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Policy Note

Fishery Sector Strategy and Climate Change

April 2012

United Nations Development Programme

ENVIRONMENT AND ENERGY



Fishery Sector Strategy and Climate Change in Yemen: Policy Implications

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Executive summary:

This policy note has carried out an analysis of National Fisheries Sector Strategy for Fisheries and Aquaculture Development (NFSS) in Yemen from a climate change perspective. The aim is to explore the relevance of the policy and strategy sector document under changing climate. In addition, this note is also grounded on a deliberate review of relevant climate change thematic studies in Yemen and other countries under similar developmental conditions to substantiate additional contextual underpinnings. This policy note concluded that climate change is noticeable in Yemen and its impact on the coastal and fishery sector is plausible. This paper will undertake a scoping study to identify the key issues of climate change on fisheries and aquaculture sector development in Yemen. This policy brief article intends to provide an overview of the current available knowledge on the possible impacts of climate change fisheries and aquaculture sector development and their communities in Yemen and highlights possible adaptation measures that could be taken up as an appropriate measure of policy response. Therefore, this policy note seeks to bring into the attention of the advisors, practitioners and relevant stakeholders involved in the development of the NFSS document including policy-makers that emphasized actions to deal with climate change impacts on the coastal, fishery and aquaculture sector development is necessarily essential to assist impede any further capacity decline of the sector under changing climate. In addition, this policy note intends to present relevant climate change implications advocating for appropriate policy response to be clearly outlined within this policy and strategy document through highlighting applicable and necessary adjustments for considerations while taking note during the current cycle stage of the development process of fishery and aquaculture sector policy and strategy document.

Introduction:

Yemen is an arid Middle Eastern country, occupying an area of less than 527,970 square kilometres at the southern end of the Arabian Peninsula. In 2009, Yemeni total population reached 22.5 million, of which 51 percent male and 49 percent female and 76 percent of the total population are in the rural areas. Yemen has the highest annual population growth rate of 3%, which putting much pressure to the limited basic infrastructure and services such as water, education, health and access roads. Moreover, 42.8 percent of the population is under the age of 15 years old and youth population (15 – 24 years old) account for 23 percent of the total population. The economy is dominated by the oil sector, which accounts for 27 percent of the Gross Domestic Product (GDP) and 70 percent of export revenues¹. The recent steep decline in oil revenues associated with the gradual depletion of oil reserves is causing severe fiscal difficulties; with the budget deficit growing to about 10 percent of GDP in 2009².

Although oil accounts for around 30 percent of the GDP, and over 70 percent of Government revenue, it does not provide much jobs for a country with as high unemployment as double digit rate. On the other hand, agriculture for instance, employs 54 percent of the population, and is the major livelihood activity of about 74 percent of the rural population, while in turn accounting by far for around 15 percent of the GDP. This can basically explain the higher incidence of rural poverty in Yemen as since most of the oil revenues have not significantly contributed to the improvement of rural economy. Therefore, economic diversification recently has critically become a priority and efforts are on-going to spur non-oil growth potential and create jobs, and reduce poverty. On this regard, macro-economic policies (i.e. DPPR 2006-2010) identified fishing, tourism, agriculture and manufacturing as promising sectors to achieve the economic growth targets. Further investments to exploit the full potential of these sectors will significantly contribute substantially toward sustainable livelihood particularly in rural areas where access to adequate and conducive infrastructure is drastically limited. As far as this policy brief concerns, the sustainable development of the fishery and aquaculture sector under changing climate will be the main theme across this paper.

¹ GoY National Accounts, 2009

² National Budget, 2011

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Sustainable use of the marine and coastal environment is a potentially important driver of development. Fisheries and aquaculture play important roles for food supply, food security and income generation. Coral reefs, sea-grass and mangroves provide coastal zones with important biodiversity and fishery potential. Yet, Yemen's coastal ecosystems are rich but also already experiencing critical environmental concerns such as declining productivity of marine flora and fauna, altered coastal vegetation and agricultural productivity, loss of mangroves, salt sea water intrusion, reduced inshore fisheries and increased pollution which are mainly attributed to man-made activities as well as climatic causes. These are the major types of current marine and coastal environmental concerns that could be exacerbated under climate change impacts. If no adequate decisive actions are promptly taken, more challenges will certainly come out.

