UNIVERSITY OF NAIROBI

LEGAL IMPLICATION OF SEA LEVEL RISE FOR KENYA BASELINE AND OUTER LIMITS OF MARITIME ZONES IN REGULATING COASTAL MARINE RESOURCES

BY

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DECLARATION

This thesis is my original work and has not been presented for a degree in other university

EMOJONG AMAI MERCY

Signature……. Date…….

Supervisor Declaration

This thesis has been submitted for examination with our approval as the University supervisors at Centre for Advanced Studies in Environment Law and Policy (CASELAP), University of Nairobi.

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DR. KARIUKI MUIGUA

Signature…….....Date…….....

DEDICATION

This work is dedicated to my parents who instilled in me a discipline of hard work and love for education, my siblings and colleagues who gave moral and material support in writing this Thesis and my supervisors for their understanding and patience as I took time to research and write this thesis. To all my special friends who gave me the encouragement to soldier on. God bless you abundantly.

ABSTRACT

The coastal climate is largely influenced by rising temperature, extreme weather conditions such as flooding and prolonged drought and sea level rise exerting pressure on coastal shoreline. This has influenced coastal land and infrastructure, destruction of fishing land that results to unsustainable exploitation. Sea level rise will have serious implication to the coastal baseline, moving it inwards and influencing the low water limit to move with territorial seas and EEZ that are drawn from the baseline. This creates a challenge with respect to the status of previously declared Territorial sea coastline in respect to sovereignty rights. It also influences the jurisdictional regimes which have been devised to manage marine resources, displays negative implication on the outer limits of maritime zones, and restricting access and sovereignty rights of the coastal states that results to inequity of resources management.

The purpose of the study is to ascertain the legal implication of sea level rise for Kenya baseline and outer limits of maritime zones in regulating coastal marine resources to merge certain aspects of two broad disciplines, namely Environment and Maritime aspects. The study approach interrogates the interplay between the parameter of control, management and sustainable exploitation of marine resources within Kenya's maritime zone. It proposes best measures to be adopted on the legal framework to integrate the accessibility to Resources, help improve equity in resource access and improve the legal practices applied in other coastal judicial decisions on resources management to achieve equity and Justice.

The methodology applied was qualitative based on purposive sampling technique to determine implication of sea level rise on access to marine resources. Both primary and secondary data were used in this study. Primary data were collected from interviews with key informant, in-depth interview and observation. Using semi-structured questionnaire, twelve (12) institutions were selected purposively, at least 30 officers were assessed on legal implication of sea level rise on access to marine resources. The study also analysed the potential impact of sea level rise, legal implication, factor hindering access to resources and challenges of resources management. The Finding showed overlapping legal instruments, inadequate and weak legal framework, inconsistent policy and institutional interventions, and capacity building, inadequate financial and technological resources for capacity building and exploitation of resources as well as poor surveillance. The proposed strategy focused on the analysis of legal framework on the maritime zone stipulated by national law and how to administer marine resources in the context of sea level rise, these are expected to strengthen the legal framework and institutions.

(**Keywords**: Maritime Law, Sea level rise, Maritime zone, Exclusive Economic Zone)

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ABBREVIATIONS

CDA Coastal Development Authority

CLCS Commission on the Limits of the Continental Shelf

COP Conference of Parties

EAC East African Community

EIA Environment Impact Assessment

EMCA Environmental Management and Co-ordination Act

EEZ Exclusive Economic Zone

ECA Economic Commission for Africa

FAO Food and Agriculture Organization

GHG Greenhouse Gases

GPA Global Programme of Action

ICJ International Court of Justice

ICZM Integrated Coastal Zone Management

ILC International Law Commission

IMO International Maritime Organization

IOC International Oceanographic Commission

IPCC Intergovernmental Panel on Climate Change

IUU Illegal, Unregulated Unreported fishing

ISA International Sea Bed Authority

ITLOS International Tribunal for the Law of Sea

KWS Kenya Wildlife Service

KEMFRI Kenya Marine and Fisheries Research Institute

MEA Multilateral Environmental Agreement

NEMA National Environment Management Authority

NEC National Environment Council

NOCK National Oil Corporation of Kenya

OCHA United Nation Office for the Coordination of Humanitarian Affairs

UNCLOS United Nations Convention on the Law of Sea

UNCED United Nations Conference on Environment and Development

UNCTAD United Nation Conference on Trade and Development

WSSD World Summit on Sustainable Development

UNIDO United Nations Industrial Development Organization

UNEP United Nations Environment Programme

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1 CHAPTER ONE

1.1 Background of the study

The Kenyan state's coastline ocean-ward boundary extends to the "200 nautical mile Exclusive Economic Zone limit in accordance with the United Nations Convention on Law of the Sea"[1] while the continental shelf Proclamation is for the exploitation of bottom ocean bed resources. The coastline of Kenya extends to about, "600 km along the seafront, from Somalia's border at Ishakani in the North (Longitude 1° 41' S), to Tanzania's border at Vanga in the South (Longitude 4° 40' S).[2] The continental shelf is sedimentary and is about 5 to 10 km wide, with depths dropping to below 200m in under 4 km of the shoreline at the mouths of the rivers Tana and Sabaki".[3]

Map 1: Mombasa coastline

Source: (Field Survey, 2018)

[1] United Nation on Law of Sea Convention, 1982.
[2] *Ibid*.
[3] *Ibid.*

Kenya's coastal and marine ecosystem has various unique features that include an almost continuous fringing coral reef. It is also marked by the Lamu Archipelago, with its extensive mangrove forests. Additionally, it has mangrove systems which are also nursery grounds for juvenile fish. More so, it is characterized by sea grass beds which are also grazing grounds of fish and reptiles which support a large variety of fish, both for human consumption and for the aquarium trade among others.[4] There are combinations of critical habitats extending into shallow waters, popular with both small scale artisan fishermen and tourists who enjoy the views and aesthetic nature of the biodiversity.[5]

Climate change has had a significant impact on the ocean and living things whose habitat depends on the sea. The increase in global average air and ocean temperatures has resulted in widespread melting of snow and ice, raising the global average sea level, conclusively indicates that the world is warming due to the influence of greenhouse gas emissions.[6] "The Coastal climate is largely influenced by large – scale pressure systems of the western Indian Ocean and monsoon winds". Thermal expansion and melting of land fast ice (glacier and ice cap and sheet ice) is as a result of sea level rise, warming of the upper ocean, changes in atmospheric and ocean circulation and local geological uplift. This adds pressure for coastal infrastructure, health and safety of communities, natural habitats, such wetlands, mangrove, coral and oyster reef buffer.[7]

Sea level rise exerts pressure on coastal shoreline. Impact includes loss of coastal land and infrastructure, destruction of fishing land, beaches, loss of coastal and marine habitat resulting in unsustainable exploitation and, poor land use practices. Kenya's ecosystems have been, and

[4] *Ibid.*
[5] *Ibid.*
[6] NEMA. (2011). Environment and economic development. Kenya state of the environment and outlook 2010.NEMA, Nairobi.
[7] Doney, S. C., Ruckelshaus, M., Duffy, J. E., Barry, J. P., Chan, F., English, C. A.&Polovina, J. (2011). Climate change impacts on marine ecosystems.www.annualreviews.org by Oregon States University

will continue to be affected by the climate change. This includes rising temperature and extreme weather conditions, such flooding and prolonged drought. Depletion of glaciers on Mt. Kenya will have negative implication on biodiversity and water supply in the country.[8] Prolonged drought and floods in the protected area will result as stress and deterioration of environmental conditions. Sustainable habitat will eventually become extinct. This is evidenced by Amboseli and Tsavo National Parks which were hit by long dry spells in 2009 that limited resources resulting in human and wildlife conflict. Therefore, rising of sea will influence access to resources due to the lag in the planet's response to human impact.[9] Some clear challenges are unregulated fishing, physical alteration and destruction of habitats and shoreline change.[10]

Intergovernmental Panel on Climate Change (IPCC) further confirms that "there is sufficient scientific evidence to prove that human activity is warming the planet and changing our climate. Since the mid-20th Century, the average temperature of Earth's near-surface air and oceans has increased by 0.74°C. The main part of this temperature rise is being caused by increasing concentrations of greenhouse gases resulting from human activity such as fossil fuel burning and deforestation". In its Fourth Assessment,[11]The IPCC predicted that by 2100, global warming would lead to a sea level rise of 19 to 58 cm, depending on the emission trajectory which will be followed in the future. It is further expected that sea levels will continue to rise for decades, even after global temperatures have been stabilised, as it takes time for the oceans to calibrate to the level of greenhouse gasses in the atmosphere.[12]

Coastal States' baselines are located at the interface between the land area and sea for the purpose of maritime jurisdiction. Coastal States establish the territorial sea and the other maritime zones from measures taken from baselines. Hence, baselines are not only important

[8]Muigua, K. Wamukoya, D.,Kariuki, F.(2015).Natural Resources and Environmental Justice in Kenya. *Natural Resources and Environmental Justice in Kenya.*
[9]IPCC, Fourth Assessment Report, WG 6: Coastal Systems and Low-lying Areas, Table 6.3
[10]*Ibid* 7.
[11]*Ibid* 8.
[12]*Ibid.*

issue to claim territory, but all other maritime zones.[13]Baselines form the starting point in delimitations between adjacent and opposite states with overlapping claims to maritime area - the role of baselines in the bilateral delimitation of maritime boundaries[14] Article 15 of the UNCLOS provides that "where the coasts of two States are opposite or adjacent to each other, neither of the two States is entitled, failing agreement between them to the contrary, to extend its territorial sea beyond the median line every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial seas of each of the two states is measured." Hence, baselines are also regarded as a mean to settle opposite or adjacent maritime boundaries[15].There is certain evidence that the coastlines of the future will differ greatly from the coastlines of today. This is not necessarily a new phenomenon.[16]Scientific studies illuminate that sea levels have been greatly variable throughout the existence of oceans on Earth. Positions of low and high-water marks may change depending on the trend and impact of global climate change, resulting from the emission of greenhouse gases. Scientist forecast that there will be a rise of between 31 and 91 cm of sea level. Consequently, scientists observe that along the Kenyan coastline, sea level will inevitably lead to the submergence of large tracts of land and disrupt established zones along the coast,[17]from the slight change at vertical result in significant changes in horizontally location of baseline posing potentially fatal threat to low lying area. This will result to lossof states maritime entitlements[18]. Furthermore, Okidi explains that to cope with the impact of climate change, there is need for an even more radical approach to address sustainable use.[19]

[13] Committee on Baselines Under the Law of the Sea Internal Discussion Document (International Law Association, 2008).
[14] International Court of Justice (ICJ) case [Maritime Delimitation in the Sea (Romania v Ukraine), 2009 ICJ General List No 132 (Feb. 3)]
[15] Article 15 of the UNCLOS
[16]Hansen, James. (2008). "The Threat to the Planet." New York Review of Books 53 (12). Accessed October 3, 2015 available athttp://www.nybooks.com/articles/archives/2006/jul/13/the-threat-to-the-planet/.
[17]Ibid 9
[18]Ibid 14
[19]Okidi.C.O. (2008). Legal aspects of management of coastal and marine environment in Kenya. In Okidi,C. et

The Indian Ocean has provided economic benefits to the country such as numerous opportunities that ranges from commercial fishing main target being billfish and various tuna species that serves East Africa due to influence of strong southeast monsoon currents that increases numbers of sea urchins, turf algae cover and among others. Minerals and energy resources have great potential and opportunities that include bulk materials, sand and gravel for construction, geological and mineral resources on the ocean floor and subsoil that are within the EEZ with approximately 880 km long with 230000 km that is commercially viable for industries.[20]It is estimated that the "53,000 ha of mangroves in creek, bays and estuaries are used for their wood, both commercially and at the subsistence level".[21]UNFCCC requires all parties to develop measure to facilitate adequate adaptation to climate change Article 4(1)(b), parties requirement to cooperate in preparing adaptation to impact of climate change, includes inter alia developing appropriate and integrated plans for coast zone management. Article 4(1)(e). Cancun Adaptation Framework adopted on 2010, parties established urgent need to cooperate on adaptation to enable and support the implementation of adaptation action aimed to reduce vulnerability and building resilience, taking account of urgent an immediate need. Warsaw international mechanism for loss and damage adopted in 2013, to address loss and damage associated with impact of climate change, including extreme event and slow onset event. Paris Agreement 2015, Article 3 on obligation, agreed in establishing global goal of inter alia enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, Article 7. Current existing framework for adaptation under UNFCCC promotes cooperation and assistance that includes technical, scientific and financial but don't provide legal framework of adaptation for Sea level rise including situation of baseline, island fortification and construction except financial and technical assistance competent. LOSC

al.(eds),Environmental governance in Kenya, East Africa Educational publishers.

[21]Doute, R. N., Ochanda, N., & Epp, H. (1981). A forest inventory using remote sensing techniques. KREMU, Technological Report, Series, (10).

provide legal foundation for adaptation to sea level rise for island and offshore features but don't express provision on Climate Change not for adaptation to climate change induced sea level rise [22].The main concern for many of the third world countries would be the quest to protect and control marine resources based on sovereign rights granted to the coastal states. For instance, the potential submergence of key base points may potentially lead to the loss of broad national claims to maritime jurisdiction. The loss of significant areas, even all, of the maritime jurisdictional zones claimed by certain coastal States is likely to have profound economic consequences as jurisdictional rights over the valuable resources within these maritime spaces would also necessarily be lost.[23]Therefore, the richness of the resources located in the exclusive economic zones. It is estimated, for example, "that 75-80% of present commercial fisheries and mineral resources falls within these 200-mile zones. Moreover, it is likely that the value of such resources will be much greater by the year 2100".[24] Thus, sovereignty, sovereign rights, jurisdiction, and title to valuable natural resources are all put into question.[25] Knowing that major concern for coastal states is utilisation of resources and claim of sovereignty over resources to have strict control over terms of participation of the third parties in EEZ creates the basis of the study to provide the best approach for equitable distribution of resources when zone shifts due to sea level rise.

[22]Ibid 8
[23] Clive Schofield (2009) "Against a Rising Tide: Ambulatory Baselines and Shifting Maritime Limits". International Symposium on Islands and Oceans. Tokyo: p. 70.
[24]*Ibid* 29pg 638.
[25]David H. Anderson,(2003) Judge of International Tribunal for the Law of the Sea; See: "Foreword" in Atunes, Nuno Marques."

1.2 Problem Statement

Climate change have impacts upon human and environment, it affects the ecosystem through physical and biological constraints that are caused by increase in global ambient temperature, thermal expansion of ocean waters, subsidence of coastal land and increased melting sea ice that contributes to rise of sea level. Effects of rise in sea level upon vulnerabilities to coastline, communities and infrastructure range from serious catastrophic such as loss of dryland, loss of wetlands, loss of exclusive economic rights over extensive areas, destruction of existing economic infrastructure, damage of subsistence and commercial fisheries production that negatively affect the economy.[26]In salt marsh and mangrove habitats, rapid sea level rise would lead to submerged land, waterlogged soils that cause plant death from salt stress, flooding due to storm surge will increase higher sea level making the shoreline retreat due to inundation[27]. In Kenya, most vulnerable sites are Watamu and Sabaki river estuary, that's projected with 0.3m increase in sea level, about 17% of Mombasa town will be submerged.[28]

As sea level rises, the actual low water normal baselines may come to shift land ward, or low tide elevation and islands that are regarded as the appropriate points to measure baselines, could also come to be entirely submerged baselines and the outer limits of maritime zones of jurisdiction regulates that as normal baselines recede in the case of sea level rise, so will the maritime zones measured from them correspondingly regress in the scope of the coastal state's maritime claims. But this interpretation is irrespective with the presence of delta, outer limits of continental shelf and other nautical conditions (e.g. 2500 metre isobasth as delineating the outer limits of continental shelf exceeding 200 nautical miles). Referring to article 76(9) of the UNCLOS, baselines shifting will however not influence the outer limits of continental shelf that is permanently fixed.[29] Special focus will be granted on the analysis of baselines and maritime zones stipulated by international law, the effects of the sea level rise on such maritime zones and on potential legal measures for coastal and island states may adopt in face of sea level rise. The adverse effects of baseline regression and the direct correlation with shifting of the outer limits of maritime zones and boundaries of opposite and adjacent coastal states.

[26]Sutherland, M. (2004). Sea-level rise and coastal zone management. In hydro fig workshop, Athens, Greece,22-27 2004

[27]Mahongo, S. (2006, November). Impacts of sea level change. In *ODINAFRICA/GLOSS Training Workshop on Sea-Level Measurement and Interpretation, Oostende, Belgium* (pp. 13-24).

[28]Oyieke, H. (2000). Implications of accelerated sea-level rise (ASLR) for Kenya. In *Proceedings of the SURVAS Expert Workshop on" African Vulnerability and Adaptation to Impacts of Accelerated Sea-Level Rise (ASLR)", Cairo, Egypt* (p. 55)

[29]Schofield, C. H. (2009). Against a rising tide: ambulatory baselines and shifting maritime limits in the face of sea level rise. Why have footnotes started at footnote one again…….

