UNION OF THE COMOROS

Unity-Solidarity-Development

VICE-PRESIDENCY IN CHARGE OF THE MINISTRY OF
AGRICULTURE, FISHERIES, ENVIRONMENT,
TOWN AND COUNTRY PLANNING

National Fisheries Directorate

Six years for improving statistic data collection in Comoros

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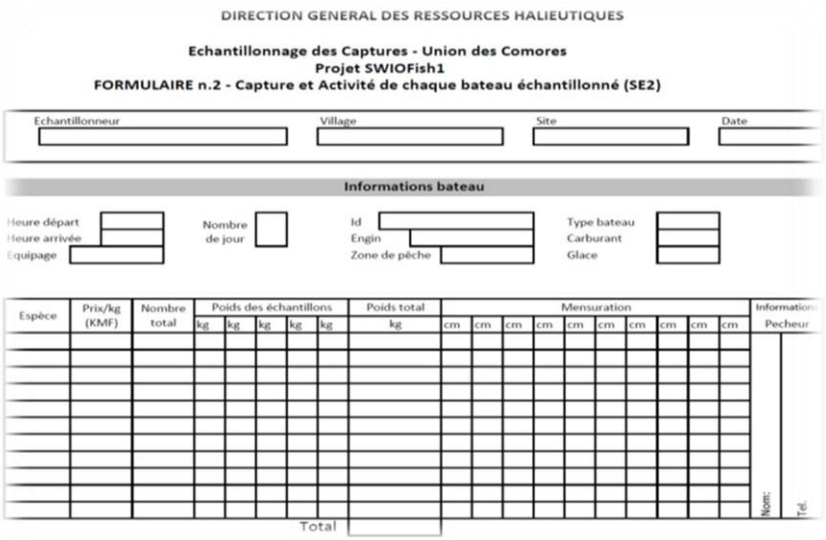

DIRECTION GENERAL DES RESSOURCES HALIEUTIQUES

Echantillonnage des Captures - Union des Comores
Projet SWIOFish1
FORMULAIRE n.2 - Capture et Activité de chaque bateau échantillonné (SE2)

Echantillonneur | Village | Site | Date

Informations bateau

Heure départ
Heure arrivée
Equipage
Nombre de jour
Id
Engin
Zone de pêche
Type bateau
Carburant
Glace

Espèce	Prix/kg (KMF)	Nombre total	Poids des échantillons					Poids total	Mensuration										Information Pecheur
			kg	kg	kg	kg	kg	kg	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	Nom: / Tel:
							Total												

November 2017

Abstract

Fisheries Data collection system is elaborated in 1995 in Comoros with the support of FAO. After more than seventeen years there is no data collected. IOTC comes back on 2011, to update the collection data system elaborated before then continue to collect new data. Since when the collect is regular with World Bank, IOC projects or IOTC support. After five years, the database is revised, sampling strategy is simplified and number of strata is reduced from 7 to 5, the number of surveyor from 11 to 13 including octopus data collectors. The estimation application is mastered by local experts. The last innovation is introduction of tablet to collect and send data by cloud database.

Résumé

Le système d'échantillonnage des données statistique de la pêche a été élaboré en 1995 aux Comores avec l'aide de la FAO. Par la suite, plus de 17 ans se sont passées sans aucune collecte. La situation étant alarmante, la CTOI est revenue en 2011 pour mettre à jour la base de données puis continuer la collecte. A partir de cette période, la collecte de données statistiques a continué tous les ans avec l'appui de la Banque mondiale, les projets de la COI ou la CTOI. Après 5 ans de travail, la base de données a été améliorée, le système d'échantillonnage simplifié de 7 à 5 strates seulement, le nombre d'échantillonneur passé de 11 à 13 comprenant 3 échantillonneurs de poulpe. Et enfin le programme logiciel pour l'estimation des résultats de la collecte est maitrisé par des experts nationaux. La dernière innovation est l'introduction de tablette pour la collecte et l'envoi des données dans un serveur Cloud.

