



NATIONAL DISASTER MANAGEMENT GUIDELINES

Boat Safety



September 2017



NATIONAL DISASTER MANAGEMENT AUTHORITY
GOVERNMENT OF INDIA

National Disaster Management Guidelines

Boat Safety

National Disaster Management Guidelines on Boat Safety

A publication of:

National Disaster Management Authority
Government of India
NDMA Bhawan
A-1, Safdarjung Enclave
New Delhi – 110 029

September 2017

When citing these guidelines the following citation should be used:

National Disaster Management Guidelines for Boat Safety, September 2017. New Delhi
A publication of the National Disaster Management Authority, Government of India.

National Disaster Management Guidelines

Boat Safety



National Disaster Management Authority
Government of India
September 2017



प्रधान मंत्री

Prime Minister

MESSAGE

I am happy to know that the National Disaster Management Authority is celebrating its 13th formation day on 28th September, 2017.

From its inception, the NDMA has been faithful to its visions and has been continuously trying to build a safer and resilient nation. It has been successful in facilitating a culture of disaster prevention and preparedness through holistic partnership with all the stakeholders in ensuring safety. Its proactive responses in rescue and relief operations have been appreciated on many occasions.

It is appreciable that the NDMA is releasing important guidelines related with Heritage Safety and Boat Safety on the occasion of the Formation Day. I hope that the new guidelines will empower all the associated stakeholders in preparing themselves with their own disaster risk management plans.

Best wishes to everyone associated with the NDMA on this occasion for all their future endeavours prioritizing the safety of our citizens.

(Narendra Modi)

New Delhi
22 September, 2017

राजनाथ सिंह
RAJNATH SINGH



गृह मंत्री
भारत
नई दिल्ली-110001
HOME MINISTER
INDIA
NEW DELHI-110001

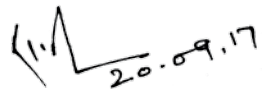
MESSAGE

I am extremely happy to note that National Disaster Management Authority (NDMA) has prepared Guidelines on Boat Safety. Boat Safety is an important issue as Inland waterways transport using boats is lifeline of millions of people across India. The guidelines provide a way forward to minimize the accidents occurring due to poor training, non-standardized boats and poor enforcements of regulations.

The guidelines provide framework on Early Warning System, Weather Forecasting, Safety Standards, Regulatory and Legal issues.

The guidelines would help in improving Boat Navigation Safety whether mechanized or non-mechanized and reduction in casualties thereon.

I congratulate NDMA and other stakeholders for bringing out comprehensive Guidelines on Boat Safety which will go a long way in ensuring safe travel.


(Rajnath Singh)

किरेन रीजीजू
KIREN RIJJU



MOS/Home(R) 1097707/46/2017

गृह राज्य मंत्री
भारत सरकार
MINISTER OF STATE FOR
HOME AFFAIRS
GOVERNMENT OF INDIA

21 SEP 2017



MESSAGE

India has long cultural history of Boat Navigation which dates back to 6000 years. It has a wide network of inland waterways. The passenger boat accidents are not uncommon in Indian river systems and other inland water channels; it was Dhubri ferry tragedy on river Brahmaputra that accounted for the loss of over 250 lives. It was then recognized that passenger boat accidents are showing increasing trends in various inland waterways leading to loss of life of scores of people. It emerges from analysis of boat accidents data that most tragedies are on account of overloading and poor maintenance of boats.

Till very recently, India had only five National Waterways created by Acts of Parliament. The National Waterways Act, 2016 makes provisions for existing National Waterways, provides for declaration of certain inland waterways and for the regulation and development of such waterways for shipping and navigation. Total of 111 Waterways have been declared as National Waterways making safety of boat navigation a must.

I congratulate NDMA for bringing out Guidelines on Boat Safety which would go a long way in assuring safe navigation. I urge all the stakeholders and State Governments to work together for better and safe boat navigation


(Kiren Rijju)

20th September, 2017
New Delhi.



राष्ट्रीय आपदा प्रबंधन प्राधिकरण
National Disaster Management Authority
भारत सरकार
Government of India

Preface


India has a wide network of Inland Waterways which consists of rivers, backwaters, canals, and creeks. Out of the total navigable length of 14500 kms covering various states, around 5200 kms of rivers and 4000 kms of canals are worthy of proper navigation. India has a long cultural history dating back of 6000 years with traditions of boat navigation.

In many of the states, transport through rivers and their tributaries is a lifeline of many people. Boats, motorized and non motorized, are used to carry people, vehicles, animals and goods. However, thousands of such boats which ply in the countries Inland Waterways have no authentic checks on the validity/permit and are overaged & also ill designed.

Whenever any boat accident occurs, the poor training, dangerous working practices, inadequate regulations and near non-existent enforcement is pointed as a root cause. The Dhubri ferry tragedy of 30th April, 2012 on river Brahmaputra that resulted in loss of over 250 lives, led to the awakening of threat of increased passenger boat accidents in various states. Thus, a need for formulating guidelines on boat and navigable safety in consultation with concerned states and stakeholders was felt. NDMA under the provision of the DM Act, 2005 has the mandate to issue guidelines for the management of disaster that periodically affects normal life and well being of the people. Accordingly, NDMA has prepared National Disaster Management Guideline on Boat Safety in consultation with state and other stakeholders. These guidelines will go a long way for safer water navigation. The guidelines addresses all facets of boat safety such as weather forecasting & early warning system, safety standards & specifications, regulatory & legal issues, search & rescue, capacity development and do's & don'ts for boat safety has been elaborated in details.

While NDMA tried to make guidelines extensive, there is surely room for improvement. The NDMA welcomes suggestions and inputs to further improve the National Guidelines on Boat Safety.


Kamal Kishore
Member, NDMA


D.N. Sharma
Member, NDMA


Lt. Gen. N.C. Marwah (Retd.)
Member, NDMA


R.K. Jain, IAS (Retd.)
Member, NDMA

एन.डी.एम.ए भवन, ए-1, सफदरजंग एन्क्लेव, नई दिल्ली-110029/ NDMA Bhawan, A-1, Safdarjung Enclave, New Delhi-110 029

दूरभाष/Tel +91 11 26701700 फ़ैक्स/Fax : + 91 11 26701831

Acknowledgements

Preparation of a national document such as the National Disaster Management Guidelines on Boat Safety is a mammoth exercise that can only be accomplished through a team work that extends beyond the confines of institutions working only on Boat Safety. The National and State level institution and individuals who have provided inputs to the preparation of this document the numerous such as CWC, IMD, IRS, IWAI, NDRF, NIDM, Ports of Goa and several state government authorities etc. We gratefully acknowledge all of their support and encouragement.

Shri A.K. Sanghi, Joint Secretary, Head of Mitigation Division worked assiduously and led the finalization of National Guidelines on Boat Safety. He was ably supported by Shri Pushkar Sahay, Joint Advisor, NDMA who coordinated activities associated with preparation of guidelines. Valuable expert technical assistance was provided by Shri Shankar Mahto, Sr. Consultant (Food & River Erosion) who also analysed the inputs received from a range of institutions and stakeholders and incorporated in the guidelines. We also acknowledge the contribution of staff of Mitigation Division in preparation of the guidelines.

Finalization of the first National Disaster Management Guidelines on Boat Safety is the culmination of the long process. During this period several round of consultation were held, inputs sought even from general public and draft prepared. We would like to greatly acknowledge the contribution of the chairman of the working groups which formed to prepare the initial draft. The former Sr. Consultant (F&RE), Dr. Rajnish Ranjan and Shri V. Venkatesan, Former Consultant (Cyclone) also played a critical role in drafting the guidelines. These inputs have proved to be bedrock on which the current guidelines stands.

In summary, the preparation of the National Disaster Management Guidelines on Boat Safety exemplifies team work that spans across different institutions and the academia. This sets the tone that will be required for its effective implementation.

Contents

Executive Summary	xix-xxiii
1 Boat Navigation-Status & Context	1
1.1 Overview	1
1.2 Indian Waterways – Brief Outline	2
1.3 Background of Boat Accidents	6
1.4 Role of State, Organization and System	8
2 Weather Forecasting & Early Warning System	11
2.1 Overview	11
2.2 Weather Forecasting for Safe Boat Operations	11
2.3 Implementation Programme-Roles and Responsibilities of various agencies	15
3. Safety Standards & Specifications	17
3.1 Overview	17
3.2 Boat Design, Trends and Practices	17
3.3. General Safety Measures	18
3.4 Safety standards for Non-mechanized Boats	20
3.5. Safety standards for Mechanized Boats	21
3.6. Implementation Plan- Roles & Responsibilities of various agencies	25
Annexure-I to Chapter 3	27

4.	Regulatory & Legal Issues	29
4.1	Overview	29
4.2	Regulatory Provisions of National Waterways	29
4.3	Legal Coverage and Regulatory Mechanism	30
4.4	Ferries Acts and Rules	32
4.5	Existing Rules	33
4.6	Regulatory regime for travel by people using passenger boats	33
4.7	Implementation Plan-Roles & Responsibilities	36
5.	Search and Rescue	39
5.1	Overview	39
5.2	Current Practices	39
5.3	Standard Operating Procedures (SOPs)	40
5.4	Accident Management Plan	41
5.5	Emergency Search & Rescue	41
5.6	Response Mechanism at Boats/Vessels	42
5.7	Rescue Equipments at Ghats	43
5.8	Medical Support	43
5.9	State Disaster Response Force (SDRF)	43
5.10	National Disaster Response Force	44
6.	Capacity Development	45
6.1	Overview	45
6.2	Framework of Capacity Development	46
6.3	International Practices	47

6.4	Identification of Methods and Target Groups	47
6.5	Conclusion	49
7.	DO's and DONT'S for Boat Safety	51
	DO's and DONT'S for Boat Safety	51
	Annexures	53
	Annexure 1	53
	Annexure 2	69
	Annexure 3	70
	Annexure 4	71

Executive Summary

Introduction

National Disaster Management Authority (NDMA) has been mandated, under the provisions of Disaster Management Act 2005 to, inter alia, issue guidelines for the management of disasters that periodically affects normal life and well being of the people.

Although passenger boat accidents are not uncommon in Indian river systems and other inland water channels, it was Dhubri ferry tragedy of 30th April, 2012 on river Brahmaputra that accounted for the loss of over 250 lives. It was then recognized that passenger boat accidents are showing increasing trends in various inland waterways leading to loss of life of scores of people. It was also discovered that most of the boat tragedies were on account of overloading and various other factors. After consultation with stakeholders, NDMA decided to prepare National Guidelines on Boat Safety. The guidelines include action points towards drawing procedures and regulatory elements by states to streamline the passenger boat navigation in the established waterways in the regions.

India has a wide network of inland waterways which consist of rivers, backwaters, canals and creeks. Out of the overall navigable length of 14500 km, around 5200 kms of rivers and 4000 kms of canals are worthy of being used by mechanized vessels for navigation. The North Eastern region of the country alone is reported to have about 1800 kms of river routes used by steamers and large & small country boats. The region has many large rivers and rivulets providing facilities for water transport, especially in its plain parts and in flat river valleys. Since long, the rivers of the Brahmaputra and Barak plains were commonly used as 'waterways' for transportation of goods and passengers.

Passenger boating has been one of the few micro enterprises in the country, where industrial intensity and technology modernization could not penetrate in a significant manner. The activities are accomplished with small and large country boats with primitive designs with a

very low free-board facility. Passenger boats are considered important means of livelihood to many people esp. in the north and north eastern regions. The country boats in these waterways generally carry more number of passengers than technically acceptable and reliable from safety considerations. The design of these boats and their engines are mostly local made or impoverished that rarely acquires certificates before drafting for commercial operations. Moreover, these boats are also playing without life jackets

The rules of Bengal Ferry Act 1885 do not include safety aspects of the boatmen, operating procedures and mechanisms of boats and boat making etc. The ferry ghat infrastructure requirements have also not been outlined much in the act. There has been an overall paucity of instruments of enforcing regulatory control measures over the private boat operating services in major water channels. Obviously, such boats do have little safety arrangements, yet daily passengers have no other means but to adopt this means of transportation.

Objectives and premises

The Guidelines on Boats Safety rest on the following objectives, which aimed at increasing the efficacy of the passenger Boat navigation and its management.

- Passenger boat transport is a state subject. Regulations and operating procedures would have to be prepared by states. The guidelines will facilitate the same.
- Since Passenger boat transport is a dispersed activity, states are required to encourage, in the first place, the implementation and enforcement of applicable provision of conventions/regulations, including the application/ implementation of 'The Bengal Ferry act (1885)', with modifications as felt appropriate, with a view to ensure harmonization of ferrying legislation within the country.
- Any future legislation be user-friendly, easily understandable, enforceable, acceptable to many and must include appropriate penalties severe enough to encourage effective implementation and discourage violation.
- Regulations be made by states subject to periodic review based on surveying, training and bringing in uniformity and to meet standards set by all the states dealing with riverine water transport.
- Regulations must encourage stakeholders to develop/establish safety management system for domestic ferries and passengervessels that include, but are not limited to,

key elements such as-

- a. Training in operational matters, including planned maintenance;
 - b. Safety awareness programmes and pre-departure safety briefs for passengers;
 - c. Effective communication between master, surveyors and boat owners to facilitate proper boat inspections and surveys; and
 - d. Stability guidance information, including availability of stability books to masters.
- Sharing of best practices and resources across all stakeholders and through regional associations;
 - Encourage development of national and regional search and rescue (SAR) response and communication plans and mock drills.

Approaches

Averting a disaster or response to mitigate the severity of disaster, as it relates to passenger boat accidents during navigation, require (i) prior and adequate advance knowledge of likely incidents; (ii) availability of instruments/facilities to contain the risks; (iii) arrangements/tools to facilitate quick resurrection; and above all (iv) facility of skilled manpower support to organize the pre and post event response mechanisms.

Thus the guidelines are presented in five related segments as below:

- Water Forecasting & Early Warning System- This is dealt in the second chapter wherein the spatial and temporal variations in climate characteristics and the resultant impacts are discussed. It is essential that boat owners and waterways management authorities must pay attention on weather bulletins and guidelines issued by local meteorological organizations to avert boat tragedies.
- Safety Standards & Specifications – These aspects have been discussed in chapter 3 wherein the importance of safety measures are discussed in details. The general safety measures expected to be adopted by boat operators are dealt with in this chapter. In addition, safety standards for mechanized and non mechanized boats are also discussed.
- Regulatory & Legal Issues- This is discussed in chapter 4. The regulatory provisions of national waterways, the existing ferry acts and rules and other legal issues are

discussed in this chapter. The model rules are discussed in this chapter with roles and responsibilities of the proposed Inspectorate of Safety.

- Search and Rescue – The Search and Rescue operations in the aftermath of boat accidents are equally important as the mitigation measures. The chapter 5 discusses these issues in details in reference to boat and navigation safety. Some of the important aspects like Standard Operating Procedures (SOPs), Accident Management Plan, Emergency Search and Rescue, Response mechanisms at boats/vessels, rescue elements at ghats, medical action plans etc. are discussed in this chapter.
- Capacity Development- The Capacity Development aims to create enabling environment with appropriate policy and legal framework, institutional development including community participation through which individuals, organizations and societies obtain, strengthen and maintain capabilities to set and achieve their own development objectives over time. Chapter 6 discusses in details about the role of capacity development on safe boat operations in navigable waterways.

Institutional framework

The responsibility of the implementation of rules and regulations related to safety of inland vessels primarily rests with the state governments. Since several state governments are experiencing limitations in terms of organizational set up to handle various policy, regulatory and operational issues in terms of quality and contents related to safety of inland vessels, the first and foremost requirement would be to develop institutional / organizational set up for framing relevant rules and regulations and implementation in an effective manner. This is considered as one of the primary requirements towards navigation safety by boats and other inland vessels. It is therefore recommended to create nodal inspectorate by each of the concerned states and to bring in SDMA/DDMA into the regulatory role. In the organizational set up emphasis must be given to separate the wings for handling matters related to non-mechanized and mechanized country boats.

The Panchayati Raj Institutions (PRIs) needs to be given more representation in regulating the country boats operation in waterways. For this purpose, it is necessary to empower Panchayats under specific rules/ regulations. They must also be given specific financial and organizational support to institutionalize the enforcement of regulations in boat travel management over a period of time.

It is recommended that a dedicated full fledged department is set up in all the concerned states dealing with inland waterways transportation. It is also proposed that every district transport department / offices should have a cell separated / created specifically for handling matters related to inland vessels. Such officers may in turn train Panchayat officials in handling matters related to mechanized and non-mechanized country boats.