Although sea level may have various other implication on humanitarian, commercial and security levels and also in some extreme cases determine the entire disappearance of a state's land territory, creating a need for a legal approach to adjust baseline shifting, to ensure the jurisdiction of maritime zones and alleviating adverse effects of baseline shifts.[30]

When the baseline moves, outer limit will move due to rise of sea level imposing pressure to shoreline,[31] that creates challenge with respect to the status of previously declared territorial sea coastlines in respect to sovereignty rights,[32] "the 'normal' baselines move inland as a consequence of sea level rise, so too will the outer limits of those maritime zones measured from such baselines, if the basepoints that control the definition of the outer limits to maritime zones are impacted. As a result of such shifting baselines and the consequential adjustments of the outer limits of maritime zones, waters previously under national jurisdiction could become part of the high seas (or become part of the EEZ rather than the territorial sea). Moreover, sea level rise would also affect low tide elevations or islands which could be very important to the delineation of baselines. This would in turn influence the entitlement of coastal States to exercise their maritime jurisdiction in certain zones. Referring to article 121 (2) of the UNCLOS, island is entitled to establish full maritime zones, article 121 (3) of the UNCLOS regulates that "Rocks which cannot sustain human habitation or economic life of their own shall have no EEZ or continental shelf." It indicates that one of the requirements to the proposition of EEZ and continental shelf for an island is "human habitation or economic life". This provision prescribes regime of islands through either human habitation or economic life of their own, and both are not obligatory to be implemented at the same time. These two provisions reveal that the extent of territorial sea and EEZ of islands could significantly decrease in face of sea level rise. The specific extent of decrease has been demonstrated by the authors.[33] The numerous loss of maritime zones caused by the islands disappearing, is deemed a serious effect of sea level rise. With respect to the low tide elevation, as analysis of article 13 of the UNCLOS at Chapter II, it could be the appropriate point of baselines. It therefore decided

[30] Clive Schofield (2009) "Against a Rising Tide: Ambulatory Baselines and Shifting Maritime Limits". International Symposium on Islands and Oceans. Tokyo: p. 70.
[31]Hioureas ,C.(2017).Effects of Rising Sea Levels on Maritime Boundaries .In 18th United Nation Informal Consultative Process on Oceans and Law of Sea
http://www.un.org/depts/los/consultative_process/icp18_presentations/hioureas.pdf
[32]Aljandro J.C. The turboil war 1995 lesson for law of sea
[33] Ibid 5

that low tide elevation for maritime jurisdictional claims is geographically restricted to coastal location.[34]

The territorial and maritime dispute between Nicaragua and Honduras in Caribbean Sea, Hondurus couldn't rely on certain coordinate for its baseline because they no longer conformed to physical reality on ground therefore, present circumstance prevailed(citation). With reference to ILA committee suggest that normal baseline remains legal, if it changes with human-induced expansion of the actual low water line to seaward, then it must also change with contraction of actual low water line to landwards. Consequently, with the existing law of normal baseline it doesn't offer an adequate solution to baseline moving landward to reflect changes caused by sea level rise and erosion.[35]

As the discussion in Part III of ILA Committee's 2016 Interim Report demonstrates clearly, some low-lying States, already under pressure, may find their land area rendered uninhabitable well before they are overrun by the sea. This raises the critical questions as to the ability of some States to maintain their statehood without a habitable land area, and to maintain sovereignty over the territorial sea and, consequently, their sovereign rights over the resources of the maritime zones appurtenant to those land areas.[36] In Kenya, at EEZ jurisdiction, the sovereign rights to exploit resources that considered 90% of commercial fish species are harvested contributing to two third of world fish catch depending on for livelihood. Thus, leads to inequity in access to resources, thereby, reducing harvesting capacity of the living resources[37]. Coastal states ensure compliance and enforcement at EEZ, inability of state to effectively monitor and enforce conservation measures in this jurisdiction due to limited rights will encourage IUU fishing thus exacerbating the depletion and collapse of marine resources and degradation of environment within the EEZ.[38]Therefore, enforcement implication of maritime jurisdictional limits always changing, resulting to jurisdictional uncertainty, dispute and conflict. In particular where enforcement activities are close to limits of certain zone of

[34] Carleton, C.M. and Schofield, C.H. (2001): p.38, by the same author, Clive Schofield (2009): p. 75
[35]Ibid 4
[36] Ibid 6
[37]Kaye, S. (2014). Enforcement cooperation in combating illegal and unauthorized fishing: an assessment of contemporary practice. *Berkeley J. Int'l L.*, *32*, 316.
[38]Oppenheim, A. J. (2004). The Plight of the Patagonian Toothfish: Lessons from the Volga Case. *Brook. J. Int'l L.*, *30*, 293.

maritime jurisdiction, this may limit due to previous basepoint no longer existed as baseline will have retreated inland to higher ground[39].

With threats to the ecosystem, current resources use pattern, and existing legal framework governing ocean resource for decision making that's not limited to Maritime zone act, climate change act, EMCA and other related legal instruments does not offer an adequate solution to this eminent challenge. Coastal state is not yet equipped to deal with critical legal consequences expected in future on sea level rise to access of EEZ. The sea level rise change raise question of disappearing of feature against will of state concerned. This research will ascertain whether upon baseline shift, the state will lose their status and entitlement for the four Maritime zones, island, rock, low tide elevation, whether they will always remain to be or can artificial reinforcement of low tide elevation and rock have legal effects to change their legal effect to change to change their legal status and entitlement. Therefore, the study seeks to provide best approach to protect and control marine resources based on sovereignty rights granted, that will ensure equity utilization of resources even after shift in baseline due to sea level rise.

1.3 Research Questions

1. What is the impact of sea level rise to coastal and marine resource?
2. What are the potential legal implications on the sea level rise to the Baseline and outer limit of maritime zones?
3. Which is the legal measure adopted to mitigate the potential impacts of sea level rise on baseline and established maritime zone?

1.4 Objectives of the study

1. To analyse the impacts of sea level rise to the Coastal and Marine resources;
2. To assess the potential legal implications on the sea level rise to the Baseline and outer limit of maritime zones; and
3. To propose best legal measure adopted to mitigate the potential impacts of sea level rise on baseline and established maritime zone.

[39]Ibid 14

1.5 Justification for the study

Agenda 21 encourages coastal States to "consider establishing, or where necessary, strengthen appropriate coordinating mechanisms for integrated management and sustainable development of coastal and marine areas and their resources at national levels" and section 17.6(b) calls for the implementation of "integrated coastal and marine management and sustainable development plans and programmes" at appropriate levels.[40]

This research sought to offer insights to legal scholars and contribute to the academic literature on matters of legal implication of sea level rise on access to marine EEZ Resources. Secondly, it sought to undertake comparative analysis of experts, opinion of recommendation from key institutions managers and others instruments forming current policy debate on coastal marine resources strategy for resources management in relation to climate change for long-term Sustainability. Thirdly, the proposed legal regime procedure is helpful to improve equity in access to resources and improving the legal practices applied in other coastal judicial decisions on resources management in order to balance environment and development by achieving equity and Justice. These findings are relevant to legal practitioners, policy makers, law reform agencies in Kenya, regionally and internationally.

1.6 Assumptions

It is assumed that the rise of sea level is a predicament that will occur based on IPCC reports.

It is also assumed that most of the respondents will be from institutions directly linked to marine resources, since they fully understand the situation on ground.

1.7 Limitations

Scarcity of research sources for literature review on the implication of sea level rise to access

[40] Agenda 21: Sustainable Development Knowledge Platform
https://susutainabledevelopment.un.org/outcomedocuments/agenda21.(page)

of marine resources in EEZ resulted to over reliance on the various IPCC reports for their forecast.

Study was not carried out using field visit. Accessing the coastline when conducting the survey was a challenge due to vastness of the ocean and limited resources for necessary tools for transportation. This includes, and is not limited to, personnel, transport, and equipment to access the EEZ and neighbouring countries. Due to the limited number of sample size, the researcher relied on key institutions for first-hand information.

Accessing long-term data on sea level rise was a challenge. Therefore, the study was based on the availability of secondary information from government websites, reports and journals which were available from only limited areas for limited period

1.8 Theoretical Framework

1.8.1 Theory on Freedom of The Sea Mare Clausum

Truman proclamation of 1945, contribution and effects of proclamation by Latin American and Arabs includes 1958 Geneva convention of evolutions of EEZ concepts. It was made to ensure the natural [41]resources of subsoil and seabed of coastal states off coast of United States and protect their fisheries, this changed traditional point of view, opening new concept related to economic interest nations, this was emphasized in Anglo Norwegian Fisheries case.[42]

Mare clausum refers to any sea or other navigable body of water which is under the jurisdiction of a particular country and which is closed to other nations. In particular, the history, which shaped that legal regime, has impacted upon subsequent developments in international law, including the evolution of the modem concepts of the territorial sea, the continental shelf and the exclusive economic zones.[43]

[41] Savigny. Law grows with the growth and Strengthens with the strength of the person.
[42]Hoyle, O. G. L. (2013). *How exclusive is the Exclusive Economic Zone: contemporary analysis of the United Nations Convention on the Law of the Sea 1982*. World Maritime University. (ICJ CASE)
[43]Ibid 12

Entitlement of every coastal state to establish maritime zone beyond and adjacent to territorial sea extending seaward to 200 miles from baselines, with authority to exercise therein rights in regards to all resources and related activities for economic exploration and exploitation of the zone. The coastal jurisdictional rights relate to artificial islands, installation of structure, marine scientific research and preservation of marine environment while the third state enjoy classified rights of state of overflight, rights to navigate and other related activities.[44]

The theory of freedom of seas advocated by Grotius and advancement by John Selden entitled *mare clausum*. Written 1989, that the sea was decreed to be controlled by man, he invoked the customs of ancient and modern countries which appropriate portions of acquisitions sea. In 19th century, freedom of seas established fundamental principle of the law sea, followed by English Admiralty court accepting status that all nation being equal, all have an equal right to the inappropriate parts of ocean for navigation, in place where local authority exist.

The principle enshrined in part V of the UN Convention on the law of the sea is the that every coastal stable of Article56 of LOSC within EEZ; rights with regards to purpose of exploration, exploitation, conservation and management of natural resources of adjacent waters, seabed and subsoils. Article 56(1) grants coastal state "sovereign rights" thus necessarily limits and restricts it to economic activities and not full sovereignty as on its land and sea territory. These right enables achieve specific and defined economic objective. Article 62 gives the coastal state on allocating EEZ fisheries allowing coastal state to determine allowable catch of living resources and determine its capacity to harvest the living resources for economic zone and give other states access to surplus of allowable catch thus living resources are not endangered by over exploitation. Article 62(4) empowers coastal state to legislate and issue regulating for fisheries activities exercise in EEZ, therefore in principle, free to issue laws that suit national

[44] *Ibid*

interest to increase employment, food supply and economic efficiency. Powers to enforce are designed to compel obedience to rule thus empowered under LOSC to take enforcement procedure to protect fisheries within EEZ. Thus, rights for coastal state to ensure compliance with fisheries laws through preventive and punish violations, but limited to prompt release of arrested vessels and crews of reasonable bonds for non-living organism, continental state has significance for conserve and manage the suprajacent waters.[45] During UNCLOS III zone represent certain functional competence to balance water history, first feature being coastal state title over resources activities within zone, another feature was inclusive of interest of 3rd state to living resources of coastal resources and saving navigational and communication rights of other states in respect to coastal state EEZ.[46]

Therefore, the coastal state has a duty to exploit their natural resources, way to preserve them for broader interest of all person, bearing in mind the interest and need of mankind and power to legislate and take necessary enforcement measure in the zone with respect to activities to ensure conservation and preservation. LOSC framework controls EEZ in four perspective namely, equilibrium quality, sovereign rights of coastal state, such hot pursuit and regional and global cooperation. This enables balance right to EEZ utilization of resources with interest of international communities.[47]There is need of bilateral agreements and multi-lateral arrangements with aim for effective of resources for economic benefit, in the eventuality of a catastrophic, coastal state legal framework should guidelines to ensure utilization and conserve marine resources that improve control and use. This concept will strengthen the purpose of study that seek equipped to deal with critical legal consequences expected in future on sea level rise to access of EEZ to protects and control marine resources based on sovereignty rights

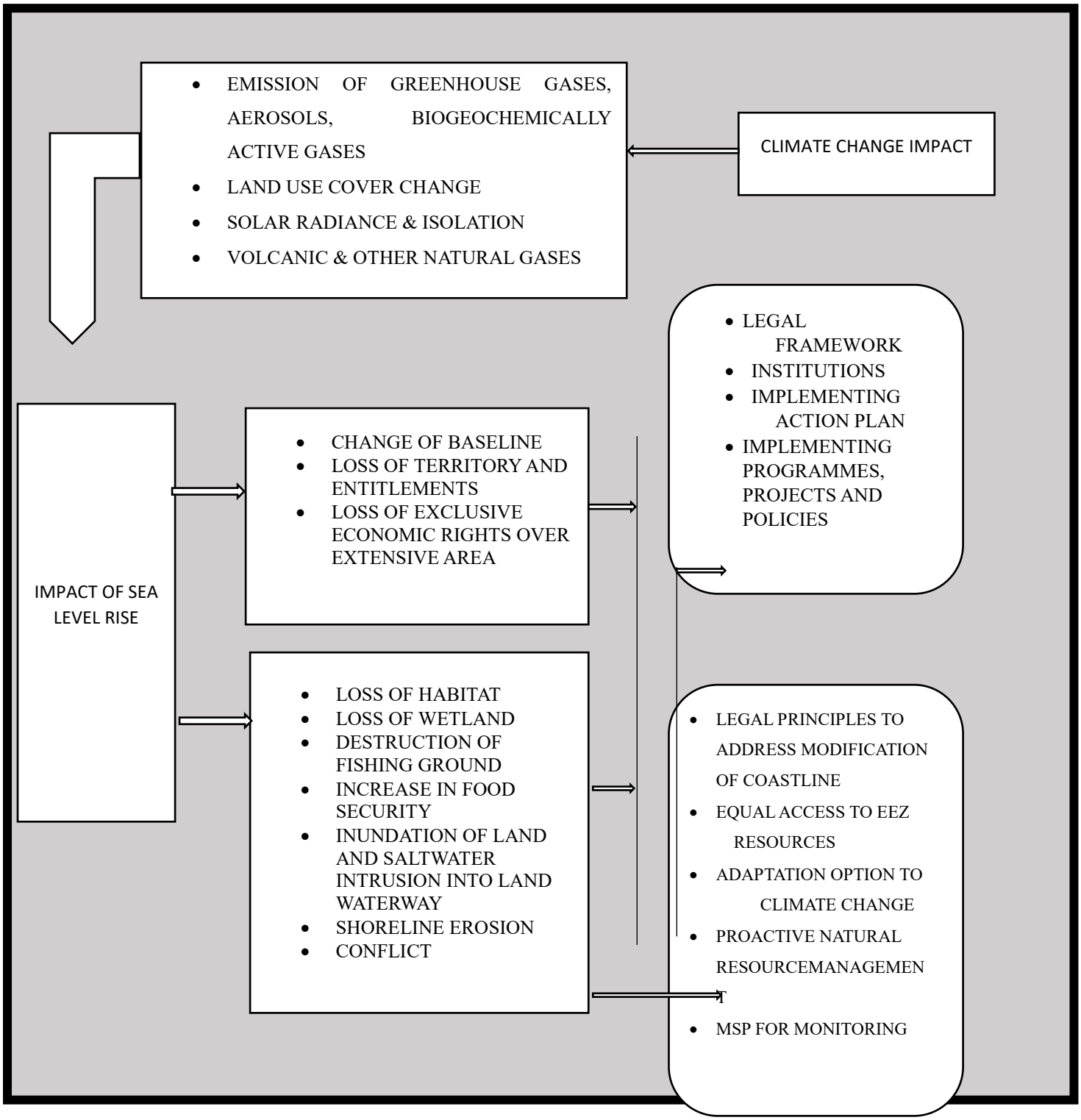
[45]Ibid
[46]Ibid 16
[47]Ibid

granted, that will ensure equity utilization of resources for better management and control of other economically oriented activities in EEZ.

1.8.2 Conceptual Framework

Sea level rise exerts pressure on coastal shoreline. The effects are loss of coastal land and beaches, loss of coastal and marine habitats. Further the sea level rise moves maritime baseline inwards influencing the low water limit to move with territorial seas and EEZ that are drawn from this baseline. This therefore creates a challenge with respect to the status at previously declared territorial sea baseline in respect to sovereign rights. Therefore, this will influence the jurisdictional regime which have been devised to manage marine resources, displaying negative implication at the outer limits of the maritime zone (EEZ). This will restrict access and sovereignty rights of the coastal states that result to inequity of resources utilization.

Figure 1: Conceptual Framework



1.9 Thesis structure

The study is divided into five chapters. The following is a brief highlight of the main contents of the chapters in the order of their occurrence in the study:

Chapter one introduces the basic concepts of the study, the problem, and how the study has been formulated. The chapter of the thesis comprises of a general introduction to research, a statement of the problem, and objective of the study. It further looks at the relevant research questions, theoretical and conceptual framework within which the research was carried out, the limitation and the assumption of the study. This is a transformed research proposal of the thesis.

