limitation and ecological consequences

EXPECTED OUTCOMES Cont…

6. Biodiversity: Health and resilience of communities

7. Nursery Role: Indicator of commercial fish reproduction

8. Beach Erosion: Stability of shoreline habitats

9. Carbon Sequestration: Climate mitigation capacity

10. Temporal Trends: Community response to change

11. Management Practices: Compliance with Ramsar and sustainability principles

5. IMPLEMENTED SCHEDULES AND TIMELINES

ACTIVITY	KEY PERFORMANCE INDICATOR	2025				2026				2027			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Project Planning	Proposal												
2. Revised Terms of References and signing of the MOU	Signed Memorandum of Understanding												
3. Project Inception: Approval Project Implementation Plan	Inception Report												
4. Project implementation	Quarterly reports and Annual reports												
5. Project finalization and Final report	Final Report												

6. CONCLUSION

- This project will enable Namport to:

  - Fulfill **Ramsar** and **global sustainability** obligations;

  - Preserve a **vital natural asset** for the local community;

  - Contribute to **climate resilience** and **biodiversity protection**.

- Ensuring the Walvis Bay Lagoon remains a thriving ecosystem is integral to Namibia’s **environmental, social, and economic** future**.**

THANK YOU!

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