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Effect of Global Warming, Climate Change and Pollution Issues in Fisheries at MENA region: A Systematic Literature Review

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Abstract

Efforts are being started to strengthen and hurry the temperature soon. MENA region has affected due to extensive semi-dry and extreme desert places developing waterless, exposed to heights of mostly elevated hotness, less water, and prolonged constraints. The effects are acute influencing both living conditions of humankind and economic interests. It is observed even the global warming, enhance the stress level risk impermanence of living population above sixty five years bears the risk between three to seven times by the year 2100. The study estimated to highlight the fisheries sector that act as a huge factory for backward communities such as sub Saharan African nations. It also generates employment opportunities for men and women supporting development to the economic status leading liquid revenue as part of international transactions. This study has used systematic literature review find the influence of global warming, climate change and pollution issues in fisheries at MENA region. MENA region describes a separate consideration around the globe. A common issue in MENA region which is vulnerable is climate change due to severe climate conditions, extreme temperature, less availability of ground water, less rainfall, less availability of agricultural resources.

Keywords: *Global Warming, Climate Change and Pollution.*

Introduction

Environmental crisis is a foremost issue contemplated in the current scenario that requires a decisive action. Climate change is an undisputable activity generating ecological transformation, deprivation and biodiversity are not only danger for the future but have already started polluting the humanity. Climate change is inevitable issue with the influence among marine and environment. Ocean environments vary due to various reasons viz., fluctuations in the wind conditions, temperature variations, unpredictable rainfalls, inputs of continental and evaporation. Greenhouse gasses among the environment and sea level are influenced by climate changes with the lowering solubility of carbon dioxide (Ricardo Anadon et. al., 2005). Territorial ecosystem results

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adaptations in the climate conditions with the impact of fluctuations in the hydrographic attributes. Fisheries generation to the extent of uncertain levels and changes in the coastline, result in the huge differences in the increase in species production and decrease in the boreal and norther special production due to temperature and subtropical waters (FAO 2000). MENA region portrays a separate consideration around the globe. A common issue in MENA region which is vulnerable is climate change due to severe climate conditions, extreme temperature, less availability of ground water, less rainfall, less availability of agricultural resources. (APICORP 2022).

MENA countries are susceptible to ocean backdrop, a smaller portion accounting to five metres over the ocean level and enormous portion of fiscal actions, larger cities in the built-up structure, agrarian activities around seven percent of the people residing in the region exposed to risk of floods, erosion of land and salinisation. Ocean environment could affect the extremely disruptive for climate sensitive from tourism to agriculture and fishing in Mediterranean and red sea sub-regions possessing biodiversity and tourism activities (Chibani, A. 2022). Middle East and North African countries were affected very seriously around three percent of gross domestic product with the influence of mortal and fiscal cost of air toxic waste and destroyed ocean and seashore. MENA region reports shows blue skies, blue seas, air pollution, marine plastics and coastal erosion in the middle east and north Africa offers suggestions to fight back to save the natural resources (OECD 2022),

Statement of the problem

Ocean at the MENA region has less availability of the data apart from the Mediterranean, having poor monitoring and control. Fishery sectors affect with the excess fishing activities, global warming situations and acidification procedures. Significant species in the Ocean has exhausted, and one of the widest dead Ocean locations is identified in Sultanate of Oman. Most of the countries in MENA region are affected to air contamination beyond unsafe levels. Agrarian activities are much reduced leading to higher imports of food supplies. Furthermore, the security for the food supply activities impaired due to the excessive degradation of land and widening process of desertification. More Deprivation and discrimination in MENA region due to environmental decrease with excessive poverty alongside excessive conflicts. Environmental crisis mostly falls on the poor people, relegated category, and vulnerable group. Challenges in the MENA region required to construct in two different groups namely landscape and seascapes (Johan Schaar 2022).

It is inevitable to identify the remedies and the same must be broadcasted to alleviate the impact of human task and to proceed with the interventions of short, medium, and long term intervals. The point of view of multi specific ecosystem should be given priority to address marine species in the management of marine coastal ecosystems. It is significant to emphasise the integration of different channels from long term atmosphere and ecological state (Kjellen Bo et. al., 2007). A big threat with the impact of contradiction in fragile elements that create environmental humiliation and deteriorating natural resources. Initiatives have commenced as part of the safeguarding atmosphere to abandon conflicts, to ease peace building activities. It helps to abandon huge conflicts in the atmosphere by forming conflict response management to safeguard the climate and defence strategy. Climate change is also not difficult by plotting and concentrating on natural resources and augmenting agricultural properties (Hussein M.A 2007).

