

A Project Report

# STUDY ON INLAND WATERWAYS OF INDIA

Submitted for partial fulfillment of the requirements for the award of degree of

## MASTER OF BUSINESS ADMINISTRATION

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Submitted By

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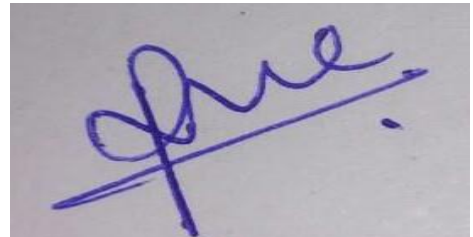
**July 2020**

## DECLARATION

I, hereby declare the project report entitled “**Study on Inland Waterways of India**” is a bonafide work submitted to School of Maritime Management, Indian Maritime University Chennai Campus. Under the supervision of **Dr. M Sekar**, Associate Professor, SMM, Indian Maritime University, Chennai, for partial fulfillment of the requirements for the award of the degree of **MBA (International Transportation & Logistics Management)**. This is the original work done by me and that is not a part of any other work.

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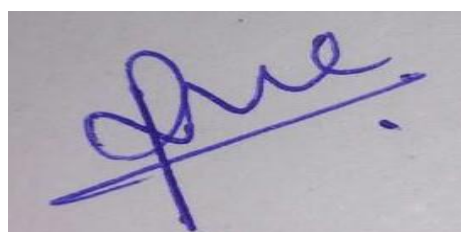


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**Date: 30/07/2020**

**Place: Chennai**

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## **Abstract**

Coordinated National Waterways Transportation Grid study is embraced with an objective to interface every single National Waterways (viz., River Ganga from Haldia to Allahabad (NW-1: 1620 km), River Brahmaputra from Dhubri to Sadiya (NW-2: 891 km), West Coast Canal from Kottapuram to Kollam with Udyogmandal and Champakara Canals (NW-3: 205 km), Kakinada – Puducherry stretch of channels with River Godavari and River Krishna (NW-4: 1078 km), East Coast Canal with River Brahmani and River Mahanadi delta (NW- 5: 588 km), River Barak among Laxhipur and Bhanga (proposed NW-6: 121 km)) to National/State Highways, Railways and Sea Ports so every one of these conduits become a vital piece of the all out transportation matrix. With this target, Phase-1 study had been completed which had prescribed 27 potential terminal areas on six National Waterways, for improvement of viable Inter-modal National Waterways Transportation Grid. These distinguished potential terminals are required to be appropriately associated by 2 path street to the close-by State or National Highways and furthermore at any rate single path expansive measure rail network to be set up to close-by rail-heads, any place achievable.

Based on the recommendations and the broad consultation on the planned Phase-I study of National Waterway Grid connectivity with the States and other Departments related to Roads, Railways and Ports, it was decided that the individual projects would be developed with the detailed project reports and financing options. Further, it was suggested to take up four more terminals viz., Allahabad and Sahebganj on NW-1, Dhamra and Kalinganagar on NW-5, in view of their potential connectivity to hinterland. Accordingly all prioritized 31 potential terminals as shown below have been taken up in this stage-1 of Phase-II of the study. The divertible traffic potential of these 31 identified priority terminals was 114 million tonnes in the base year (2011-12) which will increase to 159 million tonnes by the year 2031-32. In this report, the feasibility for connecting these 31 terminals with nearest National Highways/ State Highways and nearby Rail-heads has been studied. This connectivity shall bring the identified terminals into National Grid with accessibility to other modes of transports viz., road, rail and port. This aspect is dealt in detail in the present study, i.e., Stage-I of Phase-II of NW Grid Connectivity Study. Feasibility of establishing connectivity of National Waterways to Ports viz., Haldia and Kolkata to NW-1, Kochi to NW-3, Kakinada, Krishnapatnam and Ennore to NW-4, Paradip and Dhamara to NW -5, has also become a part of this study.

In this report, it is stated that the IWT has a wide scope in India because it provides cost effective

as well as eco-friendly mode of transport compared to other modes. The data for this report is collected through primary as well as secondary sources. These waterways will help the nation to increase the economy of country, and also it will help major as well as minor industries located on the shores of these waterways route. It will help to escalate the connectivity in terms of cargo movement which will eventually lead to national growth.

## Table of Contents

SN	TOPIC	Page No
<b>1</b>	<b>Chapter 1- Introduction to National Waterways</b>	1
1.1	Introduction	1
1.2	Inland Waterway of India	3
1.3	Imperative things for National Waterways	4
1.4	Benefits of Inland Waterways	5
1.5	Significance of Study	6
1.6	Objective of the Study	6
1.7	Research Methodology	6
<b>2</b>	<b>Chapter 2- Literature Review</b>	7
2.1	Shripad Dharmadhikari, Jinda Snadbhor(March 2007)	7
2.2	In JV with IRG system	7
2.3	Working group report on Shipping & IWT	8
2.4	Business Line (May 2016)	8
2.5	IRG Systems	9
<b>3</b>	<b>Chapter 3- Overview of National Waterways of India</b>	10
3.1	<b>National Waterway -1</b>	10
3.1.1	Project Description	10
3.1.2	Fairway Development	12
3.1.3	Cargo movements	13
3.1.4	Development of Tourism	14
3.1.5	Infrastructure, Facilities and Services	14
3.2	<b>National waterway – 2</b>	26

3.2.1	Navigational Facilities	27
3.3	<b>National Waterway – 3</b>	30
3.3.1	Features	30
3.3.2	Brief Description	31
3.3.3	Navigable Fairway	31
3.3.4	Aids to Navigation	32
<b>4</b>	<b>Chapter 4 - Comparative study of National Waterways</b>	34
4.1	Comparative Model Share	34
4.2	Cost Comparison between different modes	36
4.2.1	Comparison with Rail and Road Transport	37
4.3	Economic & Social Benefits of Water Transport	38
4.4	Length of National Waterways of India	39
4.5	Vessel Draft	40
4.6	Major Freight Products	40
4.7	Scope of Inland Waterways of India	41
<b>5</b>	<b>Chapter 5 – Findings, Suggestions, Conclusion</b>	43
5.1	Findings	43
5.2	Suggestions	43
5.3	Conclusion	45
	<b>References</b>	47

## List of Figures

<b>SN</b>	<b>Topic</b>	<b>Page No</b>
1.1	Inland Waterways Map	4
3.1	Map of National Waterway 1	11
3.2	Cargo Transportation from NW 1	12
3.3	Location Map - Haldia Terminal	16
3.4	Varanasi Multimodal Terminal	17
3.5	Location map - Varanasi Terminal	18
3.6	Location Map - Sahibganj Terminal	21
3.7	Location Map - Farakka Lock	22
3.8	Location Map - Tribeni Terminal	24
3.9	Haldia To Sahibganj	25
3.10	Map of National Waterways 2	26
4.1	Model Cargo share of India	34
4.2	Comparative study between India and Developed Countries	35
4.3	Cost comparison between IWT Mode, Rail and Road Transport	37
4.4	CO2 Emissions	38
4.5	Energy use per tonne	38
4.6	Cost of Accident	39
4.7	Length in km	39
4.8	Vessel draft of all NWT	40

## List of Tables

<b>SN</b>	<b>Topic</b>	<b>Page No</b>
3.1	NW 1 Length and Draft	13
3.2	Bank protection work as per current planning	23
3.3	NW 2 length for river connected with states	27
3.4	NW 2 terminals	27
3.5	Features of NW 2	30
4.1	Cost comparison between IWT mode, Rail and Road transport	36
4.2	Divertible traffic within National Waterways	38
5.1	Major freight products via NW 1	45

# CHAPTER I

## 1.1 Introduction

Inland conduits of India has around 14,500 km of flexibility and possibly safe conduits out of which around 5,200 km of the stream and 4,000 km of waterways can be utilized by motorized specialties. India's Inland Waterways are un-used contrasted with different nations in the World. The all payload moved (in ton-kilometers) by the inland conduit was only 0.5% of the complete inland traffic in India. The Inland Waterways Authority of India (IWAI) appeared on 27th October 1986 for improvement and guideline of inland conduits for transportation and route. Its base camp is situated in Noida, Uttar Pradesh. The IWAI pronounced five National Waterways in India and furthermore proposed the 6th one. India has around 14,500 km of traversable conduits including waterways, trenches, backwaters, brooks. This is notwithstanding the coastline of 7,517 km covering the territory, Lakshadweep Islands, and the Andaman and Nicobar Islands. Directly, Inland Waterways activity is limited to a couple of stretches in the Ganga-Bhagirathi-Hooghly Rivers, the Brahmaputra, the Barak River, the streams in Goa, the backwaters in Kerala, inland waters in Mumbai and the deltaic districts of the Godavari – Krishna River.

On ninth March 2016 Parliament ordered The National Waterways Act, 2016 which got the consent of the President on 25th March 2017, and came into power from 12 April 2017 according to the warning of the Government of India. This demonstration has pronounced 111 streams or waterway extends, rivers, estuaries as National (inland) Waterways. The entry of this enactment empowers the Central Government to control these conduits for improvement with respect to delivery, route and transport through precisely pushed vessels. Before this Act there were five national conduits, each pronounced all things considered by their own different enactment.

The conduit's stretch among Kolkata and Delhi goes through a standout amongst India's most thickly populated regions. As indicated by a World Bank ponder, a sizeable 40 percent of all India's exchanged merchandise either start from this asset rich locale or are bound for its overflowing markets. While the area is evaluated to create around 370 million tons of cargo yearly, just a modest division of this roughly 8 million tones at present travel by water. Inland

Waterways in India are created and controlled through the Inland Waterways Authority of India (IWAI) from October 27, 1986.

These long conduits give a decent method of transport over the urban communities just as towns, similar to backwaters of Kerala, Canals in Gujarat and couple of conduits in Goa, West Bengal, and Assam. Cargo transportation by conduits is exceedingly under-used in India. The all out freight moved (in ton-kilometers) by the inland conduit was less of the absolute inland traffic in India, contrasted with the 21% figure for the United States. Indian water transportation is accepting critical consideration as of late since coordination's cost in India is one of the most elevated among real nations – according to the reports it is 18% in India versus 8-10% in China and 10-12% in European Union.

The obligation of improvement of these conduits rests with the Inland Waterways Authority of India (IWAI). This expert, alongside Central Inland Water Transport Corporation (CIWTC) as the vital administrator, are the two Central offices occupied with the nation. The endeavors of these associations are enhanced and upheld by inland water associations of different States and private administrator. In mainland Europe, out of 26,000 km of traversable conduits, 17,000 km length is having profundity more than 2.75 m.

The European Union (EU) has propelled a particular modular move program called "Marco Polo" in 2003. In China, out of 119,000 km of safe conduits, 5000 km length is having profundity more than 2.75 m. Also, 2000 inland ports exist in China. In USA, out of 41,000 km of traversable conduits, 24,000 km length is having profundity more than 2.75 m. The IWT modular offer in Netherlands is 42%, France 15%, Hungary 15%, Germany 14%, Belgium 13% and in US 15%. India has 14,500 km of safe conduits, of which around 5700 km is traversable by motorized vessels, anyway the modular offer of IWT in India is 0.28% as it were.

### **Extent of the Inland**

Waterways The subtleties of every one of the 111 national conduits, including the scope longitude directions of the begin and end focuses, are given in the National Waterways Act, 2016. These conduits go through 24 states and two association domains, with an inexact all out length of 20274 km. These conduits will go through about 138 waterway frameworks, streams, estuaries and related channel frameworks of India.

