REPORT OF THE
FISHING DATA EAST AFRICA (FIDEA) STAKEHOLDER'S AND PROJECT KICK-OFF
WORKSHOP

DAR ES SALAAM, TANZANIA, 16–17 SEPTEMBER 2019

TANZANIA FISHERIES RESEARCH INSTITUTE (TAFIRI)
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EXECUTIVE SUMMARY

The FIDEA Stakeholders and Project kick-off Workshop took place in Dar es Salaam, Tanzania, from 16-17 September 2019. The overall objective of the workshop was to present the FIDEA project to consortium members and stakeholders from the region and get their feedback needful for the project implementation. More specifically, the workshop provided a forum to more clearly i) review the state of knowledge and gaps in the artisanal fisheries data collection systems in Mozambique, mainland Tanzania, Zanzibar and Kenya, ii) evaluate the feasibility and performance of using digital tools for fisheries data collection in the region, iii) discuss the country's overview and progress towards meeting the goals of the sustainable development goals (SDG) 14.4.1 and iv) make recommendations for next steps in working towards improved and efficient data collection, processing and harmonized reporting, which can support the process of SDG 14 reporting at the county level.

The Workshop was altogether attended by 35 participants from five countries (Appendix 2), and was structured in to two main themes: Day 1 focused on 1) the 2030 Agenda (SDG 14), and the country's overview on fisheries data and statistic, the status of submission of capture production, fleets and fishers statistics to FAO's and information on state and trends. The presentations were followed by discussion rounds focusing on improving the data collection, processing, and reporting in the region. Day 2 stressed on 1) application of digital tools for improving the collection of fisheries data in the area, strategies for countries/region to move forward with reporting on SDG 14.4.1 in line with the United Nations Standards and 3) building capacity in the country and the region towards improved data collection, processing and reporting.

Some of the key highlights from the workshop include: (1) there has been some progress in the collection of fisheries data at the country levels, however, there are still discrepancies in the identification of fish stocks in the region, with most of the fisheries data still aggregated and relying on the so-called "expert judgment" and not on long term fish monitoring systems. (2) Most of the countries have not prioritized fisheries data collection and as such, lack the relevant information required for making important decisions in fisheries management. (3) Most countries have similar fisheries and stocks yet rely on different monitoring systems and tools for data collection, making it difficult to compare and provide a regional synthesis of the state of fisheries. (4) There are already existing digital tools for data collection, e.g. electronic Catch Assessment Survey (eCAS) and open art fish, which are already being used with some level of success. However, there is still a need to work towards a common platform, which allows for easy access and exchange of the data required for decision making.

CONTENTS

ABBREVIATIONS AND ACRONYMS

AIS	Automatic Identification System
BMZ	German Federal Ministry for Economic Cooperation and Development
BMUs	Beach Management Units
CAS	Catch Assessment System
CBD	Convention on Biological Diversity
CPUE	Catch Per Unit Effort
CWP	Coordinating Working Party on Fishery Statistics
EAR	East African Region
ECAS	Electronic Catch Assessment System
EFMIS-KE	Electronic Fisheries Management Information System in Kenya
FAO	Food and Agriculture Organization of the United Nations
FETA	Fisheries Education and Training Agency
FIDEA	Fisheries Data in East Africa
FISMIS	Fisheries Management Information System
FIRMS	Fisheries and Resources Monitoring System
IIP	National Institute of Fisheries Research
IT	Information Technology
KEFS	Kenya Fisheries Service
KMFRI	Kenya Marine Fisheries Research Institute
MASMA	Marine and Coastal Science for Management
MEERWISSEN	African-German Partners for Ocean Knowledge
MSY	Maximum Sustainable Yield
NGO	Non-Govermental Organization
PSU	Primary Sampling Unit
RFBs	Regional Fishery Bodies
SDGs	Sustainable Development Goals
SNAPA	National Sampling System for Artisanal Fisheries
SOFIA	State of World Fisheries and Aquaculture
SSU	Secondary Sampling Unit
SWIOFC	Southwest Indian Ocean Fisheries Commission
TAFIRI	Tanzanian Fisheries research Institute
TANFIS	Tanzanian Fisheries Information System
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stock Agreement
VRE	Virtual Research Environment
WIOFISH	Western Indian Ocean Fisheries Database
WIOMSA	Western Indian Ocean Marine Science Association
WSSD	World Summit on Sustainable Development
ZCAS	Zanzibar Catch Assessment System
ZMT	Centre for Tropical Marine Research

DAY 1

Official opening of the workshop

1. The workshop was opened by the Acting Director-General of the Tanzania Fisheries Research Institute (TAFIRI), Dr Mzighani who welcomed the workshop participants and led in an open round of introduction. In his opening address, Dr Mzighani emphasized on the importance of the FIDEA project to Tanzania, highlighting the existing gaps in fisheries data collection, analysis and reporting, and the need to reintegrate the result to policy and decision making. The director further welcomed the representatives from the ZMT (Prof. Dr Matthias Wolff-FIDEA project co-ordinator), FAO (Mr Marc Taconet-FAO), WIOMSA (Dr Mathias Igulu) and IIP (Ms Isabel Chauca-deputy director).