Chapter two, the literature review begins with a review of various literature materials on impact of sea level rise on coastal marine resources. It interrogates the legal implications of the rising sea level to the baseline. It also looks into the legal framework governing marine resources and addresses the governance challenges of marine ecosystems, remedy tools to facilitate access to marine resources and approaches for potential measures for sustainable management when the coastline shifts.

This chapter also highlights the setbacks of our national and international legal instruments on marine and climate change, challenges hindering proper governance and principles of resource management and conservation. It underscores the importance of principle review and legal approach to sustainable management. The literature review informs best approaches to ensure equity of access of marine resources. The informed intellectual background of the study is being presented under the specific thematic area. It also covers analysis of the legal framework governing the marine resources both at the national and international level.

This has assisted to answer the question as to how Kenya has addressed the issue of sea level rise impact on marine resources inclusive of critical analysis of the strength and weakness of the laws of these countries as well as experience in providing good governance through

developing functioning systems. This information includes policies, legal principles and best practices for access to marine resources, with a view to answer questions as to whether or not the laws address issues of access to marine resources when climate change modifies the coastline and how they meet the requirement of these international standards. The lessons and recommendations will inform Kenyans on the context of improving equity in access to resources as a way of balancing development and the environment.

Chapter three Embodies the research methods and describes the research design and research methodology that was employed in this study. It also brings to the fore the research method used in the study. It looks at the research design, choice of method, sampling methods, which include the selection of study area and selection criteria of respondents. This chapter also looks at the research approach, data collection tools and how the data was analysed.

Chapter four Provides the research finding on the legal implications of sea level rise in regulating coastal marine resources. Field research conducted in coastal institutions was analysed and reported in this chapter. In a nutshell the study sought to find out the extent to which the institutions and existing systems address the issue of access to marine resources when the coastline shifts due to climate change and approaches in place that promote sustainable use and good governance.

Chapter five in conclusion is the last chapter of the study. It sets out the conclusion and recommendation of the study as derived from previous chapters. This is tied to recommendations which is in consonance with the objectives and research questions of the study and concludes by recommending research areas for future research.

2 CHAPTER TWO

2.1 Effects of sea level rise to coastal marine resources

Earth's warming climate is causing sea levels to rise in two different ways. First, warmer air temperatures are causing glaciers and land ice to melt. As the melt water flows into the ocean, the increase in the total amount of water causes the sea level to rise. Second, as ocean water warms, it expands pushing water farther up along our shores and resulting in physical changes to ocean heat and temperature.[1]

In future scenarios for some coastal locations, it is possible that what is now called a 100-year flood could occur as frequently as high tide. Not only does this pose extraordinary challenges for coastal communities, it also has potentially devastating consequences for wildlife that rely on coastal habitat[2].

2.1.1 Ecosystem

A study done elsewhere by Union of Concerned Scientists argues that ,two major mechanisms are causing sea level to rise. First, shrinking land ice, such as mountain glaciers and polar ice sheets, is releasing water into the oceans. Second, as ocean temperatures rise, the warmer water expands. Trapped within a basin bounded by the continents, the water has nowhere to go but up. In some parts of the world, especially low-lying river deltas, local land is sinking (known as subsidence) making sea levels that much higher, this in turn leading to direct effect to the coastal communities where some 40 percent of the world's population lives within 62 miles

[1]Bindoff, N.L., J. Willebrand, V. Artale, A, Cazenave, J. Gregory, S. Gulev, K. Hanawa, C. Le Qu&eaute;r&eaute;, S. Levitus, Y. Nojiri, C.K. Shum, L.D. Talley, and A. Unnikrishnan. 2007. Observations: Oceanic climate change and sea level. In: Climate change 2007: The physical science basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Edited by S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller. Cambridge University Press.

[2]Environmental Protection Agency. 2010. Climate Change Indicators in the United States, Washington, DC. EPA 430-R-10-007. pp. 74

(100 kilometres) of the ocean, putting millions of lives and billions of dollars' worth of property and infrastructure at risk.[3]

A study by Awuor *et al* (2008) on Climate Change and Coastal cities the case of Mombasa argues that, Mombasa is on the coastal plain, which is 4–6 kilometres wide and lies between sea level and about 45 metres above sea level. Parts of the city and its surroundings are likely to be submerged with a rise in sea level, and this would consequently disrupt ecosystem functions and balance, disrupt agricultural and industrial activities, cause the destruction of human settlements and interfere with the water supply.[4]

Awuor *et al* (2008) asserts that this increase in seal level will impact negatively on the city's economy and, by extension, on the national economy due to the many activities and investments found in the area. According to the IPCC Fourth Assessment Report, it is estimated that during the 20th century, sea level has been rising at a rate of about 2mm per year, with the fastest recorded rates averaged along the global coastline (four millimetres per year) occurring in the 1990s.[5] It is estimated that about 17 per cent of Mombasa, or 4,600 hectares of land area, will be submerged with a sea-level rise of only 0.3 metres[6]. At the same time, there will be large areas that may be rendered uninhabitable as a result of flooding or water logging, or will be agriculturally unsuitable due to salt stress, especially in the peri-urban space where agriculture is practised. Sandy beaches and other features, including historical and cultural monuments such as Fort Jesus, several beach hotels, industries, the ship-docking ports and

[3] Union of Concerned Scientists (2011). Global Warming Effects Around the World

[4]Awuor, C .B. Orindi, V.A & Ochieng Adwera,A.(2008) .Climate Change and Coastal cities: The case of Mombasa, Kenya. Environment and Urbanization,20(1),231-242

[5]Bindoff, et al (2007), "Observations: oceanic climate change and sea level", in S Solomon, D Quin, M Manning, Z Chen, M Marquis, K B Averyt, M MTignor and H I Miller (editors), Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge and New York, pages 385–432

[6]Mahongo, S (2006), "Impacts of sea-level change", Paper presented at the ODINAFRICA/ GLOSS Training Workshop on Sea-Level Measurement and Interpretation, 13–24 November, Oostende, Belgium.

human settlements could be negatively affected by sea-level rise.[7]

2.1.2 Atmosphere Circulation

The circulation change influences precipitation patterns that affects salinity pollution, the impacts of anthropogenic climate change that enhances strong wind in upwelling of currents, thus increasing nutrients availability stronger thermal stratification and deepening, to prevent cooling when rich nutrients waters is upwelled, changes in atmosphere circulation might change frequently, increasing water storms. Increasing GHG concentration has impact on ocean biogeochemistry, with atmospheric carbon dioxide concentration expected to rise from industrial level, roughly half of released by human activities, 30% of modern CO2 emissions is always taken to ocean, therefore, continued atmospheric co2 expected to decrease oceanic PH, thereby changing saturation horizons of aragonite, calcite since more organisms have adapted to thermal fluctuations, rise in PH will interfere with fossil record[8].

2.1.3 Biological Organisms

Climate change is predicted for drive species towards poles resulting to extinctions, where dispersal capabilities are limited or either suitable habitat is unavailable. Such fishes, it influences distribution and abundance through changes in growth, survival, reproduction or response to change at trophic level that directly impacts commercial fisheries.[9]

Biological importance of rising temperature varies among species, mid to high intertidal species while recent warming, the larval environment has resulted to earlier spawning resulting to temporal mismatch between larva production and food supply. The shift of species distribution upwards, as result, ecological changes could result from decreased habitat

[7]Awuor, C .B. Orindi, V.A & Ochieng Adwera,A.(2008) .Climate Change and Coastal cities: The case of Mombasa, Kenya. Environment and Urbanization,20(1),231-242 Journals.sagepub.com/doi/abs/10.1177/0956247808089158.

[8]Doney, S. C., Ruckelshaus, M., Duffy, J. E., Barry, J. P., Chan, F., English, C. A., ... &Polovina, J. (2011). Climate change impacts on marine ecosystems

[9]Harley, C. D., Randall Hughes, A., Hultgren, K. M., Miner, B. G., Sorte, C. J., Thornber, C. S., ... & Williams, S. L. (2006). The impacts of climate change in coastal marine systems. *Ecology letters*, *9*(2), 228-241.

availability within particular depth zone.[10]Species that shows climate related latitudinal changes shifted in dept, since north sea depth are roughly positively correlated with latitude thus more deeper with warming but didn't change latitude. Therefore, species boundary has been displaced by warming after moving significantly, the warming related shift occurred independently of time for centre distribution in 8 of 36 species and range limit in4 of 20 species, where shift reflected year to year environmental variability, poses great threat to fish population that constrained by the dispersal capabilities or habitat requirement.[11]

The impact to species with slower life histories is more vulnerable to over exploitation and may be less able to compensate for warming through rapid demographic response. Different rates of shift may result to altered spatial overlap among species disrupting interaction and potentially compounding the decoupling effect of climate drive change

2.1.4 Flooding

As per the study by Awuor *et al* the potential impacts of sea-level rise that could affect Mombasa are increased coastal storm damage and flooding; sea-shore erosion; salt water intrusion into estuaries and freshwater aquifers and springs; changes in sedimentation patterns; decreased light penetration to benthic organisms leading to loss of food for various marine fauna; and loss of coral reefs, contributing to loss of biodiversity, fisheries and recreational opportunities, among other.[12] Kenya experiences two wet seasons with strong patterns of climate variability and extremes. Future projection indicates temperatures increase in mean annual temperature by 1°C to 35°by 2050s, while changes in precipitation are more uncertain. Therefore, extreme events will be experienced such as intense heavy rainfall in the wet season

[10]Ibid 8
[11]Ibid 9
[12]Ibid 7

in some regions thus greater risks of flood.[13]

The key impact of climatic change itself results in sea level rise, periodic floods and drought. In Kenya, major drought occurred in 1998-2000, 2004/05 and in 2007.[14] The 1997/98 floods affected almost 1 million people with an estimated total economic cost of $ 0.8 to 1.2 $ billion arising from damage to infrastructure that included roads, building and communication, public health effects that included fatalities and loss of crops.[15] There were other major floods that occurred in 1997/98 and 2006, estimated to have cost $2.8 billion as a result of loss of crops and livestock, forest fires, damage to fisheries, reduced hydropower generation, and reduced industrial production and water supply. Over 723,000 people were affected. Therefore, continual annual burden leads to large economic cost equivalent to 0.5 billion per year and 2% of the GDP. This threatens post development gains and constrains future economic progress. However, global models indicate that additional net economic cost (on top of coast of existing climate variability) could be equivalent to loss of 2.6% of GDP each year by 2030 in Kenya.

2.1.5 Agriculture

There is high potential risk in agricultural sector. The modest impacts are medium term with some regions even experiencing increased agricultural yield while other model estimate high economic cost. The shift in Agro-ecological potential zone, future land use change and production, exploring the sensitivity of agricultural and pastoral land on climate change shifts the value of agricultural land evaluating. Some 150 land units are potentially sensitive to climate change resulting in change of land value, under two scenarios; first, it assumes national drought occurrence with most severe impacting humid highlands. This reduces maize products dramatically and total value of agricultural land in Kenya reduces to about 2/3 of average value.

[13]Stockholm Environment Institute project report (2009) Economic of Climate Change in Kenya: https:www.sei-international.org/mediamanger/../climate-change..Kenya-climatechange.pdf.

[14]*Ibid*.
[15]*Ibid*.

Second scenario for long-term consequences of climate change, assume wetter condition prevail that increase in land value in central zone but not highland with overall 10% increase in agricultural land.[16] Potential multi-sectoral effect of water resources and climate change using case study of Tana River using water planning model, projects economic impact to range from $2 million to a cost of $66 million for hydropower, irrigation and drinking water access. As for energy, average temperature will increase number of hotter days and increase cooling burden especially in urban areas. The higher the temperature combine with higher income will increase electricity demand to high economic cost. For instance, cooling demand could increase by 240 to 340% in Mombasa by 2010, thus, increasing electricity demand for cooling and have economic cost especially in tourism sector.

Authors such as Awour *et al* (2008) suggests that Adaptation approach towards accelerating development to cope with existing impacts such integrated water management, natural resources and environment management and electricity sector diversity. Increasing social protection through cash transfer to most vulnerable following disasters, safely net for two most vulnerable events. There is building adaptive capacity and institutional strengthening mechanism to improve capability of informing and creating awareness, lastly enhancing climate resilience such infrastructure design and flood protection measures.[17]

2.1.6 Diseases

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) (2006), pointed out that the rise of sea level could potentially cause the spread of climate-sensitive diseases such as cholera, which may affect large numbers of people due to high population densities in cities, and could lead to high loss of life as health institutions and residents are often caught unawares. These impacts also disrupt normal livelihood activities and school

[16] *Ibid 10*
[17] *Ibid*.

attendance.[18] Also, there could be potential increase in rural health burden of malaria since this area has higher elevation and the disease is currently restricted by temperature variation. The new malaria risk model, based on altitude finds that climate change could increase rural population at risk for malaria by between 36% and 59% by 2015 affecting an extra 2.9 to 6.9 million people. Therefore, the economic cost of this additional burden is estimated to be $45 to $99 million annually as direct cost while $144 to $ 185 million if full economic cost is considered, including dis-utility from pain and suffering, impacts that are directly and indirectly linked to climate change.

The study contributes rich ideas to the current research by highlighting the effects of sea level rise on the coastal communities and properties however it falls short of things, the study was not conducted the geographical area that the current study is intended to focus on, the study did not ascertain the level of damage the sea level can cause to the coastal communities and finally the author did not have factual figures on the damage caused by rising sea level on the communities around coastal region have suffered.

2.2 Legal implications on the sea level rise

Kenya has Sovereignty rights in economic exploration and exploiting. Conservation and managing of Natural Resources whether living or non-living, of water super adjacent to seabed and its subsoil[19]. This has resulted in massive competition for fish resources by numerous fishermen who exploit the resources leading to overexploitation. Marine resources are shared resources especially the outer zone of maritime. Major challenge arises when there is continual change in climatic conditions attributed to resources extraction activities and uncertainty in boundaries and limits delimitation on boundaries in coastal zone which have common reference to high water limit, shoreline among others. Normal baseline is difficult to locate through land

[18] United Nations Office for the Coordination of Humanitarian Affairs (OCHA) (2006), Regional Overview of the Flooding in the Horn of Africa

[19] Article 56 of LOSC.

water interface has resulted into conflict in the past, there is much emphasis on fishing boundaries but in most cases, it is until conflict arises when states fix them without court decisions or specific legislation.[20] Location of many maritime boundaries is a matter of considerable subjective interpretation to bring sound recommendation such Kenya and Somali delimitation boundary where Somali is requesting ICJ to draw the boundary according to international law that might affect both fishing ground and mining.[21]

2.2.1 Baseline

Low tide elevation is used as critical basepoint for generating maritime jurisdiction drawn specially for island article 121(2) and 121(30) for rocks. Loss of critical basepoint as result of sea level rise can result to reclassifying to isolated feature from being an island capable of generating EEZ to more rock incapable to generate maritime claim will have enormous impact on scope of jurisdiction claim, since maritime boundaries once agreed, are not subjected to change except through agreement among parties even in case of subsequent fundamental change of circumstance. Article 7(2) adopted two possible interpretation on 'not withstanding's imply state must redraw straight baseline gives substantial shift in coastline since straight baseline were not intended as universal protection against shift in coastline but for drawing baseline on highly irregular coasts. The convention is silent about changes in coastal geography or whether normal baselines are ambulatory. U.S Supreme Court in 1969, case united states vs Louisiana, whether baseline is ambulatory under 1958 convention on TS and coastal zone; court dismissed Louisiana argument and interpreted that baseline remain ambulatory.[22]

[20]Muigua, K.Wamukoya,D.,Kariuki, F.(2015).Natural Resources and Environmental Justice in Kenya. *Natural Resources and Environmental Justice in Kenya*

[22]Lisztwan, J. (2012). Stability of maritime boundary agreements. *Yale J. Int'l L.*, *37*, 153.

