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Census of the artisanal fishing fleet in Union of the Comoros



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Abstract

An assessment was financed by the IOTC-OFCF project for evaluating the artisanal fisheries fleets in Comoros on two months. The Comorian fishing fleets are essentially artisanal, locally made and work less than 30 nautical miles from shore in general. The Comorian artisanal fishing vessels are small, with dimensions included under category 1.1 (0.1 – 5.9m) and under category 1.2 (6.0 – 11.9m) defined by FAO. A total of 5,323 boats were inventoried in 2011 against 3,946 units in 1994. Today, 32% of the Comorian fisheries fleet is motorized against 14 % in 1994. Twenty six percents (26%) of fishing operations are done using trolling line, 24 % by using short line and 51 % of all operations target tuna species.

Résumé

Un recensement a été financé par le projet CTOI-OFCF pour évaluer le nombre d'embarcations de la pêche artisanale aux Comores en deux mois. La flottille de pêche est essentiellement artisanale, de fabrication locale et opérant surtout dans la zone marine en dessous des 30 miles nautiques. Ce sont des petites embarcations dont leur dimensions entrent dans la sous catégorie 1.1 (0.1 – 5.9 m) et la sous catégorie 1.2 (6,0 – 11.9 m) définies par la FAO. Un ensemble de 5323 embarcations ont été recensées en 2011 contre 3946 unités en 1994. Actuellement, 32 % de la flottille est motorisée contre 14 % en 1994. Un taux de 26 % des opérations de pêche a été effectué en utilisant la ligne de traine, 24 % à partir de la palangrotte et 51 % de toutes les opérations visent le thon.

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1 CONTEXT

The Comorian fishery has been progressing from 1980 to nowadays. It is exclusively an artisanal fishery (Oirdi, 2002), and exploits essentially pelagic species (Naji and Youssouf, 2007), particularly tuna species, and sometimes night benthic species. During the last decade the Comorian fleet had some units undertaking semi-industrial activities, but there is no national boat practicing industrial fishing yet. 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. The annual production is near 16,000 tons of fish for a total business quantity of fourteen billions Comorian francs (equally 28,455,285 €). The fishery activity had represented 8% of the GDP and 5% of takings and currency (Naji and Youssouf, 2007).

Despite the socio-economic importance of this sector for a coastal country, there is no fishery data collection system to monitor the activities and report statistics to the IOTC as per its requirements. The last fishery statistic including a fishing boat census was done in 1994. Such a census, or frame survey, is necessary to appreciate some fishery monitoring parameters like effort and also to have good idea of the pressure applied at sea by the fleet. So such census should preferably be done every year but the national fishery office is not able to implement it. The 2011 frame survey of fishing vessels was financed by the OFCF (*Overseas Fisheries Cooperation Foundation of Japan*)-IOTC project in conjunction with a sampling programme financed by the IOTC. The catch statistic is currently still ongoing but the boats census was completed end of March 2011.

The aim of this document is to give the preliminary results of the artisanal fleet census that took place in the Union of the Comoros. This study will later provide a baseline to design a stratified sampling programme which should provide reliable estimates of catches by gear, time strata and area.

Seventeen years after the last fishery statistic, many questions are required about many aspects of the fishery: has the total number of fishing boats increased? Were new type of vessels introduced in the fishery? What is the percentage of motorized boats? We have to try to answer even a part of those questions.

2 MATERIAL AND METHODS

2.1 Study area

The study area is constituted by 3 of the 4 islands of the Comoros archipelago, which are Grande-Comore (1148 km²), Anjouan (424 km²) and Mohéli (220 km²) (Bru, 2002). The study focuses on the first 24 nautical miles from the shore, in the whole archipelago (Figure 1). Indeed, most artisanal fishing boats are active in the contiguous zone and only a few boats expand their activities beyond that limit.