2. Prof. Dr Matthias Wolff presented on the role of ZMT in supporting research and capacity in the East African region. He presented both ongoing and completed projects, which have provided a platform for students from the region to pursue their MSc and PhDs. Matthias also briefly presented the MeerWissen initiative.

3. Mr Marc Taconet from the head of Statistics and Information Branch (FAO) delivered a short speech, emphasizing on the FAOs commitment to supporting the member countries setting up reliable indicators to monitor the progress towards the SDG 14.4. He emphasized on the need for formulating joint efforts in addressing common fisheries challenges given that fish stocks are shared in the region, and cannot be fenced off. Thus, he was optimistic that through the FIDEA project, data handling regimes in the region will be improved to provide relevant data on which relevant decisions can be made. Thus, he was looking forward to full stakeholders' participation and sound output from the workshop that can be taken up by the project during the implementation phase.

4. Dr Mathias Igulu from Western Indian Marine Science Association (WIOMSA) gave a summary of the commitment of the WIOMSA to support the countries form the region in meeting the targets of the SDG 14. Through the Marine and Coastal Science for Management (MASMA) programme, several projects have already been initiated to address knowledge gaps and support the implementation of the SDGs. More specifically on ocean acidification and marine litter. He further highlighted the need to invest more in the area of fisheries data, mainly in the harmonization of approaches in the region to meet the targets prescribed in the SDG 14 goals. Thus, he emphasized the need to link science to policy formulation to ensure that the results from the project can find application and acceptance both at the national and community level.

5. Ms Isabel Chauca, the deputy director of the Institute of Fisheries Research (IIP) in Mozambique, gave a brief speech to reiterate the institute's commitment to supporting the project implementation. She highlighted the challenges that the long coastline of Mozambique is facing with regards to fisheries data collection and the hope that through the FIDEA project capacity in the fisheries institutes will be enhanced to improve on the process of data analysis and fisheries management.

6. Mr Yahaya Ibrahim Mgawe, the Chief Executive of Fisheries Education and Training Agency (FETA), stressed the Tanzanian government's commitment to the sustainable management of both marine and freshwater fishery resources, where the collection, processing, and translation of data and of the results from the stock assessment are essential for fisheries management. He believes that this project is an excellent opportunity for the country as it aims at improving fisheries data collection, processing and reporting in the country and region and, eventually, will help policymakers and managers to make correct science-based management decisions for the benefit of the nation and the EAR at large.

5. Mr Paul Tuda delivered the first presentation introducing the FIDEA project. In his presentation, he outlined the project background, objectives and expected outputs. The FIDEA project is a two-year project funded by the German Federal Ministry for Economic Cooperation and Development (BMZ)

and coordinated under the MeerWissen initiative in cooperation with the Western Indian Ocean Marine Science Association (WIOMSA). The project was designed to cover mainland Tanzania, Zanzibar and Mozambique, where artisanal fisheries are essential for the livelihoods of coastal communities, contributing to poverty reduction and economic development. It is co-designed with national fisheries institutions to address the challenges that the partner countries face related to: (i) insufficient infrastructure and capacity to monitor and assess fisheries status, (ii) limited data (quality and quantity) and (iii) the need to support the partner countries commitments to report on the status and trends of indicator 14.4.1. Through the kickoff workshop, Mr Tuda envisioned that participants would come up with recommendations for improving data collection and processing at the national and regional level and recommend suitable interventions that can be incorporated in the project plan. Planned in the project calendar is a proposed on-site data analysis workshop for researchers and fisheries officers at the government level (tentative time period: *8th – 20th March 2019*), where about 30 participants from the fisheries research and management institutions from mainland Tanzania, Zanzibar and Mozambique, will be trained on fisheries data handling and analysis.

Presentations and discussions Day 1

6. Mr. Yimin Ye from the Marine and Inland Fisheries Branch of FAO presented on the SDG 14.4.1 framework, significance and rationale for monitoring. He first started by highlighting the value and importance of the ocean for food security and food production. Despite their importance, the oceans and seas are facing unprecedented threats, and the global outlook for fisheries indicates a declining trend. Thus the SDG 14 with its 10 targets is aimed at conserving and sustainably using the oceans. Of particular interest is target 14.4, which states that "By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce Maximum Sustainable Yield (MSY) as determined by their biological characteristics". To report on stock status, there has to be information on the fisheries stocks, which requires stock assessment. However, stock assessment is technically demanding, and most developing countries lack the infrastructure and scientific capacity to conduct full stock assessment. Thus, most countries will be unable to achieve this target by 2020. However, countries must put in place measures to monitor progress towards this target. All countries have the responsibility to report on their progress, but the reporting is non-mandatory, and it is the prerogative of the country to decide on which goals/indicators to report. FAO is a custodian agency for 25 indicators and offers technical support to facilitate the estimation and reporting of SDG indicators.

