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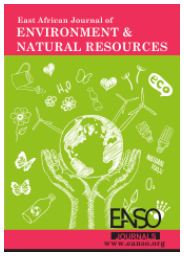

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Original Article

Compliance with Environmental and Social Safeguards by Large Infrastructure Projects: The Case of Lamu Port and Associated Road Infrastructure Projects Implemented under LAPSSET

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Compliance, Environmental and Social Safeguards, Large Infrastructure Projects, LAPSSET, Lamu Port, Kenya.

ABSTRACT

The study evaluated compliance with environmental and social safeguards during the implementation of Lamu Port and associated road infrastructure projects implemented under LAPSSET in Lamu County. The study employed a mixed-method approach in collecting primary and secondary data. This comprised of key informant interviews, focused group discussions, and field observations for primary data and document analysis of; i) the LAPSSET Corridor Feasibility Study report, ii) Strategic Environmental Assessment (SEA) report, and iii) the Environmental and Social Impact Assessment (ESIA) Reports for Lamu Port and associated infrastructure, ESIA's of Lamu Port access road and Garsen-Witu-Lamu Highway. Descriptive statistics and geospatial analysis were used to synthesise and interpret the data collected. Results show that the project safeguards meant to deter alteration of marine water quality, pollution of marine flora and fauna, protection of livelihoods of the fishing community, preservation of tangible and intangible heritage were not implemented. The study further established that compensation of project-affected persons pre-determined as exposed to effects of the project like landowners for loss of arable land was done while loss of grazing fields and watering grounds for pastoralists were not compensated. Overall, the location of the chosen borrow pit sites for the extraction of construction materials was inappropriate with about 25% of the borrow pits being in close proximity to homesteads. Rehabilitation of borrow pits was minimal; less than 10% of disused borrow pits had been rehabilitated. Inadequate budget and lack of

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enforcement by government agencies were cited as the main cause of poor compliance.

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INTRODUCTION

Environmental and social safeguards are a global normative standard that is meant to ensure the assessment and management of environmental and social risks of a proposed project, inform and consult with stakeholders and compensate project-affected persons (PAPs) (Dann & Riegner, 2019). Safeguards support the integration of environmental and social risks into project decision-making and provide a framework for consultation and disclosure (Passoni *et al.*, 2016). Environmental and social safeguards therefore are critical measures designed to prevent and mitigate undue harm from development activities (World Bank, 2005). Such measures include addressing environmental and social issues relating to a proposed development, respecting the rights of indigenous and local communities, stakeholder participation, and enhancing local social benefits (Rajamani, 2011). The procedural component of the safeguards provides for consultation with PAPs, while distribute component of the safeguards provides for equitable sharing of project benefits with those affected by the project (Kirchherr *et al*., 2017). Proponents of projects have a greater responsibility of managing environmental and social risks associated with their projects and hence must fully implement the national environmental and social safeguard framework of the host country (Passoni *et al*., 2016).

Large-scale infrastructure projects more often than not generate significant environmental and social issues which negatively affect the timely implementation of the projects (Fadhil *et al.*, 2018). Such projects attract serious environmental and social concerns from conceptualisation through implementation (Eccleston and March 2011). Large-scale infrastructure projects often result in sociocultural, economic, and environmental impacts exacerbated by the loss of livelihoods brought about by the alteration of the environment and the repossession of land (Onditi, 2018). Whereas social safeguards provide for consultation of PAPs throughout the life of the project while ensuring PAPs benefit from the project (World Bank, 2016), large-scale infrastructure projects in

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many cases, are faced with the challenge of inadequate consultations (Kamau & Khsiebi, 2022; Onditi, 2018; Le, 2016). Poor and inadequate consultations with PAPs contribute to delays in the timely implementation of large infrastructure projects (Kamau & Khsiebi, 2022) and results in legal battles brought about by land rights, fair allocation, and compensation (Onditi, 2018).

The Lamu Port South-Sudan Ethiopia (LAPSSET) Corridor is a formidable megaproject (Kamau & Khsiebi, 2022; Aalders *et al*., 2021; Mahn et al., 2021: Fadhil *et al*., 2018) designed to connect Kenya, South Sudan, and Ethiopia and eventually form a land bridge across the entire Great Lakes region from Eastern Coast of Africa (Lamu) to Western Coast (Douala) Cameroon (Enns, 2017). This megaproject consists of the deep-sea port at Manda Bay, Lamu County in Kenya, a network of highways, oil pipelines, standard gauge rails, resort cities, international airports, and multipurpose High Grand Falls Dam (Le, 2016; DCP Kenya, 2019; Aalders, 2021). Whilst the LAPSSET programme was subjected to Feasibility Study (Le, 2016), Strategic Environmental Assessment (SEA) (DCP Kenya, 2019) and Environmental and Social Impact Assessments (ESIA) for its project components (Le, 2016), its implementation has in the past ran into headwinds (Kamau & Khsiebi, 2022).

Implementation of the programme components has not been without legal battles (Chome, 2020., DCP Kenya, 2019; Onditi, 2018; Kitu Cha Sheria, 2014) due to myriad issues and concerns including environmental sensitivities and effects on local communities (DCP Kenya, 2019; Fadhil *et al*., 2018; Le, 2016). Implementation of LAPSSET Corridor components is at different stages of completion (Aalders, 2021). The first three berths of the Lamu deep sea port will be complete by the end of year 2021, pending the completion of associated support infrastructure (Kamau & Khsiebi, 2022). Also completed are the dual carriage port access road and C112- Garsen-Witu-Lamu Highway, critical road infrastructure for evacuating cargo in and out of the port. The implementation of safeguards documented in the Environmental and Social Management Plan (ESMP), an output of ESIA of these projects, is meant to mitigate against adverse environmental and social impacts of projects implemented under the LAPSSET Corridor. Yet, there has not been any detailed study conducted to document how proposed safeguards for LAPSSET projects were being implemented. Against this backdrop, this study sought to contribute to bridging this knowledge gap.

MATERIALS AND METHODS

Study Area

The study was conducted within the LAPSSET Corridor Programme core area in Hindi and Basuba Wards of Lamu County in Kenya. It covered three LAPSSET Corridor projects, specifically the first three berths of Lamu port and associated infrastructure, the Lamu Port Access Road, and the Garsen-Witu-Lamu Highway. The study area also covered the borrow site for construction materials for the three projects. Lamu Port is located within Basuba Ward in Manda Bay, home to a diversity of marine species (Shinn & Clarke, 2020). Lamu Port Access Road is located within Basuba Ward and forms the boundary between the Hindi and Mukoye Locations. Garsen-Witu-Lamu Highway traverses through the two wards of Hindi and Basuba; materials borrow sites were located within the Hindi, Mkunumbi, and Witu areas (*Figure 1*).

