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FISHERY COMMITTEE FOR THE EASTERN CENTRAL ATLANTIC

Scientific Sub-Committee

Seventh Session

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STATISTICS: THE CATCH TRENDS, THE SOCIO-ECONOMIC STUDY, AND THE PAN-AFRICAN STRATEGY

SUMMARY

At present, the CECAF capture database includes data by statistical divisions for 44 years, from 1970 to 2013. Total catches have been decreasing after the maximum ever reached in 2010. However, a pattern of catch cycles along a general upward trend can be observed on the longer period since 1970. Share of total catch by Distant Waters Fishing Nations (*DWFNs) has been falling from 57.5 percent in 1977 to 16.7 percent in 2013, making available more fish for local populations. Catches of small pelagics have been decreasing in recent years but still represent over 60 percent of total catches. Valuable species such as flatfishes, shrimps and cephalopods have instead significantly increased their catches. Data reporting from countries fishing in the Fishery Committee for the Eastern Central Atlantic* (*CECAF) area should improve to provide updated and reliable information on catch trends.*

*"*The value of African fisheries*" study estimated that in 2011 the fisheries sector as a whole contributed more than US$24 billion, 1.26 percent, to the GDP of all African countries. The fisheries sector employs 12.3 million people as full-time fishers or full-time and part-time processors, representing 2.1 percent of Africa's population of between 15 and 64 years old.*

*The "*A Pan-African Strategy on the improvement of fisheries and aquaculture data collection, analysis and dissemination*", which set up guidelines for the development of sound data collection systems, was endorsed by African Ministers of fisheries and aquaculture CAMFA II and is currently implemented in a series of projects in African countries.*

THE CATCH TRENDS

1. The FAO Fisheries and Aquaculture Statistics and Information Service (FIPS) manages the CECAF capture database on behalf of the Committee. The database is updated annually and presently includes data for 44 years, from 1970 to 2013. Data are disseminated through the software FishStat[1] and are also available on line at the FAO web site[2]. Catch statistics should be reported to FAO by all countries fishing in the Eastern Central Atlantic area, whether they are bordering the region or if they are Distant Waters Fishing Nations (DWFNs).

2. Total capture production in the CECAF area (corresponding to the FAO Fishing Area 34–Eastern Central Atlantic) has been decreasing after the maximum ever reached in 2010 at 4.5 million tonnes. On the longer period of forty-four years between 1970 and 2013, a general upward trend is clearly visible (Figure 1).

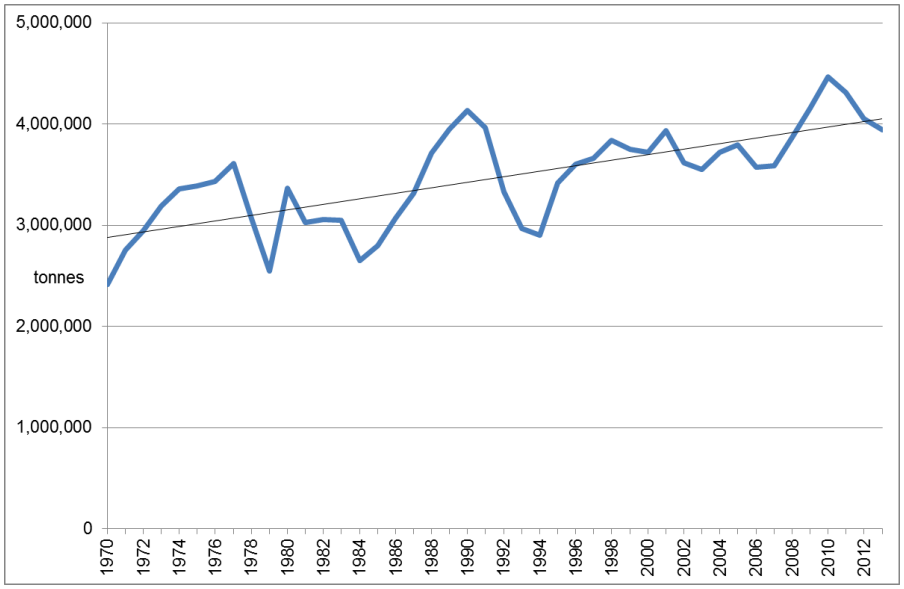

Figure 1. Total capture production in the CECAF area between 1970 and 2013

3. A pattern of catch cycles, with time periods ranging from 6 to 13 years (1970-1979; 1979-1984; 1984-1994; 1994-2006; 2007-) can be also noted (Figure 2). In each cycle total catch increases, reaches a peak and then decreases. Final minimum point of each cycle it has been so far always greater than the starting point. When total capture production for 2014 is available, it will be possible to observe if the decreasing phase of the cycle initiated in 2007 is still on or increasing catches concluded that cycle and started a new one.

[1] http://www.fao.org/fishery/statistics/software/fishstatj/en
[2] http://www.fao.org/fishery/topic/16140/en

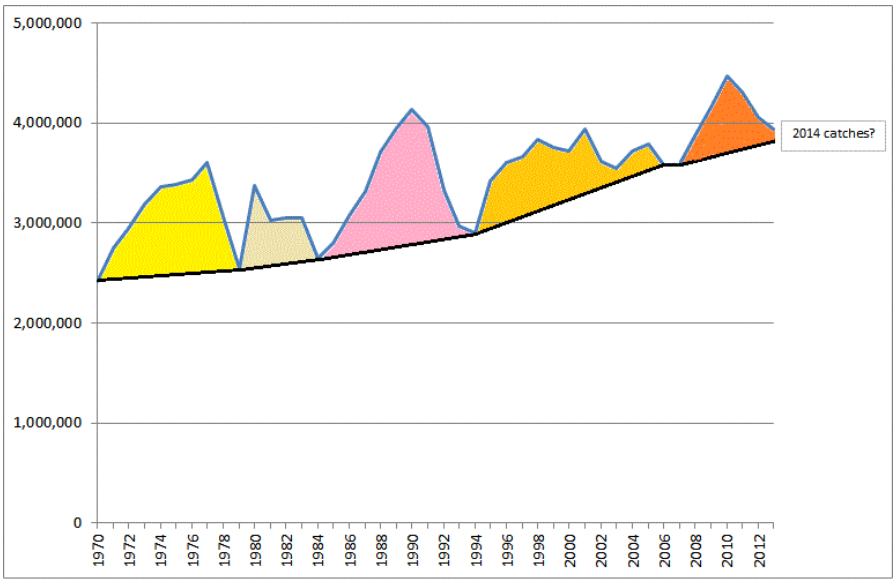

Figure 2. Pattern of cycles in CECAF total capture production

Capture production by country

4. Table 1 lists total catch by country, separated by those bordering[3] the CECAF area and the DWFNs, in the last four years (2010-2013) for which data are available. Countries that in the period exceeded an average of 150,000 tonnes per year were Morocco, Senegal, Nigeria, Mauritania, Ghana and Sierra Leone among the bordering countries; Belize and Russia Federation for the DWFNs (Table 1).

