



AFRICAN COMMISSION ON AGRICULTURAL STATISTICS

Twenty-Sixth Session

Libreville, Gabon, 4 – 8 November 2019

AGENDA ITEM 9

ENHANCING FISHERY AND AQUACULTURE DATA TO ACHIEVE THE SDGS – ACHIEVEMENTS AND CHALLENGES

Stefania Vannuccini
Senior Fishery Officer (Statistics)
FAO Fishery and Aquaculture Department - Rome

SUMMARY

This document provides an overview of the critical role that accurate, timely and comparable fisheries and aquaculture statistics play in monitoring the trends and the progress towards national and international development goals and targets. In this respect, the major functions played by the Coordinating Working Party on Fisheries Statistics will be illustrated as well as the key standards relevant to the fishery and aquaculture sectors. An overview of the key statistical issues concerning the fisheries and aquaculture sectors in Africa will also be shown. In addition, a brief overview of the Sustainable Development Goals related to fisheries and aquaculture of which FAO is custodian will be provided.

I. THE ROLE OF STATISTICS

The fisheries and aquaculture sectors play an important role in food security, providing a valuable source of micro-and macro-nutrients for healthy and diversified diets, but also representing an important source of income and livelihoods for hundreds of millions of people around the world, including Africa. Although these sectors may represent a limited share of the overall national economy of a country and the consumption of fish products may not be significant compared to other food at national level, they can be crucial for the population of numerous coastal, riverine, insular and inland regions, which depend heavily on these sectors.

However, the marine and inland ecosystems and the resources they provide are increasingly threatened by changes in land-use, overfishing, illegal unreported unregulated (IUU) fishing, climate change, bycatches and discards, environment degradation and habitat destruction, poor management and many other factors. These issues can threaten the future expansion of the sectors and affect their potentiality to continue to contribute significantly to food security and adequate nutrition.

Further benefits and the sustainability of these sectors can only be achieved through more cautious and effective fisheries and aquaculture management, with main emphasis in maintaining fully exploited fish resources and recovering those that are overexploited or depleted. Knowledge of the status and trends of the sectors, not limited to production, but encompassing the entire value chain, is key to sound policy-making, as well as to assess and track the performance of responsible fisheries and aquaculture management. The limited availability of information often constrains policy-making and planning. With information on fish stocks, fish seeds/fingerlings, employment, vessels, processing, damage and loss, governance and access to marine resources and markets, countries can gain a fuller picture of activities in their waters and design sound targeting policies to manage the sectors. However, to better monitor the trends of the fishery and aquaculture sectors, it is important that statistics are as precise, timely and detailed as possible.

Information often exists, but might be very fragmented, inaccessible (if not lost) or collected according to different standards. In many cases, the information is collected in isolation and with no possibility to link it to data collected from other sectors/or typology of collection. This constitutes a major challenge to the implementation of cross-sectoral management. There is a need for integration among different data collection initiatives, across different sectors, and throughout the entire value chain, in particular for social and economic valuation in relation to sustainability. Such integration also entails the exchange of expertise and related methods and tools, while catering for particular requirements of aquatic resources.

In addition to have in place proper collection systems, it is also necessary to establish mechanisms enabling efficient information networking especially when information resources, expertise and tools are scattered among multiple organizations. In this respect, the following three components are deemed essential:

1. Enhance information standards and harmonization capacities to facilitate information exchange by enabling the use of common classifications, concepts and data structures;
2. Provide global, regional and national data and information sharing platforms. Existing technologies can manage and analyse huge amounts of data collected through a diversity of methods and sensors;
3. Enhance partnerships and other networking arrangements. This is vital as no single organization in isolation can cover all the requirements.¹

In a context of limited statistical capacity, it becomes more complex, if not impossible, for countries to produce data to be used for reporting on Sustainable Development Goals (SDGs) indicators and monitoring progress achieved. The 2030 Agenda for Sustainable Development is built on 17 SDGs, which are global objectives that all members of the United Nations have agreed to pursue and implement. The SDGs are shaping the development agendas of countries, setting a new policy framework focused on ending all forms of poverty, reducing inequality and tackling climate change, with inclusive development at the heart of all policies. There are 17 SDGs, with 169 targets and 232 related indicators that monitor progress in social, economic and environmental development. Some of them are specific for fisheries and aquaculture, in particular Goal 14. FAO is currently the custodian agency responsible for monitoring and reporting on four of the indicators related to SDG14, which aims to “conserve and sustainably use the oceans, seas and marine resources for sustainable development”. The FAO’s role as custodian UN agency of four of the SDG14 indicators implies that FAO has also to facilitate the process, provide technical support, build capacity (e.g. in supporting required statistics which help the country in progressing on the target), and also ensure that national data used for calculating the indicators are comparable.

II. FAO AND CWP

FAO is the only source of global fisheries and aquaculture statistics, which represent a unique global asset for sector analysis and monitoring. The FAO Statistics and Information Branch of the Fisheries and Aquaculture Department (FIAS) is responsible for the collection, compilation, validation, analysis and dissemination of

¹ For more information, see section on “Data needs for blue growth”, in FAO. 2016. The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all. Rome. 200 pp.

these statistics, which are structured within different data collections (capture and aquaculture production, fisheries commodities production and trade, fishers and fish farmers, fishing vessels and apparent fish consumption).

