

Multi-stakeholder approach in natural resources management: The case of Mida creek and Gongoni-Marereni Mangrove Ecosystems in Kilifi County, Kenya

ABSTRACT

Multi-stakeholder approach has an overall improvement in conservation and management of mangrove forests resources, more so with a functional coordination framework among stakeholders. Mida creek and Gongoni-Marereni sites were compared in terms of the presence of the multi-stakeholders and the level of coordination and cooperation among stakeholders in conservation of mangrove forests. Data was gathered through a semi-structured interview questionnaire from Key Informants from the stakeholders present in the two sites. The data collected captured stakeholder presence on site, participation in mangrove conservation, and coordination and cooperation with others. There was a variation in multi-stakeholder participation in the two sites. Gongoni-Marereni site had less stakeholders compared to Mida creek which had more, with the latter having a greater participation of stakeholders. The Gongoni-Marereni site mangroves were degraded while in Mida creek had healthy mangroves.

Key words: multi-stakeholder, approach, resources, mangrove, ecosystem

INTRODUCTION

Globally, the mangrove forests have significant ecological and economic roles. Various benefits such as improved livelihood, timber, poles, Charcoal, fuel wood, habitat, shore line protection, traditional medicine, nursery, and carbon sequestration are derived from mangroves (Government of Kenya, 2017). Extraction of mangroves has continued over the years with relative increase in demand for their products and conversion to other land uses. Loss and degradation of mangroves is caused by overexploitation, land conversion for other uses, climate change and pollution (UNEP, 2020).

Current global estimates indicate a 14.8 million hectares of mangrove forests cover. From the years 1990 to 2020, about 1.04 million hectares of mangrove forest cover were lost globally. Africa has had a 2330 haper year loss of mangrove forest cover between years 2010 and 2020. The largest mangrove forests are in Asia having 5.55million hectares and Africa with 3.24 million hectares. 40% of the world mangrove forests are in four countries which are Indonesia, Brazil, Nigeria and Mexico (FAO, 2020).

Mangrove forest ecosystems cover is larger in the northern Kenya coast region with about 67% of the total cover in Lamu – Kiunga and Tana Delta in Lamu and Tana River Counties, while the rest are in Kilifi, Mombasa and Kwale Counties (FAO, 2016). The total mangrove forest cover in Kenya coast region is about 530 square Kilometres (Tayloret *al.*, 2003). Kenya has ten of the mangrove species that occur in the East African Coast (Kairo & Dahdouh-Guebas, 2004). Mangrove forests are in Mtwapa creek, Takaungu, Kilifi creek, Mida creek, Sabaki, Ngomeni, Gongoni and Marereniin Kilifi County with an area coverage of 6000 ha along the coast line (County Government of Kilifi, 2018). Mida creek mangrove forest ecosystems cover an area of 1746 ha with species occurring in this locality (Kitheka *etal.*, 1999); and Warui (2011) recorded a mangrove forest loss of 105 ha (Erasto *et al.*, 2021). The Gongoni-Marereni (commonly referred to as Ngomeni area) mangrove ecosystems cover an area of about 4,240 ha, the largest in Kilifi County (Government of Kenya, 2017).

Multi-stakeholder approach in natural resources management is vital in decision-making, contributes to quality policy decisions and enhances policy acceptance during implementation (Healey, 1998; Holmes & Scoones, 2000). The engagement of multi-stakeholders helps in coordination of policies across sectors in conservation and management of mangrove forest ecosystems (Huxham *et al.*, 2015). Public participation increases confidence and enthusiasm in mangrove forests conservation and provides a focus for construction of common perspectives, agreed on solutions and interactions to reach consensus regarding the set objectives (Holmes & Scoones, 2000). Local communities have rich indigenous knowledge which enrich and complement scientific knowledge and techniques of mangrove forest resource management at the local level (Meadowcroft, 2004; Eddy *etal.*, 2016).