2.2.2 Maritime Delimitation

Coastal state with agreed maritime delimitation with an opposite or adjacent state, if boundary agreement divided their EEZ, most case coastline will retreat only to increase EEZ of the two states thus not affecting types of the zones delimited on total area of EEZ that don't exceed 400 nm, if it exceeds then new area of high sea is created. Low tide elevation is used to measuring breadth of territorial sea where low tide elevation is situated at distance not exceeding the breadth of TS from mainland of island, with disappearing basepoint, it creates loss of 12 miles it generates when situated within territorial sea area. Island generate maritime zone such territorial sea, contiguous zone, EEZ and continental shelf, therefore coastal baselines used when situated within 12 nm and enlarge extent of territorial sea seaward as it generate its own territorial sea, if island submerged due to sea level rise, this will lead to different legal situation with the regard to maritime entitlement making island become more low tide elevation.[23]

2.2.3 Illegal, Unreported and Unregulated Fishing

FAO has observed illegal, unregulated and unreported fishing and unlicensed fishing vessel poaching occurs in EEZ by both national and foreign vessels that has direct effect on the management of high fish stocks. IUU at EEZ is as a result of vastness of area to national jurisdiction that often require that states expend substantial assets, therefore, difficult to patrol by virtue of geography and lack of capacity. Also, the difficulty of enforcing coastal state law has resulted to increase of IUU fishing that require cooperation among states for efficient management on maritime enforcement.[24]

[23]Sefrioui, S. (2017). Adapting to Sea Level Rise: A Law of the Sea Perspective. In *The Future of the Law of the Sea* (pp. 3-22). Springer, Cham

[24]Kaye, S. (2014). Enforcement cooperation in combating illegal and unauthorized fishing: an assessment of contemporary practice. *Berkeley J. Int'l L.*, *32*, 316 Kaye, S. (2014). Enforcement cooperation in combating illegal and unauthorized fishing: an assessment of contemporary practice. *Berkeley J. Int'l L.*, *32*, 316 Kaye, S. (2014). Enforcement cooperation in combating illegal and unauthorized fishing: an assessment of contemporary practice. *Berkeley J. Int'l L.*, *32*, 316

2.2.4 Conflicts

Most states want to benefit from it and maliciously safeguard the sovereignty that they have over natural resources within their territory. For instance, such change in coastline due to sea level may involve countries in transition when fixing the boundary. Accordingly, they would want to reap greatest benefit from the resources, this, hindering strategy for managing Trans-boundary resources that arises from shared water resources and in differences of entitlements which may lead to conflict, i.e., controversy over use of river Nile water between lower and upper riparian and Trail Smelter arbitration.[25] Such disagreements will rouse interest and needs that are incompatible or when priorities of some parties are not considered in policies, programmes and projects. Such threats to sustainable development of natural resources in Africa has resulted in undermining of economic development and sustainability. Conflict hinders exploitation and scares away investors.[26] There is need to promote environmental governance, upholding the rule of law and in ensuring a fair balance between environment, social and development consideration through its judgement and declaration.[27]

2.2.5 Enforcement

There is restricted exercise of legislative and enforcement jurisdiction within EEZ on matters relating to fishing and mineral exploration. For instance, coastal states will not have power to arrest or detain foreign vessel using prohibited gears and impose penalty.[28] Similarly, there will be no jurisdiction to adopt relevant law and regulation for enforcement procedure to grant authority to a third state, to construct and operate artificial islands and structure for economic purposes[29] and for conducting scientific marine research among others[30]. This will hinder state

[25]Muigua, K.Wamukoya, D.,Kariuki, F.(2015).Natural Resources and Environmental Justice in Kenya. *Natural Resources and Environmental Justice in Kenya*
[26]*Ibid.*
[27]Wrtstoepfer message (2005) UNEP global judge programme UNEP,Nairobi 2005.
[28] Article 73(4) of LOSCUnited Nations Convention on the Law of the Sea.
[29] Article 60 of LOSC.United Nations Convention on the Law of the Sea.
[30] Article 56 of LOSC.United Nations Convention on the Law of the Sea.

economy forcing them to carry out their right in contiguous zone after the shift. Therefore, the third state might conduct marine scientific research with no coastal states consent, contrary to Article 246(2) of LOSC.

A number of states will endure significant economic costs in fixing boundaries as opposed to allowing them to remain ambulatory, especially when tied to the costs involved in developing accurate charts and precise satellite imagery that reflects their new boundaries, for the costs associated with maintaining "uncertain boundaries" could very well offset these merely monetary expenses.[31]

2.2.6 Dispute mechanism

Despite success of dispute mechanisms, the main limitation facing practices of dispute settlement in Africa are inadequate legal regimes and infrastructure for efficient conduct of arbitration. This is attributed to inadequate legal framework in some states to facilitate commercial matters. Also, some states are not parties to important multilateral treaties relevant to international dispute resolution.

Secondly, dynamic cultural differences in reference to economic, political and development issues that affect the practice, misinterpretation of policy due to its uncertainty has resulted in unnecessary interference, intimidation of national court to investor during commercial dispute especially during interpretation. Such instances arise due to unclear definition and lack of clear public policy. Thus, it forces states to opt for foreign jurisdiction and perception of corrupt systems that interfere with processes, and intimidate foreigners[32]. For instance, Kenya Marine and Fisheries Research Institute (KMFRI) is mandated to conduct aquatic research covering all Kenyan EEZ in Indian Ocean waters. The research aim is to guide the country to undertake "sustainable exploitation, management and conservation" of aquatic resources. The main

[31] *Ibid*, pg 15.
[32] Muigua,K. "Promoting International Commercial Arbitration in Africa".

shortcoming of the institution is lack of enforcement and capacity that limit effectiveness of expected intervention within the sector". [33]

2.2.7 Inadequate policy

Despite the fact that several initiatives have been undertaken, there still exist inadequate policy framework for marine resources to prevent proper management of resources. These results to serious implication such as diminishing finfish and coral, thus increasing number of sea urchins, turf algae cover and lowered coral cover.[34] Jurisdiction enforcement is based on territoriality and nationality law in place. The extent of the territorial reach of court, legislation power, jurisdictional reach of the court and enforcement capability are all tied to existing legal framework. Therefore, ability to enforce is consistent with national and international law for fisheries and mining.[35] In light of "special rights and responsibility" of Coastal states in EEZ, "the primary responsibility for taking necessary measures to prevent, deter and eliminate IUU fishing rests with coastal states, therefore, adoption of relevant and necessary law and regulation, includes enforcement procedure, consistent with LOSC to conserve and monitor the living resources in EEZ consistent with Article 61 of LOSC and tribunal decision N/V Virgin G case.[36]Kibiwot, R. (2008) analyses the gap on the law to address conservation and development of resources, explaining gap on management that sustains resources for prosperity, he further explains existing policy has enhance only narrow interest rather national interested confirms the existing challenges on legal framework that not only utilize full utilization of ocean resources but also other opportunities presented by ocean frontier that

[33]Ongolo, David and Samson Awino,S. (2013).Small and Medium Enterprises and Devolved Government and System: An Assessment of regulatory and Institution Challenge Affecting the SMEs Development in Kenya. ICBE-RF Research Report No. 71, 13.
[34]Wambua, P.M(2009).Governance of the forgotten province :*a critical Appraisal of the policy, legal and institutional frameworks for the control and management of marine resources within Kenya's maritime zone*(Doctoral dissertation, University of Nairobi).
[35] Don Rothwell (2016 October) Presentation in ANU during Ocean governance and sustainable fisheries.
[36]Babu, R. R. (2015). State responsibility for illegal, unreported and unrelated fishing and sustainable fisheries in the EEZ: some reflections on the ITLOS Advisory Opinion of 2015. *Indian Journal of International Law*,*55*(2), 239-264.

results to inefficient governance, conflict and wastage of resources. The text doesn't mention guiding principles to enable equity access to resources to EEZ considering current sea-level rise despite mention major problem of inadequately harnessing/realizing potential of the commercial fisheries, over 60 vessels from over 13 countries are licensed to fish at Kenyan offshore waters located within richest tuna belt in Indian ocean. The estimated 4000 artisanal fishing in marine water face challenges of low technology craft with less finding and capacity to enhance livelihood. Therefore, there's gap in law dealing with ocean management, missing link between coordination amongst key stakeholder[37].

2.2.8 Limited funds and skills

Exploration and research institutes that are involved in governance of marine resources has been faced with perennial problems due to lack of funds and trained man power. Over reliance on donor funding and grants has denied institutions autonomy and negatively affect their work. Major institutions involved in exploration and research on marine resources are KEMFRI and NOCK. The challenges involved include lack of research vessels, lack of suitable trained manpower to carry research, trained scientists leaving institute for greener pastures and inadequate purchase of "up to date" core scientific journals.[38]

Data management

Poor data management is limited to appreciation of local knowledge and traditional practices about marine interests is not well documented and management of numerous government agencies involved resulting in fragmented, duplication, incomplete and inconsistent datasets. Historical datasets are often incomplete and out of date because governance has until recently been ignored by planners and policy makers such that there is no agency with responsibility to

[37]Kibiwot, R. (2008). Towards the formulation of Kenya's integrated ocean management policy including institutional framework. *Division for Ocean Affairs and the Law of the Sea (DOALOS), UN, New York USA. 109p*

[38]*Ibid.*"

lead data management activities in both coastal land maritime zones.

Cooperation

This cooperation principle includes multilateral, bilateral trans-boundary and private sector cooperation.[39] Duty to cooperate naturally obtains from the duty to conserve shared natural resources. This applies in conservation implementation measures to regulate its exploitation justifying the need for improved level of cooperation.[40] Combating climate change requires effort and cooperation of every state, this is underscored in Article 186(3) of national government as interpreted as a function of government. Therefore, cooperation among national, county and regional government are designed and the overall implementation of Climate Change Act, 2015 recognised. County governments are to play a central role alongside national government in mitigation effort.[41] EMCA Act (1999) provides that in exercising jurisdiction conferred upon it, the High Court will be guided by the principle of sustainable development, principle of international cooperation in management of shared resources, the principle of intra-generational and intergenerational equity, the polluter pays principle and pre-cautionary principle during redress process.[42]Consequently, there is need for greater institutional cooperation and coordination at regional and international level for effective enforcement and monitoring of activities so that equitable share of management responsible focuses on regions ocean resources.[43]

EAC protocols have addressed the trans-boundary reality of resources, their use and their impact on the environment security for communication within and outside national boundaries. This has allowed effective management of resources. However, there is need to coordinate

[39]*Ibid 21*
[40]Wambua, P. M. (2009). Enhancing regional maritime cooperation in Africa:The planned end state. *African Security Studies,18(3)45-59.*
[41]*Ibid.*
[42]*Ibid.*
[43]*Ibid*.

development mechanism protocol to deal with illegal exploitation of natural resources.[44] Article 13 on management of water resources mandates partner states to "develop, harmonise and adopt common national policies, law and programmes relating to management and sustainable use of water resources and utilise water resources including shared water resources, in an equitable and rational manner".[45] Article 18 provides for the management of mineral resources. It requires partner states to "develop and harmonise common policies, laws and strategies for access to exploitation of mineral resources for socio economic development and sustainable utilisation".[46] Maritime governance transcends national geographical and political boundaries. Nevertheless, most African coastal states have presented degree of complexity as a result of lack of capacity.[47]

Positive development with regional cooperation has been shown on non-treaty agreements between states such as the Indian Ocean Memorandum of Understanding, IMO for code of conduct within states, establishment of sub-regional maritime rescue coordination centre in Mombasa, among others. This has enabled achievement of effective governance to enable effective implementation of LOSC. Correspondingly, legal framework is evolving rapidly through expansion of national maritime zone.

Major challenges hindering cooperation of states includes lack of appropriate framework, inadequate training facilities and institution to develop a pool of competent human resources, lack of funds for exploration of research, illegal, unreported and unregulated fishing from distant water fishing nation vessels, and inadequate disaster preparedness on maritime matters. Major gaps that African states need to work out include AU establishing an organ through

[44]Mwaniki,P.A.N. (2010) Natural resources conflict: Management Processes and Strategies in Africa. *Institute for Security studies papers,(216,12-p).*
[45]*Ibid 21*
[46]*Ibid.*
[47]*Ibid.*

which the maritime agenda can be handled to make it easier for coordination and allow focus on common challenges facing African states on ocean governance. Secondly, identify common goals and objectives that shall integrate exploitation and governance through regional cooperation. Thirdly, have strategic plan for regional cooperation development through outlining priorities as well as structure and institution both at national and regional level. This can be realised through sharing information to curb the problem despite financial capacity.[48]

Wambua, P.M. (2009**),** identifies major challenges facing Africa states in quest for sound governance to maritime zones, this includes lack of appropriate policy, legal and institutional framework for governance of maritime zone. Inadequate training facilities and institution to develop competent human resources to governance, illegal, unreported and unregulated fishing from distant water fishing nation vessels. However, he fails to explain implication to the resources when the zones expand. It also fails to address regional cooperation in maritime zone to enable access of resources or adjusted state when coastline shift, it only speaks of integrated exploitation and governance of resources, focusing on challenge being security, surveillance and marine pollution leaving out resources, focusing on challenge being security, surveillance and marine pollution leaving out critical factor of climate change implication.[49]

2.3 Kenyan legal framework regulating coastal marine resources

The key element which characterises marine environmental protection and conservation of species, has been adopted to protect marine environment and incorporated into legal instruments such the clear obligation upon state to apply this principle widely in conservation, management and exploitation of fish stock and protect living marine resources.[50]

[48]Ongolo,David and Samson Awino,S.(2013).Small and Medium Enterprises and Devolved Government and System: An Assessment of regulatory and Institution Challenge Affecting the SMEs Development in Kenya. ICBE-RF Research Report No. 71, 13.

[49]Wambua, P.M. (2009). Enhancing regional maritime cooperation in Africa: The planned end state. African Security Studies, 18(3)45-59

[50]*Ibid 24*

2.3.1 Guiding principle for legal governance

2.3.1.1 Principle of Freedom

French jurist R-J Dupuy summarised essence of law of sea as always between two major contrary winds, wind of high seas towards land is wind of freedom while wind from land towards high seas is bearer of sovereignties thus law of sea is always in the middle. Therefore, to ensure that this freedom given to various oceans of that ranges from "navigation, over flight, laying submarine cables and pipelines, construction of artificial islands", fishing and marine research that's essential for maritime powers in order to secure their states economic interest and maritime networks and expanding their political or military influence over their overseas.[51]

2.3.1.2 Principle of Sovereignty

It seeks to safeguard the interests of the coastal states since it promotes extension of jurisdiction into offshore spaces and support the territorialisation of oceans. This concept was formulated by Vattel that critically analysed on how nations take possession of certain parts of the sea, as a result possess the empire as well as domain. For parts of sea within jurisdiction of the nation and part of its territory sovereignty command that states make laws and punish those who violate them as he has right there, as on land and every right which laws of state allow him. Nevertheless, it distinguishes the role in high seas that has a renowned sovereignty. Subsequently maritime belt adjacent to coast became important for purpose of neutrality, security, custom control, sanity regulation, fisheries and economic policy on basis of doctrine of mercantilum.[52]

[51] Tanaka, Y. *TheInternational Law of the Sea*, (Cambridge: Cambridge University Press, 2012)

[52] *Ibid.*

2.3.1.3 Precautionary Principle

Rio Declaration Article 15 states that "whereas threats of serious or irreversible damage, lack of full scientific certainly shall not be used as reason to postpone cost effective measure to prevent environmental degradation thus calls for action even where there is no scientific uncertainty.[53] This explains that states have, according to the Charter of the UN and principle of international law, sovereignty rights to exploit their own resources pursuant to their own environmental and development policies and responsibility to ensure activities within jurisdictions do not cause damage of environment of other states of areas beyond limit of national jurisdiction.

2.3.2 Legal instruments

2.3.2.1 Maritime Zones Act Cap 371

The revised Maritime Zone Act, 1989, Cap 371 provides the basic legal framework for oceans management and sets out the principles and norms that apply to state parties, and entitled to sovereign, and jurisdictional right which includes internal waters, located on the landward side of the baselines, [54] as stipulated in LOSC. States are entitled to the full sovereignty in the same way with the land territory in its internal waters.[55] It includes parts of sea along the coast down to the low water mark ports and harbours, estuaries, land water from closing line of bay. This does not include water within land territory and landlocked water or lakes.[56]

Coastal States have right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles.[57]Kenya's sovereignty extends to the territorial sea as an inherent part of its territory with full sovereignty including the safety of "navigation, conservation of living

[53]Birnie,P.W., Boyle, A.E (1994) .International Law and environment.
[54]Article 8(1) of the LOSC.
[55]Article 2(1) of the LOSC.
[56]*Ibid 24*
[57] Article 3 of the LOSC.

resources and the prevention of infringement of the customs, fiscal, immigration, or sanitary laws".[58] Therefore the coastal state's legislation governing territorial sea extends to the southern boundary on Pemba channel that stand 9,700 square km. This is recognised in section 2 of the EMCA, characterisation and delimitation in maritime zone and section 42(3) (h) which recognises prescribed guidelines to access and exploitation of living and non-living resources of marine environment.[59]

The contiguous zone area is limited to "24 nautical miles in breadth from the baselines; and allows control for prevention or punishment on infringement of customs, fiscal, immigration, and sanitary laws in its territory or territorial sea".[60] EEZ is the area "beyond and adjacent to the territorial sea up to 200 nautical miles" from baselines from which the breadth of the territorial sea is measured and Kenya has already proclaimed this area of approximately 142,000 km^2. The Coastal States are entitled to enjoy sovereign right for the purpose of "exploring and exploiting, conserving and managing the marine resources (living or non-living), and with regard to other economic activities (e.g., production of energy from water, currents and winds); jurisdiction with regard to the establishment and use of artificial islands, installations and structures; marine scientific research; and protection and preservation of marine environment; and other rights and duties"[61]. Kenya has benefited from Pemba channel Agreement while the Northern boundary of EEZ with Somalia was delimited by notice of gazette with bilateral agreement.[62] The High seas zone is the area designated as all parts of the sea that are "not included in the exclusive economic zones, in the territorial sea or in the internal waters of a state, or in the archipelagic waters of an archipelagic state, thereby, termed as open

[58] Article 21 of the LOSC.
[59]Okidi.C.O. (2008). Legal aspects of management of coastal and marine environment in Kenya. In Okidi,C. et al.(eds),Environmental governance in Kenya, East Africa Educational publishers.
[60]Article 33 of the LOSC.
[61]*Ibid*
[62]*Ibid 33*

seas to all States".[63]

The continental shelf of a coastal state comprises the "seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer limits of the continental margin, or to distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental shelf margin does not extend up to that distance."[64] Kenya made a submission to the Commission on Limits of the Continental Shelf (CLCS)[65] and has the right to "explore and exploit the living and non-living resources of the shelf ", with regard to the delineation of the extended continental shelf.