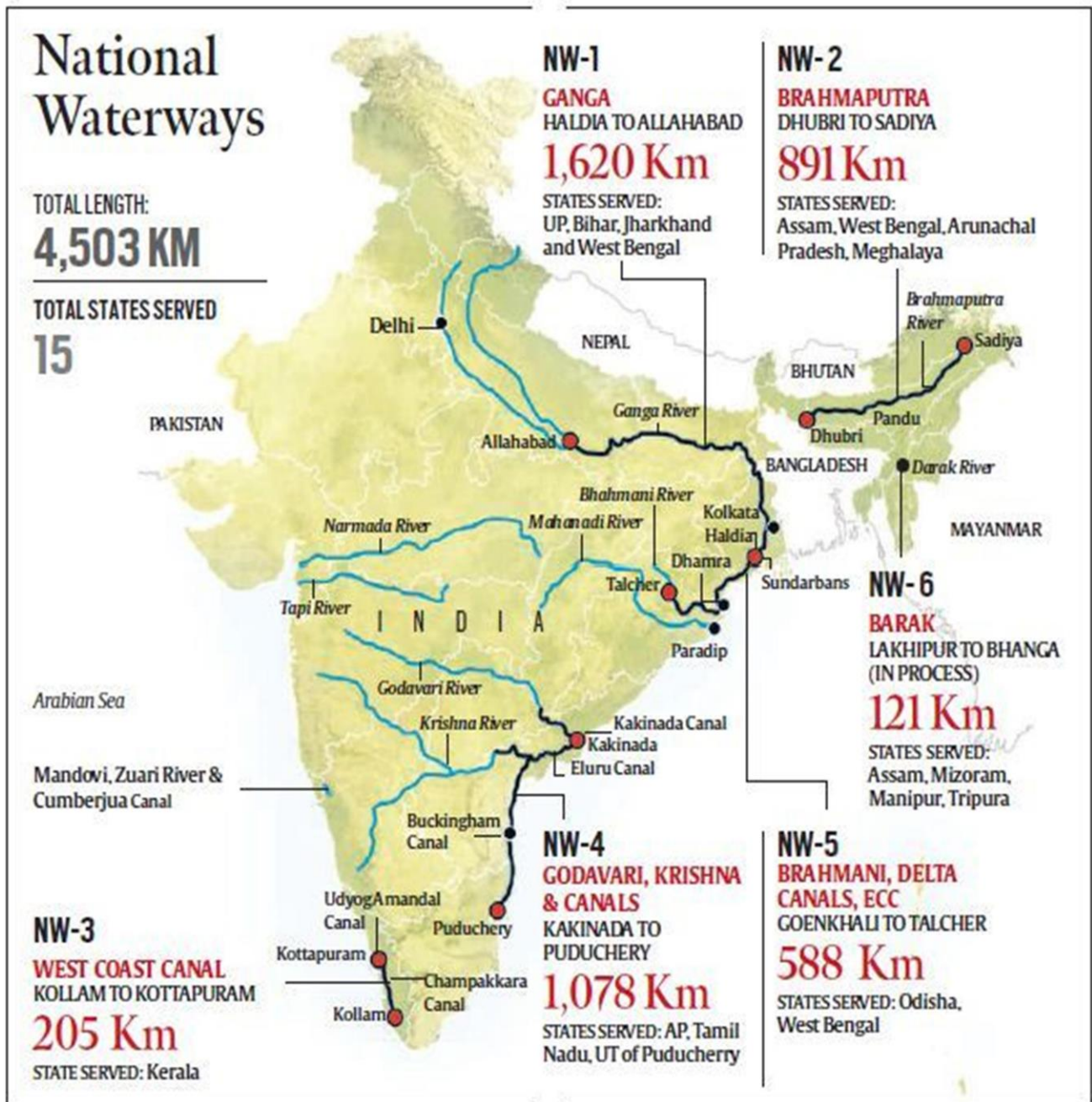
The National Waterways Bill, 2015 was presented by Shri Nitin Gadkari, Minister of Road Transport and Highways and Shipping, on 29th April 2015. This Bill was exchanged to the

Parliamentary Standing Committee on Transport, Tourism and Culture for study and comments<sup>12</sup>. This Bill had recommended 101 new national conduits notwithstanding existing 5 national conduits. The Standing Committee prescribed some more conduits to be included and furthermore solicited the legislature to take comprehension from complaints raised by some state governments on certain national conduits. In the wake of considering every one of the proposals made by Standing Committee the Bill was altered and 13 proposed conduits were evacuated and 18 conduits were included. The subtleties of these are given in Annexures 2 and 3. Annexure 3 additionally records the conduits which the Parliamentary Committee had recommended for option. The Bill was passed by Parliament with 111 conduits announced as National Waterways.

## **1.2 Inland Waterway of India**

- **National Waterway 1:** Varanasi–Haldia stretch of the Ganges–Bhagirathi–Hooghly river system having a length of 1620km with expected cargo movement of 4 million tonnes.
- **National Waterway 2:** Sadiya-Dhubri stretch of Brahmaputra river system having a length of 891km with expected cargo movement of 2 million tonnes.
- **National Waterway 3:** Kozhikode-Kollam stretch of the West Coast Canal, Champakara Canal and Udyogmandal Canal having a length of 205km with expected cargo movement of 1 million tonnes.
- **National Waterway 4:** Kakinada-Pondicherry stretch of canals and the Kaluvelly Tank, Bhadrachalam – Rajahmundry stretch of River Godavari and Wazirabad – Vijayawada stretch of River Krishna having a length of 1095km.
- **National Waterway 5:** Talcher–Dhamra stretch of the Brahmani River, the Geonkhali – Charbatia stretch of the East Coast Canal, the Charbatia–Dhamra stretch of Matai River and the Mangalgadi – Paradip stretch of the Mahanadi River Delta having a length of 623km.

Fig. 1.1 Inland Waterways Map (Source: Geographyandyou.com)



### 1.3 Imperative things for National Waterway

The National Transport Policy Committee (1980) recommended the accompanying standards for affirmation of a national conduit.

- It ought to have capacity of route by precisely moved vessels of a sensible size.

- It ought to have around 45 m wide channel and least 1.5m profundity.
- It ought to be a ceaseless stretch of 50 kms. The just exception to be made to conduit length is for urban conglomeration and intra-port traffic.
- It should go through and serve the enthusiasm of more than one State (or).
- It ought to interface a tremendous and prosperous hinterland and Major Ports (or).
- It should go through a vital district where improvement of route is viewed as important to give strategic help to national security (or).
- It ought to interface places not served by some other methods of transport.

#### **1.4 Benefit of Inland Waterways**

- As the acquisition of land for national and State highways becomes scarce and the cost of construction of roads, flyovers and bridges goes up, the government is now exploring using water as a means of public transportation.
- Water transport is not only environment-friendly but also cheaper than other modes of transport.
- It takes lesser time to transport cargo by waterways in some areas and the chances of congestion and accidents on highways are eliminated.
- There is a huge potential for domestic cargo transportation as well as for cruise, tourism and passenger traffic.
- There is huge potential for public-private partnership (PPP) led investments in dredging, construction, operation and maintenance of barges, terminals, storage facilities, and navigation, as well as tourism.
- It will help in the generation of millions of job opportunities.
- It will boost the maritime trade of the states and augment their economies.
- It provides much more flexible service than railways and can be adjusted to individual requirements.

### **1.5 Significance of my study:**

My project is regarding “Inland Waterways of India”, the Indian government has given priority to the development of National waterways with the objective of making them “Robust and Sustainable mode of transport. But the study is all about how this mode of transport change the Indian economy as well the cost effective in comparison to other mode of transport.

### **1.6 Objectives of the study:**

- To study the impact of IWT on cargo movement in comparison with other modes of transportation.
- To analyze the role of other modes of transport on the cargo movement during summer seasons.
- To study how far SCI is prepared for IWT movement in terms of the challenges and opportunities lie before IWT.

### **1.7 Research Methodology:**

It is the framework or a blueprint which guides the collection and analysis of data. This is being done in order to achieve the objective of the study. It is an expression what is expected from the research and what input is needed to convert data into research, finding, planning the instruments used for research.

**Type of data:** Primary data research on IW-1 and secondary research on IW-1,2,3,4,5&6 further to that both the finding will be thoroughly examine and analysis is made on the future trend of all the national waterways potential.

**Data collection method-** Data is collected from multiple locations. Some of these are articles, journals, research papers, and websites. Some data will come from questionnaires mailed to businesses.

**Sampling-**Convenient sampling

**Data analysis technique-** Quantitative as well as Qualitative technique

## CHAPTER 2

### Literature Review

This chapter covers a literature review of five studies pertaining to study of National Waterways of India. After the study of reports it helps me to identifying the key areas of interventions for promoting waterways as a mode of regional transport connectivity. The major challenges which I found in Inland navigations are maintaining minimum depth for year round navigation, high sedimentation rate, competitions from other modes of transports, infrastructure challenges. The study also find that instead of promoting large- scale infrastructure developments for navigation in India, government has to critically analyze what are the immediate gains for the local communities so that they can also benefit and be part of the development paradigm. Boosting the unorganized sector by providing adequate policy support will foster local trade across smaller stretches within and between states as well as national borders would enhance the trade volume and contribute to the local economy.

#### **2.1 Shripad Dharmadhikari, Jinda Sandbhor (March 2017):**

Massive intervention are being proposed in Odisha in the Mahanadi and Brahmani basins and the delta though the expansion of the National Waterway 5 and the creation of the new National Waterway 64. These are likely to have severe impacts on the ecology, livelihoods and communities of this entire area, which is highly eco-sensitive at the same time which provides livelihoods to lakhs of people. The EIA processes do not inspire much confidence and it is not clear if the economic benefits will outweigh the many costs. We would suggest that this unilateral push to go ahead with the waterways must be put on hold. A full and comprehensive exercise of assessing the desirability of the waterways, along with their impacts must be carried out with the full involvement of the people and civil society before taking a final decision on the water

#### **2.2 In JV with IRG Systems South Asia Pvt. Ltd. Abnaki Infrastructure Applications & Integrated Development Pvt. Ltd. (May 2016):**

Jal Marg Vikas” is beneficial for the economic development of country by increasing the freight transportation and is beneficial for environment by shifting freight load from road/railway to

waterways and cutting down carbon emission. However, project development will have many impacts on social and environmental parameters. Mitigation measures and management plans are prepared in line with impacts anticipated. If the proposed mitigation measures are taken and environment management plan is implemented, anticipated negative impacts of project can be reduced and benefits can be further enhanced. The project will overall bring development in the area. IWAI should develop all facilities for handling emergencies as part of emergency response plan. IWAI shall develop Indian Waterways Operations Responsible Carrier Programme on the line of American Waterways Operators Responsible Carrier Programme for accident and pollution free waterways operations.

### **2.3. Working Group Report on Shipping & IWT:**

In report there is no major policy related or resource related constraint that come in the way of the banking system or insurance company for providing assistance to viable projects in the shipping sector. Indian shipping sector should look competitive vis-vis the international shipping companies operating out of other countries. It is necessary that there is a fiscal regime conducive for encouraging and attracting investment in the sector. Shipping sector is global by nature. It is observed that even though 100% FDI has been allowed in the shipping sector there is not much of FDI flow in the sector. In case, the fiscal regime is improved it is likely to have a positive impact on the FDI flow as well as on the lenders to lend money to the shipping sector.

### **2.4. Business Line (May 2016):**

In the report two issues found: **first**, the rights of States and local communities over water resources and **second**, the ecological consequences of movement of heavy vessels in particular. The impact of dredging and barrages on river flows (Farakka being an example) and direction, aquatic life and the livelihoods of citizens dependent on the river is an important aspect. A Standing Committee report has pointed to the need to regenerate rainfed rivers and take into account the rights of States with respect to irrigation and provision of drinking water. It rightly suggests a regulator with both Central and State government representatives to address a gamut of concerns.