1

Boat Navigation-Status & Context

1.1 Overview

- 1.1.1 The tradition of boat navigation in India has a long cultural history which dates back about 6000 years ago, when the art of navigation was originated from river Sindh (Indus). The word “Navigation” is derived from a Sanskrit word “Nav Gatih”. Ancient literatures and scriptures provide several accounts of navigation in river channels and small waterways. The ‘Rig-Vedic’ period Aryans were well aware about the river and sea navigation routes across the country. They were skilled to construct and operate boats in a scientific manner.
- 1.1.2. The Indian subcontinent is characterized by typical hydro-meteorological set up with dense network of rivers system. The country is surrounded on three sides by seas which are connected with interior drainage network of rivers, thus making enabling environment for inland waterways for transportation esp. in coastal regions. Many of the coastal states are endowed with natural harbors stretches along 5700 kms long coastlines that act as big commercial transit point in the country.
- 1.1.3. In many of the states, where inland water transport through rivers and their tributaries is a lifeline for many people, over aged boats ply overcrowded not only with people, but also vehicles, animals and other goods of daily needs. In the aftermath of Dhubri ferry tragedy in 30th April, 2012 on river Brahmaputra that accounted for a loss of over 250 lives, it was recognized that passenger boats accidents are on the increase in various states leading to the loss of lives of scores of people .It was also discovered that most of the boat tragedies were on account of overloading and other related factors. There are thousands such boats plying in the country’s inland waterways with no authentic checks on the validity/permits. Whenever any boat accident occurs, the reason often points to poor training, dangerous working practices, inadequate regulation and near non-existent enforcement as the root causes for this and similar losses of life. Sometimes boat accidents also take place during adventure sports

boating and that's too in turbulent water that is considered a purely man made risk. This may also cause boat mishaps. Thus a need was felt at the policy level to formulate guidelines on boat and navigational safety in consultation with the concerned states and stakeholders. The guidelines would be an effort to make enabling reference for states/UTs in streamlining passenger boat navigation in the established waterways through inception of a set of regulatory and structural framework.

- 1.1.4. The prime responsibility of the maintenance of safety in boat transport functionally lies with boat operators and wharf (ghat) management authorities; however, the administrative and socio-economic controls are enjoyed by state/district authorities .The guidelines is also an effort to sensitize boat operators, passengers, local authorities and other stakeholders about the dangers of unsafe navigation practices and potential disaster threats

1.2 Indian Waterways – Brief Outline

- 1.2.1 Inland Navigation- There are several waterways in India suitable for inland navigation, but the lower Ganga and the Brahmaputra waterways are specifically suited due to their distinct advantages like gentle gradient, appropriate depth of water and flow through densely populated regions. In addition, the tropical nature of climate doesn't allow freezing of water, which provide suitability of navigation throughout the year at the cheaper rate .However, due to seasonal nature of rainfall; fluctuation in water level is greater. Before 1854, there was no railway lines in the entire stretch of the Gangetic plains, thus goods and passengers had to travel through country boats in rivers like the Ganges & the Brahmaputra. The emerging commercial centers during those periods were also preferred to be located near river banks. The cities like Kanpur and Patna established due to such suitability. The "Steam Navigation" was introduced in 1830, which became very popular particularly in the lower Ganga waterways till the construction of railways was started in 1885 after which the number of country boats and cargoes declined gradually in these routes due to the preponderance of rail transportation of goods and passengers which were comparatively safer and faster. Thus the steam navigation also declined considerably. In addition, the water levels in these navigational routes declined considerably after the opening of Lower Ganga canal in 1878 and other canals subsequently. The repeated famines in subsequent years led to the diversion of more waters from these waterways to the water deficit regions that led the further decline in water level in these rivers thus greatly affected waterways navigation in these regions.

The rapid expansion of railway network and increase in canal irrigation resulted in the decline of cheap river and canal transportation in the waterways of the region. Though the Upper and the Lower Ganga canals were built to serve the dual purpose of irrigation and navigation, neither of them carries any traffic now. The same condition of extinction also occurred in the Sutlej waterways.

East India is a land of mighty rivers which often damage railway lines and roads during the rainy season. Volumes of consumer goods, fertilizers for tea plantations, and machinery leave Calcutta for Assam by steamers which pass through Bangladesh. Two such inland waterways are between Kolkata and Dhubri as well Kolkata and Karimganj. The river Hooghly in West Bengal is an important waterway in east India. Cargo services also operate regularly between Haldia and Patna.

The rivers on the Indian Plateau are not suitable for navigation because there is very little water in the streams during the long dry months. Some distributaries of the deltas of the Krishna, the Godavari and the Mahanadi are navigable. In the middle of the last century, irrigation cum-navigation canals were constructed in the deltas of the Godavari and Krishna. The canals are particularly suitable means of transport here in view of the difficulty in constructing rail and road bridges on numerous distributaries in the delta regions. These canals now carry a sizable portion of goods and passenger traffic. They are inter-connected and, also join the Buckingham Canal which runs southwards to Chennai and extends for 106 km even beyond Chennai. Thus, Vijayawada is connected with Chennai by this navigable canal, but fast running train again has affected adversely the goods and passenger traffic carried by this canal. The Buckingham Canal connects some lagoons and is meant purely for navigation. The coastal lowland of Kerala State is served with navigable canals which also connect many lagoons. The canals are used extensively by country boats for transporting goods like coconut, cashew-nut, pepper and raw rubber. Inland water transport is also important in Goa.

1.2.2 Inland Waterways- Economic & Social Context

The Inland Water Transport (IWT) in India is considered as one of the cost effective, relatively fuel efficient, and environment friendly means of transportation. This also provides livelihoods to many people living along the river courses. India is among those countries where new initiatives are being undertaken to make better use of the existing capacity of Inland waterways transportation. Several development projects aimed towards the enhancement of inland water transportation infrastructures are

underway. Out of the total navigable length of about 14500 km, approx 5200 kms. of rivers and 4000 kms. of canals are being used by mechanized vessels for navigation. The North East regions alone subscribe to about 1800 kms of river routes. A large portion of it is presently used for transportation of passengers and cargos by mechanized and non-mechanized boats including country boats. It is, therefore needed that social control coupled with technology and management support aided by financial and regulatory incentives and disincentives may be promoted that can lead to sizeable and competitive expansion of inland water transport and passenger boat industry in the growth Matrix.

1.2.3 Inland Waterways Authority of India (IWAI)

The Government of India (GoI) established Inland Waterways Authority of India (IWAI) as a statutory body in 1986 entrusted it with the responsibility to develop, maintain and regulate the national waterways, and to advise the central and the state governments on matters relating to the development of inland water transport. IWAI is a legal authority in-charge of the waterways in India and was created by the Govt. of India on 27 October 1986. Its headquarters is located in Noida, Uttar Pradesh and regional offices are at Patna, Kolkata, Guwahati and Kochi and sub-offices at Allahabad, Varanasi, Bhagalpur, Farrakka and Kollam. The function of IWAI is to build necessary infrastructure in the waterways, survey the economic possibilities of new projects, administrate, develop and regulate the waterways for navigation and shipping.

More recently the government has taken a series of decisions to revitalise the inland water transport system to improve its reliability and efficiency and to enable it to complement other modes such as road and rail. The government's new policy is to create 'highways' on the waterways and to maintain them with private sector participation and assistance from international aid agencies like the World Bank.

There has been a policy decision to grant a tax holiday of ten years to this sector, and to encourage private Foreign Direct Investments (FDIs) to bring in modern technology to upgrade the indigenous capabilities. Another important policy initiative taken is to involve more actively, the concerned state governments in the development of inland water transport. Techno-Economic studies have been conducted on many new waterways such as the Godavari, Krishna, Buckingham Canal System from Kakinada to Marcanum, the Sunderbans, Goa rivers, Brahmani & East Coast Canal from Talcher to Paradip & Haldia, the DVC Canal, Barak river etc. which have potential for immediate development.

It is estimated that the north-eastern region has about 1800 km of river routes that can be used by steamers and large country boats. The inland water transport departments of both the state and central governments have been trying to improve the water transport system in the region. The river Brahmaputra now has several small river-ports like Sadiya, Dibrugarh, Neamati, Tezpur, Guwahati, Jogighopa and Dhubri. Besides, there are more than thirty pairs of ferry-ghats on the Brahmaputra, transporting men and materials. The River Barak also has small ports at Karimganj, Badarpur and Silchar and ferry services at several places across it. The major tributaries of Brahmaputra namely Lohit, Dhansiri and Subansiri, rivers of Tripura namely Gumti and Haora, Tizu river in Nagaland, Kolodyne river in Mizoram are having immense navigation potential and it can be developed for better utilization of both cargo and passenger movements.

1.2.4 National Waterways in India

There are total five national waterways in India; which provide means of public and freight transportation. Cargo transportation is only limited to a few waterways in Goa, West Bengal, Assam and Kerala in an organized manner

The concept of National Waterways was introduced in 1982 to promote the development of inland water transport in the country. Following 5 (five) waterways were declared National waterways by separate acts of parliament.

1. **National Waterway 1** - This important waterway covers the length of 1620 kms. stretching from Allahabad to Haldia in the Ganges–Bhagirathi–Hooghly river system. This was established in October, 1986. It has fixed terminals at Haldia, BSN (Kolkata), Pakur, Farrakka & Patna and floating terminals at Haldia, Kolkata, Diamond Harbour, Katwa, Tribeni, Baharampur, Jangipur, Bhagalpur, Semaria, Doriganj, Ballia, Ghazipur, Varanasi, Chunar and Allahabad.
2. **National Waterway 2** running from Sadiya to Dhubri stretch of river Brahmaputra having the total length of 891 kms. This was established in September, 1988. The Pandu is having fixed terminal facility whereas Dhubri, Jogighopa, Tezpur, Silghat, Dibrugarh, Jamgurhi, Bogibil, Saikhowa and Sadiya are floating terminals.
3. **National Waterway 3** lies on the Kottapuram-Kollam stretch of the West Coast Canal, Champakara Canal and Udyogmandal Canal. It was established in February 1993. The total length of the route is 205 km. Thrikkunnapuzha, Kollam and Alappuzha are fixed terminals on this waterway.

4. **National Waterway 4** lies on the Kakinada-Pondicherry (1027 Km) stretch of Canals and the Kaluvelly Tank, Bhadrachalam-Rajahmundry stretch of River Godavari and Wazirabad-Vijayawada stretch of River Krishna, It was established in November.
5. **National Waterway 5** lies on the Talcher- Dhamra stretch of the Brahmani River, the Geonkhali- Charbatia stretch of the East Coast Canal (588 kms), the Charbatia-Dhamra stretch of Matai River and the Mangalgadi-Paradip stretch of the Mahanadi River Delta. It was established in November 2008.
6. National Waterway Act, 2016 (No17 of 2016) was passed in both houses of parliament and published in Gazette of India on 26.03.2016. 111 National Waterways have been declared as National waterways including the existing five National Waterways.

1.3 Background of Boat Accidents

In many of the navigable waterways in India, boats usually run without life jackets or inflated tubes and engines - mostly local made or impoverished versions, are not checked for fitness. It is observed that the safety of the boatman, operating conditions of boats and boat making docks, inconsistent or nonexistent ferry ghat infrastructures have not been outlined much in the rules and ferry acts available.

There is an overall paucity of control measures over the private boat operating services in major water channels. Such boats do have little safety measures, yet daily passengers have no other means than to travel in such dangerous conditions.

The following prime factors contribute to boat/ferry accidents in most of the inland waterways -

- **Understaffing/Unqualified crew**
- **Severe overcrowding**
- **Ageing vessels**
- **Lack of regulatory standards**
- **Faulty boat design and stability**

- **OPERATORS DISTRACTION**
The person operating the boat or personal watercraft divert attention to other issues while driving boats may cause accidents
- **RECKLESS OPERATION OF THE BOAT**
Many a times, boats accidents occur due to over speeding of boats or watercrafts. In addition negligence in boat operations also cause accidents.
- **UNRULY OR RAMPANT PASSENGERS**
Sometimes unruly passengers in boats/ferries create ruckus or chaos on board, and may slips and hits their head, falls overboard, etc. This also cause accidents due to imbalance.
- **RECKLESS SKIERS**
Reckless skiers performing illegal or dangerous stunts around boats may cause imbalance of boats or distraction by boat operator that may cause accidents.
- **DRIVING UNDER THE INFLUENCE OF ALCOHOL**
When a person has been drinking they are far more likely to fall overboard and drown. Alcohol also leads to a lack of judgment which results in many of the other factors listed here as contributing to boat accidents. Person may be injured because of someone else's operating their boat or watercraft under the influence of alcohol.
- **FAILURE TO POST A PROPER LOOKOUT**
Many boating accidents, especially collisions occur because no one is watching for obstacles, other boats, etc.
- **INEXPERIENCED OPERATOR**
Just as car accidents are more common among new drivers, anyone who is new to operating a boat or a personal watercraft is at higher risk for causing or being involved in a boating accident.
- **EQUIPMENT FAILURE**
Boat accident may also be caused due to the failure of equipments on board of boats or personal watercrafts.

- ***POOR WEATHER CONDITIONS***

This is a major contributor to many serious boating accidents, especially accidents that involve the loss of the vessel. It is important to pay attention to weather advisories so that you are not caught in conditions that your vessel was not designed to handle.

1.4 Role of State, Organization and System

While recognizing the importance of boat and navigational safety along waterways, it is required to invite attentions of stakeholders like state governments, boat owners/operators, training providers, boat industry associations etc. to take precautionary measures and actions as follows:

1. Implementation and enforcement of applicable provisions of conventions/regulations, with a view to ensure harmonization of ferrying legislation within the country.
2. To ensure that legislation is user-friendly, easily understood, enforceable, accessible to all and includes appropriate penalties severe enough to encourage effective implementation.
3. Periodic review and updation of the relevant provisions of guidelines.
4. Development and implementation of the effective passenger control and accountability mechanisms.
5. Encourage stakeholders to develop safety management systems for domestic ferries and passenger vessels that include, but are not limited to, key elements such as:
 - a. Training in operational matters, including planned maintenance.
 - b. Safety awareness programmes and pre-departure safety briefs for passengers.
 - c. Clear communication and the provision of necessary information, including weather forecasts, to support boat masters.
 - d. Effective communication between masters, surveyors and boat owners to facilitate proper boat inspections and surveys.
 - e. Stability guidance information, including availability of stability books to masters.

6. Incentives and subsidies for procurements of new boat/vessels.
7. Encourage the development of adequate infrastructure, particularly in the areas of docking, slipping and passenger terminals to ensure the sustainable and safe operation of domestic ferries and other passenger carrying vessels.
8. Encourage the exploration of means to reduce the excessive cost of servicing lifesaving and firefighting equipments, such as establishment of life saving appliances (LSA) and firefighting equipments (FFE) service stations.
9. The sharing of best practices and resources across all stakeholders through regional associations
10. Based on the concept of corporate social responsibility, the stakeholders need to encourage the development of long-term maritime personnel retention policies that are supported by continuous training programmes.
11. Encourage the development of national and regional search and rescue (SAR) response and communication plans, that include familiarization programmes and the use of appropriate technology and tools such as:
 - a. Voluntary community organizations that work alongside national SAR services to provide community awareness and increase search and rescue capacity and capability
 - b. High and low level technology for communicating locations of incidents and tracking survivors.

2

Weather Forecasting & Early Warning System

2.1. Overview

Weather is an important component in safe boat operations across the world. In India, there are great spatial and temporal variations in climatic characteristics that are reflected in the form of localized weather variations across the country. Whereas, the favorable weather can support boat operators in carrying out safe navigations and organizing pleasure trips, the poor weather can spoil the trip and may cause emergency situations that may eventually lead to major disasters like boat capsizing, collision etc. It is, therefore essential for boat owners and waterways management authorities to pay much attention on weather bulletins and guidelines issued by local meteorological organizations to avert boat tragedies.

2.1.1 Forecast of hydro-meteorological events related to passenger boating suffers from technology and typically short lead-time limitations. However, even with such limitations forecast could be made with a fair degree of accuracy with select technology choices.

2.2 Weather Forecasting for Safe Boat Operations

2.2.1 India Meteorological Department (IMD)

India Meteorological Department (IMD) is the nodal agency in the Government of India providing vital information about the meteorological observations, weather forecasting and early warning at the national level. The information issued by IMD is gainfully utilized in the optimum operation of weather-sensitive activities. IMD issues advance warning information at stipulated intervals to government functionaries, media and general public against severe weather phenomena like tropical cyclones, thunderstorm, dust storms, heavy rains, snow, cold/heat waves etc. The primary aim of providing warnings ahead of a hazard impact is to empower individuals and communities to respond appropriately to the hazard threat in order to reduce the risk of death, injury, property loss and damage. It is, therefore, essential for all the

stakeholders to keep themselves abreast of the atmospheric disturbance taking place in their locality and how to respond to the emerging threats. A good network of various instruments, half hourly satellite information, high end forecasting work stations, improved NWP models including auto Nowcast systems and enhanced computational and communication capabilities are some of the essential requirements for issuing Nowcast warnings with high degree of accuracy. This may enhance the level of preparedness at the wharf (ghat) or waterways authority level.

