

People's Republic of Bangladesh Revival of Inland Water Transport: Options and Strategies

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ACRONYMS AND ABBREVIATIONS

ADP	Annual Development Program	IMTP	Integrated Multi-Modal Transport Policy
ASA	Association for Social Advancement	IWT	Inland Water Transport
BRAC	Building Resources Across Communities	LAD	Least Available Depth
BWDB	Bangladesh Water Development Board	JDCF	Japan Debt Cancellation Fund
BIWTA	Bangladesh Inland Water Transport Authority	MDGs	Millennium Development Goals
BIWTC	Bangladesh Inland Water Transport Corporation	MOC	Ministry of Communications
CAS	Country Assistance Strategy	MOS	Ministry of Shipping
CIWTC	Central Inland Water Transport Corporation	NSAPR	National Strategy for Accelerated Poverty Reduction
CODEC	Community Development Center	NWMP	National Water Management Plan
CPA	Chittagong Port Authority	PKSF	Palli Karma-Sahayak Foundation
DANIDA	Danish International Development Authority	PSO	Public Service Obligations
DOS	Department of Shipping	SARPS	South Asia Region Procurement Services
DWT	Deadweight Tonnage	SASSD	South Asia Sustainable Development
EIRR	Economic Internal Rate of Return	SWOT	Strengths, Weaknesses, Opportunities and Threats
ESW	Economic and Sector Work	TEU	Twenty-Foot Equivalent Unit
ETWTR	Energy, Transport and Water and Department	TIWTP	Third Inland Water Transport Project
FMIS	Financial Management Information System	VOSD	Voluntary Organization for Social Development
GOB	Government of Bangladesh	WARPO	Water Resources Planning Organization
ISSA	Inland Ship Safety Administration		

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TABLE OF CONTENTS

Preface and Acknowledgements	ix
Foreword.....	xi
Executive Summary	xiii
1. Background	1
1.1. Introduction.....	1
1.2. Current Government Strategy	1
1.3. Past and Present IWT Projects.....	3
1.4. Towards a new IWT Strategy	4
2. Objectives and Scope.....	7
3. Operation and Maintenance of IWT Infrastructure and Fleet.....	9
3.1. IWT Network	9
3.2. Network Maintenance	10
3.3. Ports and Landing Facilities.....	13
3.4. IWT Fleet	16
3.5. Country Boats	17
4. Transport Demand Analysis	19
5. Economic Analysis	23
5.1. IWT Productivity	23
5.2. Intermodal Comparison	23
5.3. Economic Justification of Dredging	26
6. Institutional review	29
6.1. Overview.....	29
6.2. Sector Coordination	29
6.3. Overlapping Responsibilities	30
6.4. Sector Management	30
6.5. TIWTP Institutional Development Action Plan	31
6.6. Institutional Support for Country Boats.....	32
6.7. Political Economy of the IWT sector.....	33
7. Sector Financing	35
7.1. Sector Expenditures	35
7.2. BIWTA	36
7.3. BIWTC.....	37
7.4. Financing of Network Maintenance.....	39
8. Private Sector Participation.....	41
8.1. Dredging	41
8.2. Port Operations	41
8.3. Container Transport	42
8.4. Ferry and Coastal Services.....	43
8.5. Private Projects	43
9. Cross-border IWT between India and Bangladesh	45
9.1. Regulatory Framework	45
9.2. IWT Infrastructure	45
9.3. Past Demand	45
9.4. Prospects for Development of Intra-regional Trade using IWT	46

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

10.	Investment program	49
10.1.	BIWTA Program.....	49
10.2.	BIWTC Program.....	50
10.3.	BWDB Program.....	50
11.	Safety	51
12.	Environment.....	55
13.	Social issues	57
14.	IWT and Water management.....	59
15.	SWOT Analysis	61
15.1.	Strengths	61
15.2.	Weaknesses	61
15.3.	Opportunities.....	62
15.4.	Threats.....	62
16.	Strategic Recommendations.....	63
17.	Possible World Bank Support.....	73
	MAP SECTION	75
	Annex 1: Dredging Works Executed During The Past 13 Years.....	81
	Annex 2: Sections of IWT Network With Siltation Problems.....	83
	Annex 3: IWT Fleet	85
	Annex 4: IWT Operating Costs	87
	Annex 5: Economic justification of dredging.....	89
	Annex 6: Government And BIWTA Resources For Dredging.....	91
	Annex 7: IWT And Road Accidents	93
	Annex 8.1: BIWTA Three-Year Investment Program.....	95
	Annex 8.2: BIWTC Investment Program	101
	Annex 8.3: Department Of Shipping	103
	List Of Projects	103
	Annex 9: BIWTC. Profit And Loss A/C Form	105
	2001 -2002 To 2005 - 2006	105
	References.....	107

TABLES

Table 1: Classes of Waterways	10
Table 2: Cost of Dredging.....	13
Table 3: IWT cargo transport costs and revenues with manual or mechanized handling	16
Table 4: Modal Share of Passenger and Cargo Traffic	20
Table 5: Intermodal Comparison of Transport Networks' Productivity	20
Table 6: Major products using IWT.....	20
Table 7: IWT traffic on major routes	21
Table 8: Utilization of IWT Fleet	23
Table 9: Comparison of passenger tariffs by transport mode	24
Table 10: Comparison of cargo tariffs by transport mode	24
Table 11: BIWTA Annual Development Program (2005-2008) - Approved Projects.....	49
Table 12: Employment in IWT Sector.....	57
Table 13: Potential Sources of Financing for Dredging	65
Table 14: Proposed IWT Strategy - Building Blocks and Actions	71

FIGURES

Figure 1: Comparison of port traffic and revenues.....	15
Figure 2: Port Throughputs.....	21
Figure 3: Comparison of IWT passenger costs and tariffs	25
Figure 4: IWT Cargo Costs by loading rate and journey distance.....	25
Figure 5: ADP allocation to IWT Sector	35
Figure 6: BIWTC Revenues and Expenditures.....	38
Figure 7: Intra-regional Traffic between India and Bangladesh.....	46
Figure 8: Causes of Accidents on Inland Waterways	51
Figure 9: Causes of Ferry Accidents.....	52

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

Preface and Acknowledgements

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People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

Foreword

Bangladesh's *National Strategy for Accelerated Poverty Reduction* highlights the role of Inland Water Transport (IWT) in providing better access to services and cheaper modes of transport. Indeed, a substantial portion (12.3 percent) of the rural population in Bangladesh has IWT as its only mode of transport. With this emphasis on IWT, the Government also recognizes the benefits that river transport can bring in terms of economic growth and poverty reduction in Bangladesh.

The World Bank's *Country Assistance Strategy* for Bangladesh supports the Government's national transport strategy and its objective to establish an integrated multimodal transport system and promote sub-regional cooperation. In the Inland Water Transport sector, new business opportunities exist such as the development of container transport between Dhaka and Chittagong, and between India and Bangladesh, as well as the further expansion of dredging programs, ferry services, port management and operations by the private sector.

The report '*Revival of Inland Water Transport in Bangladesh: Options and Strategies*' aims to provide a comprehensive overview of the IWT sector in Bangladesh and identify and discuss the sector's strengths, weaknesses, opportunities and risks. The study suggests establishing the elements of a new strategy to bolster the sector's contribution to growth and poverty reduction.

The World Bank, as a key development partner in the IWT sector, stands ready to help address governance and institutional constraints in the transport sector and support improvements on the main transport corridors, in view of improving the investment climate in Bangladesh.

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People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

Executive Summary

Inland Water Transport: An unexploited opportunity for economic growth and poverty reduction

1. With the approval of the **National Strategy for Accelerated Poverty Reduction** (NSAPR) in October 2005, the Government of Bangladesh (GOB) has adopted a development strategy more focused on growth and poverty reduction. Within the framework of the NSAPR, the Government has expressed a renewed interest in Inland Water Transport (IWT) to achieve the objective of providing better accessibility to services as well as cheaper modes of transport.

2. The potential contribution of IWT to poverty reduction is significant. A substantial portion (12.3 percent) of the rural population only has reasonable access to the transport system through IWT, and is directly affected by the availability of IWT services. This is half of all rural households, which have access to river transport (25.1 percent). Comparatively to road transport, accessibility provided by IWT is quite high for a 24,000 km long network, which is much shorter than the road network. Although the road network is 274,000 km long, only 37 percent of rural households live within two kilometres (typically equivalent to a walk of 20-25 minutes) of an all-weather road.

3. Despite of IWT being such an asset for Bangladesh, during the past ten years, the country's economy has not been able to reap the benefits that IWT can bring in terms of economic growth and poverty reduction in comparison to other modes of transport. On the contrary, since 1996, IWT cargo traffic has stagnated and IWT passenger traffic has decreased at 1.3 percent per year while the total transport demand has grown at about 7 percent per year.

4. Although sound IWT-related elements of policies have been recently formulated in several Government documents, there remains a lack of genuine Inland Water Transport policy as would be expected as part of the National Transport Policy. Such policy would aim at reinstating the role that the IWT Sector can play in the national transport system and beyond that, in the economic and social development of the country.

5. As a first step in defining a new policy for the IWT sector, the present report proposes options and strategies for a revival of IWT in Bangladesh. While lack of resources has been claimed to be the main cause of poor sector performance, the report does not limit itself to exploring options to increase the amount of resources available for the sector. Indeed, poor performance has been caused by other reasons as well which need to be addressed in the new policy. The report thus also examines the means to improve the efficiency in the use of these resources as well as the quality of the sector management and services provided by the sector operators. The report includes comments received from a number of stakeholders and was presented during a workshop held in Dhaka on February 28, 2007.

IWT has a role to play in the transport sector in Bangladesh and in the country's economy

6. IWT has three functions with distinct modes of operations and stakeholders:

- a. **National:** This consists in trunk haulage of freight and passenger carriage along the main corridors of demand between the ports and major economic centers (including international). Trips are medium to long distance and high volume movements are recorded. Vessels are modern vessels of large capacity (100 to 1,200 passengers, 20 to 1,800 tons).
- b. **Local:** This consists in feeder, distribution and local traffic. Trips are mostly on short distances with low volume movements to and from (and between) smaller communities. The demand is predominantly for passenger movement but with an important need to accommodate modest freight loads, usually for small enterprise, small-holder or 'own account' purposes. Local trips use traditional country boats offering a capacity of up to 100 passengers and 100 tons.
- c. **Ferries:** Ferries link sections of roads separated by large channels in the absence of bridges. Functionally these are an entirely separate category since they are part of the road transport system rather than the IWT system. However, operationally it is sensible to integrate aspects of the ferry services (such as vessel maintenance and repair and river dredging) with those of IWT.

7. IWT is competitive for cargo transport compared to road and rail on the niche market of bulk cargo and petroleum products. On the domestic market, IWT is mostly used for transport of construction materials, petroleum products, fertilizers and food grains. On the regional market, Bangladesh imports fly-ash, gypsum, rice and wheat from India using IWT. These are low value products that can afford relatively long transport times compared to road. They are also transported in large quantities in cargo vessels filled with one product only. Products with higher value in smaller packages are transported by road as it would be inefficient to wait for enough freight to be available to fill a cargo vessel when trucks are available and can be filled quickly with smaller quantities.

8. IWT can also provide large capacity for passenger transport but regulatory issues need to be addressed if the sector wants to capture its potential share of the market. About 50 million passengers on average are recorded in the 10 major inland ports. IWT's share of the overall passenger transport market is estimated at 8.9 percent in 2006. However, this share has eroded in percentage and in absolute value since 1996 reflecting poor operating conditions. IWT is in competition with rail which has unreasonably low tariffs determined by the Government for social reasons. Rapid

IWT tariffs for cargo are below Tk 1 per ton-km whereas for road they are around Tk 4.5. Rail tariffs range between Tk 2.5 and 4. Even after adding to IWT and rail tariffs the cost of handling at the port/railway station and terminal transport between the port/railway station and the origin/destination, IWT still remains the cheaper mode of transport. For example between Dhaka and Chittagong, the tariff to transport a 20-foot container is around Tk 600 per ton by IWT, compared to Tk 1,200 for rail and Tk 6,000 for road.

Based on the statistics for the past 15 years, fatalities on inland waterways averaged 148 per year against 2,400 for roads. The ratio of fatalities per billion of passenger-km is 158 for roads and 41 for IWT.

development of the road network has also attracted a significant share of passenger traffic because of much faster even if costlier services. IWT is also considered unsafe because of dramatic accidents involving a large number of passengers although statistics show that IWT is less dangerous than road.

9. Country boats, the traditional mode of river transport for centuries, play and will continue to play an important role in the life of rural people and in the rural economy. It is estimated that about 745,000 country boats ply the rivers in Bangladesh of which 464,000 are used for passengers and 261,000 for cargo. This is more than the 526,000 road vehicles registered in 2003 in the entire Bangladesh. During the monsoon season when roads become impassable, country boats are the only mode of transport for an important part of the rural population of Bangladesh. They are also the main mode of transport in the Southern coastal areas of the country where the road network is little developed. The country boat sector is a major source of employment in rural areas as it is estimated to employ about 3.8 million workers.

10. IWT is an environmentally-friendly mode of transport. The use of IWT instead of road transport is estimated to save about 58.5 million liters of diesel and 155,000 tons of CO₂ per year because of lower diesel consumption. Additional savings estimated at 100 million liters of diesel and 260,000 tons of CO₂ would be generated by adding a gearbox to country boats. The total diesel consumption of the IWT sector is estimated at 350 million liters, about 13 percent of the total consumption of diesel in Bangladesh. The quite significant amount of savings would make installation of gearboxes a potential candidate for access to carbon finance resources.

11. From the standpoint of the country's economy, dredging of waterways is highly economically justified. In the hypothesis where all IWT cargo is transferred to road, the additional cost for the economy is estimated between Tk 2.1 billion and Tk 3.1 billion whereas the cost of dredging to continue IWT cargo transport is estimated at Tk 0.6 billion only. This does not include the additional cost of road maintenance and road accidents due to the additional traffic on the roads. Using the data above, the threshold above which dredging is justified is roughly estimated at 50,000 tons equivalent to 1.5 trip of a 600 ton ship per week. This analysis is done globally on the entire IWT network to demonstrate the economic justification of IWT for the economy. It would need to be carried out by sections of the network to justify any dredging program.

Water management governs the future of IWT

12. The constraint on the availability of water provides the environment for any IWT strategy as it is outside the sector and not under its control. River water is used for several purposes: water supply, electricity generation, irrigation and drainage. Availability of river water is also subject to regional agreements and the vagrancy in their implementation due to political reasons. Even with improved water management, increased extraction of water from rivers in the future combined with siltation resulting from deforestation will continue to impact significantly on IWT as it has increasingly done in the past decades. The impact of water management on IWT is thus the major challenge faced by IWT in the future. IWT has to face that reality and decide on the type of network and the type of services that are affordable, sustainable and socially and economically acceptable.

13. In view of this constraint, the short-term priority for the Government should be to determine the core IWT network which would be justified to receive resources for development and maintenance by distinguishing between the network that can be used by modern vessels and which will require a significant amount of resources for maintenance, and the remaining network used by country boats which does not need maintenance. This will change from the past strategy where network development was based on internal IWT sector considerations only.

14. While water management and IWT projects need to be coordinated, it is not the responsibility of the IWT sector to develop projects with significant water management components and impacts. Development plans for the IWT sector should not be based on benefits resulting from better water management. This is particularly important for the establishment of the core network as recommended above. It should be based on a given situation of river waters resulting from the water management conditions existing or expected in water management plans and should not be based on expectations that would assume unapproved changes in water management conditions.

Improved governance is required to make sector management more efficient and transparent

15. There are two authorities responsible for the management of this sector: The Department of Shipping (DOS) and the Bangladesh Inland Water Transport Authority (BIWTA). DOS is responsible for safety, the provision of the regulatory framework for the sector and for training and scrutiny of maritime staff. It includes the Inland Ship Safety Administration (ISSA), which is responsible for the definition and enforcement of ship safety rules and for registering vessels. ISSA is also the institution responsible for managing environmental aspects of the sector. BIWTA is a parastatal responsible for maintenance and development of waterways. This responsibility includes: (a) provision of dredging services; (b) provision of pilots and navigational aids; (c) provision of hydrographic services; (d) management and administration of inland ports and landing facilities of significant importance; (e) regulation of transport operations, including licensing and scheduling of routes and setting up of tariffs; and (f) training and research.

16. Allocation of responsibilities between the DOS and the BIWTA needs to be clarified. The overlap of responsibilities between BIWTA and DOS is apparent. While BIWTA defines construction design, DOS certifies the same vessel after construction; crew members are trained by BIWTA but licensed by DOS. BIWTA issues some classification rules for ship operations with DOS monitoring these rules. All of these functions could be better executed by one of these two organizations.

17. An adequate level of resources is required to ensure good sector management. Priority should be given to making enough human resources available to enforce safety regulation (controlling the technical quality of vessels design and construction, controlling overloading). An equivalent priority would be to provide the human and financial resources to monitor sector performance. Particularly important is monitoring of the waterways network as the last comprehensive hydrographic survey was carried out in 1989. Since then only surveys limited to the most important inland and coastal waterways have been carried out, and the present condition of the network of navigable waterways is unknown. As a result, planning is based on ad-hoc decisions without real sector

perspective, objective information and technical and economical justification, making it difficult to resist political pressure. Improved monitoring would include environment for which equipment has been purchased during the past decade but has remained unused because of lack of human and financial resources.