FAO Fisheries and Aquaculture statistics are annually released and made available through:

- Online query panels, at <http://www.fao.org/fishery/topic/16140/en>;
- Alternatively, data can be downloaded as Database-Cum-Software System called FishStatJ at <http://www.fao.org/fishery/statistics/software/fishstatj/en>
- FAO Yearbook of Fishery and Aquaculture Statistics at <http://www.fao.org/fishery/statistics/yearbook/en> . The latest issue is composed by a summary (Booklet: <http://www.fao.org/3/ca5495t/CA5495T.pdf>) and detailed version (USB card: http://www.fao.org/fishery/static/Yearbook/YB2017_USBcard/index.htm)

In addition an analysis of the main trends of the sector are published every two years in “The State of World Fisheries and Aquaculture (SOFIA)”, the flagship publication of the FAO Fisheries and Aquaculture Department, available at: <http://www.fao.org/fishery/sofia/en>

FIAS’ vision is to ensure that policy making and management decisions in fisheries and aquaculture at global, regional and national levels are based on the best available scientific evidence, information and data. FIAS’ mission is to provide access to global statistics, cross-disciplinary knowledge and analysis on the fishery and aquaculture sector and to enhance the capacity of member states through the provision of standards, guidelines, tools, expertise and training on fishery and aquaculture statistics and information systems.

The structure of the classifications used by FIAS to collate fisheries and aquaculture statistics has been agreed within the Coordinating Working Party on Fisheries Statistics (CWP)², of which FAO FIAS serves as Secretariat. Functional since 1960, under Article VI-2 of Basic Text of FAO, CWP provides a mechanism for the coordination of fishery statistical programs of regional fishery bodies and other inter-governmental organizations whose remit relates to fishery statistics. The CWP’s main purposes are:

- Continually review fishery statistics requirements for research, policy-making and management;
- Agree on standard concepts, definitions, classifications and methodologies for the collection and collation of fishery statistics;
- Make proposals for the coordination and streamlining of statistical activities among relevant intergovernmental organizations.

The CWP is composed of experts nominated by intergovernmental organizations which have a competence in fishery and aquaculture statistics. There are currently 19 participating organizations in the CWP. Although the initial focus was on fisheries, with the growing importance of aquaculture the Fishery Subject Group (CWP-FS) and the Aquaculture Subject Group (CWP-AS) were established during the twenty-third session of the CWP in 2010, in accordance with the CWP Rules of Procedure. These groups were created to enhance the effectiveness of the CWP to address issues specific to capture fisheries and to aquaculture. The CWP usually meets every three years with intersessional meeting/s held between the main sessions. The latest session of CWP (twenty-sixth Session: CWP26) was held in Rome, Italy in May 2019.

Since 1960, and with particular emphasis in the last few years, CWP has been active in developing or adapting existing standards to the fishery and aquaculture sector, thus contributing to connecting scattered and multidisciplinary sources of statistics and data.

III. CWP HANDBOOK OF FISHERY STATISTICAL

Being the source and reference documents related to the concepts and definitions used in fishery statistics widely dispersed and not always readily available, in 1982 CWP proposed that a “Handbook of fishery

² <http://www.fao.org/fishery/cwp/en>

statistics” be put together. Subsequently renamed as the “CWP Handbook of fishery statistical standards”, it covers a wide range of fishery statistical concepts, definitions, classifications and related matters as applied to fishery statistics by the international agencies. The main users are the CWP Member Agencies, national fisheries statistics offices, national administrations and other fishery agencies.

National systems can differ from those used internationally as depending on the specific national purposes for which they have been developed. However, it is important that national fisheries statistics programmes are coherent and consistent with common regional or inter-regional sets of statistical standards, and apply internationally recognized definitions, classifications and codes. The CWP Handbook of Fisheries Statistics Standards was created to serve as the basis for this integration and it is intended to assist in the development of national standards as logical extensions of the international standards. In its efforts to develop useful and practical systems, the CWP is consistently keeping these standards under review and welcomes the comments of the national authorities on the application of these international standards at the national level.

The current version of the Handbook is available at <http://www.fao.org/fishery/cwp/search/en>. It is largely based on the 1990 edition, but includes regular and extensive revisions concerning CWP membership, statistical work, and changes in major fishing areas.

Work is in progress to undertake a major revision of the handbook structure, content and accessibility through a process that started in 2009, with the collaboration and the involvement of the CWP members. The release is planned to be done gradually as soon as the different sections are finalized and the content is agreed on by CWP members.

The Handbook is a web-based document with continuous and timely updates, and with internal and external links to relevant information, including FAO Technical Reports. For those issues beyond the CWP’s expertise, the Handbook follows United Nations or other authoritative sources for concepts and introduces such issues in a way suitable to the fishery and aquaculture framework. The Handbook provides not only the single authorized standards and concepts, but also to show a range of them where no agreed standards exist. All updates to the Handbook need to be approved by CWP.

The handbook contains six main components:

- Introduction, including a presentation of the data collection systems, and a brief of overview of the methodology for data collection and confidentiality issues
- General concepts applicable to all relevant statistics (mainly following FAO policy)
- Capture fisheries - specific concepts
- Aquaculture - specific concepts
- Socio-economic section
- Tools and resources

The handbook contains classification and metadata standards endorsed or adopted by CWP as standards for fisheries and aquaculture statistics. It also illustrates a range of additional methodologies and practices in use by the CWP members in the case no standards exist. The methodological standards include the methodologies and practices endorsed by the CWP or in use by the CWP members.