2.3.2.2 The Climate Change Act 2016

Kenya is a signatory to UNFCC that sets out action aimed at the stabilisation of the atmospheric concentration GHG. The treaty has been domesticated by the Climate Change Act, 2015. The Act seeks to provide for the legal and institutional framework for mitigation and adaptation to the effects of climate, and facilitate and enhance response to climate change.[66] The government has developed the National Climate Change Action Plan[67] with the aim of implementing the National Climate Change Response Strategy to ensure the section supports Kenya's achievement of development goals and supports effort towards attaining vision 2030. At regional level, African Union adopted Africa Climate Change Strategy in 2011. Also, the East Africa Community adopted the Climate Change Policy, Strategy and Master Plan the same year.[68] Also, the Kyoto Protocol, domesticated to our Climate Change Act 2016**,** has clearly

[63]Article 87 of the LOSC.
[64]Article 76(1) of the LOSC.
[65]Kibiwot, R. (2008). Towards the formulation of Kenya's integrated ocean management policy including institutional framework. Division for Ocean Affairs and the Law of the Sea (DOALOS), UN, New York USA. 109p."
[66]*Ibid 21*
[67]Kenya National Climate Change Action plan (2013-2017) https://cdkn.org/2013/03.
[68]*Ibid*.

manifested precautionary principle. These basic formulations suggest sound action, measure or strategy to specifically address potential risk where there is lack of full scientific certainty considering uncertainties in climate change issue and risk of damage to human and environment[69]. Agenda 21, links the principle to integration of ocean and coastal management and development on national level in precaution approach, having emphasis on national, regional framework cooperation to address resource depletion and pollution. There is great emphasis on marine environment for coastal state to develop national regulations concerning management of marine resources, thus sustainable exploitation of resources has to be addressed first and foremost, at national level for progress of agenda 21 and LOSC to domesticate into national policies, action plans, legislation and guidelines.[70]

As much as scientific uncertainty relating to mechanism of marine ecosystem is an important approach to adopt, the main challenge remains to be assessment of the potential risk and legal guidance on how to control environmental risk for precautionary approach. It doesnot specify measures that should be taken in light to difference of economic and technological capacities between states that cannot be adopted uniformly. Decision making process of the approach that involve national policy, international courts and tribunal seems to encounter difficulties with its reinforcement.[71] This has been tracked by various governance challenges.

2.3.2.3 Integrated Coastal Zone Management policy

In reference to legal instruments, Integrated Coastal Zone Management policy seeks to "promote the domestication of Multilateral Environmental Agreements (MEA's) and imploration to foster international and regional cooperation" for better management of trans-

[69]Deloso,E.(2005). Precautionary Principle Relevance in International Law and Climate Change, The *.phil. LJ, 80,642*.
[70]Wambua,P.M. (2009). Enhancing regional maritime cooperation in Africa:The planned end state. *African Security Studies,18(3)45-59.*
[71]*Ibid 24.*

boundary issues[72]. Whereas the policy is adequate in addressing environmental socio-economic impacts, aspects of human and environment wellbeing, the issue arising is that the "policy is inter-linked with some national laws and policies, regional and international conventions and treaties" but not with the new Constitution and it also does not indicate that it will be followed by enactment of a law, but will be implemented through a National Plan of Action.It is necessary to anchor it on an existing law to espouses best practices in natural resources management and conservation. These best practices entail sustainable management and use of coastal zone considering the fragility interaction, the maritime orientation of certain activities, uses, and their impact on both marine and land parts.[73]

2.3.2.4 Environmental Management Coordinating (EMCA) Act Cap 376

EMCA as provided in Section 55 of EMCA. Also, there are difficulties in ensuring that the legal measures adopted are duly enforced, and lack of coordination between decision-making levels. Therefore, there is need for a more "holistic expansion to fully embrace ecological sustainable development by including integrated planning that considers management plans for the natural resources being exploited and developing appropriate indicators for monitoring and evaluation"[74].

Section 55 of EMCA (1999) mandates the National Environment Management Authority (NEMA) to coordinate and implement the ICZM policy through recognising its approach as a tool for the protection and preservation of the coastal and marine environment.[75] However, this should be done in collaboration with other institutions whose policies and mandates directly or indirectly offer synergy in promoting ICZM policy as given in appropriate integrated management approach to promote sustainability. However, Section 55 which gives the Cabinet

[72]ICZM Policy 2016-2018.
[73]*Ibid.*
[74] EMCA Act 1999.
[75]*Ibid.*

Secretary the authority to declare an area to be protected in coastal zone does not however specify either the conditions that should justify such protection and the numerical delimitation of such an area. This provision is thus seen not to offer much opportunity for protection due to its open-endedness. Similarly, the list of details to be included in survey report for ICZM plan according to EMCA 55(2) is limited to emerging dynamics such as climate change.[76]

For instance, Kenya Forest Service and Kenya Wildlife Service both have power to manage and conserve Mangrove forests, pursuant to Section 58 of the amended EMCA, 2015. Therefore, there is need for capacity building within and outside the NEMA institution and to review policies, guidelines and regulation to harmonise with revised EMCA.[77]Section 7 on wildlife conservation and management of national parks, enumerates wildlife conservation areas and sanctuaries under its jurisdiction. KFS is mandated with conservation, protection and management of all forest in Kenya. Thus, fisheries' interests tend to conflict with nature protection as with forestry agriculture and urban authorities in regard to mangrove and marine national parks creating institutional overlaps and conflicts that result in occasional poor management of marine resources. This calls for harmonisation of institutional framework at both national and international level.[78]

National courts are not adequate to fully adjudicate environmental cases at international level, regional and at times national level. Most of the international issues are trans-boundary in nature; this requires either national or regional institutions to manage. Due to growing demand for a solution to the environment crisis, most states opt for international mechanism to resolve disputes relating to natural resources of environment.[79] The African Court on Human Rights

[76]Ruwa, R. K., & MOMBASA, K. (2011). Policy and Governance Assessment of Coastal and Marine Resource Sectors in Kenya in the Framework of Large Marine Ecosystems.
[77]The Environmental Management Coordinating Act, Cap 387 of the Laws of Kenya."

[78]*Ibid 21*.
[79]*Ibid.*

Protocol has established a court that is yet to come into force since it lacks the necessary number of ratifications. The court lacks jurisdiction to preside over cases concerning interpretation and application of Africa Charter as well as any human rights instruments ratified by parties[80]. The overlaps and duplicity of jurisdictional authority and administration power between government bodies that are primarily land-based and marine-based. Consequently, the information about the marine interest in questions is not only fragmented but may also be inconsistent and incomplete leading to general inefficiency. Scattered legislation enactments give simple mention mandate to institutions and statutory bodies although the provision is by and large same such that mandate is overlapping but with different objectives such as NEMA and CDA. Hence, conflict arises when carrying out duties, notwithstanding the lack of broad, comprehensive and integrated national policy on governance of marine resources. Most maritime laws have remained unchanged for years and are ill-suited for modern day sustainable use of marine areas and resources power.[81]

2.3.2.5 Law of Sea Convention

LOSC has set compulsory dispute settlement procedures to be integrated by parties. Accordingly, new permanent ITLOS (International Tribunal for the Law of Sea) was established. For efficient and unique procedure for international dispute settlement, the procedure has four main principles that includes an optional protocol concerning compulsory settlement of dispute, built in procedures as tool for securing integrity of interpretation, compulsory procedures for dispute to secure uniform interpretation, and establishment of new permanent Judicial body, ITLOS with great range of *locus standi* with relevant clarification of the rules[82]. It has been supplemented by Agenda 21; the GPA and the United Nations

[80]Avgerinopoulou,D.T (2003). The Role of international Judiciary in the Settlement of Environment disputes and Alternative proposals for strengthening international environmental Adjudication.Yale Centre for Environmental Law and Policy."
[81]*Ibid.*
[82]*Ibid 24*

Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks of 1995. Others include the Rio Declaration on Environment and Development, the outcome of WSSD and instruments emanating from various UN organs that include IMO and UNCTAD. They promote the peaceful uses of the seas and oceans, the equitable and efficient utilisation of their resources, the conservation of their living resources and study the protection and preservation of the marine environment[83]. This needs to be integrated to our national policy for effective governance.

2.3.3 Mechanism to adapt sea level rise along the Kenya coastline

The chapter tackles major challenges being habitat destruction, pollution and weak governance structure, fails to mention the drift of baseline due to sea level rise. `with emphasis in coastal marine includes inadequate governance, inadequate technical capacity, lack of sufficient financial resources, overlapping institution mandates, political goodwill and prioritization.[84]

The dissertation offers discussion on fisheries regime in EEZ, coastal state fisheries management at EEZ advocate for structure of governance on living and nonliving resources. The study limits itself with current dynamics of climate change, sea level rise and impact to maritime zone with mention of Maritime zone act that doesn't provide enforcement mechanism in regards to governance and management of marine resources. With specific insight practice in governance of more resources in other jurisdiction with insight on best practices with critical review of existing legal framework on Kenya maritime zone. The study limits, not considering current dynamics of sea level rise and legal instrument would apply its principle to enable equity access to resources. He further analyses principles embodied therein will prove useful in efficient resource governance explain cases at ICJ on fishing zone boundary, giving reference to the Gulf Maine case, Greenland/Jan Mayen (Denmark vs Norway) case. The boundary was drawn as far as is practicable, equitable criteria facing account all relevant

[83]Ibid,Odote,C.(2015)

[84]Momanyi, A. (2016). Governance: Legal and Institutional Frameworks. *Western Indian Ocean*, 445

circumstance to achieve equitable result to ensure rights to harvest, maximum sustainable yield of living natural resources and its responsibility for managing them.[85]

The author comprehensively focuses on the approach to utilize and control EEZ with elaborative practical mechanism to control and utilize resource with effective framework but limits its discussion to current issues of climate change and implication of sea level rise; he critically examines the existing legal gap on the legal framework on matter of climate change and hinderance to access of resources to living and non-living resources within maritime zone. Further he explains importance of legal framework for reconciling extensive rights to enable coastal states meet their legitimate claim. critical emphasis was that many states don't recognize her duty to promote critical areas of optimum utilization of sea resources and potential marine environment, thus study seek to the study seeks to provide best approach to protect and control marine resources based on sovereignty rights granted, that will ensure equity utilization of resources even after shift in baseline due to sea level rise.[86]

2.4 Sustainable utilisation of coastal marine resources after shifting of coastline

Maritime zones play an important role in establishing maritime jurisdiction on sovereignty and sovereign rights. With circumstances such as shifting of coastlines that is affected by sea level rise, there should be certain legal measures on how to alleviate these negative impacts.[87]

2.4.1 Option to fix coastal baseline for sustainable utilization

LOSC has some shortcomings that are not addressed. These include, absence of provisions that potentially "fix" the outer boundary of the maritime zone, the EEZ zone the contiguous zone, or the territorial sea when change of circumstances occur such as sea level rise. This has resulted in scholars interpreting the legal and physical boundary of these maritime zones to be ambulatory. For instance, one expert involved in boundaries issues for almost four decades

[85]Wambua, P.M (2009). Governance of the forgotten province: a *critical Appraisal of the policy, legal and institutional frameworks for the control and management of marine resources within Kenya's maritime zone* (Doctoral dissertation, University of Nairobi)

[86]Lumumba, P. L. O. (2003). The exclusive economic zone: a study of the approaches for its utilization and control with specific reference to the Kenyan economic zone (Doctoral dissertation, University of Gent, Belgium).
[87] UCAN.

explains that, "As the normal low-water line moves landward and seaward with aggression and erosion, so does the baseline. As the baseline ambulates, so does each of the maritime zones measured from it." Perhaps this observation makes it clear how rising sea levels may soon affect boundary lines, at least as viewed by some scholars.[88]The original drafters of the Convention seem to suggest that they recognised the possibility that "a mean low-water mark may change, or that the mark charted on a map may not always be accurate. No member objected to this draft language, except one, who expressed his concern that the word *appreciably* may introduce unnecessary subjectivity in determining what is *appreciable"*. Thereafter a member suggested that "if a dispute arose as to whether a chart did or did not '*appreciably'* depart from (the more scientific) criteria, it could be referred to an international tribunal." Notably, however, this particular paragraph was not included in the two subsequent Sixth and the Seventh Sessions of the ILC, where the members discussed the regime of the territorial sea again, or in the final text of UNLOSC.[89]

Also "LOSC does not regulate whether the outer limits of maritime zones (territorial sea and EEZ) shall move with baselines or not. Article 76(9) of the LOSC, nevertheless, regulates permanently describing the outer limits of the continental shelf. These two issues provide a negative implication that low water line and outer limits of the territorial sea, contiguous zone and EEZ may be ambulatory".[90]

A number of authors, such as Soons[91] and Caron[92] have consequently concluded that "outer limits of the territorial sea, contiguous zone, and EEZ must be ambulatory as the consequence of the negative implication". This not being a new problem for it has long been recognised that

[88]*Ibid,* pg 28.

[89]*Ibid*, pg 29.
[90] LOSC.
[91]*Ibid*, Soons (1990): pg. 216, 218.
[92] David. D. Caron. (1990) "*When Law Makes Climate Change Worse: Rethinking the Law of Baselines in Light of a Rising Sea Level*". ECOLOGY LAW QUARTERLY. Volume 17: p. 634.

coastlines are dynamic, so normal baselines can change significantly over time or 'ambulate' and this necessarily has an impact on the "generation of the outer limits of claims to maritime jurisdiction".[93]

This is supported by International Law Commission (ILC) which states that "The line of low water mark is that which is indicated on the charts officially used by the coastal state, provided the latter line (the line indicated on the charts) does not considerably depart from the line of mean low water spring tides".[94] This implies that low watermark could not always be accurate.[95] Referring to case decision of ICJ in support that the "actual low water line may be recognized as a legal measure to delineate baselines in the arbitration between *Guyana v.Suriname".*[96] Consequently, Article 5 of the LOSC should be seriously considered since its interpretation would highly affect the potential impacts of sea level rise with regard to the maritime claim of jurisdiction of zones.

It can be recalled that the provisions of Vienna Convention on the Law of Treaties, the concept of "fundamental change of circumstances" may be interpreted that sea level rise may be regarded as a fundamental change of global ocean, which significantly influence the baselines coastal States have drawn. However, Article 62(2) (a) of that "Convention excludes a treaty establishing a boundary from the fundamental change of circumstances. When coastlines change due to sea level rise in the future, bilateral treaties may be used to permanently fix points for drawing boundary lines".[97] As for existing boundaries treaties, there is a possibility

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[93] Reed, M.W. (2000) "*Shore and sea boundaries: the development of international maritime boundary principles through United States practice*", (Washington D.C.: US Department of Commerce): p. 185; by the Author, Prescott, J.R.V. and Schofield, C.H. (2005): p. 100-101.

[94] International Law Commission (1952) "*Yearbook of International Law Commission 1952*", Volume I, Publisher: New York United Nations: p.171.

[95]*Ibid*. p. 177. Mr. Scelle:" Not all states possessed expert hydrographic services, and an international body of the standing of the Commission could not assume that official charts were always accurate."

[96] The Arbitral Tribunal was constituted pursuant to article 287, and in accordance with Annex VII, of the UNCLOS in the matter of an arbitration between *Guyana v. Suriname.* (UN Law of the Sea Annex VII Arbitral Tribunal. September. 17. 2007) 47 ILM 166 (2008).

[97]*Ibid*."

for states to "use amendment or change the treaties between states based on a concept of change of circumstances, rather than terminating or withdrawing".

2.4.2 Options to the shifting baseline

1. The LOSC treaty has only two provisions on shifting coastlines that possibly address dynamism in coastal geography. First, the outer limits of the continental shelf are described as "permanent" when established in accordance with recommendations by the Continental Shelf Commission. However, the word permanent was meant to indicate the end of the usually lengthy and politically contentious process of claiming a continental shelf, rather than to address concerns of geographic change.