Table 1. Total capture production by country in the CECAF area in 2010-2013

Country	2010 (t)	2011 (t)	2012 (t)	2013 (t)	Average per year 2010-13 (t)
Bordering countries					
Benin	9,441	7,743	12,158	16,256	11,400
Cabo Verde	19,713	22,130	20,189	23,646	21,420
Cameroon	40,721	45,826	61,658	78,455	56,665
Congo, Dem. Rep. of the	34,686	39,843	43,184	37,127	38,710
Congo, Republic of	4,491	4,250	4,000	3,818	4,140
Côte d'Ivoire	67,508	65,305	71,976	71,110	68,975
Equatorial Guinea	6,376	6,115	9,758	7,600	7,462
Gabon	22,292	25,822	23,000	23,000	23,529
Gambia	41,970	36,700	31,091	39,155	37,229
Ghana	280,259	275,558	284,939	207,912	262,167
Guinea	96,657	104,500	112,233	105,000	104,598
Guinea-Bissau	6,434	6,399	6,400	6,400	6,408
Liberia	7,300	7,300	7,300	7,300	7,300
Mauritania	261,238	357,011	422,709	277,624	329,646
Morocco	1,095,101	923,250	1,121,493	1,203,169	1,085,753
Nigeria	323,599	334,205	356,745	381,856	349,101
Portugal	11,940	11,159	8,652	6,027	9,445
Sao Tome and Principe	4,827	5,100	5,400	5,750	5,269
Senegal	375,604	393,726	426,685	436,313	408,082
Sierra Leone	185,822	190,400	189,660	186,000	187,971
Spain	135,549	148,996	141,321	144,594	142,615
Togo	22,535	19,122	14,320	15,015	17,748
Sub-total bordering countries	3,054,063	3,030,460	3,374,871	3,283,127	3,185,631

[3]Also Portugal and Spain, which have a fraction of their territory in the CECAF area, have been considered as bordering countries.

DWFNs					
Belize	391,131	269,279	144,889	17,000	205,575
China	18,777	42,587	49,355	3,843	28,641
Comoros	52,977	27,766	1,991	-	27,578
Curaçao (until 2010 under Netherlands Antill)es)	17,173	20,032	22,723	23,964	20,973
France	39,610	40,993	38,081	40,740	39,856
Georgia	5,544	-	-	-	5,544
Germany	20,395	35,246	14,565	-	23,402
Greece	1,270	1,090	1,136	905	1,100
Guatemala	7,223	5,962	6,905	9,108	7,300
Ireland	33,300	7,931	...	-	20,616
Italy	2,359	2,452	1,014	-	1,942
Japan	14,163	11,275	11,402	11,982	12,206
Korea, Republic of	29,242	34,066	40,388	36,258	34,989
Latvia	87,238	89,668	34,904	52,820	66,158
Lithuania	116,850	113,651	43,769	61,880	84,038
Netherlands	137,626	121,014	37,463	13,806	77,477
Netherlands Antilles	17,173	...	...	...	17,173
Other nei	2,066	2,046	2,720	16,512	5,836
Panama	29,342	31,109	18,100	21,738	25,072
Philippines	49	-	-	-	49
Poland	14,604	60,174	29,179	54,138	39,524
Russian Federation	206,306	204,873	140,336	213,821	191,334
Saint Kitts and Nevis	20,706	29,261	19,703	15,900	21,393
Saint Vincent/Grenadines	63,007	73,288	8,056	37,784	45,534
Taiwan Province of China	7,379	9,157	5,946	5,184	6,917
Ukraine	70,465	33,332	4,575	22,562	32,734
United Kingdom	22,552	8,447	4,758	32	8,947
Vanuatu	255	6,580	165	122	1,781
Sub-total DWFNs	1,411,609	1,281,279	682,123	660,099	1,008,778
Total CECAF area	**4,465,672**	**4,311,739**	**4,056,994**	**3,943,226**	**4,194,408**

5. The share of catches by DWFNs on total capture production has been falling from 57.5 percent in 1977 to 16.7 percent in 2013 (Figure 3). This is a very positive trend as it means that coastal countries have been progressively exploiting themselves the fishery resources in their Exclusive Economic Zone (EEZ) rather than selling licenses through fisheries agreements with DWFNs.

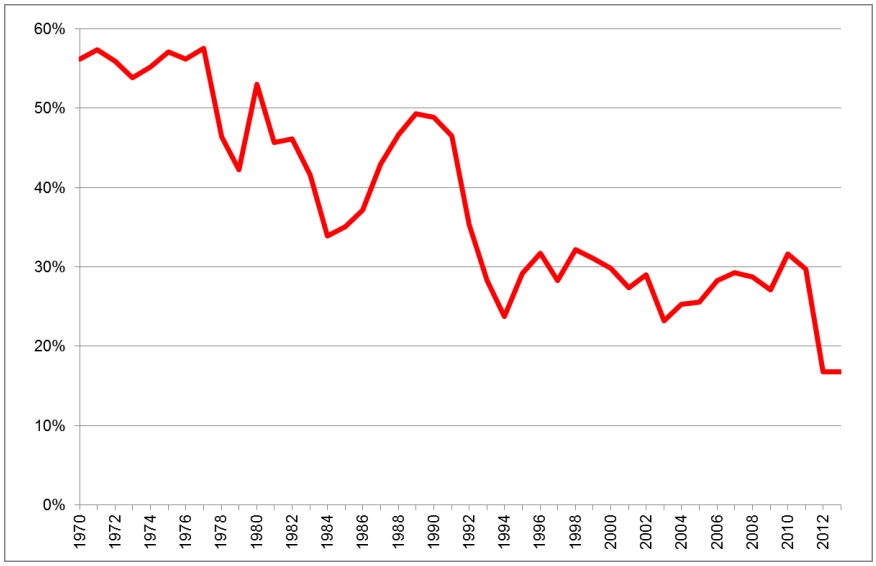

Figure 3. Share by DWFNs on total capture production in the CECAF area

6. Mauritania is one of the countries which significantly increased its share of national catches in recent years. Figure 4 shows catches by DWFNs and Mauritanian vessels in the Mauritanian EZZ since 2000 as recorded by the *Institut Mauritanien de Recherches Océanographiques et des Pêches* (IMROP). A very detailed description of recent developments percentin the relationships between Mauritania and DWFNs can be found in Corten, 2014.