Country overview on fisheries data handling

6. Ms Upendo Hamidu, from the Ministry of Livestock and Fisheries, delivered a presentation on the status of fisheries data collection in mainland Tanzania. To begin with, she made a note of the importance of the SDG 14 in the context of the small scale fisheries and the vital role that monitoring of the small scale fisheries play in meeting the SDG 14 targets. However, fisheries data collection in small scale fisheries is challenging due to their dispersed nature, multiple uses of gears and vessels, and seasonality. Therefore, an adequate sample size is needed to make sense of the fishery and proper management decisions. Marine and coastal fisheries in mainland Tanzania are categorized into artisanal, semi-industrial and industrial fisheries. Small scale fisheries, involving fishing households are crucial in mainland Tanzania, making up to 95% of the entire fishery. Fishing is mostly conducted using non-motorized vessels with traditional gears, and the fishery is primarily restricted to the inner sea and inland waters. The monitoring of fisheries and collection of fisheries statistics is the mandate of the Ministry of Livestock and Fisheries. The data collection is targeted and is done at the species level with priority given to the following fish groups and species; octopus, prawns, sharks and rays, lethrinids, carangids, tuna and tuna-like, and the small pelagics. Artisanal fisheries data monitoring has gone through a transition since the establishment of the fisheries department in the 1960s. The

fisheries department officially started the national fisheries sampling programmes in 1980. In 1995, the programme was decentralized and random sampling (16 days/month) was introduced to target all fishing fleets. In 2006, with the establishment of a co-management regime, the fisheries department started involving the fishing communities in the form of Beach Management Units (BMUs) in the data collection. For this to be effective, the BMUs were trained, and the questionnaires were translated to enable local communities to participate in the process. Though it is the mandate of the Ministry of fisheries to collect fisheries data, several players are also involved in the process including the national fisheries research institute (TAFIRI), as well as national and international NGOs. The fisheries data collection system in Tanzania has been computerized since 1989 and stated with the Tanzanian Fisheries Information System (TANFIS), which was later replaced by Catch Assessment System (CAS),. However, following the decentralization of the data collection system, difficulties were experienced in data collection and archiving, where a modified catch assessment survey was introduced in 2008 based on FAO recommendation. This new system is linked to an online database[1] and has been fully transformed into an electronic fish catch assessment (i.e. eCAS). With the introduction of the eCAS system, there has been significant improvement in quality and quantity of the data collected, which is an improvement from the manual paper system. Besides, the number of priority species from artisanal fisheries has increased, and as result, the e-CAS system has been scaled-up in all coastal districts since June 2019. Despite the successful implementation and scaling up, some challenges have been observed, which include: i) Sustainability of the system - a financial mechanism, ii) Network availability (Phone companies), iii) Inadequate expert on databases and iv) Low commitment to some data enumerators. In conclusion, Ms Hamidu reiterated the importance of fisheries data collection but noted that the process is costly and time-consuming and needs to be supportable financially given that governments have limited resources. Nevertheless, with the introduction of the mobile system of data collection, the costs have been reduced, and the impact has been positive given that the accuracy and reliability of the data collected have significantly improved and data and data collectors can now be tracked in real-time. Further, the BMUs can also now actively be involved in the data collection system and are thus empowered to be more involved in the primary decision-making process.

7. Mr Hashim Muumin from the department of fisheries Zanzibar presented the ''Catch Assessment (CAS) data collection process and fisheries information system (FIS)''. The collection, analysis interpretation and submission of statistic report is the responsibility of the statistics unit in the Department of Fisheries. Previously, all fisheries data were collected and analysed manually with beach recorders stationed in landing sites based on the size of the district. In addition, data collection was conducted based on the accessibility of the landing site, type of vessel and gear and the availability of beach recorders. The collection of fisheries data by the beach recorders followed the ZCAS template, which was designed to collect data at the species level and vessel type, and was then compiled daily and submitted to the district fisheries officers who in turn computed the monthly summaries for each landing site. The compiled report was then submitted to the Ministry of fisheries, the Tuna Commission and FAO on an annual basis. The challenge of the manual data collection and collation system is that authentication of the data is complicated with only a few catches appearing in the system and fish landed in the morning or late in the evening is not considered. Secondly, there is overcrowding during auction, which makes it difficult for the beach recorders to monitor the entire catch. Thirdly, the manual system requires the photocopy of large sheets of forms and the data is entered manually making it challenging to authenticate the entered values. Besides, information is lost during the transfer of information. Therefore, the Ministry has been in the process of digitising its data collection system by introducing a web-based fisheries information system[2]. With the new system, it is projected that the transfer of information from sites will be more efficient though there is is still a need

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[1] https://smartcas.net/ecas/?page=members

[2] http://www.artfish2.com/zanzibar/samakis.php

to introduce a mobile phone-based tool. Also, the fishers should be trained and incentivized to report the catch by themselves. This should be reinforced by establishing a Fishery dock to centralize the landing of fish for easy monitoring.

