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Reef ريف

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Ministry of Environment Water & Agriculture

Technical recommendations for Improving management practices and technologies in small scale fisheries in the Kingdom of Saudi Arabia FIS/051/2021/1

Strengthening MoEWA's Capacity to implement its Sustainable Rural Agricultural Development Programme (2019-2025) (UTF/SAU/051/SAU)

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Contents

pages



1. Background and rationale

Marine capture fisheries are an important source of food and livelihoods for Saudi Arabia. Over the last 10 years, the national marine fish catch has remained stable although the fishing capacity of the artisanal fishing sector has increased. While subsidies targeting employment and investment for Saudi nationals have remained a pillar of fisheries management approach, the Kingdom has also introduced many management measures aiming at protecting the living aquatic resources by limiting their exploitation and at solving short-term issues faced by the fisheries sector.

A comprehensive fisheries management consists of input and output control measures. For more effectiveness, both control measures should operate in tandem. In Saudi Arabia, input control measures, for example seasonal and area closures, boat licensing, or gear specifications, which are relatively easy to implement, are the major measures implemented. On the contrary, output control measures such as limitation of total catch or catch quotas do not exist and with the prevailing fisheries management approach, it may be too early to introduce them although they are globally recognized as a better management option. Indeed, before adopting effective output control measures, reliable information on fish biomass and status of stocks is needed. However, in the absence of output control measures, the input control measures alone will not be as effective, especially because of the current lack of knowledge and huge uncertainty on the status of the resources. Therefore, there is a need to first improve the knowledge base capacity in the country.

The most efficient way to manage fisheries sustainably and reverse the potential problems arising from harming the habitats and fisheries populations is to apply an Ecosystem Approach to Fisheries Management (EAFM). As Saudi Arabia increasingly moves toward a growing demand for seafood products, overfishing of some resources could potentially become an issue, also to achieve some of the objectives of 2030 KSA vision.

Fishery statistics need to be improved to provide more accurate and precise estimation of the status of the stocks, both in the Red Sea and in the Arabian Gulf. Digitalization of fisheries data, especially the Catch Per Unit Effort (CPUE) by species and gear, would improve the process of stock assessment. Fisheries biological composition data should also be collected along with the catch and effort data, as well as the reproduction status by location and month to define proper location of Marine Protected Areas (MPAs). Electronic logbooks must be implemented and a database created by integrating the data into one major data frame and data warehouse. Discards and length frequency distributions of both the

target and bycatch species should be collected. Number of traps too, as well as the trap size. Number of gillnets panels, the mesh size, and type of net is also required. All that improvements about the data and fisheries statistical analysis are recommended to apply an Ecosystem Approach to Fisheries Management (EAFM).

One of the major environmental impacts of fishing is the unintended capture and discard of organisms of no fishing value, including individuals of the fishing target species that are too small to be marketable. This incidental catch or by-catch removes biological components from the ecosystem and from the fishing target stock in a wasteful manner. It could affect biodiversity and ecosystem functioning through impacts on the food webs, recruitment, biomass and/or stocks that form the basis of other fisheries, and lead to underestimated fishing mortality. The four major fishing gears used by fishers in the Arabian Gulf are gargoor traps, trawls, drift gillnets and set gillnets, which together account for 87.9% of the recorded catch from 1995 to 2013. The gargoor traps are not suspected to have a high by-catch impact because they are passive gears with high selectivity and low spatial coverage. Furthermore, their catches are marketable and landed. On the contrary, shrimp trawls, drift gillnets and set gillnets are suspected of having a large by-catch impact because they are active and moving gears (shrimp trawls and drift gillnets) and/or they cover large areas. These characteristics potentially put large number of organisms at risk.