## **2.5. IRG Systems South Asia Pvt. Ltd. & Abnaki Infrastructure Applications & Integrated Development Pvt Ltd (May 2016):**

Jal Marg Vikas Project involves navigation capacity augmentation of the NW-1 so as to ensure the navigation through IWT mode throughout the year in entire NW-1. NW-1 is natural waterway, extends from Haldia (Sagar) to Allahabad and spans 1620 km crossing the states of Bihar, Jharkhand, Uttar Pradesh & West Bengal. Project area includes entire reach NW-1 (Haldia to Allahabad) including the areas proposed for development of project related facilities & infrastructure, i.e. terminal sites, lock site, Ro-Ro jetty sites and sites for other planned development. NW-1 stretch traverses through various major cities and towns which are well connected by roads and railways. existing cargo movement across the stretch of NW-1 through road & rail is 121426130 tonnes. Forecasted cargo studies are carried out by the survey consultant and cargo generation potential across NW-1 (Haldia to Varanasi) by year 2045 is expected to be 4,80,11,367 tonnes.

## CHAPTER 3

### Overview of National Waterways of India

#### 3.1 National Waterways 1

Ganga-Bhagirathi-Hooghly stream framework from Allahabad to Haldia was proclaimed as National Waterway 1 (Allahabad-Haldia stretch of the Ganga Bhagirathi-Hooghly waterway) Act 1982 (49 of 1982). This national conduit is the longest inland conduit in India. It begins from Haldia port on waterway Hoogly and running along the stream Ganga closes at Allahabad city. This conduit goes through the conditions of West Bengal, Jharkhand, Bihar and Uttar Pradesh.. It ended up employable from 27th Oct 1986 after the development of the IWAI. The conduit stretches out from Haldia to Allahabad for a separation of 1620 km.

##### 3.1.1 Project Description

The all out assessed cost of the venture is ₹5,369.18 crore, which will be similarly shared between the Government of India and the World Bank. Proposed Project-Jal Marg Vikas goes for development of route in whole stretch of 1620 km. of NW-1 (Haldia to Allahabad) . NW-1 is the Ganga - Bhagirathi - Hooghly waterway framework. NW-1 is being nourished by different tributaries at various areas. Significant tributaries of waterway Ganga in NW-1 between Haldia to Allahabad are Tons, Gomti, Ghagra, Son, Gandak, Punpun and Kosi. This undertaking crosses through 4 States name Uttar Pradesh, Bihar, Jharkhand, and West Bengal. The accompanying mediations have been proposed and arranged under the Jal Marg Vikas Project.

- Maintenance dredging to provide the required LAD in this waterway channel and also for various proposed terminal facilities.
- Improved Navigation Infrastructure & Navigation Aids.
- Construction of 5 Ro-Ro crossings & ferry passenger jetties. Locations of these jetties are yet to be identified.
- Construction of 6 terminals: Site identification and planning for 3 terminals sites at Sahibganj, Varanasi and Haldia is accomplished. Besides 2 more potential sites for development of terminals are also identified at Ghazipur and Kalughatand 1 site, i.e. at

Kalyani in Tribeni is under consideration.

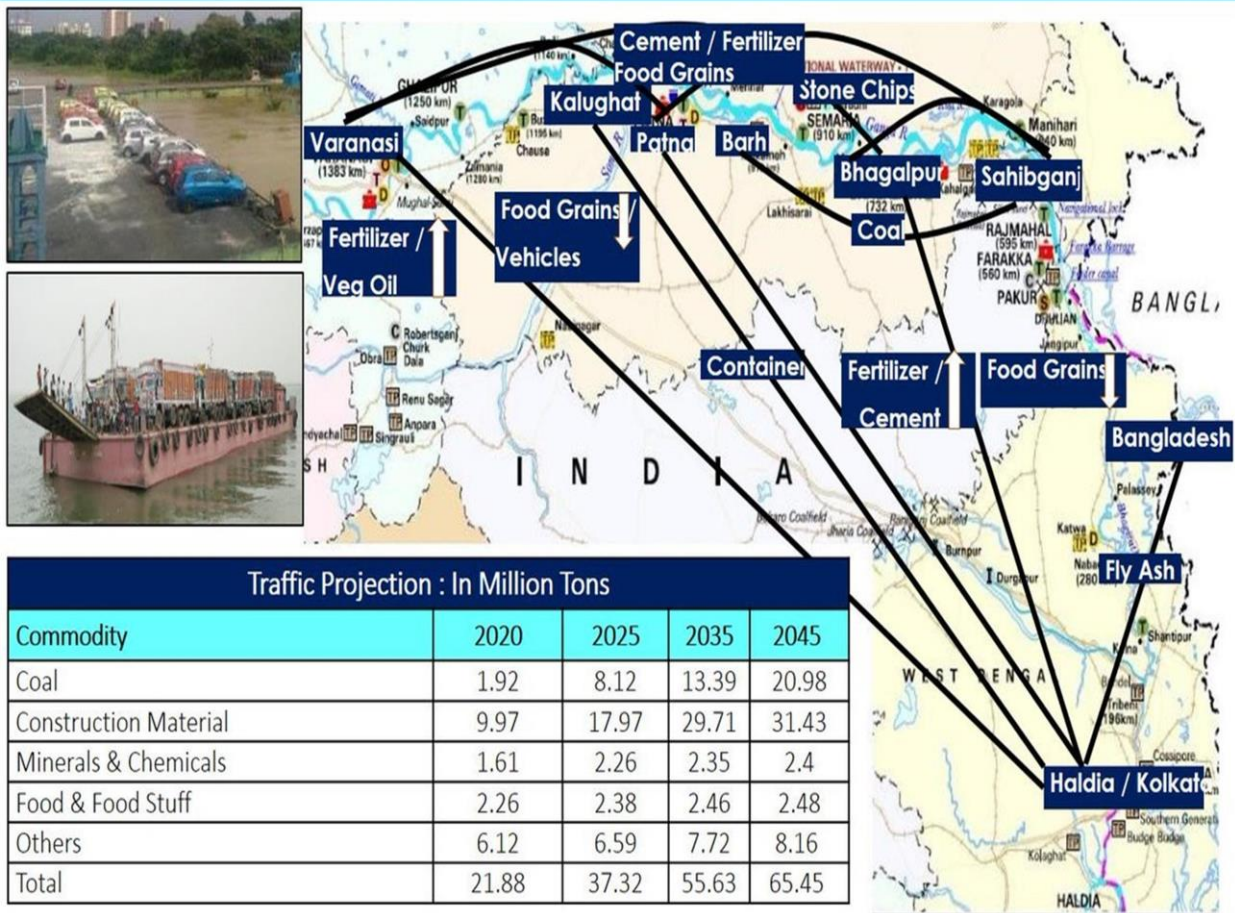
- Construction of one new navigation lock at Farakka, West Bengal.
- Provision for tow barges, inland vessels, survey vessels including rescue boats and survey equipment. Development of low draught vessel.
- Development of navigation aids along NW-1 for facilitation of day & night time navigation.
- Development of efficient River Information System with all hardware & software.
- Provision for bank protection / slope protection and river training works for critical locations.



**Fig. 3.1 Map of National Waterways 1(Source: IWAI)**

The project also envisages the creation and improvement of integration opportunities with other surface transport modes such as roads and railways, so as to improve the overall efficiency of the logistics chain by linking the waterways through various well equipped terminals and jetties.

# Enhanced cargo transportation



**Fig. 3.2 Cargo Transportation from National Waterways 1(Source: RITES)**

Cargo proposed to be transported in NW-1 includes cement, fly ash, iron ore, iron ore fines, coal, steel shed, tyres, iron fines, iron ingots, Galvanized steel plain sheets, stone chips, furnace oil, high Speed diesel (HSD), lube oil, boulders, pulses, aluminum block, sand, chips, ship blocks, food grains, manganese ore, petroleum products, coke, cooking coal, rock phosphate, timber, peas, slag oil, and non-cooking coal. As per the survey traffic, current traffic transported via rail & road between Haldia & Varanasi is 121426130 tonne. Traffic projection studies are carried out and as per the study, projected traffic for year 2045 is 4,80,11,367 tonne. Under NW-1, 6 nos. of terminals are proposed out of which planning for 3 terminals is completed.

### 3.1.2 Fairway Development

A fairway with focused insight and width has been created/kept up on NW-1 with the end goal of smooth and safe route. This was accomplished by attempted River Conservancy estimates like

bandalling, digging and so forth in Tribeni-Chunar (1226 Km) stretch of NW-1. The stretch between Haldia (Sagar)–Tribeni (196 km) is tidal and the Least Available Depth (LAD) of more than 3.0 m is kept up normally. IWAI was not undertaking any River Conservancy works past Chunar to Allahabad stretch with the exception of day channel stamping as the dredgers claimed by IWAI being utilized in lower stretches of NW-1 because of more traffic request. In spite of the fact that, the day navigational guide being given in whole stretch of NW-1 from Haldia (Sagar) to Allahabad (1620 km).

Amid 2017-18, Bandalling works of 3,900 m in Tribeni-Rajmahal (399 km) extend and 18,300 m in Rajmahal-Chunar (827 km) extend were executed for creating and keeping up the route channel (fairway), other than some channel adjustment. Further, 1.46 lakh m<sup>3</sup> digging in Tribeni–Rajmahal and 7.24 lakh m<sup>3</sup> digging in Rajmahal-Varanasi/Chunar stretches were completed by conveying IWAI's dredgers. Some appealing photos of the bandalling and digging works and so forth can be viewed as under. The detail of Least Available Depth (LAD), which was maintained for various stretches of NW-1 during 2017-18 is given below:

Haldia – Farakka stretch	560 km	2.5 m to 3.0 m
Farakka – Barh stretch	400 km	2.0 m to 2.5 m
Barh – Ghazipur stretch	290 km	1.5 m to 2.0 m
Ghazipur - Chunar/Allahabad	370 km	1.2 m to 1.5 m

**Table 3.1 NW-1 Length & Draft (Source: IWAI)**

### 3.1.3 Cargo Movements

The transportation of Coal for NTPC Power Plant is being embraced since November 2013 from sand heads (Bay of Bengal) to Farakka through National Waterway–1. Amid FY 2017-18 about 1.60 lakh huge amounts of imported Coal (up-to July, 2017) has been transported effectively by M/s Jindal ITF Ltd. utilizing the freight ships of 1500 – 2000 tons limit.

In addition, around 30 lakh tons payload including fly cinder, nourishment grains and general freight moved among India and Bangladesh through National Waterway - 1 and Indo-Bangladesh Protocol Route under Inland Water Transit and Trade. Furthermore, the preliminary development of 240 tons of stowed bond from Kolaghat situated on stream Rupnarayan (NW-87) to Bhagalpur

on stream Ganga (NW-1) and 300 tons of sacked fly fiery debris from Kahalgaon (NW-1) to Kolaghat of M/s Dalmia Bharat Cements has been finished by IWAI's shallow draft load vessel MV VV Giri under consultancy administrations for plan and execution support for commercialization of National conduits 1.

As of late, without precedent for India's history, a compartment vessel was utilized for coordination's transportation on the National Waterways-1 along the River Ganga. A compartment freight having a place with PepsiCo (India) transported 16 holders of sustenance and drinks from Kolkata to Varanasi. The IWAI vessel, MV Rabindranath Tagore, transported 16 holders comparable to 16 truckloads of sustenance and snacks and came to Varanasi on November-12-2018. It made its arrival venture with manures from IFFCO.

### **3.1.4 Development of Tourism**

Inland traveler vessels – RV Bengal Ganga, Ganga Voyager-I and Ganga Voyager-II of M/s Heritage River Cruise Pvt. Ltd., ABN Rajmahal and ABN Sukapha of M/s Assam Bengal Navigation Co. Pvt. Ltd. are employing on NW-1 in the State of West Bengal, Jharkhand, Bihar and Uttar Pradesh since numerous years on an expanding pattern. The developments of these traveler vessels with outside visitors were kept amid 2017-18 and finished their business trips effectively according to plan. One hundred seven (107) no. to and fro voyages between Kolkata to Hazardwari/Farakka and six (06) no. to and fro voyages between Kolkata to Bateswarsthan/Munger/Patna has been performed by these vacationer vessels. UP Chief Minister Yogi Adityanath has introduced a five-star extravagance voyage dispatch on Ganga. Being worked by Nordic Cruise line, the twofold decker 2,000 sq. feet extravagance vessel has a seating limit of 125 visitors. The name of the voyage vessel is Alaknanda kasha.