8. Mr Rui Mtombene, from the Institute of Fisheries Research (IIP), gave a presentation on "Mozambique fisheries and data collection framework". The first part of the presentation focused on the overview of the country's fisheries. With a coastline of 2700 km, Mozambique`s total catch in 2018 was estimated at 397,272 tonnes out of which 89% was contributed by the artisanal fisheries. The main fishing gears include beach seines, handlines, gill nets, long lines and the purse seines targeting mostly small pelagic and demersal fish species. Besides, the artisanal fisheries, recreational fisheries, and semi-industrial fisheries also operate with the semi-industrial fisheries mostly conducted in the Sofala bank. The monitoring of fisheries and collection of data has been the mandate of the Ministry of Fisheries from 1990 to 2015 with the IIP being responsible for the artisanal fisheries sampling (catch, effort, species composition and length data). However, since 2015, the collection of data has been delegated to the Ministry of Sea inland waters and fisheries and was decentralized to the provincial level. This change brought more capacity to the Ministry to deal with the management of the marine and inland resources and coordinate all sectors involved in the exploitation of these resources, to the benefit of the people of Mozambique. Under the National Sampling System for Artisanal Fisheries (SNAPA) monitoring scheme, data collected include details of fishing crafts (statistics on licenses), catch and effort data, species composition, length-frequency data, and socio-economic data. However, the monitoring scheme has faced a number of challenges including; (i) low reliability on data (low coverage in number of fishing gears or species), (ii) non compatibility of the database with recent software updates and hence difficulty in processing of data and (iii) difficulty in computing summaries such as effort and catch per unit effort (CPUE) per species. Therefore, in an attempt to simplify the data collection system in the country, the Mozambique Fisheries Sector decided to experiment with the Open Artfish[3] (from FAO). This was trialed out in Maputo province (9 districts) and Cabo Delgado province (covering 2 districts (Minor strata)). With the new system, there have been some improvements particularly in the reporting and generation of catch summaries. However, there is still a need for improvements in the software component to make it compatible with other databases. Furthermore, there is a need to strengthen the capacity of the field data collectors in order to increase the coverage of the data collection.

9. Mr. Pascal Thoya, a scientist from the Kenya Marine and Fisheries Research Institute (KEMFRI), presented the case study of the Kenyan fisheries data collection system. The marine fisheries in Kenya are primarily artisanal and support the livelihoods of thousands of coastal communities and are estimated to produce about 9000 metric tonnes annually, which is equivalent to 7% of the national fish production from capture fisheries. The artisanal fishery employs about 14000 fishers who use simple gears such as basket traps, gill nets, beach seines and the ring net. Common fish species landed include the rabbitfish, parrotfish, emperors, pelagic species and tuna-like species. Up to 163 reef and seagrass associated species have been recorded representing about 37 fish families, yet very few species dominate the catch. The monitoring of fisheries is the mandate of the Kenya Fisheries Service (KeFs), but the Kenya Marine Fisheries Research Institute (KMFRI) also conducts routine targeted catch assessment for 10 days in a month. The CAS aims to generate information on fish catch and catch rates to support monitoring and the sustainable management of the fisheries resources in Kenya. At the Kenyan coast, KMFRI collaborates with the state department of fisheries and county government to monitor activities in the landings sites in five counties. The CAS employs a two-stage sampling divided into primary sampling units (PSU[4]), which are landing sites selected in each county. Within

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[3] http://www.fao.org/fishery/static/OpenArtfish/Toolkit.pdf

[4] Landing sites, where a more than five fishing crafts routinely land fish.

each PSU, secondary sampling units (SSU5) are then selected for sampling, and this involves the sampling of a number of fishing crafts per landing site. Attempts are made to cover at least 10% of all landing sites (PSUs) within a county, and the sampling is randomly done. At the moment a mobile CAS is currently being developed (Pilot Phase is progress), but an electronic fisheries management information Systems-Kenya (EFMIS-KE6) has already been trialed out in Lake Victoria. The EFMIS-Ke provides real-time information on fish production, weather conditions, prevailing prices and other vital information using mobile phone technology. In closing, Mr Thoya expressed his expectations that through the FIDEA project, there will be opportunities to strengthen capacity, especially on stock assessment using data-limited methods and collaborations to apply the use of digital tools for data collection.