IV. A FEW KEY CLASSIFICATIONS/STANDARDS

Among the key and most widely used standards there are the following:

1) ASFIS, ISSCAAP

One international adopted classification used to collect capture and aquaculture production statistics, regularly utilized by FAO, is the *List of Species for Fishery Statistics Purposes (ASFIS)*³ that includes 12 771 species

³ <http://www.fao.org/fishery/collection/asfis/en>

items in the 2019 version, selected according to their interest or relation to fisheries and aquaculture. It is annually updated. Since 2000, the ASFIS list has been made available to provide external users with a standardized codification system covering most of the species items related to fishery and aquaculture activities. The list is a part of the ASFIS Reference Series which includes the authority lists, rules and guidelines for Aquatic Sciences and Fisheries Abstracts (ASFA)⁴. For each species item stored in a record, the following descriptors⁵ are available:

- *3-alpha code*
 - This is a code developed by the CWP for tabulations, questionnaires and publications in which the lack of space may impede the use of adequate descriptors in all the languages required;
 - The 3-alpha identifier is a unique code made of three letters that is widely used for the exchange of data with national correspondents and among fishery agencies;
 - It is assigned to a species item permanently (it is, thus, a permanent reference to that species item);
 - The 3-alpha code is issued only for species of commercial significance;
 - The three letters of the 3-alpha code are only sometimes related to the scientific or English name of the species items. In all other cases, the 3 letters are randomly assigned;
 - FAO is the depository agency for the 3-alpha codes: requests for information and for the allocation of a 3-alpha code to new species should be addressed to FAO.
- *ISSCAAP code*⁶
 - ISSCAAP stands for International Standard Statistical Classification for Aquatic Animals and Plants;
 - ISSCAAP classifies aquatic commercial species into 50 groups and nine divisions on the basis of their taxonomic, ecological and economic characteristics;
 - Currently, all species in the ASFIS List are classified by ISSCAAP group, with the exception of marine birds and snakes.
- *Taxonomic code*
 - The taxonomic code consists of five levels of aggregation (Main groupings, Orders, Families, Genera and Species);
 - Taxonomic information (scientific name, author(s), family, and higher taxonomic classification);
 - The taxonomic code is used by FAO for a more detailed classification of the species items and for sorting them out within each ISSCAAP group.

FAO is the depository agency for the classification and updating of ASFIS, but revision of ISSCAAP is done within the framework of CWP.

The ISSCAAP classification is widely used for fisheries and aquaculture statistical dissemination and analysis. Through it, aquatic species can be aggregated in a standard format, allowing a better and more coherent utilization of data for monitoring, management and planning purposes. For example, the ISSCAAP classification is used by FAO in disseminating its fisheries and aquaculture data in FishStatJ, online query panel tools, the Yearbook of Fisheries and Aquaculture and SOFIA publication. The version currently in use of ISSCAAP is dated 2001. A further revision of the classification has been discussed at the CWP meeting in 2019, in order to include a further breakdown of freshwater species, seaweeds and other aquatic plants to allow an improved monitoring of aquaculture species. The new version should be implemented during the next few years.

⁴ <http://www.fao.org/fishery/asfa/en>

⁵ http://www.fao.org/fishery/static/ASFIS/ASFIS_Structure.pdf

⁶ http://www.fao.org/fishery/static/Yearbook/YB2014_CD_Master/root/capture/isscaap.pdf

2) FAO MAJOR FISHING AREAS⁷

FAO Major Fishing Areas for Statistical Purposes are arbitrary areas, the boundaries of which have been determined in consultation with international fishery agencies. The rationale of the FAO Major Fishing Areas has been that the areas should, as far as possible, coincide with the areas of competence of other fishery commissions when existing. This system facilitates comparison of data, and improves the possibilities of cooperation in statistical matters in general.

The boundaries were determined in consultation with international fishery agencies on the basis of various considerations, including:

- the boundary of natural regions and the natural divisions of oceans and seas; the boundaries of adjacent statistical fisheries bodies that had already been established in intergovernmental conventions and treaties; existing national practices; national boundaries; the longitude and latitude grid system; the distribution of the aquatic fauna; and the distribution of resources and the environmental conditions within an area.

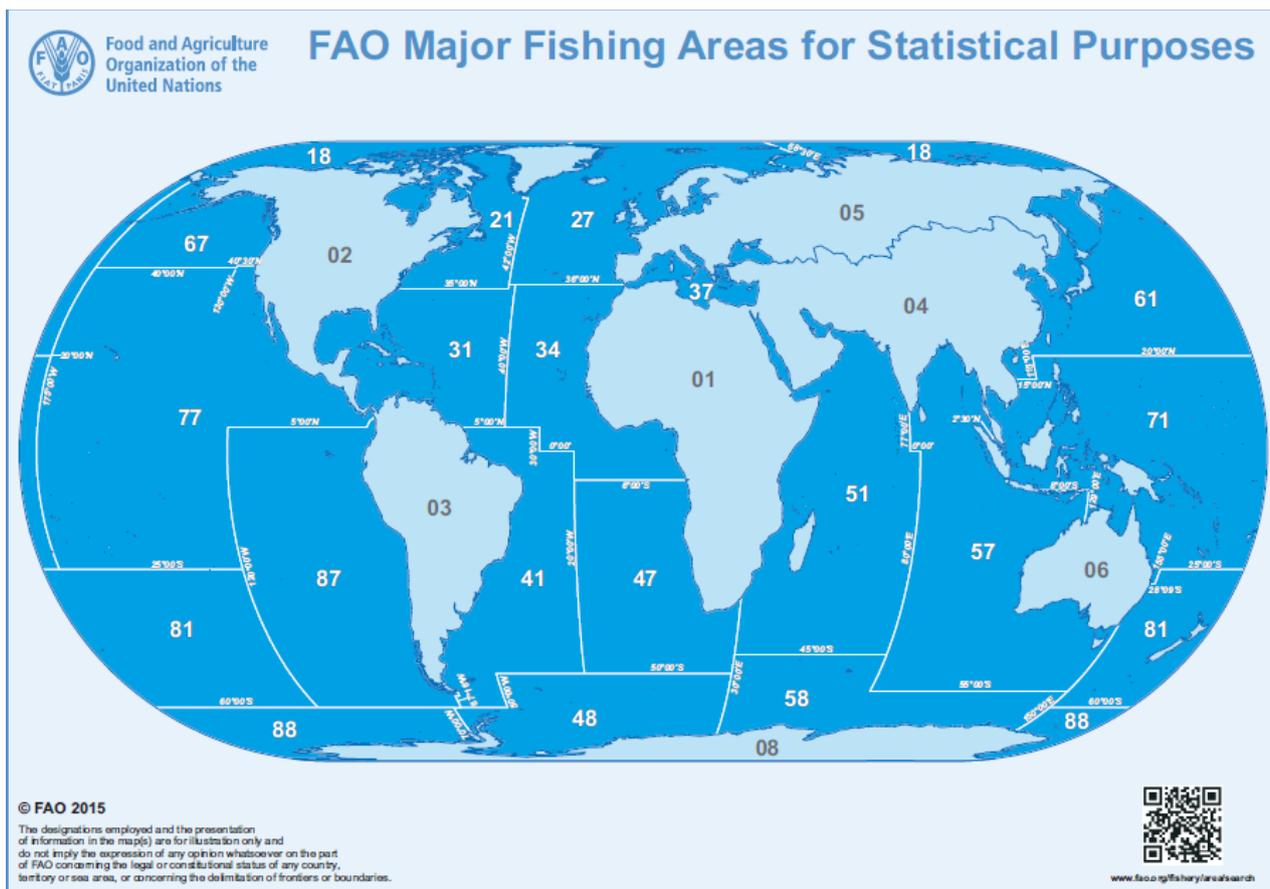
For statistical purposes, 26 major areas currently exist (Figure 1). These comprise:

- seven major inland areas covering the inland waters of the continents and
- 19 major marine areas covering the waters of the Atlantic, Indian, Pacific and Southern Oceans, with their adjacent seas.

Some FAO major marine areas are further divided into subareas, divisions and subdivisions, according to the needs of the regional fishery management bodies responsible for managing the fisheries and fishery resources of the individual FAO Major Areas. These systems of subareas, divisions and subdivisions have been successfully developed and implemented by relevant regional fishery bodies; any modifications are duly reported to CWP.

Figure 1: FAO Major Fishing Areas for Statistical Purposes

⁷ <http://www.fao.org/cwp-on-fishery-statistics/handbook/general-concepts/major-fishing-areas-general/en/> and <http://www.fao.org/cwp-on-fishery-statistics/handbook/general-concepts/fishing-areas-for-statistical-purposes/en/>



Other major standards available in the CWP Handbook are the International Standard Statistical classification of Fishery Commodities (ISSCFC) ⁸, International Standard Statistical Classification of Fishery Vessels (ISSCFV) and the International Standard Statistical Classification of Fishing Gear (ISSCFG).

V. FOCUS ON FISHERIES AND AQUACULTURE STATISTICS IN AFRICA

a. FAO Fisheries and Aquaculture Statistics for Africa

FAO FIAS collates fisheries and aquaculture statistics on production, utilization, processed and preserved production, employment and fleet. Trade data are not requested directly by FAO, but obtained through UN Comtrade. Data are collected through annual questionnaires sent around June, with a deadline by the end of August.

The quality of FAO's fishery and aquaculture statistics depends in large measure on the accuracy and reliability of the data collected nationally and provided to FAO. The response rate for Africa implies that about half of the countries provided data to the annual collection updated up to 2017 (Table 1). This share has not much varied during the last few years. As a consequence, FAO has had to estimate a major share of the data. In addition, some of the reported data presented insufficient quality and completeness.

⁸ <http://www.fao.org/3/a-bt967e.pdf>

Table 1: Africa: reply to FAO questionnaires in 2018-2019 (statistics up to the year 2017)

Global aquaculture production		Global Capture Production		Regional Capture Production		Disposition of fishery and aquaculture production		Production of preserved and processed fishery and aquaculture commodities		Fishers and fish farmers		Fishery Fleet	
S	R	S	R	S	R	S	R	S	R	S	R	S	R
54	26	55	32	22	8	48	21	37	18	54	21	49	20
	48%		58%		36%		44%		49%		39%		41%

S: Sent. R: Response

Overall, it would be important for the countries to have proper collection of basic data on catches, fishing effort, aquaculture production, trade, processed production and prices as primary data for a wide variety of statistical applications. In addition, more detailed data (fishing vessels, gear and operations; socio-economic data; etc.) from sample-based fishery surveys conducted on a regular basis represent an important source of fishery information of wide utility and scope. The transboundary nature of many fish stocks requires regional research and management that can only be effectively addressed through the analysis of complementary data sets to ensure complete coverage.

