ENVIRONMENTAL SENSITIVITY ATLAS FOR THE COASTAL AREA OF GHANA

VOLUME I: DISTRIBUTION OF ENVIRONMENTAL SENSITIVITY

DECEMBER 2020

FOREWORD

The coastal zone of Ghana, consisting of the sea, the coast (which is about 550 km long), and the adjacent land up to 30m contour, is very important for the people of Ghana and for the economy of the country. Though the coastal area represents only approximately 6.5% of the total area of the country, it houses around 25 % of the population. For instance, high population densities (>500 inhabitants/km^2) are present in the Accra – Tema area, Cape Coast and Sekondi-Takoradi areas. The main economic activities in the coastal zone are oil and gas extraction, fishing, salt production, tourism, farming, and manufacturing. However, this unique and important area is vulnerable to any potential crude oil spill.

The threat from crude oil activities to the coastal zone of Ghana was long realized by Ghanaians in the 1980's. As such in 1986, the country through the assistance of the International Maritime Organisation (IMO), developed a National Oil Spill Contingency Plan (NOSCP) and a paper-based environmental sensitivity atlas (ESA) as a decision-support tool for the NOSCP. In 2004, the Environmental Protection Agency through the support of the Embassy of Denmark and UNOPS, developed a Geographic Information System (GIS)-based ESA for the entire coastline. The discovery of the Jubilee Field, in 2007 with its attendant oil production since 2010, additional discovery and production of Tweneboa-Enyera-Ntomme (TEN) Field and Sankofa-Gye Nyame Field, increased the potential threat of an oil spill to the coastal zone. These later developments hence called for the update of the 2004 environmental sensitivity atlas. The 2020 ESA development is a response to that call.

In the 2020 ESA, the environmental assets (such as important species, both threatened and endemic, habitats, and protected areas) and the socio-economic assets (such as cultural, fisheries, industry, ports, tourism) have been accounted for.

There are many uses to which the sensitivity maps can be put to, ranging from strategic planning at national level to informing a contingency plan for oil spill response within an area. The Agency envisages that the atlas will inform governmental and private sector spatial planning of targeted response strategies that improve the effectiveness of response operations aimed at minimising negative impacts caused by accidental events.

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INTRODUCTION

Ghana lies within longitudes 3° 5' W and 1° 10' E and latitudes 4° 35' N and 11°N in West Africa. It covers an area of about 239,000 km. The country is bordered by Togo to the East, Côte D'Ivoire to the West, Burkina Faso to the North and at the south by the Gulf of Guinea.

The coastal area and the sea are very important for the people of Ghana and for the economy of the country. The country's coastline is about 550 km long with the coastal zone representing only approximately 6.5% of the total area of the country. It however houses around 25 % of the population. High population densities (>500 inhabitants/km^2) are present at the major cities along the coast, such as Accra – Tema area, Cape Coast and Sekondi-Takoradi area. The main economic activities in the coastal zone are oil and gas extraction, fishing, salt production, tourism, farming, and manufacturing.

Ghana is indeed endowered with petroleum resources. However, historically, the petroleum industry in Ghana consisted mainly of oil trading based on the importation of refined petroleum products under contractual agreements with multinational companies such as Shell Plc and Total Plc. These groups were later joined by the national refinery company, Tema Oil Refinery (TOR), which commenced its own crude processing around 1960. To augment power generation in the country, the government, through its national power producer, Volta River Authority, built a power enclave at Aboadze, near Sekondi-Takoradi. The facility receives light crude through its Single Point Mooring (SPM). Apart from imports of crude oil for the domestic refining at TOR and power generation at Aboadze, the Gulf of Guinea adjoining Ghana serves as a super-highway for crude oil tankers.

The threat from these crude oil activities to the coast of Ghana was long realized by Ghanaians in the 1980's. As such the Environmental Protection Agency (EPA), as the focal point for coastal zone management activities in Ghana, in 1986, sought assistance of the International Maritime Organisation (IMO) and developed a National Oil Spill Contingency Plan (NOSCP) and paper-based Environmental Sensitivity Atlas (ESA) as a decision-support tool for the NOSCP.

