Central American Region Maritime Organization and their Role in the occurrence of maritime casualties

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Keywords: maritime security, maritime casualties, Central American Region, accidents on board

ABSTRACT

Since many years ago and in spite of the existence of national regulations and international conventions ratified by the countries that are conformed the Central American Region (CAR), the seagoing maritime sector of this Region, has developed its activity without any type of safety measures. Therefore, a large number of people are known to die, disappear and suffer from serious injuries each year. These maritime casualties devastate the families affected by these events, and severely impact the local social and economic well-being. While all these accidents occurred in this Region, non government or any other official records are available recording these casualties

Due to the lack of any historical written reports about maritime casualties occurred in this Region, the compilation of this type of accidents information and data was carried out directly by the researchers in the field. Also, all the information about the CAR Maritime Organization Components was too compiled by the authors from the respective National Maritimes Authorities.

From the compiled information was elaborated the CAR maritime casualties data base and from the analysis of the above data base were determined the main causes of the maritime accidents occurred in the CAR. The lack of safety measures onboard and the ignorance of the presence and influence of atmospheric phenomena were among main factors that had been caused the maritime casualties in this Region. By other hand, from the analysis of the CAR maritime organization components, the existence of one level of organization very similar among them was determinate. The objective of this research was to analyze the role of the CAR maritime organization in the prevention of the occurrence of maritime casualties.

The results of this study provides general understanding of the causes of this type of accidents in the CAR and basis for support in improving safety navigation system and measures so that the number of fatalities and maritime accidents may be reduced in the future.

I. Introduction

1.1 CAR and their Maritime Problematic

According to the provisions of article 94 of the United Nations Convention on the Law of the Sea[1] (UNCLOS), "a flag State shall cause an inquiry into every maritime casualties or incidents of navigation on the high seas involving a ship flying its flag and causing loss of life or serious injury to national of another State, which might pose a risk to life or to the environment, involve the coastal state search and rescue (SAR) authorities, or otherwise affect the coastal State". Also, under relevant IMO conventions, such as SOLAS[2] regulation I/21 and MARPOL 73/78[3] articles 8 and 12, "each Administration undertakes to conduct an investigation into any casualty occurring to ships under its flag subject to those conventions and to supply the IMO with pertinent information concerning the finding of such investigations". The Load Lines Convention article 23 also requires the investigation of casualties. In compliance with the international regulations mentioned in the above, many countries have established a specific authority to carry out maritime casualty investigations, such MAIA in Japan, MAIB in the United Kingdom, and NTSB in the USA.

In the case of the Central American Region (CAR) and according with the results of the investigation compiled by Porras et al [4], in spite of, the high amount of maritime casualties occurred in this Region, the information about these casualties has not been reported in official documents.

By other hand, the high amount of persons death and disappear happened between 1980 and 2004, by the maritime casualties in the Pacific side of the Central American Region and the high fatality rate calculated by 100,000 persons, was the base to supposed that the cause of this problematic would be the inexistence of a Maritime Organization on the Central American Region.

The reason why Japan was selected as the country of comparison with CAR is because Japan is an island country with long maritime tradition and it has a record of maritime casualties. Other important reason, that can be observer in section 3.9 (Fig. 8), is based on the historic decreasing of the amount of Japanese dead and disappear persons from 1980, and the maintenance of a low fatality rate.

1.2 Authorities responsible of the CAR and Japan Maritime Organization and their Competences

Based on the existent legislation on each one of the respective CAR countries and Japan, Table 1, shown the IMO entry year and the existence or nonexistence of responsible authorities in each nation, with regard to National, Port and Maritime Authority. Also, Table 1 shown the difference in competency of these countries. In the CAR case, the Aids to Navigation & Lighthouse maintenance is under the responsibility of the Port Authority, whereas in the Japan case, is under the Coast Guard's responsibility. The Harbour Master Control, however, is under the responsibility of the Maritime Authority in all countries. Depending on the country, the maritime vigilance control is under the Naval Forces (Republics of Guatemala, El Salvador, Honduras and Nicaragua) or under the Coast Guard Service control. In relation to the Port State Control, the same obeys to the ratification of Solas 74, an IMO convention. In the CAR case, with the exception of the Republic of El Salvador, all countries have legislation to ejected the Port State Control, and in Costa Rica and Nicaragua this responsibility are supported by national regulations. In all cases this responsibility is under the Maritime Authority.

By other hand, the existence or nonexistence in each nation of certifications concerning to ships and crews are also shown in table 1. With regard to Ship Property Register, Ship Inspection Certification and Ship Navigation Certification, the responsibility is under the Maritime Authority. In relation to the Tonnage Certification, the same is linked to the ratification of Load Lines 66, an IMO convention. The Tonnage Certification competency is not applied on the Republic of El Salvador. In Costa Rica, however, this competence is supported by national regulations. In all countries this competency is under responsibility of the Maritime Authority. With respect to the Crews Certification, this competency is linked to the STCW, an IMO convention.