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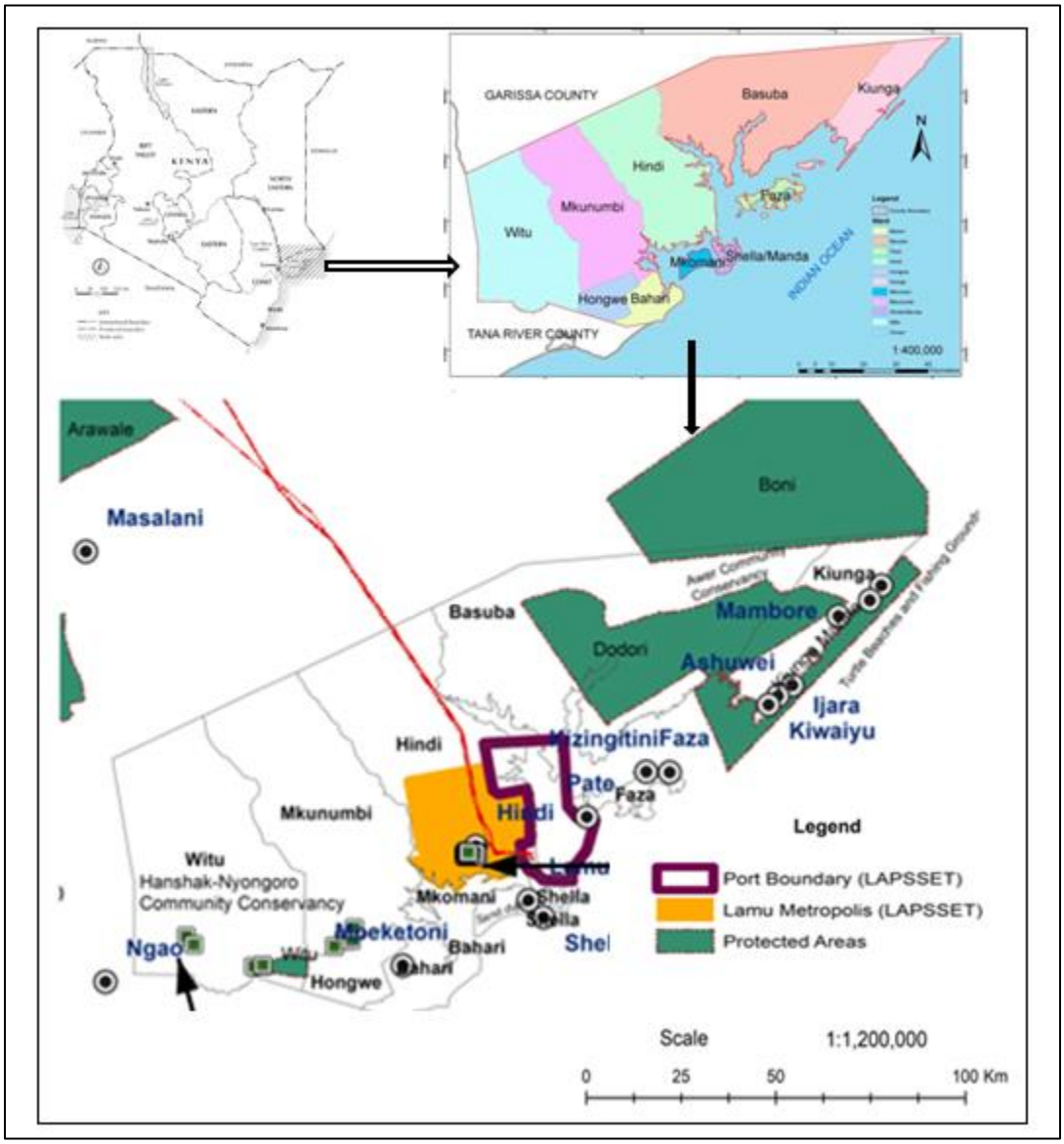
Figure 1: Study area



Study population and sampling design

The sampling design was the technique or procedure adopted in selecting the study sample (Kothari, 2004). The sampling procedure used in this study involved defining the study population, determination of the sampling frame, selecting the sampling technique, determination of the sample size and executing the sampling process. The sampling design ensured the study sample was not haphazardly selected in order to avoid and or minimise bias as much as practically possible (Bluman, 2017). The study sample for this study was from primary and secondary sources.

Elements of the study population from primary data sources were State Agencies (National and County level) relevant to the implementation of the LAPSSET Corridor Programme, Non-Governmental Organizations (NGO) active within the study area, Project Affected Persons (PAPs) and Beach Management Units (BMU). Elements of the study population from secondary data sources were ESIA reports for projects implemented under LAPSSET.

The sampling frame from primary data sources comprised of Government Officers responsible for environmental and safeguards matters from

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LAPSSET Development Authority (LCDA), National Environment Management Authority (NEMA), Kenya Wildlife Service (KWS), National Museums of Kenya (NMK), Kenya National Commission for UNESCO (KNATCOM), Kenya Ports Authority (KPA), Kenya National Highway Authority (KeNHA), Kenya Forest Service (KFS), County Commissioner (CC) Lamu, and Deputy County Commissioner (DCC). Respondents from NGOs responsible for environmental and safeguards matters, specifically WWF-Kenya, Save Lamu and Coastal Oceans Research and Development in the Indian Ocean (CORDIO) East Africa. Representatives of PAPs, specifically, Pastoralists, Farmers and Business Communities, and Contractors of the three LAPSSET projects and suppliers of construction material. BMU officials, specifically from Munguni BMU, Kipungani BMU, Matondani MBU, Shela BMU and Amu BMU. The sampling frame from secondary data sources comprised ESIA reports for Lamu Port and associated infrastructure, Lamu Port access road and Garsen-Witu-Lamu Road.

A purposeful sampling technique was used to select the study sample from primary data sources (Kothari, 2004). Purposeful sampling sampled Government Officers responsible for environmental and safeguards matters, respondents from NGOs responsible for environmental and safeguards matters, and representatives of PAPs and BMU officials. This sampling technique ensured information-rich sample for the purposes of the study was obtained (Sandelowski, 2000). The entire study population (*N*) for secondary data sources formed the sample size (*n*) to ensure sample size sufficiency that reflected variations in the study population.

Data Collection

Data was collected from primary and secondary sources (Kumar, 2011). Primary data sources were key informant interviews, focused group discussions (FGDs), and field observations at material borrow sites, while secondary data sources were documents for LAPSSET Corridor Programme.

Primary Data Collection

Key informant interviews and FGDs were employed to collect qualitative data on the status of implementation of safeguards for the first three berths of Lamu port and associated infrastructure, the Lamu Port Access Road and the Garsen-Witu-Lamu Highway. Field observations at material borrow sites and discussions with land leasers of borrow sites and operators of borrow pits generated both qualitative and quantitative data on the status of implementation of safeguards for material borrow sites. Key informant interviews and FGDs collected qualitative data on the implementation status of safeguards that were designed to protect PAPs and the local community from marginalisation while at the same time addressing sociocultural and political issues.

The data collected specified which safeguards had been implemented and which were yet to be implemented. Further information on safeguards proposed to protect the terrestrial and marine environment, archaeological, historical, and cultural sites and protection of material borrow sites were collected. Twenty-four key informant interviews and nine FGDs were conducted. The key informant interview technique was applied as described by Ali *et al*. (2013), while FGDs were conducted as described by Mishra (2016). Participants of the key informant interviews comprised State Agencies implementing the LAPSSET Corridor Programme, the County Government of Lamu and NGOs active within the study area. State Agencies representatives who participated in the key informant interviews were as follows: LCDA, NEMA, KWS, NMK, KNATCOM, KPA, KeNHA, KFS, CC) Lamu and DCC.

County Government of Lamu (CGL) representatives who participated in the key informant interviews were as follows: the Department of Fisheries and the Department of Public Health Environment and Natural Resources. NGO representatives who participated in the key informant interviews were as follows: WWF-Kenya, Save Lamu and Coastal Oceans Research and Development in the Indian Ocean (CORDIO) East Africa. FGDs members were drawn from the LAPSSET team, PAPs, and project contractors and suppliers. The FDGs included LAPSSET Team at

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LAPSSET headquarters, BMU, specifically Munguni BMU, Kipungani BMU, Matondani MBU, Shela BMU and Amu BMU, Pastoralists, Farmers and Business Community, and Contractors of the three LAPSSET projects and their suppliers of construction material specifically ballast.

Field observations were carried out at material borrow sites in Hindi, Mkunumbi, and Witu. Borrow pits in each location were counted and their number was recorded. The location of each borrow pit was captured using a handheld Geographical Positioning System (GPS) device, and latitudes and longitudes were recorded. Information on operators of each borrow pit was obtained from landowners who had leased borrow sites, and their names were recorded. The acreage of each borrow pit was obtained from landowners who had leased borrow sites and was recorded. The status of use of the borrow pits, whether active or abandoned, was recorded. Land use adjacent to each borrow pit and its proximity to homesteads was recorded. The safety of each borrow pit, whether fenced off or not fenced off from unauthorised access was recorded. The rehabilitation status of each borrow pit, whether rehabilitated, rehabilitation in progress, backfilled, or not rehabilitated, was recorded.

Secondary Data Collection

Secondary data sources were documents for the LAPSSET Corridor, specifically Feasibility Study and SEA Study reports, ESIA Reports for the first three berths of Lamu Port and associated infrastructure, Lamu Port access road, and Garsen-Witu-Lamu Highway. Qualitative data on environmental and social safeguards proposed for implementation during the execution of the LAPSSET Corridor Programme as a whole and projects implemented under LAPSSET Corridor in specific was collected. Content analysis, an intensive data extraction method from secondary sources that generate an enormous amount of qualitative data, was used (Isaac & Micheal, 1995). Information was extracted on safeguards proposed to protect PAPs, specifically the fishing community, pastoralists, farmers, and landowners. Information on safeguards to protect the local community from marginalisation, sociocultural and political issues was extracted and recorded. Also extracted was information on safeguards to protect terrestrial flora and fauna, marine flora and fauna, marine water quality, archaeological, historical and cultural sites, management and rehabilitation of material borrow sites.