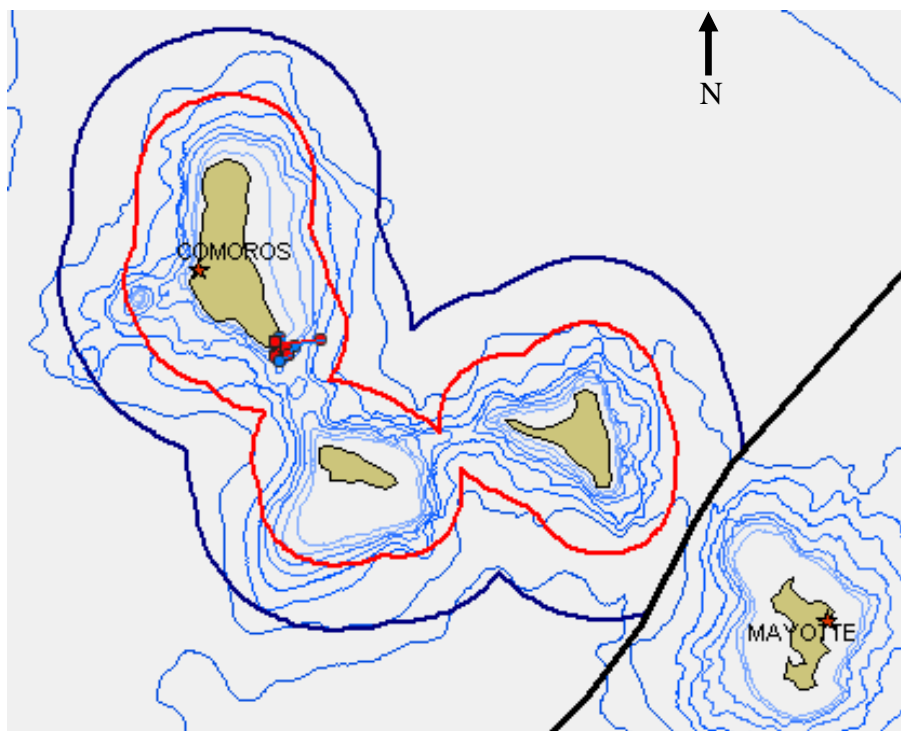


Figure 1: Maritime zone of Union of the Comoros, 3 Islands of Comoros archipelago are covered by the fishery statistic. ----- Line of 12 nautical mile, ----- line of 24 nautical miles, ----- Limit of Comoros EEZ

The census had begun by a number of fishing villages considered as primary and secondary sites, all over the three islands.

2.2 Methodology

A total of thirteen persons have participated to this fleet census. Four investigators to work in coastal villages in Grande-Comore, 2 investigators in Mohéli and 4 others investigators to survey Anjouan Island. A group of three persons is tasked to enter data in a Microsoft Access database. The dataset group is composed of a Database manager and two assistants for data entry.

Six groups of 2 persons were tasked to survey the three islands. Each binomial has a decameter, a GPS and a package of adapted forms.

The fishery fleet is divided into motorized (GAF, FD1, FD2, G18 and JAK) and non-motorized boats (GAP) (Figure 2).



a



b



c



d



e

Figure 2 : different types of fishing vessels in Comoros. a) G18 boats with cale outboard propulsed, b) Sogawa without cale and outboard motor, c) Japawa with inboard motor and cale, d) GAP category, e) JAK (Komacat)

GAF, FD1, FD2, JAK and GAP, are all local names designed little boats; its dimension varies between 2 and 10m.

2.3 Data capture

Three forms have been used:

- Form N°1, information on the village, particularly availability of motor and boat repairation, catch selling facilities and the number of the landing sites (near or far from village).

- Form N°2 to collect general information about landing sites, especially GPS position, the availability or unavailability of equipment us (access road, taxi, market, electricity etc.) also the placement of the fishing vessels in the site. These forms N°1 and N°2 had used only on the first visit in the landing sites and the village. The investigator have needed to its GPS to fill out the form N°2.

- The form N°3 was filled out during the different visits made by the samplers into the landing sites. A count of different fishery boats was done, including the boats on the sea and others one in repairation on land. The Comorian fleets which can have a fishery activity are considered as active. More information from the boats present on the land was required during the investigator (boat lengths, year of building, kind of propulsion, number of member of equipage onboard, fishing gear and kind of conservation etc.). All those information have been obtained by direct observations and the investigator's questions to fishermen, to the village Chief or the previous investigator for the same statistic.

Data have been collected by the investigators and sent regularly to the national office of marine resources in Grande-Comore where it had been verified by the dataset group before putting it into the Microsoft Access database. The data we analyze below are from that database.

3 RESULTS

3.1 Global fishery fleets

3.1.1 Fishery fleets in the total area

The fishing fleet in Comoros is divided proportionally to the size of the 3 islands. The whole fishery units listed from January to March 2011 are presented in table 1 below. Among the fishery fleets only the GAP category is not totally motorized and few units are still using sails while fishing..

