TANZANIA

AQUACULTURE DEVELOPMENT INITIATIVE

Concept Note

LONGLINE ENVIRONMENT

June 2025

INTRODUCTORY NOTE

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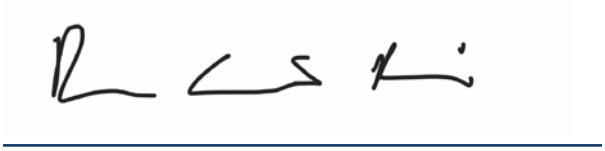

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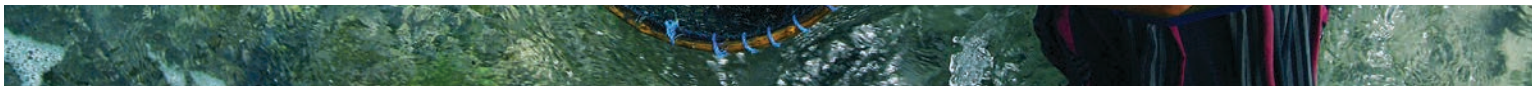
TABLE OF CONTENTS

OVERVIEW



The United Republic of Tanzania presents considerable potential for sustainable aquaculture development by implementing comprehensive spatial governance mechanisms and sector assessment frameworks. This concept note outlines a systematic approach to sector optimisation through evidence-based spatial planning, regulatory framework enhancement, and stakeholder capacity development.

This initiative proposes two integrated workstreams designed to address critical knowledge gaps in Tanzania's aquaculture sector:

Workstream 1 - Aquaculture Readiness Assessment. A comprehensive evaluation of Tanzania's aquaculture sector readiness across seven key components: seed, feed, investment climate, human capital, markets, law and policy, and regulatory frameworks.

Workstream 2 - Coastal Aquaculture Atlas. A geospatial assessment of Tanzania's coastline for seaweed and sea cucumber farming, incorporating environmental parameters, infrastructure accessibility, and spatial constraints to identify optimal production zones for integration into the larger marine spatial planning initiative.

OR

Workstream 3 - Inland Aquaculture Atlas. A comprehensive spatial analysis of Lake Victoria's suitability for tilapia cage culture systems, updating previous assessments to account for climate impacts and evolving farming activities.

The proposed intervention will establish the foundation for sustainable aquaculture expansion while ensuring environmental stewardship and socio-economic benefit optimisation. Results will be integrated into the Tanzania Aquaculture Atlas, an online governance platform designed to support regulatory, commercial, and development missions across the sector.

SECTOR OVERVIEW AND STATUS

Marine Aquaculture Systems

Tanzania's marine aquaculture sector is dominated by seaweed farming, particularly Eucheuma and Kappaphycus species. Smaller-scale operations produce milkfish (Chanos chanos), silver pompano (Trachinotus blochii), and various invertebrates, including sea cucumbers.

Geographic range

Seaweed mariculture is primarily found in Zanzibar but has expanded to the mainland's Tanga, Lindi, and Mtwara regions.

Sector significance

- Employs over 30,000 direct beneficiaries, with 80% female participation
- Represents a critical livelihood source for rural coastal women
- Key sector for developing small-scale aquaculture holders

Critical Challenges

- Dramatic production decline from 7,000 tonnes (2001) to 450 tonnes (2024)
- Rising sea temperatures are increasing disease prevalence and reducing growth rates
- Competition from coastal tourism is attracting youth labour away from aquaculture
- Weak value chain development with limited domestic demand
- Declining export prices due to Far East market dominance

Inland Aquaculture Systems

Freshwater aquaculture in Tanzania is widespread but underdeveloped, with substantial growth potential mostly in the Lake territories. Primarily consisting of small-scale pond systems cultivating 90% Nile tilapia (Oreochromis niloticus) and 9% African catfish (Clarias spp.), emerging cage culture systems in Tanzanian Lake Victoria, Lake Tanganyika, and potentially Lake Nyasa demonstrate potential for sector expansion.