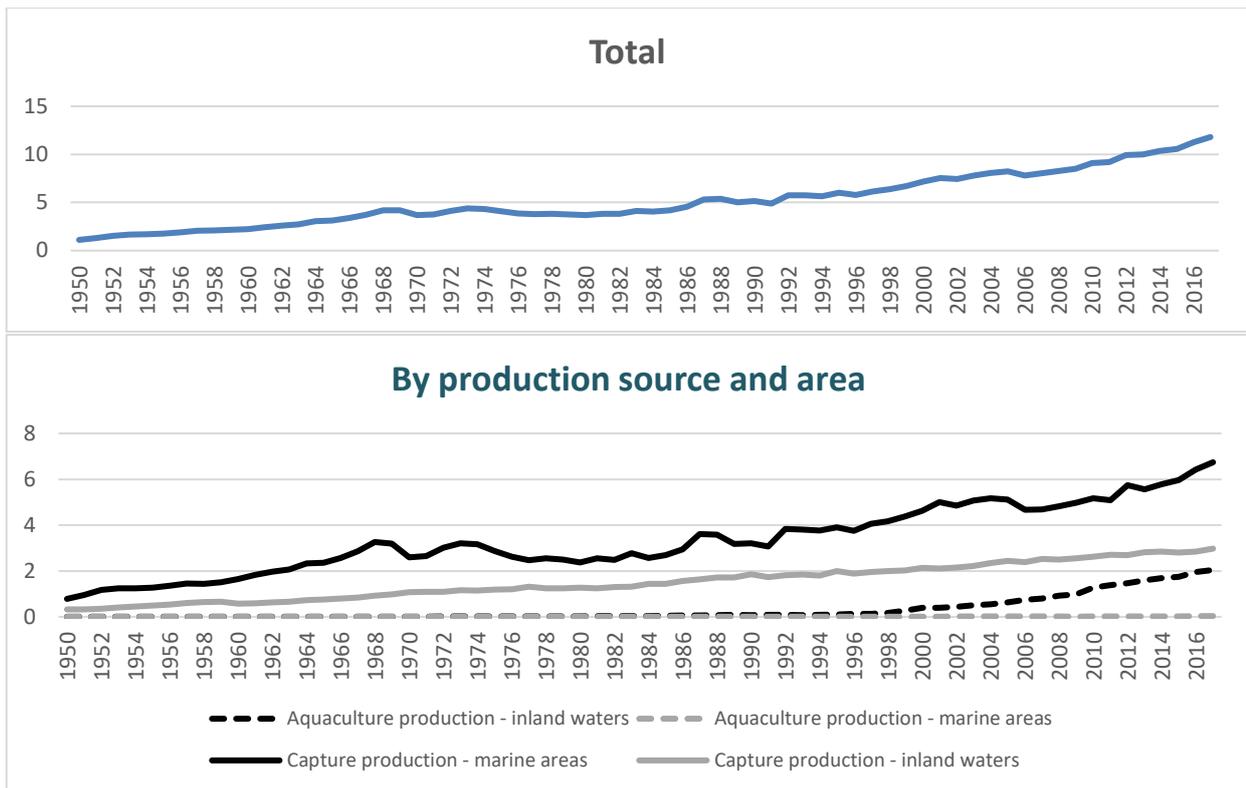
b. Overview of the fisheries and aquaculture sectors in Africa

Fish and fishery products play an important role in food security in Africa, representing a valuable source of income, livelihood and nutrients for healthy, diversified diets. Average per capita fish consumption in Africa is among the lowest in the world (10 kg vs. about-20 kg of the world level), but the contribution of fish to animal protein intake is higher than the world average (over 20 percent compared to 17 percent at world level) and this share exceeds 50 percent in many countries such as the Gambia, Ghana and Sierra Leone. Domestic supply is insufficient to meet demand and imports constitute an important share of the food fish supply.

Total capture fisheries and aquaculture production in Africa has been increasing during the past few decades reaching 11.8 million tonnes in 2017. This represented about 7 percent of world production (6 percent if including aquatic plants), with capture fisheries having a share of 11 percent (10 percent including aquatic plants) and aquaculture 3 percent (2 percent if including aquatic plants).

In 2017, total capture fisheries in Africa reached 9.7 million tonnes, with about 31 percent caught in inland waters, of particular relevance in selected African landlocked countries, and representing 25 percent of world catches in inland water. Overall marine capture fisheries production has regularly increased (Figure 2).

Figure 2. Total fishery and aquaculture production - million tonnes



However, resources are at risk due to increased over-exploitation and the use of destructive fishing methods, which have led to a general decline of marine resources and biodiversity loss. Many countries in Africa have focused more on production and revenue maximization rather than on sustainable management of resource productivity. This has caused over-exploitation of some valuable species, changes in the fish species composition and overall oscillation in catches by some countries in recent years. Together with weak monitoring capacity in many countries, these factors have increased the incidences of IUU fishing activities. The role of foreign fishing vessels, which fish in several coastal waters of the region, often under foreign access agreement, is also noteworthy.

Overall marine capture fisheries production has regularly increased. However, resources are at risk due to increased over-exploitation and the use of destructive fishing methods, which have led to a general decline of marine resources and biodiversity loss. Many countries in Africa have focused more on production and revenue maximization rather than on sustainable management of resource productivity. This has caused over-exploitation of some valuable species, changes in the fish species composition and overall oscillation in catches by some countries in recent years. Together with weak monitoring capacity in many countries, these factors have increased the incidences of IUU fishing activities. The role of foreign fishing vessels, which fish in several coastal waters of the region, often under foreign access agreement, is also noteworthy.

The oceans around Africa are divided into four FAO numbered areas. In three of these regions, according to the fish stocks monitored by FAO, the stock situation is worse than the world average and in one of them it is in line with the world average. It is therefore necessary to implement better management to let recovering stocks. However, often attempts to regulate fisheries in the region through, for example, the implementation of marine protected areas and gear restrictions, have been constrained by the lack of scientific data, inadequate infrastructure and human capacity to monitor and assess their marine resources adequately. In instances, where data exist, they often remain underutilized. This is caused by inappropriate sampling scales and methods or delayed transmission due to a lack of an efficient digital data transmission system, which ultimately hinders their use in the formulation of relevant policies for the sector. Therefore, to achieve the long-term goal of sustainable fisheries and marine conservation in the region, the focus should be directed towards restructuring the planning, collection, archiving and analysis of data to track the status of exploited resources and promote the appropriate utilization and dissemination of information for decision-making.

Also in the case inland capture fisheries is complex to assess the state of due to the following reasons: the diffuse nature of the inland fisheries sector, with numerous landing sites and methods of fishing; the large number of people involved and the seasonality of fishing effort; the subsistence nature of many small-scale inland water fisheries; the fact that catch is often consumed or traded locally without entering the formal market chain; a lack of capacity and resources to collect adequate data; activities not associated with inland water fishing can greatly influence the abundance of inland fishery resources, e.g. stocking from aquaculture, water diversion for agriculture and hydroelectric development.