10. Savore Stefania presented on the status of countries submission of capture production, fleets and fishers statistics to FAO's global statistics database and information on status and trends (FAO). In general, there has been an improvement in the quality of fisheries data submitted to the FAO from the countries. Most notably, there has been an increase in the quality of data from Zanzibar and Mozambique with Zanzibar having more regular data submission. However, there is no data submitted on fleet and employment from Zanzibar for both capture and aquaculture. In mainland Tanzania, the capture fisheries data is combined with the aquaculture data, but overall the capture fishery data is declining. The information provided on fishing fleets and employment data from mainland Tanzania is useful. However, there is no distinction between the fleet types between inland and marine fisheries. In terms of regularity in submitting data, there has been inconsistency in mainland Tanzania with only partial information on fleets submitted in 2016. In 2014 and 2015, there was no submission. In Kenya, the submission of data is patchy, and there has been limited reporting in the last three years.

11. During the presentation, the challenges of submitting statistics to FAO were discussed. Some of the issues, which emerged include i) frame surveys which are the primary source of information on the fleets and fishers statistics are not done consistently and hence most countries tend to omit them from the submission, ii) there are discrepancies in the identification of fish stocks, iii) for most countries, gender-based information on fishing fleets are missing, iv) misinformation provided due to the wrong contact people at the institutions, with some having already retired but still are maintained in the mailing list, v) questionnaire for the stock status not submitted to the right institution/ people, vi) the data is submitted but lack the protocol for the methods used to give the stock status, vii) the dispersed and remote nature of landing site makes it difficult to sample some sites and viii) information on migrating fishers are normally not captured in the frame surveys. Thus some necessary steps can be taken to improve the quality of data and process of submitting data to the FAO. This includes i) countries should think of standardizing their approaches and make them comparable, given that there are similar stocks in the different countries, ii) revise the contact persons at the institutes who are mandated to submit the statistics to the FAO (some have long retired) and iii) more training on species identification with possible in-country manuals provided to ease the confusion of stock misidentification.

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[5] Fishing vessels or gear types
[6] Electronic Fish Market Information System (EFMIS-KE)

DAY 2

Application of digital tools for data collection

12. The second day of the workshop was dedicated to the application of digital tools for improving fisheries data collection. The day began with a general overview of the previous day's presentations and key highlights.

13. Mr Yimin Ye delivered the first presentation on "FAO general concepts and reporting process on SDG indicators 14.4.1 in line with the United Nations Standards''. To begin with, he highlighted the commitment of FAO to the 2030 agenda and emphasized that, as a custodian to 25 indicators, FAO is supportive of countries to set up reliable indicators for monitoring their progress towards the SDG goals. More importantly, on the SDG 14 indicators, which directly addresses fisheries concerns, FAO is committed to supporting the countries to achieve sustainability in their fisheries. Sustainability as presented in the SDG 14.4.1 "proportion of fish stocks within biologically sustainable levels" refers to the Maximum Sustainable Yield (MSY) reference point against which stocks are to be classified as 'biologically sustainable'. This indicator measures the sustainability of the world's marine capture fisheries by their abundance. Several International frameworks advocate for the sustainability of fisheries. They include the United Nations Convention on the Law of the Sea (UNCLOS-Article 61.3), the United Nations Fish Stock Agreement (UNFSA Par 30), the Convention on Biological Diversity (CBD - article 10) and the FAO Code of Conduct for Responsible Fisheries (CCRF, 1995). Besides, the World Summit on Sustainable Development (WSSD), set out, as one of the goals "to restore overexploited stocks to the MSY level no later than 2015". However, the global trend of fisheries as reported by FAO indicate a decline in the proportion of stocks that are within safe biological limits. The situation is, even more, worrying for the developing countries when compared to the developed countries. This is because of the overcapacity, which has put pressure on the fish stock as a result of an increase in economic development. The declining state of the fisheries in some countries is linked to the existing governance structures in place. Based on the governance index, countries that have improved the way they manage their fisheries have better performing fisheries compared to countries with weak governance. Hence to reduce overfishing, countries need to enhance institutional and governance structures through global partnerships, particularly in developing countries. Also, countries should share successful experiences and knowledge while embracing technology to improve fisheries data collection. This should be strengthened by capacity building in science-based policymaking. Nevertheless, appropriate measures should be put in place to control fishing capacity at sustainable levels through policy and regulations and establish a robust global monitoring system.

14. After the presentation, the participants highlighted several issues, which needed further clarification. i) 25% of the global landing from fish stocks is assessed based on numerical models. How are the models chosen and are they applicable to small scale fisheries? ii) the distant fleets come to exploit fish from the developing countries and this has severe implications on the small scale fisheries. iii) Calculating the MSY for the multispecies fisheries is complex and not straight forward for small scale fisheries in tropical countries. For most of these fisheries, there is a need to decide on the species to be monitored, the level of assessment to be conducted, and the methods to be applied depending on the data quality. Further, given the institutional overlap and mandate for fisheries agencies in developing countries, the question of who (institution) to conduct the assessment must also be addressed.