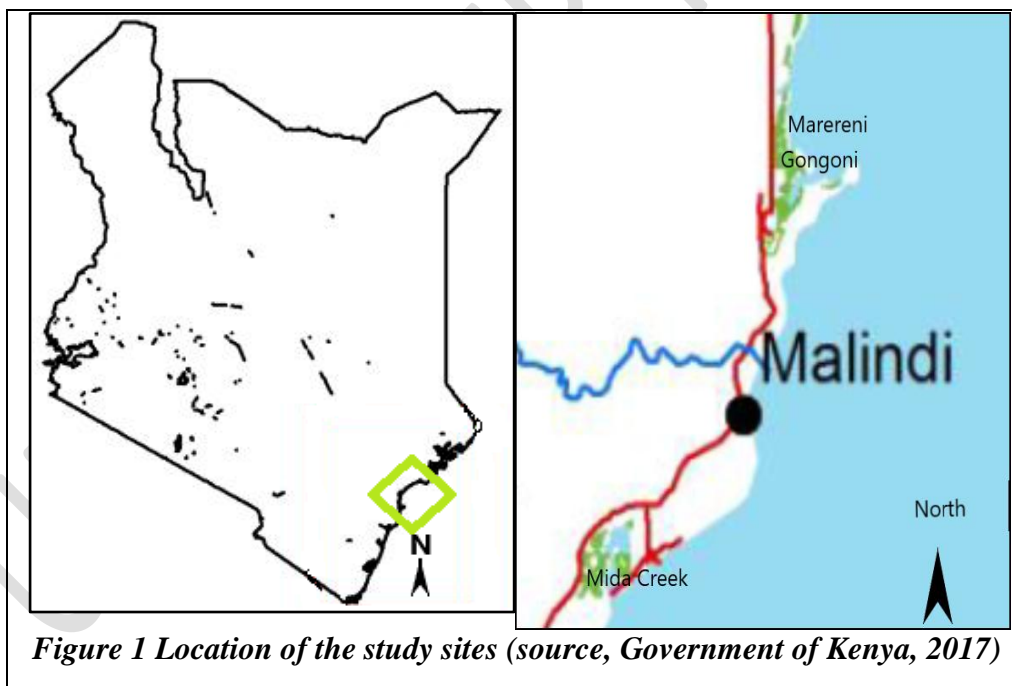
The local communities and private organizations play pivotal role in designing and implementing policies aimed at improving environmental management and pursuing sustainable development (Gaventa & Robinson, 1998; Cornwall & Gaventa, 2000). Through the National Forest Policy (NFP) and Integrated Coastal Zone Management (ICZM), the Kenya government commits itself to mangrove forest ecosystems management (Government of Kenya, 2017). The government has established various agencies dealing with forests and protected areas and are have mandate to manage coastal and marine resources including mangrove ecosystems. Kenya forest services is the government agency in charge of management of all forests in Kenya and in charge of coordination of other stakeholders in all

sectors (Government of Kenya, 2009). For a sustainable environmental conservation, multi-stakeholders which include the government, the private sector, civil society, community groups and ordinary citizens must work in collaboration (Tschentscher, 2016).

This study was seeking to establish if there was effective and efficient multi-stakeholder participatory management of mangrove forests in the Kenya Coast region. It involved comparison of site-specific mangrove forests multi-stakeholder participatory management to establish variations if they existed. This was in order to effectively address social and environmental concerns and achieve effective and efficient mangrove forests conservation and management in the Kenya Coast region.

STUDY AREA

Mida Creek and Gongoni-Marereni Mangrove forests ecosystems were the two sites in which the study was conducted, located in Kilifi County in the North Coast of Kenya. The two study sites are separated by a distance of about 68 km. Location of the two study sites is shown on the maps below, which are not to scale (Figure 1).