In 2004, in order to strengthen the planning capabilities and support the government's effort to ensure sustainable coastal zone management, a GIS-based environmental sensitivity atlas was developed to replace the paper-based maps. This was conducted as part of the 'Environmental Sensitivity Map for the Coastal Area of Ghana' project with support from United Nations Office for Project Services (UNOPS) and the Fund for Danish Consultancy Services.

In 2007, after the discovery of the Jubilee Field, the interest in the country's petroleum industry heightened. The heightened interest, together with the regulatory reforms, led to the discovery of three additional oil fields, with two in production, to the Jubilee Field. These two are Tweneboa-Enyera-Ntomme (TEN) Field and Sankofa-Gye Nyame Field.

With the opening up of the oil and gas industry to experienced oil companies, the actual production and utilization of oil and gas, advent of developments and modern needs in the sector, it has become evident that the tools for support of decision-making, such as 2004 ESA must be updated. For as the oil and gas development continues offshore, the risk of oil spill is ever increased for Ghana's coastal area. As a result, in 2015 the EPA in collaboration with the Norwegian Environment Agency (NEA), identified an update to 2004 atlas as a priority to further strengthen the capacity to manage the coastal environment effectively.

This updated Environmental Sensitivity Atlas for the Coastal Area of Ghana (2020), has been developed through a collaboration between EPA, NEA and the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), under the Norwegian Agency for Development Cooperation's (NORAD) Oil for Development programme (OfD).

The atlas incorporates both ecological and socio-economic assets and provides an assessment of sensitivity to oil spill within the coastal area. It will support the Ghana National Oil Spill Contingency Plan, to fulfil legislative requirement that *'amenity areas, ecologically sensitive areas and resources should be identified […] and each area described and illustrated on maps. […] priorities for oil spill response actions will need to be decided after consideration of potential conflicts of interests […] and ecological, recreational and economical concerns should be carefully balanced'* (EPA, NOSCP, 2002).

The atlas is comprised of three volumes:

- Volume I: Distribution of Environmental Sensitivity
- Volume II: Environmental Sensitivity Ranking
- Volume III: Coastal Environmental Sensitivity Atlas

This document, Volume I, presents an overview of environmentally sensitive assets within the coastal area of Ghana. Statistics regarding the number and distribution of assets within the coastal area are presented, along with two series of 96 map plates displaying ecological and socio-economic assets respectively.

ENVIRONMENTAL SENSITIVITY

Environmental sensitivity is a measure of the characteristics of an asset and the degree to which a system or asset is affected, either positively or negatively, by a given pressure, e.g., an oil spill (SMIT et al., 1999). It incorporates aspects of the likely change in the assets condition if exposed, as well as the importance of that asset both locally and globally.

By visualising this in relation to oil spill, the atlas will inform governmental and private sector spatial planning of targeted response strategies that improve the effectiveness of response operations aimed at minimising negative impacts caused by accidental events (Jensen et al., 1990). These include:

- Pre-oil spill identification of sensitive assets that require prioritisation and/or specific actions in order to protect and minimise the impacts of oil spill (e.g., to shorten oil spill response time and identify appropriate oil spill response strategies such as containment, mechanical clean up at sea, use of dispersants, leave alone strategy, deliberately deflect oil to less sensitive shore line areas, etc.).
- Real-time oil spill response to become more effective and targeted as a result of having access to clear and readily available information.
- Post-oil spill assessments of recovery time, clean-up efforts, cost assessments and compensation claims (EPA, 2004).

ENVIRONMENTALLY SENSITIVITY ASSETS

Environmental assets likely to be sensitive to oil spill were identified from 'Environment Sensitivity Map for Coastal Areas of Ghana' (EPA, 2004). These were divided into 14 ecological asset types and 8 socio-economic asset types (Table 1). Each asset type was assigned a sensitivity in accordance with the methodology outlined in Volume II of this atlas.