Contents

1 BACKGROUND

Comorian Archipelago is situated in the Indian Ocean in the North of Mozambique Channel, from 350 km from North-West Madagascar and 250 km from Eastern Mozambique (Bru, 2002). Comorian fishery is practiced on maritime zone estimated at more than 160,000 km². This zone covers a continental shelf of 900 km² and linear coast estimated at 427 km. Comorian marine water keeps marine resources which the potential sustainable production is about 33,000 tons per year, which only 64% are actually exploited (Naji et Youssouf, 2007).

Comorian fishery is exclusively artisanal (Oirdi, 2002), and exploits essentially pelagic species (Naji et Youssouf, 2007) particularly tuna species, and sometimes night benthic species. Activities of the Comorian fishing fleet contribute to the population's protein food resource as it ensures nearly the totality of national market supplies. The fishery sector uses directly about 6 % of population (8,500 posts) and others indirectly 24,000 posts (Naji et Youssouf, 2007). The Comorian fishery has been progressing from 1980 to nowadays.

After more than seventeen years without any fishery statistical data collected, the directorate of fisheries received financial support from IOTC for the 2011 statistics. Since then, two types of data have been collected: fisheries statistics and census of fishing boats. Then, the World Bank initiated the SWIOFish project which became effective in 2015. Since 2011, data collection has followed a regular frequency until now. This regular frequency of statistic, takes its origin from recommendations from the national management plan of demersal fishery elaborated by EAF (Ecosystem Approach for Fisheries) - NANSEN project with South West Indian Ocean Fisheries Project partnership. This management plan is for demersal but the statistic data collected cover also the pelagic fishery data.

The last census of fishing boat done gave also the number of the total fishery fleet estimated on 5,323 units which 32% of it are motorized (Mohamed Toihir, 2011).

The 2011, data collection gave strange results (total capture was decreased compared of literature) which were hardly endorsed by the Directorate of Fisheries. One hypothesis was fraud with data surveyors. It was reported *(Person.Comm.)* that several surveyors did not visit their sampling landing sites and filled fake forms, but the opposite is confirmed the national system. All verification is done and the Data collection system and their surveyors are all right. Moreover, the large number of strata which composed the sampling strategy could not be properly managed by the surveyors who were limited in number. Consequently, the national team could not visit all the sampling sites on a regular basis.

The aim of this document is to give an overview of the improvements made in the data collection system since 1993.

2 MATERIAL AND METHODS

2.1 Study area

The data are collected in the three islands administered by the Government. Each island has a number of survey sites corresponding to the fishers villages. There are two types of villages according to the importance of the fishery: primary villages where catch is important and which must be surveyed every time, and the secondary village where catch is less important

and which are surveyed at a lower frequency. The strata described hereafter were those implemented in the first phase of the sampling programme (Figure 1).

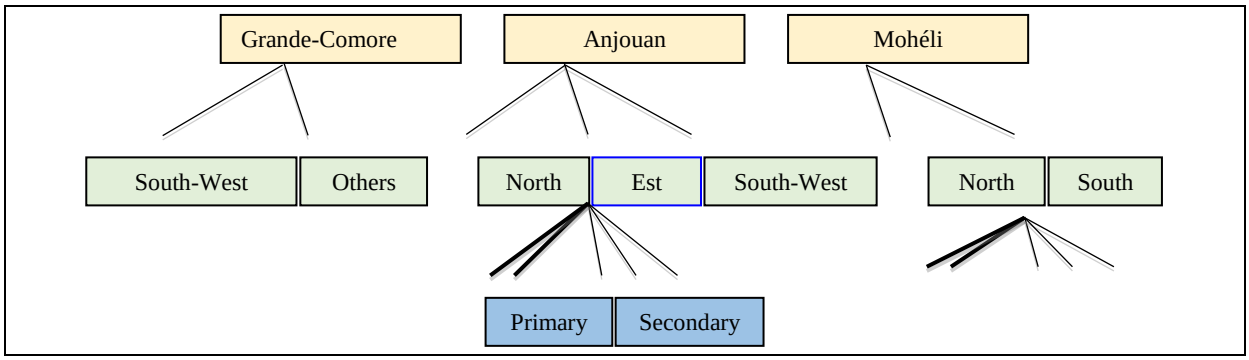

Figure 1: macro strata for the first phase of sampling programme

Grande-Comore (Figure 2): this is the main island with 1142 km², which was subdivided in two strata: GCO1 (from Iconi to Male) with 7 primary villages, GCO2 (from Moroni to Foumbouni) crossing over the north with 13 primary villages.