Table 1 : Fleet composition (in number of boats and percent of total fleet) classified by category, resulting from the census done in January to March 2011.

	FD1	FD2	G18	JAP	GAF	GAP	Total
Number of boats	49	200	1 263	86	106	3 619	5 323
Percentage	0.92	3.76	23.73	1.62	1.99	67.99	100

The motorized fraction represents 32% of the fishery global fleet while the non-motorized boats represent about 68%.

3.1.2 Fishing fleets by island

All categories are represented in the fishing fleet on each island, which supplies the fish demand for its population.

- Anjouan Island has a total of 2 373 fishing boats of all categories (Figure 3). This represents 45 % of the national fishery fleet. Motorized boats compose 30% of the total and 70% are non-motorized boats.

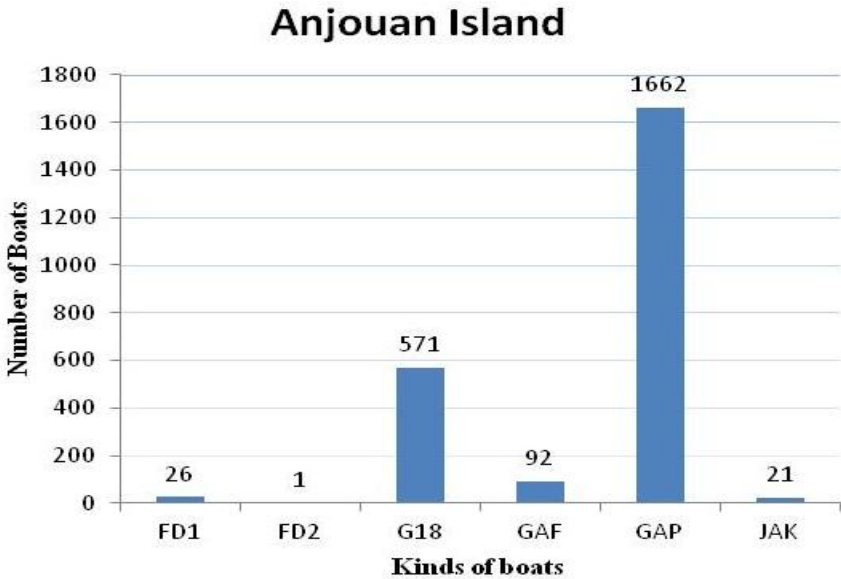


Figure 3 : Distribution of fishing boats by category in Anjouan Island between January and March 2011.

- Grande-Comore Island has 2 612 fishing boats including different types (Figure 4). That total represents 49 % of the national fishery fleet. Among that total fishing boats for Grande-Comore 31% are motorized and 69% are non-motorized.

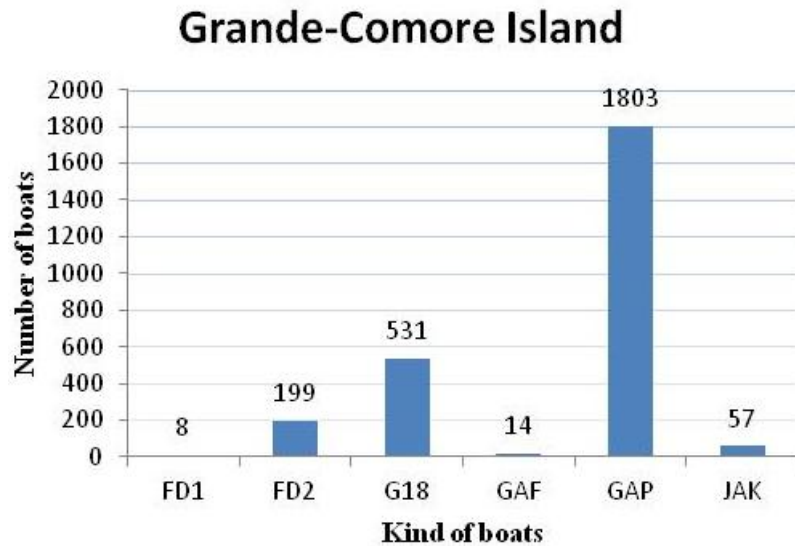


Figure 4 : Distribution of fishing boats by category in Grande-Comore Island between January and March 2011

- Moheli Island has 338 fishing boats (Figure 5) which 54% are motorized and 46% are non-motorized. The whole fishing fleet in Moheli represents 6.35% of the national fishery fleet.

