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Evaluating the Ecological and Socioeconomic Effects of Wetland Restoration on Artisanal Fisheries in Watamu, Kenya

Overview

Artisanal fisheries are the backbone of Kenya's fish production, supporting the livelihoods of over 27,000 active fishers, with marine artisanal fishing accounting for the highest share of output. However, fish stocks have been declining over the years, threatening both food security and the sector's contribution to the national economy. This makes the protection of artisanal fisheries essential. Communities like Watamu, where 60% of households depend on artisanal fishing, have been particularly hard hit by this decline.

To address this, mangrove restoration has been identified as a key strategy for preserving marine resources, given that mangroves serve as critical breeding grounds for fish. Under the National Mangrove Ecosystem Management Plan (NMEP) 2017–2027, the government aims to rehabilitate degraded mangrove areas and incorporate them into national climate mitigation and coastal resilience efforts. Recent assessments show that over 8,000 hectares of mangroves have been restored along Kenya's coast, marking significant progress toward these goals. However, what are the lived ecological and socioeconomic effects of wetland restoration?

Background

This policy brief presents evidence on the ecological and socioeconomic effects of mangrove restoration on artisanal fishers in Watamu, Kenya. The study conducted in Mida, Dabaso (Restored) and Magangani (Unrestored) employed mixed-methods approach. Ecological data were collected through a systematic layout of 30 belt transects (10 per site), each with 10×10 m plots, to assess mangrove stem density and structural complexity.

Socioeconomic data were collected through semi-structured interviews with 50 (20 from Mida; 20 from Dabaso; 10 from Magangani) marine artisanal fishers and 27 key informants (including Beach Management Units (BMU) officials, Kenya Wildlife Service (KWS), and Kenya Fisheries Service (KFS) officers) designed to capture fishers' perceptions on wetland restoration effectiveness, changes in fish catch and income trends, livelihood diversification, management strategies and perceived impacts of mangrove restoration.

Key recommendations

- **Livelihood diversification** County government and fisheries stakeholders should introduce targeted diversification programs in Magangani, encompassing aquaculture, eco-tourism, mangrove beekeeping, and fish processing, to reduce dependence on artisanal fishing where alternative income adoption remains low.
- **Barnacle-resistant planting** Given observed barnacle colonization on the mangrove species *Rhizophora mucronata*, restoration programs should prioritize *Avicennia marina* as a resilient alternative. Its smooth bark inhibits larval attachment, making it better suited to affected areas.
- **Increased community awareness** Fisheries and environmental agencies should scale up education programs on mangrove–fishery linkages and sustainable fishing practices, with targeted outreach in villages where awareness levels remain low.
- **Long-term research** Further research is needed to assess the long-term socioeconomic and ecological impacts of mangrove restoration, particularly regarding fisheries sustainability, household income dynamics, and ecosystem recovery trends.

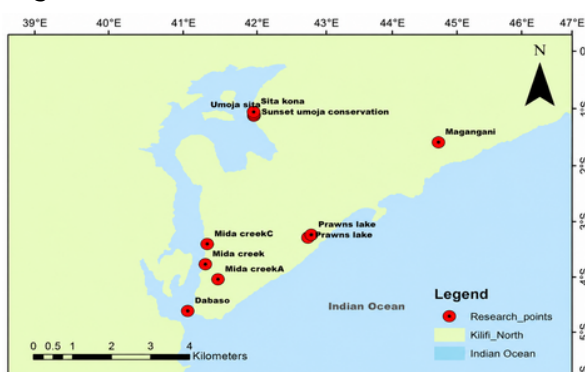


Fig. 1. Map of Watamu showing the study sites



KEY FINDINGS

Ecological assessments found that restored mangrove sites at Mida and Dabaso had substantially higher stem densities (4,600 and 4,100 stems per hectare, respectively) and greater species diversity than the non-restored site at Magangani, which recorded only 2,300 stems per hectare.

