MARTEC 2006

5th Biennial Conference on Marine Technology

Makassar, 4th - 5th September 2006

PROCEEDING

INTENSIFYING TECHNOLOGY STUDY FOR EMPOWERING MARITIME INDUSTRIES
TOWARDS THE PROSPERITY OF ARCHIPELAGIC COUNTRIES

Jointly Organized By

UNHAS ITS UTM BUET RINA

Published By

Jurusan Teknik Perkapalan

UNHAS

MARTEC 2006

5th Biennial Conference on Marine Technology

Makassar, 4th - 5th September 2006

PROCEEDING

INTENSIFYING TECHNOLOGY STUDY FOR EMPOWERING MARITIME INDUSTRIES
TOWARDS THE PROSPERITY OF ARCHIPELAGIC COUNTRIES

Jointly Organized By

UNHAS ITS UTM BUET RINA

Published By

Jurusan Teknik Perkapalan

UNHAS

Cetakan Pertama : 2006

Diterbitkan oleh :
Jurusan Teknik Perkapalan UNHAS
Kampus Unhas Tamalanrea, Jalan Perintis Kemerdekaan Km. 10
Makassar 90245
Telp. & Fax. : +62 411 585637
E-mail : *kapal9uh@indosat.net.id*

Perpustakaan Nasional : Katalog Dalam Terbitan (KDT)

Marine Technology Conference 2006 Proceeding
Makassar, 2006
vii + 380; 21,5 x 29,7 cm

I S B N

ISBN 979-15214-0-9
9 789791 521406 >

TABLE OF CONTENTS

SESSION VA : MARINE MANAGEMENT

SESSION I B : MARINE APPLICATION

SESSION II B : MARINE APPLICATION

SESSION III B : MARINE APPLICATION

SESSION IV B : MARINE APPLICATION

SESSION V B : MARINE APPLICATION

P R E F A C E

On behalf of the Organizing Committee, I would like to welcome and thank all authors, presenters and participants of the Fifth Marine Technology Conference 2006 (MARTEC V-2006). The Organizing Committee of MARTEC V compiled all accepted papers into a conference proceeding to ensure its continuity to be one of the sources of reference in the maritime technology field. Besides it, the organizing compiled also a number of late submitted accepted papers into supplement to conference proceeding.

The MARTEC 2006 Proceeding consists of 40 papers that divided into 10 sessions of presentation, 3 subtopics: Marine Basic Sciences; Marine Application; and Marine Management. The arrangement of presentation session and topics of paper presented is not always in line due the any difficulties of the sequencing.

In out-laying of proceeding format, the Organizing Committee just adjusted some minor spelling and paper format ignoring the contents originality and validity of the paper. As a non-referee conference, the content of paper stays fully as responsibility of its author(s).

The Organizing Committee made all efforts to ensure the quality of the proceeding. Nevertheless, please accept our apologies for some mistakes and misprints that disturbing reader of this proceeding.

Finally, on behalf of the Organizing Committee, I would like to take this opportunity to express our thanks and appreciation to the authors, presenters, sponsors, participants, and all parties who had contributed to the success of this conference. We do hope that MARTEC 2006 Proceeding will be a valuable source of reference in Marine technology field and will encourage more research works and study for empowering maritime industries towards the prosperity of archipelagic countries.

Makassar, September 2006

Prof. Dr. Ir. Yusuf Siahaya, M.Eng.
The Chairman
Organizing Committee.

INTERNATIONAL COMMITTEE

Assoc. Prof. Dr. Adi Maimum Abdul Malik (UTM, Johor)
Assoc. Prof. Dr. Omar Yaakob (UTM, Johor)
Assoc. Prof. Khabirul Haque Chowdhury (BUET, Dhaka)
Prof. Dr. Md. Refayet Ullah (BUET, Dhaka)
Dr. Daniel M. Rosyid (ITS, Surabaya)
Dr. Djauhar Manfaat (ITS, Surabaya)
Dr. I Ketut Arya Pria Utama (ITS, Surabaya)
Dr. Alham Djabbar (Unhas, Makassar)