The second plausible reference to coastline shift concerns straight baselines. LOSC allows coastal states to use straight baselines on coastlines that are "unstable." Article 7(2) of LOSC provides that "Where because of the presence of a delta and other natural conditions the coastline is highly unstable, the appropriate points may be selected along the furthest seaward extent of the low-water line and, notwithstanding subsequent regression of the low-water line, the straight baselines shall remain effective until changed by the coastal State in accordance with this Convention".[98]

This has adopted two possible interpretations: First, the provision could imply that the state must redraw straight baselines given a substantial shift in the coastline since they were not planned to be universal protection against any shifts in coastline location but to simplify the drawing of baselines on highly irregular coasts, and to provide a modicum of stability in cases of frequent but minor fluctuations. Secondly, the provision could also reasonably be interpreted to ensure that straight baselines will not shift at all given a regression of the low-water line. This alternate interpretation would, however, imply that normal baselines, without such a

"[98] Article7 (2) of LOSC.

protection in the face of regression, do shift with the coastline.[99]

2. A possible solution could be to agree on permanent maritime zones through bilateral or multilateral treaties which conform to the Vienna Convention on the Law of the Treaties through negotiation between the States. The creation of the treaty itself does not seem to be the issue in this solution; the issue would perhaps be to convince the International Community to agree and to convince States to sign and ratify it. Perhaps there is more potential in the solution of changing the current Maritime Law and the regulation of maritime zones in comparison to reaching an agreement on the maritime zones through a treaty. In this way, the new potential rule would be applicable for every State meeting the criteria, instead of creating a treaty for each State that wants to freeze their maritime zones.[100]

Two opinion exist for drawing baselines and dealing with outer limits of maritime zones as a reference of mitigating adverse effects occasioned by sea level rise. First, appropriate points of straight baselines are addressed even as the geographical information of sea level rise changes year by year. Accordingly, legal norms should be appropriate to make a more flexible system correspond to the physics of climate change. The key of such baselines is dependent on selecting base points.[101] Soons addressed artificial 'conservation of baselines' through construction to preserve features of base points.[102] He asserted that constructed artificial conservation which is very expensive may be useful to prevent baseline points degenerating.[103]However, coastal States should be cautious and strictly follow the rules set out in Article 7 since the use of straight baselines has often been abused and often invite protest

[99]Lisztwan, J. (2011). Stability of Maritime Boundary Agreements Julia Page 163."
[100]*Ibid.*
[101]Moritaka Hayashi (2009) "*Sea Level Rise and the Law of the Sea: Legal and policy Options*". International Symposium on Islands and Oceans. Tokyo: p. 79. Subject to Article 7(4), he argues that such lighthouses or similar installations may be accepted by drawing baselines.
[102]*Supra* n102 pg. 222, 223.
[103]*Ibid.*

from other States.[104]

It can be recalled that the provisions of Vienna Convention on the Law of Treaties provide that the concept of "fundamental change of circumstances" may be interpreted that sea level rise may be regarded as a fundamental change of global ocean, which significantly influence the baselines coastal States have drawn. However, Article 62(2) (a) of that Convention excludes "a treaty establishes a boundary" from the 'fundamental change of circumstances'. However, when maritime boundaries are changed by future sea level rise, bilateral treaties may be used to permanently fix points for drawing boundaries lines.[105] On the other hand, for "existing boundaries treaties, there is a possibility for states to use amendment or change the treaties between states based on a concept of 'change of circumstances', rather than terminating or withdrawing".

3. This can be achieved in three ways: the assertion of a new rule; the liberal interpretation of existing rules such as the allowance for the freeze of baselines of deltas as provided in Article 7(2) of the 1982 Convention; or the assertion of historic rights over waters that would otherwise be lost.

There two alternatives provided for boundary systems (ambulatory baselines vs. frozen boundaries) and the means by which a freeze could be partially or completely implemented, but before so, some factors are considered. They include the soundness of each approach as a boundary system in terms of the ascertained ability and certainty of the resultant boundaries; the technical feasibility and costs of each approach; the fairness of each approach given the

[104]Roach and R.Smith (2000) "*Straight Baselines: The Need for a Universally Applied Norm*", Ocean Development and International Law, Volume 31: p. 47. By the same author, Moritaka Hayashi (2009): pg79.
[105]*Ibid."*

present international allocation of authority over ocean space; and the value of each approach as part of an adaptation strategy to climate change.

Therefore, any proposal on the evaluation of whether it is in the best interests of the interested party to change the "present regime of maritime boundary delimitation must be multidisciplinary; having in mind economic, legal, scientific, and political impacts, as well as assess historical rights and technical feasibility".[106]

Therefore, when freezing the outer limits, the baselines would still be ambulatory and continue to move. To freeze the baselines would imply that all maritime spaces will be fixed from the point of the freezing. Mr. Leonard Bernard commented on the possibility to freeze the outer maritime boundaries of disappearing island nations during the first gathering of the ILA Committee on International law and sea level rise.[107] He argued that to freeze the baselines would mean to freeze baselines which are already established in accordance with LOSC and, therefore, should be accepted by the International Community. In this way, the current baselines at the given time would be converted into permanent baselines and consequently not moved even if the land territory decreases due to sea level rise.

To freeze the outer limits of the maritime zones instead of the baselines would imply that only the outer limit is fixed and the baseline could still be moved due to sea level rise. However, the internal waters, or archipelagic waters, would still be changing and adapting to the moving coastline. These aspects are important due to the rights of third States in these maritime spaces since it is of great importance not to hamper the rights of third states. Although, archipelagic waters should not get confused with internal waters. For archipelagic waters is characterised as

[106]David. D. Caron. (1990) "*When Law Makes Climate Change Worse: Rethinking the Law of Baselines in Light of a Rising Sea Level*". ECOLOGY LAW QUARTERLY. Volume 17: p. 634..
[107]*ILA Committee on International law and sea level rise, minutes of the Open session*, p5, (session held in 2014).

Sui generis since it is a mix between territorial sea and internal waters. This implies that the consequences of an Archipelagic State freezing their maritime zones compared to a non-Archipelagic State doing it, differs. A non-archipelagic State would have an increasing area of internal waters where third States may only enter when in distress.

This leads to the conclusion that the difference of freezing the outer limit or the baselines will not be significant when referring to an Archipelagic State. However, for a non-archipelagic State, the difference would be of bigger importance because of the lack of rights of third States in internal waters.

4. To freeze a State's baselines, instead of the outer limits would result in a continuously increasing area of internal waters. This is because, when the coast descends, the space of the internal water consequently will become wider since the baseline is fixed but the coast keeps on descending. This would imply a bigger area where there are practically no rights of third States which could potentially contravene with and hamper the fundamental principle of Freedom of the seas.

However, the right of a third State in archipelagic waters differs from the rights in the internal waters. There would still be a right of innocent and sea lane passage through the archipelagic waters regardless. However, the aim is to create a solution applicable and suitable for all States, not only the Archipelagic States, with a descending coast with the biggest chance to be accepted by the International Community. Hence, I see an immense importance in taking into consideration the fact that the rights of third states are not being hampered.

A question that probably would arise is at which point the zones should be frozen. To avoid excessive claims, a state should base their permanent baselines on the ones that were operating by the time this rule, or exception, entered into force. This will enable States to maintain their current maritime zones and not to extend or make excessive claims over maritime spaces. I

believe the best available option for States with descending coasts to maintain their maritime spaces, is to freeze the outer limits of their maritime zones according to the reasoning above**.** Therefore, regarding the option to freeze maritime zones, there has been a discussion of either freezing the baseline or freezing the outer limit of the maritime zones. This study is in favour of the latter since it considers this to have the most equitable result.

5. Historic waters do not have a legal definition in LOSC or in any of the Geneva Conventions. However, the term was defined in *the Anglo-Norwegian Fisheries case* as "waters which are treated as internal waters but which would not have that character were it not for the existence of a historic title".[108] Historically, the claim of having the right to a historic bay has been made more frequently compared to historic waters, which makes this term somewhat more developed. However, it has been said that this doctrine may be used when discussing historic waters as well[109].The two criteria based on the Fisheries case are:

(1) There must be a claim by a state to a Maritime area in the high seas and

(2) There must be recognition, acquiescence, by other states.[110]

Therefore, it has been used frequently by States who have wished to maintain sovereignty over areas in the high seas which in one way or another were important to them. In fact, it might seem fairly natural when imagining a situation of a State that has been practicing sovereignty over a maritime area with the acquiescence by other states and suddenly, due to maritime delimitation law, the State would be deprived of this right.

Regarding the first criteria made by Gidel, a claim of a maritime area in the high seas, it does not define how this claim or expression of sovereignty should be made. However, the terms that have been used when discussing how to claim historic waters seems to be quite uniform. Terms such as "exclusive authority", "jurisdiction", "dominion", "sovereign ownership" and

[108] *Anglo-Norwegian Fisheries case*, ICJ Reports 1951, p.130.
[109] *Ibid 33*.
[110]Bouchez L.J. (1964) 281, *The Regime of Bays in International Law (Vol 1)*. Sythoff, Leyden, (publishing 1964).

"sovereignty" have been used and one may say that they could be concluded as – a continuously exercised claim of authority and sovereignty over a maritime area.

The doctrine of historic waters has been interpreted quite restrictively by the ICJ, therefore, converting the waters within current maritime zones into historic water would mean quite a drastic change of the practice by the ICJ. It would most likely be a controversial claim which the International Community most likely would be sceptical to. Given the circumstance that historic waters are claimed areas in the high seas, this could wrongly encourage a broad type of different claims of the high seas and it could potentially lead to every single country claiming their waters to be historic.

6. The question is whether the proposals can comply with the UNCLOS or not. Fixing baselines or permanently freezing the outer limits of maritime zones are not explicitly stipulated in the UNCLOS. If States opt for these proposals as the solution to deal with baselines, regression caused by subsequently dramatic climate change, then appropriate changes/amendment on UNCLOS should be necessarily considered.

The amendment of the law on climate change reflects this modification in the law can provide advice and measures. Legal advice is different from physical change, which is a dynamic issue or which can be a transformable existence. It does not speed up or slow down climate change. On the contrary, what it affects is at any level the consequences of climate change and damage.[111] In the case of sea level rise, the provisions of baselines and the outer limits of maritime zones can greatly affect the jurisdiction of coastal States within valuable maritime zones. Amendment procedure of the LOSC should, therefore, fall within the change of law.

The European Commission suggested the need to revisit existing rules of the international law,

"[111] See Caron (2009): David asserts law should be adjusted with the coming circumstance. The destination of this sense the significant challenge. He appeals expressly that law or policy is the only tool to stipulate a legal structure for the climate change.

particularly the Law of the Sea. This was in regard to the resolution of territorial and border disputes, due to land submerged by sea level rise and territory loss[112]. Each State is able to try to propose an amendment from the perspective of international law. "States party to the LOSC may exercise the simplified procedure amendment stipulated by Article 313 of the LOSC because it has been more than 10 years since it entered into force[113].When the LOSC was negotiated, the parties did not foresee that the rise in sea level would affect the state's baseline. In this context, State parties have the obligation and right to make amendment within the LOSC to state sovereignty over the seas". They may propose to "adopt an amendment with the simplified procedure. If the proposals of the amendment are not objected to propose by any State parties within 12 months, the amendment shall be regarded adopted".[114]

Nevertheless, this provision is restricted by implementation, "which stipulates the premise for State Parties to invoke. In the procedure of amendment, each State would take their own ocean interests into account, and such proposal of the amendment are concerned with not only fact but also the policy of various States. It thereby, cannot immediately be adopted. Apart from amendment of the LOSC requests, a state becomes a party to the UNCLOS after entering into force of amendments in accordance with relevant procedure, shall be a party to the UNCLOS".[115]

Author discuss the impact of sea level rise with the case study of Bangladesh and Guyana with discussion on theory on rising sea level shifting baseline and maritime boundaries, he gives scenario threatened states with loss of maritime areas with great resources to be protected. This study enables to suggest approach for uncertainty regarding to ownership of valuable resources not limiting to fishing ground inn EEZ. He offers systematic approach on rising sea level thus

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[112] *Climate Change and International Security*. Paper from the High Representative and the European Commission to the European Council, S113/08 (14. March. 2008).

[113] Subject to article 312(1), a state party may propose specific amendment to UNCLOS after the expiry of a period of 10 years from the date of entry into force."

"[114] Article 313(3) of the LOSC.

[115] Article 316(5) of the LOSC.

crucial guide in mapping out proper approach to enable access of resource when sea level rise, study heavily borrow from conclusion and decision[116].

Author recognize effective implementation of UNCLOS Kenya, with need to strengthen its capacity to acquire knowledge of its both living and non-living resources in their jurisdictions for effective management exploitation and conservation. He notes that Kenya's known national institutional capacity for achieving this is still inadequate although efforts are made to realize these through regional and international collaboration and cooperative. Therefore, establishing existing gap in Integrated Ocean Policy and Law that seek to address sustainable exploitation and conservation of living and non-living resources including the ocean waters and environment for in an ecosystem-based approach. Lack of integrated approach in the mapping of both living and non-living resources informs the study to fill the gap[117].

2.5 Emerging issues

Adaptation approach towards accelerating development increases social protection, building adaptive capacity and enhance climate resilience to reduce economic impact of sea level rise in an emerging concept that require robust strategies to work. There is need to plan robust strategies to prepare for uncertain future of extreme events of drought, floods scenario than using uncertainty as reason for inaction

1. Similarly, reality in fishing and marine scientific research in EEZ has raised particular sensitivities for coastal states. There is no compulsory dispute settlement for EEZ disputes with regards to exercise of discretionary power by coastal states over activities mentioned above[118]. Contrary to compulsory procedure for disputes, Article 297(2) (a) outlines that coastal state discretionary in conservation and management of laws and

[116]Caron, D. D. When Law Makes Climate Change Worse: Rethinking the Law of Baselines in Light of a Rising Sea Level' (1990). *Ecology Law Quarterly*, *17*, 621-641.

[117]Ruwa, R. K., & Mombasa, K. (2011). Policy and Governance Assessment of Coastal and Marine Resource Sectors in Kenya in the Framework of Large Marine Ecosystems

[118]*Supra* n18."

regulations.[119]For dispute on coastal states discretionary powers over marine scientific research in EEZ is to be submitted to compulsory conciliation under Annex V, section However, it will not call in question the exercise by coastal state of its discretion to the designation specific areas as referred to Article 246(6) or discretion to withhold in accordance with Article 246(5).[120] Therefore, a dispute that falls within the scope of Section 2(b) is not a matter to be unilaterally decided by disputing states but issue for the court or tribunal whose jurisdiction is in question.[121]Secondly there is distinction between susceptibility to compulsory procedures and disputes exempted from procedure. For instant dispute over high seas fisheries fall within scope of compulsory procedures yet fisheries dispute in regard to fish stocks straddling the EEZ and high seas when it is the subject, is not susceptible to compulsory procedure.[122]

2. The Current national framework often operates under rather narrowly focused legislation and regulation which do not consider the broader spectrum of overlapping policy, legal and institutional frameworks and yet jurisdictional lapses are the heart of problems that result to inefficiency in governance regimes on marine resources.
3. As for LOSC it does not provide legal consequences in events where cooperation among state is not achieved since primarily, the process of negotiation is between relevant states. The third state compelled to comply with conservation and management measure adopted. The duty to cooperate and its implication for non-contracting states raises question of whether or not, it violates the principle of *pacta tertis* that explains that treaties only bind third parties. Fundamental idea is that sovereign state only incurs legal obligation if it consents to those legal obligations.[123]Therefore, for effective

"[119]Article 297 of LOSC.
[120]Article 246 of LOSC.
[121] Article 297 of LOSC.
[122]Boyle, A.E (1999) Problems of compulsory jurisdiction and settlement of disputes relating to straddling fish stocks. The International Journal of Marine and coastal law, 14(1) pg 43".
[123]Mbendo, J.R (2011). Management of Tuna in Indian Ocean: A Study of Kenya Implementation of

regional cooperation, it requires a decision maker in national government, for those with coastlines to achieve and set guidelines that can only be achieved by goodwill.

International and Regional Conservation and Management Measure for Tuna.

3 CHAPTER THREE

3.1 Introduction

In this chapter the methodology used in undertaking the research is outlined. The chapter details the research design, data collection methods, instruments and analysis employed in the research.

3.2 Research design

The study employed descriptive approach as research design defined the subject by creating a profile of the problem, people and event. This was accomplished by collecting data and analysing the research variables. Further, the research with selected respondent were willing to share their experience and opinion in articulate and relative manner on factor influencing sea level rise to access of resources in exclusive economic zone.

The research study utilized qualitative tools involved in identification, collecting, reviewing and assessing both the primary and secondary data generated from published and unpublished materials, including internet resources. Primary data includes international, regional and bilateral instrument, resolution, within reports and documents records from subsidiary organisations. Others include national legislation, maps, official statement and policy documents relevant to EEZ resource management. Secondary data was obtained from secondary resource including books, unpublished dissertations, and scholarly journal in both printed and electronic forms. Additional literature includes selected paper available from Internet proceeding of workshop and seminars.