The Saudi seafood market is peculiar in that it has traditional and modern sectors and the differences in demand dynamics is a central structural feature. The traditional market involves fresh, whole, and well-known species, whilst the modern market segment involves typical processed seafood products encountered in globalized marketplaces. The traditional segment has stabilized whilst the modern segment is growing – but this is apparently occurring incrementally and not through displacement of traditional items. This means that a large proportion of Saudi seafood is still retailed through unhygienic, unattractive traditional facilities that are not in accordance with the country's fast developing economy and the modern societal standards it aspires to. There are problems with both infrastructure and practice within the traditional segment – i.e. there are physical construction, health, hygiene and food safety and possibly regulatory issues. Ironically, much of the most sought-after prime seafood on the market arrives through this traditional system, i.e. the least attractive sale venues. By contrast, the modern segment has no such problem, as it increasingly reflects global best practice in supermarket development and retailing. Global and regional seafood growth data provides a good indication that Saudi seafood consumption is set to continue its sustained growth. However, the key needs to fulfil this potential are to undertake reform of the wild catch fishing sector, to ensure ongoing catches and to reform the infrastructure, practices and regulation of the traditional market segment by addressing market buildings, hygiene, health and quality framework and training. Arguments for this reform may be supported by the generally high margins along the traditional product/market value chain (150-200 percent from first sale/import to final sale).

2. Objectives

The main objective of this report is to provide concrete technical recommendations to the Directorate of Fisheries of the MEWA to improve management practices and technologies in small-scale capture fisheries. More specifically it will contribute to the following specific objectives:

- Improve the management of fisheries data and statistics,

The Fisheries Directorate used to conduct annual fisheries surveys and looks for reviving the same with more relevant data and statistics. The current system of fisheries data collection in KSA has several weaknesses. The MEWA collectors in coastal areas are required to fill the data form in paper, creating many risks of mistakes and data losses (e.g. paper degradation because of water splashing). Data on paper is later send it to HQ office in Riyadh and transcribed on the computer with high risk of mistakes. The data registered in the computer in HQ is analyzed with basic software. The digitalization of fisheries data would avoid the mistakes due to degradation of material or wrong transcription of information. It would also facilitate the automatic and immediate analysis of data and the use of more advanced software.

- Increase the quality and conservation of seafood,

The handling and conservation of seafood in small-scale fisheries in KSA is not meeting the minimal hygienic and food safety standards. The rough handling of fish, the limited use of ice and when used, the reliance on ice blocks, all produce a much lower quality of fish than could be achievable with simple improvement measures. The preservation methods must be improved by mainstreaming the use of flake ice during handling, auctions and distribution of the products. It is also necessary to increase the awareness and promote good practices for handling and conserving of seafood.

- Reduce the impact of the fisheries activities on the marine environment.

The impact of fisheries activities on the marine environment cannot be avoided but should be reduced as much as possible, especially in coastal areas of high and rich biodiversity like the Red Sea and the Arabian Gulf where the environmental caution must be maximum. The creation of Marine Protected Areas is one of the most successful measures to reduce the impact but also to produce alternative incomes through development of sustainable tourism and environmental education. Other more direct measures like modification of gears are necessary to reduce the impact on endangered species like marine turtles.

3. Expected outputs

If the proposed recommendations are carried out, better information on the status of the fisheries will be available and the decision makers will be able to adopt more appropriate measures and regulations. The quality of the seafood would allow to increase the fisheries incomes while keeping the same fishing effort. This will be more socio/economically profitable and environmentally positive. The establishment of marine protected areas (MPAs), the implementation of scientifically-defined seasonal and locations bans and the modifications in some gears and fishing methods would allow to assure a prosperous fisheries sector in years to come, but also a better conservation of the marine environment.

4. Target beneficiaries

The target groups are the fisheries communities and cooperatives along the coast of Saudi Arabia, all the stakeholders in the small scale fisheries value chain and the fisheries officers and staff of the Directorate of Fisheries of MEWA.

5. Recommendations under each objective

Objective 1: Improve the management of fisheries data and statistics:

a) Digitalization of fisheries data and improvement of data analysis

The digitalization of fisheries data, especially CPUE by species and gear, is needed to improve the stocks assessment. The biology of the main targeted species is crucial to determine important aspects like the minimal size of capture, or seasonal and locations-specific fishing bans. Reproduction status by location and month should also be a clear data collected along the year, as well as discards and length/frequency distribution of both the target and bycatch species. The number of traps, regardless of the trap size, the number of gillnets panels, regardless the mesh size, and type of net, and the biological composition data must be regularly recorded along with the catch and effort data.

It is also recommended to establish a digital system for collecting fisheries data. The system should include collection of CPUE by species and gear, fisheries biological information, estimation of discards, length frequency distributions of both the target and bycatch, size of the traps, mesh size and type of gillnet panels.