Table 1 CAR and Japan Maritime Authorities and Maritime Competences

	IMO	N Auth	P Auth	M Auth	A Nav	Harb Mast	M Vig	Port State	Prop Reg	Insp C	Nav C	Tonn C	Crews C
Guatemala	1983	O	O	O	O	O	O	O	O	O	O	O	O
El Salvador	1981	O	O	O	O	O	O	X	O	O	O	X	X
Honduras	1954	O	O	O	O	O	O	O	O	O	O	O	O
Nicaragua	1982	O	O	O	O	O	O	O	O	O	O	O	X
Costa Rica	1981	O	O	O	O	O	O	O	O	O	O	O	X
Panama	1958	O	O	O	O	O	O	O	O	O	O	O	O
Belize	1990	O	O	O	O	O	O	O	O	O	O	O	O
Japan	1958	O	O	O	O	O	O	O	O	O	O	O	O

Abbreviations used: N(National); P(Port); M(Maritime); Auth(Authority)A Nav (Aids to Navigation and Lighthouse maintenance); Harb(Harbour); Mast(Master); Vig(Vigilance); Prop(Property); Reg(Register); Insp(Inspection); C(Certification); Nav(Navigation); Tonn(Tonnage)

1.3 IMO conventions related to Ships and Crews ratified by CAR and Japan

Table 2, contains the list of IMO[5] conventions related to Ships and Crews, ratified by the CAR countries and Japan. The countries of the CAR has a ratification rate of 39% of the total of the IMO conventions related to Ships and Crews, whereas Japan has a ratification rate of 94%.

Table 2 IMO conventions related to Ships and Crews ratified by CAR and Japan

	LL 66	LL 88	TO 69	IN 69	IN 73	COL 72	CSC 72	Solas 74	Solas 78	Solas 88	IM 76	IM OA	IM 98	STCW	SUA 88	SUAP 88
Guatemala	O					O		O		O				O		
El Salvador			O			O									O	O
Honduras	O		O			O	O	O	O					O		
Nicaragua	O	O	O	O	O	O										
Costa Rica											O	O			O	O
Panama	O		O	O		O		O	O		O	O	O	O	O	O
Belize	O		O			O		O	O					O		
Japan	O	O	O	O		O	O	O	O	O	O	O	O	O	O	O

Abbreviations used: LL 66 (Load Lines 66); LL 88 (Load Lines 88); TO 69 (Tonnage); IN 69 (Intervention on the high seas in case of oil pollution casualties); COL 72(Collision Regulation); CSC 72 (Safe Container); SOL 74 (Solas 74); SOL 78 (Solas 78)

1.4 IMO conventions related to Pollution ratified by CAR and Japan

Table 3 contains the list of IMO conventions related to Pollution, ratified by the CAR countries and Japan. The countries of the CAR has a ratification rate of 50% of the total of the IMO conventions related to Pollution, whereas Japan has a ratification rate of 92%.

Table 3 IMO conventions related to pollution ratified by CAR and Japan

	LC 72	CLC 69	CLC 76	CLC 92	Marpol I/II	Marpol III	Marpol IV	Marpol V	Marpol 97	OPRC	FUN 71	FUN 92
Guatemala	O	O			O	O	O	O				
El Salvador	O	O	O	O						O		
Honduras	O	O			O			O				
Nicaragua		O	O		O	O	O	O				
Costa Rica	O	O	O									
Panama	O	O		O	O	O	O	O	O		O	O
Belize		O	O	O	O	O	O	O				O
Japan	O	O	O	O	O	O	O	O		O	O	O

Abbreviations used: LC 72 (London Convention); CLC 69 (Civil Liability for Oil Pollution Damage); OPRC (Oil Pollution Response and Cooperation); FUND 71 (Fund Compensation Oil Pollution Damage)

1.5 ILO conventions related to Crews ratified by CAR and Japan

Table 4 contains the list of ILO[6] conventions related to sea workers, ratified by the CAR countries and Japan. The countries of the CAR has a ratification rate of 30% of the total of the IMO conventions related to Pollution, whereas Japan has a ratification rate of 37%.

Table 4 ILO conventions ratified by CAR and Japan

	C8	C9	C16	C22	C23	C53	C55	C56	C58	C68	C69	C71	C73	C74	C92	C108	C109	C112	C113	C114	C119	C125	C126	C133	C134	C137	C147
Guatemala			O						O							O	O	O	O	O	O						
El Salvador																											
Honduras																O											
Nicaragua	O	O	O	O	O																O					O	
Costa Rica	O		O												O			O	O	O					O	O	O
Panama	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O		O	O	O	O	O	O				
Belize	O		O	O	O		O		O		O		O		O	O								O	O		O
Japan	O	O	O	O					O		O		O								O				O		O

Abbreviations used: see reference (ILO)

2. Method

Due to the lack of any historical written reports about maritime casualties occurred in this Region, the compilation of the maritime casualty information and data was carried out directly by the researchers in the field. The information was compiled by personal communication means way, from the origin source, such as, maritime workers associations and cooperatives, Fishermen Cooperatives members (El Salvador, Guatemala and Nicaragua), fishermen independents, ship-owners. Furthermore were read and transcribed all the neglected daily hand workbooks beginning since 1980 of the Coast Guard Service of Costa Rica, abandon without any care. The information was compiled personally, by hand process way, firstly as textual form and then was to digitize in the computer as data base. About each one of the casualties occurred, was compiled information such as, casualty's date and type, ship's position, build material and length, ship's type involved in the casualty, persons affected by the casualty, cause and consequences of the casualty. During the investigation, were compiled 2,479 data and then analyzed. Furthermore with the purpose of know the atmospheric influence on the maritime casualties occurred in the Pacific side of the CAR, from National Oceanographic Atmospheric Administration[7] were analyzed, weekly sea surface temperature satellite images and information about hurricanes and tropical torments, corresponding to the selected period of time. Also, based on the compiled information was calculated the CAR mortality rate per 100,000 persons. And then, was compared with the Japanese mortality rate calculated, which was base on the information provide by the Kainan statistics of the Japan Ministry of Land, Infrastructure and Transport [8], the Japanese Coast Guard[9] and the Japanese Fishery Agency [10].