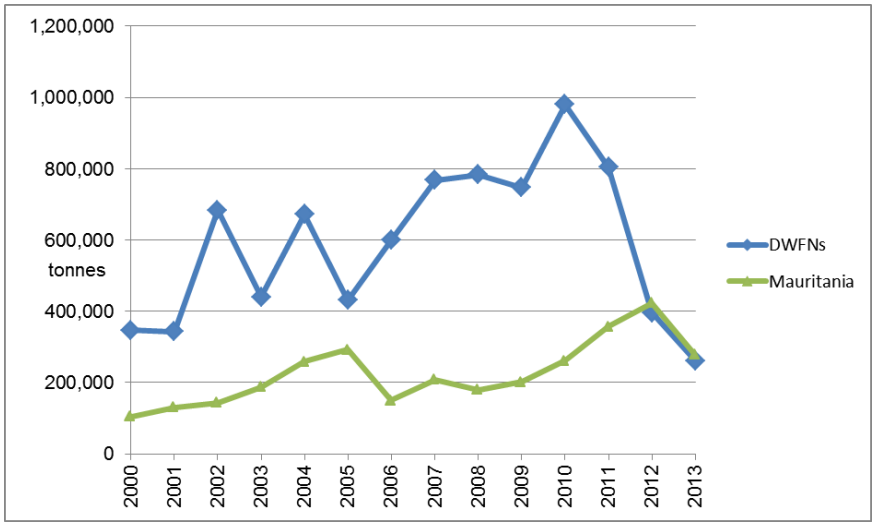

Figure 4. Catches by DWFNs and Mauritanian vessels in the Mauritanian EZZ

Capture production by species

7. Figures by the ISSCAAP groups of species shows that the negative trend in the total CECAF capture production since 2010 was mostly due to a decrease of catches for the group "35-Herrings, sardines, anchovies" (Table 2), mostly represented in the area by *Sardina pilchardus*, *Sardinella* spp and *Ethmalosa fimbriata* (Bonga shad). Major changes in catches of this group always strongly affected the trend in the whole area, as on average it represents 43 percent of the total catches, with peaks over 50 percent (Figure 5).

Table 2. Total capture production by ISSCAAP species group in the last four years

ISSCAAP code	ISSCAAP name	2010 (t)	2011 (t)	2012 (t)	2013 (t)	Average per year 2010-13 (t)
12	Tilapias and other cichlids	2,521	3,049	3,197	2,479	2,812
22	River eels	9	...	0	0	3
24	Shads	14,870	14,773	14,264	13,145	14,263
31	Flounders, halibuts, soles	30,224	32,503	37,374	41,224	35,331
32	Cods, hakes, haddocks	15,673	16,881	15,514	14,997	15,766
33	Miscellaneous coastal fishes	367,053	350,664	376,422	350,339	361,120
34	Miscellaneous demersal fishes	53,482	58,530	59,167	69,783	60,241
35	Herrings, sardines, anchovies	2,227,071	2,072,998	2,060,789	1,857,322	2,054,545
36	Tunas, bonitos, billfishes	366,780	406,076	408,456	367,151	387,116
37	Miscellaneous pelagic fishes	924,392	834,608	613,671	676,650	762,330
38	Sharks, rays, chimaeras	84,091	78,595	80,526	93,918	84,283
39	Marine fishes not identified	205,571	256,743	200,101	224,478	221,723
42	Crabs, sea-spiders	7,013	6,644	6,036	6,860	6,638
43	Lobsters, spiny-rock lobsters	6,589	5,919	6,381	5,834	6,181
45	Shrimps, prawns	47,366	55,032	57,816	63,859	56,018
47	Miscellaneous marine crustaceans	297	339	539	397	393
52	Abalones, winkles, conchs	17,634	13,952	13,935	15,873	15,349

53	Oysters	242	455	193	2,990	970
56	Clams, cockles, arkshells	640	601	589	155	496
57	Squids, cuttlefishes, octopuses	93,146	102,171	99,959	134,527	107,451
58	Miscellaneous marine molluscs	990	1,054	2,058	1,242	1,336
72	Turtles	4	4	3	3	4
76	Sea-urchins and other echinoderms	14	90	4	-	36
77	Miscellaneous aquatic invertebrates	-	58	0	0	19
	Total CECAF area	**4,465,672**	**4,311,739**	**4,056,994**	**3,943,226**	**4,194,408**

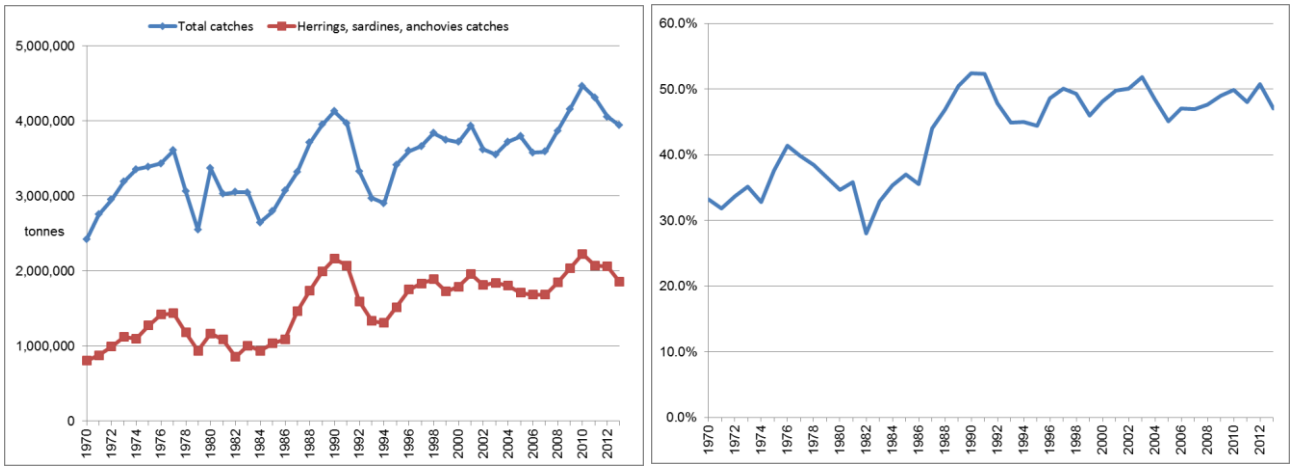

Figure 5. Catch trend of the "Herrings, sardines, anchovies" species group (left) and its share on total catches (right)

8. Catches of other important small pelagic species belonging to ISSCAAP group 37 such as *Scomber japonicus* (Chub mackerel) and *Trachurus* spp. (Jack and horse mackerels) also reduced recently, in particular in the year 2012.