2.2.1.1 The weather forecast issued by IMD may be of immense utility to boat operators and concerned management authorities to regulate operations in waterways during adverse weather events. IMD runs numerical models for generating weather forecasts in different temporal scales which may be used by regional and local waterways management authorities for providing early warning to boat operators. Summary of the numerical forecasting system is given below:

Forecast System	Validity Period
Global Forecast System	3-10 days
Weather Research and Forecast System	1-3 days
Nowcast	3 hours
Hurricane (Cyclone) Weather Research and Forecast	1-5 days
Multi Model Ensemble for district forecast	1-5 days, twice a week

2.2.1.2 The operational forecast and warnings issued for different spatial and temporal domains which may be used for ghat and waterways are as under-

Forecast	Domain	
	Temporal	Spatial
Nowcast	3-6 hours	Venue/ Location
Short Range	3 days	City/ District/State/Met Sub-division

Though there are various types of models and forecasts issued by IMD in medium to extended range (3 -15 days), these forecasts may not be suitable for real time boat operations as well as for planning purpose .

2.2.1.3 Nowcast Services for Boat operations

Nowcast technology offers an opportunity to warn boat operators about severe weather events with short lead times up to 3 hours. Currently, IMD

issues Nowcast of localized high impact/ severe weather events such as thunderstorms, squalls and other convective weather phenomena for about 206 cities which are covered by Doppler Weather Radars (DWRs). These information can be helpful for boat owners to take timely decisions on boat operations and safety measures while moving in the water. The Nowcast warnings are issued in different colors depending upon the intensity and are updated at 3 hour intervals. The current Nowcasting network of IMD does not cover the entire river systems covering boat operations.

Regarding provision of nowcast for boat operations by IMD, the following points are to be noted.

- No input possible for river channel crossing.
- Elements of the forecast and scale of warning will depend upon the category of the vessel and the purpose of the operation for both scheduled and non scheduled boat operations.
- For providing the forecast, the details like type of boat, purpose of the boat operation (whether it is of passengers/cargo movement/ passengers and cargo combined) , starting point and the end point of the boat operations with points en route, time schedule and the total duration of the boat operation are to be provided.
- The above details to be provided at least one week before for scheduled operations and at least one day before for non scheduled operations.
- The forecast provided will include the information like possible occurrence of severe weather including its intensity which will be updated in every three hours.

2.2.1.4. Dissemination of Nowcast information

In view of the typically short lead time in Nowcasts and the perishable nature of the generated information, the Nowcast information should reach the end users well in advance. The fastest mode of communication should be used for the dissemination of Nowcast warnings like World Wide Web, e-mail, Fax, telephone, mobile, SMS, TV, radio communication, flag hoisting, public announcements/ Sirens etc.

The forecast products in different spatial as well as time scales suitable for the purpose are already being issued by IMD. These products are being made available in the IMD website immediately after their issue. Hence provision should be made by inland water Authority to access and extract the forecast and warning information of IMD pertaining to the State, Subdivision, District and City levels. Suitable mobile based APP may be developed by the authority to access and extract all the required information along with the route forecast issued for boat operations. Arrangements to be made for the display of the relevant weather information which can be hazardous for the boat operation for the knowledge of the boat operators as well as the public.

2.2.2 Central Water Commission (CWC)

Central Water Commission (CWC) is the technical agency of water resources and flood management working under the Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India. The organization is entrusted with the task of formulating and disseminating information about flood forecasts at various interstate river locations. CWC maintains 878 hydrological observation stations and 199 flood forecasting stations which include 151 level and 48 inflow forecast stations spread across 20 states and union territories and 19 inter-state river systems in the country. The work of formulation and dissemination of flood forecasts under various inter-state river basins is carried out directly by 27 Flood Forecasting Divisions which are designated as Divisional Flood Control Rooms (DFCR). Flood forecasts are issued 6 to 24 hours in advance depending on the travel time available between base station to FF station and available time of concentration up to flood forecasting stations. CWC has also started rainfall based mathematical modelling to generate 3-day flood advisories for all the flood forecasting stations for 2017 monsoon.

There are two types of forecast issued by CWC – Stage forecast or level Forecast gives information about water level in rivers and Inflow forecast provides information about the likely amount of inflow into the dams /barrages. All these information can be helpful in streamlining safe operations of boats and other cargo during monsoon period or high discharge situation in river channels.

2.2.2.1 In order to improve the safety of boat operations, there is a need for strengthening the scientific, technical and operational meteorological support system in a holistic manner at the national, state and local

forecasting offices so that accurate and precise warnings can be circulated to boat operators and other stakeholders. Improved forecasting of hydro-meteorological hazards require more robust observational systems for the atmosphere, oceans, and land surface. Communication system and computational capabilities at the national, State and local level and infra-structure facilities like forecasting work stations/ computer platforms & Public Weather System at state/ local level requires physical strengthening and improvement. All these communication networks and infrastructural facilities are to be located in state, districts and local EOCs.

- 2.2.2.2 The hydrological forecast should be generated through hydrological modeling based on scientific use of reliable hydrological and meteorological real-time data, river morphological data, catchment characteristic data etc.

2.3 Implementation Programme-Roles and Responsibilities of various agencies

Early warning/forecasting for boat safety demands a three-tier implementation i.e. at national, state and local level. At each of these levels, however, the action plan would require the concerted efforts of all stakeholders that operate at that level. Respondents, stake holders, NGOs, local community need to be clearly identified.

2.3.1 National Level –

- Early warning and Nowcast products to be issued at national, regional, state and local level required for safe boating. Necessary SOP and check list to be prepared.
- Observational network and other infra-structure facilities to be set up at national, regional, state and local level.
- Rainfall data, weather forecast & heavy rainfall warnings to be issued by IMD. In addition, catchment-wise Quantitative Precipitation Forecast and other information to be given to CWC.
- IMD and CWC to provide specialized training for their officials at State and local level for improved understanding of the interaction of hydrological and meteorological processes. Forecasts of flood river level, dam discharge to be issued by CWC.
- NDMA to prepare guidelines and Standard Operating procedures (SOPs)

for co-ordination between concerned agencies and defining the role and responsibilities of different institutions and developing inter-institutional functional mechanism; Implementation of warnings and advisories issued by IMD and CWC. Managing various emergencies and preparation of contingency plans.

2.3.2. State level –

- State Govt. to undertake overall responsibility of the implementation of guidelines and continuous monitoring and follow up.
- State Govt to provide necessary land (free of cost) and other logistic support for setting up of required observatories and provide security of officials and equipments
- State Inland Water Transport Department will act as the implementing authority and to liaison with nodal officers of IMD, CWC & NRSC, Boat operators, ferry passengers and other stake holders to ensure strict implementation of SOPs of NDMA for safe boat operations. IWT officials will be nominated as ferry Ghat managers.
- State IWT officials to conduct regular inspection of the boats and ensure availability of necessary communication equipment, GPS, lifesaving jackets & other materials.
- Each organization will identify their nodal officers for each location and establish control rooms to remain functional on 24x7 basis.
- State Inland Water transport Department to arrange for space and other infrastructure facilities like electricity, internet connectivity etc. for installing screens for display of forecasts and warnings of IMD and CWC.

3

Safety Standards & Specifications

3.1. Overview

The importance of 'safety' in the passenger-boat travel and its long term benefits cannot be underestimated. Design of boats to meet the safety specifications and to conform to operational standards would form the first and the foremost desirable structural support to 'mitigation and management of risks' in the boat travel. The second and the equally important support structure for safe boats operation is the "Wharf Facility" which can be accomplished with their modernization and advanced embankment arrangements in the form of floating Jetty-infrastructure, and related support systems. The enforcement of adopting the standard designs and operating regimes of boat navigation requires active cooperation from boat manufacturers and operators, whereas the responsibility of ensuring availability of boats, modernization of wharfs with suitable embankments rest with the state governments. However, the successful implementation and enforcement of safety standards is largely dependent on the proactive role to be played by local administration including Panchayati Raj Institutions (PRIs), State and District Disaster Management Authorities and other local level functionaries.

3.2. Boat Design, Trends and Practices

3.2.1 Most of the passenger boats or country crafts are constructed in a primitive or traditional style by using locally available material especially woods. The traditional boat construction styles are carried forward from one generation to the next generation thereby having less scope of modernization. Some of the boats are, however, mechanized using agricultural pumps, engine and propeller systems. However, most of the boats do not have gear boxes for reduction of speeds or for providing mechanism for reversing. In addition, many of the boat-designs have low free board which is unsafe for carrying passengers.

3.3. General Safety Measures -

3.3.1 Construction and Structural Strength

The design, construction and materials of the hull structure as well as machineries and equipments should be suitably designed to ensure safe operations of boats for the intended services. It is, therefore, recommended that all new boats should be designed & constructed as per the recognized standards and construction rules of the certification body.

In case of existing boats, it should be demonstrated by the history of safe operation of the boat or similar design of boats that the construction of the vessels is adequate for the service.

3.3.2. Freeboard and Stability

Freeboard is defined as the minimum vertical distance from the waterline to the top of deck at side in case of a decked boat or to the top of side in an open boat. This corresponds with the full load condition and gives a good measure of the safety of the boat. The freeboard values are assigned by certifying authority 'Indian Register of Shipping' according to the applicable rules. The Freeboard values increase with the length of the boat. When freeboard is not assigned, the following values may be recommended-

Types of Boat	Boat Length	Freeboard
Decked Boats	Up to 7 meters	120 mm
	18 meters & above	240 mm
Open Boats	Up to 7 meters	240 mm
	18 meters & above	480 mm

Table – Freeboard values for different boat length

For Intermediate length in both the cases, freeboard values may be interpolated. The Stability of a boat is checked by the certification body (Indian Register of Shipping). In case of boats, which already exist, the certifying body may use a heeling test to verify the stability of boats for carrying the specified number of passengers.

3.3.3. Registration Number and Seating Capacity on Board

It may be a good practice to keep mandatory provisions for boats to have registration with the local statutory body such as Inland Water Transport Department of the concerned State. The Registration number should be prominently marked on the boat on a particular place as decided by the authority.

Since overloading is one of the common reasons of boat accidents, it is necessary to determine the maximum number of persons that can be safely carried on each boat and clearly marked on the boat. The carrying capacity of the boat should be primarily determined by stability and space considerations. The floor space required may be based on 1.8 square meter per person. In case of long seats or benches, two persons may be accommodated per meter of the seat.

3.3.4 Monitoring and Maintenance

The statutory body responsible for regulating boat operations should frame out rules and regulations for monitoring and periodical examination of boats. The operators should have to satisfy themselves about the integrity of the vessel's hull by an out of water examination at least every 3 years and 2 years in case of wooden vessels, which should be documented. In addition, the external components of steering and propulsion machinery and shell fittings should also be examined out of the water. The documented report of such examination should be made available on board for verification by statutory bodies, passengers associations, local NGOs, interested users etc.

3.3.5 Safety Briefings

At the start of every voyage or trip, the master operator or other responsible crew members should give safety briefing to passengers. The safety briefing should consist of restrictions about the movement on board, emergency procedures, location of emergency exits, stowage and use of personal protective equipments such as life jackets and life buoys.

3.3.6. Wharfs/ Jetties

The availability of proper infrastructures at each wharf/Jetty for embarkation and disembarkation are equally important for safe boating. It should be the responsibility of local authorities to provide adequate facilities. Wherever any variation in water level exists in rivers or harbors, the appropriate stairways and landings should be provided covering the whole range of water levels for safe embarkation/disembarkation. The floating facilities may also be used for embarkation/ disembarkation. Suitable barges for landing should be arranged with gangways/ ladders connected to shore for this purpose. In addition, floating or fixed jetties are to be provided with appropriate fenders to prevent damage to the boats while berthing. Rubber fenders are suitable for this purpose.

3.4 Safety standards for Non-mechanized Boats

3.4.1 Life Saving Equipments

Every boat should have approved life saving equipments sufficient for the number of persons that can be carried. IRS/MMD approved lifesaving appliances such as life jackets, life buoy etc. confirming to latest SOLAS/LSA Code requirement along with identification/marketing details on the product. (Also Refer Annexure-I to Chapter 3 for details)

3.4.1.1 Life buoys

It is recommended that at least one lifebuoy should be provided for every 5 passengers, with a minimum of 2 lifebuoys on the boat.

3.4.1.2 Life jackets:

In general, life jackets are not required for boats operating in the calm water. However, it is recommended that as a good practice, passengers should be provided life jackets before the journey begins. All the life saving appliances should be properly maintained and periodically serviced based on the recommendations by the manufacturing company.

3.4.1.3 First Aid Box should be kept essentially in every boat with all the emergency first aid equipments and medications to be used in case of emergency.

3.4.2 Fire Safety

At least one multipurpose portable fire extinguisher of a recognized standard should be carried in all the vessels navigating in inland waterways. In order to prevent fire accidents, it is strongly suggested that the following items should be prohibited to be carried on boats.

- a) Lamps powered by liquefied gas or liquid oil
- b) Vaporizing oil burner stoves
- c) Solid fuel heaters
- d) Devices fitted with wick burners
- e) Liquefied gas devices

All the boat operators should display posters on board indicating items prohibited to be carried in the vessels.

Smoking shall be strictly prohibited in the boats.

3.4.3 Navigation and Communication

3.4.3.1. Navigation lights and Sound signals

The Vessels operating at night should be equipped with navigation lights as required by the local authority. This may enable ferry/vessels operators to get acquaintance with the routes or possible dangers during navigation. The appropriate sound signaling equipment should also be provided in all vessels.

3.4.3.2. Communication Equipment

In order to disseminate distress communication, all boat operators should carry emergency communication equipments. The mobile phones are normally sufficient for this purpose provided operation area has signal coverage. In other cases portable VHF may be required. The authorities to be informed in case of emergency should be clearly indicated on board .The communication equipments for receiving weather forecast and warnings are also essential depending on the area of operation. This may be arranged at the landing points onshore and boat operators be informed by the administrative authorities.

3.4.4. Anchoring and Mooring

In order to prevent drifting of vessels in the area of operations during calm weather in general and cyclonic conditions in particular, it is essential to keep suitable anchoring equipments on board like Anchors, Cables and Ropes etc. The anchoring arrangements may be helpful for holding the boats especially during unstable weather conditions. The Mooring arrangements consisting of bollards or cleats and mooring ropes are to be provided suitably for the vessel.

3.5. Safety standards for Mechanized Boats

In mechanized boats, safety standards must be followed as the top priority especially to ensure that machinery failure is avoided to avert potential disasters. It must also be ensured that propulsion machinery is reliable and may not be stranded in mid waterways due to machinery failure. An important safety measure for mechanized boats is the possibility to apply reverse thrust which may be achieved by means of gears that may enable boat operators to quickly stop the boat for avoiding possible collision. In addition, prevention of fire and explosion in boats should also be ensured important safety measures for mechanical boats.

In order to maintain general safety measures in mechanized boats, the major thrust should be on protecting people from the imminent danger of machineries. The moving parts and hot surfaces are to be protected so as to minimize danger to people during normal movement of vessels. All fuel tank vents should be fitted with a 'flame gauze' and carried above the tank top level, to above a height of personnel standing next to the engine or to a level where there is no danger of escaping fuel or vapour. A valve or cock, which can be shut from a position outside the engine space should be fitted in the fuel feed pipe, as close to the fuel tanks as possible. Petrol tanks for outboard motors should have quick connection shutoff devices.

3.5.1 Safety measures for fuel storage

In mechanized boats, safety measures for fuel storage tanks should be undertaken with utmost caution and safety. The following precautions are recommended for fire safety of storage tanks in mechanized boats.

- The storage container should be composed of metal and fitted in such a manner that the possibility of leaks/spills may be averted.
- The container should be stored upright and secured to prevent shifting or fall over with the movement of the vessel. They should also be located away from the direct sources of heat and should be made of fire resistant materials.
- The container should be properly labeled according to contents like materials stored, hazard signs, no smoking/ignition sources etc.

3.5.2 Safety Measures for Petrol Engines and Petrol Fuels

The fixed petrol tanks of more than 2.5 liters should not be located within one metre of any engine or heating appliance unless insulated and protected by fire resistant materials. It is recommended not to use glass or plastic fuel sight gauges. The fuel level indicators should be designed in such a way that it should not allow fuel to escape in the event of damage. All the fixed fuel feed pipes should be of metallic type. The flexible pipes should be of fire resistant materials.

3.5.3 Charging Devices

Arrangements of charging facilities for batteries should be ensured on board, so that boats machineries are started /operated through batteries smoothly. In other boats where battery is the sole means of starting the engine, provisions be made duplicate batteries with change over switches for emergency uses.

3.5.4 Lighting Arrangements

When lighting within the vessel is provided through a centralized electrical system, an alternative source of lighting should be provided for emergency use. This may be

ensured by means of torches provided on board. Alternative source of lighting is to be ensured for the movement of people, deployment of life saving appliances and to work on essential machinery.

3.5.5 Steering Arrangements

Each vessel should be provided with effective means of steering. Emergency steering arrangements are recommended where there are safety risks of passengers due to main steering failure. This may be in the form of a tiller which can be attached to the rudder stock or steering oar depending on the area of operation.

3.5.6 Bilge Pumping/ Drainage Arrangements

All the vessels plying in the waterways should have means of bilge pumping either by a power driven pump or a hand pump so that all compartments can be drained during emergency. In machinery spaces, a holding tank is recommended for oily bilges to prevent water pollution. In case of small open boats operating in areas with small wave height of less than 0.6 m, drainage with the help of bailers or buckets may be sufficient.