Data Analysis

Descriptive statistics and geospatial analysis were used to analyse the data collected. The descriptive statistical analysis generated both qualitative and quantitative information such as descriptive statements, percentages, frequencies, means and sum and presented in the form of tables and graphs. Descriptive statements were derived from qualitative data on safeguards proposed to address environmental and social impacts and statements explaining each safeguard's implementation status. Pie charts were derived from data on land use adjacent to borrow pits to show the contribution of each type of land use to the overall land use in the area adjacent to the borrow pits. Histograms were derived from data from borrow pit operators, acreage of land used by each operator, and the number of borrow pits for each operator to compare the contribution of each operator to the overall land acreage used for borrow material. Geospatial analysis of borrow pits data was done by ArcMap software. The analysis generated a map indicating the distribution of borrow pits within the study site and their rehabilitation status.

RESULTS AND DISCUSSION

The aim of this study was to assess the status of the implementation of environmental and social safeguards documented in the ESMPs of the ESIAs of three LAPSSET projects. Various safeguards were proposed in the ESMP for Lamu Port, associated road infrastructure projects and material borrow sites to protect PAPs from adverse negative impacts from the implementation of the projects. Identified PAPs were mainly the fishing community, which was organised in Beach Management Units (BMUs), the farming community comprising landowners and pastoralists, and the business community. Further, the safeguards were designed to protect both terrestrial and marine flora and fauna from adverse negative impacts of projects. Likewise, the safeguards were also to cushion the local community from marginalisation with respect to employment at the

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Lamu Port and associated facilities due to a lack of required skills. With respect to archaeological, historical and cultural sites and local tourism, the safeguards proposed aimed at preserving local culture from dilution provide pathways for collecting and preserving artefacts encountered and preserving both tangible and intangible heritage while at the same time promoting, enhancing and diversifying. Table 1 is a presentation of safeguard measures that were to be implemented to mitigate the potential negative effects of the adverse impacts predicted.

Table 1: Safeguards proposed to mitigate predicted potential negative impacts of Lamu Port and associated infrastructure

Thematic area	Identified Impacts	Proposed Safeguards
Water quality	Deterioration of marine water quality due to water column turbidity and sedimentation	• Installation of silt curtains to secure the marine construction area • Monitoring of marine water turbidity and sedimentation
Mangroves	Reduction of local mangrove cover due to mangroves clearing	• Re-planting of mangroves in other areas to replace the areas that are cut to pave the way for the project
	Destruction of fish spawning grounds due to mangroves clearing	• Minimising acreage of mangrove to be cleared • Planting of mangroves in adjacent areas to replace cleared ones
Fisheries	Loss of local fisheries due to degradation of fishery grounds (destruction of corals and sea grass beds)	• Minimising coral reef habitat loss by applying careful controls on boundaries during the dredging process • Financial compensation to fishers • Restoration of degraded coral reefs and seagrass beds
	Encroachment on local fishing grounds displacing artisanal fishers from traditional fishing grounds and landing sites	• Empowering local fishermen to move to deep waters by offering training on deep-sea fishing methods and provision of fishing gears and vessels that can enable them to venture into other more distant deep-water fishing grounds • Providing modern fish landing sites with adequate infrastructures such as power, access roads and cold rooms or ice-making plants to the local fishing community
	Encroachment on sea routes used by local fishers from Faza, Kizingitini, Matondoni, Kiunga, Mkokoni, Kiwayu, Dodori and Chandani, especially Mkanda fisher due to dredging of the Manda channel	• Demarcating safe passageways for small fishing vessels away from those used by ships destined in and out of the Lamu Port • Allocation of specific sea routes for small vessels used by the local community
	Encroachment on community marine conservation area- Iweni at the entrance of the Manda channel due to dredging	• Shortening the dredging period to minimise associated negative impacts • Dredging and offshore dumping operations to be during dry periods when no buoyant water would enhance surface transport of the turbid discharge

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Thematic area	Identified Impacts	Proposed Safeguards
		• Negotiation with the affected fishing community for appropriate compensation
	Restriction and/or loss of sea routes and access to mangrove resources in Shella, Magogoni and Ndununi areas during port construction	• Allocation of specific sea routes for small vessels
Landownership	Displacement of landowners at Kililana area for Port related infrastructure construction	• Preparation and implementation of a Resettlement Action Plan (RAP) • Livelihood restoration measures for affected landowners • Monitory compensation for land compulsory acquired for the project
Archaeological, historical cultural sites	Damage to archaeological, historical and cultural sites	• Archaeological Impact Assessments are to be carried out prior to project implementation • Protection of the world heritage site • Conservation of traditional cultures of the Lamu people
Induced risks	Competition for opportunities due to the influx of migrant workers	• Employment priority to be given to local people • Priority training for local people to ensure they are competitive • Provisions of scholarships for local youths to fast-track their training
	Preferences for communicable diseases, including HIV & AIDS	• HIV-AIDS Programs for construction Voluntary Council and Testing (VCT) • Peer Counseling • Availability of VCT services • HIV/AIDS outreach programs during operation
	Accidents and incidents at the construction site	• Use serviceable equipment • Personnel to be trained, experienced and equipped • Regular servicing and maintenance of plant and equipment • Provision and appropriate use of Personal Protective Equipment (PPEs)
	Oil spills	• Upscale use of OSMAG and related oil spill contingency plans currently in Mombasa to cover Lamu Port
	Marine accidents	• Demarcate passageways for small fishing vessels away from those used by ships • Training of fishing boat coxswains on navigation and sea safety

Marine Water Quality

To safeguard the quality of marine water within Manda Bay and its environs, the ESMP proposed that the site where the first three berths of the Lamu port were to be constructed were to be secured with silt curtains within a defined radius from the active construction site. Further, monitoring of specific

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water quality parameters was to be carried out at pre-determined locations and at a prescribed frequency throughout the construction period to check the effectiveness of deployed silt curtains in mitigating the spread of turbidity plumes. Key Informant Interviews with BMUs and Save Lamu stated clearly that no silt curtains were deployed nor water quality monitoring was carried out. Further, CORDIO East Africa stated that proposed mitigation measures were not implemented, and if they were, the measures were ineffective.

An interview with LCDA stated clearly that no water quality monitoring was carried out. Lack of and or poor implementation of mitigation measures that were proposed in the ESMP meant that marine waters within Manda Bay were directly exposed to pollution. This finding was consistent with that of Thoya *et al*. (2022), who, in their study of the development of the ports of Lamu and Bagamoyo, concluded that port development would degrade ecosystems and reduce water quality due to dredging and port operations. In the absence of appropriate measures to mitigate the spread of turbidity plumes due to dredging activities, a reduction in marine water clarity was likely due to increased turbidity (Manap & Voulvoulis, 2016). Turbidity increases sediment loading hence shifting marine water quality (Orth *et al.*, 2006). Suspended sediments reduce primary productivity by limiting light penetration into the water column (Olalekan, 2020). Increased sedimentation results in the degradation of local seagrass (Walker & McComb, 1992; Duarte, 2002; Short, 2003) and contributes to the loss of seagrass vegetation (Erftemeijer & Lewis 2006). While seagrass vegetation enhances carbon burial and preserves sediment carbon stocks (Marbà *et al.*, 2015, p. 299), its loss leads to erosion of carbon stores (Marbà et al., 2015, p. 301) hence negating the deployment of blue carbon strategies (Marbà *et al.*, 2015, p. 296). While disposal of dredge spoil poses a significant challenge, poorly planned and managed dredging can result in the death of coral reefs (Olalekan, 2020).

Marine Flora and Fauna

The construction of Lamu port and allied infrastructure had the potential to negatively affect marine flora and fauna. Consequently, it was proposed that marine flora and fauna were to be protected from adverse impacts of port construction activities by the installation of silt curtains during dredging works. The silt curtains were to be deployed around the working area to contain and or minimise the dispersal of turbidity plumes. Other safeguard measures proposed included the use of intrinsic dredging techniques, the selection of a short dredging period in relation to tidal currents, the time of the year, and the dredging period. Likewise, dredging and offshore dumping operations were to be done during dry periods when marine waters were less buoyant.