18. Financial management of BIWTA needs to improve for more efficient and transparent use of resources allocated to the sector. There is uncertainty on the actual cost of dredging executed by BIWTA. BIWTA estimates this cost at Tk 98 per m³, which is in the range of unit costs in or outside Bangladesh. In view of the quantity of dredging performed by BIWTA (3.48 million m³), BIWTA would have spent TK 341 million for dredging in 2004/2005, which is very low compared to BIWTA's total expenditures of Tk 1,115 million that year as dredging is supposed to be the main and most costly activity of BIWTA. The question would be then to justify the significant amount of resources that are spent on other activities than dredging, in particular administrative tasks.

19. Revision of the sector's financing structure would also contribute to the more transparent and efficient use of sector resources. Presently, the Government finances maintenance of ferry channels without a clear view of performance and costs. On the other side, BIWTC operates ferry services with profits that are used to subsidize loss-making coastal passenger services. It is proposed that coastal passenger services be subsidized only after the level and quantity of services as well as the level of subsidy have been defined, and incentives have been introduced to improve efficiency and control costs. Dredging of ferry channels executed by private contractors through contracts and financed by a fee paid by ferry users would also give a much clearer view of the costs, revenues and expenditures.

20. Involvement of IWT users in management of resources for maintenance of navigable waterways would improve transparency in the decision-making process to allocate resources, and ensure adequacy of resources allocated to maintenance. An IWT Maintenance Fund is envisaged in the draft Integrated Multi-modal Transport Policy at the image of the Road Maintenance Fund that has been discussed for some time in Bangladesh. While arrangements for the management and operation of the Fund will be confirmed by the Government, using the Road Maintenance Fund as a model, IWT users would be represented in the Board of Directors of the Fund and user fees paid by IWT users would be transferred directly to the Fund.

21. Management of the country boat sector should be increasingly decentralized similarly to what exists for rural roads. Involvement of country boats owners in the decision-making process at the local level will improve the consistency between the sector investments and the needs. This has often been an issue in the past when infrastructure was not built in consultation with the users. Registration of country boats at the local level will also generate revenues, which can be used then for the benefits of the local population.

22. A political economy analysis of the IWT sector has identified several sources of potential opposition to the reforms proposed in the sector, and these oppositions should

be addressed. Clause 4(c) of the Ghat Ijara Policy¹ should be suppressed. It has been abused as now 400 ghats have been leased out using this clause. The financial transactions associated to the lack of transparency in the process increase the cost of the use of the ports, which is contrary to the initial objective of people's welfare. To improve the governance, there is a need to better control dredging expenditures (fuel consumption and overtime) as well as revenues collected from the passenger terminal fees and cargo fees. In addition, the Government needs to put in place the regulatory and control mechanisms to prevent misuse of Government funds that may occur as a result of increased private sector participation in port operations or dredging.

Sustainable IWT infrastructure requires increased users' contribution to sector financing

23. Until now, IWT users have contributed little to financing of river maintenance and Government budget has been haphazardly allocated. Resources collected from IWT users represent a small share (about 6 percent) of the resources required for maintenance. The Government is expected to provide the balance but has not given priority to maintenance when allocating resources to the sector. The share of resources allocated to network maintenance has decreased from about 30 percent in 2002-03 to about 15 percent in 2004/2005. In 2005/06, when dredging volumes were expected to jump to 6.5 million m³ due to the availability of resources from the Japan Debt Cancellation Fund (JDCF), only resources for 1.1 million m³ were allocated to maintenance dredging of navigable waterways.

24. The potential exists to increase contribution of IWT users to financing of maintenance. A significant share of BIWTA's budget is allocated to maintenance of channels where BIWTC operates ferries with profit. BIWTC should contribute to maintenance of the ferry channels, which has not been the case until now. User charges collected by BIWTA can also be increased to contribute to financing maintenance in addition to covering BIWTA's administrative costs. Additional resources could come from a levy on petroleum products similarly to what is envisaged for road maintenance financing. However, this may not be feasible if this new user charge creates inequity, especially vis-à-vis country boats which ply rivers that would not be maintained. Another possibility is to ask port users to pay tolls as river maintenance is required to guarantee access to ports but the need to also increase resources to maintain port infrastructure limits this option.

25. User charges can potentially cover the cost of maintaining the IWT network as shown in the following table. An increase in the price of diesel oil of Tk 1.3 per liter would provide the resources necessary to cover maintenance needs assuming that BIWTC finances the dredging of ferry channels and that other user charges are increased by 50 percent. This seems reasonable compared to the current price of diesel of Tk 30 per liter. The actual amount of resources needed for IWT network maintenance needs to be clarified though. This requires defining the core IWT network as recommended above, the level of service offered and the dredging requirements to maintain this level of

¹ This clause authorizes local Members of Parliament, Ministers in charges of districts or the Shipping Minister to lease out ghats and ports to institutions/ organizations/associations under the pretext of people's welfare

service. A dredging strategy where half of the IWT network would be maintained would result in a user charge on petroleum products of Tk 0.4 per liter, which is quite affordable. Progressive implementation of the user charge would also facilitate its acceptability.

Table 1: Potential Sources of Financing for Dredging

Source of funds	Amount (Tk million)	
Users of ferry services	362	Actual cost of maintenance of ferry channels
Increase in IWT user charges	147	Twice the present revenues
User charge on petroleum products	453	For 350 million liters
TOTAL	962	6 million m ³ at Tk 100 per m ³ plus the actual cost of maintenance of ferry channels

Performance of IWT services needs to improve to make them more attractive and viable

26. Quality of IWT services suffers because of inadequate regulation and involvement of Government in service delivery. Tariffs regulated by the Government are insufficient to generate a reasonable profit if applied, thus become a source of overloading of passenger vessels. The present arrangement where passenger tickets are delivered on board of vessels² prevents control of the number of passengers boarding, which results in overloading. As overloading contributes to 56 percent of accidents on waterways, the Government is responsible for failing to provide the framework that would prevent overloading.

27. Efficiency of dredging needs to improve. The productivity of dredgers operated by BIWTA is relatively low. Insufficient supporting equipment and only two shifts per day explain this performance. Though the private sector offers a capacity³ of 6.9 million m³ (2.5 times the capacity of BIWTA) and lower cost (Tk 112 per m³ with VAT), BIWTA gives priority to its own dredgers. BIWTA also turns to Bangladesh Water Development Board (BWDB) for dredging works before turning to the private sector.

28. The private sector has the capacity to progressively take over the responsibility for the execution of dredging programs. Nevertheless, the Government is in the process of acquiring three new dredgers and is considering the acquisition of nine additional dredgers. BIWTA does not provide the framework for efficient operation of these new dredgers. How to transfer their management to the private sector should be explored. The Government should also recognize that the private sector has enough capacity to execute dredging programs, and should contract the private sector instead of investing in more new equipment in the future.

² BIWTC has the right to deliver tickets in the passenger terminals but this right is denied to private operators.

³ Five private companies operate six large cutterhead dredgers, two with a productivity in the range of 2,500 - 3,500 m³/hour and four 18" dredgers with a productivity in the range of 350 - 400 m³/hour. The Engine Boat Association built seven smaller dredgers with a productivity of 150 m³/hour, which however are not utilized presently.

29. BIWTC divesting of IWT operations has proved successful and should continue. Most of cargo vessels have already been leased out to private operators. This should be followed by selling the assets to the private operators. Ferry services, starting with new services, should be offered progressively to the private sector through competition for the market or in the market. As for coastal services, progressively offering them to the private sector should be explored using Public Service Obligations.

30. Contractual arrangements between BIWTA and private port managers and operators should be revised to transfer more responsibilities to the private sector. Currently, BIWTA delegates port management to private operators through lease agreements of one year only. The responsibilities of port managers are limited to collect port dues and pay a lease to BIWTA. Though BIWTA also leases port space to operators who want to build warehouses, the one-year lease agreement puts risks on the private investor when the life of the investment goes far beyond one year. This is also a potential cause of problems when the lease agreement has to be renewed through a competitive process (pressure from the investor to obtain the lease, possibility of corruption). In addition, one-year agreements prevent operators to invest in mechanized equipment for freight handling. As a result, port productivity is low and ports are congested. Extension of lease agreements beyond one year would give the opportunity to transfer the responsibility for maintenance to the port managers and to pilot the use of mechanized equipment for freight handling.

31. Country boats services need to improve if they want to continue to compete with road services. Lack of gearbox reduces control and causes hazards during manoeuvres. Installing a gearbox would also reduce diesel consumption with a positive impact on environment. Women also complain about the lack of comfort, which is aggravated by the lengthy time of travel compared to buses, although the latter are not more comfortable.

New business opportunities exist to further develop IWT services

32. IWT has the potential to become a major actor in the transport of container between Dhaka and Chittagong. With the strong growth of container traffic in the port of Chittagong, the port throughput will soon reach one million TEUs per year. At present, railways are congested and the road does not have the bearing capacity to carry container trailers. Under a project to promote container transport by IWT developed jointly by BIWTA and the Chittagong Port Authority (CPA), a new Inland Container Depot (ICD) is envisaged near Dhaka. ICD operation will be concessioned to a private operator. BIWTC is also acquiring two 100-TEU container vessels. Leasing out the two vessels to the private sector would be consistent with the past policy of divesting BIWTC of freight transport. While the Government may continue to play a role in the future development of IWT infrastructure, further development of container transport by IWT should be left to the private sector.

33. The development of container transport by IWT between India and Bangladesh shows a strong potential as well. IWT has already attracted the bulk traffic for which it is competitive compared to road and rail. Container transport has not grown however in the absence of port infrastructure. With the ICD project in Dhaka, the conditions will be in place to set up container transport services that would be faster and cheaper than the

services presently offered by sea-trucks transiting through Singapore or Colombo. The cost of transport by IWT is estimated at US\$700 - per TEU for a 7- to 9-day trip compared to US\$2,500.- for a 15- to 30-day trip by sea. Until now, however, cross-border transport has been hampered by short-term bilateral agreements and uncertainty making it difficult to invest in and sustain IWT services.

34. The Government of Bangladesh should pursue with the Government of India the establishment of a sustainable framework for development of regional IWT. Although the current framework for cross-border movements between India and Bangladesh is not conducive to development of exchanges using IWT, regional traffic has grown gradually during the past five years. This is the expression of a strong demand and demonstrates that IWT is an appropriate mode of transport for these exchanges. Inter-country cargo traffic has grown from 46,000 tons in 2000/01 to 414,000 tons in 2004/05. Transit traffic from and to Northeast India is also growing although it is much smaller (2,000 tons in 2003/04 and 15,000 tons in 2004/05). IWT is the right transport mode for products crossing the border which are in bulk and large quantities with low value such as fly-ash, gypsum, rice and wheat, crushed bones, jute products, cement, coal and bitumen.

Conclusion and recommendations

35. Three factors make it a particularly opportune time for Bangladesh to reform the IWT sector:

- a. First, there is a strong agreement within the Government that IWT is a key contributor to poverty reduction in rural areas and to economic growth in the country.
- b. Second, the momentum already exists with past restructuring measures implemented in BIWTC, the consultation process on reforms launched by BIWTA among stakeholders since 2005, and various similar reforms that are underway or discussed in the road maintenance or the railways sector.
- c. Third, new business opportunities exist such as development of container transport between Dhaka and Chittagong or between India and Bangladesh, and further expansion of existing programs such as dredging, ferry services, port management and operations by the private sector.

36. The benefits for the country of implementing the proposed strategy justify the efforts that would be required. This report hopes, through its recommendations, to contribute to the momentum being built for faster reforms and as a result for a substantial performance improvement of the IWT sector in Bangladesh.

37. To achieve this objective, the report recommends that the Government concentrates on the following areas:

- a. Adoption of a new sector strategy;
- b. Adoption of a network development and dredging strategy providing a mid-term vision for the sector encompassing investment needs, financing of recurrent costs and the role of the private sector;

- c. Setting up of a new framework for sustainable sector financing with enhanced participation of IWT users (financing of maintenance of ferry channels, waterways maintenance fund);
 - d. Adoption of a new institutional framework for country boats with responsibilities for IWT regulation and infrastructure transferred to Local Government Institutions;
 - e. Deregulation of passenger tariffs;
 - f. Adoption of a new institutional framework for IWT to streamline and improve sector management;
 - g. Adoption of a new framework for public-private partnership in port management and cargo handling;
 - h. Improvement of governance in sector institutions (selection procedures for port managers and port operators, financial management system in BIWTA);
 - i. Improvement of capacity to manage and monitor the sector with particular emphasis on safety and environment.
38. From the above assessment of the IWT sector, including achievements under the Third Inland Water Transport Project (TIWTP), it can be concluded that World Bank involvement in the sector ended in 2000 with an unfinished agenda. Sector development opportunities exist and the sector has strengths that justify enhanced donor support to the sector. Based on the experience of TIWTP however, it is suggested to separate support to reforms and investments, using Development Policy instruments for the first one and sectoral investment instruments for the second.
39. The World Bank can provide support in implementing the above recommendations. A policy operation would ensure that the financial resources necessary for implementing the reforms as well as executing the priority recurrent expenditures are available. An investment operation would provide the resources necessary to improve infrastructure services and take advantage of the new business opportunities where IWT has a strong development potential.

1. BACKGROUND

1.1. INTRODUCTION

40. In Bangladesh, being a country with many rivers, Inland Water Transport (IWT), is a major mode for the transport of goods and people. IWT is important for the poor as well as for the competitiveness and growth of the economy as it is the cheapest mode of transport compared to road or rail. Until recently, however, the sector had received little attention from the Government of Bangladesh with only limited resources allocated to its development. In addition, these resources were mostly used to develop the main routes (the ones most used by large mechanized vessels) while secondary rivers and transport using country boats (mainly rural and until recently non-mechanized vessels constructed in traditional design) were given second priority.

41. The total length of rivers in Bangladesh is estimated to be in the range of some 24,000 kilometers, providing a very high degree of penetration. Out of this total, 6,000 kilometers are accessible for movement of modern mechanized vessels during the monsoon season, and out of this, some 3,800 kilometers are navigable around the year. Country boats, in the number of several hundred thousands, are traditional vessels which have been plying inland and coastal waters for hundreds of years and which play a key role as a rural mode of transport of goods and people. Inland ports and other facilities include 11 major inland ports, 23 coastal island ports, 133 launch stations and more than 1,000 minor landing points located in rural areas. In comparison, the road network is 274,000 km long with 70,000 km of paved roads, 21,000 km of major roads and 253,000 km of rural roads. Bangladesh Railways operates a network of around 2,800 km.

1.2. CURRENT GOVERNMENT STRATEGY

42. With a development strategy more focused on growth and poverty reduction, and the objective of providing better accessibility to services as well as cheaper modes of transport, the Government has expressed a renewed interest in IWT. This has been translated in recent Government documents which give due reference to IWT.

43. The **National Strategy for Accelerated Poverty Reduction** (NSAPR) issued in October 2005 emphasizes that infrastructure may emerge as a binding constraint on the goal of accelerated poverty reduction unless the emerging challenges are effectively addressed. The NSAPR recommends the formulation of a long-term strategy to develop IWT. The NSAPR acknowledges that the inland waterway system is not used to its full potential and identifies that the following factors be taken into consideration:

- a. Setting and enforcing standards for bridges and berthing facilities;
- b. Promoting internal government coordination to ensure sufficient clearance under road bridges;
- c. Allowing country boat owners to participate in the design of sluice gates;
- d. Encouraging local authorities to develop facilities through self-financing by user charges.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

44. The NSAPR confirms the Government commitment to preserving navigation of country boats. However, the proposed measures are meant to be self-financed by the poor communities themselves and may not translate quickly into action and results. This clearly limits the impact of the Government commitment.

45. The draft **Integrated Multi-modal Transport Policy** (IMTP) issued by the Government in November 2005 proposes an efficient, safe and cheap IWT system with special attention to dredging, encouragement of further mechanization of country boats, and strengthening quality of shipmasters for improved safety.

46. The draft proposal includes the establishment of a single independent body to regulate fare structures in the transport sector in the public interest, separated from any other interests, with economic regulation being removed from individual public agencies in the transport sector. The IMTP further proposes alternative financing measures through transfer of resources collected on petroleum products from users of the river network to a special Inland Water Maintenance Fund allocated for dredging and maintaining waterways. The draft policy indeed highlights some of the issues deemed most critical to sustainable development of IWT. Notably tariff fixing mechanism is deemed a main hindrance to further involvement of the private sector and alternative financing to Government subsidies for dredging seems to be key to the sector's sustainability.

47. In terms of Operations, the IMTP sets out two goals: (i) for the private sector to introduce door-to-door services using IWT and the trucking industry; and (ii) to foster a high level of rural mobility using rural water transport.

48. The **National Water Policy** issued in 2001 recognizes that IWT is of substantial economic importance to Bangladesh because its numerous watercourses provide the cheapest means of transportation. Siltation, however, has disrupted communications by river in many channels. Dredging of these channels is required not only to restore their navigational capability but also to assist surface drainage. The policies of the Government in this regard are:

- a. Minimum water flows in designated rivers and streams will be maintained for navigation after diversion of water for drinking and municipal purposes.
- b. Water development projects should cause minimal disruption to navigation and, where necessary, adequate mitigation measures should be taken.
- c. Dredging and other suitable measures would be undertaken, wherever needed to maintain navigational capability of designated waterways.

49. The National Water Resources Council approved on March 31, 2004 a **National Water Management Plan** (NWMP). The NWMP envisages that the main river system will be comprehensively developed and managed for multi-purpose use through a variety of structural and non-structural measures. To reduce the impact of gradual siltation, measures will be implemented to augment the surface water flow. These include dredging of rivers using labor-intensive methods.