By other hand, the analysis of the CAR maritime organization components was carried out on the information compiled from each of the CAR countries. All the information was obtained by the authors from the respective CAR maritime authorities[11], national legislation and the existing IMO and ILO international conventions related to maritime affairs and ratified by this Region. The data on different authorities (national, port and maritime), were analyzed for their specific competency in aids to navigation and lighthouse operation and maintenance, harbour master control, maritime vigilance control and port state control. In addition, their competency with respect to the ships and crews, such as ship property register, ship inspection certification, ship navigation certification and ship tonnage certification were also analyzed. Furthermore, their competency with respect to the maritime education and the crew competency certification as well as the legislation in which the maritime authorities based their competency was also analyzed. In order to establish a comparison parameter the CAR compiled information was compared against the Japanese compiled information obtained from the respective sources. From the comparison, the differences among the CAR and Japan organization were obtained.

3. Results

3.1 Maritime Casualties types occurred in the Pacific side of the CAR

Based on the compiled data, various types of maritime casualties occurrences between 1980 and 2004 are graphed as Fig. 1. Fig. 1 shows that Capsize (41%) and Machinery Failure (36%) account for the majority of the maritime casualties in this Region. The occurrence of other types of maritime casualties were relatively low and included Ships Missing (7%); Sinking (6%); Flooding (4%), Grounding (3%) and Fire (3%).

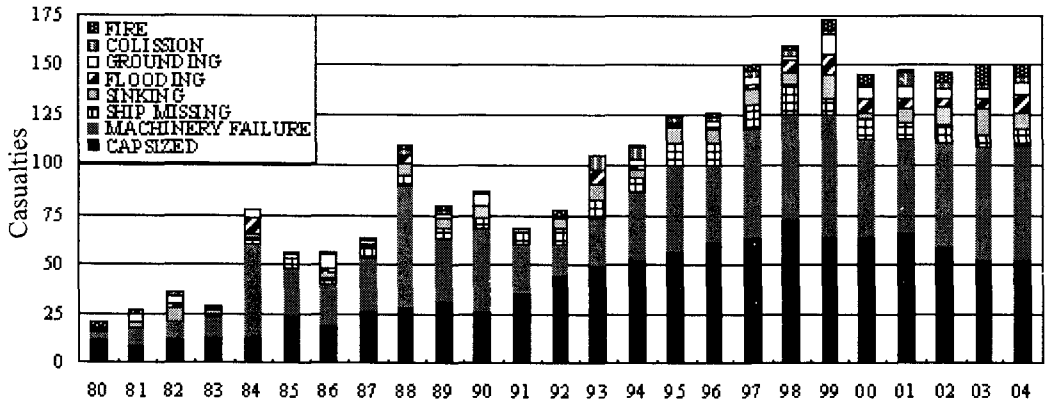

Fig.1 Maritime Casualties types occurred on CAR

3.2 Type of ships involved in the maritime casualties occurred

The type of ships involved on the maritime casualties occurred between 1980 and 2004, in the Pacific side of the CAR, are presented in Fig. 2. Fig. 2 shown 95% of all that maritime casualties happened onboard on fishing boats.

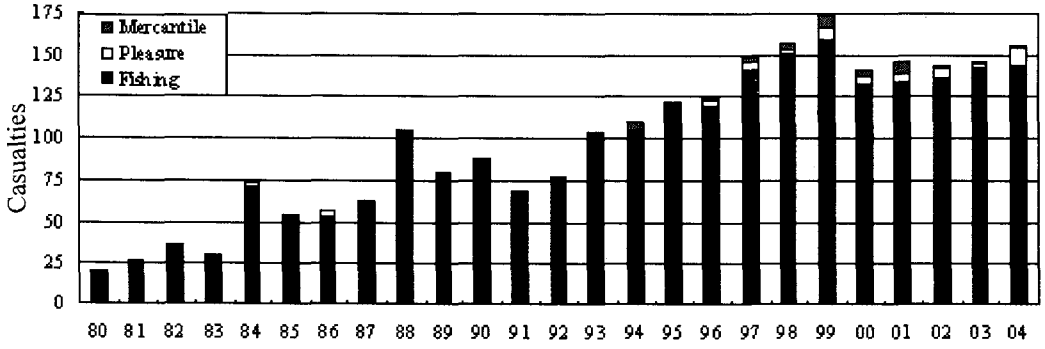

Fig. 2 Ship's type involved in the maritime casualties occurred

3.3 Characteristics of the fleet involved in the maritime casualties occurred

The analysis of the information obtained during this research revealed that the characteristics of the ships, specifically decked or undecked, played significant role in the occurrences of maritime casualties. Fig. 3 presents the characteristics of the ships that encountered maritime casualties between 1980 and 2004.