The BMU members from Mungini BMU, Kipungani BMU, Matondani MBU, Shela BMU and Amu BMU) described the state of marine flora and fauna. Many from the fishing community indicated that these safeguards were either not implemented or, if they were, then the safeguards were not adequate; hence their performance in protecting marine flora and fauna from adverse impacts was poor. Our findings explain and support the finding of previous studies carried out by Kamau and Khsiebi (2022), Thoya *et al*. (2022) and Wanderi (2019). In their research, Kamau and Khsiebi (2022, p. 62) noted that local people reported dredging to have inhibited local fishermen from accessing the deep sea while it destroyed their traditional fishing grounds; it polluted the ocean and destroyed corals. This could only happen in a scenario where safeguard measures were not deployed. Thoya *et al.* (2022, p 7) documented that the development of Lamu and Bagamoyo ports caused the degradation of coral reefs and mangroves, while the dredging was done at the port area and channel resulted in increased sedimentation, which most likely contributed to coral reef degradation and damage in the vicinity of Lamu and Bagamoyo Ports.

Wanderi (2019) documented that the initial impacts of the Lamu Port development had started to be noticed and were now being felt in the fragile marine ecosystem. Wanderi maintained that dredging and deepening of the channel coupled with the clearing of mangroves and reclamation of fishing areas, fish spawning grounds, and fish landing sites had not only increased the danger of violent marine waves that was disturbing marine life breeding patterns but also threatened marine flora and fauna as a whole, denied local community their

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livelihoods besides threatening the balance between culture and nature (Wanderi, 2019, p. 19). Dredging reduced the clarity of marine water (Pastor *et al.*, 2020) due to increased turbidity and created sediment plumes (Todd *et al.*, 2014, p. 4-5) which negatively impacted marine flora and fauna.

Mangrove ecosystems were to be shielded from adverse impacts by minimising cleared areas and replacing all cleared mangroves through targeted mangrove planting in selected adjacent areas. This safeguard was implemented. Only 1.5 hectares of the projected 2 hectares were cleared. Further, both KFS and local CSOs were actively involved in mangrove planting in adjacent creeks. However, our finding on implementing this safeguard differed from that reported by Wanderi (2019), who stated that large swathes of mangrove forests were cleared during the construction of Lamu Port.

Fishing Community

Besides farmers and pastoralists, another group of PAPs that was identified was the fishing community, notably those who derived their livelihoods from fishing activities and fish value addition. The fishing community was to be cushioned from adverse impacts of the construction of the first three berths of Lamu Port and associated infrastructure project by first being monetarily compensated for lost livelihoods, being enabled to explore alternative and new fishing sites in deep sea through targeted training, provision of modern fishing equipment, modernisation of landing sites and construction of fishing ports. Our findings indicated that none of these safeguards had been implemented.

During the FGDs, all BMU officials who participated categorically stated that the lack of implementation of these safeguards continuously impacted negatively on the fisherfolk economically, socially and their overall wellbeing. Each BMU stated that their livelihoods were diminishing as their daily fish catch had dwindled. Findings from earlier research on the impacts of LAPSSET projects on the fishing community done by Chome (2020), Le (2016), Thoya *et al*. (2020) and Fadhil *et al.* (2018) were consistent with our findings. However, finds from the work by Wanderi (2019) differed from our findings. Chome (2020) noted that negative impacts that could arise from the implementation of LAPSSET projects, if not avoided, eliminated, or appropriately mitigated had the potential to wipe out not only Lamu's ecological diversity but also the livelihoods of its indigenous population. Likewise, Le (2016) noted that while the livelihoods of local communities in Lamu heavily depend on natural resources, if no proper measures are taken, these natural resources could be severely threatened by the Lamu Port construction.

Equally, Thoya *et al.* (2022, p 7) who studied the development of the ports of Lamu in Kenya and Bagamoyo in Tanzania, found out that these two ports were located were essential fishing grounds. Furthermore, these ports displaced fishers from their traditional fishing grounds and forced them to find alternative fishing grounds. Thoya et al. (2022) concluded that the development and implementation of the two ports negatively impacted the marine environment, polluted fishing grounds and reduced the livelihoods of the fishing community. Le (2016) documented that Lobster Fishermen in Lamu had complained of a sharp decline in catch from a high of 20 to 30 kilograms to a record low of 1.5 kilograms, indicating a sharp decline in fish catch due to the development of Lamu port. Fadhil *et al*. (2018) concluded that the environmental impact of the LAPSSET project was costly in terms of pollution of the sea and other facets of the environment. Our findings, however, differed from that of Wanderi (2019).

According to Wanderi, the assertion by BMUs that they had neither received targeted training nor been provided with modern fishing equipment was inaccurate. Wanderi (2019) observed that in response to litigations concerning LAPSSET and in the spirit of addressing current and future concerns, LAPSSET Authority had not only mainstreamed community participation in their projects but also collaborated with local BMUs. The collaboration had seen the role of training programmes for artisanal fisherfolk and provided them with modern fishing gear (Wanderi, 2019, p. 20). Marine environments support diverse and significant fishing communities' the majority of whom fishing is their lifetime source of livelihood (Rees *et al.*, 2013). Marine fisheries not only provide employment to millions of people but also

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significantly contribute to food security (Bennett *et al.*, 2021).

Coastal communities in Kenya depend on fisheries and other coastal resources for their livelihoods, particularly in Lamu, Kilifi and Kwale Counties (Ochiewo *et al*., 2020, p.106). Reduced access to coastal fishing areas is increasingly being experienced as a result of an array of issues, including port development (Rodden, 2014; Souza & Oliveira, 2010). Whereas coral reefs and mangroves are the most preferred fishing habitats for the Lamu fishing community, most of these fishing habitats are within a ten-kilometre radius of Lamu Port (Thoya *et al.,* 2022). Considering that port development has a direct negative effect on marine habitats, in the absence of implementation of appropriate mitigation measures, it therefore follows that the development of the Lamu port has the potential to directly affect fish habitats negatively.

Farmers and Pastoralists

To safeguard potential impacts that could arise from the compulsory acquisition of land to construct Lamu port and associate infrastructural projects under LAPSSET, it was proposed that all affected landowners be compensated. To inform who was to be affected and what and how the affected parties were to be compensated, a Resettlement Action Plan (RAP) was first to be prepared and then implemented. Our findings showed that, indeed, the RAP was prepared and implemented as was envisaged. The RAP worked well in ensuring displaced landowners were compensated for the land they lost to the project. All affected landowners had been compensated; however, women and children displaced at the household level were disadvantaged when the head of the household who is mainly male spent the proceeds from the compensation for other purposes besides resettling the affected family members.

Onditi (2018) observes that the livelihoods of most of the communities living along the LAPSSET Corridor are nature-based and hence revolve within the confines of pastoralism, fishing, hunting, gathering, eco-tourism, and substance farming. This notwithstanding, it is argued that LAPSSET projects have continued to create anxiety among locals on potential forced resettlements while opening loopholes for land grabbing (Le, 2016, p.118; Onditi, 2018, p. 5; Chome, 2020, p.317). At the same time, displaced landowners were compensated under RAP. Pastoralist communities who lost access to traditional livestock grazing and watering areas were not compensated as the RAP was silent on pastoralist compensation. This finding mirrors that of Chome (2020), who alluded that LAPSSET had generated diverse anticipations that had precipitated socio-economic challenges that had contributed to farmer-herder conflicts over water and land-based resources. LAPSSET infrastructure projects are viewed from the pastoralist eye as an obstacle to the livelihoods of pastoralists and hence the reason for the chaotic movement of pastoralists that is creating conflict between pastoralists and infrastructural mobility (Aalders, 2020).

It is, however, argued that if designed differently, LAPSSET presents an opportunity to improve the livelihoods of the pastoralist community through the modernisation of the livestock industry and creating linkages to lucrative markets (Onditi, 2018, p. 7). In light of environmental and social safeguards, deliberate efforts have to be made to minimise project social conflicts (Mohamad *et al*., 2022) by embracing a culture of continuous stakeholder engagement and meaningful consultations with the aim of addressing emerging challenges as the implementation of LAPSSET progresses.

Local Community Marginalization

Disproportionate competition between the already economically marginalised and poorly educated local community and incoming economic migrants could further marginalise the local community. To mitigate this, targeted training for youths from the local community was to be initiated and sustained through the LAPSSET project cycle to build the capacity of the local community to be competitive in the job market while at the same time cushioning locals from marginalisation with respect to employment due to lack of pre-requisite skills. This safeguard was implemented through the operationalisation of the LAPSSET Corridor Scholarship Scheme for local community youths. Through this scheme, local youths received funding to pursue education and training in tertiary institutions. However, beneficiaries of the

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scholarship scheme who had graduated from various institutions of higher learning were yet to secure employment in the new port and associated facilities.