Geographic range

Tilapia aquaculture in Lake Victoria.

Sector significance

- Annual fish harvest of 376,000 tonnes nationally (wild and farmed)
- Aquaculture contributes 10,000 tonnes (3%) to national production
- Large-scale operations produce 95% of aquaculture volume
- Over 20,000 semi-intensive earthen ponds dominate employment and spatial footprint
- Local agricultural byproducts constitute primary feed sources

Critical Challenges

- Limited commercialisation with production concentrated among a few operators
- Lack of species diversification (two genera comprise 99% of production)
- Scarcity and high cost of quality feeds and fingerlings

WORKSTREAM 1: AQUACULTURE READINESS ASSESSMENT

Objective

Conduct a comprehensive evaluation of Tanzania's aquaculture sector readiness to attract investment, support sustainable growth, and optimise performance across marine and inland systems.

Methodology

Conduct a comprehensive evaluation of Tanzania's aquaculture sector readiness using the Longline Aquaculture Readiness Index to attract investment, support sustainable growth, and optimise performance across marine and inland systems.

Figure 1: The Aquaculture Readiness Index.

- **Seed Production:** Evaluates availability, quality, and pricing of production inputs for target species
- **Feed Systems:** Assesses formulated feed availability, affordability, and supply chain reliability
- **Investment Climate:** Analyses conditions for attracting private sector investment and development finance
- **Human Capital:** Reviews the availability of skilled professionals in farm management and aquaculture practices
- **Market Access:** Examines domestic and international market conditions, demand elasticity, and value chain development
- **Legal Framework:** Assesses government statutes, guidelines, and policy coherence affecting sector development
- **Regulatory Environment:** Evaluates the scientific basis of regulations and alignment with industry best practices

Deliverable Impacts

- **Investment opportunity identification and prioritisation framework for scaling**
- **Resource allocation guidance for stakeholders and development partners**
- **Human capital development recommendations**
- **Policy reform priorities and implementation roadmap**
- **Sector intervention impact maximisation strategies**

WORKSTREAM 2: COASTAL AQUACULTURE ATLAS

Objective

Develop comprehensive spatial suitability maps for seaweed and sea cucumber farming along Tanzania's coastline, incorporating environmental, infrastructure, and socio-economic parameters.

Methodology

Multi-criteria geospatial analysis utilising satellite imagery, remote sensing, oceanographic data, environmental parameters, and socioeconomic factors, including:

- **Environmental factors:** Water temperature, salinity, depth, wave exposure, current patterns
- **Infrastructure access:** Proximity to ports, processing facilities, transportation networks, friction models, cellular connectivity
- **Spatial constraints:** Marine protected areas, shipping lanes, tourism zones, fishing grounds
- **Socio-economic considerations:** Community presence, existing aquaculture activities, market access
- **Aquaculture farm registry:** Machine learning detection of all seaweed farms with analytics