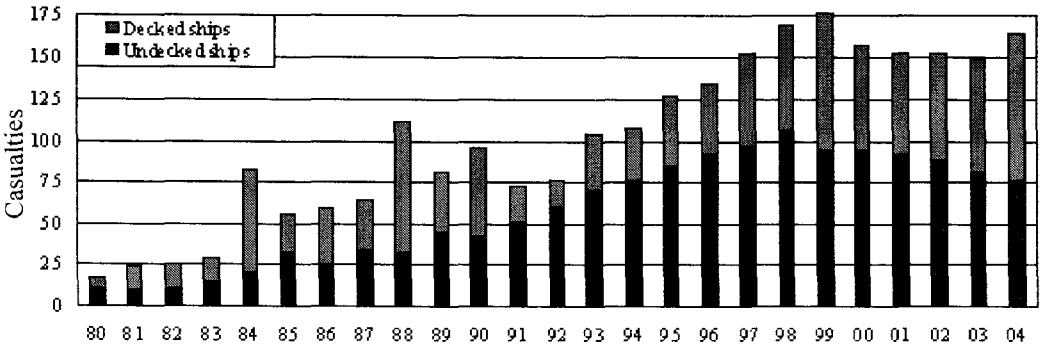

Fig. 3 Characteristics of the fleet involved in the maritime casualties occurred in the CAR

3.4 CAR Seagoing Fleet Characteristics

The CAR seagoing fleet is characterized by two types of ships, specifically decked ships and undecked ships. Those ships characterized as undecked vessels (shown in photo 1) are generally shorter than 8 meters in length, propelled by one or two outboard motors and constructed of fiberglass. Today, fishermen onboard undecked vessels sail over 100 nautical miles in search of sharks without any type of communication device and generally only equipped with GPS and magnetic compass. Onboard undecked type of ships have happened the 63% of all the maritime casualties occurred in the mentioned Region.

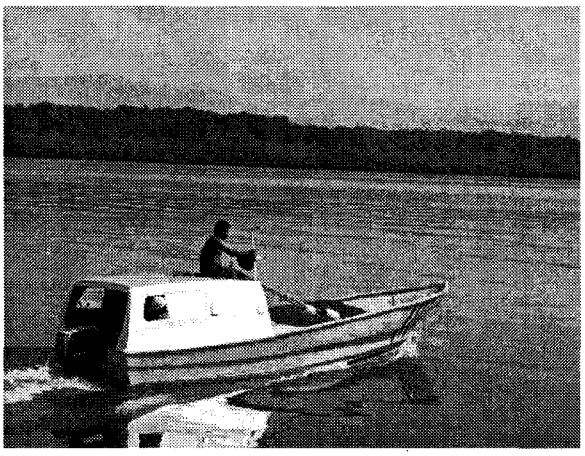

Photo 1 Undeck type of ship used in the CAR

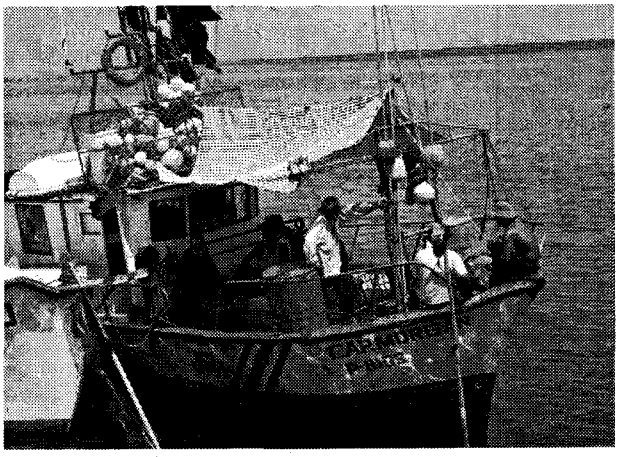

Photo 2 Decked ship type used in the CAR

On the other hand, decked ships (shown in Photo 2) are generally longer than 8 meters in length and lower than 24 meters, propelled by internal motors, often with mechanical working power and usually constructed of wood. Over 50% of this fleet use second-hand engines, which are designed for land vehicles. Today, fishermen onboard decked vessels sail between 300 and 2,000 nautical miles in search of productive fishing zones only equipped with GPS, magnetic compass, and sometimes with SSB radio communication system. This type of ships is actually used along the Pacific side of the Central American Region.

3.5 Types of maritime casualties by ship's characteristics happened onboard occurred in CAR

The percentages of maritime casualty's types that occurred between 1980 and 2004 are tabulated according to the ship's characteristics in Table 5.

Table 5 Casualties types happened onboard undecked ships and decked ships, expressed as percentages

	Capsized	Mach Fail	Ship Missing	Grounding	Flood	Sink	Collision	Fire	TB
Undecked ships	63%	21%	9%	----	----	4%	----	----	1%
Decked ships	----	60%	3%	9%	9%	7%	6%	6%	----

Abbreviation used: Mach Fail (Machinery Failure); Flood (Flooding); Sink (Sinking); TB (Thunderbolt)

Table 5 shows that Capsize (65%) and Machinery Failure (21%) constitute the majority of the maritime casualties occurred in undecked ships. The remaining is constituted by Missing ships (9%), Sinking (4%) and Thunderbolt (1%). On the other hand, Machinery Failure (60%) was the single largest category of maritime casualties in decked ships, and the following constitute the remainder of the casualty's types; Grounding (9%), Flooding (9%), Sinking (7%), Collision (6%), Fire (6%) and Missing ships

3.6 Influence of the Atmospheric conditions on the maritime casualties occurred in CAR

Based on the analysis of the information contained in the NOAA, weekly sea surface temperature satellite images archive, were obtained the major atmospheric phenomena that occurred between 1980 and 2004 on the Pacific side of the CAR. Fig. 4 shows the existence of an annual increase in the amount of maritime casualty's cases occurred until 1999. The occurrences of atmospheric phenomenon are indicated by the arrows on the figure. The occurrence of the last atmospheric phenomenon in this Region is reported in 1999. However, based on the analysis of the weekly sea surface temperature satellite images archive, this Region has continued to be affected by abnormal heating of the sea water temperature which has a similar effected by El Nino even after 1999.