Mida creek is located at latitude $03^{\circ} 22^1$ S and longitude $039^{\circ} 58^1$ E in Kenya, East Africa. Creek area coverage is a total of 32 Km^2 including that covered by mangroves. Mangroves at Mida creek are separated naturally by the main creek into the two local villages or islands, that is Kirepwe and Uyombo (Kitheka, *etal.*, 1999). Gongoni-Marereni area has a combination

of riverine, creek and fringing mangroves. Majority of the mangroves in the study area are separated by small creeks and are generally overexploited and converted for salt harvesting (Bundotichet *et al.* 2009).

The climate of the Kenya coast region is fairly similar, hence fairly uniform weather conditions in Mida Creek and the Gongoni-Marereni areas. The climate is hot and humid with temperatures ranging between 24°C - 35°C and a mean annual rainfall of between 500mm – 900mm annually. Average relative humidity is high throughout the year; however, the rain season has the optimum humidity levels of up to 90%. Two rain seasons are which are the long rains (March to May) occurs during the South East Monsoon and the short rains occur during the North East Monsoon (October to December) (Kitheka, *et al.*, 1999; Government of Kenya, 2009; Kenya Forest Service, 2015).

METHODS

A quasi-intervention model was used in this study as it was difficult to assign random participants to different levels of the different stakeholders in mangrove conservation. A comparison of the two sites with different level of stakeholder involvement was carried out to measure stakeholder interventions' impact on mangrove conservation efforts.

An estimate population of 60 multi-stakeholders. The study population was estimated from the multi-stakeholders engaged in mangrove resources conservation. A total population of 60 multi-stakeholders in four categories were operating in the two study sites, drawn from clusters of the government agencies, civil society, private sector and local community. Sample size of 15 Key Informants was derived by applying the formula by Daniel 1999 with a 5% confidence level applied.

$$n = \frac{NZ^2 p (1-p)}{d^2 (N-1) + Z^2 p (1-p)}$$

Where: N= total number of multi-stakeholders in Mida Creek and Gongoni-Marereni; Z= 1.96 standard error from the mean; P=0.2 availability; and D=0.05 absolute precision

In-depth Key Informant Interviews using semi-structured interview questionnaires were carried out with the management level personnel of stakeholders in the local community, private sector, NGOs and the relevant government agencies to gather data on variables under investigation. Experienced members of local community groups were used as key informants. The identification of stakeholders was done at various levels of stakeholder participation.

Data entry, and categorization to produce frequency tables and charts was done in Statistical Package for Social Sciences (SPSS) version 21. Paleontological Statistics Software package for education and data analysis (PAST) version 2.09 was used to cluster interventions by various stakeholders present in the two sites using qualitative stakeholder analysis. Pair-wise ranking comparison procedure was applied to identify utilization and dependency on mangrove in each study site. The results of pair-wise ranking were used to explain the stakeholders' involvement in the mangrove conservation efforts and their interests in supporting the objectives of sustainable mangrove forest management.

RESULTS AND DISCUSSION

Stakeholders present and engaged in mangrove conservation

There were four categories of stakeholders present and involved in conservation of mangrove forests in Mida creek and Gongoni-Marereni mangrove ecosystems. These stakeholders included government agencies, civil society organizations, private sector and local community (Table 1). Stakeholder presence and engagement in mangrove conservation varied with some present in both sites, and others absent. Mida creek is marine protected area and UNESCO Biosphere Reserve (SeaTrees, 2021), hence attracts more stakeholders especially the government agencies such as Kenya Wild life Service(KWS) and Kenya Marine and Fisheries Research Institute (KMFRI) in conservation of the mangrove ecosystems.