Findings from previous studies by Chome (2020) and Aalders (2020) concur with our findings. Chome (2020) documented that students from Lamu had benefited from government scholarships courtesy of LAPSSET in their preparation to take up future employment opportunities that were to be generated by LAPSSET projects. Aalders (2020) stated that LAPSSET was providing incentives not only to semi-nomadic pastoralists to modernise but most importantly, to mobilise capital that would spur employment opportunities for educated children from pastoralist communities.

Terrestrial Flora and Fauna

Construction of road infrastructure projects under LAPSSET was predicted could negatively affect terrestrial flora and fauna. To mitigate the potential negative impacts on terrestrial flora and fauna, targeted planting of trees in public spaces was to be done to offset those that could be lost during the construction of the two roads and parts of the Lamu port. Further, the establishment and gazettement of wildlife corridors were envisaged to safeguard wildlife movement. Whereas these safeguards were supposed to be implemented simultaneously with project implementation, none of them had been implemented. This finding concurs with the findings from the studies of Owino (2019) and Mkutu (2021). Owino (2019) investigated the effects of LAPSSET on the communities in Isiolo County and found that the Isiolo-Marsabit-Moyale Road, one of the highways constructed under LAPSSET, was a physical barrier that negatively affected the movement of wild animals from conservancies in neighbouring counties of Samburu and Laikipia to those in Isiolo. Samburu, Isiolo, and Laikipia Counties are home to a significant number of community wildlife conservancies (Mkutu, 2021).

Owino's findings alluded that the Government of Kenya failed to set aside wildlife animal corridors as a safeguard measures for the safe movement of wildlife (Owino, 2019, p. 55). Failure to gazette wildlife corridors has resulted in depressed movement and dispersion of wildlife resulting in a declining population of buffalos at the Buffalo Springs National Reserve. Likewise, Mkutu (2021) observed that the Isiolo-Moyale Road had blocked elephant movements near the National Buffalo Reserve. Restricted movement of the animals will, over time, lead to inbreeding and weakening of the gene pool, a consequence of interfering with access to water sources, breeding, and lactating sites (Mkutu, 2021, p. 31). Like many infrastructure corridors, LAPSSET is a corridor encompassing a network of transport infrastructure projects whose development was to meet growing human population needs; however, the project faced the difficult challenge of encroaching on traditional wildlife areas (Okita-Ouma *et al.,* 2016).

Manyara (2021) observed that implementing Lamu Port and other associated infrastructure projects under LAPSSET could potentially result in environmental and social impacts that could negatively affect wildlife and biodiversity in general. Manyara's concern was the institutional and capacity challenges faced by the institution mandated to monitor and coordinate environmental matters NEMA. Manyara maintains that such challenges have curtailed NEMA's effectiveness in enforcing mitigation measures to minimise potential negative impacts. Lack of oversight from NEMA was arguably the underlying reason behind the poor or no implementation of safeguards proposed to mitigate negative impacts from various LAPSSET projects, including terrestrial flora and fauna. Bastille-Rousseau *et al*. (2018) state that the development of transport corridors such as LAPSSET negatively impacts wildlife and their ecosystems. Whereas it is not possible to eliminate the ecological impacts of infrastructure projects on wildlife, mitigation of the impacts is critical in reducing their effects on ecological systems (Clevenger & Huijser, 2011).

Road construction and use affect not only biotic components of the ecosystem but also abiotic components and ecological systems (Coffin, 2007; Seiler, 2001). In terrestrial ecosystems, the ecological effects of roads resonate substantial distances from the actual road, besides creating habitat fragmentation and ensuing fragmentation (Trombulak & Frissell, 2000). Road development has both direct and indirect effects on biota

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(Bennett, 1991; Trombulak & Frissell, 2000). Roads directly affect plants and animal pupations by obliterating the ecosystems in their path (Coffin, 2007; Trombulak & Frissell, 2000). Roads, once constructed and in use, become barriers and or filters to the movement of some animals (Richard *et al.*, 1998), causing fragmentation (Underhill & Angold, 2000), making areas adjacent to infrastructure hostile to wildlife as they are disturbed environments (Seiler, 2001; Trombulak & Frissell, 2000). However, biodiversity offsets enhance environmental values in scenarios where development is planned despite obvious detrimental environmental impacts (Kiesecker *et al.*, 2010).

Archaeological Historical and Cultural Sites

LAPSSET projects, from their sheer size and footprint coupled with proximity to Lamu World Heritage Site, were seen as a major threat to the existence of the World Heritage site besides potential negative impacts on both the tangible and intangible heritage. Comprehensive Heritage Impact Assessment (HIA) and Archeological Impact Assessment (AIA) for all sites for projects under LAPSSET were to be carried out, and findings and recommendations from the assessment studies were implemented. Further, procedures and protocols were to be developed and documented to guide the collection, conservation, and protection of artefacts encountered during project implementation. This could protect archaeological, historical, and cultural sites and our heritage as the LAPSSET project implementation progresses. Whereas HIA was carried out, the recommendation that its findings be adopted as an annexe to ESMP of the ESIA report for the Lamu port to ensure implementation of recommendations was not done. International best practices envisage that the implementation of large-scale infrastructure projects ensures the protection and preservation of tangible and intangible cultural heritage (Mohamad *et al*., 2022, p.231).

However, the study found that the safeguard on AIA was not implemented; and no AIA was carried out for any of the sites of the three LAPSSET projects. Further, no procedures were developed nor protocols put in place that contractors could deploy to collect, preserve and hand over to NMK encountered artefacts. Key informant interview with the Curator Lamu Museum revealed that archaeological remains were uncovered during the opening up of the port access road, including building foundations, tombs, and human skeletons. In the absence of an AIA prior to project implementation and documented procedures and protocols on the handling of an encountered material of archaeological importance, the encountered archaeological material could not be secured and preserved for posterity. These findings, to a large extent, explain the findings of works by Wanderi (2019), Bekker *et al.* (2015) and Kamau and Khsiebi (2022). Wanderi (2019) concluded that LAPSSET was a major threat to the conservations of Lamu Old Town. Kamau and Khsiebi (2022) describe the fears of local people regarding the consequences of Lamu Port development ranging from cultural assimilation and dilution as a result of the influx of migrant workers from other parts of the country into Lam to the eventual destruction of Lamu Town as UNESCO World Heritage Site.

These fears can be attributed to the lack of implementation of mitigation measures to safeguard both the tangible and intangible heritage. While confirming that a Heritage Impact Assessment was carried out prior to the implementation of the LAPSSET project, Bakker *et al.* (2015) cautioned that the LAPSSET project had many direct and indirect potential impacts on the setting of the World Heritage property and on its cultural and natural heritage. Further, Wanderi (2019) observed that the failure of the proponent of LAPSSET to fully disclose possible negative impacts of LAPSSET on the local culture and on the outstanding universal value of the Lamu World Heritage site and the meaningful involvement of the local community in the design phase of the project resulted in the project being challenged in court.