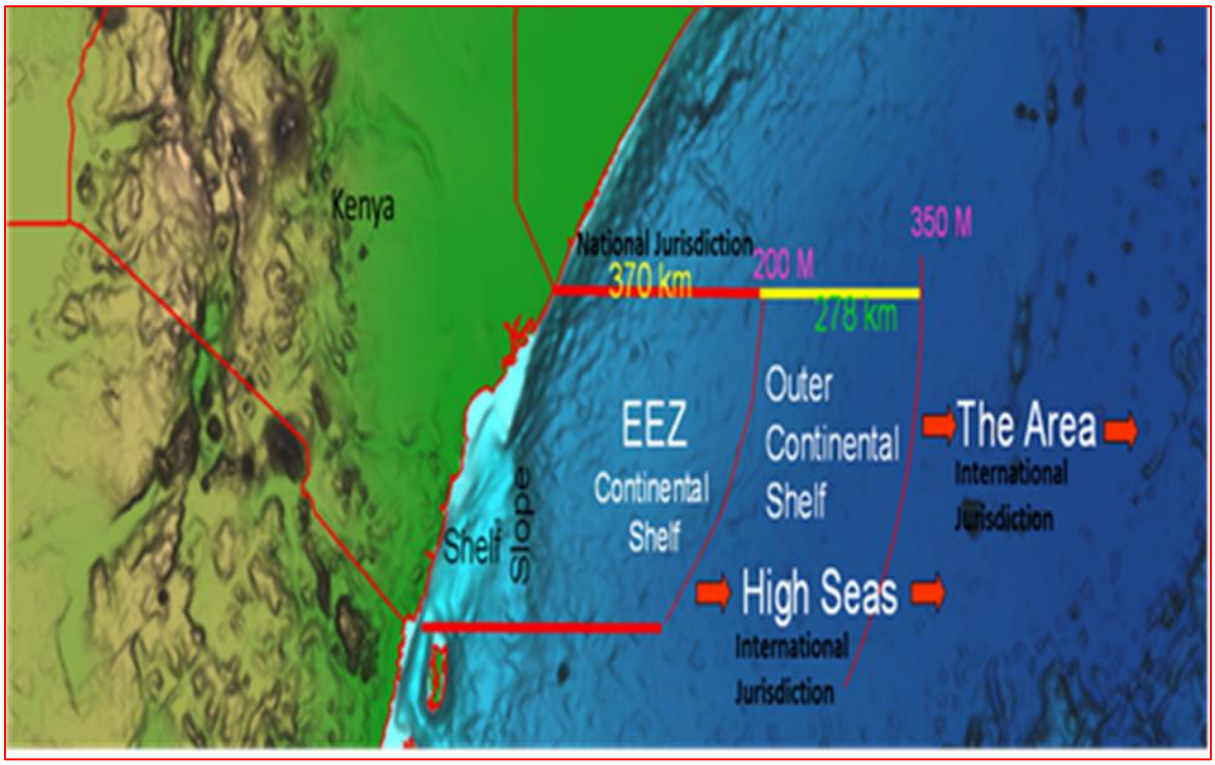
3.3 Location of the study

The coastal city of Mombasa is located in southern Kenya (39.7 ° east, 4.1 ° south).Geology of the Kenyan coast is dominated by the rifting and breakup of the Palaeozoic Indian Ocean. Mombasa lies on coastal plan with variable width ranging from 4 to 6 kilometre and forms part

of fringing reef shoreline of Pleistocene age with raised limestone along the coast. The tidal exchange in the creeks is considerable with maximum tidal range of 4.0 metre at spring tide and 2.5 metre neap tide. There's also freshwater and sediment input from rivers, waves outside the fringing reef might reach air amplitude ranging from 1 to 3 metres during monsoons. Offshore, the seafloor drops to below 200 metres within less than 4km of the shoreline. 94% of Mombasa Island and 24% of kisauni-2 division lie within low –lying coastal zone for land area within 10 metres of mean sea level while other areas are higher elevation up to 226m.[1] The city is a hub for government institution and private one that directly deal with coastal management that offered greater insight. From baseline survey, there was a total of 12 institutions that were selected from specialised and relevant institution dealing with management of marine resources. They included KEMFRI, KWS, KMA (Kenya Maritime Authority), Mining ministry, CORDIO, NAVY, Bamburi Cement, Kenya Forest Service, Marine Association members, Coast Development Authority, and NEMA.

[1]Kebede, A. S., Nicholls, R. J., Hanson, S., & Mokrech, M. (2010). Impacts of climate change and sea-level rise: a preliminary case study of Mombasa, Kenya. *Journal of Coastal Research*, *28*(1A), 8-19.

Map 2: Kenya Maritime Zone



Source: Field Survey, (2018)

3.4 Target population and sample size

The research is designed to utilize qualitative method based on purposive sampling technique. The stakeholder sampling is particularly useful in context of evaluating research and policy analysis, strategy involved in identifying who major stakeholder are and who are involved in designing, giving, receiving or administering the program for evaluation.[2] Therefore, purposive sampling was employed in selection of respondents who are potential in study on the basis of knowledge, experience and other helpful information as most of them are professional and executives on matters of marine resources management. This information was essential in developing comprehensive understanding and making appropriate judgement in sample selection process. For quality and effective of survey, researcher chooses to have at least 30

[2]Palys, T. (2008). Basic Research. *The Sage encyclopedia of qualitative research methods*, 58-60.

officers based on sufficient knowledge and experiences with marine resource management to enable evaluation on merits and risks associated to its impacts.

3.5 Data collection and instruments

The research instrument employed Survey consisted of closed and open Questionnaire formulated, aiming to ensure more in-depth information is provided to address specific objectives and research question of the study. Key informant interview was applied to a highly structured research guide to capture the interviewee's views on the process of the discussion and observation was employed to gather the data and information utilized in the study[3]. Anonymity was considered in questions to allow respondents to have freedom to express their views and make suggestions.[4] This was complementary to primary and secondary literary materials, which form the background as well as part of the analysed.

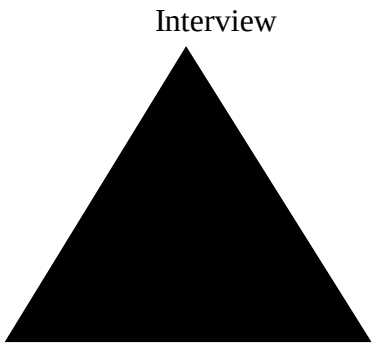
3.6 Data analysis and presentation

Data processing was undertaken. It included descriptive analysis. For qualitative, it was through text from review of documents and journals analysed by organising the issues emerging from discussion sessions and interview into various thematic areas. The data before presentation were edited, coded, data entry, and data cleaning and consistent checking, analysed and interpreted in accordance with the assessment objectives then presented as tabulation of reports, graphs and charts.

3.7 Validity of data

It employed the triangulation method of validating data whereby the researcher did not rely on one source of data but used various sources to validate for some key inform with review of document as well as observant before concluding.

[3]Olive M. M., and Abel, G.M. (2003). Research Method: Quantitative and Qualitative Approaches.
[4]Orodho,J .A(2009).Elements of Education and Social science Research Methods. Nairobi pg 126-133.



Qualitative data was used in triangulation with official statistics and secondary analysis of data collected by others to facilitate and support the main argument in research. First, secondary literature was of high value to evaluate the existing theoretical and empirical approaches to issues focusing on primary document of Kenya's institution in form of treaties, law, policy & states official documents, speeches. Secondly, review of existing relevant literature, books, journal articles, and documented data employed in scientific inquiry as to complement studies of all sorts, regardless of the subject. Institutions are source of large information that can be used to uncover policy process and evaluation research. The documents have been acquired mainly through the official website of Kenya and main institution level documented and legislative text; as systematic approach while purposive sampling employed to focus only on appropriate data for the study

3.8 Reliability

Reliability is the measure of the degree to which research instrument yields consistent results after repeated trials.[5] To guarantee trustworthiness, instrument used in study was inducted to determine consistency making the instrument reliable.

[5]Orodho,J .A(2009).Elements of Education and Social science Research Methods. Nairobi pg 126-133

3.9 Ethical issues

The Research was apprehended by following procedure outlined by the university and by seeking approval from relevant authorities, honesty, integrity and confidentiality was highly maintained throughout the study.

4 CHAPTER FOUR

4.1 Data analysis, interpretations and presentations

This chapter discusses the interpretation and presentation of the findings obtained from the field. The chapter presents the background information of the respondents, findings of the analysis based on the objectives of the study. Descriptive statistics have been used to discuss the finding of the study.

4.2 Evidence of sea level rise

Climate impacts is possible to assess, at least in indicative economic terms, most of the direct effects. of sea level rise using the DIVA (Dynamic Interactive Vulnerability Assessment) model, a coastal integrated assessment model that assesses biophysical and socio-economic impact. Impacts were determined with and without adaptation, so that the benefits and costs of protection could be considered[1]. Potential impact of sea level rise has three scenario of IPCC fourth assessment. Assessed three IPCC socio-economic scenario describes the population growth and density as well as future GDP for Kenya. Impact assessed in year 2000, 2025, 2030,2050,20175 and 2100 focus on five parameter that includes: a) people flooded, b) cumulative forced migration, c) loss of wetlands value, d) total residential damage cost & e) total adaptation cost.[2]

According to GIS-based study provides an estimated number of people and associated economic assets exposed to coastal flooding due to sea level rise and storm surges. Results show that the current exposure to the 1:100 storm surge levels for the Mombasa district as a whole is estimated at more than 210,000 people and over US$ 500 million in assets. By 2080, under the sea-level rise scenario (43 cm rise in sea level by 2100) and the socio-economic

[1]Stockholm Environment Institute project report (2009) Economic of Climate Change in Kenya: https:www.sei-international.org/mediamanger/../climate-change..Kenya-climatechange.pdf
[2]Ibid

scenario with rapid urbanisation, this increases to more than 426,000 people and infrastructure costing approximately US$ 17 billion.

The analysis shows that the projected socio-economic change and the location of population growth play a significant role in the overall increase in population and asset exposure to extreme water levels. About 75 percent of this exposure is concentrated in the Island city of Mombasa where approximately 426,000 people (2080 estimate) are projected to live within the low-lying coastal zone (within 10m of mean sea level). This continues into the future if the projected population growth is distributed across the city. However, if the population of Mombasa Island remains constant at 2005 levels, exposure is reduced by up to one third, with a total of 272,000 people and assets worth to US$ 1.1 billion exposed across the city by 2080. It should be noted that 54% of these reduced totals is still located on Mombasa Island highlighting its vulnerability to extreme water levels.[3]

4.2.1 Droughts and Flooding

The economic costs of droughts affect the whole economy. The 1998-2000 event was estimated to have economic costs of $2.8 billion from the loss of crops and livestock, forest fires, damage to fisheries, reduced hydro-power generation, reduced industrial production and reduced water supply. The 2004 and 2005 droughts affected millions of people and the recent 2009 drought has led to major economic costs from restrictions on water and energy. The 1997/98 floods affected almost 1 million people and were estimated to have total economic costs of $0.8 to $1.2 billion arising from damage to infrastructure (roads buildings and communications), public health effects (including fatalities) and loss of crops. The more recent 2006 event affected over723, 000 people in Kenya.[4]

[3] Ibid
[4]Ibid

4.2.2 Wetland

The analysis shows that coastal flooding from sea level rise is estimated to affect 10,000 to 86,000 people a year by 2030, as well as leading to coastal wetland loss and coastal erosion. The associated economic costs in 2030 are estimated to be $7 – 58million per year including flooding. By 2050, these costs could increase to $31 - 313 million per year.

4.2.3 Health

The study estimates in the absence of adaptation, there could be a potentially large increase in the rural health burden of malaria in Kenya. This arises because a large part of the rural population

lives at higher elevations, where the disease is currently restricted by temperature. The new malaria risk model, based on altitude, and finds that climate change could increase the rural population at risk for malaria by between 36% to 89% by the 2050s affecting an extra 2.9 to 6.9million people (across the range of temperature projections). The economic costs of this additional burden are estimated at $45 to 99 million annually in terms of direct costs, but rise to $144 - $185million if full economic costs are considered (including disutility from pain and suffering).[5]

4.3 Impact of sea level rise

Economic cost of fixing boundary is costly especially when proposing developing of accurate charts and precise satellite imagery opposed to imaginary remaining ambulatory may not be achievable. This is linked to funds and finances. According to responses during survey,major challenge of sea level rise was decline of fisheries due to change of fishing ground at52%, loss of land and properties due to erosion 18% and reduction of mangrove forest at 9%. Challenges rate included poor equipment that include fishing gear, vessels monitoring system. The reduced

[5]Ibid

capacity to fish due to expensive operating cost rated at 30.8%, whereas limited finances and inadequate investment of technology was rated at 14.3%.

There is evidence of massive competition on marine resources in reference to FAO report. These has come along with issues such as overexploitation due to IUU, lack of control of maritime zone that was confirmed during survey as 92% of the respondent agreed. Therefore, change in economic activities due to sea level rise will majorly influence decline of fisheries and changing of fishing ground leading fishermen to abandon fishing activities, and loss of land due to soil erosion. There is also reduction of mangrove forest that affects the ecosystem. Action to mitigate the above situation includes having adaptive management of marine and coastal resources, co-management and Trans-boundary engagement with effective framework in place and adequate surveillance to stop illegal exploitation

4.4 Legal implication of sea level rise

As scientific research has described, sea level rise will be one of the most serious environmental issues in the near future. This comprises shift of baseline, that might result to change of sovereignty rights such that "if the outer limit of the territorial sea shifts landward, it could mean that some areas that now falls in territorial sea becomes part of the EEZ, and what is now within the EEZ would become part of the high seas. This, in turn, would imply that a coastal state can start exercising its "sovereign rights" granted to it in the EEZ for the "economic exploitation and exploration" in what is now the territorial sea, but that it could lose part of its current EEZ. In addition, if such a shift occurs, other states would have "freedom of navigation" instead of "innocent passage" in certain parts of the coastal state's waters. This change could, in turn, mean lost access to resources in EEZ. Due to such circumstances. It suggests that rising sea levels may lead some states to try to preserve the current baselines by arguing that it would promote stability in boundaries (less uncertainty), be fair, in that it maintains the present

allocation of authority over the oceans and their resources, preserving the "historic use" of the waters and be efficient, in that it avoids the costs of adjustment".[6]

Other emerging issues are broadening spectrum of overlapping policy, inadequate institution, jurisdictional lapses of institution mandate, poor management of resources were all exhibited on response from the survey, for instance Inadequate existence dispute resolution mechanism was rated at 54% while 35% acknowledged existing one was not adequate and efficient both at national and regional level. To prevent this, there is need for proper governance on the resources at coastal state, adoption of relevant and necessary law including enforcement procedure and integrated national policy on marine governance.

4.4.1 Governance challenge hindering resources management

4.4.1.1 Legal Framework

Continual change of climatic condition will attribute to delimitation of boundaries. These challenges include ineffective frameworks to govern especially on weak institution as vividly may be seen. In Somali vs Kenya case in ICJ to draw boundary survey confirms uncertainty in boundaries and limit delimitation in coastal zone, lack of clear delimitation boundary restricting jurisdiction rights at 33.3%. Main challenges being inadequate law, guidelines and institution to interpret and enforce the fixing of boundary within regional level. Such conflict hinders exploitation of resources and scares investors away. Therefore, inadequate legal framework to address national and regional legal system needs to be strengthened in expanding maritime zone under LOSC to address to complex boundary delimitation.

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[6]Di Leva, C., & Morita, S. (2008). *Maritime rights of coastal states and climate change: should states adapt to submerged boundaries?* The World Bank. p. 12-32. Available at http://siteresources.worldbank.org/INTLAWJUSTICE/Resources/L&D_number5.pdf.

4.4.1.2 Enforcement

Restricted exercise of the legislative and enforcement jurisdiction. This was confirmed during survey when gap was established on inefficient legislation that result to governance challenges, difficulties in ensuring the legal measures adopted are duly enforced, and lack of coordination between decision-making levels. Therefore, there is need for an integrated planning that considers management plans for the natural resources being exploited and developing appropriate indicators for monitoring and evaluation**.** This was confirmed as poor leadership and planning hinders access to resources. It included weak institution to implement and enforce the law, inadequate policy for monitoring, researching, and reviewing marine resources in Kenya. Particularly, offshore non-living resources have been given minimum attention. This has resulted in minimum exploitation without any local component on catch and effort resulting to IUU fishing in the deeper waters of Kenya zone, yet it stands to provide maximum economic value rating to poor surveillance and law enforcement. Existing mitigation suggested to curb the situation includes institution capacity building, implementing effective policy and legislation, foster public private partnership, and coordination among stakeholders, this integration will address illegal exploration.

4.4.1.3 Inadequate Finance and Technology

Different institutions investigated had various factors hindering access to marine slightly different or similar to each other. The issue ranged from inadequate resources such finance and technology. Fisheries department there is inadequate capacity in terms of finance or technology for capacity building to exploit marine resources was the great hindering factor, degraded marine resources whereby marine resource are exploited by both foreigners and distant water fishing nations. The public land beaches are grabbed by private individuals which

restrict other marine users' access to marine resources. With expensive marine operation cost factors, where only large company can afford to comfortably meet huge operational expenses required to adequately marine resources such as deep-sea fish. Therefore, poor equipment (fishing gear/inadequate capacity of the fishermen), blockages of the access roads, insecurity matter was the leading problems.

4.4.1.4 Capacity building

There are inadequate skills among staff members thus inadequate capacity building, lack of technical skills or expertise or capacity to conduct effective MCS and implement existing regulations is a major setback, were lack of marine management programmes for the case of interviewed institutions thus limiting mandate to manage marine resources. Response from the survey indicated that insufficient data due to lack of agreed objective and principle. Therefore, need for capacity for ocean and coastal governance to improve stewardship to adopt framework for capacity building that emphasise on sustainable enforcement, knowledge transfer and collaboration.

4.4.1.5 Data dissemination and Collaborations

Lack of information on marine resources both at institution level Inadequate that informs policy makers and researchers. This is as result from poor leadership and planning are the main factors hindering access to marine resources poor coordination. Collaboration among stakeholders across natural resources will allow for formation of more resources agencies to allow more comprehensive and all-inclusive management approach to enhance utilization resources.