50. The plan includes the project of dredging for navigation, which seeks to restore the IWT waterways in a cost-effective manner, with a structured approach recognizing both the technical and enabling management issues that have to be overcome. A comprehensive national dredging management plan would be prepared covering short to

long term dredging requirements, as well as dredging operations and the role of the private sector. The plan also makes provision for capital dredging (development of new routes or improvement of existing routes) and maintenance dredging of the major rivers.

51. The **National Policy for Ports, Ocean Shipping and Inland Water Transport** adopted by the Ministry of Ports and Shipping in 2000 established the Government's aim for Inland Water Transport *of ensuring that Bangladesh has a safe and efficient inland and coastal water transport system able to support the national development aspirations*. The policy provides a comprehensive guidance for the sector covering its management and administration, IWT infrastructure, services, safety and environment, technology and financing.

52. The Government through the Planning Section of the Ministry of Shipping (MOS) recently⁴ issued comments on the IWT Policy for Bangladesh as follows:

- a. Private sector participation in IWT in the coastal areas so that objectives of the NSAPR will be achieved and balanced investment and development will be established.
- b. Evaluation of future potential aspects/advantages for the IWT sector in view of the gradual loss of inland waterways assets.
- c. Development of ferry operations on secondary routes.
- d. Inclusion of Myanmar in the development of cross-border IWT.
- e. Improvement of aids to navigation to accommodate adverse weather conditions.
- f. Close consultation and participation of stakeholders in the conception of an IWT policy.
- g. Combating pollution caused by IWT, notably in ports and landing areas, by ship building and repair activities.

1.3. PAST AND PRESENT IWT PROJECTS

53. Few donors are involved in the sector. The Danish International Development Agency (DANIDA) provided support to the Bangladesh Inland Water Transport Authority (BIWTA) until 2000. Spain is currently financing the construction of two dredgers and South Korea the purchase of two salvage vessels.

54. The Government of Japan is currently contributing substantial subsidies to BIWTA through the Japan Debt Cancellation Fund (JDCF). The International Maritime Organization (IMO) is developing a project in Bangladesh to promote a safer design for domestic ferries.

55. Several NGOs and local or foreign institutions have expressed interest in promoting development and improving operations of country boats. A project to develop a new design for country boats had little success. Use of metal sheet instead of wood was

⁴ In connection with the World Bank's Concept Note for the preparation of the present strategy note, the Ministry of Shipping issued a policy statement by letter dated 19 April 2006.

also promoted and was more successful because of the increased scarcity of wood for construction of country boats.

56. The World Bank financed three Inland Water Transport Projects completed in June 1982, June 1985 and June 2000. The first project financed spare parts and equipment needed for rehabilitation of some vessels, and modifications and repairs of the offshore oil terminal in the port of Chittagong. The second project financed equipment, materials and spare parts for sector state enterprises and technical assistance to (a) assist in strengthening planning and project preparation; (b) review, recommend and assist in implementing measures for improving cargo vessel deployment, cargo handling operations and communications; and (c) review and recommend measures for improving the finances of the sector state enterprises. The third project consisted of: (a) an institution building component to enhance the capacities of the sector institutions; (b) a vessel safety improvement component; (c) an inland ports component to provide 100 launch landing pontoons in rural areas; (d) a waterways development component which included dredging, hydrographic survey equipment, and equipment to improve the productivity of the existing dredging fleet; and (e) a country boat component to provide services to the country boat sector (mechanization, safety and financing of country boats and establishment of boat owners associations). The Implementation Completion Report prepared in November 2000 rated the project's outcome satisfactory, its sustainability uncertain and its institutional development impact negligible.

57. Investments financed under the TIWTP have had a positive impact on the sector operations without doubt. Five dredgers were refurbished and have been operating since then. Aids to navigation were installed on 918 km of class I and II waterways (see para. 68) improving navigation, especially at night. Dredging works at ferry terminals have been reasonably sustained by BIWTA. No complete assessment of the 200 landing facilities built under the project is available to evaluate their usefulness, the appropriateness of their design and whether they are still in good condition. Survey vessels purchased under the project are not utilized as initially expected. They are mostly used to monitor water depth on the route between Dhaka and Chittagong and at a few other spots such as ferry terminals and dredging sites.

58. The **Country Assistance Strategy** (CAS) for FY07-FY09 adopted by the World Bank acknowledges the importance of IWT in Bangladesh and, accordingly, the lending portfolio includes an IWT project in FY09. During the CAS period, with the objective of improving the investment climate, the World Bank Group will help address governance and institutional constraints in the transport sector and support improvements on the main transport corridors. With the objective of improving national transport and communication systems, the World Bank Group will support the Government's national transport strategy, aimed at gradually establishing an integrated multimodal transport system and promoting sub-regional cooperation by developing transit links and cross-border facilities.

1.4. TOWARDS A NEW IWT STRATEGY

59. While sound IWT-related elements of policies have been recently formulated in the previously mentioned documents, there remains a lack of a genuine updated Inland Water Transport policy as would be expected as part of the National Transport Policy.

1. Background

Such policy would aim at reinstating the Inland Water Transport Sector at the level corresponding to the role it plays in the national transport system and beyond that, in the economic and social development of the country.

60. The Government of Bangladesh has initiated an effort jointly with the World Bank to define a new strategy for development of Inland Water Transport. This effort was launched during two workshops organized by the Bangladesh Inland Water Transport Authority (BIWTA) to discuss IWT sector issues with the main stakeholders in early 2005 and 2006. This report aims at providing the analytical underpinning that would serve to the Government to decide on the new IWT strategy.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

2. OBJECTIVES AND SCOPE

61. The primary goals of this Economic and Sector Work (ESW) are: (i) to provide an overview and assessment of IWT in Bangladesh, (ii) to identify and discuss the sector's Strengths, Weaknesses, Opportunities and Threats (SWOT analysis); (iii) to help the Government to define a strategy agreed with stakeholders to bolster the sector's contribution to shared growth and poverty reduction; and (iv) to identify priorities for a possible support from the Bank to the sector scheduled in FY09.

62. The scope of the report is limited to transport issues and will not propose a strategy for river management in relation to water management. However, the report will help to better integrate the IWT strategy and the water management strategy. The latter issue goes much beyond the transport sector as it encompasses the impact of dams built in Bangladesh and India as well as the impacts of irrigation and on-going deforestation. It is acknowledged that those three factors reduce the water levels in the rivers, thereby increasing siltation. This has dramatic consequences for IWT as many rivers have already completely silted up or have limited capacity during the dry season, thereby reducing the mobility of people using country boats in rural areas. The other consequence is that rivers widen to compensate for the reduction of their depth. In many locations, this causes dramatic erosion and results in loss of land for an increasing number of rural people. For example, a recent survey of rickshaw pullers in Dhaka found that a significant percentage of rickshaw pullers are landless people who lost their land because of river erosion and came to Dhaka to find job opportunities.

63. The report is structured into a number of sections (3 to 14) which analyze the sector's situation and issues, followed by an analysis of the sector's Strengths, Weaknesses, Opportunities and Threats (section 15). The report then concludes in section 16 with a summary of the main strategic recommendations that might constitute the foundations of a new IWT strategy in Bangladesh. Section 17 provides orientations for future World Bank involvement in the sector.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

3. OPERATION AND MAINTENANCE OF IWT INFRASTRUCTURE AND FLEET

3.1. IWT NETWORK

64. ***Physical characteristics.*** Physical characteristics of the river system are one of the first challenges to overcome when defining a strategy for sector development. The river system in Bangladesh can be divided in four categories from the point of river stability. The northern part of the Meghna River (see map) and a network of its tributaries represent basically meandering flows. These rivers, therefore, form sharp bends and are subject to wide channel shifting. At the same time, some of the tributaries are relatively stable to the extent that a dredged channel may retain some residual deepening over several years. Unfortunately, for a number of years and for various reasons, these rivers have not been dredged or surveyed and, apparently, are now in their natural forms.

65. The second category is in the Jumuna basin where the rivers represent a meandering flow with channels divided by a number of branches. To maintain navigation, normally one of these branches is open for navigation. The confluence of the Jumuna and the Meghna creates the large Lower Meghna River, which is the third category and is relatively easier to maintain with most dredging focused on tributaries and access to ports. Finally, the fourth category is a network of southern rivers under the influence of tidal fluctuations. The insufficient flow in these rivers not only affects navigation but also the general salinity of the water.

66. The rivers in Bangladesh are subject to large flow fluctuations between the high water stage in the June-October period and low flow stage during the rest of the year. The Lower Meghna River's discharge fluctuates from less than 10,000 m³/sec during the dry season to up to 140,000 m³/sec during the monsoon season. The difference between seasonal water levels is on the order of 6-7 m. Water velocities reach a high value of 3-5 m/sec during the monsoon season.

67. ***Network Condition.*** The condition of the network of navigable waterways is not known as the last comprehensive hydrographic survey was carried out in 1989. From the partial information collected from operators and BIWTA, it can be concluded that the level of service provided by the river network is less than the level expected in the existing classification. Annual channel dimensions in many cases do not correspond to their assigned Class. For instance, out of 683 km expected to offer the better level of service of the entire network, only 360 km of waterways between Dhaka and Chittagong actually offer this level of service. Several similar discrepancies have been identified by BIWTA in all classes.

68. ***Network Classification.*** The navigable waterways are assigned to four Classes that define the level of service to be guaranteed taking into account the economic importance of the river as well as the technical and financial capacity to maintain the level of service.

Table 1: Classes of Waterways

IWT Classification	Length (km)	Depth (m)
Class I	683	3.66-3.96
Class II	1,000	2.1-2.44
Class III	1,885	1.52-1.83
Class IV	2,400	Less than 1.52

Source: Department of Hydrography, BIWTA, 1988.

The level of service is defined by the least available depth in the navigation channel based on the loaded draft characteristics of the mechanized cargo vessels. The system of classification is useful as it provides information on the conditions of navigation that can be expected on a river in a defined Class and is also the basis for determining the dredging policy necessary to maintain the conditions of navigation. Classification is also needed to decide on vessel design and ensure its adequacy with the characteristics of the river where the vessel will operate.

69. The network classification does not reflect changes since its establishment 15 years ago:

- a. Type and size of vessels: Draft requirements have increased on certain routes. The single-deck vessels, which existed in large numbers in the eighties, have now given way to larger ships with two or three decks. Cargo ships with a 500 to 1,000 DWT (Dead Weight Tons, expressing the cargo carrying capacity) capacity are quite common, now compared to a capacity of 250 DWT in the eighties.
- b. Navigation restrictions: Navigation has been restricted on certain rivers due to the construction of bridges and overhead high tension wires/cables over waterways without taking into account the vertical clearance required for navigation.
- c. Transport demand: The number of inland ports has increased from 11 in 1988-89 to 19 in 2005 allowing new services to develop. The volume of traffic has increased on certain routes and decreased on others. New traffic is expected to develop in the future such as cross-border traffic with India and dedicated container traffic, in particular between Chittagong and Dhaka.
- d. River regimes: Morphological changes are natural in a very complex hydrologic system of rivers. Changes can also result from other reasons due to human intervention such as increased siltation due to capture of water for irrigation or construction of dams and variable inflow of water discharge.
- e. Maintenance: Maintenance needs result from the definition of a minimum draft on each river of the network as provided by the classification. They need to be confronted however to the financing capacity for maintenance. This specific issue is analyzed in subsequent sections of this report.

3.2. NETWORK MAINTENANCE

70. **Dredging methods**. Dredging is an expensive method of maintenance in Bangladesh where rivers are unstable. In addition, it needs to be repeated every year and there is rarely a permanent solution to the accumulation of sediments. In the majority of

3. Operation and Maintenance of IWT Infrastructure and Fleet

waterways, floods totally wipe out dredging performed at low water stage and the volumes of annual maintenance are practically equivalent to volumes required for capital dredging that has brought the depth of the river to its initial value determined by the network classification. River training is another expensive method that has proved difficult to apply because its effect is not always as positive as expected. Bank protections have also often proved to be inefficient and are used only in a few places.

71. **Dredging capacity.** An ample dredging capacity exists in Bangladesh. Dredging capacity is provided by BIWTA, BWDB (Bangladesh Water Development Board) and the private sector. The total capacity available for dredging is estimated at 14.4 million m³ (BIWTA: 2.8; BWDB: 4.7; private sector⁵: 6.9 million m³). This capacity could be improved through increased productivity. With the present productivity, the capacity for river dredging is estimated at 5.4 million m³ provided by BIWTA and BWDB to which an unknown quantity performed by the private sector can be added.

72. Although no assessment of the condition of the fleet owned by BIWTA is available, it is likely that its useful life is reaching its end and that the issue of dredging capacity in Bangladesh needs to be addressed soon. BIWTA operates seven dredgers which are between 31- and 34-year old. Five dredgers were refurbished between 1991 and 2000 with World Bank financing. The project provided equipment and spare parts but the dredgers were not fully overhauled. Under a normal routine maintenance program, the dredgers would undergo docking every three years, but this has not happened.

73. Productivity of the dredgers operated by BIWTA is low. According to BIWTA, the average annual productivity of the dredgers is 400,000 m³. Assuming that the period of operations lasts six months during the dry season and that utilization is 85 percent, the weekly productivity is about 20,000 m³. The utilization rate is relatively high as maintenance and repairs of dredgers are performed during the high water stage when there is no execution of dredging works. The weekly productivity is higher than the productivity measured before the five dredgers were refurbished (18,000 m³) but still about half of the productivity of similar dredgers in other countries. Insufficient supporting equipment and only two shifts per day apparently explain this low productivity. While three shifts per day are technically possible, lack of experienced crews is the first reason given to explain the limitation to two shifts. The second reason is that increased utilization of the dredgers would result in increased need for maintenance and overhaul and additional resources, which are unavailable within the limited budget, allocated by the Government to BIWTA.

74. BWDB's unused capacity available for river dredging is estimated at 2.3 million m³. BWDB owns a fleet of 27 dredgers of which 18 are suitable for river dredging. The dredgers are newer than those of BIWTA with five delivered in 2001 and the rest between 1977 and 1981. According to BWDB, the newer dredgers operate with an annual productivity of about 420,000 m³, which is similar to BIWTA's performance. The older

⁵ Five private companies operate six large cutterhead dredgers, two with a productivity in the range of 3,500 - 2,500 m³/hour and four 18" dredgers with a productivity in the range of 350 - 400 m³/hour. The Engine Boat Association built seven smaller dredgers with a productivity of 150 m³/hour, which however are not utilized presently.

dredgers have half of this productivity. Based on these numbers, BWDB's annual capacity is estimated at 4.7 million m³. BWDB performs dredging works for water projects, for BIWTA and for the Road and Highway Department. BWDB indicates that it dredges about 2.4 million m³ per year of which on average 0.3 million m³ are performed for BIWTA.

75. Six private companies have developed a dredging capacity. Four companies have 18" cutterhead dredgers with productivity similar to the productivity of BIWTA and BWDB (350 - 400 m³/hour). Two dredgers have productivity 6 to 10 times higher (2,500 - 3,500 m³/hour). The information on the type of works performed by the private sector is not available. Private sector's contribution to BIWTA's programs ranges between 0.1 and 0.5 million m³. In addition, the Engine Boat Owners' Association owns seven small dredgers to dredge small routes for country boats. These dredgers are not utilized because of the inability to recover the cost of operations. A large fleet of makeshift small dredgers also exists in the country but is not suitable for waterway dredging.

76. **Dredging activities.** Maintenance of waterways seems to have received the lowest priority from the Government of Bangladesh compared to route development or maintenance of ferry crossings. Dredging performance has been stable over time at around 3 million m³ (see Annex 1: Dredging Works Executed During The Past 13 Years). Dredging is performed either for maintenance of the river network or for development. The distribution of resources between maintenance and development has been variable but the trend has been in favor of development rather than maintenance. No clear mechanism has been established to decide on the quantities of works to be performed for each of the tasks. Programs reflect demands from Launch Owners' Association, Cargo Vessels Owners' Association, BIWTC, BIWTA as well as political demands.

77. Maintenance works are divided between maintenance of ferry crossings and dredging of navigable waterways. Between three and four BIWTA dredgers are permanently assigned to ferry crossings. During the past three years, the quantity of dredging works at ferry crossings has increased from 1.09 million m³ to 1.49 million m³. On the contrary, the quantity of maintenance of navigable waterways has decreased from 0.85 million m³ to 0.68 million m³.

78. In 2006, BIWTA benefited from additional financing for dredging following the introduction of the Japan Debt Cancellation Fund (JDCF). As a result of the availability of additional resources, dredging volumes were expected to reach 6.5 million m³. However, only 1.1 million m³ were devoted to maintenance of waterways with the remaining amount directed to development works and ferry crossings.

79. **Dredging costs.** Dredging costs estimated by BIWTA, BWDB and the private sector are similar but costs for BIWTA and BWDB would need to be carefully analyzed to verify that they include all inputs, especially the right value of depreciation as equipment used by both entities is very old.