ORGANIZING COMMITTEE

Prof. Dr. Ir. Radi A. Gany
Prof. (em.) Dr.-Ing. Sularto Hadisuwarno
Prof. Dr. Ir. Yusuf Siahaya, M.Eng.
Dr. Ir. Baharuddin Abidin
Mr. Muchtar Ali
Mr. Amrullah Pase
Ganding Sitepu,
Misliah
Erwin Eka Putra
Mansyur Hasbullah
Syarifuddin Dewa
Rusydi Alwi
Abd. Haris Djalante
Baharuddin
Surya Hariyanto
Eko Haryono
Amil Ahmad Ilham
Lukman Bochary
Suandar Baso
M. Zubair M. Alie
Irfansyah
Eva Pardiana Lestari
Dwi Astuty
Astrid Atalia
Irvan Bahri

Dr. Jabir Hamzah
Prof. Dr. Ir. M. Saleh Pallu
Prof. Dr. M. Yamin Jinca
Mr. Suleman Wiradidjaya
Mr. Jus'an
Mr. Baharuddin Sellang
Achmad Yasir Baeda
Wihdat Djafar
Rahimuddin
Abd. Latief Had
Taufiqur Rachman
Rizal Firmansyah
Lukmanul Hakim
Ilham Alimuddin
M. Syuaib Nur
Zulkifli A Yusuf
Syamsul Asri
Hairul Arsyad
Husni Sitepu
Hamzah
Wahyudi
Dwi Nirmalasari
Muhibbuddin
Andi Muliama

ANALYSIS OF PASSENGER VESSEL ACCIDENTS IN THE INLAND WATERWAYS OF BANGLADESH

Zobair Ibn Awal[1], M. Rafiqul Islam[2], Mazharul Hoque[3]

[1]Jr. Research Fellow/Lecturer, Accident Research Centre (ARC)
Bangladesh University of Engineering & Technology (BUET), Dhaka 1000
E-mail: ibnawal@arc.buet.ac.bd
[2]Associate Professor, Department of Naval Architecture & Marine Engineering
Bangladesh University of Engineering & Technology (BUET), Dhaka 1000
E-mail: rafiqis@name.buet.ac.bd
[3]Professor & Head, Department of Civil Engineering and
Director, Accident Research Centre (ARC)
Bangladesh University of Engineering & Technology (BUET), Dhaka 1000
E-mail: dirarc@arc.buet.ac.bd

Abstract

This study investigates the characteristics of passenger vessel accidents in the inland water ways of Bangladesh and attempts to identify some of the underlying causes. This study is limited to the accidents passenger vessels which occurred in the inland waters during 1995-2005. A total of 67 cases were considered in this study and the data were collected from Department of Shipping (DOS), Ministry of Shipping (MOS), Bangladesh. Total number of human casualties were more than 1500 (one thousand and five hundred) during this period. The statistical study revealed that the leading causes of accidents were found to be collision due to human error (56%) and loss of stability due to Nor'weaster (21%) (Nor'weaster is a type of storm locally known as 'Kalboishakhi') which particularly occurs in the monsoon in Bangladesh. The study also identifies some other causes of accidents such as loss of stability due to rushing of passenger, overloading, grounding, etc. However, all these accidents were broadly categorised in two groups: 1) Accidents involving human errors and 2) Accidents due to natural disasters. It was observed that over 75% of these accidents fall into the earlier group and the rest falls into the later category. Analysis of the length of the vessels suggests that vessels having length in the cohort of 40-60 meter fell more into accidents (about 44%). It is also noticed that accidents were occurring all around the clock leaving behind no particular patterns to trace out. Geographical Information System (GIS) has been used to identify the most hazardous locations on the basis of frequency of the occurrence. It is pertinent to mention that the data collected and analysed in this study may not represent the total safety situation in Bangladesh as many accidents in the country not often get reported or remain underreported due to less exposure to the media probably because the victims represent the poorer segment of the society.

Indeed, the time has come to modernise and redesign the inland water transport sector of Bangladesh since a safe transportation system has the potential to relieve enormous burden on other modes of transport with the ability to render a balanced multimodal and cost-effective sustainable transport system for both mass movement of passengers and goods in Bangladesh. Nevertheless, based on this study a number of recommendations are made for further research and investigations.