9. After two consecutive years at over 405,000 tonnes, tuna total catches in 2013 returned to the 2010 level around 365,000 tonnes, with all major species in this group (skipjack, yellowfin and bigeye) decreasing in comparison to the two previous years.

10. Valuable species groups like flatfishes (group 31), shrimps (45) and cephalopods have instead shown positive trends with their catches increasing of a range between 35 and 45 percent in the 2010-2013 period.

11. As mentioned above, in 2012 and 2013 catches by DWFNs in the CECAF area were about 16.7 percent of the total catches, a very low level in comparison to previous years. This percent was largely exceeded for the "Miscellaneous pelagic fishes" (mostly catches of *Scomber japonicus* and *Trachurus* spp by the Russian Fed. in the division "1.3-Sahara coastal") and tunas species groups of which foreign fleets caught respectively the 41 and 34 percent in the last two years.

Capture production by statistical divisions

12. Differently from the FAO global capture production database, the CECAF database includes also data disaggregated by statistical divisions. Standards of data reporting for the CECAF area were established in the 1970s (Ansa-Emmin and Levi, 1975) and, for

statistical purposes, the CECAF area was split into four subareas, further sub-divided into twelve divisions (Figure 6 and Table 3). Tuna catches are not allocated according to CECAF statistical divisions and are grouped together into a division named "0.0-Tunas". Two other divisions, namely "1.9-Northern coastal, not known" and "9.0-Not known", contain catches for which the exact statistical division is not known.

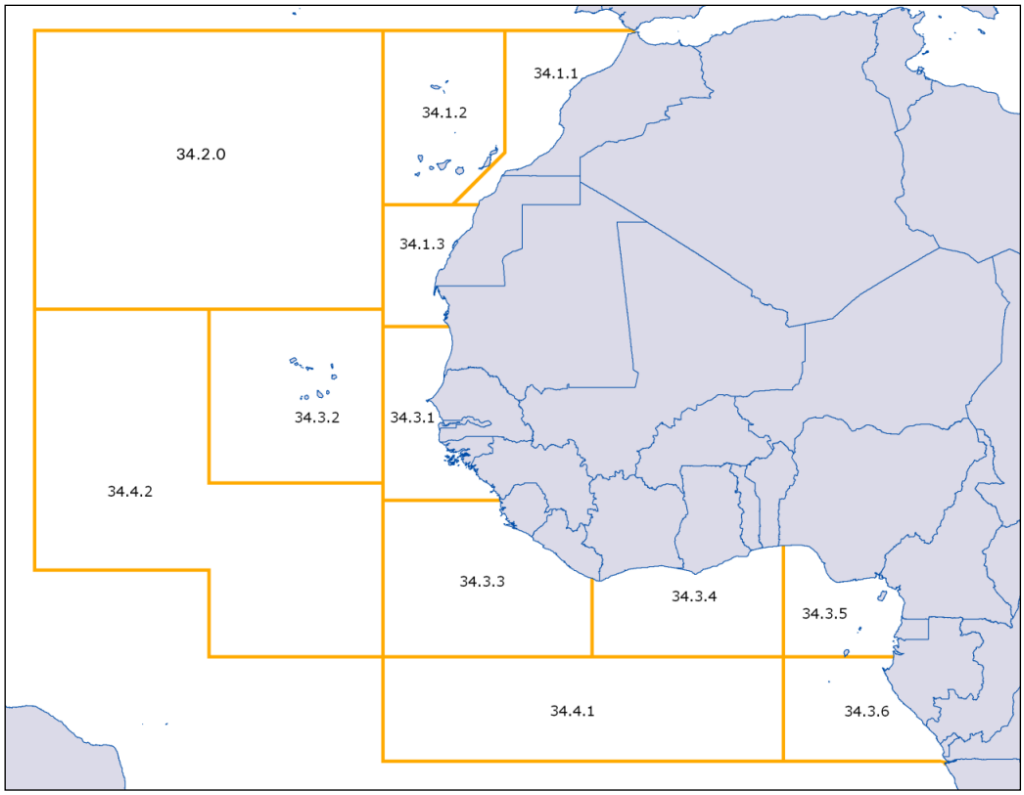

Figure 6. The CECAF area and its statistical divisions

Table 3. Recent total capture production by CECAF statistical division in the last four years

Division code	Division name	2010 (t)	2011 (t)	2012 (t)	2013 (t)	Average share on total CECAF
34.1.1	Morocco coastal	1,097,566	924,665	1,121,495	1,219,035	26.0%
34.1.2	Canaries/Madeira insular	6,448	7,084	8,056	8,840	0.2%
34.1.3	Sahara coastal	932,474	989,724	580,245	598,904	18.5%
34.1.9	Northern coastal, not known	1,278	1,352	1,137	905	0.0%
34.2.0	Northern oceanic	14,524	14,699	12,259	14,710	0.3%
34.3.1	Cape Verde coastal	1,102,228	1,015,232	921,845	754,207	22.6%
34.3.2	Cape Verde insular	12,471	10,843	13,541	16,094	0.3%
34.3.3	Sherbro	193,391	190,455	188,857	191,478	4.6%
34.3.4	Western Gulf of Guinea	270,527	264,520	276,820	223,600	6.2%
34.3.5	Central Gulf of Guinea	371,109	387,265	427,231	468,899	9.9%
34.3.6	Southern Gulf of Guinea	61,511	70,055	70,040	67,859	1.6%
34.4.1	Southwest Gulf of Guinea	1,087	1,413	2,276	1,297	0.0%
34.4.2	Southwest oceanic	3,790	5,763	7,071	6,741	0.1%
34.9.0	Not known (CECAF area)	30,488	22,593	17,665	3,506	0.4%
34.0.0	Tunas (CECAF area)	366,780	406,076	408,456	367,151	9.2%
	Total CECAF area	**4,465,672**	**4,311,739**	**4,056,994**	**3,943,226**	

13. Boundaries of CECAF divisions were mainly set according to geographical coordinates rather than matching national borders between coastal countries. The most relevant case is that of Mauritania where the boundary between the divisions 1.3 and 3.1 is approximately

in the middle of the Mauritanian coastline, with the consequence that catch collection and reporting according to the present statistical divisions is cumbersome for both Mauritania and the DWFNs fishing in its EEZ.