Stakeholders had varying roles in conservation of mangroves influenced by their mandates and interests. Local community had interest and enthusiasm in mangrove conservation and had put more effort through community-based organization and self-help groups involved in rehabilitation and restoration of mangrove forests(Lugomela, 2012; Eddy *et al.*,2016). In Gongoni-Marereni, the local community played a great role in conservation, however, their progress was slow due to lack of proper organization and management (UNEP-Nairobi Convention/USAID/WIOMSA, 2020), and low awareness creation and capacity building due to little involvement of the NGOs and government (COBEC, 2015).

Table 1 Stakeholders identified in the two study sites

<i>Stakeholder Category</i>	<i>Stakeholder</i>	<i>Mida Creek</i>	<i>Gongoni-Marereni</i>
<i>Government Agencies</i>	Kenya Forest Service (KFS)	✓	✓
	Kenya Forest Research Institute (KFRI)	✓	

	Kenya Wildlife Service (KWS)	✓	
	National Museum of Kenya (NMK)	✓	
	Kenya Marine and Fisheries Institute (KMFRI)	✓	✓
<i>Non-Governmental Organizations (NGOs)</i>	A Rocha Kenya	✓	
	Community Based Environmental Conservation (COBEC)	✓	✓
	Nature Kenya	✓	
	Local Ocean Conservation (LOC)	✓	
<i>Private Sector</i>	Watamu Marine Association (WMA)	✓	
	Hotels	✓	
	Salt Firms		✓
<i>Local Community</i>	Community Based Organizations (CBOs)	✓	
	Community Forest Associations (CFA)	✓	
	Village Development Forest Community Conservation (VDFCC)	✓	✓
	Self-help groups	✓	✓

The impact of NGOs in mangrove conservation was greater in Mida creek a UNESCO Biosphere Reserve because of its international significance as opposed to Gongoni-Marereni (Sawhney *et al.*, 2007). The salt firms in Gongoni-Marereni area had put little effort in conservation of mangroves as they concentrated in making more profits through the expansion of the salt ponds to increase the total volume salt produced. Hoteliers in Mida creek participated in mangrove conservation in various ways such as donations to conservation projects, observation of national and international environmental events, and development of community eco-tourism projects (Bundotich *et al.*, 2009).

Multi-stakeholder interventions/measures in conservation of mangrove ecosystems

In the two sites, stakeholders had different functions and efforts in conservation of the mangrove ecosystems. Awareness creation and education was a general intervention/measure to all stakeholders and others exclusive to some stakeholders based on their varying mandates and interests (Table 2). Government agencies especially KFS has exclusive role in implementation of the law and mangrove forest management plans and mediation between the community and stakeholders in order to help to resolve conflicts when they arise such as the community and salt companies land conflicts in Gongoni-Marereni. Multi-stakeholder efforts include education and awareness creation; local community capacity building; provision of alternative sources of livelihood such as ecotourism; conducting research and dissemination of information on conservation of mangrove ecosystems and mangrove restoration; and funding the process and implementation of forest management plans.

Table 2 Interventions/measures employed by stakeholders in conservation of mangrove ecosystems

<i>Stakeholders</i>	<i>Actions of stakeholders in conservation of mangroves</i>	
	Midacreek	Gongoni-Marereni
Government agencies <i>KFS, KWS, KEFRI, NMK, KMFRI</i>	Implementation of laws & mangrove forest management plans KFS &KWS	Implementation of laws & mangrove forest management plans KFS & KWS
	Security, management & protection of mangrove forests KFS &KWS	Security, management & protection of mangrove forest KFS
	Creating awareness in the community	
	Technical support & organizing planting activities KFS, KEFRI, KMFRI	
	Conducting research on various species & their zonation NMK, KEFRI & KMFRI	
NGOs <i>COBEC A Rocha Kenya Nature Kenya LOC WMA</i>	Awareness creation	Awareness creation
	Offering education to community members	Offering education to community members
	Conducting research on mangrove species & their zonation	
	Providing incentives & donations to conservation groups & motivation	
	Organizing tree nursery establishment & tree planting activities	
Privatesector <i>Hotels Salt firms</i>	Awareness creation	Awareness creation
	Offering education to community members	
	Providing incentives & donations to conservation groups & motivation	
	Organizing tree nursery establishment & tree planting activities	
Local community <i>CBOs CFA VDFCC Self-help groups</i>	Awareness creation	Awareness creation
	Nursery establishment	
	Mangrove tree planting	
	Security & protection of mangrove forests (community forest guards)	
	Beach cleanup activities	
	Ecotourism	