### **3.1.5 Infrastructure, Service and Facilities**

Planned/Proposed Infrastructure on NW-1 Jal Marg Vikas project involves development of various components for capacity augmentation of NW-1. Some of these components are already planned and being implemented, some are at initial stage of planning and some are yet to be planned. Details of all such components is given below

#### **Planned Infrastructure**

- Multi Modal Terminal sites at Haldia, Sahibganj & Varanasi.

- New Lock at Farakka.
- Bank Protection and River Training Works at existing and planned civil interventions.
- Maintenance dredging for maintenance of waterways and proposed civil interventions/navigational infrastructure.

## **Description of Planned Infrastructure**

### **Brief on Haldia Terminal**

Undertaking includes improvement of an inland water terminal at River Hooghly (NW-1) proposed to be situated at Haldia mechanical zone, close Durgachawk, Haldia, District Purbi tviedinipur, West Bengal. Land directions of the focal point of site are 22°03'38.34"N and 88°08'29.49"E. Waterway Hooghly streams South way of the terminal site. Terminal site is very much associated by the streets. Site is associated with NH-41 through 7 m cleared street North way. Durgachak Railway Station is around 06 km far from the site towards North heading and Haldia railroad station is around 12 km away towards west bearing. Closest Airport is at Kolkata which is around 135 km far from the site north way. Stream Hooghly in this stretch is safe and neighborhood ships are as of now working in the waterway for transportation of men and material. Interior streets of width 17 m and 10 m will be created at undertaking site. All out region of terminal site is 61.0 sections of land. The distinguished land has a place with Haldia Dock Complex. Site is low lying territory with rise going from 4-9 m. It is required to fill the site to accomplish completed dimension of 7 m, for example 2.54 m above HFL. Soil required for filling is 3.3 lakh cum. Terminal office is intended to deal with 3.18 MTPA of freight. Payload involves fly fiery remains, compost, stone total, coal, eatable oil and POL. These materials will be put away, stacked, emptied and transported from the terminal site.

Offices to be created at terminal site incorporate both inland and seaward offices. Inland offices incorporate 16 nos. of storehouses for fly slag stockpiling, stockyards for stone totals, manures and palatable oil/POL, inner streets, organization building, laborers pleasantry building, lighting tower, control supply framework, putting out fires framework, sewerage framework, storm water the executives framework, squander the executives framework and green belt (3 sections of land). Seaward offices incorporate 4 nos. of compartments and approach trestles and water approach channel. The proposed terminal task will be created in stages, for example stage 1A and 1 B. Stage 1 A will contain all the proposed improvements aside from 8 nos. of fly slag

stockpiling storehouses and its transports out of proposed 16 nos. of storehouses, stockyard improvement territory (future stockpiling) and railroad siding.



**Fig 3.3 Location map – Haldia terminal (Source: IWAI)**

### **Facilities Proposed**

- I. Storage sheds (future storage area will be developed in phase 1B).
- II. 8 Nos. of Silos in phase 1A & 8 nos. of silos in phase 1B for flyash storage and pipeline conveyor system.
- III. Unloading & Loading Areas
- IV. Internal Roads
- V. Berths (4 Nos.)
- VI. Water area & approach channel
- VII. Administration Building
- VIII. Workers Amenity Building
- IX. Fuel bunker
- X. Security office
- XI. Weigh bridge building

- XII. Lighting Towers
- XIII. Railway siding (future development)
- XIV. Other associated facilities like sewerage system, STP (Sewage Treatment Plant), dump pond, drainage system, RWH (Rain Water Harvesting) pond, fire-fighting facilities, communication system, water supply, ESS (Electrical Sub stations) & power supply.

### **Brief on Varanasi (Ramnagar) Multimodal Terminal**

A multimodal terminal is being developed at Ramnagar, on river Ganga in Varanasi district in Uttar Pradesh. Area of 5.586 ha has been acquired for development of the terminal by IWAI and is in possession of IWAI. Identified site is open agricultural land. However, no agriculture activity is being carried out at site at present. The proposed terminal project site falls in Ramnagar Municipal Board of Varanasi district. Photographs of the Varanasi terminal site are given in figure.



**Fig. 3.4 Varanasi Multimodal Terminal (Source: IWAI)**

In addition to this land, area of 1.415 is to be acquired for construction of access road to connect terminal with NH-7. Total land requirement will be thus 7.001 hectare. The Varanasi terminal is

proposed to be developed as a multimodal terminal facility. The terminal site is agricultural land at present with land cover comprising of crops, mango orchards and few settlements. Site is flat land with elevation variation from RL +74-77m. Finished level of site achieved after cut & fill will be RL +75 which is more than the highest flood level, i.e. RL +74.

As per planning this terminal will be connected to rest of the city via roads and railways both. At present site is connected by a village road. Approach road of 1 km length will be constructed to connect terminal site to NH-7 and NH-2. Railway siding will be constructed to provide connectivity to terminal site with the EDFC. Internal road of 12 m width will be developed within the terminal to facilitate smooth movement. In the phase 1 the terminal shall handle about 0.54 MTPA (million metric tons per annum) or 1636 TPD. Material to be handled will be coal, cement, stone chips, and fertilizer and food grains etc. Capacity will be enhanced to 1.22 MTPA by 2038. Onshore facilities for phase 1 include unloading/loading areas, internal roads, administration buildings, substation building, toilet block, fuel bunker, security office, weigh bridge building, lighting tower and other allied services sewerage management system, drainage system, fire-fighting facilities, communication system, water supply & power supply (ESS); Boundary wall, Green belt and Approach Road (1 km connecting to NH-7).

Off-shore facilities for phase 1 include construction of berth of 200m length & 35 m width, Water area & approach channel and Shore protection (117 m upstream of terminal and 35 m downstream of terminal).



**Fig 3.5 Location map – Varanasi terminal (Source: IWAI)**

## **Facilities Proposed**

- I. 2 Nos. berths (100 m length & 36 m width each) so as 2 vessels of 80 m each can be berthed at one time.
- II. 2 mobile cranes for loading & unloading.
- III. Open area at site for storage of transportation material (Edible oil tank storage area).
- IV. Passenger jetty (floating pontoons-20 m X 10 m) & gangway (1.2 m wide).
- V. Stone pitching upstream & downstream river bank (35 m length downstream & 117 m length upstream).
- VI. Area for DGPS
- VII. 12 m wide internal roads-365 m & 22 m wide internal road-650 m.
- VIII. Approach road to NH-7 ESS (400 sq m) building & power back-up.
- IX. Soak pit & septic tanks-wastewater management system.
- X. Workers amenity building (30 sq. m.)
- XI. Water supply system
- XII. Storm water drainage system
- XIII. Earthing & lighting protection system for all conducting materials
- XIV. Lighting system
- XV. Green area

## **Brief on Sahibganj Terminal**

The Sahibganj terminal is proposed to be developed as a multimodal terminal facility. The terminal site is agricultural land at present with land cover comprising of crops, mango orchards and few

settlements. Site is highly undulating with ground level difference ranging from 30-56 m. large quantity of cut & fill is required to achieve flat surface. App. 14.25 lakh CUM of soil will be excavated, out of which 2.1 lakh CUM will be re-used for filling. 12.1 lakh CUM of remaining earth will be re-used for road and railway construction. Finished level of site achieved after cut & fill will be 37.0 m AMSL (above Wan Sea Level) which is more than the highest flood level, i.e. 30.91 m AMSL

As per planning this terminal will be connected to rest of the city vide roads and railways both. At present site is not connected to any public road. An access road of 1 km will be developed by PWD to connect the terminal with national highway 80. Railway connectivity will be developed by railways to connect the terminal site to Sakrigali railway station (Eastern railway corridor). Internal road of 12 m width and total length 3.6 km will be developed within the terminal to facilitate smooth movement.

In the phase 1 the terminal shall handle about 2.24 Million Metric Tons per annum or 6788 Tons per day. Material to be handled will be coal, stone chips, food grains, cement, fertilizers and sugar.

Facilities to be developed at terminal site include both onshore and off-shore facilities. Onshore facilities for phase 1 include stockyards for coal (6 stock piles), stone chips (8 stock piles) & 1 covered shed; Unloading & Loading Areas; Internal Roads (12 m wide & 3.6 km length); Administration Building; Workers Amenity Building; Lighting Towers; Other associated facilities. like sewerage system( Sewerage Treatment Plant), drainage system, fire-fighting facilities, communication system, water supply & power supply (ESS); Boundary wall of 2.4 m, Green belt- 15-20 m (2.9 ha), Approach Road (1 km connecting to NH-80 crossing LC-54) and Railway Connectivity (through Sagrakali Railway Station) with provision of ROB over LC-54 for approach road to be developed.

Off-shore facilities for phase 1 includes Jetty (1 No.) & Berth (2 Nos.), Water area & approach channel, Turning Circle (2 Nos. at starting & end of channel) and Shore protection (1.5 km. along River Bank).

During phase 1, 2 nos. berths, one for coal and one for stone chips / other cargo, are proposed to be provided in a length of 270 m. Berths are connected to shoreline / bank line by approach trestle (jetty) of 50 m length at its berth ends. Berth extends to another 25 m beyond the jetty into the river. After 50 m, available depth in the river for cargo varies from 7-11 m which is sufficient for cargo movement and will not require dredging. It is estimated app. 0.1 m CUM of maintenance dredging will be required annually during operation and maintenance stage of project.



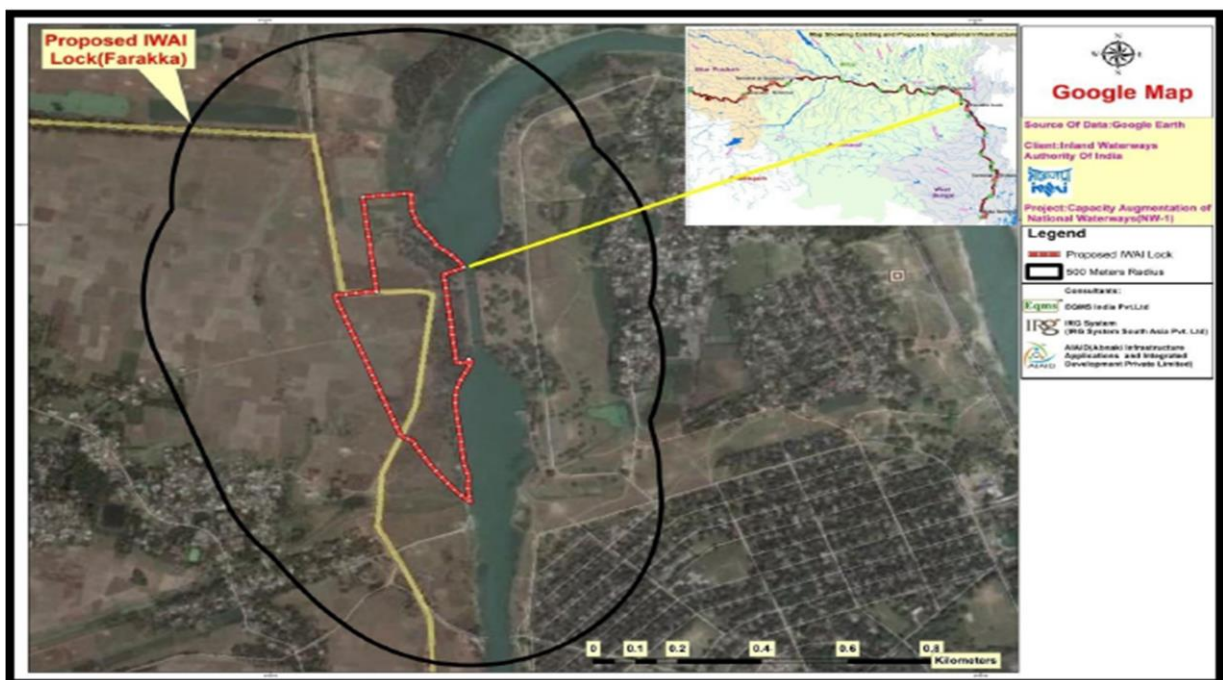
**Fig 3.6 Location map – Sahibganj terminal (Source: IWAI)**

### **Lock at Farakka**

A navigational lock is a device used for raising and lowering ships/vessels between stretches of water of different levels on river and canal waterways. The existing lock gate at Farakka which has been operational since 1978, is old and inefficient. Since the modernization of the existing lock will entail closing down the lock gate for to 8-10 months, a new lock is proposed to be developed in Farakka on the Feeder Canal of Farakka Barrage adjacent to the existing lock at Farakka in Murshidabad district of West Bengal. New lock will be further West to the existing lock and will share its right bank with the left bank of the existing lock. Site is located in village Goraipada, Grampanchayat Bewa, Farakka in Murshidabad district of West Bengal. The Ganga River is flowing about 1.2 km east of the proposed lock gate site. With the existing lock it takes about 2 hours or more for a vessel to pass upstream or downstream of Farakka. With the new lock it will take only 38 minutes for a vessel to pass through. If movement of a vessel is followed by movement of another vessel in the reverse direction, the operating time will be 23 minutes only.