Table 1: Environmental asset types

Group	Sub-group	Asset Type	Sensitivity
Ecological	Habitat	Mangrove	Very High
	Water Bodies	Open Lagoons Important for Birds	Very High
		Semi-closed Lagoons Important for Birds	High
		Estuaries	High
		Open Lagoons	High
		Semi-Closed Lagoons	Medium
	Physical Environment	Exposed Rocky Flats with Abundant Crevices	High
		Intertidal Rocks with Algae Exposed at Low Tide	High
		Sandy Beach with Turtle Nesting Sites	High
		Exposed Rock with Low to Moderate Slope	Medium
		Mixed Exposed Rock and Sandy Beach	Medium
		Steep Exposed Rock	Low
		Sandy Beach with Coarse Sand, Often Mobile Eroding	Low
		Sandy Beach with Fine-grained Sand and Low Slope	Low
Socio-Economic	Fishing	Fish Landing Sites	High
		Fishing Communities	Medium
	Tourism	Coastal Hotels	High
		Coast Used for Recreational Purposes	Medium
		Historical Monuments Near Waterfront	Low
	Industrial Activity	Major Ports	Very High
		Industrial Plant Relying on Marine Water Intake	Very High
		Salt Production Using Marine Water	Very High

Statistics

Summary statistics regarding the distribution of sensitivity and assets have been disaggregated by ecological and socio-economic assets.

Ecological Assets

A total of 2,485 unique ecological assets were identified within the coastal area, spilt across 14 asset categories (Figure 1). Of these assets, 23% were considered mangrove habitat, 27% were associated with physical environments like sandy beaches and exposed rock, and 50% with water bodies such as lagoons and estuaries.

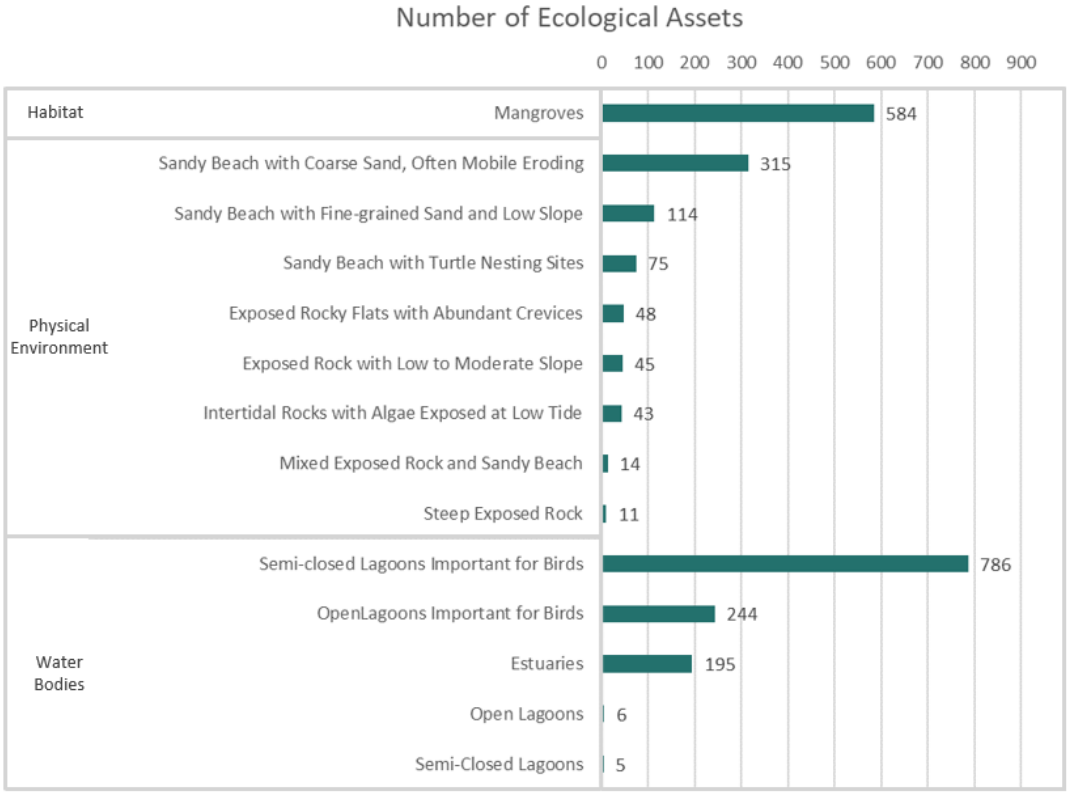


Figure 1: Statistics on the distribution of ecological sensitivity along the coastline

Socio-economic Assets

A total of 541 socio-economic assets were identified within the coastal area, split across 8 asset categories (Figure 2). Of these assets, 65% were associated with fishing, 32% with tourism, and 3% with industrial activity.