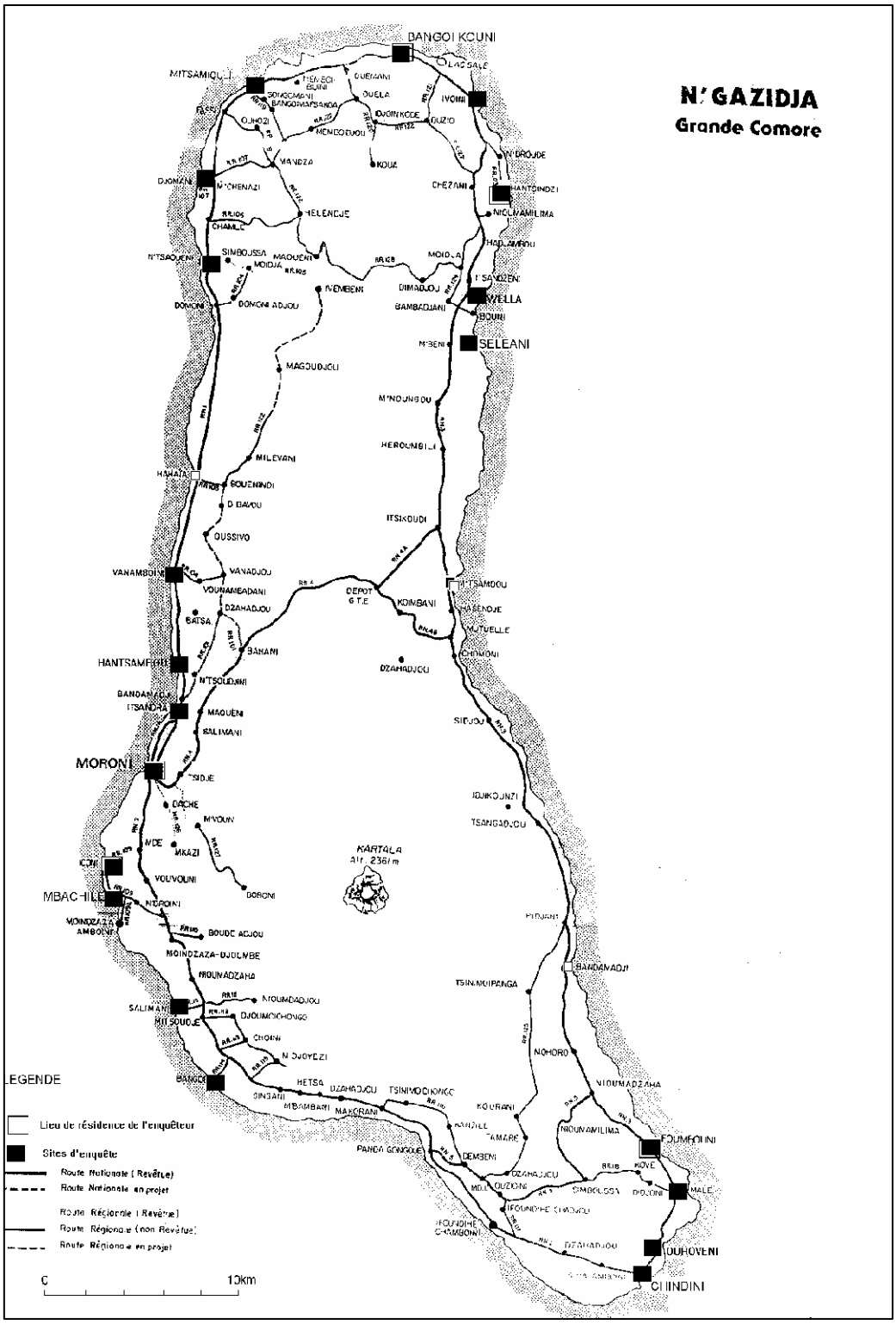

Figure 2 : survey site for Grande-Comore (Two strata)

Anjouan (Figure 3): this is the second island of the archipelago in term of area (424 km²). Three strata were defined across its triangular shape. Firstly, the northern side (ANJ1) where 5 primary villages are listed. Secondly, the South western side (ANJ2) with 4 primary villages and thirdly, the Eastern side (ANJ3) with 3 primary villages.