The proposed project would be set up in the 14.86 ha transferred land of Farakka Barrage Project (FBP) and the land revenue area demarked by Beoa Mouza`s, JL No. 31, Sheet No.3. As per the topographic survey carried out at site by IWAI, ground levels vary from RL+13 to RL+29 m which indicate the site is almost flat with gentle slope. The lock gate site is well connected with road & rail. This road at presently passes through the site and thus will be realigned to Western boundary of the proposed lock gate site. This road connects the NH-80 is located about 1.6 km West of the proposed Lock gate site and is connected.

The new lock like the existing lock will facilitate the movement of vessels/barges from main River Ganga upstream to River Bhagirathi-Hooghly downstream through feeder canal negotiating the significant difference in water level existing in main River Ganga and feeder canal. Water level in the River Ganga and feeder canal varies according to the flow in River



**Fig 3.7 Location map – Farakka Lock (Source: IWAI)**

Ganga & the feeder canal. New lock is required as the existing lock is not functioning adequately and obstructs the movement of the vessels. The length and width (size) of the proposed lock is similar to the existing lock. Length & width of new lock will be 179.0 m & 25.148 m respectively. Lock is designed to handle four vessels of size 85 m (length) X 12 m, (width) so as two vessels are moored lengthwise and two sidewise like existing lock.

## Bank Protection and River Training Works

Erosion of banks is natural phenomenon in the alluvial rivers. However, erosion is aggravated due to construction of any structure like bridge, terminal and jetty on the river. Thus, river training works includes the engineering works carried out in river to prevent the erosion of the banks, control and guide the river. It is proposed to carry out bank protection works of total 48.168 km. in the areas where erosion is observed and where civil interventions are planned to be carried out and details of the same are given at

**Table 3.2 Bank Protection Works as per Current Planning (Source: World Bank)**

<b>Sr. No.</b>	<b>Location</b>	<b>Approx. length(km)</b>
1	Varanasi	0.35
2	Sahibganj	1
3	Farakka Navigational Lock	0.75
4	Three new terminals	2.5
5	Farakka Feeder Canal	9.438
6	Farakka to Tribeni	27.43
7	Barge Repair and maintenance facility	2
8	Existing Terminals & Jetties	4.6

### Facilities yet to be planned

- One similar terminal site (Kalyani at Tribeni)
- 5 Nos. Ro-Ro Crossings and Passenger Ferry Jetties
- Development of low draught vessel
- River Training Works at Critical Locations like bends and civil interventions under planning Bank/slope & scour protection works
- Equipment of tow barges, inland vessels, survey vessels including rescue boats and survey equipment
- Barge maintenance and repair facility.

## Description of Upcoming Project:

It is planned to develop terminal at Tribeni. Planning is at initial stage and site selection & finalization is undergoing at present. Two locations are considered for development of terminal. First site is located on left bank of River Hooghly upstream of Road Bridge on SH-6 at Tribeni, west Bengal. Site is well connected with road & railways. Kalyani Samanta is nearest railway station. App. 40 ha of agricultural land is identified for development of terminal at this site. Some brick kilns also exist at the site. One more site is considered for development of the terminal. Site is located on the right bank of the River downstream of the road bridge at SH-6. This site is located near the thickly populated area. Out of both the options alternative 1, i.e. site located upstream of SH-6 is considered for development of terminal.



**Fig 3.8 Location map- Tribeni Terminal (Source: World Bank)**

## Barge Maintenance & Repair Facility

Barge maintenance and repair facility is essential component of Jal Marg Vikas Project. At present no location has been finalized for the purpose but this development is under planning.

**Slipway:** It is a ramp, which helps in moving the barge/ship to and fro from water to land. Slipway will be provided in deeper water conditions so as design vessels can be taken in docking conditions.

**Winch House:** It should be provided in straight-line to main slipway. It is generally a single room like structure and should have adequate space for winch and electrical equipment

**Repair bay for large & small vessels:** Repair bay for vessels should be inclined so as the vessels can slide towards the river on its own after repair under control of winch.

**Transfer bays:** To transfer small vessels between slipway and repair bay

**Winches and trolleys:** Winches should be provided at winch house and at transfer bay. Trolleys should be provided to receive the vessels on main slipway.

**Workshops and buildings** with all basic utilities like water, electricity, storm water management system and waste management system.



**Fig: 3.9 Haldia to Sahibganj (Source)**

In the figure 3.12 from Haldia to Sahibganj there is a regular cargo movement of dry bulk cargo (coal, fertilizers, & silica), monthly two vessel operates between these routes.

## 3.2 National Waterways II

The river Brahmaputra having a length of 891 Km between Bangladesh Border and Sadiya was declared as National Waterway no. 2 (NW-2) on 1st September, 1988. IWAI is carrying out various developmental works on the waterway for improving its navigability as laid down in the IWAI act, 1985 (82 of 1985).

As per IWAI, Act 1985, IWAI is responsible to develop the waterway for navigation. IWAI is maintaining a navigable depth of 2.5m in B'Border- Neamati (629 Km), 2.0 m in Neamati – Dibrugarh (139 Km) and 1.5m in Dibrugarh – Sadiya (Oriumghat) stretch. At present the waterway is being used by vessels of Govt. of Assam, CIWTC, Border Security Forces, Tourism organization and other private operators. Long cruise tourist vessels are making voyages between Sivsagar near Dibrugarh and Manas wild life sanctuary near Jogighopa regularly. Over dimensional cargo (ODC) is also transported through the waterway from time to time. Transportation of POL (petroleum, oil and lubricants) was also experienced through this waterway from Silghat to Budg-Budg (West Bengal) and Baghmari (Bangladesh).



Fig. 3.10 Map of National Waterways II(Source: RITES)

### 3.2.1 Navigation Facilities

In order to provide the safe navigation for various cargo vessels, tourist vessels with foreign tourists, local regular service by private operators and mechanized country boats, day navigation marks with bamboos and navigational lights fixed on country boats / beacons have been provided from B'Border to Dibrugarh as detailed below:

S No.	Stretch & Distance in Km	Number of day marks		Solar operated Navigational lights fixed on country boats/ Beacons
		Lean Season	Flood Season	
1	Bangladesh Border - Pandu (255 km)	293	147	255
2	Pandu- Neamati (374 Km)	430	215	200(up to Silghat)
3	Neamati-Dibrugarh (139 km)	139	135	
4	Dibrugarh- Sadiya (123 Km)	140	105	

**Table 3.3 NW-2 Length for river connected with states (Source: RITES)**

### Terminals

Terminals at 11 locations are being maintained on NW-2 for handling cargo vessels and passenger ferries as per the details given below

**Table 3.4 Terminals of NW-2 (Source: World Bank)**

S. No	Location	Type of terminal (Fixed/Floating)	Purpose	Status
1	Dhubri	Floating terminal with a steel pontoon is provided	For completion of customs and immigration both for incoming and outgoing	(i) Land acquisition for construction of terminal has been completed. (ii) A DPR has been prepared through M/s L&T Ltd. for construction of a Ro-Ro

			vessels on Protocol route in addition to handling of cargo vessels and passenger ferries.	terminal (iii) Based on DPR project has been prepared and sanctioned by IWAI Board. (iv) Work entrusted to CPWD in Jan'13. They finalized executing agency and preliminary work started. (v) A DGPS station is also established at this location
2	Jogighopa	Floating terminal with a steel crane pontoon.	For transportation of Meghalaya coal/import of coal for NTPC power plant at Bongaigaon.	The terminal is proposed to be developed as permanent terminal with mechanical handling facilities. Sufficient land is already available with IWAI at Jogighopa Terminal which is enclosed with boundary wall. A DGPS station has been established at this terminal.
3	Pandu	Fixed/permanent terminal with two godowns and RCC jetties	Pandu is the major location on NW-2 as an entry point to NE States.	A low level jetty is operational for berthing of vessels. A high level jetty is also completed in March'14. 2 shore cranes of 20 ton capacity, one container crane of 75 ton capacity and ones floating crane are placed at terminal for handling of cargo. One B.G. siding is also constructed and notified for operation Sep'13.
4	Tejpur	Floating terminal with steel crane pontoon.	For handling of cargo vessels, local Ferry service. ODC cargo is also expected at	A crane pontoon is placed at this terminal.

			this terminal in view of upcoming hydro power projects	
5	Biswnath Ghat	Floating Terminal	Projected for handling of PDs cargo by FCI and ODC movement.	Land acquisition completed
6	Silghat	Floating terminal with a steel pontoon.	For movement of POL of Numaligarh Refinery.	(i) Land acquisition completed. (ii) Development activities are under progress. (iii) A DGPS station is also established at this location. (iv) It is a port of call in Indo-Bangladesh Protocol Route.
7	Neamati	Floating terminal with a crane pontoon	For handling of cargo vessels, local ferry service. ODC cargo is also expected at this terminal in view of upcoming hydro power project.	Land acquisition, shore development facilities are being developed.
8	Bogibil	Floating Terminal with steel pontoon.	For handling of FCI cargo.	Food grain has already been transported and experienced.
9	Dibrugarh	Floating terminal with a steel pontoon	For handling of cargo vessels, local ferry service.	(i) Land acquisition for terminal completed. (ii) A DGPS station is established .

			ODC cargo is also expected at this terminal in view of upcoming hydro power project.	
10	Sengajan/ Panbari	Floating terminal with a crane pontoon	Considered in view of regular movement of Indian army IWT fleet.	At this location floating terminal is being maintained in view of movement of Indian Army vessels between Arunachal and Assam.
11	Oriumghat	Floating steel pontoon	To facilitate passengers connected to Arunachal/ Assam, BSF / Army and link to southern bank like Dibrugarh. ODC and project cargo.	(i) Land acquisition completed. (ii) Other developmental activities are planned.