14. About 45 percent of catches in the CECAF area comes from the northern part, where the two divisions "1.1-Morocco coastal" and "1.3-Sahara coastal" have opposite trends (Table 3). Division 1.1 is fished almost exclusively by Morocco, which in 2013 reached the maximum ever of its catches in that area at 1.2 million tonnes. In 2012 and 2013, total catches in division "1.3-Sahara coastal" markedly decreased to about 0.6 million tonnes whereas in 2010 and 2011 had been around 0.95 million tonnes per year. This is due to the drastic reduction of fishing by DWFNs in the Mauritanian EEZ in the last two years (Figure 4), which is also reflected in decreases of catches in area "3.1-Cape Verde coastal".

15. Moving southwards towards the Gulf of Guinea, total catch in statistical division "3.4-Western Gulf of Guinea" decreased in 2013 as a consequence of reduced catches by Ghana, while those in the division "3.5-Central Gulf of Guinea" are in a positive trend since 2010 due to increasing catches by Nigeria and Cameroon. Catches in division 3.5 are however probably underestimated as a technical mission, under the FAO TCP project *"Renforcement de collecte de données des pêches en Afrique Centrale*" developed in collaboration with Regional Fisheries Commitee for the Gulf of Guinea COREP, found out that in Cameroon about 13,000 canoes are not covered by the data collection system currently in place. The annual catches of the artisanal fleet will then probably be subject to an upward revision.

Data reporting by countries

16. The cycle for updating the FAO fishery statistics databases follows every year the following steps:

    - June: dispatch of the electronic questionnaires to national correspondents;
    - 31st August: deadline to return data to FAO;
    - Reminders and contacts with countries which have not submitted their data (in collaboration with FAO Representatives and Regional Offices);
    - Beginning of March: updated global capture and aquaculture databases are made available on the web through FishStatJ and the online query panel;
    - May-June: regional capture databases (e.g. CECAF) released on the web.

17. Besides the National Summary (NS1) questionnaire, for the CECAF area FAO-FIPS requests national correspondents to fill in also the STATLANT 34A questionnaire to assign the capture production by CECAF statistical divisions. For countries which fail to report data, notwithstanding several reminders, FAO estimates the missing data and marks them in the database with an "F".

18. Trend of capture production is the minimum information required when fishery management measures are considered at a national or regional level. However, there is still a good number of bordering countries and DWFNs which do submit regularly their catch statistics as can be seen in Table 4, which shows a screening of capture statistics submissions for last four years (2010-13). FAO does a major effort to keep up with institutional arrangements at the national level but there are cases in which, although the

statistics are available, they are not transmitted to FAO due to officers' turnover or changes in responsibilities between offices. Among those that submit data, sometimes information provided by countries is incomplete, scattered or with scarce species breakdown and, in some cases, data for the last year are completed and reported after a longer time lag.

19. Several DWFNs regularly report catches from the CECAF area. In addition, FAO cross checks and complements data received with those made available by other sources, i.e. the tuna and shark catch data available from the ICCAT database, and national statistical bulletins and databases which report foreign fleets' catches by EEZ. In recent years, catch data for DWFNs which fished in statistical divisions 1.3 and 3.1 and had not reported their catches to FAO have been derived from issues of "Estatistícas de Pesca Industrial" yearbooks published by the *Centro de Investigação Pesqueira Aplicada* (CIPA), Guinea-Bissau, and from the database on catches by foreign fleets in the Mauritanian EEZ managed by the IMROP.

20. At present, the CECAF capture database includes catch statistics for 297 species items, 28 more than in the previous version of this report that was prepared for the 6th Scientific Sub-Committee. For the CECAF area as a whole, 63.6 percent of the 2010-13 total catches were at species level, a 1.7 percent decrease in comparison to the 2007-09 period. However, among the catches reported above the species level, the share of those lumped together under "Marine fishes nei[4]" reduced significantly from 23.7 percent in the previous period to 14.5 percent in 2010-13, now representing only 5.3 percent of the total catches. This is an intermediate value between the high percents of other tropical areas and the low level of unidentified catches in the North Atlantic and north and south eastern Pacific fishing areas, where the vast majority of catches are detailed by species.

[4] nei = not elsewhere included.

Table 4. Submissions of 2010-2013 catch statistics for the CECAF area

Country	Complete submission	Partial Submission	No submission	Data from other sources
Bordering countries				
Benin	10-11-12-13			
Cabo Verde	11-12-13		10	10-11-12-13 ICCAT
Cameroon		12	10-11-13*	
Congo, Dem. Rep. of the	13	12	10-11	
Congo, Republic of	10-11-12-13			
Côte d'Ivoire	10-11-12-13			10-12-13 ICCAT
Equatorial Guinea	10-11-12	13		10-11 ICCAT
Gabon			10-11*-12-13	
Gambia	10-12-13		11	
Ghana	10-11-12-13			10-11-12-13 ICCAT
Guinea	10-12		11-13	10-13 ICCAT
Guinea-Bissau		10-11	12-13	
Liberia			10-11-12-13	
Mauritania	10-11-12-13			
Morocco	10-11-12-13			10-11-12-13 ICCAT
Nigeria	10-11-12-13			
Portugal	10-11-12-13			
Sao Tome and Principe	10		11-12-13*	10-11-12-13 ICCAT
Senegal	10-11-12-13			10-11-12-13 ICCAT
Sierra Leone			10-11-12-13	
Spain	10-11-12-13			10-11-12-13 ICCAT; 11-12 Mauritania
Togo	10-11-12-13			
No. submis. from bordering countries	*15 - 13 - 15 - 14*	*1 - 1 - 2 – 1*	*6 - 8 - 5 - 7*	
DWFNs				
Belize			10-11-12-13	10-11 GB-YB; 10-11-12-13 ICCAT; 10-11-12-13 Mauritania
China	10-11-12-13			10-11 GB-YB; 10-11-12-13 Mauritania
Comoros			10-11-12; 13 no catches	10-11 GB-YB; 10-11-12 Mauritania
Curaçao (until 2010 under Netherlands Antilles)			10-11-12-13	10-11-12-13 ICCAT
France	10-11-12-13			10-11-12-13 ICCAT
Georgia			10; 11-12-13 no catches	10 Mauritania
Germany	10-11-12		13 no catches	
Greece	10-11-12-13			
Guatemala	13		10-11-12	10-11-12 ICCAT
Ireland	10-11		(12)-13 no catches	10-11 ICCAT; 11 Mauritania
Italy	10-11-12		13 no catches	10-11 GB-YB
Japan	10-11-12-13			
Korea, Republic of	10-11-12-13			12-13 ICCAT; 13 Mauritania
Latvia	10-11-12-13			12-13 Mauritania
Lithuania	10-11-12-13			12 Mauritania
Netherlands	10-11-12-13			11-13 ICCAT
Other nei				10-11-12-13 ICCAT; 13 Mauritania
Panama			10-11-12-13	10-11 GB-YB; 10-11-12-13 ICCAT
Philippines			10; 11-12-13 no catches	10 ICCAT
Poland	10-11-12-13			
Russian Federation	10-11-12-13			
Saint Kitts and Nevis			10-11-12-13	10-11-12-13 Mauritania
Saint Vincent/Grenadines			10-11-12-13	10-12-13 ICCAT; 10-11-12-13 Mauritania
Taiwan Province of China	10-11-12-13			
Ukraine	10-11-12-13			11 Mauritania
United Kingdom	10-11-12-13			
Vanuatu	13		10-11-12	10-11-12 ICCAT; 11 Mauritania
No. submissions from DWFNs	*16 - 16 - 15 - 15*	*0 - 0 - 0 – 0*	*10 – 10 - 11 - 11*	