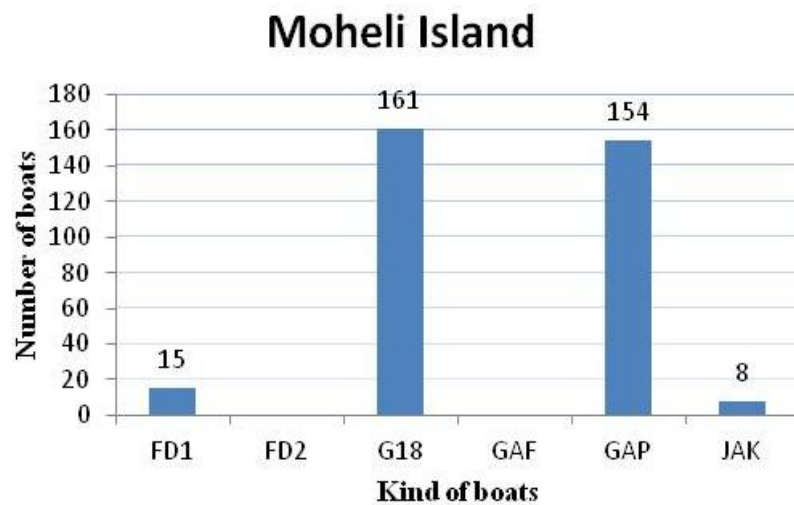


Figure 5 : Division of Fishery boats according to the categories in Moheli Island between January and March 2011

3.2 Vessels size

The artisanal fishing boats are of small size and locally made. Their dimensions vary between 2 and 10.5m long. Those dimensions have been included in the FAO category 1.0 (0.1 – 11.9m long) (Table 2).

	Length (m)		FAO Code 1.0
	Min	Max	Under categ.
GAP	2	7.7	1.2 (6.0-11.9m)
JAK/FD1	2.9	10.5	
FD2	3	10.5	
G18/JAP	3.6	8.8	
GAF	3	7	1.1 (0.1-5.9m)

Table 2 : Categories of the Comorian fishing fleet according to FAO size categories. GAP, JAP, G18, GAF are local name of the artisanal boats.

There are some GAP, JAK and G18 in under category 1.1 and under category 1.2. The GAP category is only under category 1.1 defined by FAO nomenclature.

3.3 Fishing gear used by the artisanal fleet

Eight fishing gears were surveyed in the Comorian fisheries including an unknown category named “other”. Those fishing gears are divided by kind of fishery according to the efficiency of fish operations. The troll line targeting tuna species is the most common gear. Three fishing gears composed more than 15% of the total (Figure 6). Five gears represent less than 15% of the total, of which 4 are below 6%.

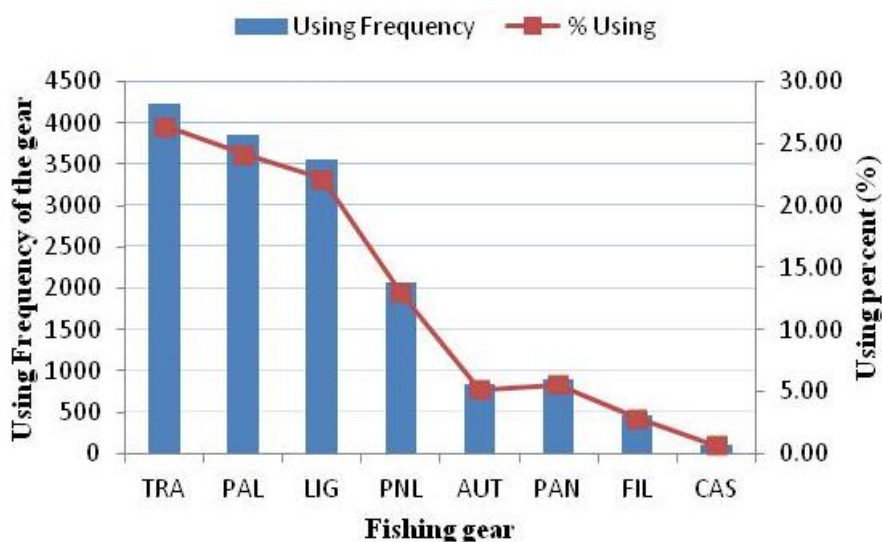


Figure 6 : Distribution of different fishing gears by the national artisanal fleet from January to March 2011. LIG (line for small pelagic), TRA (trolling line), PAL (Short line), PNL (Night fishery with light), PAN (Night Fishery without light), AUT (Other), FIL (gill net), CAS (Trappe)