Keywords : Accident, Passenger Vessel, Inland Water Transport (IWT), Statistical Analysis

1. INTRODUCTION

The inland water transport system in Bangladesh is both extensive and well-connected with the rest of the transport system. In terms of traffic intensity, the inland waterway network generates about 1.57 million passenger-kilometres per route-kilometre of waterway. The density of inland ports and terminals is much higher on the inland waterways with approximately 3.7 berthing facilities per 100 route-kilometres. The density of passenger facilities on the inland waterways is also high at around 40 per 100 route-km [1].

Mostly of passenger vessels, cargo vessels, tankers, tugboats and dumb crafts ply in the inland water ways of Bangladesh. In the year 2000, the number of registered passenger vessels (including sea trucks and ferries) was 1,868, cargo vessels (including tanker and coaster) 2,160, dumb craft 760 and towing vessel 194. The static carrying capacity of the IWT fleet is about 0.20 million passengers and 0.55 million tons cargo. In terms of carrying capacity, the private sector outweighs the contribution of the public sector both for the passenger and cargo movement (private sector 93% for passenger and 95% for cargo). In the informal sector, the country boats plying mainly in the perennial waterways play the key part. According to Bangladesh Bureau of Statistics (1991-1992), the number of country boats operating within the country was 745,000, a substantial part of which has already been mechanised mostly with low-cost shallow pump engines. Approximately 65% of the country boats are passenger boats and the rest are cargo boats. The static cargo capacity of the country boats is about one million tons, nearly double that of the formal IWT sector [1, 2].

Some recent studies suggest that with the increase in population in the country the waterways are getting very congested. Consequently, the number of accidents in the water ways are also uprising and causing serious socio-economic problems. Investigations show that over eight thousand people have died, injured and been reported missing due to these accidents in the past few years. This caused a great concern in both local as well as international community and has become a national issue [3, 4].

2. DATA COLLECTION AND DATABASE DEVELOPMENT

One of the primary goals of this study is to compile and maintain a technical database which will work as a tool for in depth accident analysis and research and that will help to come up with pragmatic recommendations and solutions in order to prevent such disasters. The accident data were collected from the reports of Department of Shipping (DOS). These reports stores accident data essentially for legal purpose and give more emphasis on the parameters related legal issues. Therefore extraction of scientific data, which are absolutely crucial for accident analysis, from these reports is very much cumbersome and time consuming.

A separate spreadsheet database hence been developed consisting of 19 different parameters. These parameters are then grouped in to 6 major categories. Figure 1 shows the database structure elaborately.

