

INTEGRATING THE NEEDS FOR MARITIME AND SHIPPING SECTOR INTO MARINE SPATIAL PLANNING: CASE STUDY MOMBASA

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Submission:

Port cities along the Western Indian Ocean (WIO) are logistics hubs and key economic points for their respective hinterland and local and national governments. Due to global maritime technological advancements, many are experiencing immense pressure to implement mega-development projects. This has made it a key requirement to increase efficiency and space to attract international investment. As the spatial extent of the port and the associated activities continue to expand, the potential conflict with other land-use allocations underscores a need for Marine Spatial Planning. Studies show that the number of countries engaging with MSP is set to increase. It is thus estimated that by 2030, a third of the world's EEZs will be covered by government-approved maritime spatial plans with the possibility of extending even further into areas beyond national jurisdiction.

MSP is yet to be adopted into Kenya's current spatial planning legal frameworks. Meanwhile, the 2015-2045 National Spatial Plan of Kenya focuses on protecting marine reserves, promoting coastal tourism and coastal infrastructure, and developing fishing, port activities, and water transport. The plan also reinforces the need to create integrated marine resource management plans alongside implementing the Integrated Coastal Zone Management (ICZM) Policy and Integrated Ocean Management Policy, Strategy and Action Plans. Another body looking into the MSP aspect in Kenya is the Economic Development Block called Jumuiya ya Kaunti za Pwani (JKP), which has been established within the Kenyan coastal counties to coordinate projects and ensure policy integration at a regional level.

Land-use and land cover change (LULC) in port cities in WIO is rarely monitored in the Western. Still, it is critical to inform MSP in Mombasa and the WIO region whilst accounting for climate change risks and sustainable development. Mombasa uses the county spatial plan as a guide/for marine planning. Current trends in population increase in coastal areas and sea trade in coastal regions make Kenya's coastal waters one of the most intensively used areas in WIO. This results in increasing conflicts amongst various marine functions; fisheries, port transportation, coastal tourism, etc. It is thus necessary to identify potential expansion areas for Mombasa port that would not compromise the rational use of the marine resources around Mombasa.

This study investigates suitable sites for port expansion around the sea bordering Mombasa using a Multicriteria Evaluation technique (MCE). This information, merged with the rate of LULC changes, will provide recommendations that can inform county government and port authorities in their MSP process.

This research problem is attributed to the Kenya Ports Authority (KPA), in charge of maintaining, operating, improving and regulating all scheduled seaports on the Kenyan Indian Ocean coastline and the Kenya Maritime Authority (KMA), responsible for the regulatory oversight of the local maritime sector and the marine conservation entities; Kenya wildlife service (KWS) and non-government conservation organizations.

Objectives:

1. To quantify LULC change in the marine environment around the port city of Mombasa.
2. Determine the stakeholder values and spatial requirements of the maritime and shipping sector for MSP objective setting to represent the identified needs
3. To map land/sea space suitable for maritime/shipping expansion for the Port of Mombasa

Methods

Data

To fulfil the requirements of this study, various sets of data were collected, processed and analysed: Landsat 8 OLI 30m resolution; Sentinel-2 image with a 10m spatial resolution; Expert response field survey data on suitable conditions for port establishment; and Vector data. Pre-processing involved radiometric and geometric corrections, topographic corrections, and image enhancement. Pixel-based classification technique was used to analyse the satellite imagery in the three epochs; 2002, 2012 and 2022. This process was done to determine the changes within the port area over the selected epochs. This step was performed to countercheck the output data and the referenced information for any form of pixel misplacement or misclassification.

MCE was used to determine a suitable site for Mombasa port expansion using the Analytical Hierarchy Process (AHP) expert weighting technique. Site suitability analysis using GIS involved; weighted overlay (weighted linear combination) and the simple Boolean. The weight will be sourced from the surveyed stakeholder values that were subjected to AHP's a number of main steps.

The Choice of factors considered expert judgment and conducted in-depth research in previous studies of similar dimensions. To produce the suitability map for a suitable port site taking into account marine and terrestrial factors. The model included layers from both factors together. The straight rank-sum method was applied to obtain the criteria weights of the factors. The maps obtained from steps 1 and 2 were joined using the weights for terrestrial and marine factors obtained from mapped stakeholder values or expert judgements. Data verification involved comparing suitable port expansion sites identified in the process and the positions of the current port expansion zones.

From the Classification, the study established the significant changes in LULC in the environs of the port-city of Mombasa over the last 30 years. Spatial zones identified land and sea spaces that are critical for maritime/shipping expansion for the Port of Mombasa.

The findings of this study identified potential areas for port expansion in Mombasa. The results of this study are applicable in informing the MSP process for the county government of Mombasa, the port authority and the maritime authorities, even as

evidence of port expansion remains valid.