Success rates of the interventions/measures in conservation and management of mangrove forests by stakeholders were variable in the two study sites (Figure 2). Higher success rates of interventions/measures in conservation of up to 96.97% were achieved in Mida creek as

opposed to Gongoni-Marereni which had 65.22%. Majority of the government agencies and NGOs operate in Mida creek and some have offices around or near to the creek hence they can achieve a higher success rate of implementing the conservation measures/interventions. Mida creek mangrove ecosystems conservation activities were successful, more effort should be directed to sustaining awareness among the community members to help reduce the illegal harvesting activities and bait harvesting. Disparities in working relations in the multi-stakeholders need to be ironed out to enable them to work in harmony and complement each other roles and optimize conservation results and outcomes.

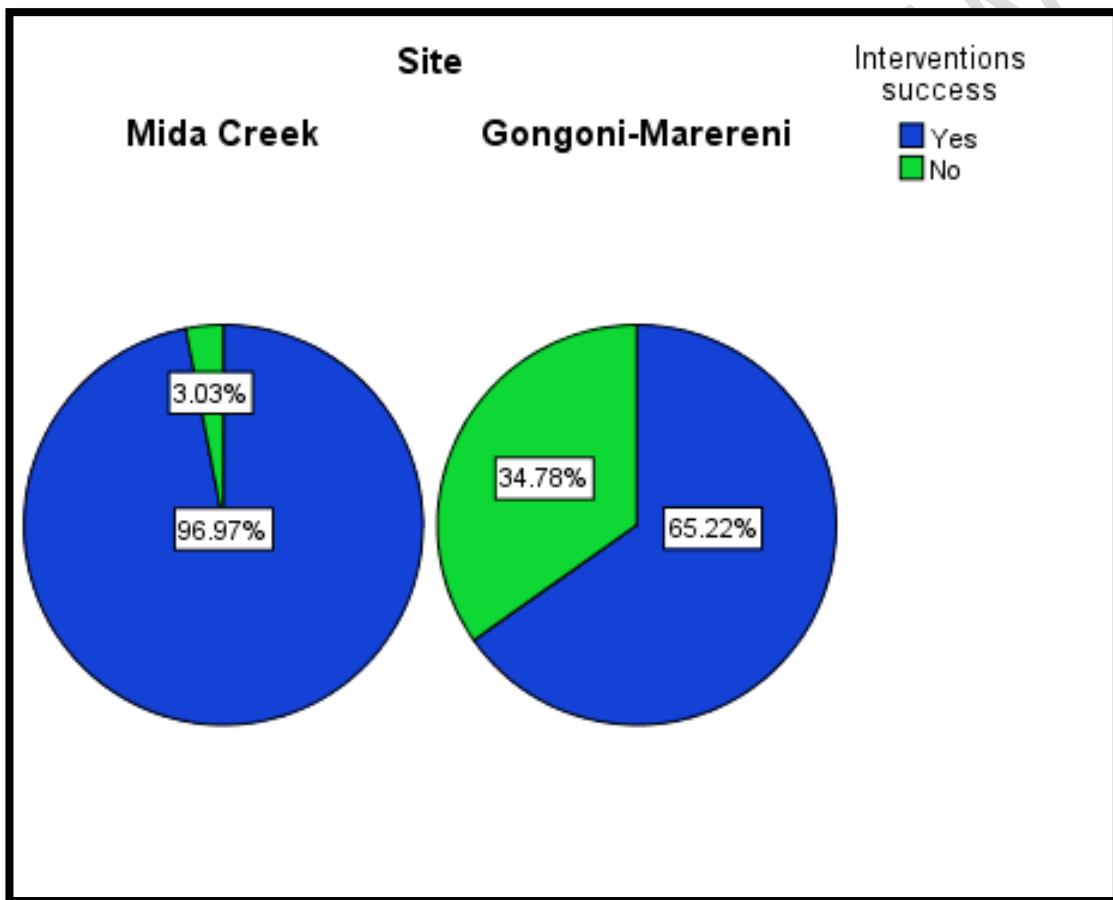


Figure 2 Performance of interventions

There is a serious need to incorporate approaches that will regulate the salt firms' activities, such as releasing brine into the mangroves and expansion of salt ponds, in a more environment friendly manner through the development of an area-based management plan within Gongoni-Marereni area (Bundotichetal, 2009). Lower success rates of interventions/measures in Gongoni-Marereni area were attributed to low presence and involvement of stakeholders with low levels of coordination and cooperation (Kairueta.,

2021). KFS, a government has low levels of patrols and implementing laws and regulations to curb illegal cutting of mangroves as it is located several kilometers away.

More awareness and education on the importance of mangrove ecosystems conservation needs to be done as the local community members, some were members in the CFAs and VDFCCs, in Gongoni-Marereni were involved in illegal harvesting of mangrove trees. The community members had inadequate/lacked information on the importance of the forests and were involved in the conservation exercise and thus engaged in illegal harvesting of mangroves (Sawhney *et al.*, 2007). COVID19 pandemic caused massive job losses which forced many of the community members to harvest mangroves for their livelihoods. Incentives and training of the local community in alternative livelihood programs such as ecotourism, aquaculture, beekeeping among others is necessary to conserve the mangrove ecosystems.