Figure 3 : Survey site of Anjouan (Three strata)

Mohéli (Figure 4**):** this island is the smallest of the archipelago with only 211 km²; two main strata are defined: MOH1 and MOH2 where each one has 3 primary villages for the statistical data collection.

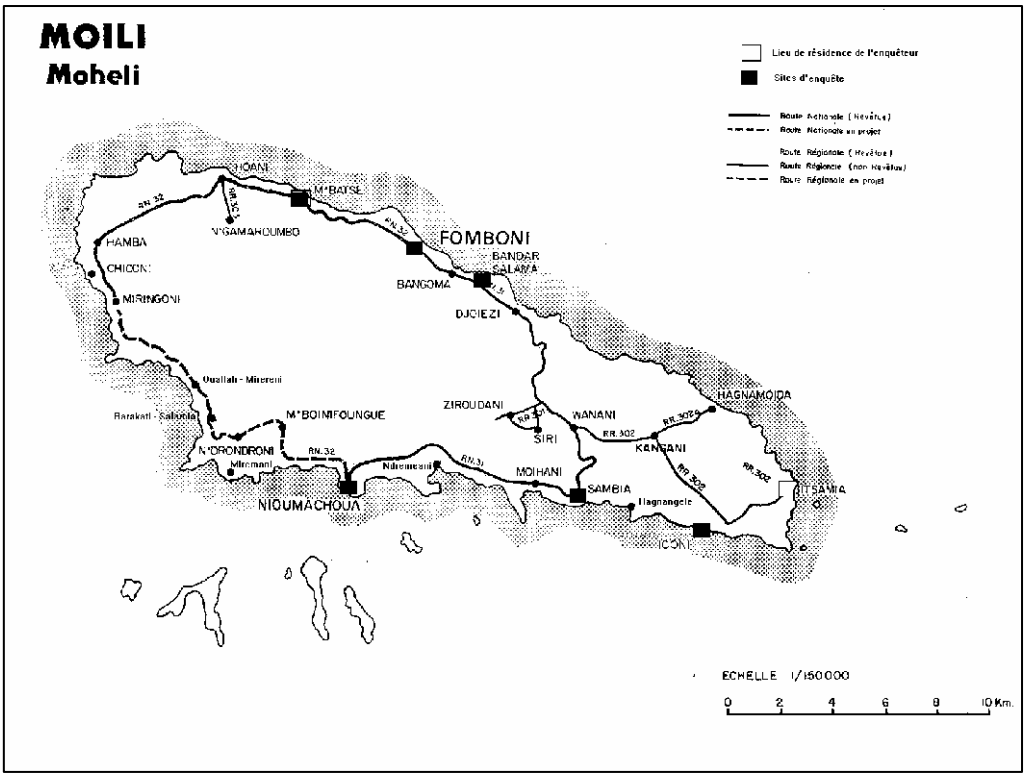

Figure 4: survey site for Mohéli (Two strata)

2.2 Surveyors and sampled species

To collect data on this system, 11 surveyors are recruited to cover the primary villages at a given time interval, and the secondary villages at a lower frequency. There are 5 surveyors for Grande-Comore, 4 for Anjouan and 2 for Mohéli.

Many species of pelagic fish are collected particularly tuna, swordfish, neritic tunas and other pelagic fishes, sharks and coral reef fishes. So the data collection was limited on fish.

2.3 Update of the data collection system

The data collection scheme was supposed to start in 1993 however nothing was collected until 2011 when the scheme was effectively implemented. After 6 years data collection, the system has improved with the support of IOTC, and the World Bank program in Comoros. Nowadays three points have been improved on the data collection system.