3. Operation and Maintenance of IWT Infrastructure and Fleet

Table 2: Cost of Dredging

	Cost per cubic meter	
BIWTA	Tk 98.00 (including all charges)	US\$1.50
BWDB (without additional charges for tugs, barges and other vessels)	Tk 82.00 for inland waterways Tk 132.00 for coastal areas	US\$1.25 US\$2.00
Private sector	Tk 112.00 (with VAT and profit) Tk 94.50 (without VAT and profit)	US\$1.71 US\$1.45

The numbers compare favorably to costs estimated by private investors to dredge a river for the transport of coal for the Phulbari Coal Project, which range from US\$1.27 per m³ to US\$4.41 per m³ depending on the sailing distance and the type of dredger. They are below benchmarks for large dredging projects in a marine area, which are at about 2 to 3 dollars per cubic meter. Unit costs under the recently completed World Bank-financed Vietnam Inland Waterways and Port Rehabilitation Project were about US\$ 1.5 per cubic meter. Under the new project under preparation in Vietnam, unit costs are estimated at US\$ 2 per cubic meter reflecting the increase in the price of petroleum products.

80. **Dredging requirements.** No information is available on the dredging requirements. BIWTA has not performed a comprehensive hydrographic survey of the network since 1989. A new survey would be needed to assess the current depth of the rivers as well as re-suspension rates of materials. Quantities of dredging volumes have been provided ranging from 6 to 12 million cubic meters. However, these numbers are not substantiated and cannot be verified. Some examples of sections of the river network with major siltation problems are provided in Annex 2: Sections of IWT Network With Siltation Problems.

3.3. PORTS AND LANDING FACILITIES

81. **Infrastructure.** A large number of facilities spread all over the country offer various levels of services. About 1,400 sites are designated as facilities for river transport. BIWTA is responsible for construction and maintenance of about half of these facilities which fall into four categories:

- a. Main ports built, maintained and regulated by BIWTA. Government Acts designate 19 such ports but only 11 have actually been developed. The infrastructure consists of terminal buildings, pontoons, jetties, gangways and godowns or transit sheds.
- b. Landing facilities (ghats) also built and maintained by BIWTA. Three hundred and seventy three sites are designated to have such facilities. Infrastructure consists of pontoons or jetties.
- c. Landing points for country boats at about 400 locations under BIWTA's responsibility.
- d. Landing sites without more than a wooden plank for passenger and freight embarkation and disembarkation.

82. Warehouses in main ports are usually built by BIWTA and leased to a port operator or another private entity. A port operator or a private developer may be

authorized to build its own warehouse as well as jetties and benefit from a reduced lease fee. Public jetties (101 in 8 main ports) are mostly used for passengers while private jetties (178 in 5 main ports) are used for cargo.

83. Absence of sufficient mooring facilities (ghats) is considered to be one of the factors negatively affecting safety on rural waterways. BIWTA allocates little resources to landing points for country boats. As a result, local authorities or local associations of boat owners develop additional sites. These sites are rudimentary and often do not represent more than a segment of shore with walking access to land.

84. **Management.** The framework for port management is not conducive to efficiency and sector development. In nearly all main ports, passenger and cargo operations are conducted by private operators under a lease agreement with BIWTA, with the exception of ports operated by BIWTA where only cargo operations are subject to a lease agreement. However, the duration of the lease is only for one year which prevents operators to invest in port development or maintenance of the port infrastructure. For this reason, damages due to floods, accidents or cyclones are not repaired. Connections between jetties and pontoons are often in poor condition due to unstable anchorage and high fluctuation of the water level during the high and low water seasons (up to 6 meters). A 1997 survey concluded that 40 percent of port operators prefer a two-year lease agreement, 33 percent a three to five-year agreement and only 27 percent approve a one-year agreement.

85. Port operators are selected every year through open tender. The lease agreement is awarded based on the highest offered rental fee. The tender, however, can be substituted by a letter from a local Member of Parliament or the procedure can be opposed by pressure groups in favour of direct negotiations. The tender documents and the decision-making process suffer from ambiguities. The tendering process also suffers from delays due to the high number of procedures to be carried out at the same time every year and the limited capacity of BIWTA. Competition is also limited and BIWTA may not get the best results that can be expected. However, other methods such as auction, which was practiced before 1991-1992 or direct negotiations would not be more transparent nor improve the results.

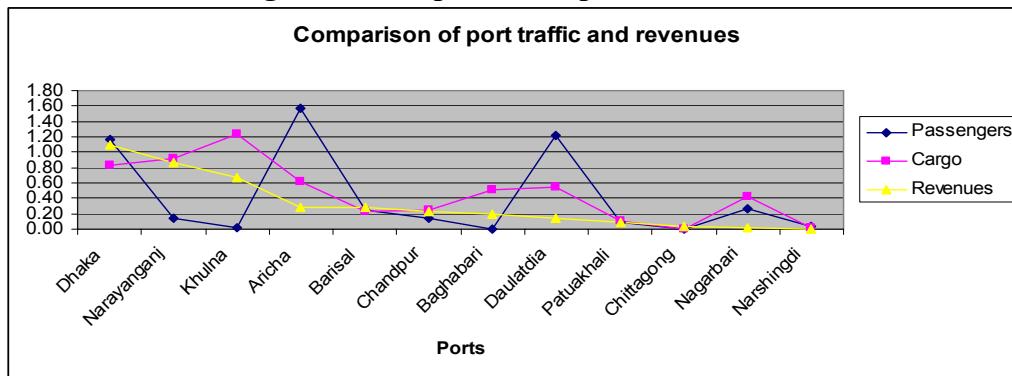
86. The lease agreements do not provide the appropriate legal framework regulating relationships between BIWTA and the operator. Roles and responsibilities are not clearly defined. This often results in complaints in courts about the implementation of the agreement, especially with respect to payment of the rental fee. Licensees are requested to pay a certain percentage of the rental fee within seven days of receiving the award but then often do not pay the balance stating that they could not earn the revenues initially expected. Courts often support the licensees as BIWTA cannot counter the licensees' claims in the absence of proper monitoring arrangements.

87. A comparison of port traffic and revenues shows that port revenues do not seem to be related to the traffic. Daulatdia for example has the same cargo traffic as Baghabari but much more passenger traffic (12 million compared to about 0). Still, both ports generate the same revenues. Narshingi has the same level of traffic as Barisal and Chandpur but generates almost 40 times fewer revenues. Aricha seems also to generate little revenues (six times less) compared to Dhaka, with little less cargo but slightly more

3. Operation and Maintenance of IWT Infrastructure and Fleet

passengers. Naryanganj generates as many revenues as Dhaka with almost the same cargo traffic but 6 times less passenger traffic. This may result from a less than perfect market with few operators as well as from collusion, corruption and political influence.

Figure 1: Comparison of port traffic and revenues



88. A more detailed review of port revenues and tariffs would be needed to provide guidance on a reform of tariffs and selection method of port operators. By moving from flat rates or lump-sum payments to shared revenues, port administration can collect a portion of additional fees with increases in port operations above the initial assumed level of demand. With the new schemes BIWTA may obtain additional funds, without in principle affecting overall operator profits. The benefits should however be measured against the risk of loss of revenues resulting from corruption or weak monitoring and management capacity in BIWTA. This option may be envisaged in ports where modern management practices can be implemented with an acceptable level of transparency and accountability and where the level of traffic is high enough to accommodate the additional cost resulting from improved management.

89. The procedure for selling tickets to passengers is questionable. First passengers pay a fee before boarding the vessels, either to BIWTA or to the terminal operator. Only after that passengers are allowed to board the vessels where they have to purchase their transport ticket. There is no control of the number of passengers boarding vessels that result in frequent overloading. Owners of passenger vessels attempted to sell tickets in the terminal in a more organized way so as to control the number of passengers but BIWTA did not allow it without clear reason. With about 600 independent boat owners, authorization to sell tickets within terminals will require some organization to avoid having one ticket booth per owner, which would make the situation unmanageable. Sub-contracting to a limited number of operators would be the solution, which would in addition facilitate obtaining statistics.

90. Revenues directly collected by BIWTA from passengers in the main ports are said to be subject to pilferage. There is no control mechanism reconciling revenues and the number of passengers transiting through the main ports. Privatization of revenue collection would improve the statistics as well as the performance in revenue collection. Bangladesh Railways improved significantly its revenues by privatizing this activity.

91. Cargo handling methods in port have a low efficiency. All cargo handling is done by manual labor using the so-called "headload" method. None of the public ports has any mechanized equipment in contrast to terminals belonging to private sector that have some

equipment, i.e. conveyors or cranes. Although the size of the gangs in the order of 100 dockers is high, productivity is low with about 7 to 10 days to load a vessel of 500 to 800 DWT capacity. The use of mechanized equipment could reduce this time to one to two days. Long cargo handling times impact negatively on vessel productivity, as the number of trips is reduced, and consequently results in higher overall transport costs. The following table compares transport costs and revenues for two productivity scenarios with manual labor or with mechanized equipment.

Table 3: IWT cargo transport costs and revenues with manual or mechanized handling

	Manual labor	Mechanized equipment	Variation Mechanized/Manual
Number of annual two-way trips	12	26	+114%
Operating costs* (Tk per ton-km)	0.90	0.67	-26%
Total Annual Revenues (based on a tariff of 0.92 Tk/t.km)	2,700,000	5,700,000	+114%
Total Annual Profit (Tk)	60,000	1,600,000	

* Operating costs include depreciation, major overhaul, salaries, fuel, lubricants, maintenance and various fees due to port operators and BIWTA. Source: World Bank estimates

92. With mechanized equipment, operating costs would be reduced by 26 percent due to the higher number of trips. The profit of transporters would increase as well although the competition and increased handling costs would likely reduce it. By increasing productivity, mechanized equipment would reduce congestion as well as the need for new investments to increase port capacity. However, introduction of mechanized equipment is likely to be resisted by labour in a situation characterized already by high unemployment.

3.4. IWT FLEET

93. No recent information exists on the number and the characteristics of the fleet of passenger and cargo vessels. All records are maintained manually by both the Department of Shipping (DOS) and BIWTA, but it was not possible to reconcile this information to provide an accurate description of the fleet. DOS data appears to record the cumulative number of registered vessels as the number of surveyors is insufficient to regularly update the files. The following section is based on 1998-1999 data provided by BIWTA and updated from discussions with various sector professionals:

94. The number of passenger vessels has remained more or less constant since 1998-99 with a static capacity estimated at 230,000 passengers for about 1,874 vessels. Operators claim that the trend is to increase the capacity of existing vessels but BIWTA and DOS do not have data confirming this trend.

95. The fleet of cargo vessels has significantly changed since 1998-99. Dumb barges of 300 tons on average have been replaced by self-propelled vessels of higher capacity of 500 to 700 tons. The total static capacity has increased by about one third from about 750,000 tons to about 1,000,000 tons (see Annex 3: IWT Fleet). The fleet consists of 2,288 units (2,000 cargo vessels, 118 tankers and 170 bay crossing coasters).

3. Operation and Maintenance of IWT Infrastructure and Fleet

96. The total capacity offered by the fleet is estimated at 76 million passengers and 35.2 million tons. Operators estimate that passenger vessels accomplish one one-way trip per day. 10 percent of the time is assumed to be spent on docking for repair. Cargo vessels make on average 12 trips per year during a period of 330 days. The comparison of the capacity offered to the demand provides the utilization ratio of the fleet which is analysed in para. 112 below.

97. While other countries where IWT exists have developed push-towing techniques, this type of transport is not exploited in Bangladesh. The reason for that is that the industry is relatively scattered among a large number of small operators. None of these operators owns a fleet sufficient in number to provide the pusher tug with a set of loaded barges as it arrives at destination with the incoming set of barges. The pusher tug would then have to wait that the convoy of barges be unloaded and then loaded which is inefficient and unprofitable in view of the relatively high cost of pusher tugs.

3.5. COUNTRY BOATS

98. A large fleet of privately-owned country boats operate all over the country. While country boats are more and more in competition with roads, they still play an important role to provide access to remote areas without road access or to areas during floods. The sector is entirely informal and its importance is not easy to quantify. BIWTA estimates the number country boats at about 745,000 of which 484,000 are used for passengers and 261,000 for cargo⁶. Half of the country boats are said to be mechanized, without knowledge of the percentage for each of the passenger and cargo categories.

99. Passengers and especially women are dissatisfied with services provided by country boats. In addition to the lack of landing facilities, which forces to embark and disembark in the water, boats are often overcrowded which is unsafe and a discomfort for women. Women also complain about the lack of toilets, which is a major impediment on long journeys. In many South East Asian countries, very simple toilets are fitted on cantilever at the boat's poop desk, hanging over the water. The amount of money involved is insignificant. Operators interviewed for this report did not express interest in applying this experience in Bangladesh.

100. The IWT and Rural Livelihoods Study⁷ recently completed in the Southern region reported that landing (ghat) facilities are generally inadequate. Planks are mostly used to provide passengers access from the riverbank onto the boat. Mothers with small children, elderly women and pregnant women find it very difficult to use them for embarkation and disembarkation. The lack of toilets in most landing places adds to the inconvenience. This has discouraged many passengers from using country boats.

101. Operators of country boats have to pay a berthing fee to the nearest BIWTA pontoon operator, without using the facilities. Country boats are compelled to pay tolls to nearby ghats, which is expensive and also not fit for use by country boats. The Engine Boat Owners' Association reported that landing facilities such as pontoons are very often ill-located without consultation with country boats operators.

⁶ BIWTA Year Book 2004-2005.

⁷ IWT and Rural Livelihoods, Case of Amtali Upazila, Barguna District, Naved Ahmed Chowdhury – Nov 2002 for DFID.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

102. The need for infrastructure specifically designed for the informal water transport sector has not been consistently addressed. As a result there is hardly any infrastructure available for operation of country boats. As a matter of fact the pontoons commonly installed are too high and are not fit for country boats. The pontoons/berthing stations set up by BIWTA across the country are suitable for large passenger vessels and cargo ships, but are not workable with country boats because the level of the landing platform is too high above the water level.

103. In the absence of Government support to development of facilities adapted to country boats, local initiatives have emerged, but are limited. Some small landing stations and landing stages suitable for berthing of country boats were developed by the Local Government Engineering Department under rural development projects. The Engine Boat Owners' Association outposts have also erected makeshift landing facilities made of bamboo by resorting to their own funds. The number of such facilities is small compared to the requirement of about 745,000 country boats.

104. Under the Third Inland Water Transport Project, boat centers were intended to be established to provide technical assistance to boat owners for repairs and improvement of their boats e.g., in respect of safety or gearbox upgrading. This component of the project was unsatisfactory. Only three centers were built and two were actually completed. The centers were to be leased to the two former Boat Owners' Associations but this failed because the Boat Owners' Associations were not interested in running the centers for lack of resources and pointlessness.

105. The Engine Boat Owners' Association confirms that the establishment of country boat centers was the right thing to do. There was a slipway for maintenance of the boats. The centers could have been a supply center for spare parts and employ a few skilled workers such as mechanics and carpenters. The Association believes that the centers could be financially sustainable, but that the major flaw of the project was the location of the centers. According to the boat owners, the authorities selected the locations regardless of actual users' needs. This may not be the only reason, but nevertheless the centers have never been operating.

4. TRANSPORT DEMAND ANALYSIS

106. **Main IWT functions.** IWT has three functions with distinct modes of operations and stakeholders:

- a. **National:** This consists in trunk haulage of freight and passenger carriage along the main corridors of demand between the ports and major economic centers (including international). Trips are medium to long distance and high volumes of movements are recorded. Vessels are modern vessels of large capacity (100 to 1,200 passengers, 200 to 1,800 tons).
- b. **Local:** This consists in feeder, distribution and local traffic. Trips are mostly on short distances with low volumes of movements to and from (and between) smaller communities. The demand is predominantly for passenger movements but with an important need to accommodate modest freight loads, usually for small enterprise, small-holder or ‘own account’ purposes. Local trips use traditional country boats offering a capacity of up to 100 passengers and 100 tons.
- c. **Ferries:** Ferries link sections of roads separated by large channels in the absence of bridges. Functionally these are an entirely separate category since they are part of the road transport system rather than the IWT system. However, operationally it is sensible to integrate aspects of the ferry services (such as vessel maintenance and repair and river dredging) with those of IWT.

107. **Share of IWT in total transport demand.** The share of IWT in the passenger transport market has decreased from 16 percent in 1975 to 15 percent in 1996 and 8 percent in 2005. In comparison, rail lost more of its market share from 30 percent in 1975 to 6 percent in 1996 and 4 percent in 2005. The road share has dramatically increased from 54 percent in 1975 to 88 percent in 2005, reflecting the heavy investments in the sector. Comparing again rail and IWT, IWT continuously lost traffic in absolute values during the period analysed, whereas since 1996 rail has been able to reverse the negative trend observed during 1975 and 1996.

108. The share of IWT in the cargo transport market has decreased from 37 percent in 1975 to 30 percent in 1996 and 16 percent in 2005. Like for the passenger market, rail lost more of its market share than IWT, from 28 percent in 1975 to 7 percent in 1996 and 4 percent in 2005. The road share has again dramatically increased from 35 percent in 1975 to 80 percent in 2005. Comparing rail and IWT, IWT traffic in absolute values has stabilized since 1996 while since 1996 rail has continued to increase modestly since 1975.

Table 4: Modal Share of Passenger and Cargo Traffic

	Passenger Traffic (Billion Pass.Km)						Cargo Traffic (Billion Ton.Km)							
	Total	Road	%	Rail	%	IWT	%	Total	Road	%	Rail	%	IWT	%
1975	17.0	9.2	54%	5.1	30%	2.7	16%	2.6	0.9	35%	0.7	28%	1.0	37%
1996	66.0	52.0	79%	3.9	6%	10.1	15%	10.7	6.9	63%	0.8	7%	3.0	30%
96/05 annual growth	7.1%	6.6%		0.7%		-1.3%		6.9%	8.6%		0.8%		0.1%	
2005	111.5	98.4	88%	4.2	4%	8.9	8%	19.6	15.7	80%	0.8	4%	3.0	16%

Source: Bangladesh Integrated Transport System Study, Final Report, Planning Commission, 1998 and own calculations⁸

109. In terms of productivity per kilometre of network, rail offers the best results. IWT and road have the same productivity for passengers. IWT has more than twice the productivity of roads for cargo.