Climate change is the defining human development issue of our generation. It has also increasingly becoming as one of the major emerging developmental issues in Yemen. Its impact on the coastal and marine sector has become evident. Several studies and reports (see below) have indicated that Yemen's coastal and marine sector is highly vulnerable to climate change impacts. The Government of Yemen has recognized climate change and as such the United Nations framework Convention on Climate Change (UNFCCC) was ratified on 21 February 1996 and immediately initiated a process to meet its commitments under the Convention.

Following this, Yemen has received support to meet its obligations under the UNFCCC convention to come up with a more relevant context. On this regard, several studies were financed by the UNDP to assess the impacts of climate change in Yemen. Among which are: Yemen's Initial National Communication (INC 2001); National Adaptation Programme of Action (NAPA 2008); and Yemen's Second National Communication (SNC 2011). The three studies found that Yemen is exposed and highly vulnerable to climate change impacts. Also, a study conducted by the World Bank in 2010 entitled as "Assessing the Impact of Climate Change and Variability on the Water and Agriculture Sectors, and the Policy Implications" revealed projections for climate change for Yemen over the twenty first century, 'downscaled' from a range of global models and under a range of assumptions about future emissions.

The projections confirmed that national and local predictability of climate is low for Yemen: temperatures will certainly rise - the median temperature projection suggests a warming of over 4 °C by 2100 – but there is little

agreement on the direction or magnitude of changes, other than to confirm the likelihood of increasing unpredictability and of concentration of rainfall in more intense events. According to the World Bank's study (2010), three climate change scenarios in Yemen are projected illustrating the range of possibilities up to 2080. The three scenarios are as follows:

- A "hot and dry" scenario of higher warming of 2 to 4.5 °C, with aridity dramatically increased due to the combined effects of low rainfall and high ET.
- A "mid" scenario, with considerable warming of 1.6 to 3.1 °C over the twenty first century but no significant change in rainfall.
- A "warm and wet" scenario with lower warming of 1 to 1.6 °C and an increase in rainfall.

The three simplified scenarios were projected for the 2030s, 2050s, and 2080s. The 'mid' scenario is a robust central estimate, and the outer scenarios provide a plausible boundary of possible climate futures. To provide a more relevant context, the following will explore a number of climate change studies and policies which set out a policy framework for coastal-sector adaptation:

First National Communication (INC 2001): Yemen INC identified the following vulnerable sectors which include: Water resources; agriculture; and coastal zones. It should be emphasized on the conclusion made by the INC that coastal areas have been considered to be among the most vulnerable sectors to climate change impacts. The 1NC report indicates that observed and predicted accelerated sea level rise (ASLR) under changing climate will pose additional challenges to the sustainable management of the coastal zone. Probabilities of flood frequencies will increase, shorelines will recede, low-lying areas in the coastal zone will be inundated, rising water tables might harm the foundations of buildings, saltwater intrusion in ground waters will impact on existing water supplies in the coastal zone; and biological activity within the coastal zone will be influenced.

National Adaptation Programme of Action (NAPA 2008): The major impacts of climate change in Yemen, as reported in the INC 2001, represented the starting point for the NAPA policy framework which includes the following:

- Increased water scarcity and reduced water quality – leading to increased hardship on rural livelihoods;

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- Increased drought frequency, increased temperatures, and changes in precipitation patterns – leading to degradation of agricultural lands, soils and terraces;
- Deterioration of habitats and biodiversity – leading to expansion of desertification;
- Reduced agricultural productivity – leading to increased food insecurity and reduced income generating activities;
- Increased sea levels – leading to deterioration of wetlands, coastal mangrove migration, erosion, infrastructure damage, and seawater groundwater intrusion;
- Increased climatic variability – leading to the possibility of spread and growth of vector borne and water borne diseases; and
- Impacts on coastal zones – leading to a loss of tourism activity due to sea level rise including loss of beaches.
- Also, NAPA reported that proper measures to address causes, impacts, responses for the most vulnerable areas which include agriculture, water and coastal zone are essential to ensure adaptation under climate change.

UNDP Human Development Report (HDR 2007/2008): Fighting climate change: Human solidarity in a divided world: The report indicated that climate change will affect rainfall, temperature and water availability as well as vulnerable marine and coastal areas (Yemen was included). The report also called for taking insights from NAPAs and other climate studies for integration into national strategies as appropriate measures of adaptation.