* = catch total for 2013 (2011 for Gabon) and for some backward years were obtained from national presentations delivered at a TCP-COREP meeting.
GB-YB = catch data derived from the "Estatistícas de Pesca Industrial" yearbooks published by CIPA, Guinea-Bissau.
ICCAT = catch data of tuna and shark species derived from the ICCAT catch database.
Mauritania = catch data of foreign fleets in the Mauritanian EEZ as recorded by the IMROP.

THE SOCIO-ECONOMIC STUDY

21. Contribution of fishery activities to the national economies is multi-faceted. In addition to supply food, capture and aquaculture production contributes to Gross Domestic Product (GDP), provides livelihoods for fishers and processors, is a source of hard currency by exporting fishery products, and provides government revenues through fisheries agreements and taxes. Unfortunately, thorough information on the socio-economic aspects of fisheries is rarely available.

22. The "The value of African fisheries" study[5] (de Graaf and Garibaldi, 2014) was carried out in the framework of the New Partnership for Africa's Development (NEPAD)-FAO Fisheries Programme (NFFP) funded by the Swedish International Development Cooperation Agency (Sida). The study tried to estimate the contribution to national and agriculture GDPs and the employment generated by the whole fisheries sector, defined as including fishing, processing, licensing of local fleet, and aquaculture.

23. The study started in October 2012. In collaboration with COREP, FCWC and SWIOFC, departments of fisheries in 40 countries were contacted with a request to collaborate with the study. Among these, 23 countries (Figure 7), which represent over 40 percent of the total African States, agreed to collaborate and information was provided by 42 experts. In order of obtaining figures for the entire continent, data by the sampled countries were analyzed and calibrated to extrapolate values for the non-sampled countries, which were classified into separate groups for marine fisheries, inland fisheries and aquaculture according to their geographical location or productivity.

Figure 7. The sampled countries which participated in the study

[5] The study, published as an FAO Fisheries and Aquaculture Circular, is only available online and can be downloaded at http://www.fao.org/3/a-i3917e.pdf (English version) and http://www.fao.org/3/a-i3917f.pdf (French version).

24. The value added by the fisheries sector as a whole in 2011 was estimated at more than US$24 billion, 1.26 percent of the GDP of all African countries (see Table 5). Detailed figures by sub-sector highlight the relevance of marine artisanal fisheries and related processing, and of inland fisheries which contribute one third of the total catches by African countries. Aquaculture is still developing in Africa and is mostly concentrated in a few countries but already produced an estimated value of almost US$3 billion per year.

Table 5. Contribution to GDP by sub-sector

	Value (US$ millions)	Contribution to GDP (%)
Total GDPs African countries	**1,909,514**	
Total Fisheries and Aquaculture Value Added	**24,030**	**1.26**
Total Inland Fisheries	**6,275**	**0.33**
Inland Fishing	4,676	0.24
Post-harvest	1,590	0.08
Local licenses	8	0.00
Total Marine Artisanal Fisheries	**8,130**	**0.43**
Marine Artisanal Fishing	5,246	0.27
Post-harvest	2,870	0.15
Local licenses	13	0.00
Total Marine Industrial Fisheries	**6,849**	**0.36**
Marine Industrial Fishing	4,670	0.24
Post-harvest	1,878	0.10
Local licenses	302	0.02
Total Aquaculture	**2,776**	**0.15**

25. To calculate the contribution of the fisheries sector to the Agriculture GDP, it is necessary to exclude the value generated by fish processing as the Agriculture GDPs published by the United Nations Statistics Division (UNSTAT) cover "Agriculture, livestock, hunting, forestry, and fishing" but excludes processing, which is covered under "Manufacture of Food Products". Fishing and aquaculture resulted to contribute 6 percent of the Agriculture GDPs in Africa (Table 6).

Table 6. Contribution to Agriculture GDP by sub-sector

	Value (US$ millions)	Contribution to GDPA (%)
GDPA African countries	**288,392**	
Total Fisheries and Aquaculture Value Added *	**17,369**	**6.02**
Inland Fishing	4,676	1.62
Marine Artisanal Fishing	5,246	1.82
Marine Industrial Fishing	4,670	1.62
Aquaculture	2,776	0.96

26. According to the new estimates produced by the study, the fisheries sector as a whole employs 12.3 million people as full-time fishers or full-time and part-time processors, representing 2.1 percent of Africa's population of between 15 and 64 years old. Fishers are half of all people engaged in the sector, 42.4 percent are processors and 7.5 percent work in aquaculture (Table 7). About 27.3 percent of the people engaged in fisheries and aquaculture are women, with marked differences in their share among fishers (3.6 percent), processors (58 percent), and aquaculture workers (4 percent) (Table 8).