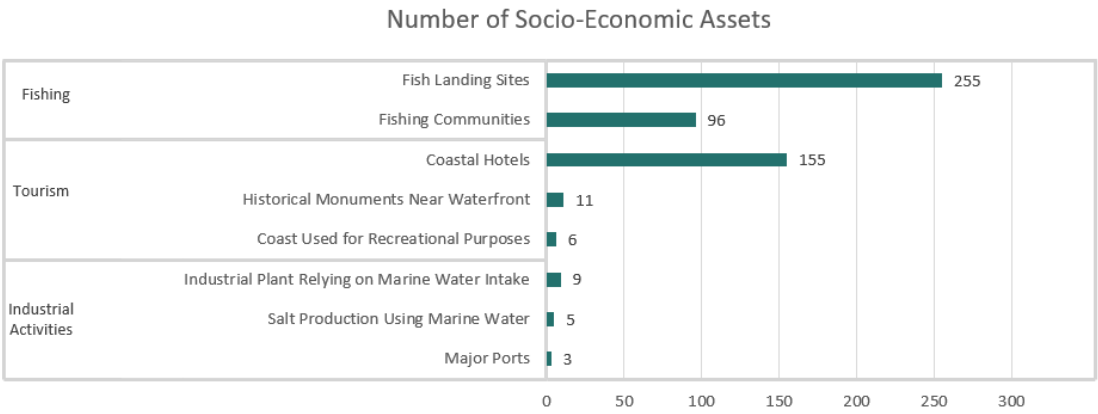


Figure 2: Statistics on the distribution of socio-economic sensitivity along the coastline

MAP PLATES

This atlas displays the sensitivity to oil spill of the entire coastal area of Ghana. The coastal area is defined as the area covering 2.5km either side of the coastline or 30metre contour on the landward side.

In order to display the sensitivity clearly, the coastal area has been divided into 96 discrete areas, each presented on its own map plate.

The ecological and socio-economic sensitivities of each area are displayed separately in order to distinguish between the underlying causes of sensitivity along the coastline, which is needed to determine appropriate responses. The ecological and socio-economic sensitivity maps for each area are displayed side-by-side in the following section, to facilitate comparison between the two.

Sensitivity is displayed in a gridded system with each grid cell covering 5.5km by 6.3km, representing approximately the area covering Aboadze-Ngyiresie in the Western Region of Ghana. The sensitivity of each cell is drawn from the most highly sensitive asset within it and displayed as one of four categories from Very High to Low. The classification is based on a combination of asset value and the assets susceptibility to oil spill (see Volume II: Environmental Asset Sensitivity).