CONCLUSION

A variation in the multi-stakeholder participation was observed in the two study sites. More stakeholders were present and had a greater participation in mangrove conservation in Mida creek than in Gongoni-Marereni. Multi-stakeholder involvement was more effective in conservation of mangrove ecosystems in Mida creek compared to Gongoni-Marereni. Success of the interventions/measures in conservation of mangrove ecosystems was higher in Mida creek because of more stakeholders involved as opposed to Gongoni-Marereni. Mangrove ecosystems were more degraded in Gongoni-Marereni as a result of low level of multi-stakeholder participation. Multi-stakeholder approach was generally inadequate in Gongoni-Marereni area compared to Mida creek.

RECOMMENDATION

Adoption of a multi-stakeholder approach in designing of multi-stakeholder participation framework as it has proved to be more effective in mangrove forest resources management. Design and implementation of a multi-stakeholder participation framework for each mangrove forest site will promote and encourage individual stakeholders to effectively participate in mangrove forest conservation and management at differing capacities.

REFERENCES

Bundotich, G., Karachi, M., Fondo, E. & Kairo, J.G. (2009) Structural inventory of mangrove forests in Ngomeni.

COBEC. (2015). Enhancing Community Participation in Environmental Management through Alternative Livelihood and Capacity Building in Marereni.

Cornwall, A. & Gaventa, J. (2000). From Users and Choosers to Makers and Shapers Repositioning Participation in Social Policy. *IDS Bulletin*. 31(4): 50-52

County Government of Kilifi. (2018). County Integrated Development Plan 2018-2022

Eddy, S; Ridho, M.R.; Iskandar, I & Mulyana, A. (2016) Community-Based Mangrove Forests Conservation for Sustainable Fisheries. *Jurnal Silvikultur Tropika*. 7(3): 42-47

Erasto, D.A., Okeyo, B., & Dharani, N. (2021). Assessment of Structure and Natural Regeneration Capacity of *Avicennia Marina* and *Bruguiera Gymnorhiza* Species of Mangroves in Mida Creek Kilifi County, Kenya. *International Journal of Plant, Animal and Environmental Sciences*: 11(2): 262-294

FAO (2020). Global Forest Resources Assessment 2020: Main report. Rome.
<https://doi.org/10.4060/ca9825en>

FAO. (2016). The importance of mangroves for food security and livelihoods among communities in Kilifi County and the Tana Delta, Kenya. Rome, Italy: FAO and ENEP.