Table 7. Employment by sub-sector

	Employees (thousand)	Share sub-sector (%)	Share within sub-sector (%)
Total employment	**12,269**		
Total Inland Fisheries	**4,958**	**40.4**	
Fishers	3,370		68.0
Processors	1,588		32.0
Total Marine Artisanal Fisheries	**4,042**	**32.9**	
Fishers	1,876		46.4
Processors	2,166		53.6
Total Marine Industrial Fisheries	**2,349**	**19.2**	
Fishers	901		38.4
Processors	1,448		61.6
Aquaculture workers	**920**	**7.5**	

Table 8. Employment by gender

	Males (thousands)	Females (thousands)	Female (%)
Total employment	**8,917**	**3,352**	**27.3**
Total Inland Fisheries	**3,632**	**1,326**	**26.7**
Fishers	3,143	227	6.7
Processors	489	1,099	69.2
Total Marine Artisanal Fisheries	**3,081**	**961**	**23.8**
Fishers	1,861	15	0.8
Processors	1,220	946	43.7
Total Marine Industrial Fisheries	**1,328**	**1,021**	**43.5**
Fishers	901	0	0
Processors	427	1,021	70.5
Aquaculture workers	**876**	**44**	**4.8**

27. There are clear geographical patterns with high percents of processors in western and southern Africa, and consequently large female employment, whereas in eastern Africa often the number of fishers is greater than processors. It should be noted that in addition to this direct employment, there are substantial numbers of people involved in support

services to the sector such as boat building and repair, provisioning vessels, fish marketing, administration and research.

28. As data on licence fees paid by foreign fleets were not easily available to the national experts participating in this study, an attempt was also made to calculate the total value of fisheries agreements with Distant Water Fishing Nations (DWFNs) fishing in the EEZs of African States. According to this conservative estimate, in addition to the value added of US$26 billion, in 2011 African countries received also US$0.4 billion through fisheries agreements with foreign nations fishing in their EEZs. This figure was calculated on the basis of publicly available information on the agreements with European Union (EU) countries and extrapolated values for non-EU countries.

29. The study calculated that in 2011 still 25 percent of all marine catches around Africa were by non-African countries. If all these catches were caught by African States, in theory they could generate an additional value of US$3.3 billion, which is eight times higher than the current US$0.4 billion African countries earn from fisheries agreements.

30. A workshop to discuss the methodology adopted and validate the preliminary results of the study was held in November 2013. The workshop discussed the several challenges and problems encountered during the study and made a series of suggestions to the study team on how to deal with doubtful data which were reflected in the final version of the study, and some general recommendations on what should be done to improve socio-economic data on fisheries and aquaculture in Africa. The major recommendations were:

- This study at the continental level required considerable time and efforts, and it is doubtful that it can be repeated at regular intervals. Therefore, institutional mechanisms should be developed at the national and regional level to compile socio-economic data similar to what was done in the present study;
- A similar study could be carried out at the level of Regional Fishery Bodies (RFBs) level, also with the purpose of refining the methodology;
- Improvements in national data collection systems should be linked to the "*Pan-African Strategy on the improvement of fisheries and aquaculture data collection, analysis and dissemination*", which was elaborated in the African Union (AU) framework in parallel with this study;
- Data on the economics of fishing operations and the processing sector collected at the national level should also include information on the production cost of the different types of fishing in order to compare Value Added Ratios at the regional level and establish standards, as well as detailed data on volumes and values in the post-harvest value chain;
- Statistical staff in national and regional institutions should be trained in the collection and analysis of data needed to estimate the contribution of the fisheries and aquaculture sector to GDP and employment;
- Access to information on fisheries agreements with DWFNs and on fishing operations by foreign fleets should be facilitated;
- Working group(s) on fisheries and aquaculture statistics should be constituted at the continental and/or RFB levels to share knowledge and establish standards, linking this process to the "*Pan-African Strategy on the improvement of fisheries and aquaculture data collection, analysis and dissemination*";
- Liaisons between AU and FAO in the field of fishery statistics should be strengthened.

THE PAN-AFRICAN STRATEGY

31. Several high-level pan-African meetings on fisheries recognized that many African fisheries and aquaculture data-collection systems are not performing satisfactorily, and do not deliver all the information required for assessing the fisheries and aquaculture policies in place and management decisions. Therefore, the NEPAD Planning and Coordinating Agency (NPCA) and the FAO, through the NEPAD-FAO Fish Programme (NFFP), in collaboration with the African Union Inter-African Bureau for Animal Resources (AU-IBAR), developed the thematic areas of the strategy during a Think Tank meeting held in Nairobi (Kenya, 8-9 July 2013).

32. The drafting of "*A Pan-African Strategy on the improvement of fisheries and aquaculture data collection, analysis and dissemination*" was done by a small group of experts, who had participated in the Think Tank meeting, during a two-day retreat at the NPCA office (27-28 August 2013) in Midrand, South Africa. The final version of the Strategy (NEPAD, FAO & AU-IBAR, 2014), as agreed by the Think Tank members, was then presented at the 2nd Conference of Ministers of Fisheries and Aquaculture in Africa (CAMFA) (Addis Ababa, Ethiopia, 28 April-2 may 2014) which endorsed it.

33. The major thematic areas of the Strategy, which cover the industrial and artisanal sub-sectors of marine and inland fisheries, aquaculture production, post-harvest and trade, are:

    1. A conceptual framework and guiding principles;
    2. A list of core variables to be collected at the national level;
    3. The institutional setting for the exchange of information;
    4. Fisheries and aquaculture statistics and its incorporation into National Statistical Systems and the National Strategy for the Development of Statistics (NSDS);
    5. Capacity building;
    6. An action plan for implementation including considerations for funding.

1. A conceptual framework and guiding principles

The Strategy is guided by the following principles:

- Sustainability;
- cost effectiveness;
- best scientific evidence;
- participatory and cooperative;
- comparability;
- objectivity and transparency;
- timeliness;
- flexibility;
- ownership.

34. For a detailed description of the principles see the NEPAD, FAO & AU-IBAR, 2014 document.

2. A list of core variables to be collected at the national level

35. List of core variables, considered to be the main indicators, to be collected at the national level in the fisheries and aquaculture sector is shown in Table 9.

Table 9. Core variables to be collected at the national level

VARIABLE TO BE COLLECTED	SUB-SECTOR COVERED	DATA COLLECTION STRATEGY
Fleet structure by fishing units, numbers and characteristics	Industrial/Artisanal Marine/Inland	Census, registration
Fishing effort by fishing unit/gear type	Industrial/Artisanal Marine/Inland	Census, sample based
CPUE by major species and fishing unit/ gear type	Industrial/Artisanal Marine/Inland	Census, sample based
Total catch by major species and fishing unit/gear type	Industrial/Artisanal	Sample based
Number and unit area by aquaculture production type (e.g. pond, cages, etc.)	Aquaculture	Census, registration
Total aquaculture production and production rates by type and species	Aquaculture	Sample based
Fish price by species (vessel/landing site/farm gate/processing)	Industrial/Artisanal Marine/Inland/Aquaculture/Processing	Sample based
Annual production cost by sector and unit	Industrial/Artisanal Marine/Inland/Aquaculture/Processing	Sample based
Employment by sub-sector and gender	Industrial/Artisanal Marine/Inland/Aquaculture/Processing	Sample based
Total quantity of processed fish produced by type of product and type of processing	Processing	Sample based
Quantity and value of aquatic products exported by type	Trade	Reporting
Quantity and value of aquatic products imported by type	Trade	Reporting

3. The institutional setting for the exchange of information

A. National level

35. Data on fisheries and aquaculture at the national level are often collected by the department of fisheries or a fisheries research institute. The data are analysed and used to report on fisheries and aquaculture status and trends including processing, MCS and trade, and to formulate national fisheries-management plans. Aggregated data are provided to the national statistical office to be included in the national statistical bulletin and for the use of policy makers. Aggregated data could also be made available to the general public.