3.5.7 Life Saving Equipments

Each boat should have approved life saving equipments sufficient for the number of persons that can be carried on board. IRS/MMD approved lifesaving appliances such as life jackets, life buoy etc. confirming to latest SOLAS/LSA Code requirement along with identification/markings details on the product (Also Refer Annexure-I to Chapter 3 for details). It should be mandatory to keep the following life saving equipments on every mechanized boats/vessels.

3.5.7.1 Life Buoys

A minimum of 4 Life Buoys for vessels up to 25 meter length, 6 Life Buoys for vessels of 25 to 45 meters length and 8 Life Buoys for more than 45 meters length should be carried in vessels.

3.5.7.2 Life Jackets

Though Life Jackets are not required for vessels operating in areas of less than 0.6 meters wave height, however in other areas, life jackets are to be carried for all passengers and crews.

3.5.7.3 Life Rafts

In case of vessels operating in areas of more than 1.2 meter wave height, sufficient number of life rafts for accommodating people on board is

recommended. While keeping all life saving equipments, it is essential to ensure periodic maintenance and servicing following manufacturer's recommendations. In a similar manner, 'First Aid' box should be kept on board for passengers and crew members like mechanized boats.

3.5.8 Fire Safety Measures

Since mechanized boats are largely operated by means of electrical and mechanical devices, there are more chances of catching fire, thus well structured fire fighting system must be essentially maintained in mechanized boats. The following equipments are required to be kept in vessels.

3.5.8.1. Fire pump A vessel of 6 meter and above in length should carry hand pumps or power driven pumps with hose connections capable of delivering a jet of water to any part of the vessel through hose and nozzles.

3.5.8.2. Fire Extinguishers

At least one multipurpose portable fire extinguisher to a recognized standard is to be carried in all vessels, which is to be kept outside the engine space. In addition, one multipurpose fire extinguisher should be placed at each exit from accommodation spaces to open decks. In addition, Fire Buckets and Lanyards are also to be provided in the boats. It is recommended that all fire fighting equipments are to be maintained in good conditions.

Like non mechanized boats, the following items should not be carried on board in all the mechanized boats -

- a) Lamps powered by liquefied gas or liquid oil
- b) Vaporizing oil burner stoves
- c) Solid fuel heaters
- d) Devices fitted with wick burners
- e) Liquefied gas devices

Smoking shall be strictly prohibited in the boats.

3.5.9 Navigation and Communication Aids

The provisions of navigation and communication arrangements should be managed in the same manner like non mechanized boats.

Anchoring and Mooring arrangements for mechanized boats should also follow the pattern of non mechanized boats.

3.6. Implementation Plan- Roles & Responsibilities of various agencies

3.6.1. Non-mechanized boats

The responsibility of the implementation of safety standards and specifications primarily rest with the state governments. The Inland Waterways Authority of India (IWAI) may be requested to extend the scope of application of model rules to non-mechanized boats, which could then be adopted by state governments. The respective departments in all the concerned states may be empowered to implement the rules.

3.6.2. Mechanized boats

The responsibility of the implementation in case of mechanized boats also rests with the state governments following the similar pattern of non mechanized boats. The state government may also requires to update rules in line with the “model rules of IWAI “.Government departments with qualified personnel such as Inland Waterways Transport department, ports and harbors department, captain of ports etc. would be responsible for implementation of the rules. The Governments may also use the services of their maritime boards, wherever established for this purpose.

It is recommended that all the states having river transportation as means of communication should be set up Inland Waterways Transport Department, if not done. The department may be responsible for the development and implementation of boat safety regulations. The respective state governments may also authorize Classification Societies like Indian register of Shipping for specific certification purpose, as done by DG Shipping for seagoing vessels. Rules of state governments already rely upon class society requirements for construction aspects.

The updation of existing IWAI rules require some considerable time as it involves setting up of a committee and deliberations, preparation of draft rules, invitation of comments and final gazette notification. This process may take about one year, considering the need to address various shortcomings in the rules. Once the updated rules are published, it can be applied to all new boats, whereas the existing boats may be given some time frame (1-2 years) to implement the regulations in a progressive manner.

As the existing non-mechanized boats are not subjected to robust regulatory practices, application of the rules to such boats will be time consuming. The existing non-mechanized boats may be required to comply with the safety requirements other than construction. It is suggested that a period of one to two years should be given to existing non-mechanized boats to progressively comply with the new rules. The local

non mechanized boat builders are also required to follow appropriate construction rules for new boats. A time frame of two years may be given for the implementation of rules.

Annexure-I

to Chapter 3

IRS/MMD approved lifesaving appliances such as life jackets, life buoy etc. conforming to latest SOLAS/LSA Code requirement along with identification/marketing details on the product are to be used.

The life saving appliances be clearly marked with approval information and any operational restrictions.

Lifejackets (Infants/Child/Adult) shall be marked by their weight or height, or by both weight and height.

In addition, infant or child life jackets shall be marked with:-

- a) Size range
- b) an “infant” or “child” symbol as adopted by International Maritime Organization (IMO) resolution A.760(18), as amended.

The container of inflatable liferaft shall be marked with:-

- a. Maker’s name or trademark
- b. Serial number
- c. Name of approving authority and the number of the persons it is permitted to carry,
- d. SOLAS
- e. Type of emergency pack enclosed
- f. Date when last serviced
- g. Length of painter
- h. Mass of the packed liferaft, if greater than 185 kg.

The following IRS website link gives the product details and manufacturer on using the search function for the relevant item.

<http://www.irclass.org/marine/types-and-works-approval/>

4

Regulatory & Legal Issues

4.1. Overview

Inland Waterways Transport (IWT) finds a place in all the three lists i.e. Union List, State List and Concurrent List within the 7th Schedule of the Constitution of India, which underline the importance attached to this mode of transportation. The constitutional provisions for shipping and navigation in the inland waterways (National Waterways) as regards to mechanically propelled vessels fall under the Union List. Communication, that is to say, roads, bridges, ferries and other means of communication not specified in the Union List, inland waterways, and traffic thereon subject to the provision of Union List and Concurrent List with regard to such waterways comes under the State List.

4.2. Regulatory Provisions of National Waterways

The Government of India constituted an Autonomous Body i.e. Inland Waterways Authority of India (IWAI) by an Act of Parliament i.e. Inland Waterways Authority of India Act, 1985 (82 of 1985). The role of IWAI is to deal with matters pertaining to shipping and navigation on National Waterways (NWs) inter-alia to create necessary infrastructural facilities, maintain a navigable fairway, provide channel marking for safe navigation etc.

Earlier, five Waterways were declared as 'National Waterways' by separate acts of parliament:

- 4.2.1. National Waterway- 1 extending from rivers Ganga – Bhagirathi to Hooghly covering cities from Allahabad to Haldia (1620 kms). It was declared as National Waterway in 1986.
- 4.2.2. National Waterway- 2 on the river Brahmaputra extends from Sadiyato Dhubri (891 kms) in Assam was declared as National Waterway in 1988.
- 4.2.3. National Waterway- 3 The west coastal Canals from Kollam (Kerala) to Kottapuram along with Champakara and Udyogmandal canals (205 kms) was declared as National Waterway 3 in 1993.

- 4.2.4. National Waterway- 4 on rivers Godavari & Krishna along with canals between Kakinada and Pondicherry (1027 kms) was declared as National Waterway 4 in 2008.
- 4.2.5. National Waterway- 5 covering routes on rivers Brahmani and Mahanadi delta system along with east coast canal(588 kms) was declared as National Waterway 5 in 2008.
- 4.2.6 The National Waterways Act, 2016 (No. 17 of 2016) was passed in both houses of Parliament and published in the Gazette of India on 26.03.2016. This Act makes provisions for existing National Waterways and to provide for declaration of certain inland waterways and also to provide for the regulation and development of the said waterways for the purposes of shipping and navigation and for matters connected therewith or incidental thereto. 111 National Waterways have been declared as National Waterways including the existing five National Waterways. The copy of the Gazette Notification which includes the list of 111 Waterways in the schedule is enclosed as Annexure:1 at the end of the guidelines.

4.3. Legal Coverage and Regulatory Mechanism

The navigational safety is of paramount importance for inland waterways, more so when traffic on the National Waterways is poised for an exponential growth in the coming years.

The IWAI Act 1985 empowers IWAI to enact, publish rules and regulations on matters pertaining to safety measures as well as development and management of inland waterways for the purposes of safe navigation and shipping and connected matters/incidentals thereto, removal of obstructions/encroachments from the Waterways, Safe Cargo loading/unloading on the Inland terminals, control of water pollution and to stop vessels running on national waterways without permit/license.

By virtue of the above, IWAI has already published through Gazette Notifications the following rules & regulations:-

- i) Prevention of Collision on National Waterways Regulations, 2002;
- ii) National Waterways, Safety of Navigation and Shipping Regulations, 2002
- iii) Inland Waterways Authority of India (Classification of Inland Waterways in India) Regulations, 2006 and

- 4.3.1 The Inland vessels Act, 1917 as amended by The Inland Vessels (Amendment) Act, 2007

The Inland Vessels Act, 1917 (1 of 1917)

As regards to all mechanically propelled vessels, the primary applicable Act is the Inland Vessels Act, 1917 (1 of 1917) which confers the powers to the State Governments for enforcement of the various provisions of this Act. This Act has been amended in 2007 and many important aspects have been added and amended so that the Act is more contemporary. The various Chapters in this Act are:

Chapter I	-	Preliminary
Chapter II	-	Survey of Inland Mechanically Propelled Vessels
Chapter II A	-	Registration of Inland [Mechanically Propelled Vessels]
Chapter III	-	Masters Including Serangs and Engineers including Engine – Drivers of Inland Mechanically Propelled Vesse
Chapter IV	-	Investigation into Casualties
Chapter IV A	-	Removal of Obstructions and Similar Hazards in Navigation
Chapter V	-	Suspension and Cancellation of Certificates Granted under Inland Vessels Act, 1917
Chapter VI	-	Protection of and Carriage of Passengers in, Inland Mechanically Propelled Vessels
Chapter VI A	-	Insurance of Mechanically Propelled vessel Against Third Party Risks
Chapter VI AB	-	Prevention and Control of Pollution and Protection Of Inland Water
Chapter VII	-	Penalties and Legal Proceedings.
Chapter VIII	-	Supplemental

The adoption & implementation of these regulations and acts would help generate awareness on issues of navigational safety and primarily would be useful to all the stakeholders in using the IWT mode of transportation in a safe and efficient manner across the country. All inland mechanically propelled vessels irrespective of the BHP of the propulsion engine and including outboard motors come under the ambit of The Inland Vessels Act, 1917 (1 of 1917) and therefore are to be governed by this Act by the State Governments. These vessels which may be ferries used for passenger or goods transportation on inland waterway or national waterways are to compulsorily comply with the provisions of Inland Vessels Act, 1917. For this, it is imperative that each State Government formulate their Rules under this Act and may implement the same in their State. This will require formation of an IWT Department at the state level and proper mechanism of survey and registration of the boats at the district level.

4.4. Ferries Acts and Rules

Some of the prominent acts and rules are under vogue for mechanized and non-mechanized ferries which are the major constituents of all the vessels that are operated throughout the length and breadth of the country. They are as follows:

- i) Bengal Ferries Act, 1885
- ii) Northern India Ferries Act (I), 1878
- iii) The Bihar Ferries Manual of 1956
- iv) Control and Management of Ferries, Rules of 1968
- v) Travancore Public Canals and Public Ferries Act of 1096
- vi) The Cochin Public Canals and Backwaters Navigation Act, 1092

4.4.1 These acts summarily provide guidelines for operation of boats in State Waterways covering the following aspects.

- a) The Registration/Licensing/Inspection/Certification of Boats.
- b) Regulation of the following:
 - Dimensions and Free board
 - Equipment including LSA/FFA
 - Number of Passengers
 - Nature and quantity of cargo to be carried.
 - Speed of Boats/Vessels.
 - Lights to be exhibited.
 - Mooring of Boats/Vessels
 - Infrastructural facilities.
- c) Defining the line of navigation and regulating the navigation of boats/vessels including limits to prevent danger to other boats/vessels, banks, navigation marks etc. & the mode of operation of ferries private operators including the facilities & manpower to be provided by the operators for safety of navigation & personnel.
- d) Duties, Powers and Qualifications of boat/vessel inspectors, Operators and crew.
- e) Procedures to be followed in case of emergencies/accidents.
- f) Penalty for breach of rules.

4.5 Existing Rules

The Working Group studied various existing rules for reference. These include:-

- 4.5.1 Inland Steam Vessels (Construction and Survey) Rules 1965, Govt. of Goa, Daman, Diu
- 4.5.2 Inland Steam Vessels (Construction and survey) Rules 1957, Govt. of Maharashtra.
- 4.5.3 Draft Inland Steam Vessels (Construction and Survey) Rules 1975, Govt. of Maharashtra.
- 4.5.4 Kerala Inland Vessels Rules 2010.
- 4.5.5 Draft Model Rules for Inland Vessels 2012 of Inland Waterways Authority of India.
- 4.5.6 Construction Rules for Inland Waterways vessels by IWAI.
- 4.5.7 Bihar Govt. Rules 2013

4.6 Regulatory regime for travel by people using passenger boats

Passenger boats broadly fall into two categories- Mechanized or propelled boats and Non-propelled boats. The regulatory regime for the above categories can cover the following aspects.

- 4.6.1 For Mechanized or propelled boats
 - 4.6.1.1 For the safe navigation of Mechanized boats, the boats are to be registered under Inland Vessels Act, 1917 and adhere to Standards which are to be promulgated by the State Governments. The Inland Water Transport Dte. of State Governments is to be formed in all States to look into the aspects of navigation in canal, lakes and rivers which constitute inland waterways of that State.
 - 4.6.1.2 Sufficient qualified manpower to register and survey all mechanized or propelled boats in all districts of the States is a step forward to be taken by all State Governments. The overloading of passengers & goods is the most important reason of accidents. Therefore, the numbers of passengers permitted are to be determined & prescribed during registration of mechanized boats which is to be done by the State IWT Directorate/ Maritime Board who looks after IWT issues in the state. It is suggested that the mechanized boats may be allowed to carry 2/3rd of their passenger capacity when boat is operating in adverse weather conditions or during high currents or floods. The enforcement of limiting number to ensure that these are not beyond the prescribed limits/numbers calls for involvement, awareness and training of boat operators, local panchayat level officers and district administration.

- 4.6.1.3 Further, regulations pertaining to all aspects dealing with construction, manning, stability, powering, Essential Safety Appliances (ESA), Fire Fighting Appliances (FFA) etc. have to be promulgated by State Government which would help in curbing the number of accidents and loss of men & material.
- 4.6.2 For Non- mechanized passenger boats
- 4.6.2.1 The non-mechanized passenger boats do not fall under the purview of the Inland Vessels Act, 1917 and are governed by various Ferries Act of various states. These Acts also do not cover the technical aspects of operation of boats.
- 4.6.2.2 An exercise to amalgamate all these Ferries Acts and making one new Act for construction, operation & maintenance of Non – Mechanized boats may have to be made and adopted by each of the States. This may be a Central Act or alternatively Central Govt. can frame Model Act which can be adopted by each State after State specific modifications, as required.
- 4.6.2.3 Till such an Act is put into place some important guidelines/issues for improving safety of non-mechanized boat operations are proposed as follows:-
- (i) Non- mechanized boats or ferries may be registered with local panchayats or District Administration.
 - (ii) Each boat may have a distinguishing registration number along with prescribed number of persons it is permitted to carry displayed prominently.
 - (iii) Periodically the boats may be checked for water tightness and river worthiness by experienced boatmen who are familiar with the local conditions.
 - (iv) The boat found lacking in any of the aspects during checking, would have to be repaired for making it river worthy.
 - (v) Local informal forums of boatmen may be formed and one or two designated boatmen in these forums may be assigned the task of giving periodical information to local panchayat about any boat found not to be river worthy.

- (vi) Gram Panchayat/District Administration may be empowered to check river worthiness of boats, issue directions for not plying till it is made river worthy.
- (vii) Gram Panchayat/ District Administration to periodically have surprise checks to ensure that the passengers are not being carried in excess of the prescribed capacity.
- (viii) In adverse weather or river conditions, boatmen have to be made aware by best available means, like SMS, Public Address System, Hoisting of suitable flags etc. not to carry out boating operations till the conditions have improved or become favorable.
- (ix) Less number of passengers may be permitted during adverse weather or river conditions.
- (x) Local certification of boatmen by Gram Panchayats into two categories such as skilled or semiskilled may be made. Able bodied skilled boatmen having greater knowledge of local conditions may only be allowed for boats carrying more than 20-25 passengers.
- (xi) Safety awareness campaigns at Gram Panchayats both for boatmen as well as for passengers to be carried out at least once in three months be made, perhaps through NGOs.
- (xii) Introduction of the provision of some Life Saving Appliances such as buoys or buoyant apparatus in the boats is to be made mandatory.
- (xiii) Local marking of channels for safe boating from one end to another to enable the boatmen to stay on course may be provided by the Panchayats. Generally the locals already have this knowledge.
- (xiv) Provision of proper landing facilities for boats at various ghats, illumination of these facilities where operations take place after sunset or dusk be made.
- (xv) Emphasis may be given to mark areas which are accident prone or where due to changes in water levels, grounding may occur. Such markings would prevent grounding of boats.
- (xvi) Wherever large number of boats operates in a particular area, District Administration may have Boat Inspectors for checking of boats and training of boatmen.