The sampling system was initially based on 7 strata, as described in 2.1. With capacity building supported by World Bank and IOTC the number of strata has been revised in order to optimize the cost, improve the management of surveyors, data collection, and reduce the occurrence of mistakes in the database. Starting end of 2015, the sampling scheme is now composed of 5 strata (Figure 5): 2 in Anjouan (instead of 3), 1 in Mohéli (instead of 2), and 2 in Grande Comore (unchanged). The estimation application is now mastered by local statistical managers. Until 2016, the data collection system was only fish. Since 2017 this situation has evolved and other species like demersal fishes and mollusc are now covered by the data collection system. Furthermore, the number of surveyors to work with this updated system has been revised.

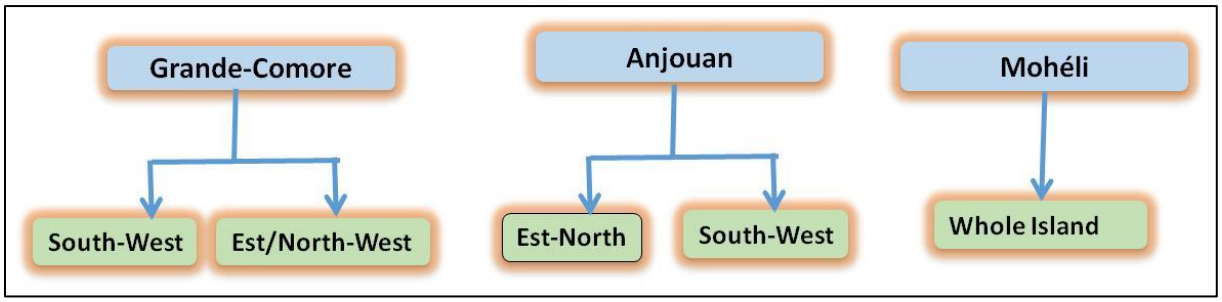

Figure 5: Macro strata of the data collection system after revised

3 RESULTS

3.1 Collected data

The statistical data collection has to collect two types of information: the first is about fishing boat and the second one is to collect information about species. For boat data survey, the surveyor has to collect information on type of boat, engine and fishing zone.

For species, the surveyor has to collect catch data and effort data for tropical and temperate tuna, swordfish, others pelagic fishes and neritic tuna, sharks and reef fish. The statistic service started to collect fish data while the first objective was to understand fish stock and potential stock. It is also to align the Comoros fisheries profiles to the international and regional legal framework and standards. IOTC has also its rules to which member countries have to abide. Finally the statistics service is an administrative issue to build knowledge basis in catch data estimation per time for decisions makers.

Since January 2017, the statistic service has improved the collect for the demersal species. Perhaps, this improvement is not interest IOTC level but just the national one. Before the statistic service has collected some demersal species in one group named DEM (Figure 6).

Figure 6: species collected together in one name DEM as demersal

The service has started to collect individual catch and effort data (Figure 7a, b) from that group of demersal species.

a

b

Figure 7: some demersal species collected individually now which are collected in group DEM before 2017. a) LEN (*Lethrinus microdon*); b) MYR (*Myripristis botche*)

Then, after six months of octopus data collection for pilot experience, the statistics service plans to continue as the results were interesting. Actually the statistics service works to introduce the octopus module into their database. There is not yet data available about the demersal collected individually before the end of this year. Introducing octopus collect in the data system is another improvement followed their capacity building from IOTC and World Bank in these last years.

3.2 Data Surveyor

The statistic data system has employed previously eleven (11) data surveyors all over the three islands: five (5) in Grande-Comore; four (4) in Anjouan and two (2) in Mohéli. Those surveyors are numerous enough to collect data all over the country according the revised sampling strategy.

Firstly, the database is improved to target error in the collected data. That is a first level of data control and the manager can ask feedback from the corresponding surveyor if some mistakes have identified. The application has reduced errors from database

Secondly, from 2015 every surveyor must use an android tablet for collecting and sending data. The tablet is configured to target errors in the data collected. This new device sends to database its geographical position automatically as well. So the surveyor has no way to put

data without being in his corresponding site. According to data collected in 2016, the system starts to be efficient. This is a second level of reducing error to the database.

Finally for collecting octopus data, three (3) additional surveyors have been recruited specifically for this. In fact, the octopus data surveyors use also tablets for collecting and sending data.