15. The FAO statistics and information Branch, through Marc Taconet and Stefania Savore, presented on the "Fisheries Information Tools". The presentation centered on a review of the SDG 14.4.1 reporting requirements. A short snippet of the reporting template was presented; this consists of a questionnaire in which member countries are requested to submit a reference list of stocks and their status. The questionnaires are designed to maintain consistency in reporting across countries and regions. Some of the input data to be requested include information on abundance, fishing mortality,

catch per unit of effort (CPUE) and the total catches per stock including supporting time series data. All this information will be linked to the FIRMS marine inventory, where the status of each stock can be visualized spatially. Summary from the FIRMS inventory indicates that as of the year 2009, 92 resources were being monitored from the region with the status indicating that 10 of the resources were depleted, 3 were recovering, 18 were overexploited, and 34 were fully exploited. Also, out of the 92 resources monitored, 19 were moderately exploited, 8 underexploited and the status of 46 resources remained unknown, which represents 31% of all resources monitored. Compared to the regional fisheries database WIOFish, there were a total of 266 fisheries recorded in the database in 2017 and out of these, 239 were operational. Considering the countries presentation on fisheries data collection systems and the resulting computed statistics by FAO, it is evident that there are operational data collection systems, but sustainability seems to be an issue. Further, there are still challenges with regards to data sharing/harmonization and reporting on fleets (fishing effort) seems weak. Regarding monitoring and reporting of status of stocks, analysis of data was not complete for the years 2009 and 2016/17 according to the southwest Indian Ocean Fisheries Commission (SWIOFC) reporting. In reporting on stock status, the uncertain stocks need to be clarified and fixed, and any discrepancies in reporting stock status to SWIOFC need to be addressed in existing assessments. From the current assessments, it seems that the existing data at the country level are not sufficient for stock assessment models and hence most fisheries from the region still rely on expert judgment and weight of evidence. Therefore, there is a need to prioritize certain species and decide for either single species or a multispecies level assessment. Other constraints to be addressed include the precise definitions of effort and the standardization and integration of data, to make comparisons easier across the region.

16. The FAO statistics and information Branch, through Marc Taconet and Stefania Savore, presented on the "Review of information on status and trends of marine resources. The management of fisheries must be based on sound scientific practices, which rely on monitoring of fishing activities and the associated socio-economics and livelihood benefits. The monitoring of fishing activities is essential to determine the status of fishery resources. This can either be done at an individual stock level for a particular region/area or regionally, as in the case of shared stocks. The FAO maintains the most comprehensive database on fish stocks globally. This database contains capture production statistics (in tonnes) by country or territory, species item, and FAO Major Fishing Area. The results are computed and presented through several platforms such as the FishstatJ[7], FAO yearbook and the state of the world fisheries and aquaculture reports (SOFIA). The Coordinating Working Party on Fishery Statistics (CWP) sets the global fisheries statistics worldwide and addresses the issues of standardization and harmonization of approaches in the data collections. The FAO works to consolidate the data into databases to facilitate data sharing and support the member countries to address the burden of collecting, collating and sharing data by providing capacity building for statistical data collection and national information systems. Through IT partnerships, the FAO has developed the integrated national statistics and management information systems (FISMIS), which is meant to support the harmonization of fishery statistics and multiple reporting. One such tool is the open art fish " Open Approaches, Rules and Techniques for Fisheries statistical monitoring". This is a generic database that estimates the total catch and value by species for sampling schemes of small-scale fisheries. The system is easily adapted to local requirements, and more specific outputs can be easily added while maintaining the appropriate statistical procedures. Similarly, the Calipseo, a web-based multilingual application platform has been developed to collect and manage fisheries administrative data (vessel, fisher and fishing companies records or registries), fishing activities data (landing form, logbook, purchase orders from processing plants) and biological data (crucial for stock assessment). The advantage of the Calipseo is that it is easily customizable to compute and process collected data to produce statistics and reports according to the National Fisheries Authorities needs. In support of data collection programs, the smartforms, mobile multilingual application has been developed to collect and review 'lightweight' fishery data. The platform combines, a builder to design

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[7] This is an open access application to access FAO's Fisheries and Aquaculture statistics.

forms according to survey's need, a mobile App loaded with the designed forms and a hub for data review, analyses and authorized exchanges with any third-party system such as Calipseo. The platform is built on a participatory approach to allow stakeholders to share the same application and collect data under international standards with linkages to national and regional standards. The FAO can make available the infrastructure for a Regional Database and support the countries make use of the available tools developed to support reporting and publication. For example, the FAO, in coordination with AZTI[8], Seychelles Fishing Authority, and Global Fishing Watch, are producing an Atlas of AIS[9]-based fishing footprint and effort to take advantage of this unique dataset to create a more detailed understanding of fishing effort, fill in gaps in knowledge and validate existing datasets. The Atlas describes, in detail, the strengths and limitations of measuring fishing effort from AIS in each FAO region. It compares fishing effort. In the northern portion of the Western Indian Ocean region, the ability to map fishing activity through AIS data is limited by poor AIS reception and by low levels of AIS use in the artisanal and semi-industrial fleets of the coastal countries. Through these partnerships, the countries can get an idea of the kind of effort, which is exerted in their respective EEZ and put measures in place to regulate and control illegal activities. In addition to the monitoring of fishing fleets, FAO has also developed the Virtual Research Environment (VRE), to offer developing countries interactive, hands-on training on stock assessment data-limited methods to raise awareness on the SDG 14 and of the significance of global reporting on indicator 14.4.1, percentage of biologically sustainable fish stocks. Thus, FAO has several ways of supporting countries to better their data collection, monitoring of fish stocks, analysis and reporting, all geared towards more sustainable fisheries.