3.4 Target species by the fishery boats

Four principles species had been identified by the census as target species by the fishing boats. Some species were grouped in “others” and few ones could not be identified by the enumerators (Figure 7). The last census shows that many boats of the Comorian artisanal fleet

(33%) target tuna species. Then follow other pelagic (sardine and barracuda). In Moheli Island, the most targeted species is the grouper.

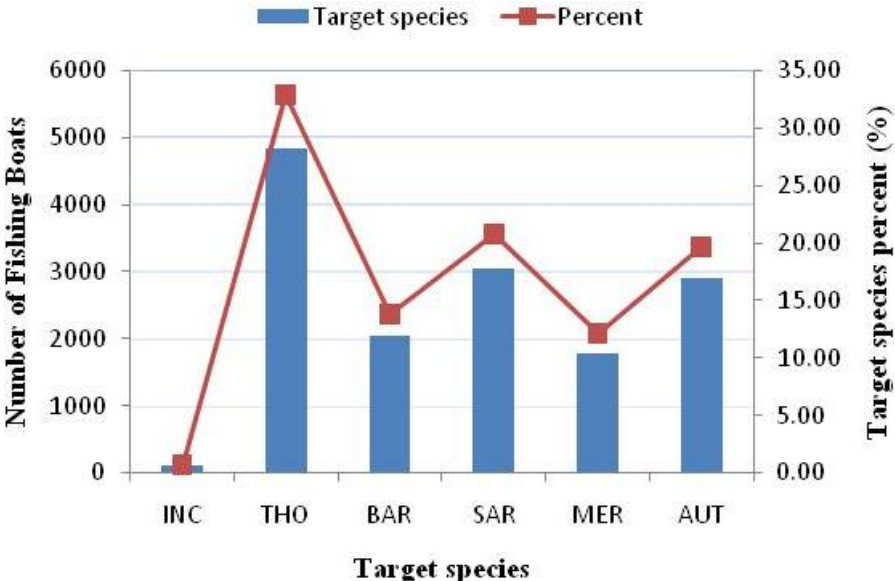


Figure 7 : Number of fishing boats as a function of target species; INC (Unknown species by the investigator), THO (Tuna species), BAR (Barracuda), SAR (Sardine), MER (Grouper) and AUT (Others)

4 DISCUSSIONS

4.1 Evolution in fleet composition

Overall, the artisanal fishing fleet has increased in number from the 1994 census (Figure 8). The Comorian population is increasing with 2.8% of growth rate (2008). In spite of the population growing, from 1994 to 2011 the FD1 category had decreased in that period of time, as the fishermen are no longer interested in this boat type

The FD2 is a medium size. The fishermen are more interested to it compared to FD1, as the quality/price ratio is profitable. The number of FD2 units has increased in 2011 compared to 1994.

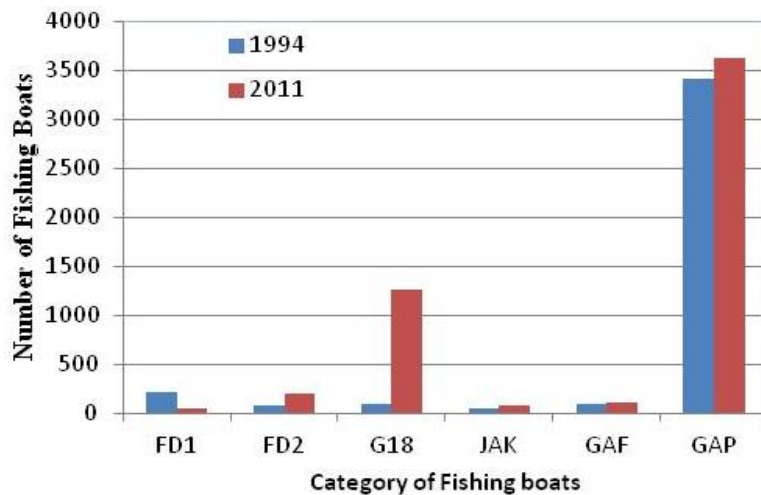


Figure 8: Comparison of the artisanal fishing fleet of Comoros between both censuses.