Table 2: Sensitivity rankings

Sensitivity	Sensitivity Code	Colour
Very High	A	
High	B	
Medium	C	
Low	D	

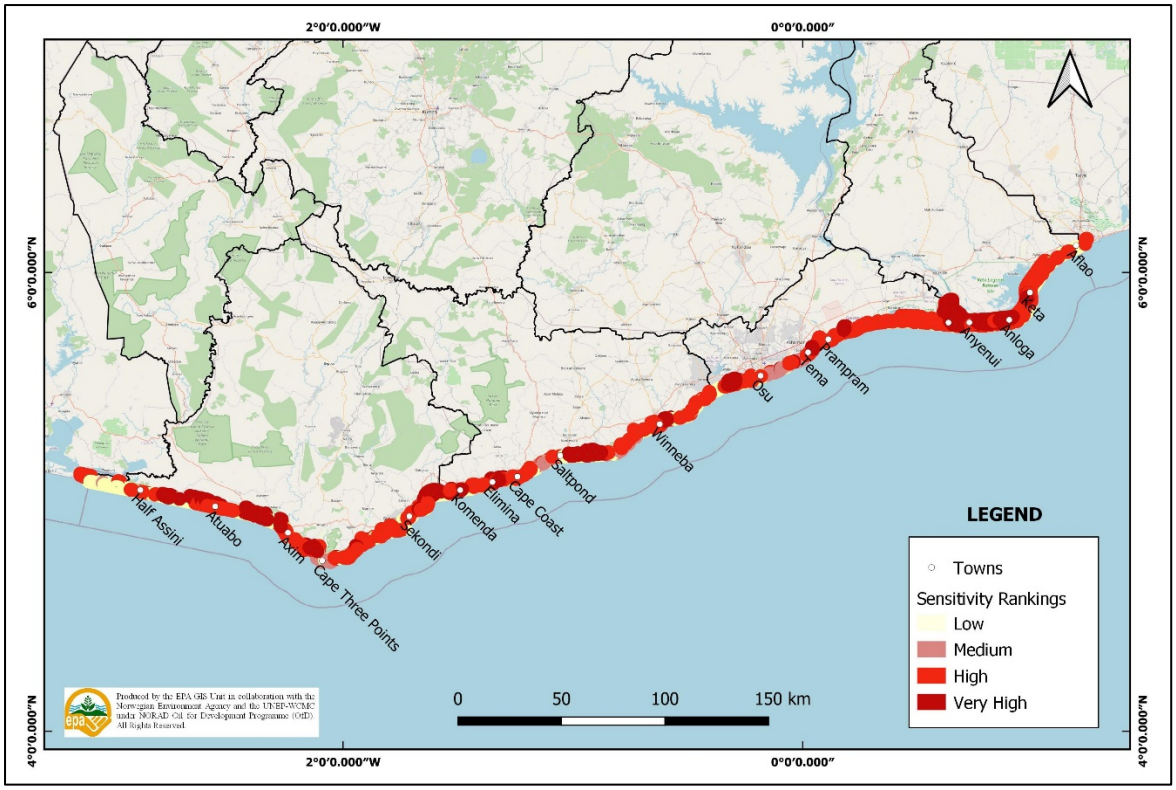