17. Mr Pascal Thoya from the Kenya marine fisheries research institute (KMFRI) presented on the "Fisheries and Resources Monitoring System (FIRMS)". FIRMS was founded in 2004 to provide access to a wide range of high-quality information on the global monitoring and management of marine fishery resources. The monitoring is based on inventories of stocks and fisheries, including identification of single marine resources/stocks and indicators of stock state/total catch/landings. Through their data inputs in FIRMS, member countries/partners contribute to the global inventory of marine resources and fisheries. The inventory is implemented using an Excel format for initial data input and is harmonized according to FIRMS standards and validated by data owners. The information is then stored into the FIRMS database and published as fact sheets. To date, the FIRMS database covers, shared stocks under Regional Fishery Bodies (RFBs) mandates but also national stocks/assessment units and status of national fisheries. At the national level, FIRMS supports the need for easy access to high-quality information for the development/enhancement of fisheries policies and management plans at national and regional levels. At the regional level, FIRMS provides access to long-time trends of stock status reports and ensures national and regional visibility at the global level. Within the SWIOFC region, FIRMS can be used as tool for disseminating the status reports on regional/shared marine resources. Within the SDG 14.4.1 framework, the FIRMS allows for the allocation of unique identifiers for national stocks for dissemination. As such, a catalyst to national and regional efforts for the collection of catch and effort statistics and providing evidence supporting global status and indicator 14.4.1.

18. Mr Mussa Ngosha from TAFIRI presented on the functionality and use of the electronic Catch Assessment Survey (eCAS) for Tanzania. The eCAS is a mobile and web-based application developed and pioneered by TAFIRI three years ago, to collect data for marine fisheries along the coastal waters of the WIO. The idea came from the prior data collection system, which was basically a paper-based system. Though considered efficient, the paper-based system had some challenges including data handling and security. Besides, the process is time-consuming given that data has to be manually

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[8] https://www.azti.es/en/about-azti/

[9] *Automatic identification system (AIS) is an automatic tracking system that uses transponders on ships and is used by vessel traffic services*

entered hence putting to question the reliability of the data. Through the eCAS system, data on specific fisheries are collected, and the input data include the catch and effort data, species composition and the biometric and morphometric information of the species. eCAS currently being used in Lake Victoria, Uganda and Tanzania and is currently being trialed in Comoros for the octopus fishery. The advantage of the eCAS compared to the paper system is that the data collection forms can be easily customized to allow for the use of common names of the fish species and also the platform allows for the secure sharing of data. The summary can be viewed as reports with details on the catch rate by craft type, summary of total catches in metric tons and value in Tanzanian Shillings. Nevertheless, there are some challenges also associated with the use of the eCAS. These include the network problems for remote areas, power supply for charging mobile phones and the motivation by the data collectors to use the system. Therefore, as a way forward, several recommendations have been offered to improve the system and its usage. These include i) providing more mobile phones and power backups to data collectors, ii) improve social inclusion by also involving women in the data collection, iii) create a system that can be used offline and updated once connectivity is restored.

19. Following the presentation, some recommendations were made by the participants. i) Increase the financial support to extend the use of the digital mobile data collection system in Mozambique, ii) EAR countries willing to learn from Tanzania on how they have been able to integrate their data collection with the digital tools and possibly implement the same, iii) FAO should provide expertise to further understand the differences (strength and weakness) between the eCAS and the open art fish by the FAO in terms of functionality and assess the potential of upscaling the same to other countries.

Recommendations and next steps

During the last session of the workshop, the participants discussed and drafted recommendations for followup. The following recommendations were made:

Country overview of fisheries data management system

  i. At the national level, countries should prioritize the stock to be assessed and the level of data collection to be conducted. What criteria will be applied?
-     - Ecological importance, abundance, commercial importance?
-     - What tools to be used for the assessment
-     - Is there sufficient capacity for conducting the assessment?

  ii. At the regional level, countries should work towards harmonizing the data collection system by adopting similar tools that have been proven to work in neighbouring countries.

  iii. The SDG 14.4.1 is an essential platform for bridging the gaps that exist within the institutional and regional levels to share and compare data.Where there is a policy framework, the countries commit to driving the process for data sharing system.

