Regional Suitability Assessment for Marine Cage Culture of Canary Drum (*Umbrina canariensis*) Along the Angolan Coastline

GRO · FTP Fisheries Training Programme

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INTRODUCTION

Mariculture is increasingly becoming one of the most promising activities for sustainable food production, especially in a world facing growing challenges related to overfishing and the decline of natural marine stocks (Damásio, 2020).

Angola has significant potential for both inland aquaculture and mariculture. However, despite this potential, there is currently no marine aquaculture in the country.

Government policies aim to boost fish production by promoting the cultivation of marine species of high commercial value. This strategy is outlined in several policy frameworks, including the Aquatic Biological Resources Law (LRBA, 6A/04 of 8 October).

Cultivating marine species such as *Umbrina canariensis*, one of the target species for sea cage farming in Angolan waters due to its high demand for national consumption and strong commercial value for export, represents a significant opportunity to diversify the fisheries sector and increase marine food production.

GOAL

The goal of this study is to analyze variations in water quality parameters such as temperature, salinity and oxygen across three different regions in order to identify the most suitable sites for sea cage farming of *Umbrina canariensis* in Angola

OBJECTIVES

The study will focus on the following objectives:

(a) To compare the water quality across three different regions;

(b) To investigate the effects of seasonal changes in water quality parameters and oceanographic conditions on fish farming

METHODOLOGY

- CTD data were collected by the Norwegian research vessel *Dr. Fridtjof Nansen.*
- A Seabird 911+ CTD probe was used for vertical profiles of temperature, salinity and dissolved oxygen.
- A Chelsea Mk III Aquatracka fluorometer was used to measure chlorophyll-a concentrations.

Study area

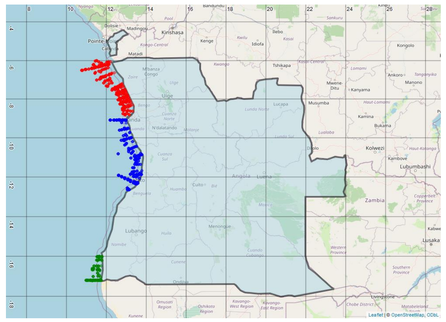

Figure 1: Map showing the study area along the Angolan monitoring lines, including the Southern Region (green dots), Central Region (blue dots) and Northern Region (red dots).

Data Analysis

- The horizontal and vertical distribution of environmental parameters was analyzed using R program to compare the sea surface temperature, salinity, oxygen and fluorescence across the three regions during different seasons.
- The present study focused on three key water quality parameters: **temperature**, **salinity**, **oxygen** and **fluorescence**.

Table 1. Tolerance ranges of water quality parameters for Umbrina canariensis.

Water Quality Parameter	Tolerance for Sciaenidae	Tolerance for Umbrina canariensis	References
Temperature	18°C - 28°C	18°C - 28°C	(Bianchi, 2018), (Haedrich, 1983)
Salinity	15-40 psu (preferably around 35 psu)	15-40 psu, optimal around 35 psu	(Haedrich, 1983), (Walker, 1990)
Dissolved Oxygen	>4-5 mg/L (higher levels are optimal)	>4-5 mg/L (optimal for health)	(Popper, 2011)
pH	7.5 - 8.5	7.5 - 8.5	(Walker, 1990)
Turbidity	Tolerates moderate turbidity, sensitive to high turbidity	Tolerates moderate turbidity, sensitive to high	(Ricker, 1969)
Ammonia (NH_3)	<0.02 mg/L of un-ionized ammonia	<0.02 mg/L of un-ionized ammonia	(Rombough, 2004)
Chlorine and chloramine	Sensitive	Highly sensitive	(Faust, 2003)
Nitrogen Compounds (NO_3, NO_2)	Sensitive	Sensitive	(Rombough, 2004)

RESULTS

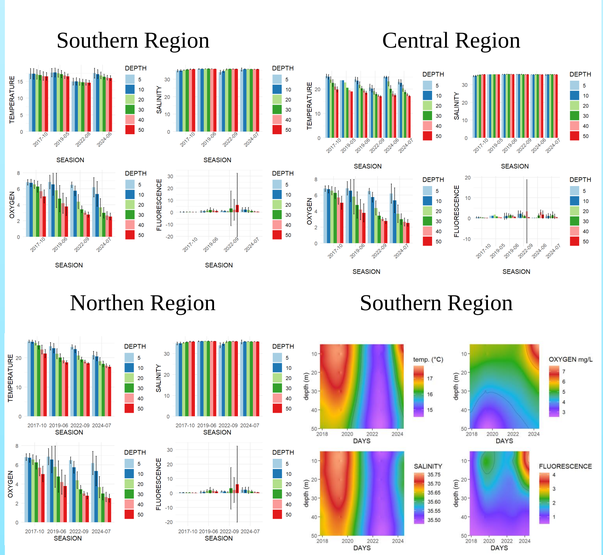

Figure 2: Variation in water quality parameters along Angolan Coastline.

Table 2 Suitability Rating.

Region	Temperature (°C)	Salinity (psu)	Oxygen (mg/L)	Fluorescence (µg/L)	Suitability Rating
Northern Region	16.94-25.57	34.01-35.98	2.51-6.80	0.13-6.07	**High** (All parameters within ideal range up to 30 meters depth.)
Central Region	17.04-25.44	34.86-35.92	1.97-6.98	0.10-3.39	**Medium** (Temperature slightly low in cold cold season , but other factors are good up to 30 meters depths.)
Southern Region	14.58-17.67	35.49-35.75	2.55 -7.49	0.50-4.10	**Low** (Temperature outside the ideal range and High flutuations in the oxygen level).

CONCLUSION

Based on the comparative analysis of the three coastal regions in Angola, the Northern and Central regions are recommended for sea cage farming of Canary drum *(Umbrina canariensis)*, as they exhibit more favorable environmental conditions such as stable water temperatures, appropriate salinity and adequate oxygen levels. These factors are critical for the health, growth, and overall welfare of the species. Selecting sites that meet these criteria can significantly improve farm productivity and sustainability.

RECOMMENDATIONS

- Comprehensive environmental impact assessments should be conducted prior to the establishment of aquaculture operations. These assessments should include all the criteria outlined in this study to identify potential ecological risks and inform mitigation strategies, thereby supporting environmental sustainability.
- Establishing monitoring programs to track environmental parameters and fish health is crucial. Such programs enable adaptive management, allowing for timely responses to environmental changes and ensuring the resilience of aquaculture operations. Implementing these recommendations will contribute to the responsible and sustainable development of sea cage farming for *Umbrina canariensis* in Angola.
- Prompt action should be taken to undertake a **fishery-independent survey** for a robust stock assessment.
- Once a comprehensive assessment is completed, **management strategies should be redefined** accordingly.

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