Significance of the study

Many inorganics as well as organic pollutants, particularly metals, plastics, pharmaceuticals, and pesticides, have been triggered by human activities and have catastrophic effects on ocean health and cause behavior effect on aquatic animals (Saarito et al.,2018). It's interesting to note that behavior changes brought on by pollution, may enhance exposure further and produce positive feedback loops that magnify the

detrimental impact of pollution on fish fitness. During times when the temperature of the ocean is extremely high, it affects the eco system, causing problems like increased mortality of fish, reproduction failure and degradation to habitat (hobday et al., 2016, Cavole et al., 2016, Hughes et al., 2017, Benthuysen et al., 2020, Piatt et. al 2020). The intergovernmental panel on climate change has emphasized the Middle East and North African region is more susceptible on climate change problems that is extremely water scarce area. MENA region is practically observed as one of the less income poverty territories when compared to another Asian continent. Most of the areas in MENA region are most sensitive in political phenomena conflicting territory issues. Climate change result huge complications in environmental issues due to less water resources and deprivation of land. Environment turn into a danger turmoil due to the desperate handling by human population residing in the rural and urban areas (AFED 2009).

Fish has long been considered as food and fisheries as a source of livelihood. The anthropogenic climate change has caused great stress on the marine ecosystem though physical and chemical changes that occur naturally cannot be undermined. Ocean warming, pH level, deoxygenating, and storms all render naturally caught and farmed fisheries vulnerable to climate change. The long-run viability of aquaculture processes and stocks, in addition to the distribution, availability, and health of wild fish, all are seriously impacted by climate change (Jonathan Wentworth and James Stewart 2019). The global warming phenomenon has the potential to impose changes in the kinds and geographic locations of fisheries, agriculture, aquaculture, and other economic activities through altering the distribution and supply of ecosystem services generated by aquatic environments both qualitatively and quantitatively (FAO 2018). The increasing utilization of the ocean and marine environments as an essential source of human food appears inevitable in a world with an estimated population imminently approaching 9 billion (FAO 2019).

Literature Review

Desertification in MENA region is big challenge towards soil erosion disturbing residential groups as well as agricultural opportunities creating pollution in the atmosphere making a big risk to cultivation productivity among clean air, cultivable soil, and water adulteration. Subsequently influencing maximum on marine fishing resources, environmental problems through agricultural activities such as grazing and fishing activities creates poverty to the fisherman by creating food sovereignty erosion. Non-urban regions consist of fifty percent of population in Africa on north side mostly consist of very tiny farmers and workers working in farms experience crisis (Climate 2023). Sustainable Development Goals are the landmark that every country in MENA region would be willing to attain around seventeen gaols that every nation would be willing to reach by the year 2030 those are related to the nature, atmosphere, and climate change. Replenishment of water is less in the MENA region due to water stress, weakens agricultural activities and threatening humankind. Marine ecological unit are tormented by fishing in excess leading to pollution and land degradation decreases the biodiversity and contributes to widespread dirt hurricanes (Johan Schaar 2022).

Significant facts in the Mediterranean ocean, blue economy obtained US $ 450 billion through marine activities. Blue economy is a challenge due to plastic pollution which act as a threat for fishing activities coastal tourism activities, transportation in maritime towards biotechnology activities, aquaculture facilities and eco system issues. Maximum per capital footprint of wastage in the plastic in the marine system releasing six stages of plastic waste in the ocean per year in the MENA region. Finding a permanent solution to erode pollution threats would help environmental health, reducing carbon emissions and creating blue economy. Plastic waste management by reducing plastic polluted waste is a permanent solution (Frederic Wahey et. al., 2023). Pollution at huge levels, at oceans in

MENA region foster a big threat to the blue economy deteriorating and factor of economic growth. MENA regions possess larger plastic waste around six kilograms every year in the Ocean contributes the hotspots of plastic polluted nations. World bank has conducted online program on awareness on environmental issues in Ocean regions in May 2023, discussing problems and solutions on the topic (Kanako Hasegawa et. al., 2023).

MENA region awareness program brought several essential solutions. Abundant use of plastic along with very poor collections of inland waste and its planning and execution and implementation are important factors as remedies for coastal and marine pollution. Another effective measure of the program is releasing the pollution in the Ocean and less usage of plastics to develop solid waste administration. Policies should be developed and implemented by the governments through circular economy methodology to reduce plastic pollution. Civil Society institutions to execute and to implement general awareness program to clear existing pollution challenges by collaborating the government activities. Private sector organizations along with the entrepreneur create highly innovative suggestions as a change over to the circular economy (Achref 2022).