The JAK category had more boats in 1994 (368) than in 2011 (86). The JAK category includes the Japawa and Komacat. The JAP boats have been offered to the Comorian fishermen in the Japanese cooperation context. After the project, the JAP boat had serious problems of availability for motors and maintenance.. The Komacat is longer and more expensive than the Japawa. But both boats have same performance of propulsion and they exploit the same area. The number of JAP increased from 1994 (44 units) to 2011 (86 units). The G18 category counts many units in 2011 than in 1994. That category has two kinds of boats: G18 and Sogawa¹.

The number of GAF was almost stable between 1994 and 2011 censuses.

4.2 Evolution of total fishing boats by islands

In this paragraph we analyze separately the GAP category from the others. In fact, there are so many GAP boats that the other categories cannot appear in the graph analyze.

- In Anjouan Island, there is an increase of GAP fishing boats from 1994 (1433 units) to 2011 (1662 units) (Figure 9). Here the particularity is the excess number of G18 boats (571 units) in 2011 against 47 units in 1994.

¹ Sogawa is local name for fishing boat

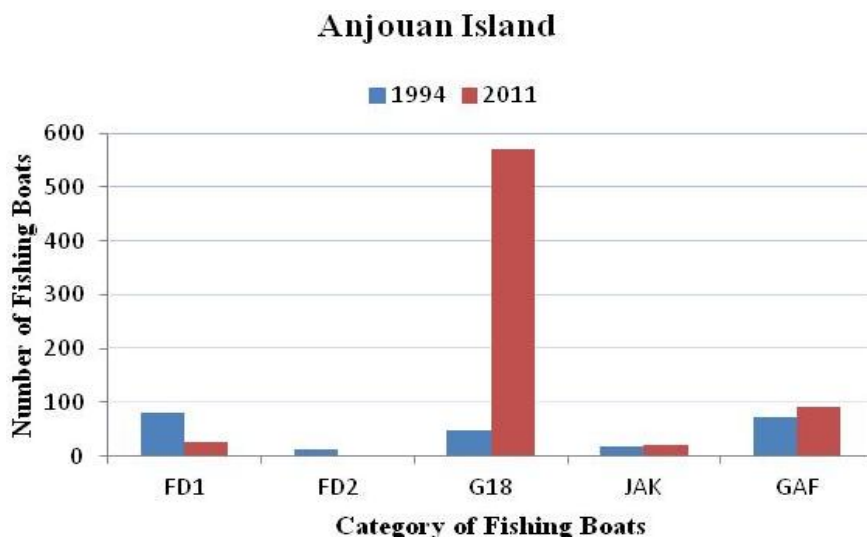


Figure 9 : Variation of total number of fishing boats in Anjouan from 1994 to 2011

The JAK category boats were almost without change between 1994 and 2011. The GAF category has a little increase from 1994 (72 units) to 2011 (92 units). The FD1 category has decreased from 1994 (87 units) to 2011 (25 units) like the national trend. Just one FD2 boat has been counted in 2011; that category is almost inexistent in Anjouan.

- In Grande-Comore Island, a similar situation prevails for the GAP category. The number of GAP boats has increased from 1994 (1734 units) to 2011 (1803 units). There is a trend from the fishermen to leave the FD1 category boat in favour of the FD2 category (Figure 10). The GAF category boats have stayed in stable level between the both censuses.