4.4.1.6 Disputes

Major limitation on dispute resolution mechanisms includes inadequate legal framework including EEZ zone and infrastructure, inadequate legal regimes to facilitate commercial

matters. National courts are not adequate to fully adjudicate environmental cases at international level, regional and at times national level. This requires either national or regional institutions to manage, due to growing demand for solution of environment crisis.[7] According to the survey insecurity issue was rated at 15.4%. Maritime security issues are today at top of the agenda in virtually every jurisdiction, among many countries in Africa. Kenya has few draftsmen specializing in maritime legislation. There is requirement for fairly specialized drafting skills are often relegated to bottom of the priority heap to enable models' laws developed in other jurisdiction to meet the needs and arising circumstances.[8]Grabbing of public beach by private individual that limits access to marine resources at 14.3%. Solution to this is to develop and amend holistic marine conflict framework.

4.5 Proposed approach for better governance

Critical aspect of good governance includes corporate governance, performance contracting and policy formulation and implementation on maritime sector. Governance refers to the regulation, coordination and the oversight of maritime affairs. This includes law and the formulation and implementation of policies for proper and sustainable management. The resource management decision making is characterised by concepts of independent sovereignty, machinery of policy, consultation and defend of sovereignty jurisdiction.[9]

Governance and management of maritime zones have three aspects: natural marine ecosystem, activities within those marine ecosystems and governance policies, programmes and agencies to regulate those activities. To optimize the management and effective stakeholder issues, it's necessary to put in place effective governance frameworks that recognition the interest of

[7]*Ibid.*

[8]Ongolo, David and Samson Awino,S.(2013).Small and Medium Enterprises and Devolved Government and System: An Assessment of regulatory and Institution Challenge Affecting the SMEs Development in Kenya. ICBE-RF Research Report No. 71, 13.

[9]Wambua,P.M. (2009). Enhancing regional maritime cooperation in Africa: The planned end state. *African Security Studies,18(3)45-59*

stakeholders and inclusion of their interest in management of plan, this interest takes various forms such as jurisdictional sovereignty, administrative rights, ownership, licenses and permits, collective and community rights.[10]

In response to the impacts of sea level, the best way to improve country economy, is through implementation of good governance that includes, rule of law, transparency, equity, effectiveness, accountability and strategic vision. This ensures proper decision are made to control and manage environment and natural resources. When interrogated the respondent on better ways to improve access to resources, this included engagement of relevant stakeholders, having adaptive strategies to cope with shifting of baseline, extensive education and awareness on marine resource, development and preparedness strategy, need to streamlined governance structure and policy, improving leadership and governance, strengthening coastal monitoring programs and increasing funding on value addition projects. In order to enhance effective governance, there is need to improve access to marine resources and help facilitate the economy of region. When the coastline shifts, this can be achieved through engaging relevant stakeholders in the management of marine resources.

4.5.1 Collaboration

Lack of collaboration among stakeholders can be solved through collaboration framework among stakeholders at local, regional and international level. The community and other organisations like KFS should be involved. Effective stakeholder collaboration would assist in combating IUU fishing. Climate change require effort and cooperation of every state to combat them. This principle includes multilateral, bilateral Trans boundary and private sector

[10] *Ibid*

cooperation[11] to allow conservation and regulate its exploitation justifying the need for improved level of cooperation[12] as underscored in Article 186(3) of national government.

4.5.2 Strengthening legal and Institutional framework

Clear national policies for some institutions and agencies to access marine resource need to be developed and incorporate public participation especially from the locals; effective stakeholder collaboration in combating IUU fishing and improving institution or stakeholders' dispute resolution. Funding on Value addition projects in the areas of marine resources to be more specific in EEZ. This would encourage investment in the exploitation of marine resources and preferably have preparedness strategy developed in time especially for fishermen and coastal cities. Adaptive strategies suggested to help cope with shifting coast line included education and awareness on Marine resources. Other suggestions shared were not limited to streamline governance structures and policy in line with international standards; development of coastal monitoring programs, and good leadership and governance. There is need for an integrated approach that considers resource management

4.5.3 Enforcement

To improve management of fisheries and mineral resources in ocean both onshore and offshore. Proper management of resources would involve effective implementation of policies and legislations, this could be achieved via proper planning. With adequate surveillance illegal exploitation like IUU fishing could be stopped hence law enforcement. Institutional capacity building was also another appropriate way suggested by the respondents. This could be enhanced by training both men and women to take part in fishing industry and provision of improved storage facilities. Investing in technology in marine resources was also mentioned.

[11]IPCC Climate Change 2014: Synthesis Report.

[12]Ibid 8

For instance, fishermen need to be provided with improved fishing gears. Other suggestions included zone mapping fisheries and mineral rich zones; developing clear management policies with both short and long term objectives; political good will to sustainably manage and use resources which could be achieved by practising better leadership; encouraging Public-Private Partnership as well as integration of coastal zone management by collaboration and knowledge sharing.

To address Poor surveillance and law enforcement, there is need to patrol the EEZ to ensure compliance with all the regulations especially on matters on IUU at EEZ is as a result of vastness of area to national jurisdiction that often require that states expend substantial assets, thereby, improving surveillance within our geography scope and strict punitive laws toward non-adherent to existing laws and regulations.

4.5.4 Data dissemination

Inadequate data information was also another unique challenge. Due to expansive ocean, there are unknown resources in the ocean. Marine stakeholders have also poor knowledge on marine legal regimes. More in-depth research [for living and non-living marine resources and legal regimes] needs to be done to improve the knowledge. The issue with limited finances/inadequate investment can be solved by seeking for more funding agencies like donors and government as well as investment in the exploitation of marine resources in the EEZ. With Inadequate skills more education, training and awareness need to be done especially on stakeholders and personnel involved in marine resources.

4.5.5 Capacity Building and Training

Exploration and research institute that are involved in governance of marine resources is face with perennial problems due to lack of funds and trained man power. Over reliance on donor funding and grants has derived institutions autonomy and negatively affects. Such challenges

are linked to lack of research, vessels, trained manpower, trained scientist, security equipment among others**.** The respondents suggested that allocation of adequate resource (for capacity building) such as human, technology, equipment's, funds and research would be the best way to improve the management. Equally, government requires to fund monitoring, control and surveillance activities in EEZ. It should take the matter of marine ecosystem seriously and invest in the sectors to cab inequalities. It should also finance scientific expedition in EEZ and fund efforts toward development of management plan and implementation so as to improve management and specifically scientific information. Training marine personnel was another suggestion made from respondents. Through training, they would acquire the skills that would help them to would improve the management. For the case of Kenya Forest Service [KFS], they need to introduce marine/mangrove management programmes to strengthening institutions involved in marine resource management. For instance, Majority of the respondents [77%] had never attended any training in the last 3 years on related maritime law and ocean governance while a few agreed to have attended slightly different trainings from maritime law and ocean governance like ICZM policy and related trainings which encompassed Marine resources.

4.5.6 Dispute Mechanism

The best method to resolve conflicts that affect policies on marine environment to achieve equal exploitation and access to marine resources. Developing conflict resolving mechanism/policy among key stakeholders was suggested through amendments of existing conflicting policies needed to prevent conflicts before they occur. Having dialogue and implementing multilateral agreements should be put into consideration as conflict resolving mechanism and that all relevant stakeholders need to be engaged adequately. Therefore, integrated approach and sustainable resource utilization through informed decisions and equity allocation of resources in the marine ecosystems would be relevant steps to this problem. As

stated, there's need to focus on co- management and trans-boundary engagements. For instance, coastal states must deal the challenges of managing these multidimensional interests in maritime zones, as addressing the complex interest associated solely from boundary delimitation and jurisdictional perspective do not necessarily improve governance of marine resources.[13]There's need to delaminate boundaries of the EEZ and continental shelf, to increase surveillances of the exclusive economic zones to ensure compliance with all. Others viewed that having one institution with experts that would coordinate marine resources exploration. For efficient methods to resolve conflicts were only suggested as having adequate public participation during policy formulation and implementation; adaptive management of Marine and coastal resources and adequate funding of implementation and monitoring activities to ascertain inadequacies and strengths of policies

Adaptive strategy adaptation

Considering the potential costs of adaptation for coastal zones, protection is required in a diverse range of coastal environments, such as cities, ports, deltas and agriculture areas. Coastal protection to sea-level rise is often a costly, but a straightforward way to overcome the adverse impacts of climate change. There are a large number of potential adaptation options, particularly for protecting market sectors. These adaptation strategies include coastal defences (e.g. physical barriers to flooding and coastal erosion such as dikes and flood barriers); realignment of coastal defences landwards; abandonment (managed or unmanaged); measures to reduce the energy of near-shore waves and currents; coastal morphological management; and resilience-building strategies. This captures a sub-set of these adaptation measures, focusing on the hard adaptation and increase in height of flood defence dikes to manage

[13]Rothwell, Donald R., and David L. Vander Zwaag, eds. Towards principled oceans governance: Australian and Canadian approaches and challenges. Routledge, 2006.

flooding, and beach nourishment to manage erosion. Beach nourishment was based on cost-benefit analysis, while the dikes were based on a demand for safety function, which is applied depending on population density.

When adaptation is applied, the potential impacts and economic costs above can be significantly reduced. The study shows that adaptation has large potential benefits in reducing coastal erosion and inundation. The number of people that could be flooded is dramatically reduced, and is one- two orders of magnitude lower at 2,000 to 11,000 people per year in 2030 across the range of scenarios. The cost of adaptation in 2030 is estimated at $28-56 million per year depending on the sea level rise scenario. These costs could rise to $80 million / year by 2050 and much higher further in the future. Not even with adaptation, there is some residual damage. The finding is that coastal protection appears to substantively reduce the threat imposed by sea-level rise at a relatively low cost, and in the analysis here, that the benefits of adaptation far outweigh the costs

of adaptation cost. The cost of adaptation in 2030 is estimated at $28-56 million / year depending on the sea level rise scenario. These costs could rise to $80 million / year by 2050 and much higher further in the future. Not even with adaptation, there is some residual damage. The finding is that coastal protection appears to substantively reduce the threat imposed by sea-level rise at a relatively low cost, and in the analysis here, that the benefits of adaptation far outweigh the costs. Cost of adaptation in 2030 is estimated at $28-56 million year by 2030[14]. Additional issues associated with the need for disaster risk management but also reversibility and flexibility. There is strong potential for development to increase future vulnerability i.e. when future economic zones are located in areas with high future risks with sea level rise. The highlights consideration of future threshold for flooding for city is to allow decision to include:

- strengthening of effective surveillance and preventive programming, development of new

[14]Ibid 1

policies to address new thread and lastly reduce cost of health research related to climate change.[15]Ideas for improvement of resources management include training marine personnel, formulate effective policies, allocation of adequate resource, strengthening institutions involved in marine resource management.

4.6 Mechanisms to adapt for protecting and preserving Coastal Marine Resources

For Kenya state should take to prevent loss of resources at Exclusive Economic Zone when coastline shifts due to sea level rise. Priorities were given on following matter of preparation of early warning system and response strategies, monitoring, control and surveillance. This involves monitoring the sea rise and ensuring resort fisheries adhere to FAO guidelines. Keeping inventory of resources available and effective regulation of resource exploitation as well as designing environmental mitigation plans to strengthen ecosystem, engineering, marine & resources laws. Among the plans, there should be rehabilitation and formation of new mangroves areas; adopting of adaptive strategies and investment in climate change adaptation measures. For inventory of resources, there's need to be revise and improve the already drafted policies and regulations. Lastly, focused on climate change adaptive measures e.g. establishing alternative livelihoods/economic activities while opinion focusing on trans-boundary approach; education and awareness.

The question is whether the proposals can comply with the LOSC or not. Fixing "baselines or permanently freezing the outer limits of maritime zones" are not explicitly stipulated in the LOSC. If States opt for these proposals as the "solution to deal with baselines, regression caused by subsequently dramatic climate change, then appropriate changes/amendment on LOSC should be necessarily considered. When coastline changes due to future sea level rise,

[15]Ibid.

freezing maritime zones, converting water into historic waters bilateral treaties may be used to permanently fix points for drawing boundaries lines".[16] For existing boundaries treaties, there is a possibility for states to use amendment or change the treaties between states based on a concept of change of circumstances, rather than terminating or withdrawing.

According to the researcher, the first two options are, the most appealing since they seem to have the smallest amount of risk of excessive use. The researcher in favour of the possibility of freezing the outer limits as this would mean that the baselines between would continue to be ambulatory and the inner zones would, therefore, be proportional in relation to the amount of land.

[16]*Ibid*.

5 CHAPTER FIVE

5.1 Conclusion and recommendation

This is the last chapter of the study. It contains the various recommendation in the form of policy intervention to the phenomenon of sea level rising in the context in hindrance to access of resources and related governance challenges.

5.2 Conclusion

At COP 12 in Nairobi, Kivutha Kibwana, the then Kenyan Minister in charge of Environment remarked on climate change that it is "rapidly emerging as one of most serious threats that humanity ever faces".[1]

The study framework in chapter one, entailed the objective of the study, the research questions and statement of the problem. Methods used to answer the research question was through review of literature through material that guided scope of the study, survey and case studies. This was done thematically.

The principle purpose for research undertaken in this thesis has been to determine the best available legal approach and options when coastline shift due to sea level rise, that shall hinder access to marine resources in EEZ and thereafter evaluate and establish effective legal system to address implication of climate change.

The principal research questions asked were the status of sea level rise, its effects and the legal implication of the sea level rise on accessibility to EEZ resources. A subsidiary research question was the effects of sea level rise. The discussion provided detailed factors that included change of sovereignty rights, illegal fishing and transhipment, decrease of fish stock in EEZ zone and escalated economic cost to fix boundaries. The third question assessed the legal

[1]UNFCCC press release "Nairobi UN climate change conference" 6 Nov 2006.

implication of sea level rise. These included those limited to overlapping legal instrument, inadequate and weak legal framework, poor data management, inconsistent policy and institution, inadequate enforcement and capacity building among others. The fourth research question exploited option to fix the boundary in order to utilize coastal marine resources. Therefore, reporting provides the best mechanism for protecting and preserving the coastal marine resources. Criteria used to evaluate its effectiveness was how simple, systematic, comprehensive and meaningful the method is, including its predictive power.

Interpretation approach gave effective response to most anticipated sea level rise was not included or anticipated in existing legal framework but way forward to its adoption predictive power within limits of gaps in information and uncertainty about the future condition and response. Some option exploited to ensure resources are utilized sustainably includes fixing outer limit of maritime zone to remain ambulatory, Article 7(2) of LOSC describes redrawing straight baseline when coastline shifts, maintaining zones through bilateral or multilateral agreement, freezing outer limit of maritime zone, converting water within maritime zone into historic water and lastly amend LOSC to address law on climate change approach.

The fourth finding was drawn from survey on major institution managing marine resources, some of issues raised included factors hindering access to marine resources at maritime zones, change of economic activities due to sea level rise, policies and strategic gaps among institution resulting to insufficient governance, challenges of managing EEZ among others and proposed approach that shall result to efficient management that were not limited to delaminating boundaries, collaborative research, spearheading training and capacity building, strengthening existing law and policy to ensure proper management as way of exercising enforcement jurisdiction.

5.3 Recommendations

The study recommends options for strategies and the procedure to be adopted to prevent implications caused by sea level affecting baseline to enable fixing the baseline.

1. Integrating Fundamental change of the circumstance into our national policy. Therefore, the climate change effects be interpreted regarded as "fundamental change of global ocean", that significantly influence baseline with support of Art 62(2) of Vienna convention. The treaty establishing boundary for fundamental change of circumstance to permanently fix points for drawing boundaries lines. Freezing outer limit of maritime zones as provided in Article 7(2), ascertain historic rights over water that would be lost, freezing may be partially or completely implemented not withstanding soundness of each approach; in term of the ascertain ability and certainty of resultant boundaries, technical feasibility and cost of each approach. The fairness on allocation over ocean space and value of each approach as adoption of strategy for climate change. Thirdly, freezing maritime baseline and lastly converting water within maritime zone historic water.
2. The proposals for amendment of LOSC will be achieved as a result of a package deal.[2] They include, and not limited to, fixing outer limit of maritime zone to be Ambulatory (Article 76(9) of LOSC), Maintaining existing maritime zone through bilateral or multilateral agreement, Freezing the outer limits of the maritime zones and baseline and Converting the waters within the maritime zones into historic waters or bilateral treaty. With need to incorporate compulsory dispute settlement for EEZ disputes with regards to exercise of discretionary power by coastal states over activities. For Maritime Zone

[2] *Supra* n113 pg 87.

Act to adopt fundamental change of circumstance of Article 7(2) of LOSC on above options.

3. Deliminate Kenya maritime zones with accurate and certainty according to LOSC and ISA to reflect legal regimes within its, internal water, territorial seas, contiguous, continental shelf and EEZ.
4. Establish marine spatial planning framework of coastal marine resources as tool for sustainable resource management for ecosystem-based management of resources. This will enable multiple user of ocean space and monitor sea level rise as early warning system to improve sustainable utilization and management of resources.

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