Table 5: Intermodal Comparison of Transport Networks' Productivity

	Road	Rail	IWT
Network (km)	274,000	2,800	24,000
Productivity per km of network			
- Passengers-km	359,000	1,500,000	369,000
- Tons-km	57,000	293,000	127,000

Source: Own calculations

110. **Cargo demand.** IWT is used mostly for transport of bulk cargo where it is most competitive, especially compared to road transport. Recent data are not available on the main commodities transported by IWT. 1996 data are presented in the following table. Construction materials represented more than half of the commodities transported by IWT in 1996.

Table 6: Major products using IWT

	Million Tons (1996)	Percentage
Construction materials	12.54	57
Petroleum, Oil and Lubricants	3.08	14
Fertilizers	2.42	11
Food grains	1.32	6
Other (jute, salt, etc.)	2.64	12
Total	22.00	100

111. **IWT demand on main corridors.** In 1996, the only year when data are available on traffic on the main corridors of the IWT network comprising mostly rivers in category I of the network classification, the main corridors were carrying 24 percent of the total waterborne traffic of passengers and 44 percent of the total waterborne traffic of cargo. Passenger traffic is greatly unbalanced in favour of the South of the country (Khulna) which represents 57 percent of the total traffic on the five corridors. Roads are relatively

⁸ The distribution of traffic among transport modes in 2005 has been estimated based on actual data for rail, on IWT traffic in ports for formal IWT traffic, and assumptions on growth of overall transport demand and of informal IWT traffic. Data for previous years are obtained from traffic surveys.

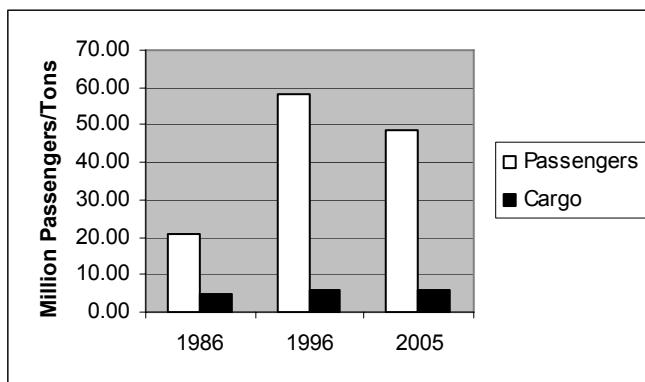
less developed in the Southern region compared to the North, which explains the importance of the IWT corridor for the South.

Table 7: IWT traffic on major routes

1996	Passenger (millions)	Cargo (million tons)
Dhaka-Chittagong	3.7	2.8
Dhaka-Northwest	1.9	2.6
Dhaka-Khulna	12.5	2.3
Dhaka-Sylhet	4.0	2.0
Total	22.1	9.7

112. **Port throughputs.** The analysis of port throughputs during the 1986-2006 period shows that IWT traffic has grew significantly from 1976 to 1986 reflecting investments in new ports but then has decreased reflecting the competition with roads. Passenger traffic grew from 21 million passengers in 1986 to 58 million in 1996 but was down to 48 million only in 2005. Similarly, cargo traffic averaged 5 million tons between 1986 and 1994, grew to about 6 million tons in 1996 but fell to 4 million tons in 2003 to increase again to 5.7 million tons in 2005.

Figure 2: Port Throughputs



People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

5. ECONOMIC ANALYSIS

5.1. IWT PRODUCTIVITY

113. The comparison of the capacity offered (para. 96) to the quantities actually transported provides an estimate of the utilization ratio of IWT vessels.

Table 8: Utilization of IWT Fleet

	Capacity offered	Actual demand	Utilization ratio
Passengers (million passengers)	76.0	63.0	83%
Cargo (million tons)	35.2	18.1	51%

114. The utilization ratio of 83 percent for passenger vessels is relatively high. Distribution of traffic in both directions is more balanced than for cargo but along the year is not uniform however. Operators claim that there are periods of heavy overloading, often vacation periods, and periods with low levels of traffic.

115. The utilization ratio for cargo vessels less than for passenger vessels. As it is an average on both directions of trips, it is likely that there is some unbalance between the two directions of the trips. This would mean that vessels are likely to be overloaded in one direction and that the fleet size is determined to respond to the demand on the major direction. Overloading in one direction is likely to be the sign of unsatisfied demand. Assuming that the productivity of vessels increases as a result of cargo handling equipment in ports, the capacity offered would increase to 62.8 million tons. The increased capacity would then allow the industry to respond to this unsatisfied demand and thus increase its market share. In view of the significant difference in capacity offered with or without mechanized port equipment, a sudden increase in capacity would create the risk of jeopardizing the IWT cargo industry. However, availability of cargo handling equipment is unlikely to be sudden and widespread, and this risk is considered minimum.

116. Productivity of the cargo fleet is significantly reduced during the dry season. i.e., for 7 months from October to mid-May on certain routes. For example, during this period, navigation to Sylhet is hampered by five shallow areas restricting navigation to 300 DWT barges or 800-1,000 DWT barges at half load (draft about 2.0 m). As a result, the cargo tariff to Sylhet slightly increases to Tk 260 per ton during the dry season, Tk 20 above the tariff during the monsoon season (Tk 240 per ton). Should those areas be dredged, barges up to 800 DWT could reportedly operate the year round. During the monsoon period, i.e., about 5 months per year, barges of 1,000 DWT (draft 3.3 m) up to 1,500 DWT (draft nearing 4.0 m) reportedly operate on the northern route at full load. Traffic to Sylhet was estimated at 2 million tons in 1996.

5.2. INTERMODAL COMPARISON

117. *Comparison of tariffs for passenger transport.* Although passenger tariffs are regulated, private road and IWT operators use different tariffs. Bangladesh Railways which competes with IWT applies tariffs determined by the Government. The following table provides a comparison of tariffs between road, rail and IWT on two major routes

Table 9: Comparison of passenger tariffs by transport mode

		Dhaka-Chandpur	Dhaka-Barisal
ROAD	Distance	130 km	250 km
	Fare	Tk 110	Tk 250
	Tariff/pass-km	Tk 0.85	Tk 1.00
RAIL	Distance	315 km	No rail connection
	Fare	Tk 72	
	Tariff/pass-km	Tk 0.23	
IWT	Distance	68 km	175 km
	Fare	Tk 61.2	Tk 146.5
	Tariff/pass-km	Tk 0.90	Tk 0.84

118. Rail tariffs are much lower than road and IWT tariffs. However, they do not reflect actual costs, and this explains the abysmal financial situation of Bangladesh Railways. Even with very low tariffs, travel by rail is more expensive than IWT as the distance by rail is much longer than by IWT. IWT is the least expensive mode of transport because the distance is less than with other modes on these two routes. On the Dhaka-Barisal route, this allows IWT operators to apply a tariff per passenger-kilometer higher than the official tariff (Tk 0.75) and still remain competitive. Operators have to take into account the fact that travel time by IWT is longer than by road, which prevents them to increase the tariff further.

119. **Comparison of tariffs for cargo transport.** Tariffs for cargo transport are deregulated and reflect better the market conditions.

Table 10: Comparison of cargo tariffs by transport mode

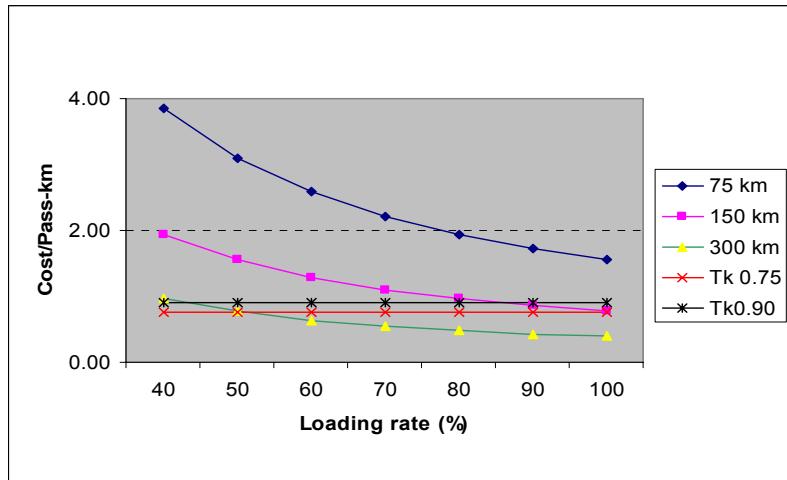
		Dhaka-Chittagong	Dhaka-Sylhet
ROAD	Distance	264 km	346 km
	Tariff per 5-ton truck	Tk 6,000	Tk 7,500
	Tariff/ton-km	Tk 4.50	Tk 4.34
RAIL	Distance	340 km	230 km
	Tariff per ton	Tk 930	Tk 870
	Tariff/ton-km	Tk 2.74	Tk 3.78
IWT	Distance	304 km	410 km
	Tariff per ton	Tk 300	Tk 260
	Tariff/ton-km	Tk 0.99	Tk 0.63

120. The tariffs reflect results found in other parts of the world with IWT being the least expensive mode of transport, followed by rail and road which is the most expensive mode. The data above do not include handling costs at the port and railway station, nor transfer costs from the initial destination to the port and railway station as well as transfer costs from the port and railway station to the final destination. In view of the gap between the tariffs, the position of IWT as the cheapest mode of transport is not expected to change if these additional costs are included, the gap being only slightly reduced.

121. **Comparison of IWT tariffs and costs for passengers.** The comparison suggests that operators need to overload their vessels to make a profit if they apply regulated tariffs, with the exception of long distance journeys (300 km and beyond). Regulated tariffs are Tk 0.90 per passenger-km for journeys up to 100 km and Tk 0.75 for journeys of more than 100 km. Passenger transport is profitable for long distance journeys with a loading rate above 50 percent. For mid-distance journeys (150 km), a 100 percent loading

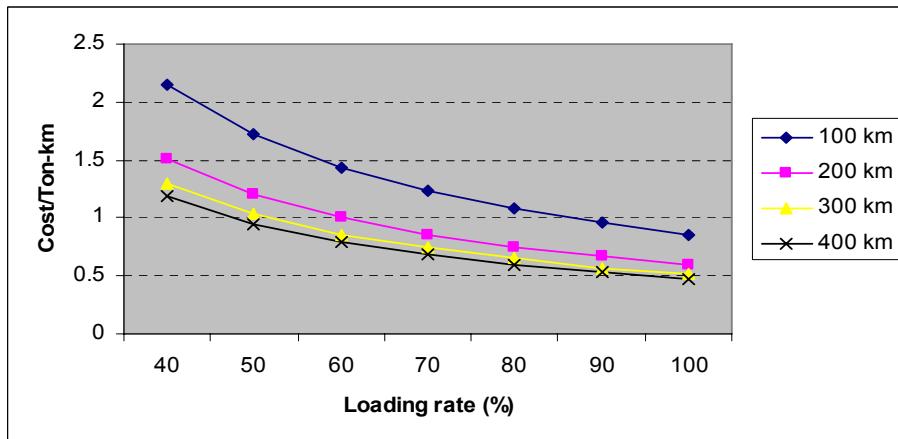
rate is necessary to make a profit. For short distance journeys (75 km), a 180 percent loading rate is necessary to make a profit. The following graph compares the transport costs to the regulated tariffs in various scenarios of loading rate and length of journeys (75 km, 150 km and 300 km). The model used for calculating costs is provided in Annex 4: IWT Operating Costs.

Figure 3: Comparison of IWT passenger costs and tariffs



122. **Comparison of IWT costs for cargo.** IWT costs are below the road and rail tariffs above, confirming that IWT is the cheapest mode of transport. The following graph compares costs per ton-km based on various assumptions of loading rate and distance of journey. Comparing costs to the tariffs offered on two routes as presented in para. 119, IWT is profitable for a distance of 300 km with a 60 percent loading rate or higher and for a distance of 400 km with a 80 percent loading rate or higher.

Figure 4: IWT Cargo Costs by loading rate and journey distance



123. Due to its low transport costs, IWT would be competitive for transport of containers between Chittagong and Dhaka as well as between India and Bangladesh. Assuming an average load of 12 tons per 20-foot container and a 100 percent loading rate, the cost of transporting containers from Chittagong to Dhaka would be about Tk

1,900. The tariffs as indicated above are Tk 300 per ton or, for an average 20-foot container of 12 tons, Tk 3,600. There is thus a considerable margin between tariffs and costs, which give the IWT industry the possibility to be very competitive, compared to road and rail. By rail, the current tariffs are Tk 6,000 and by road Tk 12,000. For international transport between India and Dhaka, goods have presently to transit through the port of Mumbai and then Singapore or Colombo. From there, they are transported by feeder vessel to Chittagong. The total transport cost from origin in India to final destination in Bangladesh (Dhaka in general) is around US\$2,500 per TEU and the delivery time is between 15 and 30 days. With a transport of freight within India by rail to Kolkatta and then by IWT to Dhaka, the cost would be reduced on average to US\$700 per TEU and the delivery time to seven days.

124. **Country boats.** Operation of country boats is financially viable. A comparison of costs and revenues in the Mongla area with a relatively high demand for country boat services concludes that the operation breaks even with a 50 percent loading rate including depreciation. Without depreciation, which is often ignored in the informal sector, the operation breaks even with a 26 percent loading rate. Still actual earnings are low and insufficient when large repairs are needed. Local associations provide some support in this case but boat owners depend often on rural moneylenders that have the practice to take 50 percent of the operating profit to repay the loan. Loans carry a 10 percent monthly interest rate and are thus extremely difficult to repay.

125. Profitability of country boats could be improved by the use of a gearbox. For the calculation of transport costs using country boats, the fuel consumption is estimated at Tk 900 per day. Assuming 180 days of operation and a reduction of consumption of 30 percent, annual savings on fuel would amount to Tk 48,600. This is about twice the cost to install a gearbox package, including new shaft and propeller. It is likely that country boats owners are not fully aware of these savings and that the difficulty to find the resources for the investment also explains why they do not invest in a gearbox.

126. Tariff regulation for passengers does not seem justified as operators do not comply with the tariff regulation. Passenger tariffs for country boats are fixed by BIWTA, but the local unions of operators determine their own tariffs. In the example above in the Mongla area, the tariff is Tk 1.0 per passenger-km, one third above the BIWTA tariff. Cargo tariffs are deregulated.

5.3. ECONOMIC JUSTIFICATION OF DREDGING

127. From the standpoint of the country's economy, dredging of waterways is highly economically justified. Savings in transport costs of cargo resulting from the use of IWT rather than road are estimated at Tk 7.5 billion whereas the cost of dredging is estimated at Tk 0.6 billion (see Annex 4: IWT Operating Cost). Cost of road maintenance and transfer costs of IWT cargo between the ports and the origin and destination of the freight would need to be added but this is unlikely to change the results of the comparison between dredging costs and benefits from using IWT significantly. This analysis is done globally on the entire IWT network. It would need to be carried out by sections of the network. Using the data above, the threshold below which dredging would not be justified is roughly estimated at 30,000 tons equivalent to one trip of a 600 ton ship per week.

128. While there is an economic justification to maintain the network used by the modern sector, there is no rationale for improving the rural navigation network beyond its natural depth. Indeed, there is no justification to increase the depth of the thousands of kilometers of rural waterways by dredging as long as the country-boats operate year-round under current conditions. As a general rule dredging is not relevant where country-boats can accommodate the natural conditions of waterways. Owing to the limited draft of country boats, dredging on the thousands kilometers of rural waterways would not be economically justified because it would not generate benefits for the economy beyond those which already occur.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

6. INSTITUTIONAL REVIEW

6.1. OVERVIEW

129. The main public institutions in the sector are:

- a. The Ministry of Shipping (MOS), which has overall responsibility of the sector;
- b. The Department of Shipping (DOS), which is a department of MOS;
- c. The Bangladesh Inland Water Transport Authority (BIWTA);
- d. The Bangladesh Inland Water Transport Corporation (BIWTC).

130. **Department of Shipping.** DOS is responsible for safety, the provision of the regulatory framework for the sector and for training and scrutiny of maritime staff. It includes the Inland Ship Safety Administration (ISSA), which is responsible for the definition and enforcement of ship safety rules and for registering vessels. ISSA is also the institution responsible for managing environmental aspects of the sector.

131. **Bangladesh Inland Water Transport Authority.** BIWTA is a parastatal responsible for maintenance and development of waterways. This responsibility includes:

- a. Provision of dredging services;
- b. Provision of pilots and navigational aids;
- c. Provision of hydrographic services;
- d. Management and administration of inland ports and landing facilities of significant importance;
- e. Regulation of transport operations, including licensing and scheduling of routes and setting up of tariffs;
- f. Approval of the design of vessels plying in the inland water of Bangladesh;
- g. Training and research.

132. **Bangladesh Inland Water Transport Corporation.** BIWTC is a parastatal providing passenger and freight shipping services. Its main business is the provision of ferry services at four major river crossings and the operation of passenger services in the coastal area.