Intergovernmental Panel on Climate Change, Fourth Assessment Report (IPCC 4AR 2007): In general, there is limited observational information on climate change impacts on marine ecosystems. However, the IPCC report examined the implications of projected climate change impacts for freshwater systems. In general, the report indicates that freshwater resources are vulnerable to, and have the potential to be strongly impacted by climate change. On the ocean and sea side, the IPCC report concludes that observed and predicted changes in the sea and ocean's heat content and salinity are and will continue to affect circulation patterns and eventually the biological productivity of the sensitive marine and coastal life.

Millennium Development Goals (MDGs) Yemen Assessment Report (2010): The report stated that *“it is expected that climate change will have multiple and adverse effects on the fundamental pillars of sustainable, environment, economic and social development. It also undermines the country's ability to reach the MDGs and other development targets, not the least poverty reduction and environmental sustainability. Maintaining environmental sustainability requires combined efforts to address challenges related to climatic changes and conservation of*

natural resources particularly energy, water and soil.” In addition, the report has also pointed out to the livelihood vulnerability to extreme climate changes such as draught and floods.

Fourth Socio-economic Developmental Plan for Poverty Reduction (DPPR 2011-2015): Climate change under the Fourth Five-Year Developmental Plan was identified as one of the emerging issues which require adequate adaptation measures. The 4th DPPR indicated that the current situation of the water sector has been recognized as unsustainable due to a number of challenges which includes climate change impact and how to adapt to it. In addition, the present water scarcity could be aggravated by droughts and hotter weather and a change in rainfall patterns.

Second National Communication (SNC 2011: a draft): The SNC draft report indicated that coastal areas in Yemen such as Aden as a pilot area will be severely affected by climate change impacts. For instance, two plausible future sea level rise (SLR) scenarios of Aden coastal region were forecasted: First, 3.3 mm/year and the second is 5.9 mm/year. The biophysical effect of SLR includes erosion of sandy shores, inundation of the low land, destruction of coastal critical habitats, saltwater intrusion into the surface and ground water, and increases of the flood frequency probability. About 48 hectare and 86 hectare of sandy shores would be eroded due to the SLR of 33 and 60 cm respectively. This loss of sandy beaches will affect the tourism and recreation activities in the coastal communities.

It can be noted that all of the aforementioned reports and studies indicated that climate change is evident, and the coastal and marine sector in Yemen is highly vulnerable to its impacts. As a Least Developed Country (LDC), and as outlined earlier, Yemen suffers from several development challenges and priorities as well as sever structural economic imbalance, making it highly vulnerable to climate change-related impacts such as sea level rise due to its low adaptive capacity. The vulnerability of the coastal areas in Yemen is for instance compounded by the existing weak coastal management structures and poor infrastructure and inadequately institutionally functioning capacity, and less empowered stakeholder.

In addition, the tremendously sensitive livelihoods of poor fishery communities further worsening the vulnerability context under which any unfavorable climate conditions such as increased sea level rise or acidity will certainly lead to deterioration of wetlands, coral reef failure, coastal mangrove migration, and erosion, infrastructure damage, and seawater-groundwater intrusion, and eventually declined biological productivity of fish communities,

and loss of opportunities and increased poverty. Altogether, it can be presumed that climate changes may affect fisheries and aquaculture through posing a number of threats including changes in temperature, precipitation, frequent and stronger weather events such as storms leading to endangered habitats influencing fish productivity and stocks.

But it still can be noted that these studies are broad and provide generic insights but less specific knowledge on the impact of climate change on the fishery sector. Given the uncertainty presented by current climate scenarios and impacts at the local level, the precise extent of the vulnerability of fishery is not known and needs to be further assessed to factor in while developing the sector policy and strategy to ensure sustainable development under changing climate. Furthermore, to pick up on the downscaled scenarios outlined in the WB's (2010) study, the development of the fishery and aquaculture sector policy and strategy should become grounded by such a climate change scenario based perspective. The scenario based development is a cornerstone strategy to deal with uncertainty involved with long-term planning to ensure that an appropriate conducive adaptive capacity for sustainable fishery and aquaculture development is maintained under changing climate.