### 3.3 National Waterways III

#### 3.3.1 Features

Date of declaration	February, 1993
<b>NW-3 consists of</b>	
<b>West coast canal (Kottapuram - Kollam)</b>	168 km
<b>Udyogmandal canal (Kochi Pathalam bridge)</b>	23 km
<b>Champakara canal (Kochi-Ambalamugal)</b>	14 km

<b>Total length</b>	205 km
<b>Sea opening- 4 nos</b>	Munambam, Kochi, Kayamkulam and Neendakara
<b>Tidal influence</b>	About 0.70 m to 1.00 m rise during high tide
<b>Obstacles</b>	Lock gates at Thanneermukkom, and Thrikunnapuzha
<b>Narrow portions</b>	Alappuzha Kollam stretch

**Table 3.5 Features of NW-2(Source: IWAI)**

### **3.3.2 Brief Description:**

There are mainly three requirements for successful navigation on Inland Waterways. These are

- i) navigable fairway for movement of inland vessels,
- ii) Aids to navigation for safe navigation and
- iii) Terminals for loading/ unloading of cargo at various locations along the waterway. The present of these facilities on NW-3 is as given below:

### **3.3.3 Navigable Fairway:**

A navigational channel of 38m width in wider reaches and 32m in narrow reaches with 2 m depth is to be developed for navigation in NW-3. To develop the navigation channel with above dimensions, 40 Lakh cum capital dredging was envisaged over a length of about 87 Km. As on July 2014, IWAI has carried out nearly 36 lakh cu. m dredging over 80 km shoal length. With this, though the targeted depth of two meters has been provided in the entire NW-3, but widening of the navigation channel to the required width of 32 meters is yet to be completed in a length of 2 km in Alapuzha (Karuvatta and Mullackal villages), 1.50 km in Kayamkulam Kayal, and 2.75 km near Chavara. The balance shoals of about 6 km are at Alappuzha/Kuttanad (2 km), Kayamkulam Kayal area (1.5km) in Alappuzha District and at Chavara (3.5km) in Kollam District, for which the work is in progress.

The developmental works of NW-3 is targeted to be completed by December, 2014 subject to co- operation of the local people and removal of remaining fishing nets from the navigation channel of NW-3.

### **3.3.4 Aids to navigation:**

The entire route length of NW-3 has been provided with aids to facilitate 24 hours navigation.

#### **Terminals:**

Out of total 11 locations envisaged for setting up of terminals, eight have already been constructed at Kottapuram, Aluva, Maradu (Kochi), Vaikom, Cherthala (Thanneermukkom), Thrikunnapuzha, Kayamkulam (Ayiram Thengu) and Kollam. Construction of one terminal at Alappuzha is in progress at a cost of Rs.9.04 crores and 88% works have been completed as on July 2014.

Terminals at remaining two locations namely Kakkanadu and Chavara are proposed to be constructed in the next phase after firming up the cargo availability. For effective utilization and to encourage private sector participation, operation and maintenance of IWT terminals at Aluva, and Vaikom have been outsourced to KSINC (A Govt. of Kerala Undertaking).

In addition, for decongesting the Kochi city by providing an alternate transport route for the Vallarpadam container terminal, IWAI has set up a pair of Ro-Ro terminals at Willingdon island and Bolghatty jointly with the Cochin Port Trust. The transportation of containers along this route is being carried out successfully since February 2011.

Important projects on NW-3:

(i) Container terminals with Roll on - Roll off facilities: Two IWT container terminals, one at Bolgatty and the other at Willingdon island with Ro-Ro facilities have been constructed by IWAI through Cochin Port Trust to provide connectivity with ICTT Vallarpadam due to which trucks/trailers bound for Vallarpadam need not pass through the congested roads of Kochi city. These terminals are in operation since February 2011.

(ii) Construction of terminal at Alappuzha: The project comprises of construction of RCC Jetty of size 30 m X 10m, Godown (400 sqm.) and office Building, approach road, hard standing area (4000 sq. m.) compound wall, bank protection and utilities. Construction of compound wall and sentry post is completed. Construction of office cum storage shed, bank protection and jetty is in

progress. for which the roof for administrative portion is completed. As on July 2014, over all physical progress of the terminal is 88%. Ro-Ro terminal at Bolgatty Alappuzha – construction in progress.

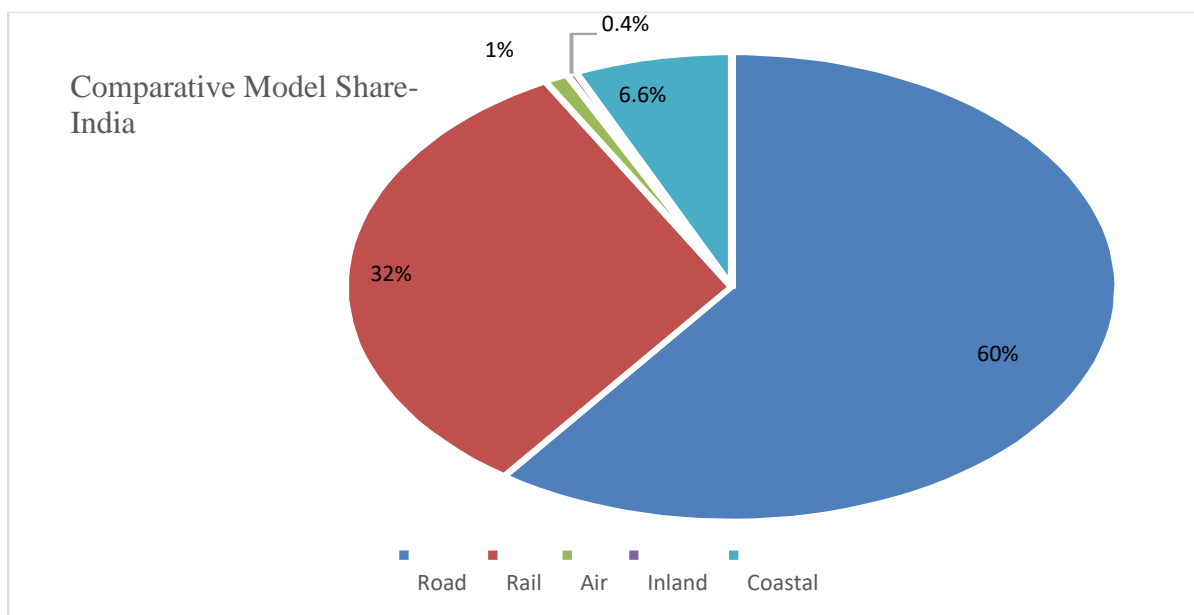
## CHAPTER 4

### Comparative Study of National Waterways

#### 4.1 Comparative Model Share

In the event that we characterized all the development of freight in India by various methods of transportation then we will locate that real segment of development of load is being finished by the street (60%) which comprise National interstates, State parkways, and so on., trailed by rail (32%) which is next most utilized mode after street, and pursued by Coastal (6.6%), at that point Air (1%) and last is Inland that is (0.4%). In the long run the thought process behind this "Jal Marg Vikas Project" is to build the offer of inland development of payload since this mode is relatively less expensive, more secure, ecological well disposed, and advantageous in contrast with different methods of transportation.

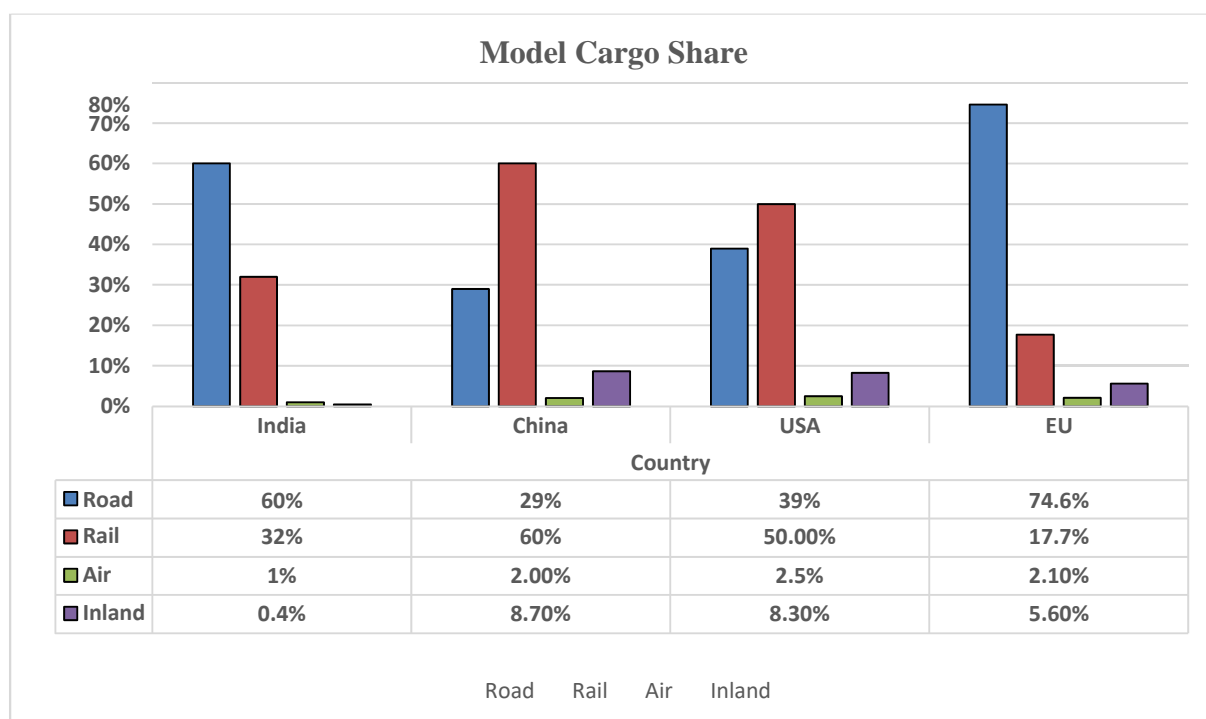
**Fig 4.1: Model Cargo Share of India (Source: iaspreparation.com)**



The above pie graph demonstrates the calculated situation of India, yet when contrasted with other huge nations like the United States, China, and the European Union, Freight transportation by conduits is exceptionally under-used in India. The complete payload moved (in ton-kilometers) by the inland conduit was less of the absolute inland traffic in India, contrasted with the 21% figure for the United States. Indian water transportation is getting huge consideration

as of late since coordination's cost in India is one of the most astounding among real nations – according to the reports it is 18% in India versus 8-10% in China and 10-12% in European Union. When we contrast the Indian situation and the other Developed Country then the outcome are very surprising, some nation underscored more on street transport, some are on Rail, and some are on Inland/Coastal. Here we are setting off to some similar investigation between India, China, United States of America, and furthermore we will talk about Inland Waterways Scenario in Thailand and Bangladesh. Structure this examination we will attempt to make sense of what are the things India ought to gain from other nation.

**Fig 4.2: Comparative study between India and Developed country (Source: Report, Sustainable Development of inland waterway transport in china)**



**North America:** In the United States with its water transport infrastructure over the Missouri-Mississippi and the inter-coastal traffic, together accounts for over 630 million tons of cargo per annum. Freight movements by IWT on the Great Lakes and the Mississippi continue to be important modes.

**Europe:** IWT is estimated to carry about 7% of freight traffic which in fact is in a growing stage in the European Union (EU) states. The Rhine and the Danube are major IWT Rivers in Europe.

A network of 30,000 km of waterways linking the North Sea to the Black Sea carried 425 million ton in the EU.

**Thailand:** IWT is estimated to transport about 20 million ton of cargo annually, representing 4.5% of total inland cargo volume better than rail, which has a share of only 1.9%, and well below road, which has a commanding share of 96.6%.

China: IWT accounts for almost 10% of the total freight tonnage carried in the country, and for that, two third is carried on the Yangtze River (including bulk cargo like coal, steel, cement, containers and LPG).

**Bangladesh:** Inland waterways are estimated to carry approximately 14% of the country's annual passenger's volume and about 35% of its annual freight volume.

#### 4.2 Cost comparison between different modes

As per the RITES Report on Integrated National Waterways Transportation Grid (INWTG) the Cost comparison between Inland Water Transport (IWT) mode and rail and road transport is given below.