Sociocultural and Political Issues

The ESMP for the construction of the first three berths of Lamu Port and associated infrastructure was proposed to safeguard sociocultural and political issues as well as a well-defined benefit-sharing system with the community. To implement the compensatory mechanism, the Lamu Port Steering Committee was to be instituted and involved in the decision-making process, a clear policy on community consultation and involvement

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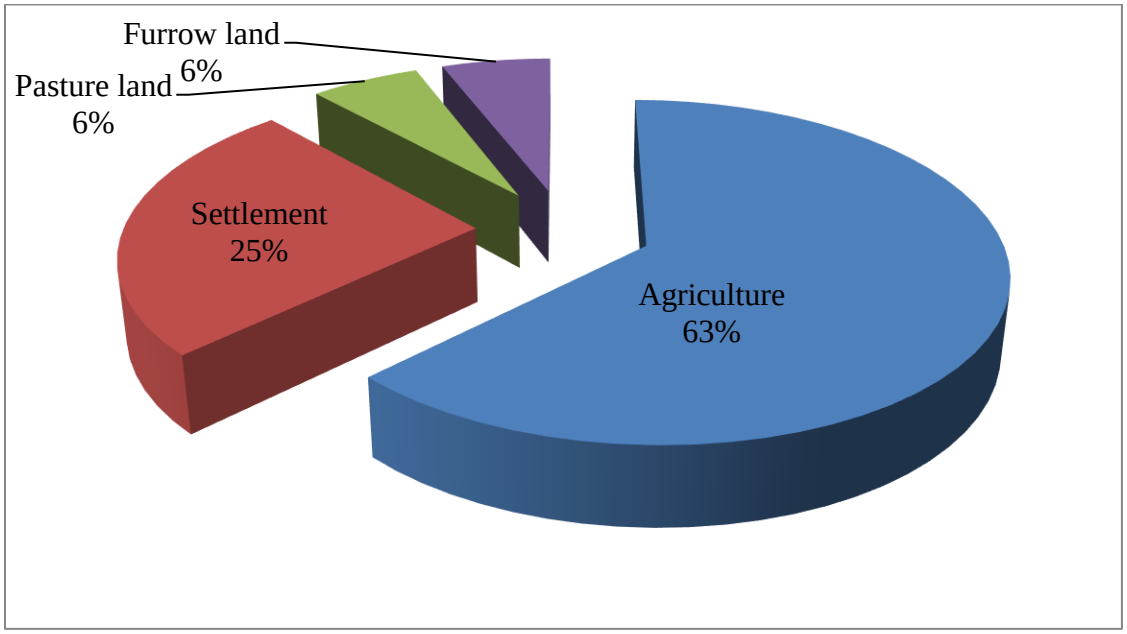
was to be developed, natural resource-related conflicts were to be addressed before initiating any project, and establishment of community grievances redress mechanism and integration of community development projects. Our findings were that none of these safeguards had been implemented. This finding concurred with that of Kamau and Khsiebi (2022) and Thoya *et al.* (2022). Kamau and Khsiebi (2022), reporting on how local people were involved in participatory communication, found that local community involvement in participatory communications needs assessment was minimal. Thoya *et al*. (2022), in their work, found out that the Lamu fishing community leadership felt that they were excluded from Lamu port governance issues as they were not adequately consulted and fully involved during the planning process for the port.

Borrow Sites for Construction Materials

Gravel, ballast, and boulders used in the construction of Lamu Port and associated road infrastructure projects were sourced from local farms in the Hindi area and its neighbourhood. The ESMP stipulated that borrow pits be located away from human settlement areas, be fenced to stop authorised access and be rehabilitated once material extraction was complete to protect landowners from adverse negative impacts of gravel and other construction materials extraction from the borrow site. Contrary to the safeguards requirement of locating borrow pits away from human settlement areas, 25% of the borrow pits in Hindi were located in close proximity to settlement areas as shown in figure 2. This clearly showed that this safeguard was not implemented as envisaged. A borrow pit located adjacent to a residential area was a safety hazard, a security risk, and a potential mosquito breeding area as it collected and retained stormwater whenever it rained. Local residents were exposed to the risk of incidences of unsuspecting people and livestock falling into the open borrow pits. Also, the borrow pits were potential hideouts of criminals and those preparing to conduct acts of lawlessness. Due to this, the security and safety of local residents were being compromised. When it rained, the open borrow pits collected stormwater runoff which could accumulate to form small ponds. The ponds were not only a safety risk to local residents and livestock alike but also mosquito breeding areas.

Figure 2: Land use adjacent to borrow pits



None of the nine borrow pit operators had fenced any of the open borrow pits (both those active and inactive) from unauthorised access. This exposed local residents and their livestock to the risk of falling into the open pits. Whereas material extraction was concluded in most of the borrow pits, less than 10% of the borrow pits in Hindi and Witu areas were fully rehabilitated (*Figure 3* and *Figure*

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4). The lack of rehabilitation of disused borrow pits denied the land owner the opportunity to make economic use.

Figure 3: Rehabilitation status of borrow pits for each operator

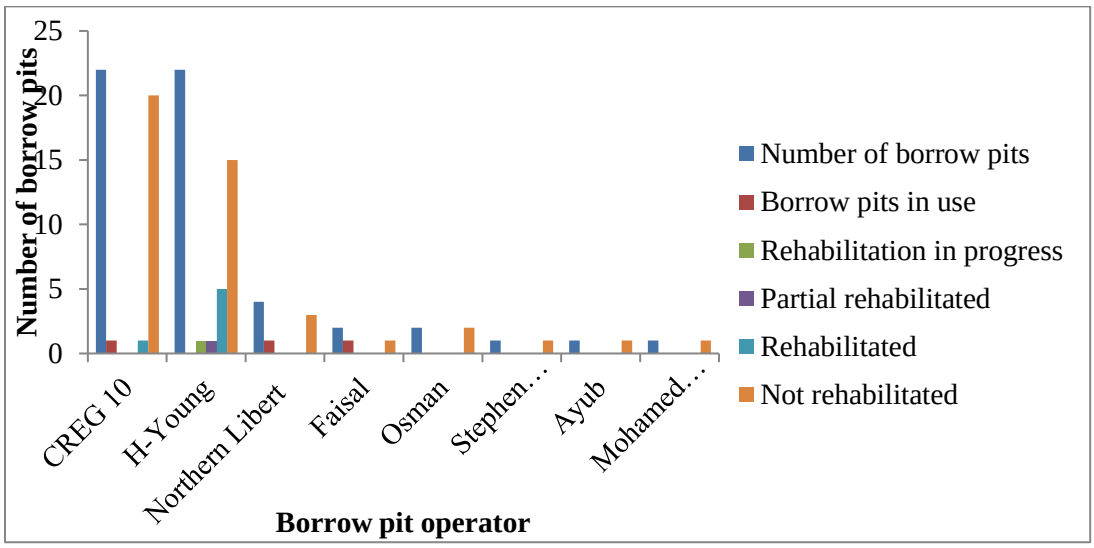
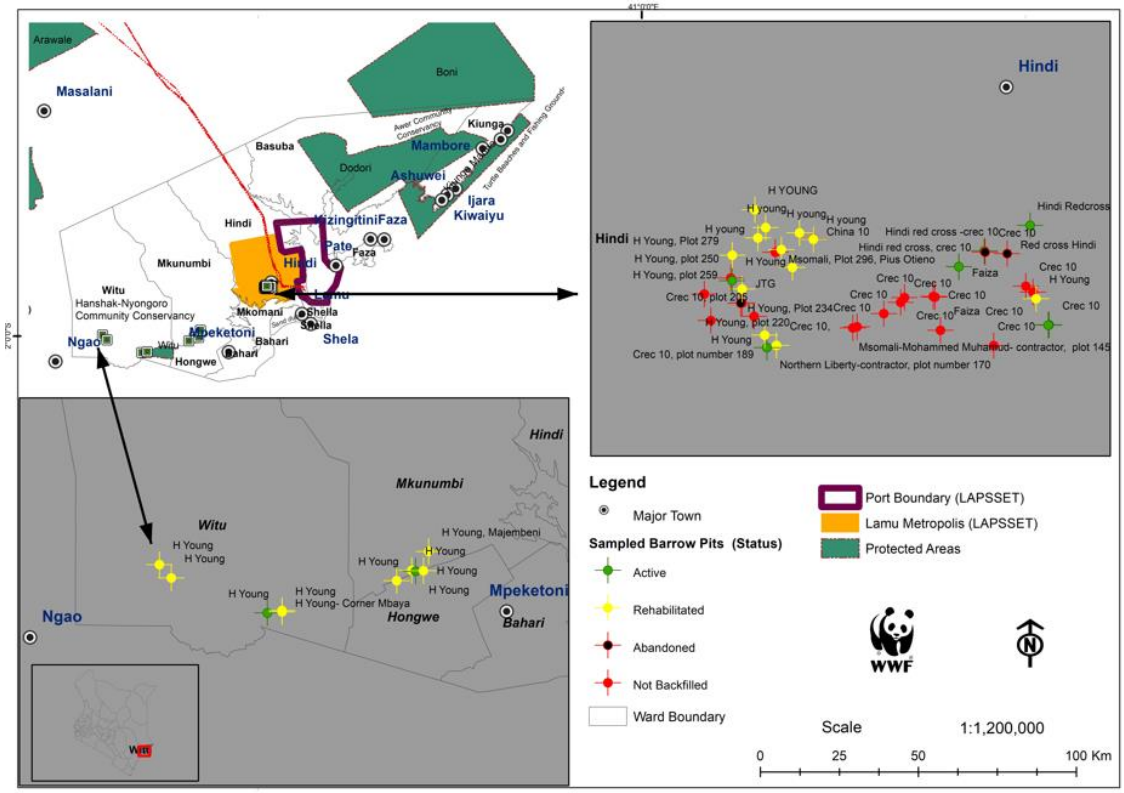