Following this discussion, the review which has been undertaken by this policy note seeks to ensure that this understanding is reinforced within coastal sectoral policies and strategies such as NFSS. Therefore, this policy note emphasizes on a number of valuable insights indicated by the aforementioned reports, studies and policies that climate change impact on the coastal sector is evident for which further assessment on the sub-sectoral areas such as fisheries and aquaculture is necessarily essential and appropriate adaptive measures are becoming urgent and imperative. Also, the aim is to optimize the perspective of scenario based analysis within the coastal/fishery sector policies and strategies under changing climate. This will ensure that measures responding to additional, climate change-related risks (i.e. greater sea/ocean temperature variability and contents, increased sea/ocean acidity, and increasing damage to infrastructure from extreme weather events) are satisfactorily taken up for considerations during the policy analysis process.

NFSS and Climate Change

This section will explore the National Fisheries Sector Strategy for Fisheries and Aquaculture Development and Climate Change in Yemen. This section therefore intends to substantiate an evidence to answer the question of whether or not National Fisheries Sector Strategy for Fisheries and Aquaculture Development (NFSS) has been well-responding and recognizing to the additional challenges imposed by a changing climate. The article has followed a conservative approach with no regret strategy to ensure that the potential underlying consequences under pessimistic climate scenarios are particularly dealt with. The matter raised under this policy note is necessarily valuable and insightful for initiating a discussion, providing policy implications and recommendations for consideration by relevant advisors, practitioners, relevant stakeholders and policy-makers.

The process through which NFSS I is being prepared is characterized by broad stakeholder participation. The sector strategy is structurally divided mainly into four sections: Introduction (Sections I); Policies, Institutions, and Process (Sections II); The Goal, Purpose and Policy Areas for the NFSS (Sections III); and financing the NFSS (Sections IV). The aforementioned sections of NFSS will be reviewed to reflect on the subject matters concerned by this policy note. However, greater attention will be devoted to the fishery sector development potentiality, sustainability, challenges, justification for NFSS under Section I being a core for the strategy approach under changing climate.

Under Section I, the vast potential of the fishery and aquaculture sector to boost the national economy and help diversify away from oil-based growth and create jobs and reduce poverty was outlined. Furthermore, key sector challenges were highlighted. However, it can be noted that climate change has not been identified as one of the issues affecting the sector development in the country. As mentioned earlier, several studies have indicated that the impact of climate change on the coastal area including fishery is evident, but further and deeper assessment is needed and proper adaptation measures have been overall proposed. To better illustrate on this regard, the following statement is quoted *“Since 1998, overall fish production shows a general declining trend, which may be attributed mainly to illegal, unreported and unregulated fishing practices in the marine capture sector.”* This statement points out that there is a clear declining trend in the fish production since 1998. The main causes of such declining trend are mainly attributed to illegal, unreported and unregulated fishing practices in the marine capture sector. It is obvious that the observed and predicted impacts of climate change on the fish sector were not

sufficiently reflected, and eventually counted for while this policy product has been produced. The authors of this note assumingly thought of that the declining trend in the fish sector since 1998 could be mainly attributed to many factors including illegal, unreported and unregulated fishing practices in the marine capture sector but possibly further deteriorated as complicated under climate change impacts. As such, this note would highly recommend conducting deeper climate vulnerability analysis for the fish sector to come out with an updated list of the priority sector challenges and provide an appropriate mitigation measures to ensure sustainable fishery development, besides the weak adaptive capacity

Nevertheless, the NFSS approach has emphasized stressing on integrated, decentralized and bottom up actions designed to restore critical sector imbalance challenges. To ensure greater effectiveness of the integrated actions, the emerging challenges under climate change which will certainly be intensifying the sensitivity of the sector should come well-accounted for. Otherwise, the potentiality of the sector in boosting the economy and creates employments and livelihoods for the poor, and the rest of benefits cannot be sustainably maintained under changing climate. The strategy goal of sustainable fishery and aquaculture development will be difficult to achieve if climate change insights have not been adequately accounted for by the current strategy. For instance, if no proper adaptation measures were integrated into any future plan for aquaculture development, the objectives of creating jobs and boosting the GDP, and expanding rural livelihood, and reducing poverty, and enhanced food security as mandated by the strategy will not be realized under climate change. Under a pessimistic scenario of frequent and prolonged droughts and temperature rise continues to occur and overrides the common conditions, aquaculture could be severely affected, and regardless of realization of any possible social goals, the Returns on Investment (ROI) could drastically be jeopardized with no appropriate proactive adaptive actions.