Countries in the MENA region are susceptible to the impact of climate change as they are naturally affected by severe climate conditions, terrifically elevated temperatures, less rainfall, and limited agricultural land. MENA region is the most water stressed area due to water and rainfall scarcity, huge population growth and high concentration of population in a particular geographic area. Climate change observed in the MENA region and anticipated to intensify in the future (Niang et al. 2014).

According to Izzat Feidi (2015) the effect of climate change on aquaculture is huge, even though it is growing at a faster rate. The capturing of fisheries is adding more stress due to increased temperature and more oxygen demands, unreliable fresh water supplies, extreme weather conditions, increase in sea level, increased diseases, and toxic incidents. Climate change clearly influences the world's oceans and their habitat-forming species. These species form the habitat for thousands of other organisms. Due to the increasing temperatures, the oceans are already losing the richness and density of fishes and other species (Hoegh-Guldberg et al, 2007).

Due to extreme physical water characteristics along with different sources of water pollution, organisms inhabiting the Arabian Gulf are already under terrific pressure and the situation are expected to be augmented by climate change (Buchanan et al., 2016). The Gulf's water living resources are in dangerous form, with negligible procedures taken to abate the unregulated and excessive exploitation. Due to this, the potential impact of ocean warming on marine organisms worsens (Stuart-Smith et al. 2015). Marine biodiversity in the gulf is widely impacted by climate change. Fifty five major marine species are projected to undergo a major decline due to climate change. In the south and southwestern coasts, the extinction of species is predicted to be high due to climate change (Wabnitz et al., 2018). Temperature trends in the Gulf are rising, in the regions of coral reefs, which could surpass the upper acceptability level of these species (Hereher, 2018). The marine environment in the Gulf is rapidly changing due to anthropogenic and natural processes. This comprises of habitat loss, coastal developments, coastline alterations, temperature, and salinity changes etc. (Sheppard et al., 2010).

In Mediterranean countries, cold-temperature species such as Sprattus and Solea are becoming more vulnerable to climate change, while warm-temperature species like bogue are showing lower sensitivity. The southern Mediterranean countries are particularly susceptible to the effects of climate change on marine fisheries. Therefore, this region must implement climate change mitigation measures to ensure the continued availability of fish (Shekoofeh Farahmand, 2023). Three major issues related to fisheries due to climate change have been identified. First, there are latitudinal shifts in the distribution of species, with a poleward movement of temperature and subtropical fishes. Second, there

are changes in the phenology of major life-cycle events, such as the timing of migrations and spawning. Third, there is a reduction in the average body size of fishes. (David J. McKenzie, 2021). The diet quality of fish caught worldwide could decline by 10% due to climate change and its consequences. This will significantly impact the marine food supply chain.(Technology, 2023)