3.3 Estimation application

As in every data collection system, it is necessary to have an estimation application or do it manually to produce the final statistics results. When the statistics service of the National Fisheries Directorate has started to collect data in 2011, the estimation application was not implemented in their database. So it took a long time to have the results for that year. Then, the estimation procedure for Comoros was run at the IOTC Secretariat. After more capacities building supported by IOTC and then by World Bank, the statistics service in Comoros is now able to estimate and produce the national catch and effort statistics results at the end of the fishing season (Figure 8 and 9).

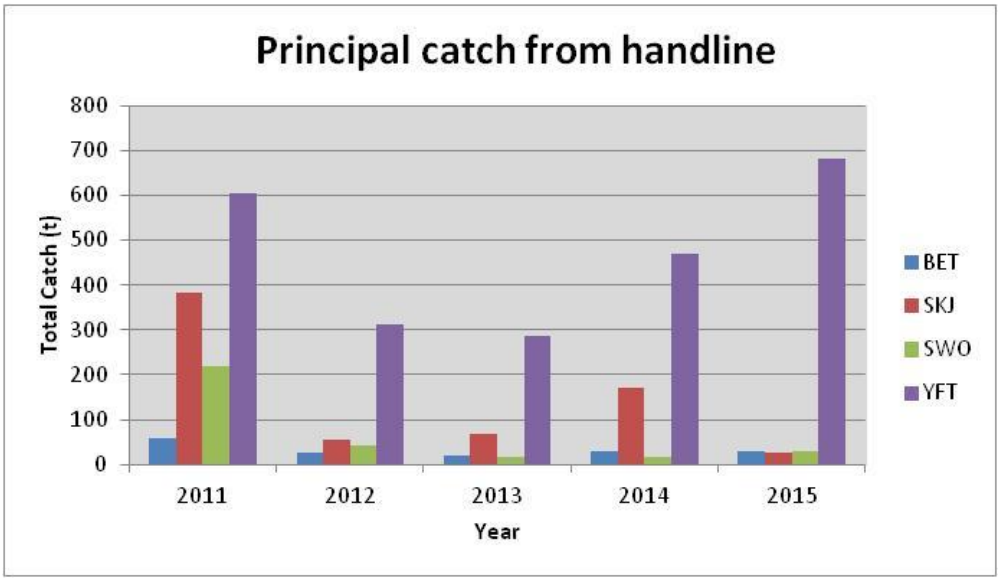

Figure 8: Principal catch and effort data by species from 2011 to 2015 from artisanal Hand line fishery in Comoros. BET (*Thunnus obesus*), SKJ (*Katsuwonus pelamis*), SWO (*Xiphias gladius*) and YET (*Thunnus albacares*)

With handline fishers catch more Yellowfin tuna than other species. They use live bait for that fishery. This kind of fishery use traditional pirogue. Less and less skipjack are fished using handline because they fish it usually by using artificial bait.