Likewise, under such a scenario of climate change, fishery stock will experience drastic decline due to increased sea/ocean heat content, increased sea level rise, destruction of habitats, and loss of nurseries, and ecological distortion including coral reef failure as a results of developing of non-conducive marine and costal environment for fishery multiplication. Following this worse case scenario, the current sector GDP contribution of about 1.7 percent will basically be far to reach and goal of 3 percent GDP contribution rate will be seemingly impossible. Furthermore, the current statistics point out such as number of fishermen (about 77,000 fishermen) and those people whose employments and livelihoods are mainly reliant on fishery (about 500,000 people), besides the 3-4

percent of the total labor force in the country generated by the capture fisheries and aquaculture cannot be sustainably supported due to declining sector capacity under changing climate.

On the other hand, although the strategy has outlined the need for developing a sector policy and strategy, climate change has not been outlined as one of the new emerging challenges for which the strategy must have come accompanied with proper response. The need for the current sector policy could have been articulated in a more appealing manner if it came to address new identified challenges, and goes beyond the conventional elements and limitations as delineated in the current stage of the policy product. Therefore, it would be highly feasible to invest in more time and resources to dig deeper exploring new emerging issue such as climate change as the most critical challenge for global sustainable development in the foreseen future. By so doing, such exercise will help integrate the buzz words of climate change during the early stages of policy analysis process of developing the NFSS.

It worth-mentioning that such exercise would definitely turn the current product into a more effective conceptual framework through which sustainable fishery and aquaculture sector development can be sustainably ensured for current and coming generations. Furthermore, mainstreaming climate change into the sector policy and strategy will absolutely strengthen the position of final product in terms of coherence and consistence with national macro development policies such as Fourth Five Year National Development Plan for Poverty Reduction (DPPR 2010-2015) which as indicated earlier calls for adaptation to climate change. In addition, doing so will be fully consistent with other national climate change policy frameworks such as INC 2000, NAPA 2008 and SNC 2011.

Under Section II, NFSS has proposed several policies, institutions, and processes related actions in order to contribute towards the sustainable development of the sector. As the NFSS indicated, this strategy will contribute towards boosting the national economy, job generation, enhanced food security, and reduced poverty in the country. In addition, the NFSS pointed out that the strategy will work out to foster a more conducive institutional framework for the sector development including improved private sector engagement, enhanced fishery information management, and planning, monitoring and oversight, and strengthened research centers, NGO development, and stakeholder empowerment, and enhanced legislative framework.

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Although these actions can be seen as essential under changing climate, the context and scale limits are situated within the scope of actions necessarily required for restoring the increasingly depleting fishery resources in the country regardless of climate change. As for the context, it can be noted that the background policy analysis in which the indicated actions were proposed has never highlighted climate change as an emerging challenge to the fishery sector in Yemen.

On this regard, for instance, the word “climate change” has never been shown in the NFSS main body document. In addition, as mentioned earlier, NFSS indicated that fishery resources are being harvested at a rate that exceeds the renewable rate leading to acute decline mainly characterized by over-fishing regardless of climate change. Under such circumstance, the scale of these actions apparently is not adequate for adaptation as the existing acute declining trend will be extremely compounded under changing climate. As coastal sector in general is among the highest sector vulnerable to climate changes in Yemen, intensification of weather cycle and subsequently frequency and intensity of extreme events, sea level rise, increased evaporation, unpredictable precipitation and prolonged and more frequent droughts are just a few demonstrations of such direct impacts on sustainable fishery and aquaculture development. As such, climate change will directly affect the reproduction rates and the sustainability of fishery and aquaculture for which particular contextual policy adjustments and proper scaled-up adaptation measures are necessarily critical.

Nevertheless, the aforementioned policies, institutions, and processes related actions under the NFSS will constantly become instrumental for building up adaptive capacity to cope with climate change. But, in order to ensure building up such adequate adaptive capacity, it is critical that climate change in fishery governance architecture be considered in the context of reducing livelihoods vulnerability for sustainable development. Since the context and scale of the existing policies, institutions, and processes related actions framework under NFSS indicates that it is not satisfactorily responsive to the emerging climate change challenges, appropriate adaptive insights need to be incorporated. For instance, there are data limitations, as climate data in Yemen are poor and erratic, and only useful to build a general picture.