Data improvements – reporting to the FAO

  i. Decentralize data collection system within countries of the EAR by engaging the local communities in the process.

  ii. Data collection is costly; hence mobilising resources from different sources and funders is vital rather than relying on a single source.

  iii. Reliability of the data – more enumerators to be engaged to expand the areas of data collection within countries.

  iv. Train the enumerators on data collection – build the capacity of the beach recorders.

  v. Invest in catch and effort data and fish length time series

  vi. Identify focal people in the various institution – that can be contacted to report to FAO reliably.

vii.   Build the capacity and facilitate the collection of meaningful data that is relevant to the SDG 14.4.1

viii.   Harmonize methodologies to have a representative of the entire fishery

Analysis of fisheries data for stock assessment and improvements

i.   Invest in digital tools, which are;
   - Reliable – can authenticate the data
   - Timely – transmission is efficient but relies on internet connectivity
   - Can be traced- georeferenced

ii.   The sustainability of digital tools is essential – review the current status of the digital tools in the countries

iii.   Government prioritize the reporting of the SDG 14.4.1

iv.   Adopt a common platform where there can be an exchange of the data – even within institutions - Calipseo platform.

Capacity development for the institutions

i.   Capacity building for data enumerators

ii.   Identify who is to conduct the capacity building

iii.   Provide support for aggregating and prioritizing data – the electronic platform is an outstanding opportunity.

iv.   Submission of a proposal for a workshop to WIOMSA (call for the workshop will be out by December)

Concluding remarks

In his closing speech, Dr. Emmanuel Sweke, the Deputy Director of Deep-Sea Fishing Authority (DSFA), thanked the organizing committee for having organized the meeting, which in his assessmet was successful. In his closing remarks, he thanked the FAO and FIDEA project team for having chosen Tanzania as the hosting nation for the kickoff workshop. He expressed the wishes of the TAFIRI director and the Permanent secretary that the workshop report will be shared, and proposals and recommendations made would be followed up.

APPENDIX 1

Workshop Agenda

Day 1: Monday 16 September 2019	
09:00 – 10:30 Chair: Dr Rushingisha George	***Opening and introduction of the FIDEA stakeholders and Kick-off Workshop*** Welcome remarks by the Director of TAFIRI (Dr Semvua Isa Mzighani) Introductory remarks - Leibniz Centre for Tropical Marine Research (Prof. Dr Matthias Wolff) - The Food and Agriculture Organization of the United Nations (Marc Taconet) - Western Indian Ocean Marine Science Association (Dr Mathias Igulu) - National Institute of Fisheries Research, Mozambique (Isabel Chauca) - Official opening of the guest of honour (Permanent Secretary Ministry of Fisheries and Livestock) Overview of the workshop objectives (Dr Paul Tuda) FIDEA presentation: project objectives, activities and expected outputs (Prof. Dr Matthias Wolff & Dr Paul Tuda) ***Group photography session***
10:30 – 11:00	*Refreshment break*
11:00 – 13:00 Chair: Prof. Dr Matthias Wolff	***The 2030 Agenda. Sustainable development goal 14*** - SDG 14.4.1 framework: significance and rationale for monitoring ***Country overview on fisheries data and statistic, institutional capacity, and action and progress on SDG 14*** *(15 mins presentation each)* - Tanzania (Ms Upendo Hamidu) - Zanzibar (Mr Hashim Moumin) - Mozambique (Mr Rui Rui Mutombene - Kenya (Mr Pascal Thoya)
13:00 – 14:00	*Lunch*
14:00 – 16:00 Chair: Ms Upendo	***Status of submission of Capture production, Fleets and Fishers statistics to FAO's global statistics database and information on status and trends*** *(Ms Savore Stefania)* - Discussions

Hamidu	- Countries performance in submitting data to the FAO - Quality and scope of the data - Challenges to data submission - Solutions and recommendations
15:30 – 16:00	*Coffee break*
16:00 – 17:00 Chair: Silas Mathew	***Discussions cont.*** - Wrap up and immediate follow-up actions
17:00	- *Day closure*

APPENDIX 2

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APPENDIX 3

Workshop Photos

Figure 1. Mr Yahaya Ibrahim Mgawe delivering the welcome remarks at the first official FIDEA workshop.

Figure 2. Prof. Matthias Wolff (ZMT)giving introductory remarks on ZMT research areas and focus

Figure 3. Mr Marc Tacconet (FAO), giving introductory remarks

Figure 4. Dr Semvua Mzighani(Director-TAFIRI), giving introductory remarks

Figure 5. Dr. Matthias Igulu (WIOMSA), presenting on WIOMSA's role in the WIO region.

Figure 6. Ms Isabel Chauka (IIP) giving introductory remarks

Figure 7. Ms Isabel Chauka and Savore Stefania (FAO), taking a break.

Figure 8. Yimin Ye (FAO) and Hashim Njowele taking a tea break