6.2. SECTOR COORDINATION

133. Inland Water Transport is part of a domestic multi-modal system. However, development of inland waterways and development of roads and railways are conducted by two separate ministries, the Ministry of Shipping and the Ministry of Communications (MOC). Individual proposals are submitted separately by the two Ministries to the Planning Commission, which has to decide between competing proposals when this should be based on a comprehensive vision for the development of national transport infrastructure. As a result, decision is often taken by resorting to political considerations or by extending past trends. Multimodal coordination is being improved at the level of

the Planning Commission with a Transport Sector Coordination Wing (TSCW), created with support from the UK Department for International Development (DFID). At the level of the sector Ministries, while transfer of IWT institutions to MOC would help to build a more coherent vision for transport sector development, another alternative would be to set up a coordination mechanism between the two Ministries. Such mechanism would likely have a more limited impact, but could ensure that road projects are not an impediment for IWT transport or that IWT projects do not stop at the border of the port but include the links to the road network.

134. Country boats are facing more and more competition from other sectors. Embankments are built by BWDB for preserving habitat and human life from flooding but often restrict movements of country boats. More and more roads are built on embankments and provide a faster access to other parts of the country. Bridges are built on roads without leaving the clearance necessary for boats because of lack of coordination between Government agencies. Use of water for other purpose than transport impacts also on country boats movements. Fishermen and farmers use fishing nets, build earth dams or extract water for irrigation, all of which are potential obstacles for rural IWT.

6.3. OVERLAPPING RESPONSIBILITIES

135. The overlap of responsibilities between BIWTA and DOS is apparent. While BIWTA defines construction design, DOS certifies the same vessel after construction; crew members are trained by BIWTA but licensed by DOS. BIWTA issues some classification rules for ship operations with DOS monitoring these rules. All of these functions could be better executed by one of these two organizations. The Inland Water Transport Authority Ordinance of 1958 created BIWTA. The Ordinance set up an Authority for development, maintenance and control of inland water transport and of certain inland navigable waterways. The subsequent Inland Shipping Ordinance of 1976 conferred sector responsibilities to both BIWTA and DOS without clarification and drawing the line between the two institutions. The 1983 Merchant Shipping Ordinance conferred responsibilities for international transport through sea-going ships to DOS.

6.4. SECTOR MANAGEMENT

136. While only DOS personnel have judiciary rights to control vessel behavior on the waterways, it does not have the capacity to exercise this responsibility. For instance, it is quite common that pontoon sites are overcrowded by fleets, especially by passenger launches, creating unsafe conditions. BIWTA representatives, who are normally present at the port to oversee cargo handling operations, do not have the rights to regulate these situations. This function is for DOS staff, which is usually not present at the port. DOS is a relatively small organization with only 62 employees assigned to IWT. Options to increase the capacity to control vessel behavior would be to transfer the right to supervise vessel behavior to BIWTA representatives or to increase DOS staff to ensure a presence at the ports. BIWTA is envisaging the creation of a safety and traffic management department but clarification of responsibilities between DOS and BIWTA will be needed to make this new department operational and prevent redundancy with DOS.

137. Capacity to enforce vessel regulation is weak. It is stated that about 1,000 vessels are not registered with DOS. Controls of fleet condition are insufficient because of lack of surveyors and inspectors. Recruitments expected under TIWTP did not happen. As boat owners are willing to pay an additional amount for timely surveying, there is no incentive in DOS to recruit additional staff. However, acknowledging that this situation can hardly continue because of the price paid in lives lost, DOS envisages delegating inspection and surveying to private companies of international standing.

138. Lack of financial and management information system in BIWTA hinders BIWTA planning and monitoring capacity. Planning is done on an ad-hoc basis without a sector perspective, objective information and justification. Costs are not objectively known. BIWTA does not monitor the sector:

- a. No comprehensive hydrographic survey of the entire network of waterways has been carried out since 1989 and as a result the condition of the network is not known. Partial information is collected from the operators and surveys limited to the most important inland and coastal routes but this can hardly be used to properly plan maintenance or investments.
- b. BIWTA does not monitor port performance. As indicated previously, port operators often claim that they cannot pay the lease that they committed to pay in their bid but this claim cannot be rejected in the absence of proper monitoring mechanism. Leasing agreements do not require port operators to provide information on their activities and port performance.

139. Passenger tariffs are regulated by BIWTA negatively impacting on the sector. The comparison of tariffs and costs for passenger transport concludes that regulated tariffs are insufficient and that operators do not have another solution than to overload the vessels to generate profit if official tariffs are enforced. Tariffs regulated by BIWTA are not updated regularly (they were revised in 2005 following a new rise of fuel costs). BIWTC tariffs remained constant between 1991 and 2005. The analysis of costs also shows that they are highly dependent on the size of the vessel, the length of the trip and the loading rate, which themselves depend on the demand and on the tariffs. Official tariffs cannot reflect the diversity of the situations encountered in the sector. IWT is also competing with the railway sector, which applies tariffs that do not reflect the cost. This is unfair competition and this would limit the capacity of IWT operators to adapt their tariffs when they are deregulated.

6.5. TIWTP INSTITUTIONAL DEVELOPMENT ACTION PLAN

140. Few actions included in the action plan agreed in 1991 during the preparation of TIWTP were implemented.

- a. A dredging unit reporting to Member-Engineering was created.
- b. Activities related to regulation of cargo tariffs were terminated.
- c. BIWTC redundant staff was not transferred to BIWTA to compensate for the shortfall in pilots and crews on dredgers.
- d. The Barisal workshop was not transferred to BIWTC.

- e. Inland vessel design approval responsibilities and associated staff were not transferred to the Department of Shipping.
 - f. The Deck Personnel Training Centre was not transferred to DOS.
141. Among the actions above, transfer of redundant BIWTC staff to BIWTA to increase the crews working on dredgers may not be necessary if the policy to develop the use of the private sector is adopted. Transfer of vessel design approval and staff to DOS remains pertinent in view of the need to strengthen DOS capacity in enforcing regulation on vessel safety. Transfer of the Barisal workshop and Training Centre, although justified, are not major institutional reforms.

6.6. INSTITUTIONAL SUPPORT FOR COUNTRY BOATS

142. Country boats associations have had little impact on the Government policy. At the local level, their representatives have been successful in setting up some landing facilities, collecting funds from their members to provide a safety net and maintaining some order and discipline in the profession. Country boats are organized in two associations, one for mechanized and one for non-mechanized boats.

143. Country boats owners often complain from being harassed by local authorities and the police, the reason being that they have no formal title of ownership of their boat and they do not have a license to operate. As these documents are not required in any regulation, this harassment is likely to be caused actually by corruption. The Department of Shipping has started to register mechanized country boats and is considering the same for non-mechanized country boats.

144. Country boats are charged a fee by ghat managers although they do not use the facilities. This is authorized by the ghat lease agreement. Country boats often load or unload passengers and cargo in the vicinity of the ghat without using the infrastructure. The fees they have to pay further erode the profitability of the activity.

145. BIWTA does not pay very much attention to country boats. It focuses more on the modern sector operating along the major routes. It is unlikely that this will change in the future because of the informal character of country boats and the difficulty for a Government institution to have a grasp on the sector. However, two issues would need to be addressed:

- a. Regulation: Some basis for regulation exists in the Inland Water Transport Authority Ordinance of 1958. Country boats fitted with engines of up to 16 horsepower were exempted from registration in the Inland Shipping Ordinance adopted in 1976. Since then, mechanization has spread quickly and it is estimated that half of the country boats are mechanized. Some local governments have established their own regulation. The issue thus remains to decide whether some regulation should be introduced and who should administer this regulation.
- b. Infrastructure: Little has been done to improve infrastructure for country boats. While BIWTA has developed a project to build 400 landing facilities, and some donor-funded projects have allocated funds to such facilities, developing infrastructure for country boats has not been considered as a

priority by the Government. BIWTA has difficulties to represent the interests of country boats, as it is a very centralized institution that does not have representatives at the decentralized level where discussions with representatives of country boats could be held.

6.7. POLITICAL ECONOMY OF THE IWT SECTOR

146. A large number of stakeholders influence the political economy of Inland Water Transport. Sector institutions have been described in the paragraphs above. While Government institutions are expected to play a regulatory, policy, budgetary and technical role, State institutions, such as Ministers and the National Assembly, also play a role more governed by political considerations. The private sector is represented by several associations of owners: Cargo Owners' Association (for passengers), Cargo Freight Owners' Association, Tanker Owners' Association, and workers: Porter (Kuli) association with local Collective Bargaining Associations (CBAs) in the ports. The Engine Boat Owners' Association represents country boat operators.

147. Political influence is particularly evident for the selection of port managers and cargo handling operators. Clause 4(c) of the Ghat Ijara Policy authorizes local Members of Parliament, Ministers in charge of the district or the Shipping Minister to lease out ghats and ports to specific institutions/organizations/associations for the welfare of the people. As a result, all the most important ports and ghats have been leased out using clause 4(c). The financial terms of the leasing agreements for these ghats and ports are defined without competition and through a non-transparent process. Often, the owner of the lease agreement is not the actual port manager or cargo handling operator as it does not have that capacity but it sub-contracts port management or cargo handling operations to actual operators. This however is accompanied by various financial transactions that benefit the decision-makers and the intermediaries. As a result, this also increases the cost of the use of the ports, which is contrary to the initial objective of people's welfare.

148. Bangladesh has generally suffered from lack of continuity in key managerial positions in the Government or state owned enterprises. This is similar in the IWT sector. Key positions are often given as a political reward or as a promotion before the end of a career. This often translates into lack of leadership, because of either lack of time to develop and start implementing a vision for the sector, or bureaucratic approach to sector management or lack of motivation to do a proper job.

149. In addition to the practices above for leasing out ports and ghats, other cases of bad governance have been identified in the sector, which are likely to create opposition to reforms. The actual level of dredging costs is difficult to measure, one of the reasons being poor control of expenditures (fuel consumption and working hours). Similarly, revenues generated by port terminal fees applied to passengers or cargo fees are not controlled and fees are not collected in proper manner. Up to two third of the revenues might thus be lost for the sector.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

7. SECTOR FINANCING

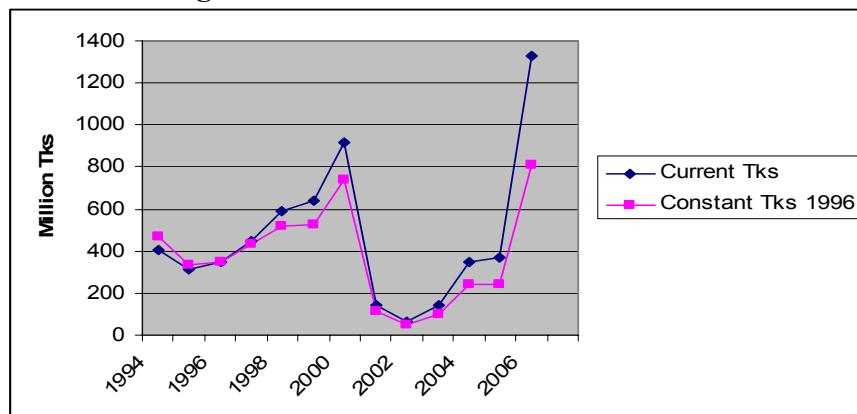
7.1. SECTOR EXPENDITURES

150. While lack of resources has been the reason given to explain why IWT has lost its share of the transport market in Bangladesh, the Government has not given priority to maintenance of the IWT network within the resources allocated to the sector. Indeed, the priority given to other expenditures than network maintenance such as development dredging and maintenance of ferry channels may explain why the overall condition of the network has deteriorated and why the demand has transferred to road, especially during the dry season. The data provided by BIWTA for the past three years show that maintenance dredging on navigable waterways, exclusive of ferry crossings, has actually decreased from 0.85 to 0.68 million cubic meters, a 20 percent reduction. In 2005-2006, when dredging volumes were expected to jump to 6.5 million m³ due to the introduction of resources from the Japan Debt Cancellation Fund (JDCF), only resources for 1.1 million m³ were allocated by BIWTA to maintenance dredging of navigable waterways, the rest being directed to ferry crossings and development works.

151. The Government allocates resources to BIWTA from two sources:

- a. Annual Development Program (ADP): These resources are used for development dredging. The following graph presents ADP allocation to IWT since 1993-1994. While resources increased regularly from 1995 to 2000, from 2001 to 2005 they fell below or near the 1995 level. 2006 shows a dramatic increase in the budget in current Takas, which is above the maximum reached in 2000. However, in constant Takas, the 2006 budget is similar to the 2000 budget. The annual variations however reflect the volatility of the Government budget and the difficulty to sustain sector development in the absence of a coherent mid-term vision for the sector supported by the Government.
- b. Government grants: These resources are used for maintenance (IWT network and ferries). They appear in the Government annual revenue budget.

Figure 5: ADP allocation to IWT Sector



152. Expenditures in the Government ADP and the BIWTA financial statements do not reconcile. Annex 6: Government and BIWTA Resources for Dredging presents the ADP

allocation, the corresponding expenditures registered in the Government accounts and revenues registered by BIWTA in its financial statements from Government grants and dredging revenues financed by the Government. Clarification would be required to reconcile the numbers.

7.2. BIWTA

153. Although BIWTA's financial situation improved between 2000/01 and 2005/06, BIWTA is unable to recover its costs from its revenues even after receiving a subsidy from the Government. Since 1991/92, the cost/recovery ratio has deteriorated until 2000/01, when it reached a low 52 percent. The cost/recovery ratio has improved since then and was expected to reach 86.7 percent in 2005/06. This improvement results from a reduction in the service of the debt (from Tk 338 million in 2002/03 to Tk 146 million in 2005/06) and a significant increase in the Government subsidy (from Tk 210 million in 2000/01 to Tk 530 million in 2005/06).

154. The financing sustainability of BIWTA is deteriorating. The Government contribution to BIWTA revenues increased from 25 percent in 1995-96 to between 31 percent and 35 percent during the 2000/01-2004/05 and recently jumped to 47 percent in 2005/06. Revenues collected by BIWTA have increased or decreased haphazardly during the past ten years. However, since 2004/05 they are above Tk 600 million after having been below Tk 519 million during the previous years. Still, the increased reliance on Government financing weakens the financial sustainability of the enterprise.

155. The 2006/07 budget expects a slight deterioration of BIWTA's financial situation compared to the current year. The Government subsidy is expected to decrease from Tk 530 million to Tk 474 million which would however be compensated by an equivalent increase in BIWTA's own revenues. Expenditures are expected to increase due to a large increase in salaries decided by the Government for the entire public sector. With a 26 percent increase expected in 2006/07, this would continue the trend started in 2005/06 when salaries increased by 36 percent.

156. The distribution of BIWTA resources between operational and administrative expenditures seems largely in favour of administrative expenditures. In the year 2004-2005, only 13 percent of revenue expenditures were allocated to dredging. While BIWTA calculated that the cost of dredging was about Tk 83 per cubic meter on average in 2004-2005, there is uncertainty on how much administrative cost should be allocated to dredging and how much the actual cost of dredging would be after this allocation. Total expenditures for both maintenance and capital dredging amounted to Tk 238 million in 2004-2005 for 2.875 million cubic meters. This represents only 21 percent of the total expenditures of BIWTA during the same year. Adding other development expenditures, the percentage of non-administrative expenditures would still represent only 33 percent of total expenditures.

157. Depreciation of new equipment under acquisition is expected to worsen BIWTA's financial situation significantly. The equipment includes dredgers and salvage vessels for an amount of US\$66 million. Assuming a 25-year amortization period, the annual amount of depreciation is estimated at Tk 159 million, equivalent to the current amount registered in BIWTA's books for already own equipment. As the new equipment is not expected to

generate a significant amount of resources, the deficit is going to increase by the same amount plus the interest on the loans. Obviously, BIWTA will not be able to service the debt nor amortize the equipment, which makes the investment unsustainable from BIWTA's point of view. In addition, it raises the question of the rationale of on-lending the loans to BIWTA. This reflects the lack of trust from the Government in the management and accounting system of parastatals, fearing that the subsidy provided to service the debt will be used for other purposes and that the amount of the subsidy itself does not correspond to services actually provided. This also reflects the Government preoccupation to keep better control of its expenditures. As a result, the Government does not provide the resources to the parastatal to service the debt and service the debt itself.

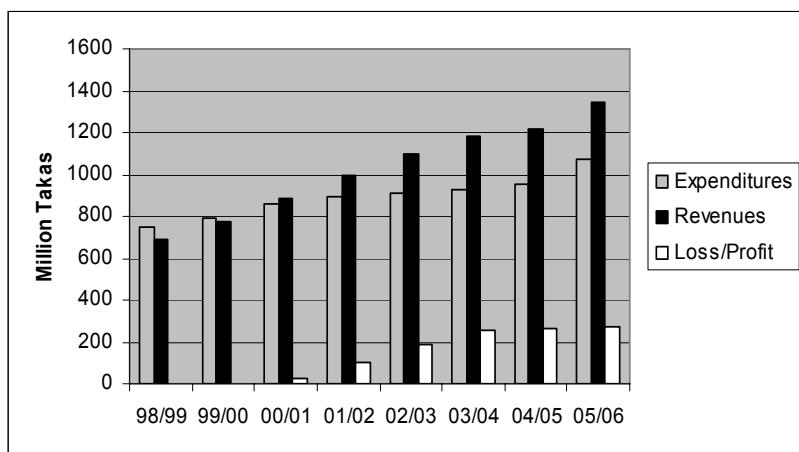
158. BIWTA collects a small percentage of its revenues from port and inland waterways users. Port revenues ranged between Tk 300 million and Tk 360 million during the past five years and their share in BIWTA's overall revenues has decreased from 73 percent to 61 percent. Revenues from conservancy and pilotage have regularly increased but their share in BIWTA's revenues has remained constant between 8 percent and 10 percent. The share of canal dues in BIWTA's has remained constant around 3 percent. These revenues are complemented by resources from the Government in addition to the Government subsidy. These resources are allocated to development dredging and have regularly increased from Tk 28 million to Tk 115.6 million. Their share in BIWTA's revenues now represents 20 percent against 7 percent five years before.