The current meteorological records in Yemen are weak. Given the uncertainty over climate models, early warning systems, together with improved data collection and sharing, public awareness and stakeholder involvement are

among the key local preparedness measures to adapt to climate change. Therefore, adequate local capacity needs to be developed for climate monitoring and analysis through targeted training and setup of appropriate meteorological station. Furthermore, community preparedness and access to climate information need to be enhanced through development of a community-based early warning system in coordination with relevant agencies.

Such systems will empower the local communities across the shoreline in generating valuable climate information that assist raising their awareness about the livelihood hazards and risks associated with changing climate besides enhancing preparedness to cope with and adapt to such hazards which include sea level rise, and prolonged droughts accordingly. However, such insightful climate change implications need to be institutionalized, and proper adaptation planning has to be considered as an essential part during the early stages of the policy analysis process to optimize the effectiveness of the NFSS policy framework ensuring that climate-resilient fishery and aquaculture is developing on a sustainable basis. Therefore, climate change adaptation planning needs to be accounted for in order to gain enhanced basis for integrating insightful measures under the current framework through which climate-resilient fishery and aquaculture development in Yemen can be ensured.

Policy Implications and Recommendations

Based on the aforementioned discussion, this policy note concludes by presenting the following two key policy implications and pertinent recommendations for consideration by relevant advisors, practitioners, and policy-makers and stakeholders:

1. The NFSS is in the final stage of development process. The process through which NFSS is being developed is characterized by broad stakeholder participation. The NFSS aims at contributing towards the sustainable fishery sector development. Structurally, the sector policy and strategy seems to stand for the purpose it intends to fulfill. Nevertheless, the strategy has substantially lacked the core basis for considering the emerging threats posed by climate change. Although, several studies have shown that the coastal sector is highly vulnerable to climate change impacts for which appropriate adaptive measures are urgent and imperative, it can be noted that neither reference was made to such studies or their insightful implications. NFSS

development process was initiated recently in 2009 while several climate change implications with regards to coastal and fishery sector had been highlighted. However, climate change has not been identified as an emerging challenge in NFSS policy framework nor adaptation was strategized. Throughout the NFSS policy framework, the word “climate change” has never shown. Therefore, this policy note would suggest that insightful climate change implications from such studies need to be accounted to ensure climate-resilient and sustainable fishery sector development.

2. The NFSS has proposed several policies, institutions, and processes related actions in order to contribute towards the sustainable development of the sector. Although these actions can be seen as essential under changing climate, the context and scale limits are situated within the scope of actions necessarily required for restoring the increasingly depleting fishery resources in the country regardless of climate change. Since the context and scale of the existing policies, institutions, and processes related actions framework under NFSS indicates that it is not satisfactorily responsive to the emerging climate change challenges, appropriate adaptive insights need to be incorporated. As such, insightful climate change implications need to be institutionalized, and proper adaptation planning has to be considered as an essential part during the early stages of the policy analysis process to optimize the effectiveness of the NFSS policy framework ensuring that climate-resilient fishery and aquaculture is developing on a sustainable basis. Therefore, this policy note would suggest that climate change adaptation planning needs to be accounted for in order to gain enhanced basis for integrating insightful measures under the current policy and strategy framework through which climate-resilient fishery and aquaculture development in Yemen can be ensured.

Conclusion

It can be concluded that the climate change impact on the coastal sector in Yemen is evident due to its high vulnerability. In addition, the context and scale of NFSS policy framework indicates that it is inadequately responsive to climate change impacts. Therefore, capitalizing on the flexibility of the current fishery sector policy framework to optimize the effectiveness of NFSS, climate change implications need to be accounted for either through applicable adjustments or proper adaptation planning during the early stages of next policy analysis and development’s cycle of the sector strategy in order to ensure climate-resilient and sustainable fishery and aquaculture development.

Acknowledgement

The authors would like to express thanks and appreciation to UNDP Yemen CO senior management for advice and support, the Boots on the Ground's regional advisor based in Cairo, Marwan Owaygen for continuous advise, support, valuable discussions, consultations, and knowledge sharing, and the Boots on the Ground's team (particularly Isabel Kreisler, Rebecca Carman, and Pia Treichel) in HQ for continuous support, facilitation, and knowledge sharing. The authors would like also to express thanks to the Economic Diversification Support Programme (EDSP) Fishery team including UNDP Programme Officer, and Project Manager for valuable discussions, and knowledge sharing.