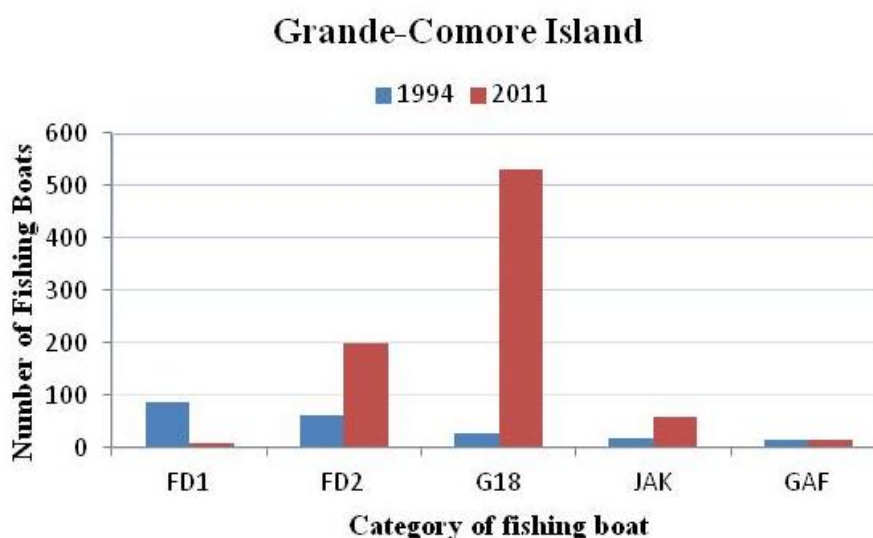


Figure 10 : Variation of the total fishing boats in Grande-Comore Island between 1994 and 2011

The G18 category increased substantially from 1994 (28 units) to 2011 (531 units). The JAK category boats has also increased from 1994 (18 units) to 2011 (57 units).

- In Moheli Island, none FD2 category boats neither GAF category had been counted in 2011 (Figure 11). The GAP category has decreased from 1994 (236 units) to 2011(154 units).

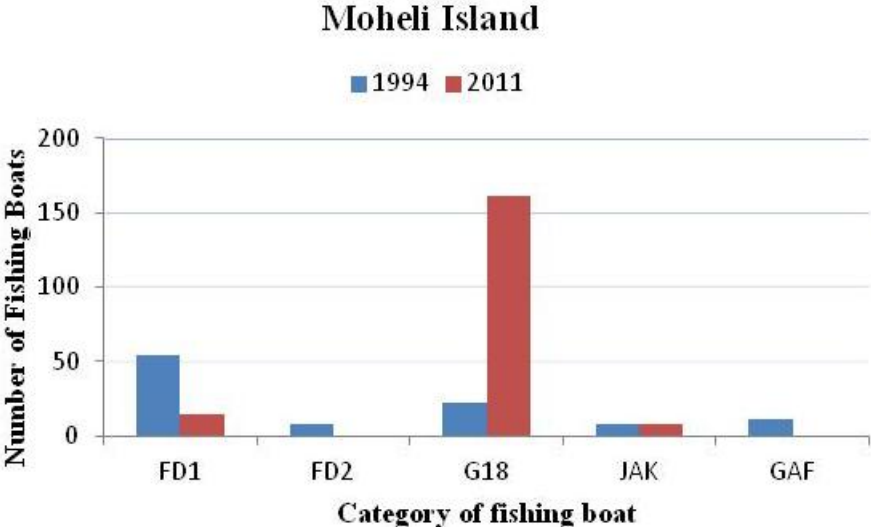


Figure 11 : Variation of the total number of fishing boats in Moheli Island between 1994 and 2011.

The G18 category evolution follows the national trend, many G18 are censured in 2011 and there are a few of JAK category as much in 1994 as in 2011.

4.3 Evolution of fishing gears

In this paragraph our observations are restricted to 3 important fishing gears for which data are available in 1994 and 2011. The most used fishing gear by the artisanal fishermen is trolling line (Figure 12). That fishing gear was used by different boats. If we compare only 3 fishing gears (LIG, TRA and FIL),the trolling line using has grown from 11.30% in 1994 to 51.35% in 2011. Even if this gear consumes much oil, it is the first most used fishing gear for the Comorian fishermen.

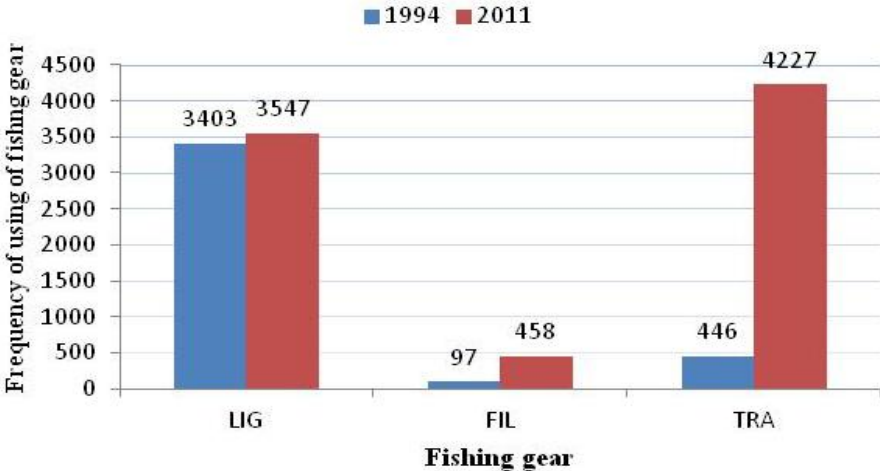


Figure 12 : Frequency of using of fishing gear by artisanal fishermen between the previous and the new census. LIG (hand line for small pelagic), FIL (Gillnet), TRA (Trolling line)