7.3. BIWTC

159. After the opening of the Jamuna Bridge in 1998, which entailed heavy losses to BIWTC finance due to the closure of an important part of its ferry activities, BIWTC has undertaken reforms in line with recommendations made under the Third Inland Water Transport Project (TIWTP) financed by the World Bank. Restructuring measures were agreed as part of the institutional and financial components of TIWTP, including deregulation of freight tariffs, establishment of profit centers within BIWTC, creation of business units by type of activities, and reduction of BIWTC fleet by phasing out cargo operations. Although all these measures have not yet been fully implemented, BIWTC has managed to improve its financial viability over recent years (See Annex 9: BIWTC Profit and Loss A/C/ Form). This situation remains fragile in view of new projects such as the Padma Bridge, which could have an adverse impact on BIWTC in the future.

160. BIWTC revenues come from three activities: (a) passenger services operated in coastal areas; (b) ferry services operated at the main crossings between the river and the road networks; and (c) cargo services. Ferry services generate about 85 percent of operational revenues and their revenues have grown at an annual 11 percent per year since 1998/99. Passenger services represent 8 percent of BIWTC operational revenues and have grown at a steady rate of 12 percent per year. Cargo revenues represent 7 percent of operational revenues. They have grown at a 21 percent annual rate due to the progressive leasing out of the fleet to private operators. The following graph presents the total annual revenues and expenditures of BIWTC during the past 7 years.

Figure 6: BIWTC Revenues and Expenditures



161. Gradual implementation of restructuring measures has contributed in the improvement of BIWTC's financial situation. Staffing has been reduced by 32 % over the 1995-2004 period. From 4,780 staff in 1995, the workforce has decreased to 3,234 permanent as of March 2004 plus 298 casual staff. BIWTC has leased out to private operators 36 of its remaining 58 units fleet of cargo vessels in operating condition, which has reduced the losses generated by cargo activities. Freight tariffs have been deregulated. Separate profit centers have been created for cargo and passenger activities.

162. Ferry services are operated at five sites linking the Northern and Southern regions with the Eastern regions. The fleet consists of 35 ferries plus 20 auxiliary vessels. The demand expressed in passengers transported has grown at a 15 percent annual rate, which is higher than the average growth of road traffic in the country, estimated at about 7.5 percent. A profit and loss account for ferry services was not available for the present report. As this information is available for cargo services and assuming that the loss on coastal passenger services is equivalent to the increase in the subsidy receivable account of BIWTC, the profit on ferry services is estimated at Tk 327 million in 2002/03, representing about 37 percent of revenues from the ferry services.

163. BIWTC has become a minor actor in the cargo sector suggesting that general cargo activities should be shortly phased out altogether. BIWTC has faced growing competition from the private sector. BIWTC cargo service has dramatically declined over the years from some 167,000 tons per annum in year 1999/2000 down to 58,000 tons in 2003/04 including transport of oil products. At the same time, about five million tons of cargo was recorded in the major ports of Bangladesh. Tanker service is the only profit making activity among BIWTC cargo services due to the fact that all vessels being leased out to private operators. Other cargo activities are recording huge losses with only part of the vessels being leased out to private operators. Crews on leased vessels are still on BIWTC's payroll, probably because their salaries are much higher than in the private sector. This reduces the interest of the operation. Barges are generating limited revenues, confirming that they are not appropriate any more to transport cargo. Private operators have already stopped to operate barges.

164. Loss-making passenger routes in coastal areas are entrusted to BIWTC and have been maintained by Government order as Public Service Obligation. The Government

allocates an annual subsidy of Tk 5 million per year to cover the deficit generated by these services. BIWTC claims that the actual deficit amounts to Tk 98 million and records the balance between this amount and the subsidy received from the Government in its Subsidy Receivable Account. In reality, a cross-subsidy coming from the profit on ferry services covers this deficit. The number of passengers has increased during the past five years from 874,000 to 1.1 million. This remains modest compared to the population of the areas covered by the 12 services operated by BIWTC. The low demand is explained by the low income of the population that is among the poorest of Bangladesh. This explains why until now no private operator has expressed an interest in opening a passenger line serving this region.

7.4. FINANCING OF NETWORK MAINTENANCE

165. Until now network maintenance has received a low priority in the Government and BIWTA. From data provided by BIWTA, BIWTA concentrates on maintenance of ferry channels and network development (see Annex 1: Dredging Works Executed During The Past 13 Years. The share of resources allocated to network maintenance has decreased from about 30 percent in 2002/03 to about 15 percent in 2004/05. That year, only 290,000 cubic meters were dredged when needs are estimated at about six million cubic meters. Based on an average cost of Tk 192 per cubic meter and a quantity of six million cubic meters⁹ usually estimated for the maintenance of the entire IWT network, additional resources to maintain the network can be estimated at Tk 1,152 million. This is equivalent to the current budget of BIWTA or about twice the Government subsidy budgeted by BIWTA in 2005/06 and 2006/07.

166. Cost recovery in the sector is low. Assuming that port revenues are used for expenditures related to ports, the only revenues collected from IWT users are conservancy, pilotage and channel dues. They amounted to Tk 74 million in 2004/05. Dredging revenues, which represent the third most important source of revenues for BIWTA, are coming from the Government budget and are used to finance IWT network development. Compared to the resources needed for maintenance estimated above at Tk 1,152 million, the cost recovery ratio would be 6.4 percent only. Revenues from piloting amount to about Tk 20 million per year for about 533 pilots. The average revenue per staff is equivalent to the average salary of staff employed on a daily/casual base. Therefore resources from piloting at their present level serve to pay salaries and do not contribute to financing of network maintenance.

167. Road users pay for the use of ferries operated by BIWTC but these revenues do not finance maintenance of ferry channels. Earnings from ferry services in 2003-2004 amounted to Tk 946 million. The cost of maintenance of ferry channels is estimated at Tk 362 million. About 13 million passengers and 1.2 million vehicles used ferries in 2003/04. Assuming that a vehicle pays on average ten times the fare of a passenger, about

⁹ While there is some uncertainty on the actual dredging needs, the above estimate seems reasonable if not below the reality. It can be compared to the quantity of 2.5 to 7.5 million cubic meters to dredge the channel of the Congo river between Kinshasa and Matadi in the Democratic Republic of Congo on a distance of approximately 350 km or a quantity of three million cubic meters to dredge the channel of the river Wouri to access the port of Douala in Cameroon.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

25 million equivalent passengers used ferries and the average fare was Tk 38. A fee of Tk 14.4 per equivalent passenger would cover maintenance of ferry channels.

8. PRIVATE SECTOR PARTICIPATION

8.1. DREDGING

168. As indicated in para. 71, the private sector has already the capacity to fill the gap between the existing dredging capacity in BIWTA and BWDB and the maintenance requirements. This should be used as a means to reduce BIWTA's dredging costs and increase its performance through comparison with the private sector.

8.2. PORT OPERATIONS

169. ***Inland Container Facility.*** In view of the urgency to establish adequate container facilities with adequate waterfront in the Dhaka area, the Government contemplates the project of converting the existing conventional cargo port of Khanpur in Narayanganj into a temporary container terminal. This would require costly reinforcement of the existing infrastructure that is inadequate for container handling. The private operators are much in favor of this development and would be ready to operate barges from Chittagong as well as from Kolkatta (India) for the transport of containers using this facility.

170. However, prior tendering that was attempted to engage the project through public-private partnership, failed to attract qualified bidders. The reason is that the conditions of eligibility included a requirement for longstanding experience in construction and operation of container terminals, which none of national operators has. Likewise interested national firms failed to seek for joint venture with qualified foreign firms.

171. The Chittagong Port Authority (CPA) and BIWTA are jointly promoting the project of developing a new inland container facility near Dhaka. BIWTA provides the land that has already been acquired at Pangaon (opposite to Pagla on the Burigonga River, south of Dhaka, not far from Narayanganj) and reclamation works are already completed. Port infrastructure is being developed jointly by BIWTA along with CPA and CPA has been entrusted the responsibility of operating the port by engaging private operators with handling equipment.

172. ***Port Management.*** The present arrangements where BIWTA leases out port areas for a short period of time do not provide the incentive to the port manager to develop the port area. Ports are one of the instruments available for the economic development of regions. This instrument has not been used until now, with ports more considered as a public infrastructure rather than an instrument of economic growth. Several options exist to revise the status of inland ports and their management:

- a. Management by the public administration: While ports are presently leased out to private managers, port management can be considered as public. The port leasing agreements are essentially an arrangement to facilitate the collection of revenues. Therefore, the return to direct management by the administration cannot be expected to improve the present situation but rather deteriorate it by making collection of revenues more difficult. Continuation of the existing arrangements should be examined with the possibility of transferring some responsibilities of BIWTA to the private managers. This would require a change in the financial conditions and the duration of the lease agreements (see paras. 84 to 92).

- b. Creation of autonomous port authorities: The port authorities would have a landlord status focussing on collection of port revenues and leasing out of port services to private operators. Port authorities would be responsible for maintenance of port area and for port development. While port authorities would have a public status, this arrangement would open to the door to more involvement of port users, local economic operators and local government institutions in the decision-making process regarding port management and development.
- c. Concession of port management to private operators: While this arrangement would be appropriate for managing port assets, specific modalities would need to be defined for port development when the investment lasts more than the concession agreement.

The decision on the more appropriate arrangements should be based on the characteristics of the port (volume of traffic, potential revenues and potential for development).

8.3. CONTAINER TRANSPORT

173. A new business opportunity arises with a strong demand for transfer of containers between Dhaka and the seaports of Chittagong and Mongla. With the strong growth of container traffic at the port of Chittagong, the port's throughput will soon reach the threshold of one million TEUs per year. Railways are congested and the road does not have the bearing capacity to carry container trailers. Presently 90 percent of the containers are stripped/stuffed in the ports of Chittagong and Mongla and transported as conventional general cargo¹⁰. Only 10 percent of the containers are loaded on the rail and transferred to the Inland Container Depot located southeast of Dhaka City. While road capacity is expected to increase and improvement of railway services is envisaged with support from the donor community through a program of policy and institutional reforms and investments in the track and in a new inland container depot, IWT will remain competitive due to its lower costs and the limited need for investment.

174. BIWTC envisages the acquisition of two 100 TEUs container feeder vessels to operate between Chittagong and Dhaka. The feasibility report prepared by BIWTC produces a low 8.1 % EIRR. The study is based on 12 hours of navigation, one day for loading and one day for unloading. Apparently the operating productivity could be increased, loading and unloading times appearing to be quite high. Such dedicated operations using dedicated terminal facilities at both ends should complete a round trip in less than three days making use of day and night navigation i.e., ten round-trips per month. Yet the project needs much further in depth examination before its economic and financial feasibility can be firmly established.

175. Provided that its feasibility is confirmed, the BIWTC project can be considered as a pilot operation to test and promote container transport using IWT. Assuming a three-day round-trip during 330 days, the two vessels to be acquired by BIWTC would be able to transport 44,000 TEUs per year to and from Chittagong and Dhaka. This represents 4.4 percent of the container traffic in the port of Chittagong, which leaves many opportunities

¹⁰ The large percentage of containerized cargoes being transported in a conventional way is also due to the fact that the Port Labor Unions until date demand this so as to protect the labor opportunities in the ports.

to private operators to develop this market once it has been tested successfully with the operation of the two BIWTC vessels and the land infrastructure becomes available.

8.4. FERRY AND COASTAL SERVICES

176. Introduction of the private sector in the provision of passenger ferry and coastal services was recommended in the 1997 Inland Water Transport Sector Policy and Strategy Study without being pursued. Two modalities were proposed:

- a. Competition for the market: The total responsibility for the provision of a particular service on a particular route would be contracted to a private sector operator. Tariffs would be regulated in accordance with the contract. Assets could be rented out by BIWTC or owned by the private operators, as defined in the bidding documents.
- b. Competition in the market: Private sector operators would be introduced in direct competition among themselves or/and with BIWTC. This modality would have the advantage that the private sector would provide efficiency as well as a safety benchmark for the public sector and vice versa.

177. The 1997 recommendation remains valid but, to be applied to existing services, would require a full restructuring of the present operational conditions of these services. In particular, this would require an analysis of BIWTC costs for operating ferry and coastal services and a redefinition of the Public Service Obligation between the Government and BIWTC for operating coastal services as well as of the related subsidy. While this restructuring is unlikely to happen in the short term, new ferry or coastal services to be developed in the future would be an opportunity to test the provision of these services by the private sector.

8.5. PRIVATE PROJECTS

178. Two industrial projects developed by private investors present a dramatic potential for IWT and the role of the State should be examined in view of promoting the role of IWT if it proves to be more competitive than road and rail:

- a. Coal mine project at Phulbari: The mining potential is 572 million tons. Annual exploration would be about 15 million tons. The bulk of Phulbari's coal production will be sold abroad and it is planned that some eight million tons will be exported through Khulna-Mongla annually. Coal would be transported by rail to an inland terminal located near Khulna and then transferred by barges to a floating sea terminal located at Akram Point near Mongla. Two types of barges are envisaged, of 3,600 tons with a draft of 3.90 m and 8,000 tons with a draft of 4.70 m. This would require a channel improvement program to enable the safe navigation of the barges.
- b. A cement factory is contemplated by a foreign investor in the North of the country, near the border of India. The planned capacity of the plant is 2.5 million tons per year that would be distributed throughout the country by barges of 1,000 tons of capacity. As indicated below, this project represents also a significant potential for developing cross-border IWT between India and Bangladesh.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

179. Both projects would require sustainable and efficient maintenance of the rivers concerned by the projects where the existing available dredging capacity of the private sector could be best used rather than developing additional capacity in BIWTA. The contribution of the private investors to the financing of maintenance dredging along the routes that they will use should be examined.

9. CROSS-BORDER IWT BETWEEN INDIA AND BANGLADESH

9.1. REGULATORY FRAMEWORK

180. A protocol signed between India and Bangladesh in 1999 regulates waterborne transport transiting between the two countries. The protocol covers four routes linking Dhaka to Kolkatta through the Sunderbans (South-West route), Farraka (North-West route), Karimganj (North-East route) and Dhubri/Guwahati (North route). The protocol has been extended 10 times since its first approval. Extensions are signed month by month and on occasion for a few months at a time. Only in 2007, the protocol was extended for two years. The protocol defines the ports of call for IWT and specifies that inter-country cargo transit of cargo has to be shared between (operators of) the two countries on an equal tonnage basis. With some extensions to the protocol limited to one month and trips between Kolkatta/Haldia and Dhaka, Guwahati and Karimganj exceeding 30 days, the protocol is an obstacle to the use and development of IWT for trade and transit between India and Bangladesh. This however is not typical only of difficult intra-regional trade using IWT, but characterizes obstacles to intra-regional trade between the two countries as well within South-Asia generally, which is one of the least integrated regions in the world.

9.2. IWT INFRASTRUCTURE

181. With the exception of the North-West route, river infrastructure is not an obstacle to IWT but some improvements and sustained maintenance would be required to facilitate cross-border movements. The South-West, North-East and North routes are categorized as classes I and II and have a targeted minimum designated depth of 2.1 meters except for a section of the North-East route which is categorized as class III with a minimum depth of 1.5 meters. No information is available on the actual depth of the protocol rivers, but it is likely that the depth required by the classification is not maintained. For example, the section Chalna-Raimongol on the South-West route has a class III depth instead of class II. The North-West route cannot be used for navigation between Godagari and Rajshahi because of insufficient water depth caused by restricted water discharges from the Farraka Barrage in India.

9.3. PAST DEMAND

182. Although the current framework for cross-border movements between India and Bangladesh is not conducive to development of exchanges using IWT, regional traffic has grown gradually during the past five years. This is the expression of a strong demand and demonstrates that IWT is an appropriate mode of transport for these exchanges. Inter-country cargo traffic has grown from 46,000 tons in 2000/01 to 414,000 tons in 2004/05. Transit traffic from and to Northeast India is much smaller although growing (2,000 tons in 2003/04 and 15,000 tons in 2004/05). Products imported by Bangladesh by IWT include fly-ash, gypsum, rice and wheat. Products exported include crushed bones, skin and hides and jute products. Transit traffic from/to India through Bangladesh consists of cement, coal and bitumen.