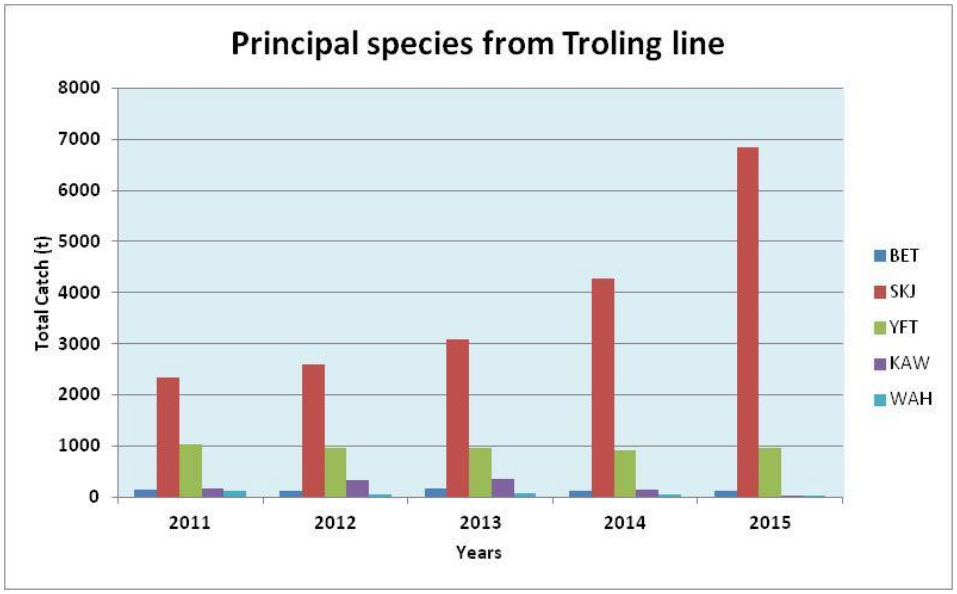

Figure 9: Principal catch and effort data by species from 2011 to 2015 from artisanal Trolling line fishery in Comoros; KAW (*Euthynnus affinis);* WAH *(Acanthocybium solandri)*

With trolling line, Comorian fishers catch more skipjack than Yellowfin and Bigeye tuna.

This improvement in the 2015 estimation comes from the reduction in number of strata and better management of the collected data all over the process. The data collect system has become more and more efficient.

4 DISCUSSION

The data collection system is still evolving; it started with collecting only fish data, but is starting to cover others fisheries. The vision of the service is to collect also qualitative data for national use. That can help the fish stock assessment which is a major target for national politics.

According to the data collection system in place, eleven samplers are enough to collect data for fish but there is a need to recruit three more for collecting octopus data. Presently, the total number of surveyors is thirteen instead of eleven previously.

Estimation application was an important component to set up because authorities are very interested to be informed for the annual total catches. Administration does not need to wait for result after annual data collection as they require numbers for total catch within short delays. Now, thanks to more training, our technical team can use the estimation application included in the database without problem.

Introduction of tablets for collecting and sending data has improved data quality. Mobile application (Open Data Kit) and simplified sampling design have reduced effectively the relative errors and improved estimation since 2015. The next estimation for 2016 will be better with all improvements already done.

Next to the principal species caught usually by fishers, there are more others species collected by the statistic from artisanal fishery (Figure 10 & 11).

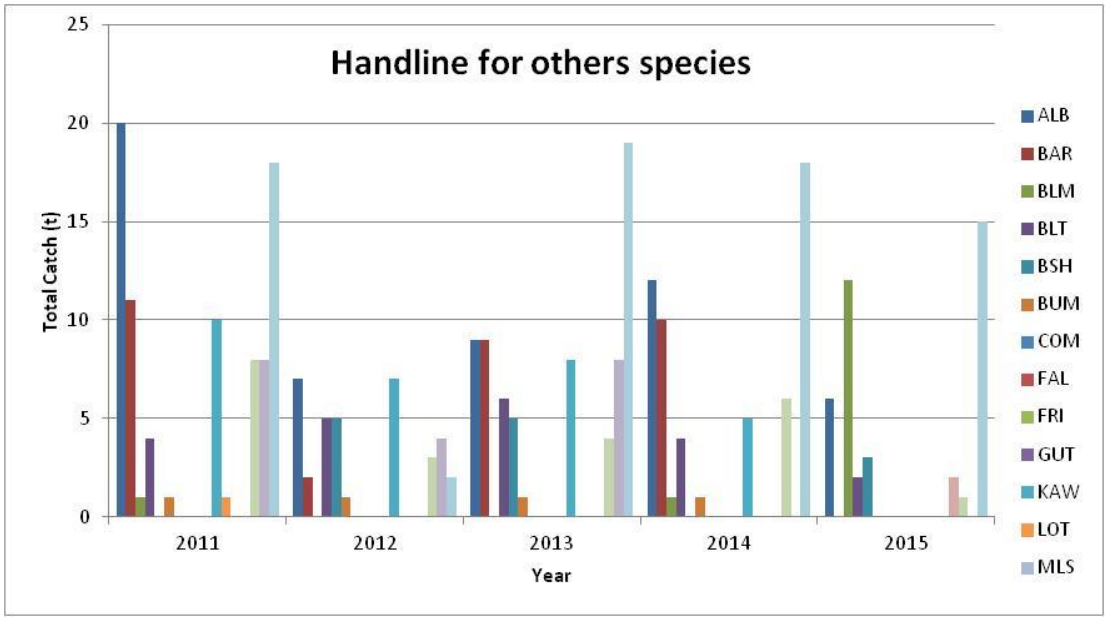

Figure 10: others species fished in lower frequency and lower quantity by handline from 2011 to 2015 in Comoros