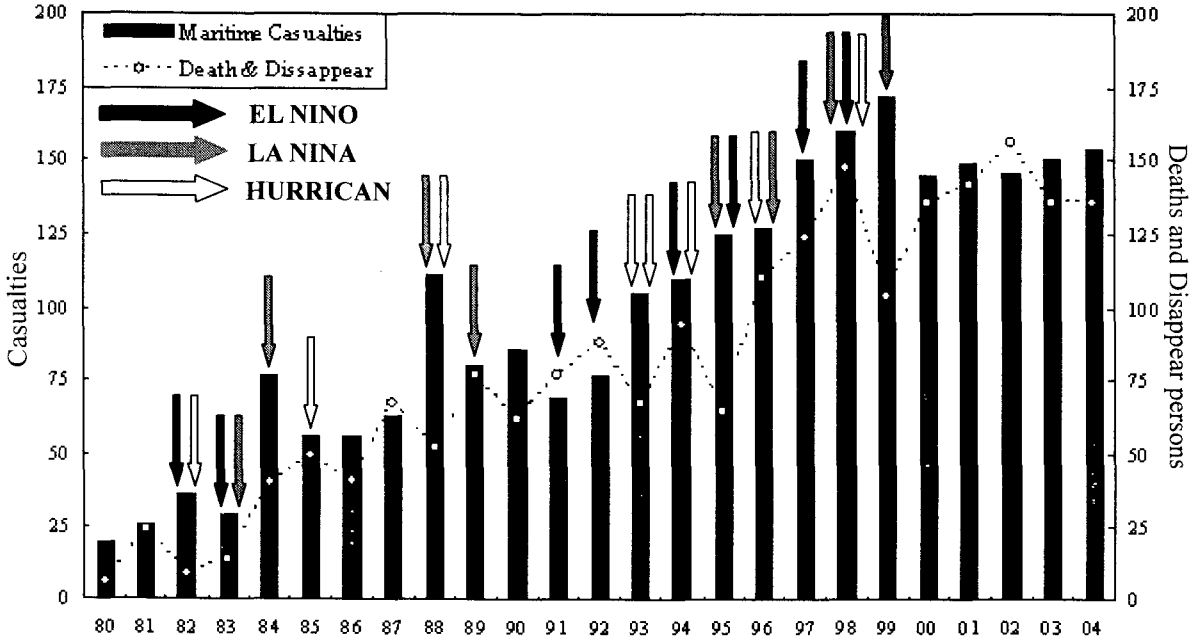

Fig 4 Influence of the Atmospheric phenomenon on the maritime casualties occurred on the Pacific side of CAR

According to the above information, it can be assumed that one of the main cause of the maritime casualties in this Region are associated with atmospheric phenomenon such as hurricanes, tropical storms, El Niño and La Niña. As a result of the changes in sea temperature from El Niño and La Niña, the fish shoal tend move to areas where the ocean conditions are normal. In these cases, the CAR fishermen tend to sail further away from the coast in search of new fish ground. This is the case of thousands of fishermen, which onboard his undecked ships, must sail distances over 100 nautical miles away the coast, without any safety measures and without any type of communication system. A similar situation is faced by thousands of fishermen, which onboard his old decked ships, whose lengths are within 8 and 20 meters, must sail distances of 300 to 2,000 nautical miles away the coast, These situations frequently result in maritime casualties.

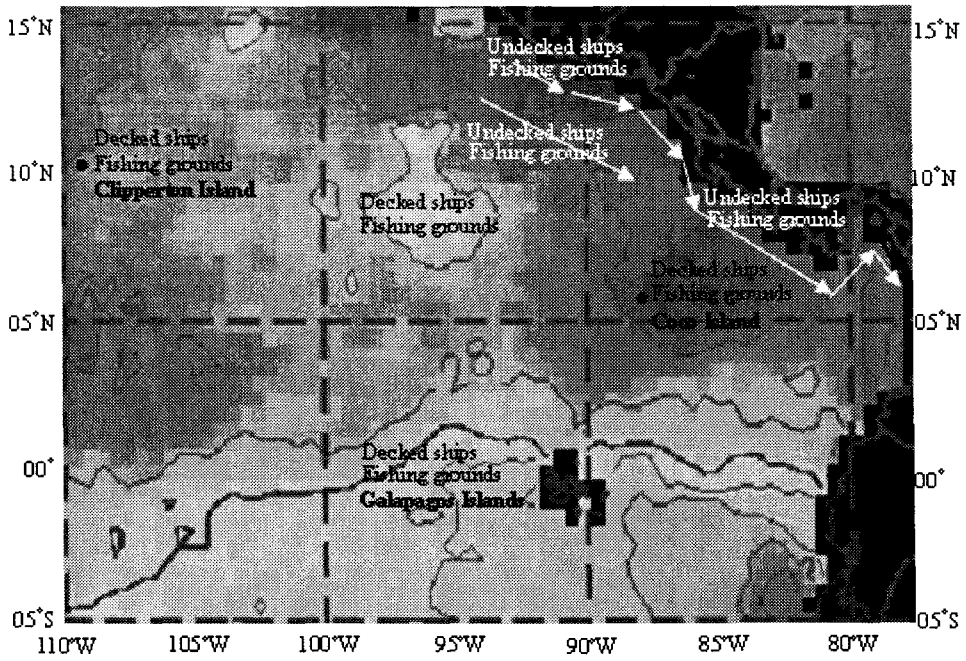

Fig. 5 Influence of the atmospheric phenomenon EL NINO on the CAR Fishing grounds distribution