Figure 3: Overview of Ecological Sensitivity

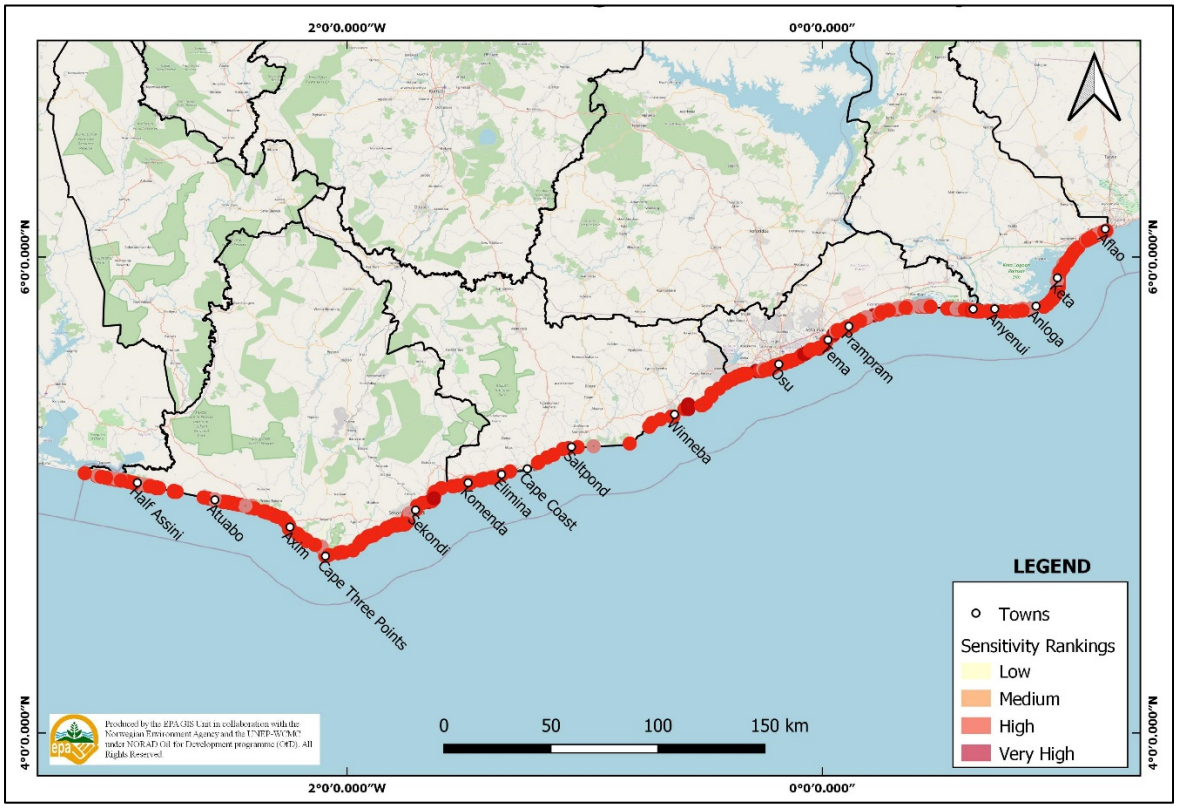
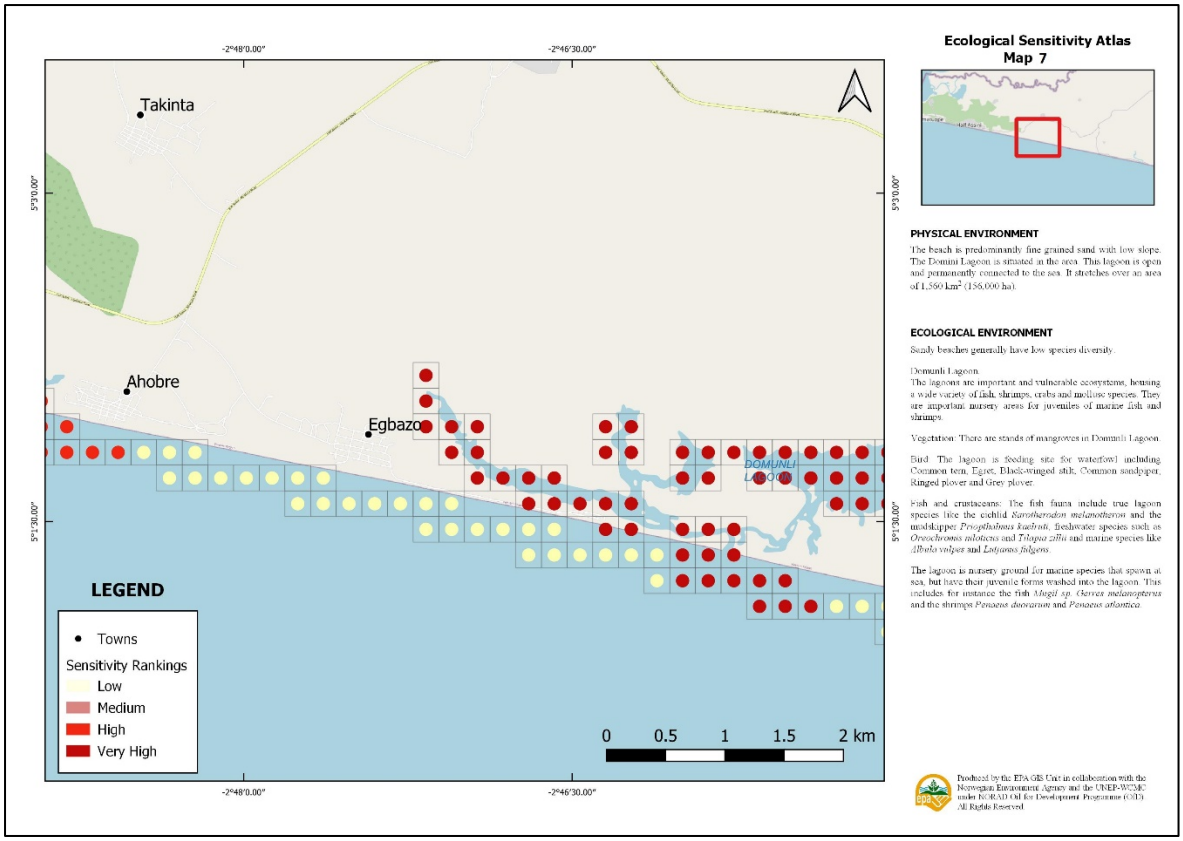