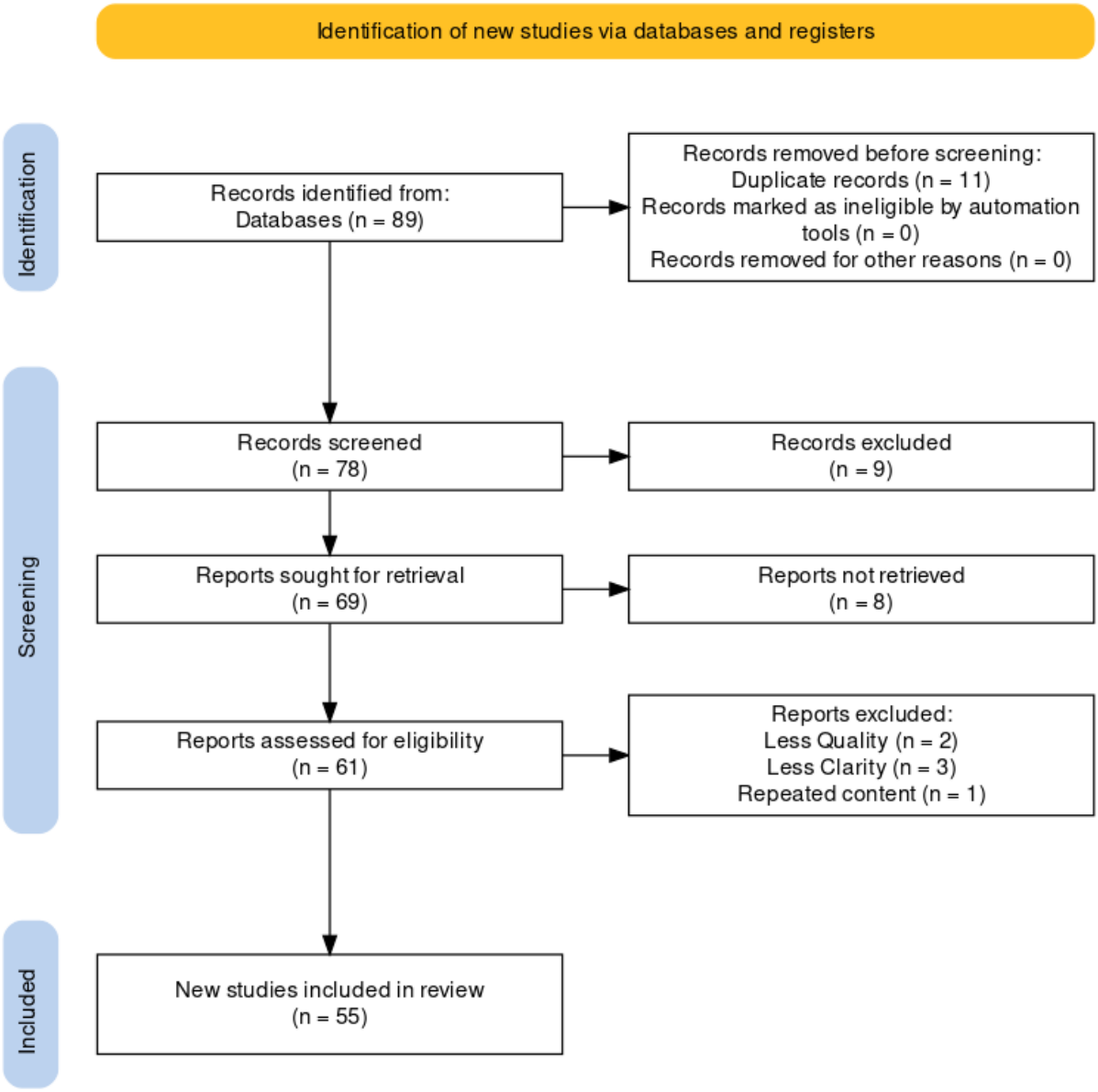
Storm risks persist in lower latitudes, while rising sea levels and temperatures are prevalent in specific regions such as Africa, South and East Asia, and South America. Ocean acidification risk is widespread in most of these areas.(Nadine Heck, 2023). Researchers have discovered significant differences in the estimated growth rates, death rates, and sizes of fish populations between warmer and less warmed areas, which can be attributed to global warming. In warmer areas, there is an increase in the growth rate of younger fish due to the warmer water, and the average size and population remain higher in these heated areas. This finding contradicts the results of previous studies. (Jui, 2023). Climate change poses a significant threat to marine fishes and fisheries resources in the Arab region. The consequences of climate change, such as frequent droughts and unusual rises in temperature, are affecting food and water security for many in the region. Additionally, climate change has adverse effects on fisheries and aquaculture, which are vital sources of livelihood for the local population. Traditional fisheries operate in coastal areas, making it imperative to take action to minimize the impact of climate change on fisheries resources in the Arab region (Feid, 2015). The rising temperature, coupled with lower dissolved oxygen levels, increased acidity, and salinity, severely affects the migratory habitat and distribution of fishes. If climate change remains unchecked, it is projected that by 2050, there will be a 10% or $10 billion decline in annual revenue globally. Fishes in hotter waters will face particularly challenging conditions (University, 2022).

Methodology

Systematic Literature Reviews are critical not only for the Research scholars, Strategy makers, and regulators but also for students to carry research activities. Procedures and practices are carried out to analyse and conclude the study in brief for the stakeholders to understand the reliability and pertinence of the review conclusions. The study has been used with PRISMA methodology that was introduced during the year 2009 to benefit the researchers to review related studies, find recommendations that would be largely permitted and implemented that refers to preferred reporting items for systematic review and meta-analysis of the studies relating to global warming, climate change and pollution issues in fisheries at MENA region.