Aquaculture has been introduced to most countries in Africa, though the region currently produces only 3 percent of farmed fish in the world and 2 percent if aquatic plants are included. However plans are for a further expansion of the sector. Aquaculture has already increased its share in total fisheries production in Africa from only 2 percent in 1997 to 18 percent in 2017. Being a relatively new sector, many countries experience difficulties in properly collect their aquaculture production and apply proper international standards. In addition, aquaculture statistical systems often receive inadequate importance by national authorities, especially if this sector is still small in a country. Minimum required statistical coverage areas and details are insufficient for monitoring sectoral development status and trend needed for informed decision making. For many countries the priority should be the focus on minimum required data collection and reporting as per current internationally established standards.

c. Main issues

Overall among the main issues related to fisheries and aquaculture statistics in Africa, the following can be mentioned:

- lack of human and financial resources;
- lack of capacity/knowledge in fisheries monitoring at local level;
- lack of appropriate, cost-effective data collection systems;
- gaps in data collection, processing and analysis;
- difficulty to monitor small-scale/artisanal capture fisheries due to the great number of landing sites;
- inaccurate or lacking species level identification, leading to miscalculations in production and trade and no reporting for certain groups;
- lack of reliable, adequate and accurate information systems;
- lack of harmonized data adopted at national level, which also affect data sharing at regional and international level;
- lack or missing information or utilization on stock assessment;
- not regular collection of socio economic data (such as fleet and employment), often done through national frame surveys but not collated and made available, or not shared amongst departments.

Some of the above points are analyzed in more detail in the following:

Lack of human and financial resources

Underreporting of catches is commonplace in many of the countries, particularly for small-scale or artisanal fisheries in coastal areas – due to limited resources to monitor catches at landing sites – but which often account for the majority of catches from coastal waters. There are also fundamental issues with the quality and coverage of reported catches.

Institutional issues in data collection

For some countries there may also be limited coordination between national institutions responsible for collecting fisheries data; in particular for fisheries that combine data collection activities by multiple agencies (for example Ministry of Fisheries and fisheries research institutions). As a result, duplication of efforts in data collection, inconsistencies in similar data collected by different agencies, or gaps in the coverage of data collected, can often occur.

In addition, the legislative or regulatory frameworks in place for monitoring of fisheries may be lacking for some countries or for sectors within the national fisheries framework (e.g., recreational and sports fisheries) leading to underreporting of retained catches or gaps in data collection.

Lack of capacity/knowledge in fisheries monitoring at local level

Species misidentification by enumerators can also occur, particularly in the case of juvenile fish, or species that are processed onboard prior to unloading. Alternatively, catches may be reported as species aggregates (e.g., sharks nei, tunas nei, marine fish nei) due to issues of identification, or commercial categories by fish auctions, which compromises the accuracy of the data available when estimating catches by species.

Lack of adequate, cost-effective data collection systems

In many countries there are often technical or financial constraints that limit existing data collection mechanisms to fully report fisheries data according to national and international requirements (e.g. catches by species, gear, and fishing area).

Vessel censuses may be outdated (or non-existent) or there might be no port sampling in place. Standardized data collection forms may also be lacking, in addition to a data entry interface or database and dissemination tools required for the processing and reporting catches.

Nevertheless in recent years a number of countries have made significant progress implementing electronic data collection in the field (e.g., enumerators using mobile devices, or electronic logbooks on vessels), which offers the potential to significantly improve the quality and timeliness of data reporting.

Definition of artisanal fisheries

The definition of artisanal fisheries is highly problematic when categorising the large array of subsistence, semi-industrial and industrial fisheries that operate within Exclusive Economic Zones (EEZ), particularly when applying standard definitions based on the length of vessel (e.g., <24 m LOA) and area of operation (e.g., within/outside the EEZ).

For example, artisanal fisheries are variously described as “coastal”, “traditional”, “artisanal commercial”, “small-scale” and “commercial line fisheries”. Differences in terminology can easily lead to inconsistencies in the data reported under artisanal fisheries, or in extreme cases, no data reported at all depending on the definition applied.

VI. FAO CAPACITY BUILDING IN FISHERY AND AQUACULTURE STATISTICS

Capacity development in data collection and fisheries and aquaculture statistics has always been a high priority for FAO, regional fisheries bodies and national fisheries authorities. Technical assistance at the national and regional level is a significant component of the work programme of FAO’s technical units responsible for fishery statistical development, and involves both normative and field programme activities. To help meeting national needs for basic fishery data, FAO has been assisting several countries in Africa in upgrading their data collection, processing and reporting capabilities in fisheries (mainly) and aquaculture statistics. Overall it has been noted that often there is still lack in understanding of the basics of routine data collection and its related statistics, especially where small-scale fisheries are concerned. FAO continues to support projects to improve national data collection systems, including sampling schemes based on sound statistical analysis, coverage of fisheries subsectors not sampled before, and standardization of sampling at landing sites. To carry out the capacity building, FAO has created several tools as:

An **international training course⁹ for fisheries statistics and data collection**. It was developed to illustrate sampling methods for improving routine data collection, which can provide the desired precision of estimates at the lowest possible cost and yet possessing a higher degree of accuracy. The course has been published (in English and in French) and it is established as a permanent course in two African institutions (i.e the Legon University in Accra, Ghana, and the Institut Sous-régional de Statistique et d’Economie Appliquée in Yaounde, Cameroon). The course provides guidance on the design of the national sample based data collection system and introduces the statistical procedures of the OPEN ARTFISH.