Gaventa, J. & Robinson, M. (1998). 'Influence from below and space from above: non-elite action and pro-poor policy', Paper prepared for Poverty Conference. Institute of Development Studies.

Government of Kenya. (2009). State of the Coast Report: Towards Integrated Management of Coastal and Marine Resources in Kenya. National Environment Management Authority.

Government of Kenya. (2017) National Mangrove Ecosystem Management Plan 2017-2027. Ministry of Environment, Natural Resources and Regional Development Authorities. Kenya Forest Service, Nairobi, Kenya

Healey, P. (1998). Collaborative planning in stakeholder society. *Town Planning Review*, 1-21.

Holmes, T., & Scoones, I. (2000). Participatory environmental policy processes: Experiences from north and south. Working paper. Brighton, UK: Institute of Development Studies.

Huxham, M., Emerton, L., Kairo, J., Munyi, F., Abdirizak, H., Muriuki, T., & Briers, R. A. (2015). Applying climate compatible development and economic valuation to coastal

management: A case study of Kenya's mangrove forests. *Journal of environmental management*. 157:168-181.

Kairo, J.K. & Dahdouh-Guebas, F. (2004). Conservation Status of Mangrove Resources in Kenya. Review on Mangrove Conservation and Biodiversity Draft

Kairu, A.; Kotut, K.; Mbeche, R. & Kairo, J.G. (2021). Participatory Forestry Improves Mangrove Forest Management in Kenya. *Research Square*

Kenya Forest Service. (2015). Mombasa Mangrove Forest Participatory Management Plan 2015-2019.

Kitheka, J. U., Mwashote, B. M., Ohowa, B. O., & Kamau, J. (1999). Water Circulation, Ground water Outflow and Nutrient Dynamics in Mida Creek, Kenya. Mombasa: KMFRI.

Lugomela, C. (2012). Mangrove Ecosystems of Chakwa Bay. *People, Nature and Research in Chakwa Bay*.

Meadowcroft, J. (2004). Deliberative democracy. In R. F. Durant, D. J. Fiorino, & R. O. Leary (Eds.), *Environmental governance reconsidered: Challenges, choices, and opportunities* (pp. 177–217). Cambridge, MA: MIT Press.

Sawhney, P., Kobayashi, M., Takahashi, M., King, P.N., & Mori, H. (2007). Participation of Civil Society in Management of Natural Resources. *Best Practice on Environmental Policy in Asia and the Pacific. International Review for Environmental Strategies*. 7(1):117 – 132

SeaTrees. (2021). <https://sea-trees.org/pages/mida-creek>. Date accessed 10/08/2021 Time: 10.50 am

Taylor, M.; Ravilious, C.; Green, E.P. (2003) *Mangroves of East Africa*. UNEP-WMCA

Tschentscher, T. (2016). *Promoting Sustainable Development Through More Effective Civil Society Participation in Environmental Governance*. New York: United Nations Development Programme.

UNEP. (2020). *Guidelines on Mangrove Ecosystem Restoration for the Western Indian Ocean Region*. UNEP, Nairobi

UNEP-Nairobi Convention/USAID/WIOMSA (2020) *Guidelines on Mangrove Ecosystem Restoration for the Western Indian Ocean Region*. UNEP, Nairobi. Western Indian Ocean

Ecosystem Guidelines and Toolkits. ISSN: 2714-1942. www.nairobiconvention.org/www.Wiomn.org/ www.wiomsa.org

UNDER PEER REVIEW