FAO Fisheries component team would support the Fisheries Directorate by trainings and building capacities on collection of data, establishment of a digital system of registration of boats and licenses and analysis of fisheries data. FAO team will also provide technical specifications for digital systems and statistical software, and will also provide technical follow up.

Objective 2: Increase the quality and conservation of seafood:

a) Establishing a digital fish auction system and redesign the auction halls facilities

It is recommended to incentivize the auction system through the rehabilitation of halls and landing facilities, in order to create added-value by enhancing the fish quality and reducing the dependency of the fisherfolks on the buyers. Auction halls should also assure the supply of flake ice to improve quality of the seafood. To improve the condition of the fisheries auctions, it is proposed to design and elaborate a Fish Auction Hall model that will allow MEWA's Fisheries Directorate to guide the improvements, contracts and constructions of such facilities.

The Health and Fisheries Services of the Fisheries Directorate would be encouraged to monitor the food quality and hygiene of small-scale fisheries auction halls. Currently the Health and Fisheries Services is focusing on monitoring the fisheries companies that export the seafood products to other countries. Special attention and compliance with the FAO-WHO *Codex Alimentarius* is needed to ensure food security and health in local populations.

The current fisheries auction system in the main fisheries areas is controlled by few seafood traders who take a high percentage of benefits. The system is unbalanced with a very uneven distribution of incomes. The distribution and sale of fish is very closed and restricted to local areas with little opening to the rest of the country.

It is recommended the establishment of some pilot projects of digital fish auction system preferably in some of the main seafood markets. The digital system working through a mobile or computer application would open the participation of numerous new actors in the submission of bids for the auctions that would produce a more distributed and fair sharing of incomes. Also, the digital systems would be open and it would avoid the control through few traders. The use of digital applications would facilitate the participation of seafood traders of all areas of the country and it would increase the generation of new employments focus in conservation, processing and distribution of seafood.

b) Mainstream cold storage boxes with flake ice on board fishing boats and transport trucks

Because of the extreme weather conditions, high attention should be put in the proper handling and conservation of the seafood, especially with regard to cold chain. To provide a good quality to the final customers, it is necessary to handle adequately the seafood product from the time of their capture and to maintain the cold chain constant throughout its journey to the plate of the consumer. A more efficient fish transport/storage supply chain is needed to ensure the quality of fresh fish products. The basic requirement of the system is the provision of ice and flake ice-producing machines should be installed in the main landing facilities along the coast with an ice production capacity in line with the daily volume harvested. It is estimated that for a proper conservation, the minimum quantity of ice should be equal the weight of the fish stored. Ice in bars is not recommended due to the high losses in the process of crushing, but also due to the weak cover of the fish body. It is highly recommended to use instead flake ice and for the proper conservation of ice, it is highly recommended to use insulated palletized bins.

It is also recommended to provide such insulated palletized bins to all small-scale fisheries boats and to substitute the ice bars producing machines by flake ice producing machines. The demand for ice in all key landing sites along the coast must be satisfied with new ice-producing machines. It is also recommended to use insulated palletized bins and flake ice during transportation. FAO Fisheries component would support fisheries communities jointly with Fisheries Directorate by trainings on proper handling and conservation of seafood. FAO team will provide technical specifications for boats holding a warehouse where the fish will be stowed in insulated palletized bins with ice, and also technical follow up.

Objective 3: Reduce the impact of the fisheries activities in the marine environment

a) Establishment of Marine Protected Areas (MPAs) and ban fishing seasons/locations following scientific recommendations

The currently existing protected areas system in KSA includes 15 zones (12 terrestrial and 3 marine protected areas) with the aim of preserving a set of integrated natural ecosystems, which are: Jabal Shada, Majami al-Hadb, Jurf Raydah, 'Uruq Bani Ma'arid, , Harrat al-Harrah, Al-Khunfah, Ibex Reserve, Mahazat as-Sayd, Umm al-Qamari Islands, Al-Tubayq, Farasan Islands, al-Jubail Marine Wildlife Sanctuary.