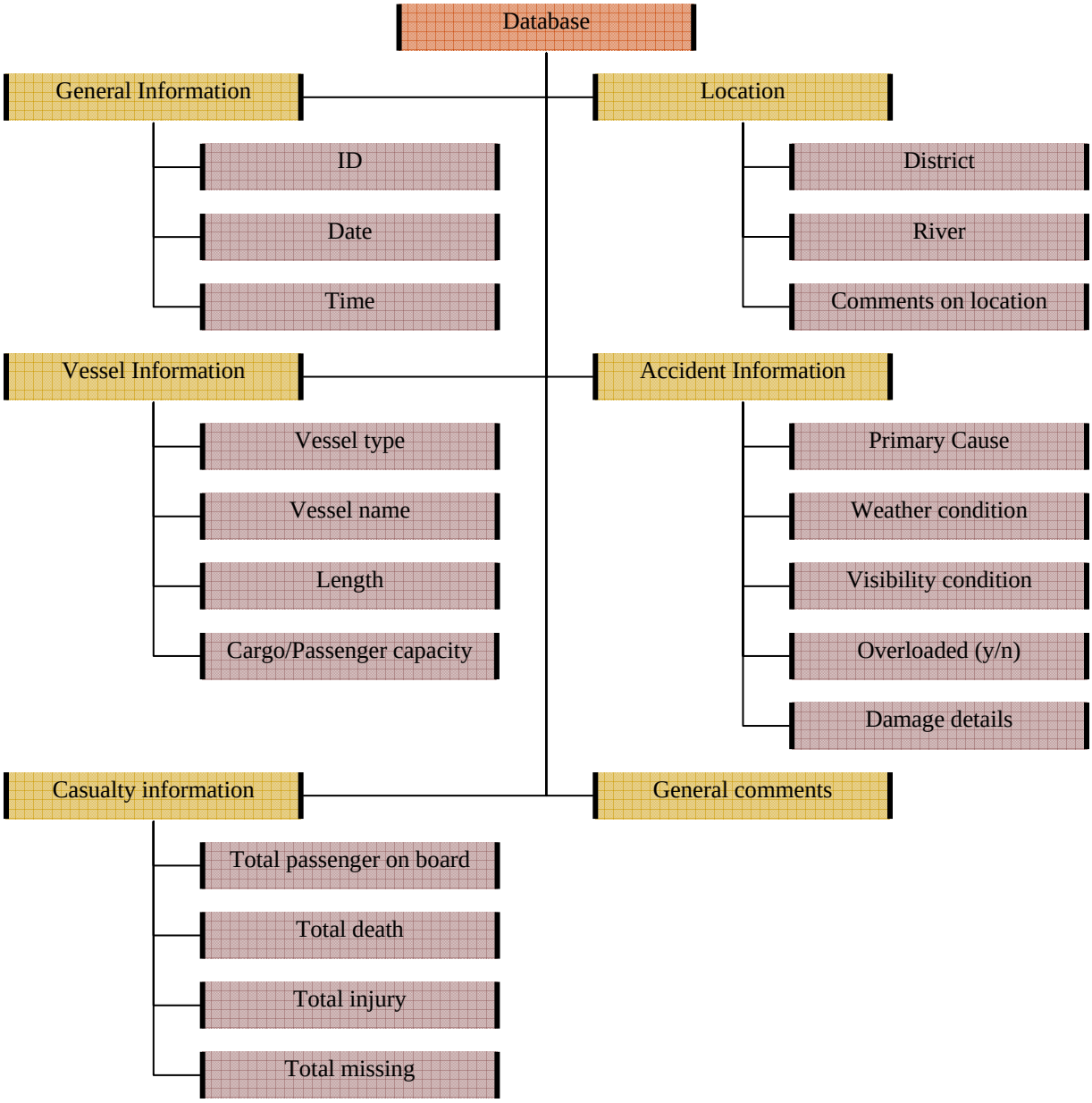

Figure 1: Database structure

3. CAUSES ANALYSIS OF ACCIDENTS

3.1 Types of Accident Causes

Five major types of accidents have been identified in this study, such as Collision due to human errors, Loss of stability due to Nor'wester and overloading, Stability problems due to rush of passenger and overloading, Grounding & Others. Table 1 shows the distribution of accident causes against different months of the year and Figure 2 shows their respective percentages.

Table 1: Distribution of accident causes against months

Accident Causes / Months	Collision due to human error	Loss of stability due to Nor'weaster and overloading	Stability problems due to rush of passenger and overloading	Grounding	Other	Total
January	2	0	1	2	1	6
February	5	2	1	0	0	8
March	4	4	0	0	0	8
April	4	2	1	0	1	8
May	1	5	1	1	1	9
June	1	0	0	1	0	2
July	2	1	1	0	0	4
August	6	0	0	1	0	7
September	6	0	1	0	0	7
October	4	0	0	0	0	4
November	1	0	1	0	0	2
December	1	0	1	0	0	2
Total	37	14	8	5	3	67