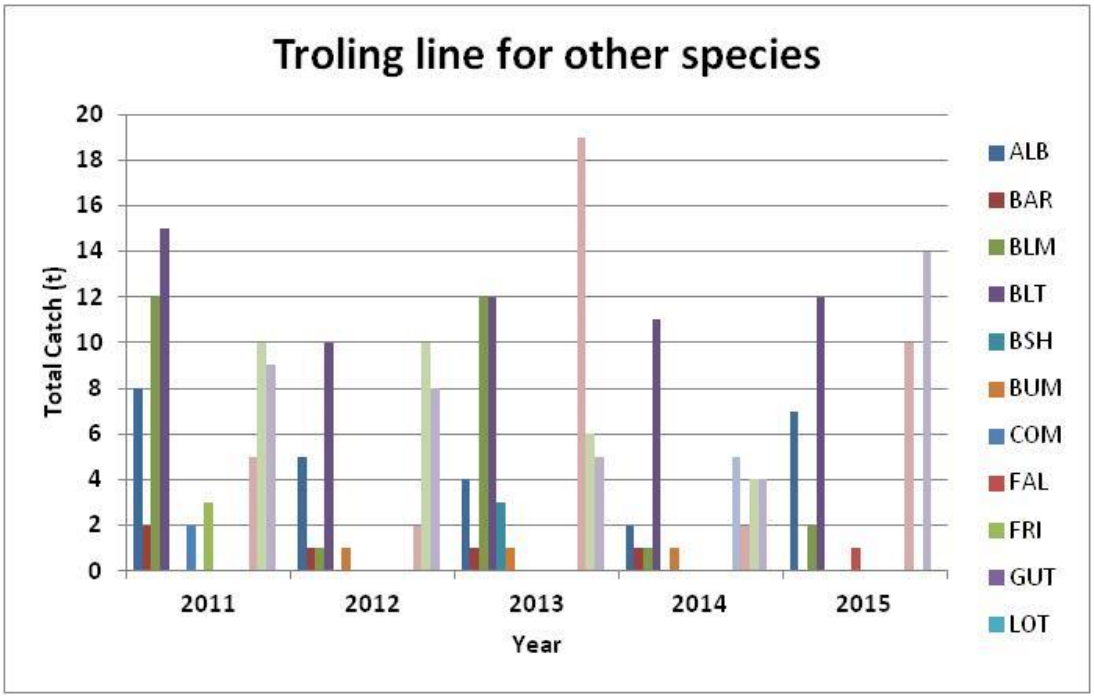

Figure 11: some others species caught by artisanal fishery with trolling line in lower frequency and quantity from 2011 to 2015 in Comoros

The negative point of this data collection system is that they do not produce regular report to publish data at national level.

5 CONCLUSIONS

The Comorian fisheries statistic data collection is very young. The sampling strategy was started in 1995. After 17 years without data collected, a sampling system was implemented with the support of World Bank. Some points had to be improved. The reduction of the number of the geographical strata, the addition of a species category (octopus), an increase in the number of surveyors and local management of the estimation module, are the good points that statistic services have targeted during the recent years.

Actually the statistics data collection system is ready to give administration all documents needed for public use. Comoros is one of the first countries in the region to collect data with android tablet sent by a cloud database.

For approximately six years efficiency that is an evolution compared to a long period without anything being done in the fish statistics sector.

6 ACKNOWLEDGMENT

We would like to thank firstly IOTC secretariat for their technical support. We thank also for Mr. Youssouf ALI MOHAMED, Deputy Director of fisheries, to inform me about the IOTC working party reunions. I think particularly for Mr. Ahmed SAID SOILIHI, national Supervisor of fisheries Statistics in Comoros, for availability to discuss about data, his support of my document; his comments for the Document are much appreciated. My thanks have addressed to the statistic services in general and the National Directorate of Fisheries to give us this opportunities.

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