The researchers have chosen the topic and search engine has been utilised to find the related publications along with the key words and date of publication. Published research studies have been found in the Scopus indexed database, springer nature and emerald publications in the specified topic, thesaurus for the key words searched in the database of the topic. PRISMA flow chart depicts the summary of the screening procedure. In the beginning the study, records the total of studies retrieved, subsequently continued for the collection process which is apparent by the decision making process.

Analysis, Interpretation and Conclusion



Source: Research Methodology Process

The above table shows the analysis of the study for the proposed topic with the help of PRISMA analysis which show that initially the researcher would search related topics under the dataset & registers along with the linked titles, abstracts, and key words, subject and headings at the identification stage. At the stage of identification researchers were able to identify eighty nine records. At the identification stage researchers were able to identify eighty nine records related to the title selected for the study. Moreover, it is found few studies have been found that are duplicate records and the same has been removed before entering the screening procedures. It is also found there were no records that are marked as ineligible by automation tools and records removed for any other reasons respectively. At the screening stage the researchers have identified total of seventy eight files screened relating to the key words searched, out of which nine records were excluded resulting sixty nine records of sought for retrieval. In the same stage of screening, eight records were not retrieved that counted for sixty one records assessed for eligibility.

There were three types of records were excluded from the study, two records were removed due to less quality, three records were removed due to less clarity and one record has been removed due to repeated contents. In the next stage of the study, which is known as included, fifty studies were considered for reviewed. Included stage consist of two very important contents namely viz., the number of studies included in qualitative synthesis along with meta-analysis. Eligibility stage consist of number of full articles assessed for eligibility and number of full articles excluded with the reasons. PRISMA methodology foster different ways in which researchers make sure clear and absolute systematic reviews and meta-analysis. In the beginning stage researchers analyse title with the help of systematic reviews methodology, meta-analysis design or both. It is suggested to use key words to explore related articles without any difficult to access data base related to the topic easily. PICOS methodology which refer to participants to the study, mediations for statement of the problem, comparators, outcomes, and study design assist researchers as part of scope of the study.

Meta analysis refers to a statistical technique carried out by researchers to synthesize the output, estimate the variances when quantitative data is available. Report refers to a document consist of the data relating to a certain topic that could be a type of journal article preprint information, abstract in the conference dissertation, entry in the study register, report in clinical study, manuscript, which is unpublished, report of government and any document that consist of a related information. A record is a title or an abstract which is a report indexed in a particular data base or website. A study refers to investigation namely clinical trial which means a definition of participants in group. The study mostly consists of multiple reports. Reports consist of protocol of research, a plan for statistical analysis, fundamental characteristics, output of primary information, output of secondary information and the outcomes of mediator and moderator. Systematic literature review analysed with the help of PRISMA 2020 approach provides advantage for the researchers' editors of the publication reviewers of peer state, various users of studies. It is also important to understand the proper follow up of the PRISMA guidelines and regulations that explore to transparent, overall, and exact reviewing system that would lead to evidence based decision making.

According to ferid blhaj, world bank vice president for the middle east and north Africa, large volume of the residents in the middle east and north African region living with the polluted skies and ocean affecting the peaceful living, economic wellbeing. He also added that post covid 2019 activities in the MENA region have created prospects to shift the polluted conditions into the better kind namely ecologically greener, bluer, and balanced with the less emission and lower ecological dreadful conditions. The pollution conditions in the MENA region are possessing greater threat while comparing to other countries around the world having ten times more pollution according to World Health Organization. Ocean in the MENA region more polluted across the globe are causing around six kilograms of wastage in the form of plastic every year which is greater across the globe. The cost of average marine plastics in the MENA region is almost 0.8% per year of the gross domestic product (Ashraf Al Saeed 2022).

The reasons for maximum plastic pollution were due to ineffective solid waste management excessive use of plastic products and less alternative to plastics. If the same conditions continuous the plastic waste in MENA region would cross two hundred and fifty million tons in the year 2050 while comparing to one hundred and twenty nine tons during the year 2016. MENA region's shoreline is occupying dirty seas activities by eroding coastal region accounting as second abrupt scale in the world. In general, other countries have eroded at seven centimetres in the Ocean by MENA region coastal are eroding at fifteen centimetre per year which is double than the other nations. It is great threat to livelihood of the MENA seaside, becoming extinct flinch shoreline, harm fisheries sector that lower the tourism and related activities. Fishery Sector face huge issues due to coastal erosion along with land and building accounting to 0.2% of Gross

domestic product in MENA region. The deterioration in MENA region fishing sector is with the result of least trusted knowledge of various sources and fishing sector. It is significant to commence and provide various awareness programs to overcome the problems of marine to safeguard the livelihood of coastal population in MENA region (Rucksthuhl S and Ward 2017).