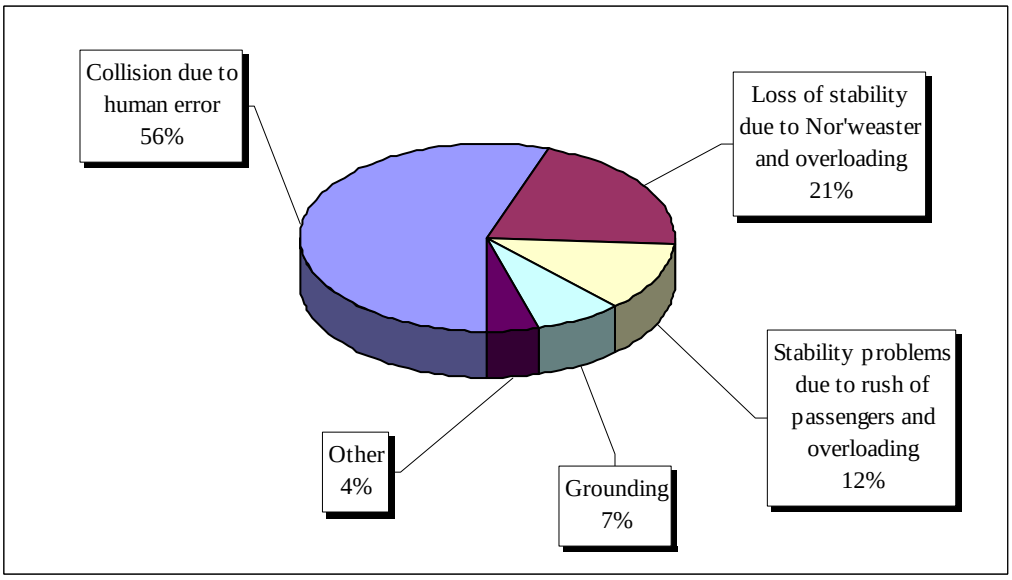

Figure 2: Percentage of different types of accidents.

3.2 Types of Vessels

Analysis of the length of the vessels suggests that vessels having length in the cohort of 40-60 meter fell more into accidents (about 44%) as shown in Figure 3. Vessels of this length range are the most common and popular type of transport for travelling in the inland waters of the country and usually used for medium to long range trips. The next most vulnerable group of vessels appeared to be of below 20 meter length (27% of all accidents). These types of vessels are usually used in the rural areas for short and medium trips for a limited range.

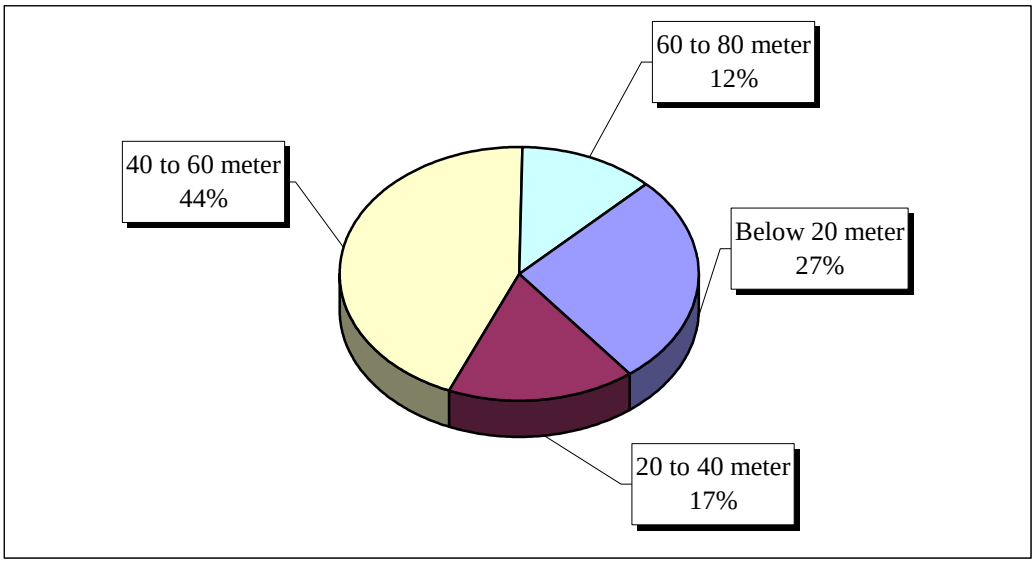

Figure 3: Percentage of accidents according to vessel length.