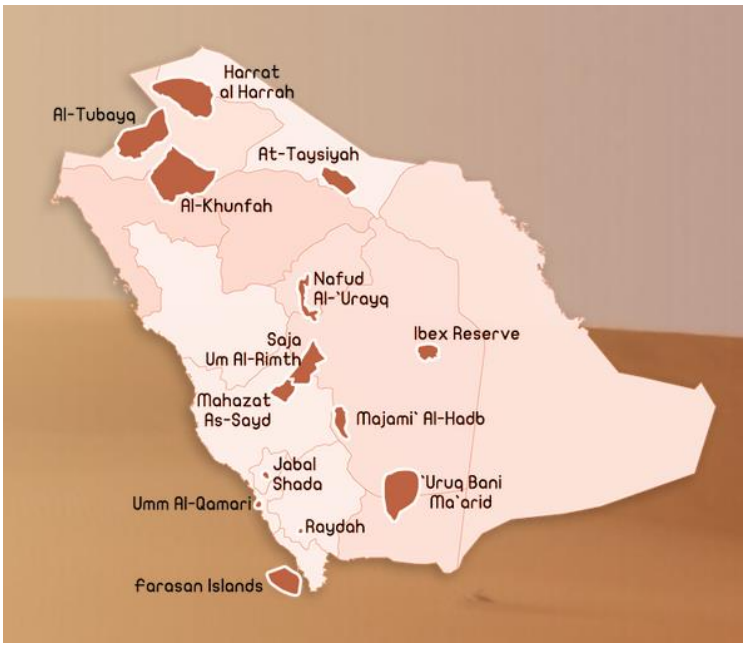


Fig 1. Map provided by the National Center for Wildlife

The design and implementation of partially protected MPAs/No-take Zones is a very effective tool in fisheries management. Some protected and no-take zone areas are already established in KSA but there are some difficulties in the implementation. One of the possible solutions is the use of artificial reefs as trawling obstruction structures that may be constructed around critical habitats for protection. Anti-trawling structures/obstructions around critical habitats will preserve the biodiversity and ecosystems of that sensitive locations. Other measures could be the trawling ban in coastal embayment considered as nursery grounds (e.g. seagrass meadows). Coastal embayment such as Half-moon, Tarut, Abu Ali-Khursaniya, Mussalamiyah, Manifa-Tanajib, and Safaniya could be established as partially protected MPAs.

In some areas there are some indications that the fishing ban seasons are not producing the expected results. For example, the Safaniya shrimp fishing ground was proved to exist as distinct ground in shallow area offshore to Safaniya, with an estimated area of 131 km2. This area is fished by up to 37 full-time large artisanal boats, in addition to a number of small boats. During the fishing season, many shrimp juveniles are captured as bycatch, indicating that juveniles of the target species are prematurely fished in Safaniya ground by large trawlers regardless of the present fishing ban period which extends over six months (February to July). So probably, the fishing ban seasons and locations are not properly defined. This condition is probably not restricted to the Safaniya ground and might be repeated in other shallow shrimp fishing grounds.

It is recommended to increase the collection of data and elaboration of scientific analysis of the breeding seasons and locations of the fisheries targeted species. According to the results of the scientific analysis, it is recommended to establish some key permanent MPAs and to define the fishing ban seasons and locations annually. It is recommended to elaborate a socio-economic analysis of the impact of that measures in the local communities and the possible alternatives to reduce the negative impacts.

b) Improve the selectivity of gears and fishing methods to mitigate the possible coastal environmental impact of fisheries

Shrimp trawl and Spanish mackerel, *S. commerson* drift gillnet are the only fisheries generating significant discards that are not recorded in national landings data. The Spanish mackerel drift gillnet fishery is the second fishery in terms of bycatch importance but the implementation of mesh size and twine thickness limits could be an effective solution to avoid any accidental catch of endangered species and to mitigate the possible coastal environmental impact of small-scale gillnet fisheries. Some scientific studies found that at least 28 species are part of the by-catches of the Spanish mackerel drift gillnet fishery (from the hauls observed in October, November 2013, January 2014, March to May 2014). Discards accounted for 3.6 to 26.1 percent of the catches in weight and number respectively, with the torpedo scad being the main contributor besides the immature individuals of the target species, Spanish mackerel, which were making most of the species catches of the observed hauls. This suggests a premature exploitation of the species by the large drift gillnetters operating in the Saudi waters of the Arabian Gulf. Implementing mesh size regulation (95 mm) and minimum legal size (60 cm) at capture would be recommended. Some other proposals would include the use of proper Fish Eye and Radius Square Mesh to allow the escape of the juveniles. With regards to trawlers, the artisanal (dhow) shrimp trawlers operating in the Safaniya fishing grounds landed a total of 500 tonnes of shrimp and 281 tons of by-catch (40 percent of which is discarded at sea) during the 2013-2014 fishing season, and 755 tons of shrimp / 563 tons of by-catch (60 percent discarded at sea) during the 2014-2015 season.