3.7 Fleet evolution occurred in the Pacific side of the CAR

Based on the information compiled through personal communication and the information obtained from the Central American Census of the Fisheries Sector [12], published in 2000, was possible make one reconstruction of the evolution of the CAR fleet, occurred between 1980 and 2004. Fig. 6 shows that during the analyzed period of time, the number of undecked ships increased 11 fold while the increase in the decked ships fleet was only 1.7 times.

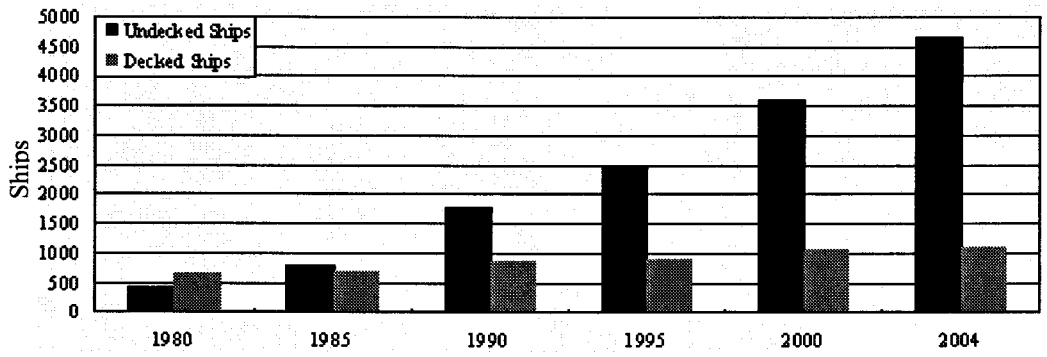

Fig. 6 Fleet evolution occurred in the CAR

3.8 Persons affected by the maritime casualties occurred in the CAR

Based on the information compiled during this investigation, the number of people affected by the maritime casualties on the Pacific side of the CAR is presented in Fig. 7. Fig. 7 indicates that the total number of maritime casualties (injured, dead and missing persons) has an increasing trend.

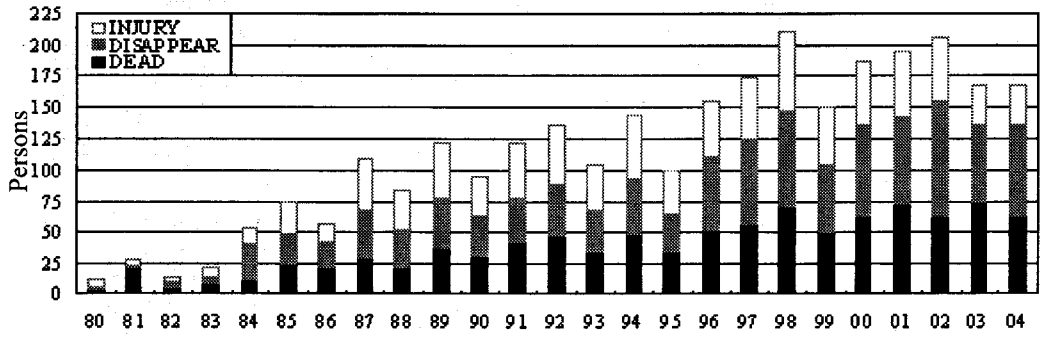

Fig. 7 Persons affected by the maritime casualties

3.8.1 Persons affected by the maritime casualties occurred onboard undecked ships and decked ships in the Pacific side of the CAR

Based on the information compiled and analyzed during the investigation conducted was elaborated the Table 6.

Table 6 Persons affected by the maritime casualties occurred between 1980 and 2004

	Deaths	Disappear	Injured
Undecked ships	867 persons (42%)	862 persons (41%)	359 persons (17%)
Decked ships	121 persons (15%)	174 persons (21%)	524 persons (64%)

From Table 6, it can be seen that, the amount of persons death and disappear between 1980 and 2004, onboard undecked ships is near 6 times more higher than the occurred onboard decked ships. But, onboard deck ships the amount of people injured were lower than the occurred onboard undecked ships. The possible reason is the large and tired working periods and the use of mechanical systems without any safety measures.

3.9 CAR and Japan Fatality Rate

Based on the number of death and missing persons caused by the maritime casualties occurred between 1980 and 2004 on the Pacific side of the CAR and Japan, the fatality rate (fatality per 100,000 persons) was calculated and plotted in the Fig. 8. In order to establish a reference point, these fatality rates were compared with the information compiled from the Japan Coast Guard Statistics, Marine Accident Inquiry Agency and Japan Fisheries Agency. The right vertical axis of the Fig. 8 represents the fatality rate by 100,000 persons and the left vertical axis represents the number deaths and missing persons due to maritime casualties. The Japanese mortality rate is shown in circles and the Central American Region values are represented by triangles. The black vertical columns represent the number of dead and missing Japanese persons during maritime casualties occurred and the grey column represents those in the CAR case.