Interviews with artisanal fishers revealed a marked decline in fish catches and an increase in fishing distances compared with three years ago, suggesting growing pressure on local fisheries. While mangrove restoration efforts have generated localized ecological benefits, fish stocks across the wider region continue to show an overall decline. Statistical analysis confirmed a significant reduction in catches over the three-year period (paired t-test: $t(49) = -9.66, p < 0.001$), with average catches decreasing by 6.52 kg per fishing trip. Nevertheless, fishers reported increases in the abundance of several species since restoration activities began, including tilapia (Ngege), mangrove snapper (Tembo), parrotfish (Chaa), squid (Ngisi), and catfish (Kambale). These perceptions suggest that communities associate mangrove restoration with improvements in species that rely on shallow, sheltered, and nutrient-rich coastal habitats.

Fishers' perceptions further underscore the importance of mangrove ecosystems to household well-being. As illustrated in Figure 2, 76% of respondents reported that mangroves play a major role in supporting their livelihoods, highlighting strong community recognition of the economic and ecological benefits derived from restored mangrove habitats. Although, restored mangrove wetlands contribute positively to the livelihood resilience of artisanal fishers, the relationship is relatively weak and influenced by broader socioeconomic and environmental factors. Regression analysis revealed a positive and statistically significant association between mangrove restoration and livelihood resilience ($\beta = 0.314, p < 0.05$), with the model explaining 8.9% of the observed variation in livelihood outcomes ($R^2 = 0.089$) (Table 1). These findings suggest that while mangrove restoration supports livelihoods, its effects are moderated by other structural factors affecting fishing communities.

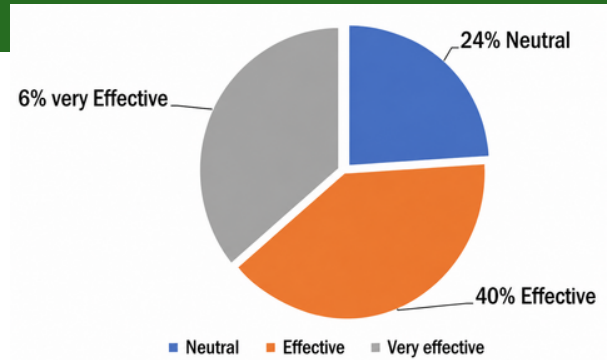


Fig. 2. Perceived effectiveness of mangrove restoration on livelihoods

Table 1: Regression analysis of restored wetland ecosystems and livelihood resilience among marine artisanal fishers' households

Source	SS	Df	MS	Number of obs	50
Model	5.621	1	5.621	F (1, 48)	37.856
Residual	57.614	48	0.148	Prob > F	0.000
Total	63.235	49	0.163	R-squared	0.089
				Adj R-squared	0.087
				Std. Error	0.3853
				Cohen's F ²	0.098
Variable	Coef.	Std. Err.	Beta	t	P > t
Constant	1.298	0.108	-	12.059	0.000
Restored Wetland Ecosystems	0.314	0.051	0.298	6.153	0.000

Interviews with management indicated that mangrove conservation and wild fisheries monitoring are implemented through a co-management framework involving BMUs, CBOs, and KWS. While restored mangrove areas have improved habitats for species such as Tilapia and Mangrove snapper, regional fish stocks continue to decline due to sustained fishing pressure. Nevertheless, restoration efforts have contributed to improved household incomes and strengthened the livelihood resilience of artisanal fishers.

CONCLUSION

Mangrove restoration in Watamu has improved ecological conditions by increasing stem density, species richness, and habitats for key fish species. It also has been perceived to strengthen livelihoods among artisanal fishers, however, fish catches and incomes remain constrained by continued fishing pressure. To enhance long-term benefits, policy reforms should promote livelihood diversification, strengthen community awareness and co-management, prioritize resilient mangrove species such as *Avicennia marina*, and support long-term monitoring and research.

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