In the Arabian Gulf, the shrimp trawl nets are proved to be source of threat to the marine turtle population. Up to 37 full-time large shrimp trawlers fishing in the area were responsible for a total capture of 1,492 to 2,018 turtle in two successive years, which is about ten folds higher than the average turtle capture rate for the whole fleet operating in all grounds. Shrimp trawl nets are thus the main threat to the marine turtle population in the Saudi waters of the Arabian Gulf. For small shrimp trawls, the estimated total number of turtle captured was 776 turtles during one shrimp season. Minimizing the impact of shrimp fishery on the marine turtles should be recognized as priority and by providing incentives, the fishers may be encouraged to use Turtle Excluder Devices. This objective can also be achieved by modifying the specification of the fishing gear in use or by implementing regulations to minimize fishing effort.

It is recommended to organize campaigns encouraging the adoption of new gears and fishing methods like new mesh size and designs, or the Turtle Excluder Devices that minimize the impact of Shrimp trawl and Spanish mackerel drift gillnet fisheries.

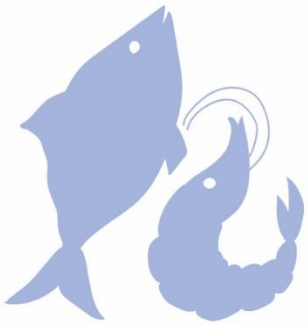
The objectives, concrete recommendations and time required are summarized in Table 1.

Table 1. Summary of objectives, recommendations, involvement of projects and period of implementation.

Objectives	Concrete recommendation	Projects involve	Period
Objective 1: Improve the management of fisheries data and statistics	**Digitalization of fisheries data**	SRAD FAO project	2021-2022
		KSA Fisheries Directorate projects	
Objective 2: Increase the quality and conservation of seafood	**Establishing a fisheries digital Auction system and redesign the auction halls facilities**	SRAD FAO project	2021-2023
		SRAD Reef project	
		KSA Fisheries Directorate projects	
		SRAD FAO project Marketing component	
	Cold storage box with flake ice on board fishing boats and transport trucks	SRAD FAO project	
		SRAD Reef project	
		KSA Fisheries Directorate projects	
		SRAD FAO project Value chain component	
Objective 3: Reduce the impact of the fisheries activities in the marine environment	**Establishment of Marine Protected Areas (MPAs) and ban fishing seasons/locations following scientific recommendations**	SRAD FAO project	2022-2026
		KSA Fisheries Directorate projects	
		Natural Resource FAO project	
		KSA Wildlife Directorate	
	Improve the selectivity of gears and fishing methods to mitigate the possible coastal environmental impact of fisheries	SRAD FAO project	
		KSA Fisheries Directorate projects	
		SRAD Reef project	
		Natural Resources FAO project	
		KSA Wildlife Directorate	

Table 2. Tentative schedule

Concrete recommendation	Corresponding Project Activity No.	Quarters																			
		2021		2022				2023				2024				2025				2026			
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
to improve the digital system of collection of fisheries data	Activities 1.3.5, 1.3.6																						
to establish a fisheries digital Auction system and redesign the auction halls facilities	Activities 1.3.3, 1.3.8,																						
to provide insulated palletized bins to small scale fisheries boats	Activities 1.3.4, 1.3.22																						
to establish some key permanent MPAs and to define every year the ban of fishing seasons and locations	Activity 1.3.2																						
to organize campaigns of adoption of new gears and fishing methods	Activities 1.3.4, 1.3.11, 1.3.13																						



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