Figure 4: Distribution of borrow pits in Hindi, Mkunumbi and Witu areas and their status of rehabilitation



Source: generated from field data

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The ambitious plan of successive governments of the Republic of Kenya to expand, upgrade and modernise the country's road infrastructure has, over time seen an increase in demand for road construction material all over the country (Kiptum & Ndiema, 2019). The ongoing implementation of LAPSSET corridor projects which include, among others, a network of highways (Le, 2016; Aalders *et al*., 2021; Mkutu, 2021), has resulted in increased demand for gravel, ballast, and other road construction materials. While borrow pits are sources of road construction materials such as gravel and aggregates (Steenbergen. 2017), an increase in road construction activities in developing countries has seen an increase in abandoned borrow pits and associated risks (Nwachukwu *et al*., 2017). Whereas abandoned borrow pits can be of some incidental positive use such as holding stormwater that can be useful in dry spells for watering livestock, among other domestic uses, such borrow pits pose serious threats such as the drowning of children playing around them (Kiptum and Ndiema, 2019).

CONCLUSIONS

The research provided insights into the state of implementation of safeguards for the first mega infrastructure projects being implemented in Kenya under the LAPSSET Corridor. Programme. Result deduced poor or no implementation of the safeguards. This situation can be concluded to have been brought about by various factors including (i) poor or lack of supervision and enforcement from relevant agencies such as NEMA, LCDA, KPA, KFS, KeNHA and NMK; (ii) lack of environmental and social consciousness of the contractors; and (iii) lack of adequate budget specifically for safeguards implementation.0

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REFERENCES

Aalders, J. T. (2021). Building on the ruins of empire: The Uganda railway and the LAPSSET corridor in Kenya. *Third World Quarterly, 42*(5), 996-1013. doi:10.1080/01436597.2020.1741345

Ali, M., David, M. K., & Ching, L. L. (2013). Using the Key Informants Interviews (KIIs) Technique: A Social Sciences Study with Malaysian and Pakistan. *Man and Society, 24*, 131-148.

Bakker, K. A., Odiaua, L., & Abungu, G. (2015). *Heritage Impact Assessment for the proposed Lamu Port-South Sudan-Ethiopia Transport (LAPSSET) and the new Lamu Port and Metropolis Development Project as well as related development projects in the Lamu Archipelago, Kenya*. Unpublished Report.

Bastille-Rousseau, G., Wall, J., Douglas-Hamilton, I., & Wittemyer, G. (2018). Optimising the positioning of wildlife crossing structures using GPS telemetry. *Journal of Applied Ecology*, *55*(4), 2055-2063. https://doi.org/10.1111/1365-2664.13117

Bennett, A. F. (1991). Roads, roadsides and wildlife conservation: a review. In D. A. Saunders & R. J. Hobbs (Eds.), *Nature Conservation 2: The Role of Corridors* (pp. 99-117). Chipping Norton, Australia, Surrey Beatty.

Bennett, N. J., Blythe, J., White, C. S., & Campero, C. (2021). Blue growth and blue justice: Ten risks and solutions for the ocean economy. *Marine Policy*, *125*, 104387. https://doi.org/10.1016/j.marpol.2020.104387

Bluman, A. (2017). *Elementary statistics: A step by step approach*. McGraw-Hill Education.

Article DOI: https://doi.org/10.37284/eajenr.5.1.829

Chome, N. (2020). Land, livelihoods and belonging: Negotiating change and anticipating LAPSSET in Kenya's Lamu County. *Journal of Eastern African Studies*, *14*(2), 310-331. https://doi.org/10.1080/17531055.2020.1743068

Clevenger, A. P., & Huijser, M. P. (2011). *Wildlife crossing structure handbook design and evaluation in North America (No. FHWA-CFL-TD-11-003)*. United States. Federal Highway Administration. Central Federal Lands Highway Division.

Coffin, A. W. (2007). From roadkill to road ecology: A review of the ecological effects of roads. *Journal of Transport Geography*, *15*(5), 396- 406. https://doi.org/10.1016/j.jtrangeo.2006.11.006

Dann, P., & Riegner, M. (2019). The World Bank's environmental and social safeguards and the evolution of global order. *Leiden Journal of International Law*, *32*(3), 537-559. https://doi.org/10.1017/s0922156519000293

DCP Kenya. (2019). *Development Corridors in Kenya - A Scoping Study. A Country Report of the Development Corridors Partnership (DCP). Contributing authors: Daniel Olago, Lucy Waruingi, Tobias Nyumba, Catherine Sang, Yvonne Githiora, Mary Mwangi, George Owira, Francis Kago, Sherlyne Omangi, Jacob Olonde and Rosemary Barasa. Institute for Climate Change and Adaptation (ICCA) the University of Nairobi and African Conservation Centre (ACC), Nairobi, Kenya*. e-Published by WCMC, Cambridge, UK.

Duarte, C. M. (2002). The future of seagrass meadows. *Environmental Conservation*, *29*(2), 192- 206. https://doi.org/10.1017/s0376892902000127

Eccleston, C. H., & March, F. (2011). *Global environmental policy: Concepts, principles, and practice*. CRC Press.

Enns, C. (2017). Infrastructure projects and rural politics in northern Kenya: The use of divergent expertise to negotiate the terms of land deals for transport infrastructure. *The Journal of Peasant Studies*, *46*(2), 358- 376. https://doi.org/10.1080/03066150.2017.1377185

Erftemeijer, P. L., & Robin Lewis, R. R. (2006). Environmental impacts of dredging on seagrasses: A review. *Marine Pollution Bulletin*, *52*(12), 1553-1572. doi:10.1016/j.marpolbul.2006.09.006

Fadhil, A. M., Mwaguni, S., & Kisimbii, J. M. (2018). Determinants of successful implementation of infrastructure projects in Kenya: the case of LAPSSET project, Lamu Port. *International Journal of Novel Research in Humanity and social Sciences*, *5*(5), 196-214.

Isaac, S., & Michael, W. B. (1995). *Handbook in research and evaluation: A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences* (3rd ed.).

Kamau, M. M., & Khsiebi, A. K. (2022). Voicing participation in large-scale infrastructural projects: A contextualisation of participatory communication in Lamu Port, Kenya. *Journal of Media and Communication Studies*, *14*(2), 53-67. https://doi.org/10.5897/jmcs2022.0765

Kiesecker, J. M., Copeland, H., Pocewicz, A., & McKenney, B. (2010). Development by design: Blending landscape-level planning with the mitigation hierarchy. *Frontiers in Ecology and the Environment*, *8*(5), 261-266. https://doi.org/10.1890/090005

Kiptum, C. K., & Ndiema, K. M. (2019). Assessing Suitability of Abandoned Borrow Pits In Mt. Elgon Region For Economic Activities In Kenya. *International Journal of Innovative Research and Advanced Studies (IJIRAS)*, *6*(4), 144-148. ISSN: 2394-4404

Kirchherr, J., Matthews, N., Charles, K. J., & Walton, M. J. (2017). "Learning it the hard way": Social safeguards norms in Chinese-led dam projects in Myanmar, Laos and Cambodia. *Energy Policy*, *102*, 529-539. https://doi.org/10.1016/j.enpol.2016.12.058

Kituo Cha Sheria. (2014). *Baseline survey on human rights violation along LAPSSET*

Article DOI: https://doi.org/10.37284/eajenr.5.1.829

Corridor. http://kituochasheria.or.ke/wp-content/uploads/2016/04/Baseline-survey-final-version.pdf

Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International.

Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners*. SAGE.

Le, D. (2016). Environmental and social risks of Chinese official development finance in Africa: The case of the Lamu Port project, Kenya. *African Review of Economics and Finance*, *8*(1), 106-128.