Figure 4: Overview of Socio-economic Sensitivity



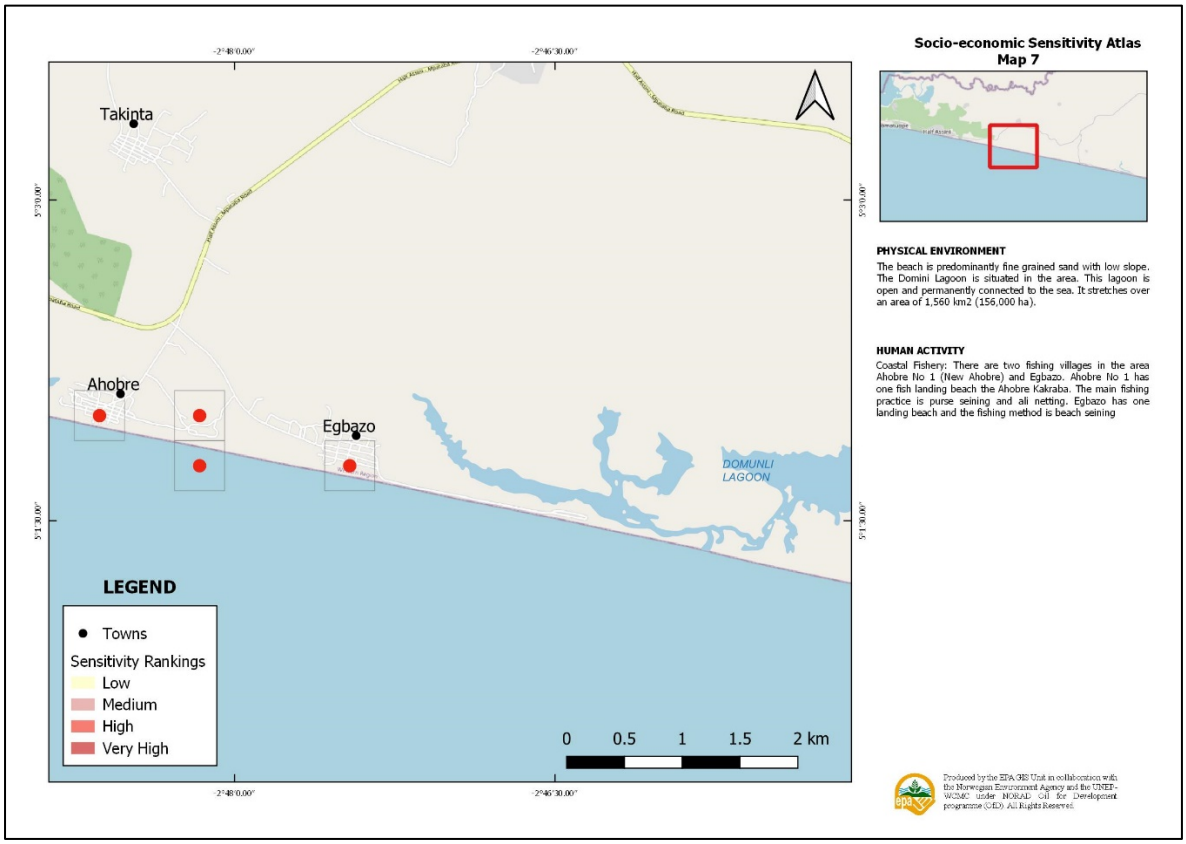


Figure 5: Ecological and Socio-economic map plate side by side

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