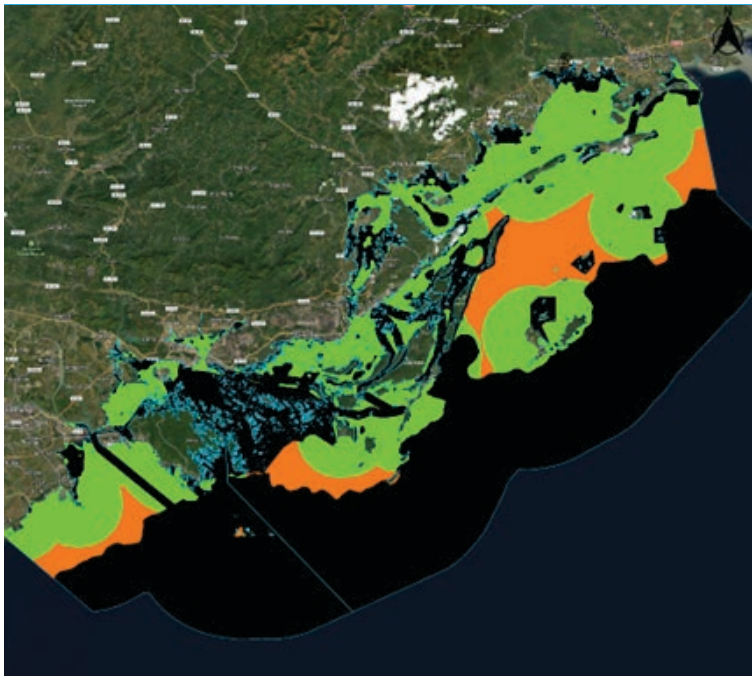


Figure 2: Screenshot of seaweed site suitability maps for northern Vietnam.

Target species selection will be determined through stakeholder consultations, with suitability models developed using established multi-criteria decision analysis frameworks. Analysis will incorporate climate change projections to ensure the long-term viability of identified sites.

Deliverable Impacts

- High-resolution suitability maps for priority seaweed and sea cucumber species
- Scalable site ranking and prioritisation framework for development planning
- Environmental constraint mapping and zoning recommendations
- Infrastructure development guidance for optimal site utilisation
- Climate adaptation considerations for site selection

WORKSTREAM 3: INLAND AQUACULTURE ATLAS

Objective

Review the existing spatial analysis of Lake Victoria's Tanzanian waters and analyse potential improvement opportunities to identify optimal sites for tilapia cage culture systems, carrying capacity for licensing and zonal management recommendations.

Methodology

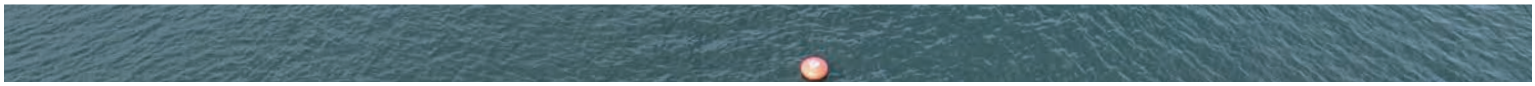
Multi-criteria geospatial analysis utilising satellite imagery, remote sensing, oceanographic data, environmental parameters, and socioeconomic factors, including:

- **Water Quality Parameters:** Temperature, dissolved oxygen, pH, turbidity, nutrient levels
- **Physical Characteristics:** Depth profiles, wave exposure, bottom composition, thermal stratification
- **Infrastructure Connectivity:** Access to roads, processing facilities, input suppliers, markets
- **Environmental Constraints:** Protected areas, critical habitats, existing fishing grounds
- **Conflict Avoidance:** Analysis will utilise updated bathymetric data, water quality monitoring records, and climate impact assessments to ensure site recommendations reflect current lake conditions.
- **Aquaculture farm registry:** Machine learning detection of all cage farming units with analytics

Deliverable Impacts

- Cloud application as a public good and management tool for public and private stakeholders
- Detailed suitability maps with site-specific recommendations
- Optimal stocking density and production capacity assessments
- Environmental impact mitigation strategies
- Infrastructure development priorities for selected sites
- Regulatory framework recommendations for cage culture licensing

TANZANIA AQUACULTURE ATLAS



All workstream results will be integrated into the Tanzania Aquaculture Atlas, a cloud-based geospatial platform designed to serve as the primary reference tool for sector stakeholders. The Atlas will provide:

Core Functionality

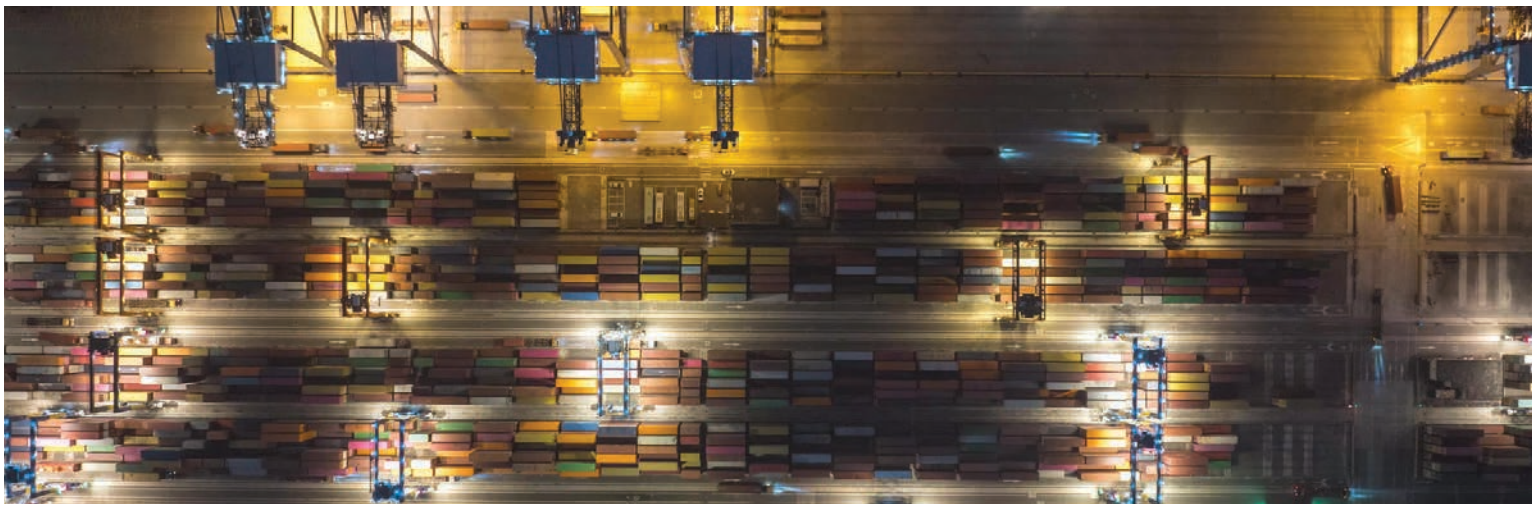
- Interactive mapping interface with layered datasets from all workstreams
- User-friendly access to suitability analyses and readiness assessment results
- Integration capability with existing government databases and planning systems
- Mobile-responsive design

Stakeholder Benefits

- **Government:** Evidence-based licensing and regulatory decision support
- **Investors:** Transparent access to site suitability and sector readiness information
- **Farmers:** Site selection guidance and production planning tools
- **Researchers:** Comprehensive dataset access for continued analysis and monitoring

Technical Specifications

- Cloud-hosted with 99.9% uptime guarantee
- Multi-language support (English, Swahili)
- Graduated access levels for different user categories
- Regular data updating capability through dedicated backend interface



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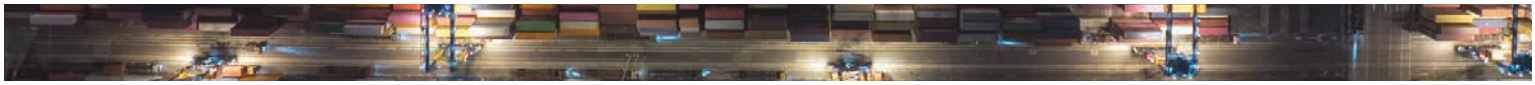

Activity	Details	Time Period
Data scoping virtual meeting	Longline employees meet Ministry of Livestock and Fisheries virtually to ascertain the current farming practice standards and availability of sector data gaps.	July, 2025
Deliverable 1	Aquaculture Readiness Report including Site Suitability	August 2025
Deliverables 2, 3, and 4	Process any feedback on reported results, carrying capacity or registry, and generate site suitability layers to be released on the Tanzania Aquaculture Atlas platform.	August 2025
Training Workshop and official handover of Atlas, including user guides	Longline travels to Dar es Salaam for the official presentation and handover of the Atlas platform, then trains personnel on using both the platform and GeoStore, the program used to update the Atlas.	September 2025

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