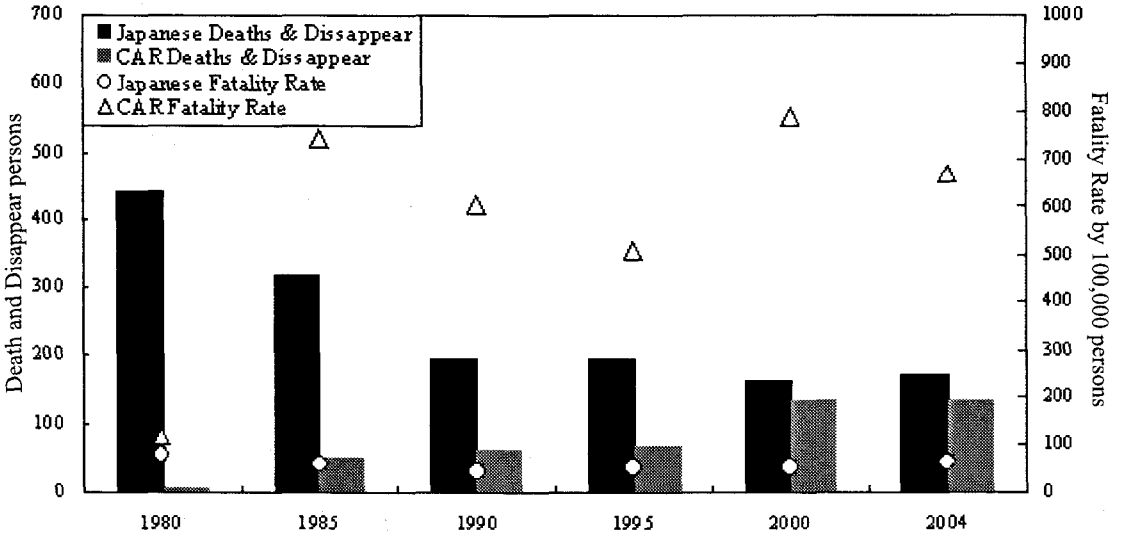

Fig.8 Comparison between the CAR and Japan Fatality Rate and Dead and Disappear number of persons

3.10 CAR and Japan Maritime Organization Components Comparison

Based on the information compiled by the authors during this study, results are tabulated in tables 1~6 and Fig. 9 (a) and Fig. 9 (b). Fig. 9 (a) shows the configuration of the components that conform to the CAR Maritime Organization. Whereas from Fig. 9 (b), the configuration of the components that conform the Japan Maritime Organization can be observed. The use of italicized and bolded letters corresponds to the difference in organizational components between the CAR and Japan Maritime Organization. Also is important to mention here, that within each one of the respective organization analyzed, only those components related to the theme of this research, were included within the Fig. 9 (a) and Fig.9 (b)