OpenARTFISH is based on statistical sampling methodologies for small scale fisheries developed by Stamatopoulos (2002) and de Graaf et al. (2014). The first version of OpenARTFISH¹⁰ was developed in 2011 for artisanal fisheries in Burundi, during the Lake Tanganyika Integrated Regional Development Programme. The main objective is to facilitate the implementation of cost-effective and sustainable routine data collection, storage and analysis of data, using the appropriate statistical procedures. In 2016, FAO made available Open ARTFISH, a software based on an MsAccess database. In 2017, FAO published an installation guide for the OpenARTFISH¹¹ software and for a mobile phone application based on the Open Data Kit (ODK). The application aims to transfer data from remote regions to the centralized database. A tailored installation of OpenARTFISH linked to the application was carried out in several countries, mainly under a project in the Fishery Committee of the West Central Gulf of Guinea (FCWC) e.g. Benin, Côte d’Ivoire, Ghana, Nigeria, Togo, and in the South Western Indian Ocean (Comoros, Madagascar, United Republic of Tanzania). The toolkit’s primary objective is to facilitate the implementation of cost-effective and sustainable routine data collection, storage and analysis of data, using the appropriate statistical procedures. The manual provides detailed guidance on the use of the OPEN ARTFISH database and the installation and use of the ODK application on Android mobile phone systems.

The Scalable Software Framework (SSFK is the current provisional acronym) is a FIAS initiative to create a new platform for simple and easy deployment and rolling-out of National Fisheries Statistics and Management Information System. The deployment of SSFK in countries requiring FAO assistance, will support the integration and harmonization of scattered sources of fishery data including censuses, administrative records and sample based statistics survey systems. SSFK also intends to facilitate harmonization in the multiple reporting obligations to international organizations which countries are facing. The objective of the platform is to provide technical solutions to manage administrative data (vessel registries, fisher licences), exploitation data (landing, catch, effort), biological and socio-economic data. The platform is a FAO corporate tool and long-term maintenance will be secured to ensure support after the end of implementation projects. The platform development is still in the final phases of development. The system is built on independent components based on standards (The United Nations Centre for Trade Facilitation and Electronic Business -UN/CEFACT-, Global Vessel Record; standard classifications such as ASFIS) to collect, store, process and disseminate fisheries data (vessel census, landing data, logbook, observer data and more to come with processing plants data, export/import from The Automated System for Customs Data (Asycuda) etc.). A statistical engine based on R offers the capacity to process collected data (simple aggregation or more complex algorithms such as the ARTFISH methodology and to produce reports; and a reporting facility provides lists or reports to the country, including standard reports to Regional Fisheries Management Organizations (RFMOs) and FAO. The system is web based, can be deployed on the Cloud or national servers, and can be interfaced to mobile applications (developed through smartForms). The system itself can be created as a mobile application. It embeds strict data access and sharing policies (access to the system by roles). Work is proceeding to develop and secure the model cost for long term sustainability of the system.

“**SmartForms: Support to data collection programs**” is a mobile App to collect and review fishery and observer data. The first round of development of the app is nearly completed and it is going to be released as a FAO App within the context of the mobile data collection initiative. The objective is to release a system for the dynamic collection of fishery observers’ data on-board fishing vessels or at landing sites by establishing a robust infrastructure to collect, validate, amend, archive and share data. SmartForms is a platform that

⁹ de Graaf, G.J., Nunoo, F., Ofori Danson, P., Wiafe, G., Lamptey, E. & Bannerman, P. 2015. International training course in fisheries statistics and data collection. FAO Fisheries and Aquaculture Circular No. 1091. Rome, FAO. 134 pp.

¹⁰ <http://www.fao.org/fishery/statistics/software/open-artfish/en>

¹¹ <http://www.fao.org/3/a-i7680e.pdf>

combines: a mobile App to collect and review fishery data, a Forms builder for mobile App customization, and a Hub for data management. The Forms are: i) Harmonized - based on CWP and other FAO endorsed standards, ii) Autonomous - every organization securely collects fishery data, iii) Replicable - builds on specialized data elements, and iv) Mobile-first - for field, landing sites and on-deck data collection. An open source version is also expected to serve a community of interest. The deliverables include data input forms suitable for use on a tablet or mobile phone that satisfies the requirements of the regional fisheries organizations and other partner organizations in initiatives on sustainable fisheries management and biodiversity conservation.

The contributions of fisheries to achieving the Sustainable Development Goals

The 2030 Agenda, the Sustainable Development Goals (SDGs) and related ongoing international and national processes are highly relevant to the fisheries and aquaculture sectors, including fish processing and trade. In addition to the above mentioned SDG 14, these sectors are also relevant to nine other SDGs:

- **Goal 1:** Eradication of poverty. Responsible fisheries and fisheries value chains support the livelihoods of the poor and the vulnerable with inclusive access to fisheries and related economic resources.
- **Goal 2:** Zero hunger. In terms of food utilization, the benefits of fish in the human diet are well established.
- **Goal 3:** Good health and well-being. Fisheries contribute to health and well-being not only through improved nutrition and livelihoods, but also in the biocontrol of disease vectors.
- **Goal 5:** Gender equality. Fisheries empower women and contribute to gender equity; however, their role has largely been unrecognized.
- **Goal 6:** Clean water and sanitation. Healthy inland aquatic ecosystems are indicators of good water quality, with benefits both in terms of productive fishery resources and in terms of municipal drinking-water that requires minimal treatment.
- **Goal 8:** Decent work and economic growth. The capture fisheries and aquaculture primary sector provided work for almost 60 million people globally in 2017, with about 10 percent in Africa.
- **Goal 12:** Responsible consumption and production. Many fisheries are increasingly addressing issues of waste through more complete utilization and reductions in post-harvest losses.
- **Goal 13:** Climate action.
- **Goal 15:** Life on land. Freshwater ecosystems, of which inland fisheries are very much a part, are a rich source of biodiversity

FAO is currently the custodian agency responsible for monitoring and reporting on four of the indicators related to SDG14, which aims to “conserve and sustainably use the oceans, seas and marine resources for sustainable development”.