The use of hand line has increased from 3403 in 1994 to 3547 times in 2011. The using ratio has not very different between the both censuses. The use of gillnet has increased from 2.46% in 1994 to 5.56% in 2011. With the total fishing boats available in 2011, 5% represent a little part of total boats.

4.4 Activities' constraints

During the survey, two major constraints appeared. Firstly, the investigators have been confused between the different fishing gears' names. In consequence, the LIG (hand line for small pelagic) was found to be the first gear, which was quite unexpected. Two hypotheses may explain that wrong result: the names of three fishing gears are almost the same in the Comorian language. The confusion comes from the Comorian translation of the different gears. The census was taken place on the abundance period of some small pelagic species. The fishing gear used against them is LIG.. The proposal was to consider the LIG gear which the target species is tuna as PAL (short line) or TRA (trolling line) according to the situation (Annex). Therefore, this correction led to have "TRA" as the dominant fishing gear used.

Secondly, the investigators have considered the different quarters of the largest towns, as villages. So the list of village apparently increased whereas this number remained unchanged from 1994 to 2011. That problem will be solved by a mission by an IOTC expert. We have to control specifically the villages' names and the problem is not totally resolved.

5 CONCLUSION

During the seventeen years since the latest fishing boat census, the Comorian artisanal fleet has greatly evolved. It is composed by little fishing boats, with size below 12m following the FAO nomenclature. A total of 5323 artisanal fishing boats have been censused in 2011 against 3945 units in 1994. This part represents about 30% growing rate of global fleet from 1994 to nowadays. Among that total fishing boats, 32% are now motorized against only 14% in 1994. A rate of about 26.42% of the fishing operations have done using trolling line, 43% with trolling line and 33% of all those operations target tuna species. The census conducted in 2001 was crucial to update the monitoring of the Comorian fishery.

Acknowledgment

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Annex

Previous data for gear and target species

Engin	EspèceCible	FreqUtilisation
AUT	AUT	217
AUT	BAR	223
AUT	MER	212
AUT	SAR	63
AUT	THO	116
CAS	AUT	75
CAS	MER	8
CAS	SAR	26
CAS	THO	3
FIL	AUT	189
FIL	BAR	15
FIL	MER	100
FIL	SAR	149
FIL	THO	5
LIG	AUT	853
LIG	BAR	570
LIG	MER	752
LIG	SAR	1369
LIG	THO	1077
PAL	AUT	672
PAL	BAR	331
PAL	MER	375
PAL	SAR	668
PAL	THO	737
PAN	AUT	256
PAN	BAR	244
PAN	MER	263
PAN	SAR	67
PAN	THO	63
PNL	AUT	521
PNL	BAR	366
PNL	MER	187
PNL	SAR	897
PNL	THO	106
TRA	AUT	367
TRA	BAR	428
TRA	MER	15
TRA	SAR	6
TRA	THO	3411

After managing data

Engin	Cible	Freq
AUT	AUT	217
AUT	BAR	223
AUT	MER	212
AUT	SAR	63
AUT	THO	116
CAS	AUT	75
CAS	MER	8
CAS	SAR	26
CAS	THO	0
FIL	AUT	189
FIL	BAR	15
FIL	MER	100
FIL	SAR	149
FIL	THO	5
LIG	AUT	853
LIG	BAR	570
LIG	MER	752
LIG	SAR	1369
LIG	THO	3
PAL	AUT	672
PAL	BAR	331
PAL	MER	375
PAL	SAR	668
PAL	THO	1814
PAN	AUT	256
PAN	BAR	244
PAN	MER	263
PAN	SAR	67
PAN	THO	63
PNL	AUT	521
PNL	BAR	366
PNL	MER	187
PNL	SAR	897
PNL	THO	106
TRA	AUT	367
TRA	BAR	428
TRA	MER	15
TRA	SAR	6
TRA	THO	3411