- (xvii) Introduction of concepts of naval architecture such as minimum freeboard, reserve buoyancy, subdivision may be slowly started in boat building processes as well by suitably qualified technical persons at District level to the local Gram Panchayat & boatmen involved in boat building activity.
- (xviii) Data collection of passenger boat operations including details of accidents/incidents happening to be done by the State Govt. on yearly basis and forwarded to the Central Govt. Even now this is being done to a limited extent and some data is available on National Crime Records Bureau website. This, however, needs to be done exhaustively. The representatives of Panchayats of those States which have more accidents may be encouraged to visit the States with less/no boat accident to understand and follow some of their practices.
- (xix) Campaigns for bringing in awareness amongst passengers not to rush to one side of the boat in case of water ingress to avoid capsizing due to tilting of boats would also help in reducing the boat accidents.
- (xx) Provision of imposing a penalty on the boat operator not adhering to the above guidelines is to be constituted by the State Govt./Local Administration.

4.7 Implementation Plan-Roles & Responsibilities

- 4.7.1 The responsibility of implementation of rules and regulations related to safety of inland vessels primarily rests with State Governments. However no state government has an adequate organizational set up which is capable (in quality and quantity) to handle various legal issues related to safety of inland vessels including boats on policy level as well day to day level. Hence the first and foremost requirement is that each and every state government should develop institutional / organizational set up to frame relevant rules and regulations and implement them in an effective manner. This is considered the primary requirement towards safety in navigation by boat and other inland vessels.
- 4.7.2 The working group is of the opinion that in the organization set up suggested above there should be one separate wing for handling matters related to non-mechanical or mechanized country boats. Such county boats have been plying in almost every

big and small river and the other water bodies (lakes, creeks etc.) which are playing an extremely important role in meeting the transport needs of country sides. These boats also do not have any standard design. Every region of the country has distinct design of boats developed over the years based on local conditions. Hence safety of operation of these mechanized and non-mechanized boats should be given special emphasis. Perhaps Panchayat should be given more roles in regulating the country boats. For this it is necessary to empower the Panchayats under specific rules/regulation Panchayats should also be provided specific funds for such regulation.

- 4.7.3 Till a full-fledged department is set up in the states for IWT operation, it is proposed that every district transport departments/offices should have a few staff and officers specially for handling matters related to non-mechanically propelled inland vessels. These staff may be trained in handling matters related to non-mechanically propelled inland vessels. Such officer can in turn train Panchayats officials in handling matters related to non-mechanized country boats.
- 4.7.4 Suitable Government departments with qualified personnel, such as Inland Water Transport department, ports and harbors department, captain of ports etc. should be made responsible for framing and implementation of rules and regulations. The Governments may also use the services of their Maritime Boards, (wherever available) for this purpose.
- 4.7.5 It is recommended that all States having river transport should set up an Inland Water transport Department if not already done. This department should be made responsible for development and implementation of boat safety regulation.
- 4.7.6 Government may also authorize Classification societies like IRS for specific certification purposes, as is done by DG Shipping for seagoing vessels. Rules of state governments already rely upon classification Society requirements for construction aspects.

5

Search and Rescue

5.1 Overview

5.1.1 The search operations in the aftermath of accidents in waterways is of paramount importance. Experience has shown that the local community in the vicinity of any accident including the Inland Water Transport are, ipso-facto, the first responders attending to a considerable part of the rescue operations before intervention by the specialized 'Search & Rescue' teams of the state machinery. Accordingly, initial focus has to be to dwell upon the advance action in terms of infrastructure arrangements which would expedite the rescue operations. This would, inter-alia, entail training and strengthening the capacity of the under mentioned front-line manpower/groups on advance 'rescue techniques' -

- a) Boat Crew and the skill- personal staff available at all entry points.
- b) Community groups living along the river bed.
- c) Police personnel/law and order machinery stationed along the river-bank and
- d) Registered local Self Help Groups (SHGs)-in the nearby Village clusters, to start with.

At the time of any tragedy, with the support of local volunteer teams, as above, the State SDRF (supported by NDRF Battalion personnel, if/wherever necessary,) would be in charge of rescue operations gainfully assisted by the local authorities in the search & rescue operation.

5.2 Current Practices

5.2.1 Agencies like Inland Waterways Authority of India (IWAI), State IWT, SDMA SDRF, Riverine Police, Local administration and local bodies like Ghat Union of Boat drivers etc. are involved in advising/subscribing to the smooth operation of boats and vessels. However, no single agency performs as nodal agency for the matters related to search and rescue. There is no separate wing/setup in Inland Water Transport

(IWT), to deal with the emergencies and no special course/training is being imparted to the employees of IWT. The Riverine Police performs only Police duties to maintain law and orders along the ferry ghats and does not have any search and rescue wing and specialized training or equipments for the purpose. In essence an institutional set-up would be required to coordinate the hazard mitigation activity, in all its facets that is from 'regulation' to 'rescue-operation' including an organized mechanism for emergency management and distress response on a regular basis. Thus there is a need to adopt training interventions on search and rescue. The primary goal of training in search and rescue operations would be to set up 'Trained and equipped volunteer Teams' consisting of local people will be set up, over a period, in the area, where Passenger Boats are frequently used, as means of 'front-line' force to respond quickly and effectively to any tragic and emergency event'.

5.2.2 Quick Reaction Teams

Well trained and equipped Quick Reaction Teams of local trained volunteers, Police, Home Guard/SDRF should be placed at pre-designated Ferry Ghat or docking points so as to carry out quick & effective rescue operations.

5.2.3 Mock Drills

There should be regular mock drills and table top exercises of all the stakeholders in the States & Districts. This will help in refreshing the training, as well as help to get to know the gaps & the lesson learnt for future sake. This will also enhance the coordination among various agencies and the stakeholders to deal with search and rescue practices.

5.3 Standard Operating Procedures (SOPs)

Responsibility of each stakeholder/ establishment needs to be fixed well in advance in form of Standard Operating Procedure. In addition other important issues that need to be considered for the development of rescue plan during boat tragedy are listed as under:-

- Department specific customized action plan to save life including quick response to any eventuality/emergency/ distress call.
- Preparedness plan of all the stakeholders involved in rescue operations, evaluate stakeholders competency, test the established emergency operation procedures.
- Online inventory of emergency, rescue & relief equipment/ resources with local authorities, public and corporate institutions for possible accessing during emergency.

- Coordinated emergency rescue plan, institutional mechanism and triggering action with joint partnership of locals, Police Stations, local Municipal/ Panchayati Raj Institution/District/State level involving all concerned agencies including Armed Forces/Para-Military Forces, Police/Coastal Police/Water Police, NDRF/SDRF/, Civil Defence, Home Guard etc.

5.4 Accident Management Plan

Boat Accident Management Plan prepared by all agencies such as local Boat operators, Ghat Owners, Panchayat Raj Institutions, Block, District & State will incorporate detail guidelines for prioritizing implementation of rescue activities depending on magnitude and severity of boat tragedy. Response component of plan will involve rapid deployment of Search & Rescue Teams. The Plan should prescribe appropriate coordination mechanism with other agency/ stakeholders working in area.

5.5 Emergency Search & Rescue

The local communities residing at bank of rivers/sea or fishermen in River/Sea are always the first responder after any waterways tragedy. The past experience has shown that 80 percent of search and rescue operations are carried out by local communities before the intervention of any local/state machinery and specialized search & rescue teams. Trained and equipped volunteer teams consisting of local people should be constituted in the area where boats are frequently used as means of communication and transportation to respond quickly and effectively at the time of such tragedy.

5.5.1 Search & Rescue Teams

In order to strengthen search and rescue capabilities at the community level, each of the river channels /waterways should have local community level with basic trainings in search & rescue operations. Wharfs /Docks should invariably have rescue teams readily available with necessary rescue equipment for quick response of life saving. Training on search & rescue should be imparted for the community along with ghat level search and rescue trainings, either through SDRF/NDRF or through any competent authority dealing with navigation rescue. Besides, the specialized teams SDRF and NDRF should also assist the local authorities in search & rescue operations.

5.6 Response Mechanism at Boats/Vessels

5.6.1 Skill Development of Crew Members and Passengers

The crew members should be skilled in handling all kinds of emergency situations besides their routine duties on board. It may be made mandatory for boat operators /other staffs to undergo training in water rescue and other distress response skills before undertaking jobs of boat handling. It should also be made mandatory for crew members to brief passengers on board about all safety provisions and Do's and Don'ts and essential life saving techniques with all other measures to be followed in case of accidents in boats /ferries.

5.6.2 Security Audit of Boats/Vessels

Security Audit of boats/vessels on regular basis should be made as mandatory provisions for all mechanized and non mechanized boat operations. It is, therefore, recommended that security audits on weekly, monthly, quarterly, half-yearly and annual basis for safety aspect of vessel/boat, safety audit of rescue equipment, medical equipment and communication equipment should be done as per requirements. There may be provision for regular mock drills and exercises of all the crew members including lifeguards/medical teams/communication team and so on. It is also recommended to conduct refresher training courses on disaster management for the entire crew members along with mental, physical and medical health check up on regular intervals.

5.6.3 Response Mechanism at Wharfs/Ferry Ghats

In order to ensure the rapid response mechanism at the wharf level, a dedicated integrated control room should be established to supervise and oversee the normal traffic, monitor and to alert all concerned in case of accidents. The Integrated Control Room must be in communication with all the boats/vessels operating in the area, nearby adjacent Ghats, QRTs as well as other sister/responding agencies that is River Police, Police, SDRF, Circle/block office etc. The Wharfs should have close circuit camera system at the approaches, boarding points and other strategic points to monitor the routine traffic to avoid accidents and other hazardous/ threatening activities. The integrated control room should be able to monitor and use integrated GPS system for smooth movement of boats/vessels and track boats in case of accidents and emergency. The personnel in the Control Room must be proficient in handling all the equipment. There should be the provision of maintenance staff to ensure that all the equipments are functional round the clock. The Control Room must work round the clock on 24x7 basis specially at places where boats operate during nights.

5.6.4 Rapid Action Teams/Quick Response Teams (QRT)

In all navigable waterways, wharfs (ghats) should be equipped with Quick Response Teams (QRT) to deal with the possible emergent situations. The size of QRT and the number of boats may depend upon the vulnerability, traffic of the ghats and navigation channels. The team must be in standby position to be able to react on a short notice round the clock. There should be provision of deep water divers in a group of three personnel while responding to the emergent situation. The regular staff appointed to manage the ghat administration may double up as QRT to garner the strength. It is, thus, recommended to impart trainings to QRT personnel for water rescue. They must take active participation at regular intervals and regular mock drills must be conducted with all the responding agencies and stakeholders. The deep divers in QRT must be able to track live victims and evacuate the victims from murky water and able to use cutting tools to rescue victims from the drowned structure of boats/vessels.

5.7 Rescue Equipments at Ghats

All the Quick Response Teams (QRTs) must be equipped with high-speed rescue boats having sufficient capacity to accommodate victims and rescuers. The rescue boat must have medical first response kits, life saving medicines and stretchers for carrying victims. It is also essential to have provisions for heavy duty recovery/dredgers and towboats to rescue and salvage boats/vessels. In addition, tools and equipment to cut the underwater iron and wooden structure of boat/vessel or any object of hindrance should also be stored.

5.8 Medical Support

All the wharfs dealing with passenger traffics must have well maintained and equipped medical room with trained staff including doctors and paramedics. The Medical Room must have all the necessary life saving drugs and medicines and emergency automated CPR system. There should be adequate provision for ambulances and boat ambulances for quick evacuation to pre-identified and coordinated higher medical care centers. They may be activated during traffic hours in the water channel or these can be kept ready for unforeseen situations. Adequate stock of life saving medicines must be stored on board the boat ambulances.

5.9 State Disaster Response Force (SDRF)

5.9.1 The activation of State Disaster Response Force (SDRF) must be ensured when the response teams at Wharfs/Block/Circle and district level have failed to effectively respond to boat accidents or when the authorities feel the existing response mechanism will not be

able to respond to the boat/vessel accidents or when the emergency requires the prompt intervention of State machinery. SDRF must be developed and equipped as per the standard structure of National Disaster Response Force to effectively respond to such disaster. All water rescue equipment like Stanley under water cutter/under water plasma cutting machines/under water chain saw/under water search camera and torch/gas cutting torches/gas cutter/under water welding pro to tackle level-2 disaster must be available. Trainings must be imparted to SDRF battalions to tackle boat/vessel accidents in addition to other kinds of disasters. It is also essential that standard activation signals of alertness and mobilization should be followed by all responders, so that team may be mobilized immediately after getting signals . SDRF should have the capability in terms of man material and training for better response with precision and efficiency. A Control Room of SDRF is recommended to be integrated with State EOCs/District EOCs/NDRF/ River Police/local Police/ other responding agencies and stakeholders which have been identified and coordinated by the state for inland water rescue emergencies. SDRF must take part at District/State level mock drills and exercises. To save the precious response time , some of the fully equipped SDRF teams must be prepositioned at vital locations/launching bases at vulnerable wharfs .The whole response mechanism of District/State level should be integrated with SDRF so that the resource requirements at the site of operation could be rapidly filled to evacuate victims.

5.10 National Disaster Response Force

The activation of NDRF should be ensured when the response teams at State level failed to effectively respond to boat accidents or when the state authorities feel the existing state response mechanism will not be able to respond to the boat/vessel accidents or when the emergency requires the prompt intervention of national response machinery.

6

Capacity Development

6.1 Overview

Capacity Building and Training (CBT) in developmental context aims at reduction in the stratification in terms of Knowledge gaps and thus promotes empowerment. The capacity development interventions for safe waterways management and passenger boat travel and navigation aims at adoption of modern standards in travel arrangements, which ultimately lead to self regulations by crew members, boat management authorities and on board passengers. For this purpose, it is expected by the state governments to facilitate promoting awareness in the form of Capacity Building and Training modules on safety infrastructure covering management of standards of boat-design and operation for safe travel, conveniences in ghat infrastructure for safe on and off loading of passenger and crew, advance facilitations for quick rescue operations at the point of risks and above all spread of 'safety education' among the stakeholders.

6.1.1 Capacity Building, as an activity, would have to provide emphasis, inter-alia, (i) to adopt modern standards of training and certification for crew members; (ii) enforcement of effective safety standards for boats/ vessels and their crew members; and (iii) placing of competent enforcement regimes at both the state / district/ Panchayat level. Thus, the ultimate goal of 'Capacity Building' would be to ensure that ferry safety and preparedness efforts across the country would lead to better regulations of safe navigation and ferry operations in waterways, and to ensure necessary safety and rescue equipment in place. In pursuing these targets, attention needs to be paid to the following mandatory and enabling aspects:

- Identification of capacity gaps and enabling environment to fill the gaps
- Minimum and mandatory requirement of infrastructures and tools required for bridging the gaps
- Framework for capacity development, training and other structured programmes on safety and awareness

- Regulatory Do's and Dont's
- Active involvement of stakeholders like SDRF, Local Police, Village Administration, Boat-Owners' Associations etc. and other structural orientations
- The infrastructure requirements for capacity development, in all its forms, be identified.
- A specific module on 'Search and Rescue' for crew members be incorporated in the existing training modules.
- Involvement of SDMA/SDRF in the implementation of capacity building and training.

6.2 Framework of Capacity Development

While acknowledging and recognizing the importance of boat accidents, it is important to invite attention of the stakeholders (governments, ship owners/operators, training providers, Boat industry associations, shipbuilders/repairers, etc.) to take actions as follows:

- Urge the periodic review and continued development and improvement of relevant guidelines on surveying, training, legislation and regulations, and domestic ship safety programmes, including adequate training, accreditation and regulation of surveyors to meet standards set by all the states dealing with riverine water transport.
- Adoption of synergy between maritime administrations in order to promote cooperation for accident investigation.
- Training and capacity building of stakeholders to develop infrastructures in the areas of docking, slipping and passenger terminals.
- Training and Mock Drills of crew members and boat operators.
- Campaign through Information Education and Communication (IEC) materials, posters , Handouts etc.
- Safety education, campaigns on boat design and operations, wharf management strategies, search and rescue education and regulatory mechanisms.
- The target groups for CBT include boat operators, Boat men, crew members, Wharf Managers besides the community groups living along the river bed.
- Police personnel/law and order machinery stationed along the river-bank and registered local Self Help Groups (SHGs) in the nearby Village clusters.