SDG Indicator 14.4.1 measures the proportion of fish stocks within biologically sustainable levels. A fish stock of which abundance is at or greater than the level, that can produce the maximum sustainable yield (MSY) is classified as biologically sustainable. In contrast, when abundance falls below the MSY level, the stock is considered biologically unsustainable. To calculate this proportion, a reference list of stocks needs to be established and status of each stock is assessed with agreed methodologies. In ideal circumstances, a stock assessment would need to be conducted to diagnose the current status of all stocks in the reference list. Stock assessment requires catch statistic data as well as fishing effort data, life history parameters of fish stocks and technical parameters of fishing vessels, which in many cases are not available. In addition to this high data demand, stock assessment requires numerical modelling skills. As a result, today only about 25 percent of the global catch come from numerically assessed stocks. How to assess the large number of unassessed stocks is a highly challenging task, but a task that is needed to significantly increase the volume of reported stocks. For the implementation of SDG Indicator 14.4.1, FAO has made a huge effort to maintain current methodologies for assessed stocks while developing new methods that are applicable to data-limited and capacity poor fisheries. FAO has invested a great deal of human and financial resources over the last decade in developing new methods in pursuit of increased coverage of its assessment and monitoring of global fish stock status. Although a universally applicable, reliable method has not appeared yet, cumulative progress and

achievements have led to the stage that a potential method is emerging. FAO is now collaborating with external institutions to produce such a new method, which should be ready for test by 2020. In addition FAO has developed an e-learning course aimed at providing guidelines to stakeholders for the reporting of SDG14.4.1, recently released¹².

Recently, FAO has designed and established an internationally recognized methodology for **SDG Indicator 14.7.1**, which monitors the economic contribution of marine resources to national economies through fisheries by calculating sustainable fisheries as a percentage of gross domestic product (GDP). The methodology is built on international standards, namely: GDP, the value added of fisheries and the biological sustainability of fish stocks. All of these inputs are utilized by international agencies, policymakers and public bodies, amongst others, for informing decision making and planning. An indicator to monitor the economic contribution of sustainable fisheries may provide a relevant picture of the importance of fisheries in national economies, ensuring a more balanced allocation of resources that may benefit the sector. Given the SDG global nature, SDG Indicator 14.7.1 was developed to be applicable to as many countries as possible, while keeping to a minimum any additional reporting requirements for countries by using internationally accepted and already available data for the calculation.

SDG Indicator 14.6.1 looks to measure the progress by countries in the degree of implementation of international instruments aiming to combat IUU fishing based upon responses by Members to the questionnaire for monitoring the implementation of the FAO Code of Conduct for Responsible Fisheries (CCRF) and related international instruments (CCRF questionnaire). The indicator is comprised of five variables, each of which has been attributed a weighting¹³ depending on its importance in eliminating IUU fishing, while taking into consideration areas of overlap between certain instruments. The indicator looks to assess the level of implementation for each variable with regard to policy, legislation, institutional framework and operations and procedures. The indicator scores are available every two years, after each edition of the CCRF questionnaire.

The **SDG Indicator 14.b.1** – progress by countries in the degree of application of a legal, regulatory, policy and institutional framework – is assessed based on three questions on the implementation of the CCRF questionnaire, filled in by Members every two years. These questions are proxies for capturing efforts of promoting and facilitating access rights for small-scale fishers and they relate to: (1) the existence of laws, regulations, policies, plans or strategies that specifically target or address the small-scale fisheries sector; (2) any ongoing specific initiatives to implement the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines); (3) the existence of mechanisms through which small-scale fishers and fish workers contribute to decision-making processes. Even if SDG14.b only relates to marine resources, the target and its indicator should equally guide action in relation to small-scale inland fisheries, which play a similar role in terms of food and nutrition security and poverty eradication. FAO is assisting its Members and other partners in better understanding and reporting in relation to SDG14.b and an e-learning course is available online in six languages¹⁴.

Proper collection systems are essential to monitor their sectors and produce data for reporting on SDGs. Overall, the SDG process provides a unique opportunity and useful framework to harmonize fisheries and aquaculture related reporting processes at all levels. FAO made substantial progress to improve i) monitoring and reporting tools and ii) accessibility of key information related to fisheries and aquaculture in cooperation with a multitude of stakeholders. Various capacity building initiatives have been carried out by FAO and partners to enhance countries' capacities to collect and analyse fishery-related data for evidence-based decision making.

¹² <https://elearning.fao.org/course/view.php?id=502>

¹³ Adherence and implementation of the 1982 United Nations Convention on the Law of the Sea (10 percent weight); adherence and implementation of the 1995 United Nations Fish Stocks Agreement (10 percent weight); development and implementation of a national plan of action to combat IUU fishing in line with the IPOA-IUU (30 percent weight); adherence and implementation of the 2009 FAO Agreement on Port State Measures (30 percent weight); and implementation of Flag State Responsibilities in the context of the 1993 FAO Compliance Agreement and FAO Voluntary Guidelines for Flag State Performance (20 percent weight).

¹⁴ <https://elearning.fao.org/course/view.php?id=348>

VII. Questions and invitations to AFCAS members

AFCAS members are requested to express their views and recommendations to FAO on the following:

- Which are the main problems experienced in collecting statistics on fisheries and aquaculture and in reporting on SDGs and how FAO can provide support?
- How to better integrate aspects related to fishery and aquaculture more adequately in agriculture statistics work. What are most effective ways to do that?
- How to strengthen cooperation at country level between national fishery/aquaculture-related correspondents/focal points, agricultural statistics offices and National Statistics Offices to sustain data availability on fishery and aquaculture related data and their systematic integration into national statistics and SDGs?