Manap, N., & Voulvoulis, N. (2016). Data analysis for environmental impact of dredging. *Journal of Cleaner Production*, *137*, 394-404. https://doi.org/10.1016/j.jclepro.2016.07.109

Manyara, W. (2021). *Protecting environmental justice in light of developmental agendas: The case of LAPSSET Lamu Port*. https://su-plus.strathmore.edu/handle/11071/12336

Marbà, N., Arias-Ortiz, A., Masqué, P., Kendrick, G. A., Mazarrasa, I., Bastyan, G. R., & Garcia-Orellana, J. (2015). Impact of seagrass loss and subsequent revegetation on carbon sequestration and stocks. *Journal of Ecology*, *103*(2), 296-302. https://doi.org/10.1111/1365-2745.12370

Mishra, L. (2016). Focus group discussion in qualitative research. *TechnoLearn: An International Journal of Educational Technology*, *6*(1), 1. https://doi.org/10.5958/2249-5223.2016.00001.2

Mohamad, D., Sanggoro, H. B., Rustendi, I., & Pramono, S. A. (2022). The World Bank - Environment and social framework: Expectations and realities of implementing environmental and social safeguards in infrastructure projects in Indonesia. **International Journal of Sustainable Development and Planning**, 17(1), 225-234. https://doi.org/10.18280/ijsdp.170122

Mkutu, K. (2021). *Anticipation, participation and contestation along the LAPSSET infrastructure corridor in Kenya* (BICC Working Paper, 4/2021). https://nbn-resolving.org/urn:nbn:de:0168-ssoar-78075-6

Müller-Mahn, D., Mkutu, K., & Kioko, E. (2021). Megaprojects—mega failures? The politics of aspiration and the transformation of rural Kenya. *The European Journal of Development Research*, *33*(4), 1069-1090. https://doi.org/10.1057/s41287-021-00397-x

Ochiewo, J., Munyi, F., Waiyaki, E., Kimanga, F., Karani, N., Kamau, J., & Mahongo, S. B. (2020). Livelihood impacts and adaptation in fishing practices as a response to recent climatic changes in the upwelling region of the East African coastal current. *Western Indian Ocean Journal of Marine Science*, (1/2020), 105-125. https://doi.org/10.4314/wiojms.si2020.1.10

Okita-Ouma, B., Lala, F., Moller, R., Koskei, M., Kiambi, S., Dabellen, D., & Leadismo, C. (2016). Preliminary indications of the effect of infrastructure development on ecosystem connectivity in Tsavo National Parks, Kenya. *Pachyderm Journal*, *57*, 109-111. https://pachydermjournal.org/index.php/pachyderm/article/view/396

Olalekan, R. M. (2020). Governing the environmental impact of dredging: Consequences for marine biodiversity in the Niger delta region of Nigeria. *Insights in Mining Science & Technology*, *02*(2). https://doi.org/10.19080/imst.2020.02.555586

Onditi, F. (2018). The balance between resource development and environmental protection is "Social contracting": The case of LAPSSET project in Kenya. *Environment and Social Psychology*, *3*(1). https://doi.org/10.18063/esp.v3.i1.597

Orth, R. J., Carruthers, T. J., Dennison, W. C., Duarte, C. M., Fourqurean, J. W., Heck, K. L., … Hughes, A. R. (2006). A global crisis for seagrass ecosystems. *BioScience*, *56*(12), 987. https://doi.org/10.1641/0006-3568(2006)56[987:agcfse]2.0.co;2

Article DOI: https://doi.org/10.37284/eajenr.5.1.829

Owino, E. A. (2019). *The Implications of Large-Scale Infrastructure Projects to the Communities in Isiolo County: The Case of Lamu Port South Sudan Ethiopia Transport Corridor. United States International University-Africa* (Master's thesis). https://erepo.usiu.ac.ke › bitstream › handle

Passoni, C., Rosenbaum, A., & Vermun, E. (2016). Empowering the inspection panel: The impact of the World Bank's new environmental and social safeguards. *International Law and Politics*, *49*, 921-958. https://heinonline.org/hol-cgi-bin/get_pdf.cgihandle=hein.journals/nyuilp49&section=29

Pastor, A., Larsen, J., Mohn, C., Saurel, C., Petersen, J. K., & Maar, M. (2020). Sediment transport model quantifies plume length and light conditions from mussel dredging. *Frontiers in Marine Science*, *7*. https://doi.org/10.3389/fmars.2020.576530

Rajamani, L. (2011). The Cancun climate agreements: Reading the text, subtext and tea leaves. *International and Comparative Law Quarterly*, *60*(2), 499-519. https://doi.org/10.1017/s0020589311000078

Rees, S. E., Rodwell, L. D., Searle, S., & Bell, A. (2013). Identifying the issues and options for managing the social impacts of marine protected areas on a small fishing community. *Fisheries Research*, *146*, 51-58. https://doi.org/10.1016/j.fishres.2013.04.003

Richard, T., Forman, T., & Alexander, L. E. (1998). Roads and their Major Ecological Effects. *Annual Reviews Ecological Systems*, *29*, 207-231. https://www.jstor.org/stable/221707

Rodden, V. (2014). *Analysing the dynamics of the artisan fishing industry and LAPSSET port in lamu* (Kenya: Independent Study Project (ISP) Collection 1765).

Sandelowsk, M. (2000). Focus on Research Methods Whatever Happened to Qualitative Description? *Research in Nursing & Health*, 23, 334-340.

Seiler, A. (2001). *Ecological Effects of Roads A review* (9). https://www.researchgate.net/profile/Andreas- Seiler- 2/publication/240639937_Ecological_Effects_of_Roads_A_review/links/0deec532d4ebd70592000000/Ecological-Effects-of-Roads-A-review.pdf

Shinn, H., & Clarke, L. (2020). *ESA-Listed Species in Manda Bay, Lamu Archipelago, Kenya Bibliography*. https://doi.org/10.25923/5mxx-s153

Short, F. T. (2003, March). *Loss and restoration of seagrass ecosystems*. Paper presented at 5th International Conference on Environmental Future (5th ICEF), Zurich, Switzerland.

Souza, T. N., & Oliveira, V. D. (2010). Environmental conflict between artisan marine fishing activities and the implementation of port activities in northern Rio de Janeiro state. *Boletim do Observatório Ambiental Alberto Ribeiro Lamego*, *4*(2), 219-229. https://doi.org/10.5935/2177-4560.20100021

Steenbergen, F. (2017). *Road-Side Borrow Pits as Ponds for Off-Season Small-Scale Irrigation*. https://roadsforwater.org/road-side-borrow-pits-as-ponds-for-off-season-small-scale-irrigation/

Thoya, P., Horigue, V., Möllmann, C., Maina, J., & Schiele, K. S. (2022). Policy gaps in the East African blue economy: Perspectives of small-scale fishers on port development in Kenya and Tanzania. *Frontiers in Marine Science*, *9*. https://doi.org/10.3389/fmars.2022.933111

Thoya, P., Pérez-Jorge, S., Okemwa, G., Mwamlavya, H., Tuda, A., Wambiji, N., & Maina, J. (2020). Spatial patterns and environmental risks of ringnet fishing along the Kenyan Coast. *African Journal of Marine Science*, *42*(1), 23-33. doi:10.2989/1814232x.2019.1705392

Todd, V. L., Todd, I. B., Gardiner, J. C., Morrin, E. C., MacPherson, N. A., DiMarzio, N. A., & Thomsen, F. (2014). A review of impacts of marine dredging activities on marine mammals. *ICES Journal of Marine*

Article DOI: https://doi.org/10.37284/eajenr.5.1.829

Science, *72*(2), 328-340. https://doi.org/10.1093/icesjms/fsu187

Trombulak, S. C., & Frissell, C. A. (2000). A review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology*, *14*(1), 18-30. https://conbio.onlinelibrary.wiley.com/doi/abs/10.1046/j.1523-1739.2000.99084.xm

Underhill, J., & Angold, P. (2000). Effects of roads on wildlife in an intensively modified landscape. *Environmental Reviews*, *8*(1), 21-39. https://doi.org/10.1139/ER-8-1-21

Walker, D., & McComb, A. (1992). Seagrass degradation in Australian coastal waters. *Marine Pollution Bulletin*, *25*(5-8), 191-195. https://doi.org/10.1016/0025-326x(92)90224-t

Wanderi, H. (2019). Lamu Old Town: Balancing Economic Development with Heritage Conservation. *Journal Of World Heritage Studies*, 16-22. http://doi.org/10.15068/00157681

World Bank. (2005). *The World Bank Operations Manual*. The World Bank, New York 1–553.

World Bank. (2016). *Environmental and Social Framework*. https://thedocs.worldbank.org/en/doc/837721522762050108- 0290022018/original/ESFFramework.pdf