6.3 International Practices

6.5.1 Passenger boat travel by means of ferries has been accounted as comparatively safer transportation medium in developed countries. In United States, ferries reportedly operate in 40 states with strict adherence to laid down procedures, including safety standards, by the local and federal governments. These regulations are periodically updated based on operational experience. The city of Seattle, which has the largest US ferry system, claims a ferry travel density of approximately 26 million passengers each year. The Ferry system in developing countries, on the other hand encounter continued problems of understaffing, severe overcrowding, aging vessels, and the lack of regulatory standards. As a result of this , frequency of accidents in rivers and ports, with the same ferry operators become a common spectacle. In Somalia and Bangladesh, for example, ferry accidents are regular phenomena. In Bangladesh, about 1,000 people die in every in year ferry accidents.

6.4 Identification of Methods and Target Groups

6.4.1 Capacity Building through Campaign –

The capacity building through campaigns may result in the capacity generation at various levels in a multi dimensional way. The under mentioned table gives account of campaigns which may result in capacity development-

Name of the campaign	Who will conduct	What knowledge will be Delivered	Output Capacity
Boat Insurance (like fire insurance; machine breakdown insurance; motor insurance; burglary insurance etc)	Insurance	Information (about type of insurance, interest rate)and laws that are needed to be followed for provision of insurance in order to minimise the risk of boat owners (loss from accidents, capsizing etc)	Risk reduction towards loss , awareness towards (importance of safety measures), ensure safety of people

Name of the campaign	Who will conduct	What knowledge will be Delivered	Output Capacity
Traditional Knowledge	Old and experienced people from the community (old and experienced drivers and boat operators)	About boating in various conditions (movement of the winds & the waves) and understanding the environment (nature of the river, weather)	How to handle the emergency situation(boat capsizing, accident, cyclone) in absence of basic equipments(safety kit, first aid kit, communication device like radio and GPS, ropes and inflated tyres.)
Alcohol Consumption	Health care institutions, NGOs, media(hospitals, rehabilitation centres)	How alcohol can cause accidents on boat. (like lack of consciousness, fights, misbehaviour)	Alcohol related accidents can be avoided (by sensitising the boating community and boat users.)
Importance of Safety Measures	NDMA, IWAI, NDRF, DOT, IMD	Weather related information, flood information, search and rescue, communication, rules and regulation, teaching use of HAM radios, GPS, Interpretation & dissemination of weather information to general populace	Knowledge and awareness generation (importance of safety measures while boating, Do's and Dont's)
Clean Beaches and Ghats	Health care institutions, Municipal corporations, Tourism department, NGOs	Information about clean environment and importance of cleanliness. How to make the ghats more attractive and safe for the people	Awareness about clean environment (so that the pollution can be reduced and better utilisation of natural resources)

6.4.2 Capacity Gap Analysis

The Capacity Gap Analysis is one of the important components of training and capacity building interventions. There are two specific tools which may be used for capacity gap analysis, Firstly visual observation of wharfs (ghats) infrastructures, conditions of mechanized and non mechanized boats, essential requirements and facilities on boats for passengers and operators etc. Secondly, the check list for stakeholders like wharf management authorities, boat operators etc.

Ghat Management	Boat Driver and Boat Men	Boat Operator
<ul style="list-style-type: none"> •weather forecast bulletin board •communication tools such as radios •provision of ticketing system •existence of a NGO or a private body for management of ghat •getting help under some goveremnt scheme? •existence of a Jetty? •ghat de-siltation •availability of divers •security and Crowd management system •provision of public announcement and visual information •road connectivity with the ghat •maintenance of ghat 	<ul style="list-style-type: none"> •licenced and trained to drive a boat •knowledge about communication device (like radio, GPS) •knowledge of signalling system (like flare) •knowledge of dealing with fires •search & rescue •knowledge about navigation system 	<ul style="list-style-type: none"> •proof of ownership. •licencing •registered boats

6.4.3 Capacity Building through Training Modules-

The Training Modules for capacity building will be prepared by the identified institutions and coordinated by state governments /SDMAs/DDMAs. The prospective institutions may be identified by State Disaster Management Authorities in consultation with National Institute of Disaster Management.

6.5 Conclusion

Capacity Building and Training (CBT) is a continuous and integrated process of safe boat operations in the inland waterways. As the target groups suffer from serious knowledge gaps and cultural diversities, the role of CBT becomes more important. Passenger safety is a function of regulation and regulatory enforcements that ipso facto requires the support of CBT programmes for eliciting the cooperation of target groups. Thus the success of CBT rests on the organizational and functional support from the state governments and concerned stakeholders

7

DO's and DONT'S for Boat Safety

DO's and DONT'S for Boat Safety

Do's for Boatmen and Boat Drivers		Don'ts for Boatmen and Boat Drivers	
✓	Carry flotation devices	✓	Don't drink and drive
✓	Carry life jackets	✓	Don't travel at high speed
✓	Communicate with passengers about safety measures	✓	Don't carry passengers more than the approved capacity of the boat
✓	Proper maintenance of boat	✓	Don't use boat in stormy condition
✓	Carry distress signal devices		
✓	Carry communication devices		
✓	Keep good look out for other boats and swimmers when in water		
✓	Store flammable item in a safe place		
✓	Carry fire extinguisher in a designated place		
Do's for Passengers		Don'ts for Passengers	
✓	Listen to the crew	✓	Don't rush into a boat
✓	Follow the rules	✓	Don't fight on board
✓	Maintain the cleanliness of the site	✓	Don't stand and change seat in small boat when it is full
		✓	Do not cross the designated zone on the site
		✓	Do not disturb the crew while they are operating

	Do's for Boat operator		Don'ts for Boat operator
✓	Ensure the certificate of survey and licence onboard when the boat is in use	✓	Do not allow any explosive and hazardous material onboard
✓	Ensure the crew is enough and sufficient to handle the passengers	✓	Do not allow over loading
✓	Ensure that right information is circulated onboard	✓	Don not allow any unauthorised alteration on boat
✓	Ensure that boat is equipped and crew is trained to handle fire and rescue passengers	✓	Do not allow unauthorised person to get on board
✓	Ensure that the boat is insured for third part risks		
✓	Ensure the boat is clean and dry while operating		
✓	Ensure proper communication mechanism exist before the boat starts operating		

Annexure: 1

रजिस्ट्री सं० डी० एल०—(एन)04/0007/2003—16

REGISTERED NO. DL—(N)04/0007/2003—16



भारत का राजपत्र The Gazette of India

असाधारण

EXTRAORDINARY

भाग II — खण्ड 1

PART II — Section 1

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

सं० 18]

नई दिल्ली, शनिवार, मार्च 26, 2016/ चैत्र 6, 1938 (शक)

No. 18]

NEW DELHI, SATURDAY, MARCH 26, 2016/ CHAITRA 6, 1938 (SAKA)

इस भाग में भिन्न पृष्ठ संख्या दी जाती है जिससे कि यह अलग संकलन के रूप में रखा जा सके।
Separate paging is given to this Part in order that it may be filed as a separate compilation.

MINISTRY OF LAW AND JUSTICE

(Legislative Department)

New Delhi, the 26th March, 2016/Chaitra 6, 1938 (Saka)

The following Act of Parliament received the assent of the President on the 25th March, 2016, and is hereby published for general information:—

THE NATIONAL WATERWAYS ACT, 2016

No. 17 OF 2016

[25th March, 2016.]

An Act to make provisions for existing national waterways and to provide for the declaration of certain inland waterways to be national waterways and also to provide for the regulation and development of the said waterways for the purposes of shipping and navigation and for matters connected therewith or incidental thereto.

BE it enacted by Parliament in the Sixty-seventh Year of the Republic of India as follows:—

1. (1) This Act may be called the National Waterways Act, 2016.

(2) It shall come into force on such date as the Central Government may, by notification in the Official Gazette, appoint.

Short title
and com-
mencement.

Existing national waterways and declaration of certain inland waterways as national waterways.

2. (1) The existing national waterways specified at serial numbers 1 to 5 in the Schedule along with their limits given in column (3) thereof, which have been declared as such under the Acts referred to in sub-section (1) of section 5, shall, subject to the modifications made under this Act, continue to be national waterways for the purposes of shipping and navigation under this Act.

(2) The regulation and development of the waterways referred to in sub-section (1) which have been under the control of the Central Government shall continue, as if the said waterways are declared as national waterways under the provisions of this Act.

(3) The inland waterways specified at serial numbers 6 to 111 in the Schedule along with their limits given in column (3) thereof are hereby declared to be national waterways for the purposes of shipping and navigation.

Declaration as to expediency of control and development by Union of waterways specified in Schedule for certain purposes.

3. Save as provided in sub-sections (1) and (2) of section 2, it is hereby declared that it is expedient in the public interest that the Union should take under its control the regulation and development of the waterways specified in the Schedule for the purposes of shipping and navigation to the extent provided in the Inland Waterways Authority of India Act, 1985.

82 of 1985.

Amendment of section 2 of Act 82 of 1985.

4. In the Inland Waterways Authority of India Act, 1985, in section 2, for clause (h), the following clause shall be substituted, namely:—

‘(h) “national waterway” means the inland waterway declared by section 2 of the National Waterways Act, 2016, to be a national waterway.

Explanation.— If Parliament declares by law any other waterway to be a national waterway, then, from the date on which such declaration takes effect, such other waterway—

(i) shall also be deemed to be a national waterway within the meaning of this clause; and

(ii) the provisions of this Act shall, with necessary modifications (including modification for construing any reference to the commencement of this Act as a reference to the date aforesaid), apply to such national waterway;’.

Repeal of certain enactments and saving.

5. (1) The following Acts, namely:—

(a) the National Waterway (Allahabad-Haldia Stretch of the Ganga Bhagirathi-Hooghly River) Act, 1982;

49 of 1982.

(b) the National Waterway (Sadiya-Dhubri Stretch of Brahmaputra River) Act, 1988;

40 of 1988.

(c) the National Waterway (Kollam-Kottapuram Stretch of West Coast Canal and Champakara and Udyogmandal Canals) Act, 1992;

25 of 1992.

(d) the National Waterway (Talcher-Dhamra Stretch of Rivers, Geonkhali-Charbatia Stretch of East Coast Canal, Charbatia-Dhamra Stretch of Matai River and Mahanadi Delta Rivers) Act, 2008; and

23 of 2008.

(e) the National Waterway (Kakinada-Puducherry Stretch of Canals and the Kaluvelly Tank, Bhadrachalam-Rajahmundry Stretch of River Godavari and Wazirabad-Vijayawada Stretch of River Krishna) Act, 2008,

24 of 2008.

are hereby repealed.

(2) Notwithstanding such repeal, anything done or any action taken under the Acts referred to in sub-section (1), in so far as they are in conformity with the provisions of this Act, shall be deemed to have been done or omitted to be done or taken or not taken under the provisions of this Act.

THE SCHEDULE

(See section 2)

Sl.No.	National Waterways	Limits of the National Waterways
(1)	(2)	(3)
1.	National Waterway 1	<p>Allahabad-Haldia Stretch of the Ganga—Bhagirathi-Hooghly Rivers with the following limits, namely:—</p> <p>From road bridge at Allahabad across the river Ganga, about 2 kilometres upstream of the confluence of the rivers Ganga and Yamuna at Triveni to the inland waterway limit on the tidal waters of the river Hooghly from a line drawn between No.1 Refuge house at the entrance to Baratola river commonly called channel creek, to a position 2.5 kilometres due south of Saugor lighthouse, and then connected to the right or south bank at the entrance to the Hijili or Russulpore river, through river Ganga, lock canal and feeder canal at Farakka, river Bhagirathi and river Hooghly.</p>
2.	National Waterway 2	<p>Sadiya-Dhubri Stretch of Brahmaputra River with the following limits, namely:—</p> <p>From a line drawn across the Brahmaputra river from the point on the north bank of the Kundil river at its confluence with the Brahmaputra river near Sadiya to the beginning of the river island Majuli and therefrom through all the channels of the Brahmaputra river on either side of the river island Majuli up to the end of the river island Majuli and then up to the international border down stream of Dhubri.</p>
3.	National Waterway 3	<p>Kollam-Kozhikode Stretch of West Coast Canal and Champakara and Udyogmandal Canals with the following limits, namely:—</p> <p>The northern limit of the West Coast Canal shall be Kozhikode at Lat 11°13'39"N, Lon 75°46'44"E and the southern limit shall be a line drawn across the Ashtamudi Kayal at a distance of 100 metres south of Kollam jetty.</p> <p>The Champakara Canal starting from the confluence with the West Coast Canal and ending at the railway bridge (railway siding for Cochin Oil Refinery) near Fertilisers and Chemicals Travancore Limited, boat basin.</p> <p>The Udyogmandal Canal starting from the confluence with West Coast Canal and ending at the Padalam road bridge (Eloor-Edayar).</p>

4 THE GAZETTE OF INDIA EXTRAORDINARY [PART II—		
(1)	(2)	(3)
4.	National Waterway 4	<p>Kakinada-Puducherry Stretch of Canals and the Kaluvelly Tank, Nashik-Bhadrachalam-Rajahmundry Stretch of River Godavari and Bridge near village Galagali-Wazirabad-Vijayawada Stretch of River Krishna with the following limits, namely:—</p> <p><i>Kakinada-Puducherry canal</i></p> <p>(Canal system consisting of Kakinada canal, Eluru canal, Commamur canal and North Buckingham canal, portion of the Coovum river linking North and South Buckingham canals, South Buckingham canal and Kaluvelly tank)</p> <p>Northern limit: A line drawn across the Kakinada canal parallel to the Jagannadhapuram road bridge, Kakinada at a distance of 500 metres down stream at Lat 16° 56' 24" N, Lon 82° 14' 20" E;</p> <p>Southern limit: Junction of East Coast Highway and Chinnakalawari-Kanakachettikulam road at Kanakachettikulam which is the end point of the artificial canal link to Kaluvelly tank at Lat 20° 0' 07" N, Lon 79° 52' 12" E.</p> <p><i>River Godavari</i></p> <p>Western limit: Road bridge on Mumbai-Agra Highway at Nashik across river Godavari at Lat 20° 0' 07" N, Lon 73° 48' 12" E;</p> <p>Eastern limit: Sir Arthur Cotton barrage across river Godavari at Dowlaiswaram, Rajahmundry at Lat 16° 56' 05" N, Lon 81° 45' 32" E.</p> <p><i>River Krishna</i></p> <p>Western limit: Bridge near village Galagali Lat 16° 25' 28" N, Lon 75° 26' 19" E.</p> <p>Eastern limit: Prakasam barrage across river Krishna at Vijayawada at Lat 16° 30' 18" N, Lon 80° 36' 23" E.</p>
5.	National Waterway 5	<p>Talcher-Dhamra Stretch of Brahmani-Kharsua-Tantighai-Pandua Nala-Dudhei Nala-Kani Dhamra-river system, Geonkhali-Charbatia Stretch of East Coast Canal, Charbatia-Dhamra Stretch of Matai River and Mahanadi Delta Rivers with the following limits, namely:—</p> <p><i>East Coast Canal and Matai river</i> (Consisting of old Hijli tidal canal, Orissa coast canal and Matai river)</p> <p>Northern limit: Confluence point of Hooghly river and Hijli tidal canal at Geonkhali at Lat 22° 12' 20" N, Lon 88° 03' 07" E;</p> <p>Southern limit: Confluence of Matai river and Dhamra river near Dhamra Fishing harbour at Lat 20° 47' 42" N, Lon 86° 53' 03" E.</p> <p><i>Brahmani-Kharsua-Dhamra river system</i> (Consisting of Brahmani-Kharsua-Tantighai-Pandua Nala-Dudhei Nala-Kani-Dhamra rivers)</p>

(1)	(2)	(3)
		<p>North-Western limit: Samal barrage across river Brahmani, Talcher at Lat 21° 04' 26" N, Lon 86° 08' 05" E;</p> <p>South-Eastern limit: An imaginary line drawn across Dhamra river at East Point of Kalibhanj Dian Reserved Forest near Chandnipal at Lat 20° 46' 26" N, Lon 86° 57' 15" E.</p> <p><i>Mahanadi delta rivers</i> (Consisting of Hansua river, Atharabanki Creek, Nuna nala, Gobri nala, Kharnasi river and Mahanadi river)</p> <p>(Alternate route-Hansua river enters into Bay of Bengal through northern point of False point bay, then enters river Kharnasi at southern end of False point bay, river Atharabanki, a northernly distributory of river Mahanadi)</p> <p>Northern limit: Confluence of Kharsua river with Brahmani river at Ramchandrapur at Lat 20° 36' 55"N, Lon 86° 45' 05" E;</p> <p>Southern limit: An imaginary line in continuation to the Northern break water structure across the entrance channel at Paradip Port at Lat 20° 15' 38"N, Long 86° 40' 55" E.</p>
6.	National Waterway 6	<p><i>Aai River:</i></p> <p>Upstream of Bridge at Adalguri No.3 at Lat 26°33'32"N, Lon 90°34'01"E to confluence with Brahmaputra river at Lat 26°12'50"N, Lon 90°36'24"E (4.7km upstream of Naranarayan Setu at Jogighopa).</p>
7.	National Waterway 7	<p><i>Ajoy (Ajay) River:</i></p> <p>Bridge on Morgram-Panagarh State Highway No. 14 at Illambazar Lat 23°36'56"N, Lon 87°31'58"E to confluence of river Ajoy with river Bhagirathi at Lat 23°39'23"N, Lon 88° 07'57"E at Katwa.</p>
8.	National Waterway 8	<p><i>Alappuzha-Changanassery Canal:</i></p> <p>Boat Jetty, Alappuzha at Lat 9°30'03"N, Lon 76°20'37"E to Changanassery Jetty at Lat 9°26'42"N, Lon 76°31'42"E.</p>
9.	National Waterway 9	<p><i>Alappuzha-Kottayam Athirampuzha Canal:</i></p> <p>Boat Jetty, Alappuzha at Lat 9°30'03"N, Lon 76°20'37"E to Athirampuzha market Lat 9°40'04"N, Lon 76°31'54"E.</p>
10.	National Waterway 10	<p><i>Amba River:</i></p> <p>Arabian Sea, Dharamtaar creed near village Revas at Lat 18°50'15"N, Lon 72°56'31"E to a Bridge near Nagothane ST Stand at Lat 18°32'20"N, Lon 73°08'0"E.</p>
11.	National Waterway 11	<p><i>Arunawati Aran River System:</i></p> <p>Bridge on State Highway No. 211 at Lat 20°13'33"N, Lon 77°33'23"E to confluence of Arunawati and Aran rivers near Ratanapur village at Lat 19°59'31"N, Lon 78°09'38"E to confluence of Aran and Penganga rivers near Chimata village at Lat 19°54'08"N, Lon 78°12'36"E.</p>