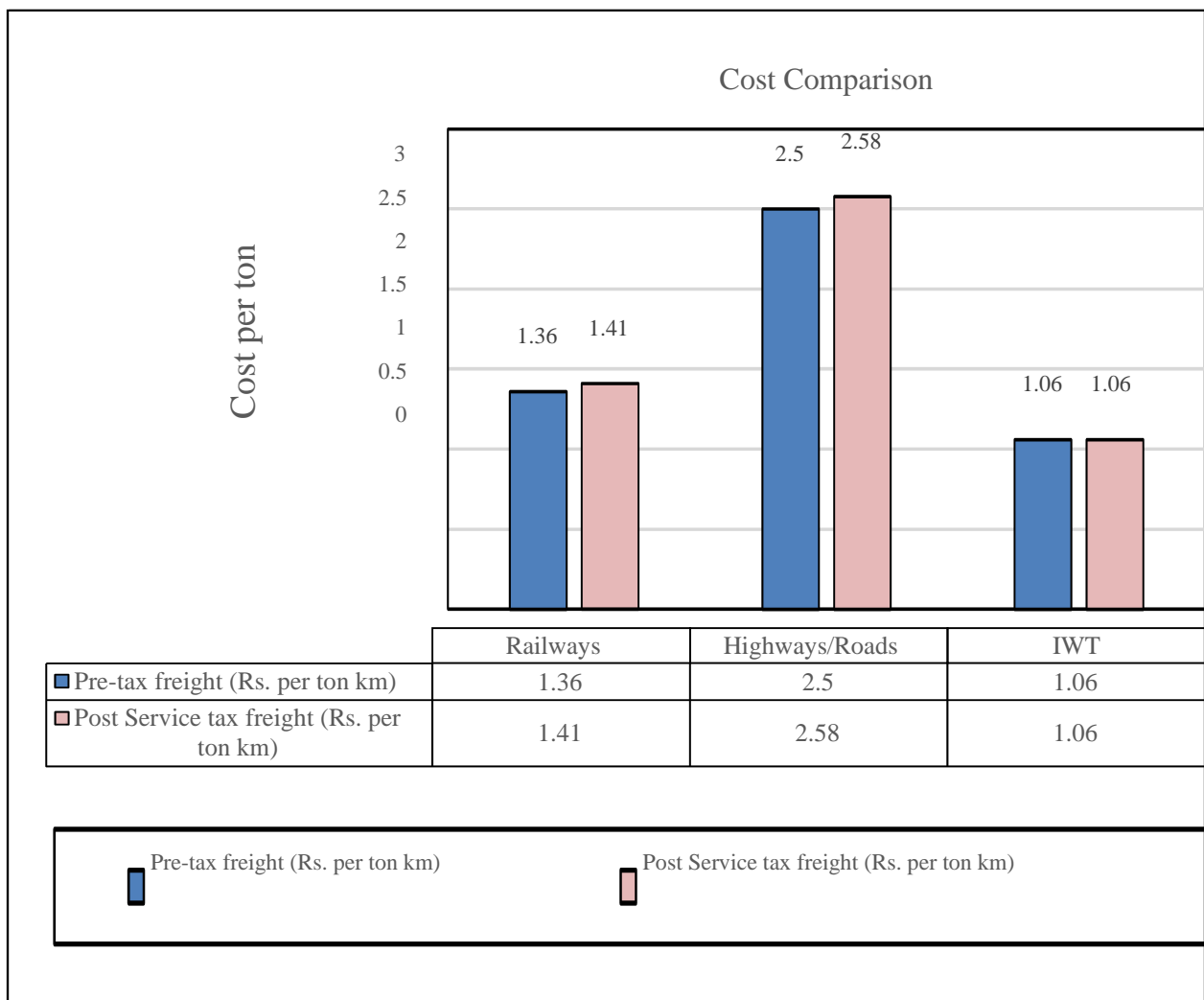
**Table 4.1: Cost comparison between IWT mode, rail and road transport (Source: RITES)**

Mode	Pre-tax freight (Rs. Per ton km)	Post Service tax freight (Rs. Per ton km)
Railways	1.36	1.41
Highways/Roads	2.50	2.58
IWT	1.06	1.06

Thus, in theory, every kilometer that a ton of cargo moves on water can save Rs. 1.52 as compared to the same cargo moved on road, and Rs. 0.35 if the same cargo was moving on rail. But cost of transport is only one aspect. There are several other aspects that constitute the Advantages (or disadvantages) of any mode of transport. On the one hand road is comparatively costlier mode of transport when vehicle operating costs alone are compared, but it has an edge over other modes i.e. rail and IWT, as road transport offers door to door services, reducing local

terminal costs. Similarly, rail has its own operational advantages of carrying bulk cargo on longer leads.

**Figure 4.3: Cost comparison between IWT mode, rail and road transport (Source: RITES)**



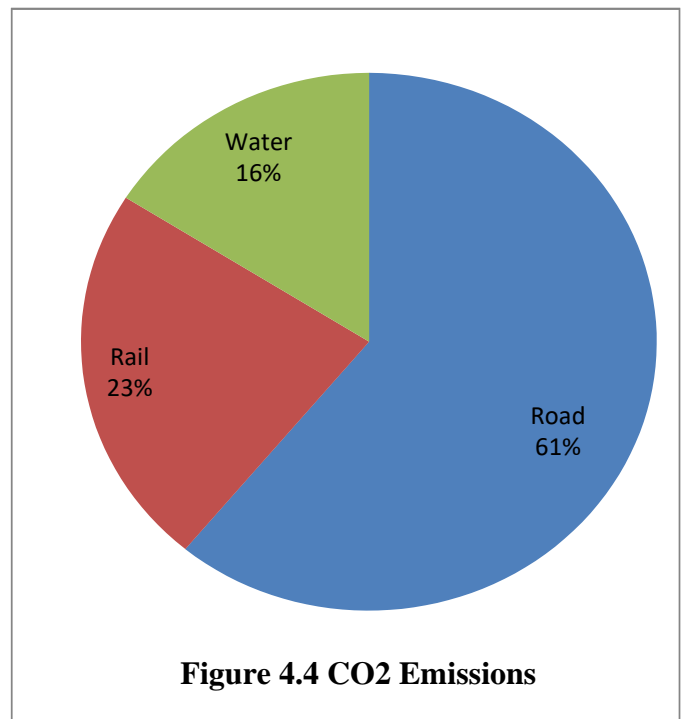
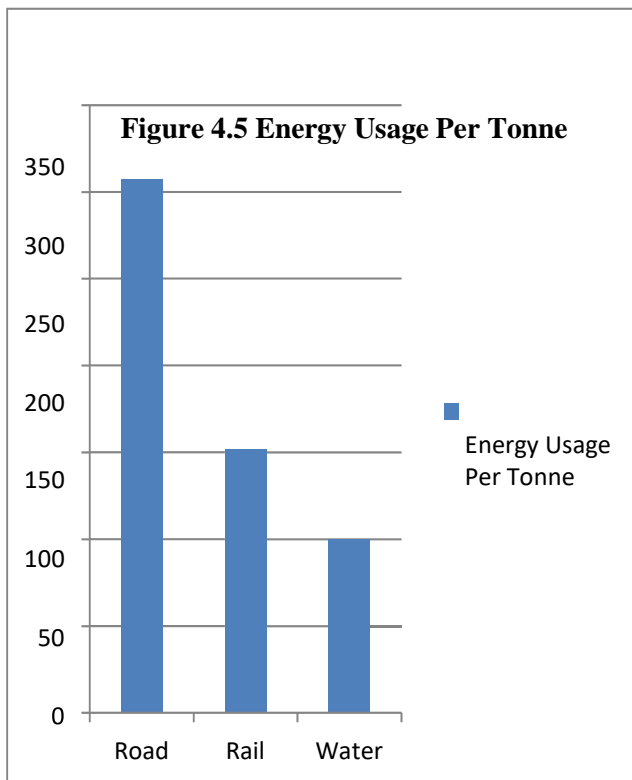
#### 4.2.1 Comparison with Rail & Road Transport

The cost figures given above indicate that the cost advantage of waterway transport is significantly low if compared to rail transport. This factor - whether it provides an alternative to road or rail – is important when assessing the viability of waterway transport. For example, the RITES report estimates how traffic would be diverted to various national waterways (NW 1 to 5, and what at that time was called NW 6, in Barak river) 47. **Table 5**, drawn from the report shows that close to 40% of the traffic that the waterways are expected to carry would be a shift from rail, where cost advantages (and fuel saving, environmental benefits) are not that high.

**Table 4.2: Divertible Traffic within National Waterways (Source: World Bank)**

Waterway	Estimated Divertible Traffic in million tons			% of WW Traffic Coming from Rail
	From Rail	From Road	Total	
NW 1	25.9	17.44	43.34	60%
NW 2	2.31	19.48	21.79	11%
NW 3	0.91	11.18	12.05	8%
NW 4	14.96	27.09	42.05	36%
NW 5	14.64	8.61	23.25	63%
NW 6	0.36	3.71	4.07	9%
Total	59.08	87.51	146.59	40%

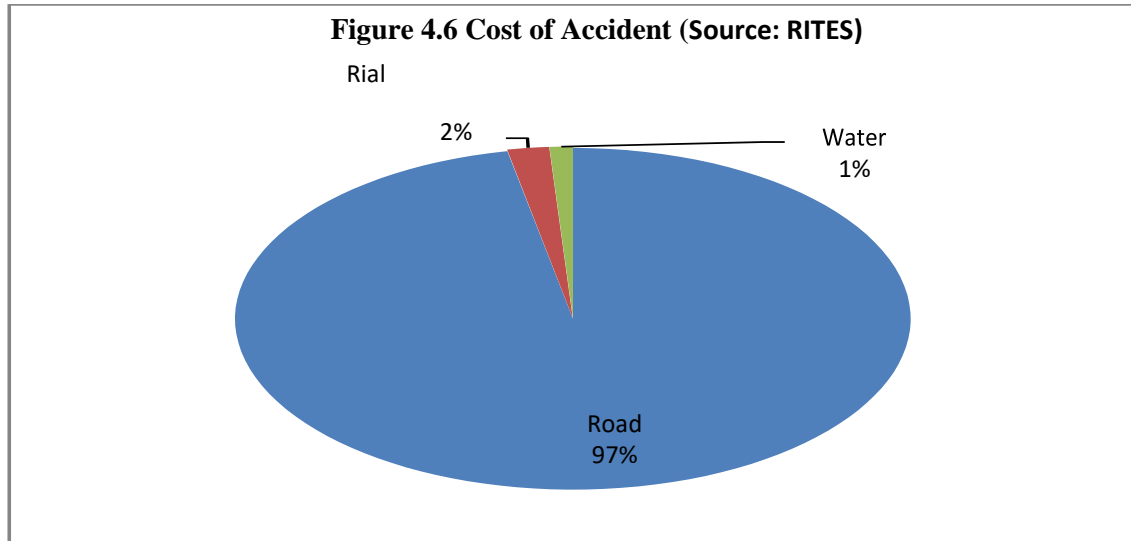
**4.3 Economic and Social Benefits of Water Transport:**



- For each tonne of goods carried, water transport produces just a quarter of the CO<sub>2</sub>

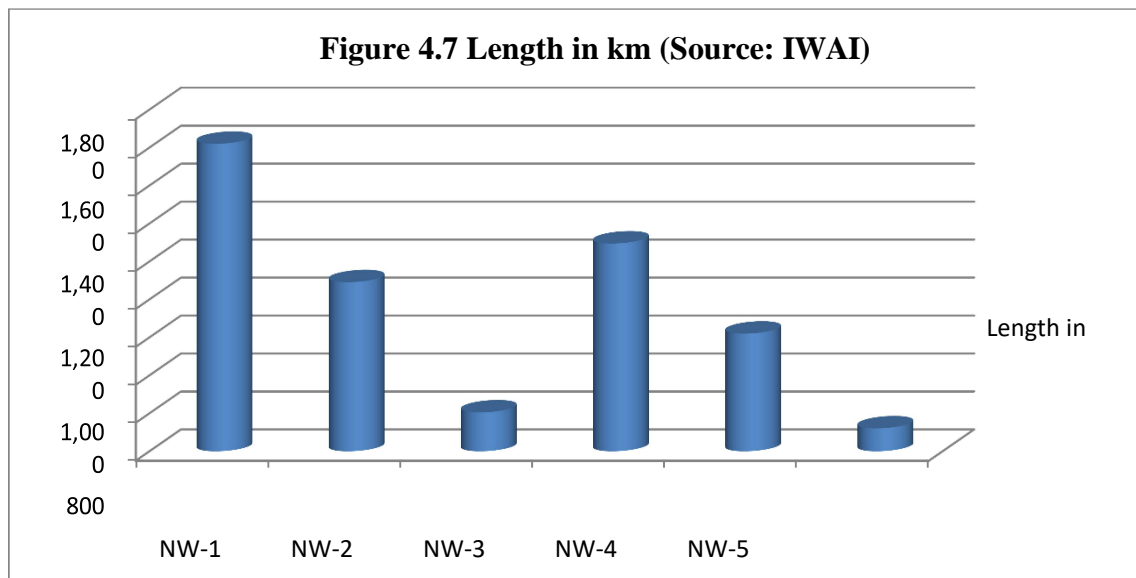
emissions created by road and a third less than rail transport.