B. Regional and continental level

36. Information will be provided to RFBs for the formulation of fisheries management plans of shared stocks. Further, aggregated data can be provided by either the fisheries department or by the National statistical office to regional information systems to support policy development at regional level, most notably the Regional Economic Communities (RECs).

C. Global level

37. AU Member States are requested to report data on capture and aquaculture production, trade of fishery products, employment and fleets to FAO, which collates the national data into the global fishery databases that are made available to the public and are largely used for trend studies and analysis.

4. Fisheries and aquaculture statistics and its incorporation into National Statistical Systems and the National Strategy for the Development of Statistics (NSDS)

37. National fisheries data collection systems are often not well integrated into the National Statistical Systems (NSS) and, as a consequence, are not included in the National Strategy for the Development of Statistics (NSDS). The NSDS, as promoted by Paris21, enables developing countries to build a reliable statistical system that produces the data necessary to design, implement, and monitor national development policies and programs. It also helps countries meet their regional and international commitments with respect to statistics (Millennium Development Goals, regional integration processes, etc.).

38. An NSDS provides a country with a vision of the development of statistics and a detailed action plan over a period of 5 to 10 years that covers the production of all official statistics. All AU Member States should ensure that fisheries and aquaculture data collection is integrated with the National Statistical System (NSS) and included in the National Statistical Development Strategy, and that it receives adequate financial and human resources for its effective implementation.

5. Capacity building

39. The Strategy recognizes that without capacity building, the statistical systems to be put in place will not ensure accuracy, sustainability, relevance, timeliness, comparability, availability and accessibility of fisheries and aquaculture information in Africa. Capacity must be built at national, regional and continental levels. Capacity for regional integration of fisheries and aquaculture statistics has to be developed so that that more and higher-quality fisheries and aquaculture data can be made available, enabling regional institutions, such as RECs and RFBs, to guide the harmonisation of national fisheries and aquaculture policies.

40. All AU Member States and Regional Bodies should ensure that the statistical capacity component, a vital part of the implementation of this strategy, is taken into account when designing fisheries and aquaculture data-collection systems.

6. An action plan for implementation including considerations for funding

41. To implement the Strategy the following steps were identified:

- Member States ensure that fisheries and aquaculture data collection, analysis and dissemination is fully integrated into the National Strategy for the Development of Statistics (NSDS);
- Member States ensure that sufficient funds are allocated for fisheries and aquaculture data collection, analysis and dissemination;

- Regional bodies ensure that a detailed and costed vision for statistics is developed and that sufficient funds are allocated for storage, processing, analysis and retrieval of fisheries and aquaculture information;
- The AU endeavour to collaborate with other institutions, including the African Developement Bank (AfDB), in the implementation of the Pan-African Strategy.

42. In addition, it should be considered to invest in:

- The strengthening of the statistical capacity of regional organisations;
- The implementation of modern electronic communication systems, such as internet connections and data transfer mechanisms, so as to promote effective communication and to make data and information more readily available for the elaboration of fisheries and aquaculture management and development plans.

Current implementation of the Strategy

43. The guiding principles of the Strategy are currently being implemented in various projects in Africa:

- FAO's Technical Cooperation Programme (TCP) "*Renforcement de collecte de données des pêches en Afrique Centrale*" in collaboration with the Commission Régionale des Pêches du Golfe de Guinée (COREP);
- World Bank's West Africa Regional Fisheries Programme (WARFP) in Ghana;
- World Bank's South West Indian Ocean Fisheries (SWIOFISH) in Comoros, Madagascar, Mozambique and Tanzania.

44. The FAO TCP analysed the current data collection systems for marine industrial and artisanal catches in five COREP Member Countries (Cameroon, Congo Dem. Rep., Congo Rep., Gabon and Sao Tome and Principe) and is supporting their improvement in order to enable the national systems to regularly produce and transmit to COREP the core variables relevant to the sub-sector. Similar activities for Angola and Equatorial Guinea will be developed under other projects in which FAO is involved.

45. The TCP is testing the feasibility of using mobile phones or small tablets for data collection through an *ad hoc* developed application which uses free Open Data Kit (ODK) software. In Congo Rep. and Sao Tome and Principe, a routine for automatically downloading the data from the mobiles or tablets in the tailored Open ArtFish database has been already developed. Although the use of these devices is subject to good internet coverage, the use of mobiles or small tablets is very promising as it would greatly facilitate the collection, transmission and storage of the data.

46. Following the recommendations of the Strategy on capacity building, the TCP delivered a training course (December 2014, Libreville, Gabon) to officers from all COREP countries along the lines of a recent FAO publication (de Graaf et al., 2015) on fisheries statistics and data collection. The same training it is planned to be delivered at the *Institut Sous-régional de Statistique et d'Economie Appliquée* (ISSEA), Yaounde, Cameroon, where it will be also probably established as a permanent course of the institution for the French speaking countries in Africa.

REFERENCES

Ansa-Emmin, M. & D. Levi, 1975. Biostatistical data for stock assessment purposes: present situation and suggestions for improvement. Fisheries Committee for the Eastern Central Atlantic, *CECAF/ECAF Series*/75/2, 13 p.

Corten, A., 2014. EU–Mauritania fisheries partnership in need of more transparency. *Marine Policy,* 49: 1–11.

de Graaf, G. & Garibaldi, L. 2014. *The value of African fisheries.* FAO Fisheries and Aquaculture Circular, no. 1093. Rome, FAO. 76 pp.

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.

NEPAD, FAO & AU-IBAR, 2014. A Pan-African strategy on the improvement of fisheries and aquaculture data collection, analysis and dissemination. Downloadable at: http://www.africanfisheries.org/knowledge-output/pan-african-strategy-improvement-fisheries-and-aquaculutre-data-collection-analysis , viii + 21 pp.