6 THE GAZETTE OF INDIA EXTRAORDINARY [PART II—		
(1)	(2)	(3)
12.	National Waterway 12	<i>Asi River:</i> Ganga river confluence at Assi Ghat, Varanasi at Lat 25°17'19"N, Lon 83°0'25"E to near Newada, Varanasi at Lat 25°16'37"N, Lon 82°58'18"E.
13.	National Waterway 13	<i>AVM Canal:</i> Poovar Beach at Lat 8°18'30"N, Lon 77°04'45"E to Erayumanthurai Bus Stop at Lat 8°14'54"N, Lon 77°09'34"E.
14.	National Waterway 14	<i>Baitarni River:</i> Dattapur village at Lat 20°51'45"N, Lon 86°33'30"E to confluence with Dhamra river near Laxmiprasad Dia at Lat 20°45'13"N, Lon 86°49'15"E.
15.	National Waterway 15	<i>Bakreswar Mayurakshi River System:</i> Bakreswar river from Nil Nirjan Dam at Lat 23°49'31"N, Lon 87°24'59"E to confluence of Bakreswar and Mayurakshi rivers near Talgram village at Lat 23°51'58"N, Lon 88°02'21"E. Mayurakshi river from Talgram village to confluence with Dwarka river near Dakshin Hijal village at Lat 23°58'22"N, Lon 88°09'21"E.
16.	National Waterway 16	<i>Barak River:</i> Lakhipur Ferry Ghat Lat 24°47'18"N, Lon 93°01'16"E to Toker Gram Lat 24°52'34"N, Lon 92°29'21"E.
17.	National Waterway 17	<i>Beas River:</i> Talwara Barrage at Lat 31°57'22"N, Lon 75°53'37"E to confluence of Beas and Sutlej rivers near Harike at Lat 31°09'09"N, Lon 74°58'08"E.
18.	National Waterway 18	<i>Beki River:</i> Elenagamari Lat 26°38'37"N, Lon 90°59'02"E to Brahmaputra confluence at Lat 26°14'24"N, Lon 90°47'21"E.
19.	National Waterway 19	<i>Betwa River:</i> Rirwa Buzurg Dariya at Lat 25°54'17"N, Lon 79°45'06"E to confluence of Betwa and Yamuna rivers near Merapur Daria village at Lat 25°55'11"N, Lon 80°13'08"E.
20.	National Waterway 20	<i>Bhavani River:</i> Bhavani Sagar Dam, Sathyamangalam at Lat 11°28'16"N, Lon 77°06'49"E to confluence of Bhavani and Kaveri rivers at Kaveri river bridge on Salem-Coimbatore Highway: "National Highway-47 Lat 11°25'54"N, Lon 77°41'02"E.
21.	National Waterway 21	<i>Bheema River:</i> Barrage (approx 1 km from Hippargi village) at Lat 17°09'05"N, Lon 76°46'34"E to confluence of Bheema and Krishna rivers at Gundloor Lat 16°24'28"N, Lon 77°17'13"E.
22.	National Waterway 22	<i>Birupa Badi Genguti Brahmani River System:</i>

(1)	(2)	(3)
		<p>Birupa Barrage at Choudwar at Lat 20°30'49"N, Lon 85°55'20"E to Confluence of Birupa and Brahmani rivers near Upperkai Pada village at Lat 20°37'36"N, Lon 86°24'19"E including alternative route from, Samaspur village Lat 20°35'41"N, Lon 86°06'32"E to near Kharagpur village Lat 20°38' 28"N, Lon 86°17'32"E.</p> <p>Bramani river from confluence of Birupa and Brhmani rivers near Upperkai Pada village at Lat 20°37'36"N, Lon 86°24'19"E to Bramani river at Katana Lat 20°39'26"N, Lon 86°44'53"E.</p>
23.	National Waterway 23	<p><i>Budha Balanga River:</i> Barrage (approx 300m from Patalipura village) at Lat 21°38'13"N, Lon 86°50'53"E to confluence of Budha Balanga river with Bay of Bengal at Chandipur Fishing Port Lat 21°28'12"N, Lon 87°04'12"E.</p>
24.	National Waterway 24	<p><i>Chambal River:</i> Chambal road bridge on National Highway-92 Lat 26°41'56"N, Lon 78°56'09"E to confluence of Chambal and Yamuna rivers at Charakpura village Lat 26°29'30"N, Lon 79°15'01"E.</p>
25.	National Waterway 25	<p><i>Chapora River:</i> Bride at State Highway No. 124 (1Km from Maneri village) Lat 15°42'47"N, Lon 73°57'23"E to Confluence of Chapora river with Arabian Sea at Morjim Lat 15°36'33"N, Lon 73°44'01"E.</p>
26.	National Waterway 26	<p><i>Chenab River:</i> Chenab road bridge at Lat 33°05'07"N, Lon 74°48'06"E to Bridge near Bhardakalan at Lat 32°48'12"N, Lon 74°34'53"E.</p>
27.	National Waterway 27	<p><i>Cumberjua River:</i> Confluence of Cumberjua and Zuvari rivers near Cortalim ferry terminal Lat 15°24'40"N, Lon 73°54'48"E to confluence of Cumberjua and Mandovi rivers near Sao Martias Vidhan Parishad Lat 15°31'26"N, Lon 73°55'34"E.</p>
28.	National Waterway 28	<p><i>Dabhol Creek Vashishti River:</i> Arabian Sea at Dabhol Lat 17°34'51"N, Lon 73°09'18"E to bridge at Pedhe Lat 17°32'39"N, Lon 73°30'36"E.</p>
29.	National Waterway 29	<p><i>Damodar River:</i> Krishak Setu, Bardhman on State Highway No. 8 at Lat 23°12'40"N, Lon 87°50'54"E to confluence with Hooghly river near Purbha Basudebpur at Lat 22°21'01"N, Lon 88°05'19"E.</p>
30.	National Waterway 30	<p><i>Dehing River:</i> Rail Bridge at Merbil Majuli No. 1 Lat 27°19'25"N, Lon 95°18'45"E to confluence of Dehing and Brahmaputra rivers near village Lachan at Lat 27°15'10"N, Lon 94°40'01"E.</p>
31.	National Waterway 31	<p><i>Dhansiri/Chathe River:</i> Bridge near Morongi T.E. village Lat 26°24'41"N, Lon 93°53'47"E to Numaligarh Lat 26°42'01"N, Lon 93°35'15"E.</p>

8		THE GAZETTE OF INDIA EXTRAORDINARY	[PART II—
(1)	(2)	(3)	
32.	National Waterway 32	<i>Dikhu River:</i> Bridge at Nazira on State Highway No 1 Lat 26°55'18"N, Lon 94°44'27"E to confluence of Dikhu and Brahmaputra rivers at Lat 26°59'58"N, Lon 94°27'42"E.	
33.	National Waterway 33	<i>Doyans River:</i> Bridge near Sialmari Lat 26°10'47"N, Lon 93°59'10"E to confluence of Doyans and Subansiri rivers at Lat 26°26'53"N, Lon 93°57'12"E.	
34.	National Waterway 34	<i>DVC Canal:</i> Durgapur Barrage Lat 23°28'47"N, Lon 87°18'19"E to Confluence point of DVC canal with Hoogly river near Tribeni Lat 23°0'31"N, Lon 88°24'55"E.	
35.	National Waterway 35	<i>Dwarakeswar River:</i> Bridge near Abantika Lat 23°06'55"N, Lon 87°18'47"E to confluence of Dwarakeswar and Silai rivers at Pratappur Lat 22°40'17"N, Lon 87°46'43"E.	
36.	National Waterway 36	<i>Dwarka River:</i> Bridge at Tarapith at Lat 24°06'58"N, Lon 87°47'51"E to confluence with Bhagirathi river near Maugram village at Lat 23°43'53"N, Lon 88°10'51"E.	
37.	National Waterway 37	<i>Gandak River:</i> Bhaisaslotal Barrage near Triveni Ghat at Lat 27°26'22"N, Lon 83°54'24"E to Gandak and Ganga rivers confluence at Hajipur Lat 25 39°18'N, Lon 85°10'28"E.	
38.	National Waterway 38	<i>Gangadhar River:</i> Pakriguri Bridge on National Highway-31C at Lat 26°27'30"N, Lon 89°51'25"E to Bangladesh Border at Binnachara Point III Lat 26°0'32"N, Lon 89°49'57"E.	
39.	National Waterway 39	<i>Ganol River:</i> Bangladesh Border at Mankachar Lat 25°31'47"N, Lon 89°51'24"E to bridge near Dolbari at Lat 25°34'20"N, Lon 90°03'46"E.	
40.	National Waterway 40	<i>Ghaghra River:</i> Faizabad at Lat 26°47'51"N, Lon 82°06'46"E to Ghaghra and Ganga river confluence at Manjhi Ghat Lat 25°44'13"N, Lon 84°42'03"E.	
41.	National Waterway 41	<i>Ghataprabha River:</i> Barrage near Malali Lat 16°20'01"N, Lon 75°11'23"E to confluence with river Krishna at Chicksangam Lat 16°20'13"N, Lon 75°47'54"E.	
42.	National Waterway 42	<i>Gomti River:</i> Bara Imambara, Lucknow Lat 26°52'21"N, Lon 80°54'58"E to confluence of Gomti with river Ganga Lat 25°30'31"N, Lon 83°10'17"E.	
43.	National Waterway 43	<i>Gurupur River:</i> Confluence of Netravathi river at Lat 12°50'44"N, Lon 74°49'45"E to confluence of Mangalore Port Bridge at Lat 12°55'35"N, Lon 74°49'37"E.	

(1)	(2)	(3)
44.	National Waterway 44	<i>Ichamati River:</i> Bridge on Border Main Road at Gobra near Bangladesh Border at Lat 22°53'50"N, Lon 88°53'49"E to near Bangladesh Border at Bansjhari Mallikpur Lat 22°39'07"N, Lon 88°55'35"E.
45.	National Waterway 45	<i>Indira Gandhi Canal:</i> Harike Barrage at Lat 31°08'33"N, Lon 74°56'57"E to near Mohangarh Lat 27°18'37"N, Lon 71°09'10"E.
46.	National Waterway 46	<i>Indus River:</i> Bridge on highway at Upshi village Lat 33°49'43"N, Lon 77°48'56"E to Bridge on Shey-Chuchol road near Shey village Lat 34°03'35"N, Lon 77°38'33"E.
47.	National Waterway 47	<i>Jalangi River:</i> Bridge on State Highway No. 14 near Plashipara at Lat 23°47'47"N, Lon 88°27'09"E to confluence of Jalangi with Hooghly/Bhagirathi rivers at Nabadwip Lat 23°24'39"N, Lon 88°22'48"E.
48.	National Waterway 48	<i>Jawai-Luni Rivers and Rann of Kutch:</i> Jawai river from Jalore at Lat 25°20'37"N, Lon 72°41'09"E to Luni river near Gandhav village to Rann of Kutchh at Lat 23°32'54"N, Lon 68°22'27"E.
49.	National Waterway 49	<i>Jhelum River:</i> Bridge on highway at Lat 33°49'26"N, Lon 75°03'50"E to Wuler lake, Srinagar at Lat 34°21'37"N, Lon 74°36'36"E.
50.	National Waterway 50	<i>Jinjiram River:</i> Confluence with Brahmaputra river at Tumni Lat 25°51'51"N, Lon 89°58'57"E to Fulerchar Point. III at Brahmaputra river Lat 25°44'15"N, Lon 89°52'53"E.
51.	National Waterway 51	<i>Kabini River:</i> Kabini Dam Lat 11°58'25"N, Lon 76°21'10"E to Beeramballi at Lat 11°56'10"N, Lon 76°14'18"E.
52.	National Waterway 52	<i>Kali River:</i> Kodasalli Dam Lat 14°55'08"N, Lon 74°32'07"E to confluence of Kali river with Arabian Sea near Sadashivgad bridge at Lat 14°50'31"N, Lon 74°07'21"E.
53.	National Waterway 53	<i>Kalyan-Thane-Mumbai Waterway, Vasai Creek and Ulhas River:</i> Arabian Sea at Navi Mumbai Lat 18°55'50"N, Lon 72°53'22"E via Ulhas river to bridge on State Highway No. 76 near Malegaon T. Waredi Lat 19°02'38"N, Lon 73°19'54"E; Bridge on Kalyan-Badlapur road near Kalyan railway yard at Kalyan Lat 19°14'06"N, Lon 73°08'49"E to Kalyan Lat 19°15'35"N, Lon 73°09'28"E; Vasai Creek from Lat 19°18'54"N to Lon 72°47'30"E to Kasheli at Lat 19°13'23"N, Lon 73°0'21"E.

10 THE GAZETTE OF INDIA EXTRAORDINARY [PART II—		
(1)	(2)	(3)
54.	National Waterway 54	<i>Karamnasa River:</i> Bridge at Kakarait Lat 25°18'11"N, Lon 83°31'38"E to confluence of Karamnasa and Ganga rivers at Kutubpur Lat 25°31'06"N, Lon 83°52'47"E.
55.	National Waterway 55	<i>Kaveri Kollidam River:</i> Uratchikottai Barrage at Lat 11°29'03"N, Lon 77°42'14"E to confluence of river Kollidam with Bay of Bengal at Pazhaiyar Lat 11°21'38"N, Lon 79°49'53"E.
56.	National Waterway 56	<i>Kherkai River:</i> Dam near Gangia village at Lat 22°45'12"N, Lon 86°05'09"E to confluence with Subarnrekha river at Jamshedpur Lat 22°50'13"N, Lon 86°09'37"E.
57.	National Waterway 57	<i>Kopili River:</i> Bridge at Banthai Gaon Tinali Bus Stop at Lat 26°10'41"N, Lon 92°13'05"E to confluence with Brahmaputra river at Chandrapur No. 2 Lat 26°15'07"N, Lon 91°56'49"E.
58.	National Waterway 58	<i>Kosi River:</i> Kosi Barrage at Hanuman Nagar Lat 26°31'40"N, Lon 86°55'29"E to Confluence of Kosi with Ganga river at Kursela Lat 25°24'40"N, Lon 87°15'14"E.
59.	National Waterway 59	<i>Kottayam-Vaikom Canal:</i> Kottayam, near Kodimatha at Lat 9°34'39"N, Lon 76°31'08"E to Vechoor joining National Waterway No. 3 at Lat 9°40'0"N, Lon 76°24'11"E.
60.	National Waterway 60	<i>Kumari River:</i> Dam near Amruhasa village at Lat 23°06'37"N, Lon 86°15'51"E to Mukutmanipur Dam at Chiada Lat 22°57'18"N, Lon 86°44'43"E.
61.	National Waterway 61	<i>Kynshi River:</i> Bangladesh Border near Mawpyllum Lat 25°12'07"N, Lon 91°15'21"E to bridge on Nonghyllam-Maweit road at Lat 25°19'35"N, Lon 91°04'07"E.
62.	National Waterway 62	<i>Lohit River:</i> Parasuram Kund at 27°52'40"N, Lon 96°21'40"E to Saikhowa Ghat, Sadiya Lat 27°47'49"N, Lon 95°38'14"E.
63.	National Waterway 63	<i>Luni River:</i> Dam at Jaswantpura Lat 26°13'35"N, Lon 73°41'20"E to Barrage near Malipura Lat 24°57'04"N, Lon 71°38'02"E.
64.	National Waterway 64	<i>Mahanadi River:</i> Sambalpur Barrage at Lat 21°27'34"N, Lon 83°57'50"E to Paradip at Lat 20°19'38"N, Lon 86°40'17"E.
65.	National Waterway 65	<i>Mahananda River:</i> Bridge near Gosaipur at Lat 25°26'41"N, Lon 88°05'26"E to Bangladesh Border near Adampur at Lat 24°57'17"N, Lon 88°10'59"E.