Analysis on registration type suggests that vessels registered as MV (Motor Vessel) face more accidents (over 50%) than any other groups. Motor Launch (ML), Motor Trawler (MT), Public Service (PS) vessels, Ferry and other type of vessels contribute the rest of the accidents as shown in Table 2. An important to be mentioned here is that the country boats (another vulnerable type of vessel) are not included in this accident study since most of these vessels are not registered with the Department of Shipping (DOS).

Table 2: Year against vessel type.

Year\Vessel Type	MV	ML	MT	PS	Ferry	Others	Total
1995	2	3	0	0	0	0	5
1996	4	0	0	0	1	3	8
1997	6	0	0	0	0	1	7
1998	3	3	0	0	0	3	9
1999	7	0	0	2	0	3	12
2000	9	5	1	1	0	0	16
2001	4	1	1	0	0	2	8
2002	3	1	1	0	0	1	6
2003	8	2	2	0	0	1	13
2004	6	0	1	0	1	1	9
2005	3	2	2	0	1	1	9
Total	55	17	8	3	3	16	102

3.3 Accident Time

The analysis of accident time suggests that accidents occur all around the clock. This is because the predominant accident type is collision and this type of accidents fundamentally doesn't depend on weather condition and thus on time of the day. However, figure 4 suggests that there is a slightly higher tendency of accidents occurring during the afternoon period. This is because most of the nor'weaster appears 1200 to 1800 hrs suggested by experience.

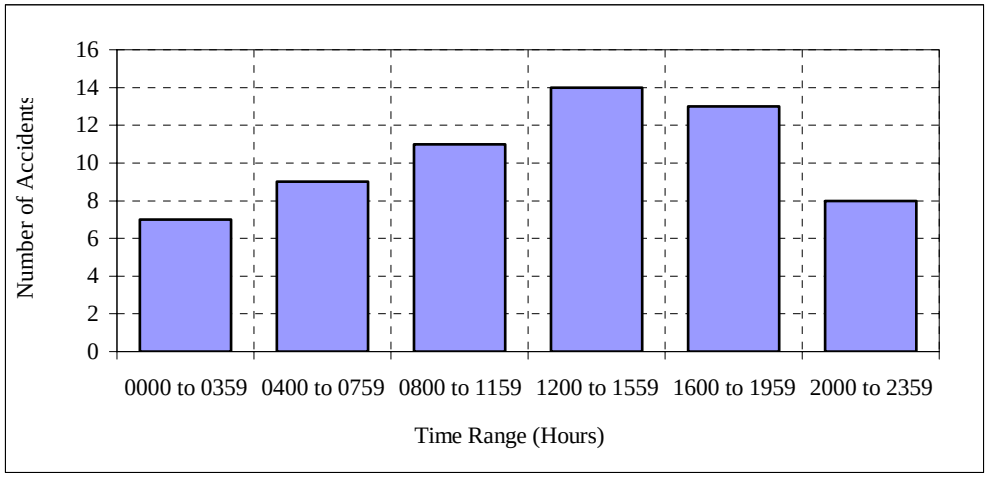

Figure 4: Accidents time.

3.4 Accident Locations

The analysis of accident locations (Figure5) using Geographical Information System (GIS) clearly suggest that the southern part of Bangladesh are the most hazardous locations and the water way along the river Meghna appears the route to be concerned with. Many accidents have also taken place within the waterways of Dhaka and Narayangangj district.