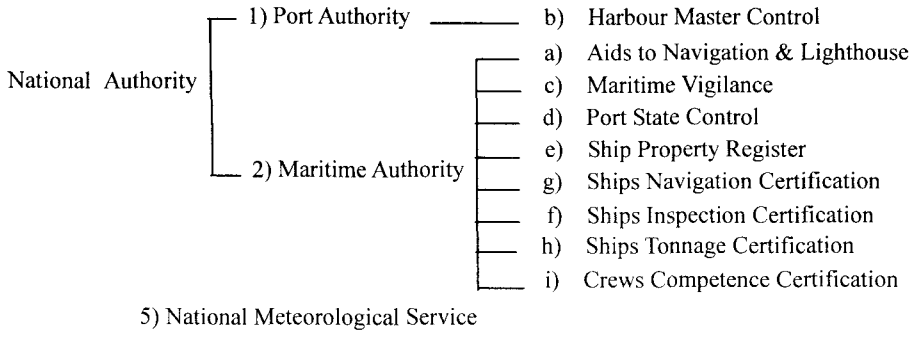

Fig. 9 (a) CAR Maritime Organization Components

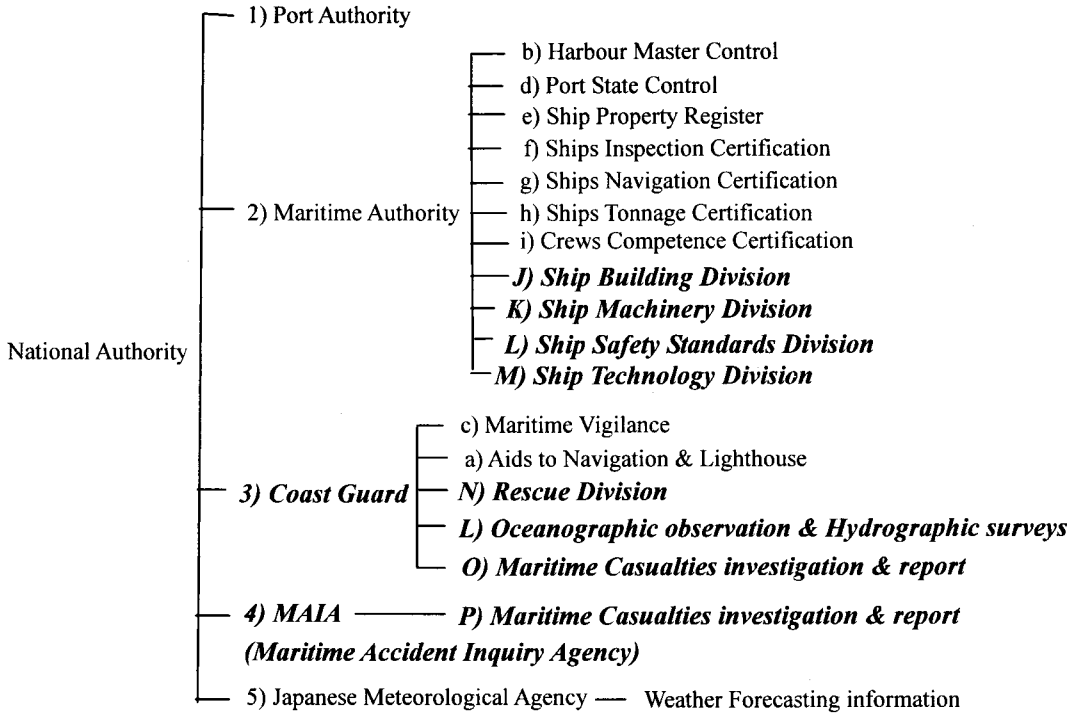

Fig. 9 (b) Japan Maritime Organization Components

3.11 Analysis of the differences in the organizational components between the CAR and Japan Maritime Organization

Among the differences observed between the two organizations, one of the main findings is that the Japanese Coast Guard works as an independent authority, and mainly carries out rescue tasks in maritime casualty events. They also conduct an investigation on each maritime casualty and write reports of all maritime casualties. In addition, the Coast Guard provides weather information to the maritime sector. In contrast, the CAR Naval Forces or Coast Guard Service only carries out the maritime vigilance function and rarely performs any rescue tasks. In the case of the Maritime Authority, the Japanese organization carries out additional four tasks that are crucial in the prevention of maritime casualties. Such tasks are related to the Maritime Authority's competency of Ship building, Ship Machinery, Ship Safety Standards and Ship Technology, designed by J, K, L and M capital letters in section 3.10.

In addition, the Japanese Maritime Organization has another authority called "Maritime Accident Inquiry Agency (MAIA)" whose involvement is restricted to the maritime casualties occurred around the Japanese sea waters and around the world on board Japanese flag ships.

The Japanese Meteorological Agency is also under the national authority control and develops functions linked to the transfer of weather information to the maritime sector.

4. Conclusions

From the analysis realized to the compiled information the following conclusions were drawn:

(1) In spite of the presence of National Regulations and International conventions ratified by the Central American Region, there is not component within the Maritime Organization that has assigned the responsibility of carrying out the investigation, write and submit the respective report during the occurrence of Maritime Casualties on board.

(2) Central American Region has clearly defined a Maritime and Port Organization that works under the coordination of the respective authorities.

(3) One of the main cause of the annual increment of maritime casualties, can be associated with the arrive at this Region of atmospheric phenomenon such as hurricanes, tropical storms, El Niño and La Niña.

(4) The fact that the 49% of the maritime casualty occurrences on the Pacific side of the Central American Region between 1980 and 2004 are linked to atmospheric phenomenon is a clear indicator that this Region do not yet have the appropriate means to transfer information to the maritime sector.

(5) The fatality rate obtained for the Central American Region from this research is very high in comparison with the Japanese fatality rate obtained

(6) The maritime components employed by the Central American Region in the prevention of the maritime casualties are almost nonexistent.

(7) The ratification rate of the IMO conventions related to Ships and Crews in the Central American Region only reaches the 39%.

(8) Two types of maritime casualties had occurred mainly in this Region. Capsized (41%), which has affected mainly to undecked ships and Machinery Failure (36%), which has affected mainly to decked ships.

References

(1) United Nations Convention on the Law of the Sea. http://www.un.org/depts/los/index.htm 2006

(2) IMO. Solas. Refunded edition 2004.

(3) http://www.imo.org/Conventions/contents 2006

(4) Porras, Imazu and Fujisaka. Investigation and Analysis of the Maritime Casualties occurred in the Pacific side of the Central American Region between 1980 and 2004. The journal of Japan Institute of Navigation. No.114, pp, 235-241, 2006.3

(5) http://www.imo.org/Conventions/contents 2006

(6) List of Ratifications of International Labour Organization. http://www.ilo.org.ilolex.html.2006

(7) http://www.osdpd.noaa.gov/PSB/EPS/SST/data/equatpac.c.gif. 2005

(8) Japan Ministry of Land, Infrastructure and Transports. Marine Accident Inquiry Agency Statistics. 1980~2004.

(9) Japan Ministry of Land, Infrastructure and Transports. Japan Coast Guard. Statistics 1980-2004.

(10) Ministry of Agriculture Forestry and Fisheries of Japan. Japan Fisheries Agency. Statistics 1980-2004.

(11) Defense Ministry of Guatemala. Maritime Department; International Merchant Marine Register of Belize; Transportation Ministry of El Salvador. Maritime Department; Merchant Marine Directorate of Honduras; Transportation Ministry of Nicaragua. Maritime Department; Transportation Ministry of Costa Rica. Maritime Department; Panama Maritime Authority.

(12) Central American Fishery Sector Census. December, 2000.