(1)	(2)	(3)
66.	National Waterway 66	<i>Mahi River:</i> Kadana Dam Lat 23°18'22"N, Lon 73°49'37"E to confluence with Gulf of Khambhat near Kavi railway station Lat 22°10'35"N, Lon 72°30'36"E.
67.	National Waterway 67	<i>Malaprabha River:</i> Jakanuru at Lat 15°49'51"N, Lon 75°38'54"E to confluence with river Krishna at Kudalasangama Lat 16°12'30"N, Lon 76°04'16"E.
68.	National Waterway 68	<i>Mandovir River:</i> Bridge at Usgaon at Lat 15°26'42"N, Lon 74°03'12"E to confluence of Mandovi river with Arabian Sea at Reis Magos Lat 15°28'32"N, Lon 73°46'46"E.
69.	National Waterway 69	<i>Manimutharu River:</i> Manimutharu Dam Lat 8°39'14"N, Lon 77°24'47"E to confluence with Tramaraparani river near Aladiur Lat 8°41'03"N, Lon 77°26'07"E.
70.	National Waterway 70	<i>Manjara River:</i> Singur Dam at Lat 17°44'58"N, Lon 77°55'41"E to confluence with river Godavari at Kandakurthi at Lat 18°49'07"N, Lon 77°52'20"E.
71.	National Waterway 71	<i>Mapusa/Moide River:</i> Bridge on National Highway-17 at Mapusa Lat 15°35'21"N, Lon 73°49'17"E to confluence point of Mapusa and Mandovi rivers at Porvorim Lat 15°30'20"N, Lon 73°50'42"E.
72.	National Waterway 72	<i>Nag River:</i> Bridge near NIT Colony, Nagpur Lat 21°06'17"N, Lon 79°06'03"E to confluence with river Kanhan near Sawangi village at Lat 21°05'38"N, Lon 79°27'54"E.
73.	National Waterway 73	<i>Narmada River:</i> Pandhariya at Lat 21°57'10"N, Lon 74°08'27"E to confluence of Narmada with Arabian Sea at Gulf of Khambhat Lat 21°38'27"N, Lon 72°33'28"E.
74.	National Waterway 74	<i>Netravathi River:</i> Netravathi Dam, Dharmsthala Lat 12°57'55"N, Lon 75°22'10"E to confluence with Arabian sea at Bengre Lat 12°50'43"N, Lon 74°49'29"E."
75.	National Waterway 75	<i>Palar River:</i> Rail bridge at Virudampattu, Vellore at Lat 12°56'14"N, Lon 79°07'30"E to confluence with Bay of Bengal at Sadurangapattinam Lat 12°27'52"N, Lon 80°09'13"E.
76.	National Waterway 76	<i>Panchagangavali (Panchagangoli) River:</i> Gangoli Port at Lat 13°38'01"N, Lon 74°40'08"E to Bridge at Badakere at Lat 13°44'50"N, Lon 74°39'15"E.
77.	National Waterway 77	<i>Pazhyar River:</i> Bridge near Veeranarayana Mangalam village at Lat 8°13'49"N, Lon 77°26'27"E to confluence with Arabian Sea at Manakudi at Lat 8°05'15"N, Lon 77°29'08"E.

12		THE GAZETTE OF INDIA EXTRAORDINARY	[PART II—
(1)	(2)	(3)	
78.	National Waterway 78	<i>Penganga Wardha River System:</i> Confluence of Aran and Penganga rivers near Chimata village at Lat 19°54'08"N, Lon 78°12'36"E to the confluence of Wardha and Pranahita rivers near Ravalli village at Lat 19°33'59"N, Lon 79°49'0"E.	
79.	National Waterway 79	<i>Pennar River:</i> Penna Barrage, Pothireddypalem at Lat 14°28'08"N, Lon 79°59'09"E to confluence with Bay of Bengal near Kudithipalem at Lat 14°35'37"N, Lon 80°11'31"E.	
80.	National Waterway 80	<i>Ponniyar River:</i> Sathanur Dam at Lat 12°11'0"N, Lon 78°51'01"E to Cuddalore at confluence of Bay of Bengal at Lat 11°46'22"N, Lon 79°47'42"E.	
81.	National Waterway 81	<i>Punpun River:</i> Bridge on National Highway-83 near Pakri village Lat 25°29'50"N, Lon 85°06'19"E to confluence with river Ganga at Fatuha Lat 25°30'50"N, Lon 85°18'17"E.	
82.	National Waterway 82	<i>Puthimari River:</i> Bridge on National Highway-31 near village Ghopla at Lat 26°22'01"N, Lon 91°39'11"E to confluence with Brahmaputra river near Bamunbori at Lat 26°15'28"N, Lon 91°20'35"E."	
83.	National Waterway 83	<i>Rajpuri Creek:</i> Arabian Sea at Rajpuri Lat 18°18'03"N, Lon 72°56'43"E to Mhasala at Lat 18°08'15"N, Lon 73°06'45"E.	
84.	National Waterway 84	<i>Ravi River:</i> Dam at Gandhiar Lat 32°35'51"N, Lon 75°59'05"E to Ranjeet Sagar Dam at Basoli Lat 32°26'36"N, Lon 75°43'45"E.	
85.	National Waterway 85	<i>Revadanda Creek Kundalika River System:</i> Arabian Sea at Revadanda Lat 18°32'20"N, Lon 72°55'33"E to bridge on Roha-Astami Road near Roha Nagar Lat 18°26'32"N, Lon 73°07'11"E.	
86.	National Waterway 86	<i>Rupnarayan River:</i> Confluence of Dwarakeswar and Silai rivers at Pratappur Lat 22°40'17"N, Lon 87°46'43"E to confluence with Hooghly river at Geonkhali Lat 22°12'42"N, Lon 88°03'14"E.	
87.	National Waterway 87	<i>Sabarmati River:</i> Barrage near Sadoliya Lat 23°26'50"N, Lon 72°48'35"E to confluence with Gulf of Khambhat near Khambhat Lat 22°09'18"N, Lon 72°27'28"E.	
88.	National Waterway 88	<i>Sal River:</i> Orlim Deusa Bridge Lat 15°13'11"N, Lon 73°57'30"E to confluence with Arabian Sea at Mobor Lat 15°08'32"N, Lon 73°57'0"E.	

(1)	(2)	(3)
89.	National Waterway 89	<i>Savitri River (Bankot Creek):</i> Bridge near Sape at Lat 18°05'54"N, Lon 73°20'09"E to Arabian Sea at Bankot Lat 17°58'47"N, Lon 73°01'45"E.
90.	National Waterway 90	<i>Sharavati River:</i> Honnavar Port Sea Mouth at Lat 14°17'56"N, Lon 74°25'27" E to link at highway at Gersoppa Lat 14°14'15"N, Lon 74°39'06"E.
91.	National Waterway 91	<i>Shastri River Jaigad Creek:</i> Sangmeshwar at Lat 17°11'16"N, Lon 73°33'03"E to confluence with Arabian Sea at Jaigad Lat 17°19'12"N, Lon 73°12'39"E.
92.	National Waterway 92	<i>Silabati River:</i> Barrage near Shimulia village at Lat 22°34'53" N, Lon 87°38'31"E to confluence of Dwarakeswar and Silai rivers at Pratappur Lat 22°40'17"N, Lon 87°46'43"E.
93.	National Waterway 93	<i>Simsang River:</i> Bangladesh Border at Lat 25°11'05"N, Lon 90°39'25"E to bridge on National Highway-62 near Nongalbibra Lat 25°27'20"N, Lon 90°42'22"E.
94.	National Waterway 94	<i>Sone River:</i> Sone Barrage near Dehri at Lat 24°50'14" N, Lon 84°08'03"E to confluence of Sone and Ganga rivers at Lat 25°42'15"N, Lon 84°52'02"E.
95.	National Waterway 95	<i>Subansiri River:</i> Gerukamukh Lat 27°27'03" N, Lon 94°15'16"E to Brahmaputra confluence at Lat 26°52'25"N, Lon 93°54'31"E.
96.	National Waterway 96	<i>Subarnrekha River:</i> Chandil Dam at Lat 22°58'29" N, Lon 86°01'14"E to confluence with Bay of Bengal at Lat 21°33'29"N, Lon 87°22'59"E.
97.	National Waterway 97	<i>Sunderbans Waterways:</i> (i) Namkhana at Lat 21°45'46" N, Lon 88°13'06"E to Athara Banki Khal Lat 21°56'57"N, Lon 89°05'32"E; (ii) <i>Bidya River:</i> Lot No. 124 at Lat 21°54'43" N, Lon 88°41'08"E to near Uttar Danga at Lat 22°11'48"N, Lon 88°51'55"E; (iii) <i>Chhota Kalagachi(Chhoto Kalergachi) River:</i> Near Rajani ferry ghat Lat 22°19'57" N, Lon 88°54'21"E to near Nazat at Lat 22°26'05"N, Lon 88°50'12"E; (iv) <i>Gomar River:</i> Near Ramkrishnapur Lat 22°11'53" N, Lon 88°44'42"E to near Gosaba Khuya ghat at Lat 22°10'05"N, Lon 88°47'37"E; (v) <i>Haribhanga River:</i> Bangladesh Border Lat 21°53'19" N, Lon 89°01'24"E to confluence with Jhila river at Lat 21°58'18"N, Lon 88°55'08"E;

14	THE GAZETTE OF INDIA EXTRAORDINARY	[PART II—
(1)	(2)	(3)
		(vi) <i>Hogla(Holgal)-Pathankhali River</i> : Near Parandar Lat 22°12'22" N, Lon 88°40'43"E to near Sandeshkhali Ferry Ghat at Lat 22°21'12"N, Lon 88°52'48"E;
		(vii) <i>Kalindi (Kalandi) River</i> : Bangladesh Border at Hingalganj Lat 22°28'08" N, Lon 88°59'46" E to Bangladesh Border near Khosbash at Lat 22°24'41"N, Lon 88°58'21"E;
		(viii) <i>Katakhalī River</i> : Bangladesh Border near Barunhat Lat 22°30'31" N, Lon 88°58'25"E to Lebukhali ferry at Lat 22°21'45"N, Lon 88°57'30"E;
		(ix) <i>Matla River</i> : Bay of Bengal at Lat 21°33'04" N, Lon 88°38'26"E to Canning ferry ghat at Lat 22°18'39"N, Lon 88°40'43"E;
		(x) <i>Muri Ganga (Baratala) River</i> : Bay of Bengal near Bisalakshmipur Lat 21°37'52" N, Lon 88°10'0"E to near Kakdwip at Lat 21°52'17"N, Lon 88°09'08"E;
		(xi) <i>Raimangal River</i> : Hemnagar at Lat 22°11'41" N, Lon 88°58'01"E to Rajnagar at Lat 22°33'57"N, Lon 88°56'17"E;
		(xii) <i>Sahibkhali (Sahebkhali) River</i> : Near Ramapur Lat 22°17'52" N, Lon 88°56'35"E to Bangladesh Border near Khosbash at Lat 22°24'41"N, Lon 88°58'21"E;
		(xiii) <i>Saptamukhi River</i> : Bay of Bengal at Henry Island Lat 21°34'57" N, Lon 88°19'08"E to near Chintamanipur at Lat 21°51'14"N, Lon 88°18'41"E;
		(xiv) <i>Thakurran River</i> : Bay of Bengal at Lat 21°33'32" N, Lon 88°27'45"E to Madhabpur at Lat 22°02'52"N, Lon 88°33'28"E;
98.	National Waterway 98	<i>Sutlej River</i> : Sunni Road Bridge at Lat 31°14'45" N, Lon 77°07'34"E to Harike Dam at Lat 31°08'33"N, Lon 74°56'57"E.
99.	National Waterway 99	<i>Tamaraparani River</i> : Sulochana Mudalir bridge, Tirunelveli Lat 8°43'43" N, Lon 77°42'54"E to confluence with Bay of Bengal near Punnaikayal at Lat 8°38'25"N, Lon 78°07'38"E.
100.	National Waterway 100	<i>Tapi River</i> : Hatnur Dam Near Mangalwadi Lat 21°04'22"N, Lon 75°56'45"E to Gulf of Khambhat (Arabian Sea) at Lat 21°02'16"N, Lon 72°39'30"E.
101.	National Waterway 101	<i>Tizu and Zungki Rivers</i> : Longmatra at Lat 25°46'12"N, Lon 94°44'35"E to Avanghku at Myanmar border Lat 25°35'03"N, Lon 94°53'06"E and in Zungki river from bridge at Lat 25°48'26"N, Lon 94°46'36"E to confluence of Zungki and Tizu rivers at Lat 25°46'58"N, Lon 94°45'21"E.

(1)	(2)	(3)
102.	National Waterway 102	<i>Tiwang (Dhaleswari River):</i> Khamrang near National Highway-54 Lat 23°55'22"N, Lon 92°39'08"E to Bridge on National Highway-154 at Gharmura Lat 24°17'19"N, Lon 92°31'0"E.
103.	National Waterway 103	<i>Tons River:</i> Bridge on National Highway-27 near Chakghat at Lat 25°02'05"N, Lon 81°43'45"E to Ganga confluence at Sirsa Lat 25°16'32"N, Lon 82°05'0"E.
104.	National Waterway 104	<i>Tungabhadra River:</i> Bridge on State Highway No. 29 near Chikka Jantakal village at Lat 15°24'33"N, Lon 76°35'13"E to confluence with river Krishna near village Murva Konda at Lat 15°57'20"N, Lon 78°14'30"E.
105.	National Waterway 105	<i>Udayavara River:</i> Arabian Sea Mouth at Malpe Lat 13°20'57"N, Lon 74°41'28"E to Bridge near Manipura Lat 13°17'33"N, Lon 74°46'26"E.
106.	National Waterway 106	<i>Umngot (Dwaki) River:</i> Bangladesh Border near Larbamon Lat 25°11'07"N Lon 92°0'54"E to Nongryngkoh at Lat 25°19'05"N, Lon 92°02'20"E.
107.	National Waterway 107	<i>Vaigai River:</i> Barrage near Anai Patti at Lat 10°05'19"N, Lon 77°51'10"E to Viragnoor Dam at Lat 9°53'52"N, Lon 78°10'34"E.
108.	National Waterway 108	<i>Varuna River:</i> Road bridge near Kuru at Lat 25°23'15"N, Lon 82°44'07"E to Ganga confluence at Saray Mohana, Varanasi Lat 25°19'45"N, Lon 83°02'41"E.
109.	National Waterway 109	<i>Wainganga Pranahita River System:</i> Bridge near Chandapur village at Lat 20°0'30"N, Lon 79°47'08"E to confluence of river Godavari at Kaleshwaram Lat 18°49'33"N, Lon 79°54'33"E.
110.	National Waterway 110	<i>Yamuna River:</i> Jagatpur (6km upstream of Wazirabad Barrage) Delhi Lat 28°45'28"N, Lon 77°13'50"E to confluence of Yamuna and Ganga rivers at Sangam, Allahabad at Lat 25°25'24"N, Lon 81°53'20"E.
111.	National Waterway 111	<i>Zuari River:</i> Sanvordem bridge Lat 15°16'15"N, Lon 74°07'11"E to Marmugao Port Lat 15°25'55"N, Lon 73°48'13"E.

DR. REETA VASISHTA,
Additional Secy. to the Govt. of India.

PRINTED BY THE GENERAL MANAGER, GOVERNMENT OF INDIA PRESS, MINTO ROAD, NEW DELHI
AND PUBLISHED BY THE CONTROLLER OF PUBLICATIONS, DELHI—2016.

GMGIPMRND—5325G(S3)—26-03-2016.

Annexure: 2

Matrix for Weather Forecasting & Early Warning System (Chapter- 2) applicable to Boat operation/ Boat Operators.

	IMD	CWC	State/local/ state IWT
i) Advance Warning information regarding severe weather condition	✓	-	✓
ii) Weather Bulletins / Forecasting / Nowcasts	✓	-	✓
iii) River Forecast	✓	✓	✓
iv) Display of forecasts & Warning of IMD & CWC	-	-	✓
v) Boat Inspection for necessary communication equipment	-	-	✓

Annexure: 3

Matrix for Safety Standards & Specification (Chapter- 3)

	Freeboard	Registration No.	Seating Capacity	Life Saving Equipments	Life Saving Equipments Non-mechanized/mechanized Boats
Indian Register of Shipping (IRS)	✓			✓	
Stat Boat /Shipping Statuary authority		✓	✓		✓

Annexure: 4

Matrix for Regulatory & Legal Issues (Chapter -4)

	Passengers	Operators	State Govt.
Life Jackets	✓	✓	
Registration/Licensing Boats of Safety			✓
Master Trainer			✓
Compulsory scrapping of vessels			✓
Smoking for bidden	✓	✓	

Contact Us

For further information on *Guidelines for Boat Safety*,

Please Contact:

National Disaster Management Authority
Government of India
NDMA Bhawan,
A-1 Safdarjung Enclave,
New Delhi-110 029
Email: mitigation@ndma.gov.in
Tel: +91-11-26701700
Web: www.ndma.gov.in