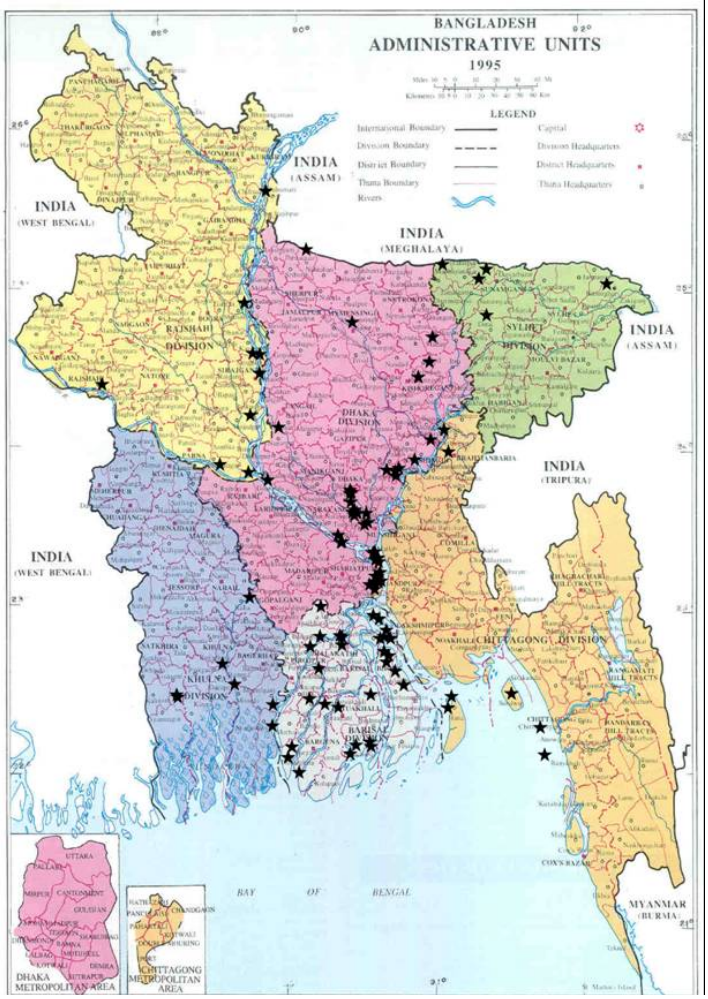

Figure 5: Accident locations shown using GIS (includes both passenger and cargo vessel).

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Research Findings

The research findings of this study may be summarised in the following manner:

- The predominant causes of accidents for passenger vessels in the inland water ways of Bangladesh are Collision and Nor'weaster (77%) out of which collision due to human error alone stands 56% of all accidents.
- The general observation is that accidents take place more during the monsoon season but this is considered as a total safety scenario. However, this study suggests that vessels carrying passengers meet accidents all around the year.
- Vessels having length in the cohort of 40-60 meter fell more into accidents (about 44%) than any other groups.
- The average number of accidents per year in 9.273 with a standard deviation 3.23. The minimum number of accidents per year is 5 and the maximum number of accidents per year is 16.

4.2 Recommendations

Considering the importance of water transportation system in the context of Bangladesh, necessary actions should be taken immediately in order to reduce the number of these tragic events. This will save a lot of lives and relieve the nation off a huge quantity of economic losses. Recommendations for improvement of waterway safety situation on the basis of this study can be summarized as:

- Collision type of accidents can be reduced by avoiding foggy weather condition and ensuring searchlight in functioning condition. Also the working environment for masters and drivers has to be improved in terms of ergonomics so that they don't get fatigue and/or get reluctant about their responsibility.
- Weather forecasting system has to be improved to reduce cyclone type of accidents. In addition, enforcements may be enhanced to guard against plying in a bad weather condition.
- Availability of adequate amount of life saving equipments should be ensured. Crews should be trained in this regard and public awareness should also be increased.
- More in depth analysis of these accidents are required in order to come up with pragmatic solutions.

REFERENCES

[1] *Internet Encyclpoedia: Banglapedia*, A.K.M. Nurul Alam, Source address: http://banglapedia.search.com.bd/HT/W_0034.htm.

[2] BBS (2001), "Statistical Year Book of Bangladesh 2001", Reproduction Documentation and Publication Wing" BBS, Dhaka.

[3] "A Study on Inland Water Transport Accidents: Some Causes and Recommendations", *Presented as a Keynote Paper in A Seminar on Preparation of Marine Transport Owners for the Upcoming Stormy Season*, 11 March 2006, National Press Club, Dhaka, Bangladesh.

[4] A Study on Inland Water Transport Accidents in Bangladesh: Experience of A Decade (1995-2005), Paper accepted for publishing in the proceedings of conference on *Coastal Ships & Inland Waterways*, 15th and 16th of March 2006, London.