- Per tonne, road transport uses three times more energy than water, with rail using 50% more.
- The cost of accidents and noise pollutions on waterways is negligible.

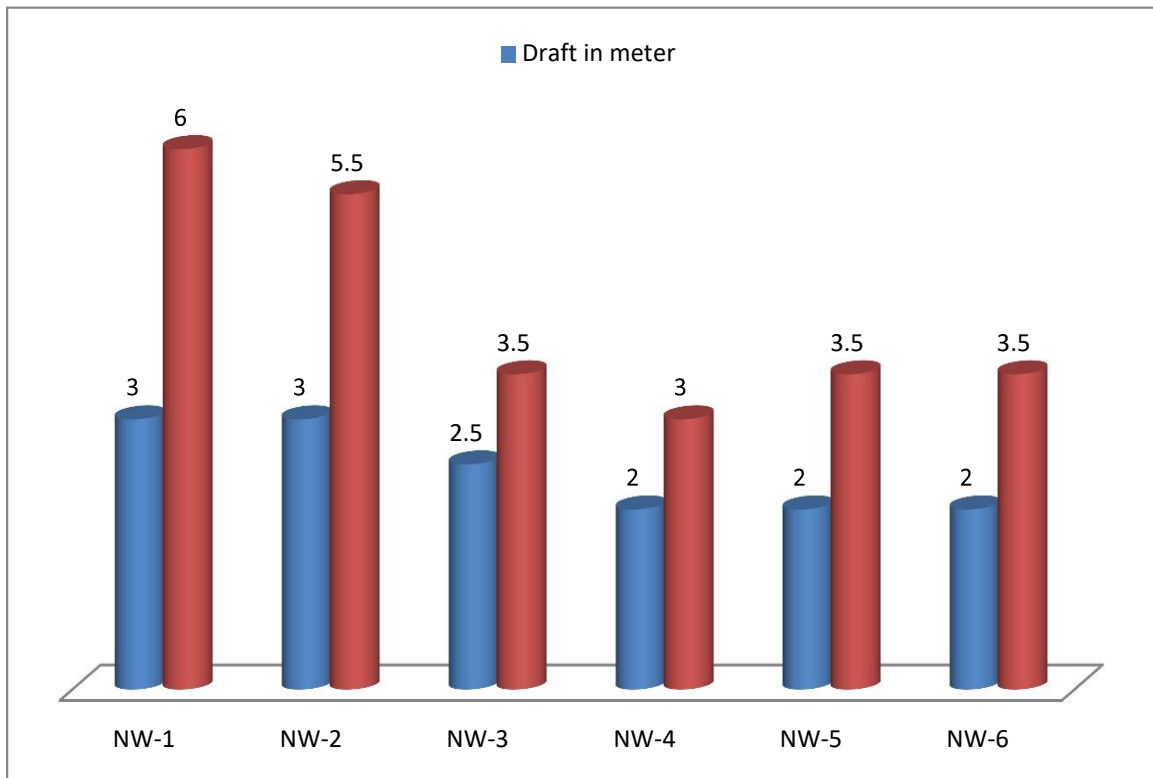


#### 4.4 Length of National Waterways of India:

In the National Waterways of India the NW-1 is the longest waterways, which is connected by the multi states of India (UP, Bihar, Jharkhand and West Bengal) with the length 1620 k m.



#### 4.5 Vessel Draft:



**Figure 4.8 Vessel Draft of all the NWT. (Source: IWAI)**

In India for the National Waterways -1 which has a deepest river draft at the river Ganga which vary from 3-6 meter, in comparison to the other NWT. For other route the draft vary between 2-3.5 meter.

#### 4.6 Major Freight Products:

S o.	National Waterways	Major Freight
1	NW-1	Coal, Agro products, Fertilizers, Petro products, Mineral ores.
2	NW-1I	Petro products, Agro products, Fish, Tea, Fertilizers.
3	NW-1II	Coffee, Agro products, Marine products, Rubber, Spices.

4	NW-1V	Rice, Cotton, Mineral Ores, Fish, Petro Products, Chemicals.
5	NW-V	Coal, Minerals ores, Iron & Steel, Aluminum, Timber, Jute
6	NW-VI	Tea, Agro products, Rice.

#### 4.7 Scope of Inland Waterways in India:

- **Vessel Making Industry:**

Due to the extension of National Waterway 1, there is immense potential for pontoon/vessel making industry between Haldia to Allahabad. There is 'N' number of artesian who are occupied with making and fixing pontoons and ships in Kolkata yet they are not building vessel having 1500-2000 DWT. Today just IWAI boats are working in Ganga however there is an immense open door for a private gathering to put resources into vessel making industry. It won't just build the quantity of the vessel yet in addition give work chance to nearby individuals. Alongside vessel development, there is potential in Inland water transportation hardware producing industry, fixing and support industry, etc.

- **Enhancing monetary open doors/Employment:**

Water transport is significant for direct work, for example, vessel building and angling jobs, too in a roundabout way, enabling destitute individuals to get to work in the urban communities while living in more affordable areas. Expanded portability likewise assumes a key job in supporting occupations by giving country makers, for example, ranchers and angler, a way to get to their end-markets. For instance, in Bangladesh somewhere in the range of four million individuals are thought to gain their living transporting nourishments and travelers along the nation's conduits, giving an expected 60% of all work in the vehicle area. IW transport will give more opening for work to marine drifting staff because of increment in the quantity of the armada, for port and harbors task Executive port chiefs who can direct the organization, activity, and support of an inland port.

- **Trade prospects along the India-Bangladesh convention course:**

The following best open door which we can distinguish under the National Waterway 1 is that its ideal usage can assist India with increasing its exchange connection with Bangladesh. As we as a whole realize that National Waterway 1 extend from Allahabad (Uttar Pradesh) to Haldia (West Bengal) which offer its outskirts with Bangladesh, and furthermore India has another conduit task called National Waterway 2 which will go through Bangladesh and interface North Eastern conditions of India with rest of the State of India. Both NW 1 just as NW 2 can possibly improve our exchange connection and social decent variety with Bangladesh. Today the exchange figures with Bangladesh by means of National Waterway are not extremely serious but rather with the assistance of appropriate guide and clear vision toward Inland Waterway development, we can anticipate a decent measure of exchange with Bangladesh.

- **Cargo from Nepal whenever associated with conduits can expand the exchanged Volume:**

For progressively respective exchange among India and Nepal (landlocked nation), National Waterway 1 can demonstrate as an achievement. Uttar Pradesh Share its limit with Nepal and by utilizing National Waterway 1 Nepal can upgrade its exchange volume with India. The present situation is that in view of Nepal is a landlocked nation, the majority of its freight is being handle at Haldia port and from that point, it is being moved starting with one spot then onto the next. National Waterway 1 can lessen the time from Haldia to Nepal and the other way around.

## CHAPTER 5

### Findings, Suggestion & Conclusion

#### 5.1 Findings

- The Inland Waterways of India has about 14,500 km. of maneuverable & potentially navigable waterways which are well connected with the other modes of transport like: Road & Rail connectivity.
- The government of India as well as state government taking initiative to increase the trade of India using Inland Waterways, with help of that macro as well as micro industries will get benefited.
- After the study this mode of transport will be the cheapest mode of transport in comparison to road & rail mode of transport.
- The least impact on environment among other modes of transport (less carbon emission).
- The Shipping Corporation of India (SCI) has not a sufficient number of vessel to operate in Inland Waterways of India.

#### 5.2 Suggestions

India is creating nation and need to examine the feasibility and intends to pull in more assets to the IWT area. The improve dimension of immersion of private area in IWT that presently been started as welcome advance. More quantities of conduits ought to be distinguished for the advancement, and those reserved given a push. IWT as a method of transportation ought not be considered in separation. It ought to be coordinated with different modes to accomplish ideal advantages for the national economy.

- Need sufficient budgetary help for operationalizing these conduits.
- The government should develop passenger terminal development, offer financial support to ferry operators to improve safety, and facilitate insurance coverage to boost passenger transport.
- Interlinking Waterways and Ports with seaside shipping – for instance Ganga,

Brahmaputra-Sunderbans stream framework can be joined with Haldia and Kolkata Ports, this will have a dominant impact of advancement of that region and furthermore it will reduce weight on the land based modes.

- These National Waterways additionally can be utilized for the voyage shipping, to produce more income.
- Digital GPS and necessary infrastructure for night navigation and need for better berthing facilities.
- The terminal ought to be found closest to the mechanical territory for simple treatment of cargos.
- IWT as a mode won't economically productive for administrators except if we apply more than 100 DWT which requires a base draft 2.5 – 3 mtr. round the year with night route offices.
- The development of dams, freight ships need to be consider as a significant necessity and make arrangements for the equivalent.

Payload transport through inland conduits ought to be boosted. Following measures can be taken:

- The Government can command/boost businesses closed to national waterways to utilize this mode for a bit of their shipments.
- Higher road taxes can be levied on transportation of coal and inflammable material over longer distance.
- The government ought to create traveler terminal advancement, offer money related help to ship administrators to improve security, and encourage protection inclusion to support traveler transport.
- Keeping at the top of the priority list the worries, it is essential to evaluate the ecological and social effect of the improvement of inland waterways and related framework to deny potential harm.
- Proper dredging and maintenance of waterways to provide good passages for cargo movements through ships.

### 5.3 Conclusion

IWT is the method of transporting cargo over rivers, backwater and canals. It provide a cost effective, logically efficient and environmental friendly mode of transport and whose development as a supplementary mode would enable diversion of traffic from over congested road and rails. This will decrease the huge logistics cost in India significantly and Hence, the waterways project deserves better regulation and development across the country.

Below is the list of the table of major freight products which are transported through National Waterway 1.

Company Name	Cargo Name	Multimodal	NW-1
Carpet petals	Carpet	✓	✓
Global Amigo Exporters	Silk Saree	✓	✓
Varanasi Silk Saree Industry	Silk Saree	✓	✓
IIFCO	Fertilizer's	✓	✓
NTPC	Coal	✓	✓

**Table 5.1: Major Freight Products Via NW-1 (Source: IWAI)**

#### Traders View

Below data is according to traders view about their business, the cargo they are trading, location where their business is active and the modes of transportation they are using. Then I came to national waterway 1 how efficiently it is helping them to carry forward their business and the stumbling blocks coming in between their way to transport cargo through NW-1.

- Absence of marketing of the Multi modal terminal results in complete interference of facilities provided by this terminal to the traders.
- Till now the terminal is in its construction stage though it's a multimodal terminal but

currently it is only providing maritime transportation and traders are mainly interested in door-to-door service.

- The project in its initial stage so the cargo handling facility at different terminal in different ports is not cost effective.
- Demand and Supply gap between fleet availability results in inefficiency of the project.
- As the project is in its growth stage, so government should take some initiative like subsidies in tariff given to the traders so that they will get attracted towards the terminal.
- Absence of proper navigational facilities in channel water at night.
- Pontoon bridges in between the navigational water acts as a barrier.

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