Fisheries sectors lack resources in the MENA region resulting unsustainable water usage pollution issues and coarse wastewater. The total expenses in MENA region consist of 0.5% to 2.5% every year. International conservation for natural resources association reported around seventeen percent water species in the MENA region are in the edge of erosions. MENA regions result huge loss of fresh water in its food stock chain. The freshwater loss in MENA region in certain countries between eighty to one hundred seventy seven cubic meters. It is significant to identify and to observe fifty percent of water waste has not been recovered and gives back fifty seven percent to the atmosphere without treatment creating health issues and huge water waste complications (Rola Dashti 2020). Climate change is one of the fundamental issues that led to enhanced water stress which result in shortage of rainfall and enhanced temperature leading to demand in water supply. Moreover, climate change increase water stress issues in the countries in the MENA region alongside the problems of political and environment. It is important to identify and witness the change in the climate, leading to increase in the sea level in return created possibilities of flood which is regular natural disaster in MENA region named as most vulnerable part of population (Aisha Al Sarihi and Michael Mason 2020).

Environmental issues and climate change problems are to be addressed through aggressive disputes with the less water and other sources indicates to anxiety. Sustainable Development goals are the main objectives of all Arab countries finding general problems for sustainable growth. Policy making procedures are essential, dysfunctionalities in the economic matters towards the deprivation of actual sources and basic rule for disregard for human rights. Sustainable Development Growths concentrates on the environmental and natural resources to identify the challenges and providing suggestions (World Bank 2018).

Conclusion

The researchers used PRISMA approach to analyse the number of reports considered for the chosen topic in the current study to justify the topic related to systematic literature review and meta-analysis through a flow diagram. The study helps to establish various reviews of quality research, permit the researchers to evaluate the depths and limitations, allow to review studies that are repeated and design formation applying PRISMA methodology. Mediterranean ocean with the fisheries problems of pollution matters lead policy makers of European Union to ignite various proposals namely Horizon 2020 as a remedy for environmental challenges. Establishment of Swedish activities in MENA region foster policies in a democratic nature for the obstacles of human beings, trade practices and water resources (Petrides 2009). Non-governmental organizations in Arab nations have started initiatives to highlight the fluctuations in the climate, atmosphere and environmental risks and launched robust groundwork for economic activities, social elements governance policy, environmental task challenges (UNDP 2009). It is expected to discuss the fisheries sector that act as a huge factory for backward communities such as sub Saharan African nations. It creates employment opportunities for men and women supporting development to the economic status leading liquid revenue as part of international transactions. It is foreseeable to study the concerns of changes in the climate system which act as a great threat to the fisheries sector in the MENA region in the form physical and biological nature (UNDP 2023). Physical changes refer to fluctuations in the water temperatures, changes in the sea level growth, salinity in the water and acidification in the ocean. Biological changes refer to the issues relating to the

formation and diversification of food products which could be disturbance in the habitat (Essam Yassin Mohammed and Zenebe Bashaw Uraguchi (2013),

Disturbance in the coastal region of fish products and subsequent risk of food process and its marketing activities. The impact in the climate change would destroy resources of fish products that provide negative impacts to livelihoods of the people depending on fish products. Another major issue is not witnessing the benefits earned by fishery sector without focusing the attention of authorities at the decision making state with the aspects of adaptation of climate change and securing for food initiatives (Taucher J and Oschlies A 2011). The most significant issue is over fifty percent of fish products and productivities are related to tiny sectors without contributing to the growth and development of Gross domestic product and fishing activities. Thus, it is emphasized fishing authorities should bring ahead various regulations and required funds as part of sustainability fishing activities (IPCC 2007). It is expected to discuss the fisheries sector that act as a huge factory for backward communities such as sub Saharan African nations. It creates employment opportunities for men and women supporting development to the economic status leading liquid revenue as part of international transactions. It is foreseeable to study the concerns of changes in the climate system which act as a great threat to the fisheries sector in the MENA region in the form physical and biological nature (UNDP 2023). Physical changes refer to fluctuations in the water temperatures, changes in the sea level growth, salinity in the water and acidification in the ocean. Biological changes refer to the issues relating to the formation and diversification of food products which could be disturbance in the habitat (Essam Yassin Mohammed and Zenebe Bashaw Uraguchi (2013),

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