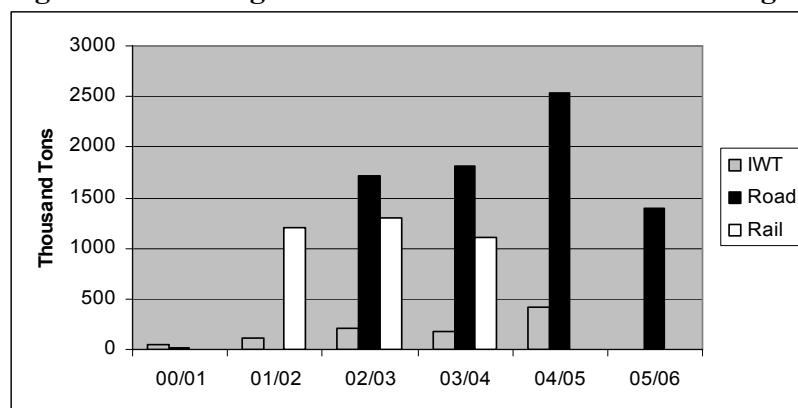
183. While the policy should be to grant preference to the more competitive operators, it is not reflected in the protocol which may be a risk for the future development of IWT. The protocol requires that transport be shared equally between the two countries. However, recent trends have seen a strong increase in the share of Bangladeshi vessels. From a 1/3 - 2/3 distribution in favour of Indian vessels in 2000/01, Bangladeshi vessels now represent 87 percent of the intra-regional fleet. The number of vessels has been multiplied by five during the same period and all new vessels are of Bangladeshi nationality. The reasons given by the shippers to prefer Bangladeshi vessels are that freight rates quoted by Bangladeshi operators are lower due to deeper draft and consequently higher volume of cargo, low operating costs due to better fuel efficiency and lower crew rate, as well as lower ship building costs in Bangladesh. The fact that Indian vessels were operated by the Central Inland Water Transport Corporation (CIWTC) which is a public company performing poorly, may be an additional reason why Indian vessels are losing their share of the inter-country traffic. Recently some private operators have entered the market and the Inland Waterways Authority of India (IWAI) also has started to operate services to Assam.

9.4. PROSPECTS FOR DEVELOPMENT OF INTRA-REGIONAL TRADE USING IWT

184. IWT competes with road and rail on intra-regional routes. Road traffic is penalized by the regulatory framework, which requires that goods are transhipped between Bangladeshi and Indian vehicles since neither of the two countries allow foreign trucks to enter their national territory. Rail traffic was hampered by the difference in rail gauges between the West and East rail networks. The following graph compares IWT, road and rail traffic between India and Bangladesh (rail traffic is limited to traffic recorded at the border station of Benapole/Petrapole as this is the traffic which is in competition with IWT).

185. Total intra-regional traffic grew steadily between 2002/03 and 2004/05. Data from 2005/06 are not available for IWT and rail and would be required to confirm the sharp decrease found for road traffic. Intra-regional traffic is very sensitive to the regional political environment and statistics may not reflect the real volume of demand.

Figure 7: Intra-regional Traffic between India and Bangladesh



Road data are missing in 00/01 and 01/02. Rail data are missing 00/01, 04/05 and 05/06.

9. Cross-border IWT between India and Bangladesh

186. Potential for transfer from rail and road to IWT is limited. Rail traffic is expected to increase as a result of the extension of the broad gauge to Dhaka. Until now, Indian freight entering Bangladesh by rail was mostly entirely transferred onto Bangladeshi vessels at Noapara. Transfer from rail to IWT on the entire journey from India to Bangladesh is therefore unlikely and, on the contrary, transfer from IWT to rail on the stretch from Noapara to Dhaka is a strong possibility. Most cargo moving by road between India and Bangladesh is neither bulk nor petroleum products. Therefore, it is not fit for transport by waterways.

187. From the above, it seems that IWT has already attracted the traffic for which it is competitive compared to road and rail. Growth can be expected from existing IWT traffic as well as from new business opportunities:

- a. As suggested previously, container traffic is a new promising development for IWT. The cost of transport using rail within India to Kolkatta and IWT from Kolkatta to Narayanganj and then Dhaka would be a low US\$700 per TEU for a seven to nine day trip compared to US\$2,500 per TEU for a 15 to 30 day trip using rail within India to Mumbai, sea transport to Chittagong through Colombo or Singapore and then rail or road from Chittagong to Dhaka. The question is whether the volume of traffic will be sufficient to organize a regular service with enough frequency to be competitive. Presently, Concor (Container Corporation of India) transports 5,000 to 6,000 TEUs of yarn for the textile industry in Bangladesh. This would represent 50 to 60 trips for a 100 TEU vessel per year and an average frequency of one trip per week which should be enough to attract container traffic. An obstacle to development of container traffic using IWT could however be the unbalance between exports and imports which could raise the cost of imports from India. This is less an issue for sea transport and containers going through large hubs such as Colombo or Singapore.
- b. Fly-ash is a by-product of coal-fired electricity generating plants and is used by the cement industry. It improves the performance and quality of cement concrete and offers environmental advantages compared to the use of pure clinker. The power plants in the Kolkatta area have large surplus of fly ash while the capacity of production of cement in Bangladesh is expected to increase with a 2.5 million ton cement plant under construction. With a 26 percent content of fly-ash in cement, the potential additional demand for fly ash from this only project would be 650,000 tons.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

10. INVESTMENT PROGRAM

10.1. BIWTA PROGRAM

188. BIWTA has prepared a three-year Annual Development Program (ADP), which includes 23 projects and totals Tk 26.8 billion (Annex 8.1: BIWTA Three-Year Investment Program). The Planning Commission already approved eight projects for an amount of Tk 6.6 billion.

Table 11: BIWTA Annual Development Program (2005-2008) - Approved Projects

Investment (US \$ Million equivalent)	Up to June 2005	2005/06	2006/07	2007/08	Total	Percent of Total
Dredging Works	0.63	5.54	2.69	-	8.86	9.4%
Ports	0.20	4.62	10.22	-	15.04	16.0%
Navigational Aids	0.01	2.37	1.42	-	3.80	4.0%
Dredgers	2.44	2.06	9.71	11.00	28.72	30.5%
Salvage Vessels	0.00	0.00	26.73	10.88	37.61	40.0%
Total	3.28	14.59	50.77	21.88	94.03	100.0%

189. While each project is subject to a Development Project Proposal used by the Planning Commission to decide on GOB financing, there is no comprehensive analysis of the financing requirements necessary to achieve the objectives of the projects and ensure the sustainability of the investments. For example, dredgers are being purchased but there is neither a dredging strategy, nor a dredging program for the mid-term to justify the purchase of the dredgers, nor a guarantee that the budget will be available to operate the dredgers. Similarly, the impact of dredging works is not evaluated in terms of maintenance required after the works are executed to ensure that the depth will be maintained and that the investment will not be lost. There is no analysis either of the economic and financial return of port investments. Finally, sector stakeholders are not involved in the preparation of the three-year ADP, especially for the definition of priorities. The 1977 IWTA Ordinance provides for an Advisory Committee on matters relating to the development, maintenance and operation of IWT and inland waterways in Bangladesh. However, this Advisory Committee has never been formally created.

190. The second part of the ADP that has not yet been approved includes 13 new projects, for a total equivalent to US\$262 Million. The bulk of the program is procurement of new dredgers and port improvement works. In this second part of the budget, the dredging component is even smaller than in the first one with just 1 % of the total budget. Dredging works would bring back about 1,752 km of waterways to the level targeted in the network classification.

191. Projects executed by BIWTA are not subject to comprehensive post-evaluation. For example, while the first phase of the circular waterway around Dhaka seems to have had a certain positive impact, this impact should have been more carefully evaluated before launching the second phase estimated at Tk 1,413 million (US\$24 million). Very often, projects are evaluated by their outputs without measuring the outcome and no correlation is established between the cost of the project and the outcome assuming that any project is justified for the simple reason that it has been executed.

10.2. BIWTC PROGRAM

192. BIWTC had identified a list of investments for the period 2006-2007. The investments fall under four categories: land infrastructure (ports, landing stations), coastal passenger vessels, freight vessels and navigation equipment. The list of investments is provided in Annex 8.2: BIWTC Investment Program. The total cost of the program is estimated at Tk 6 billion, the equivalent of US\$67 million. The program should be reviewed in order to estimate the impact of coastal passenger services on the financial situation of BIWTC as these new services generate losses similarly to existing services. Also, the program should be reviewed in view of the potential role of the private sector especially for profitable freight services.

10.3. BWDB PROGRAM

193. The National Water Management Plan (NWMP) developed in December 2001 by the Water Resources Planning Organization (WARPO) of the Ministry of Water Resources includes two Inland Waterways Development Projects:

- a. MR011: River Dredging For Navigation. The program covers dredging for navigation purposes in the main rivers over a period of 7 years. Both capital and maintenance dredging would be funded by GoB. The project description refers to private sector participation in dredging as being promoted under the World Bank Private Sector Infrastructure Development Project. Increased cost recovery from IWT users is further noted as deserving more emphasis as part of the overall institutional development of the IWT sector.
- b. MR006: Regional River Management and Improvement. This program will complement MR011 River Dredging for Navigation Program quoted above. It highlights the main thrusts of the Government's policy to develop and manage the river systems to bring multi-purpose benefits. The program intends to accomplish this policy within a framework of decentralised and devolved management responsive to end-user needs. The strategy for this recognizes three levels of system management as follows:
 - (i) BWDB retaining responsibility for main and regional rivers;
 - (ii) Local Government Institutions assuming responsibility for water resources management within their areas; and
 - (iii) Communities assuming responsibility for field level systems and local channels.

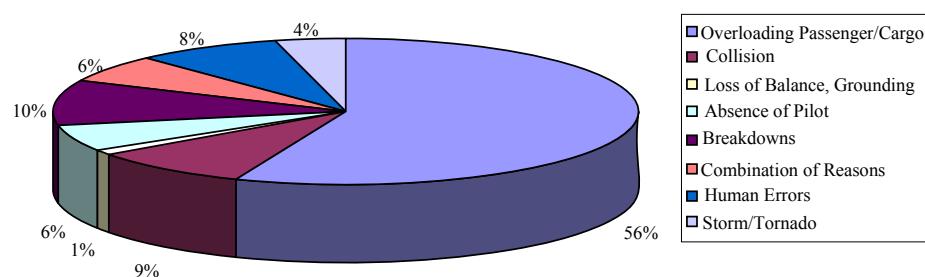
The program is targeted at the first level and provides the resources to plan, develop and maintain the regional river systems in an integrated manner, interfacing with Local Government in order to bring mutual benefit to both the central Government's and the local Governments' programs.

11. SAFETY

194. Accidents on rivers attract attention with often many hundreds people perishing at once. These accidents however are not as frequent or damaging as those of other modes of transportation. During the past 15 years, fatalities on the roads averaged 2,400 per year whereas on the inland waterways, 148 people died on average (Annex 7: IWT And Road Accidents). The ratio of fatalities per billion of passenger-km is 158 for roads and 41 for IWT. 3,280 accidents without fatalities on average per year would need to be added to road fatalities to better reflect the seriousness of the situation and the lack of safety of the road network. Still, because of the dramatic character of IWT accidents, people consider IWT to be unsafe.

195. On waterways, 56 percent of accidents are caused by overloading (see Figure 8). On ferries, accidents are caused by a combination of inclement weather, collision and overloading (see Figure 9).

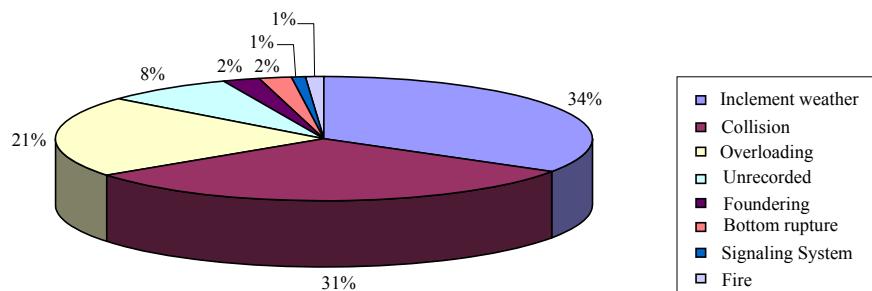
Figure 8: Causes of Accidents on Inland Waterways



Source: Department of Shipping

196. Overloading, the main reason for accidents, is the result of human actions or decisions and for this reason can be reduced. One factor causing loading is that boarding conditions are inadequate. As mentioned in paragraph 89, passengers entering terminals pay an entrance fee to BIWTA or a usage fee to port operators. Tickets for travel are sold only on board with the exception of BIWTC which has the right to deliver tickets in the passenger terminals. A BIWTA representative is supposed to come on board to verify that the launch is not overloaded, but this does not eliminate overloading, which frequently occurs during holidays with massive numbers of passengers in a rush to take the first available ship going to their destination. While sale of tickets in the terminal would help control the number of passengers boarding vessels, the only reason given not to proceed this way was that passenger terminals are not sufficiently comfortable and are not suitable for prolonged waiting times. The terminal conditions certainly are a factor requiring improvements. However, in view of the need to prevent overloading and reduce accidents, this only reason should not prevent to sell passenger tickets in the terminals before boarding, to allow control over the total number of passengers.

Figure 9: Causes of Ferry Accidents



Source: Department of Shipping

197. Regulations are insufficiently monitored and enforced. In accordance with the sector regulation, DOS is supposed to examine the number of passengers and to penalize a ship owner in case of overloading. There is also a regulation regarding passenger vessels that does not allow people to occupy vessel superstructures. These regulations are useful but are not applied and the ship's superstructures remain a place favored by passengers. Rules and procedures exist for issuance of completion certificate for the construction of a new ship, but very few ships (if any) undergo the regular procedure. Paperwork is done after completion for the purpose of registration and it is too late to correct mistakes. Also actual construction may not comply with the drawings and DOS does not have the capacity to verify consistency between design and construction. In Bangladesh, the cost to comply with the rules is estimated at 50 percent of the cost of construction against 5 to 10 percent in industrialized countries that is hardly affordable by the industry. An upcoming regulation will require dry-docking of vessels every five year in addition to annual fitness surveys. Again, DOS does not have the staff to perform all the surveys required in the regulation that it develops. Enforcement is weak and, with one magistrate only, the marine court in Dhaka has limited capacity to settle cases in reasonable delays. On average about 60 cases are settled per month but 4,000 cases are said to be pending which correspond to a 6-year workload of the marine court. The situation has deteriorated since 1997 when 2,500 cases were already pending. Police on rivers is the responsibility of land police, which is not equipped for this task.

198. DOS' capacity to monitor and enforce safety regulations has not been strengthened as recommended by the Third Inland Water Transport Project. While a specialized Inland Ship Safety Administration (ISSA) was created in DOS, it is not operational and has been unable to fulfill its responsibilities. Under TIWTP, 600 surplus staff from BIWTC were supposed to be recruited by DOS and deployed in launch stations to control and report overloading. DOS was to appoint six special officers for marine safety. Six speed boats were also to be procured for DOS. Vessel design approval responsibility was supposed to be transferred from BIWTA to ISSA with BIWTA personnel employed for this task. DOS was also supposed to employ 20 additional vessel inspectors and 8 surveyors but actually employs only seven inspectors and four surveyors.

199. Poor conditions such as high water velocities, continuously changing channel configurations and fast changing weather conditions also contribute to the frequency of

accidents. Specifically damaging is a very strong northwestern wind, which normally, is localized in a small area; it occurs without warning and is difficult to predict. More meteorological stations, better hydrographic surveys and communication systems may improve the situation. At this time, the main communication system between vessels, owners and Government agencies is by means of mobile telephones, which are effective and also common in other countries. At the same time, radio communication should be improved and utilized during emergency situations to inform all vessels in the area. Creation of so-called Safe Haven harbors at difficult waterway reaches would also improve safety. This measure, however, might be overly expensive and alternative measures to enhance safety would be more practical and cheaper.

200. Another factor to increase safety is the training of ship's crews including ship's masters and engineers. Training of these seafarers is done by BIWTA and examination by DOS. The training, in general, is not sufficient both in numbers and quality. To improve the situation somewhat, DOS is about to introduce a written examination, which will better demonstrate the overall level of training. The low education level of unskilled crews is an obstacle to improving the efficiency of training though.

201. IWT operators are not insured because the cost of insurance is too high or insurance companies do not want to insure vessels. The high level of insurance premium does not seem in relation with the risk and could be discussed with insurance companies. IWTA has created a passenger welfare fund (Marine Casualty Trust Fund) in case of accidents. Funds are collected annually from launch owners (through an annual fee of Taka 10 per passenger on capacity basis), and from passengers at Dhaka terminal (Tk 1 per passenger). The victims are paid Taka 20,000. However, the Government has to bear substantial costs such as salvage and cleaning up, which usually are borne by the private sector through insurance coverage. The mechanism does not provide an incentive to the private operators to improve the safety of their operations, as their contribution to the fund is the same, independently of compliance with safety requirements. While the fund could be used to promote safety through incentives and penalties depending on the safety performance, this would require significant improvement in enforcement of safety regulation before such mechanism can have an actual impact on safety.

202. While inexpensive, engines used on mechanized country boats are unsafe for navigation. The engines were originally designed for irrigation pumps. They have been massively imported by the Bangladesh Agriculture Development Corporation from China in an effort to support development of irrigation to increase agricultural production and reduce poverty. The pumps were subsidized by the Government and sold to farmers at low cost. They are used now by country boats but also by motorized rickshaws. On country boats, they are fit in the hull at a cost of about Tk 15,000 to 20,000. They do not have a gearbox that reduces control and causes hazards during manoeuvres and crossing of other boats.

203. The possibility to import second-hand engines at very low price from Japan and China (as it occurs in neighboring countries) or from India would be worth investigating in the long run. For illustration, second-hand car and truck engines with a gearbox are imported from Japan into Thailand in bulk container loads providing fast, efficient, maneuverable, low-cost and relatively safe propulsion units to "long-tail" boats plying inland waterways across the country.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

12. ENVIRONMENT

204. The Government's environment policy¹¹ defines the following objectives for the IWT sector: (i) to maintain ecological balance and overall development through protection and improvement of the environment; (ii) to identify and regulate activities which pollute and degrade the environment; (iii) to ensure environmentally sound development in the IWT sector; and (iv) to ensure sustainable, long term and environmentally sound use of the resources of the inland waterways. This chapter will focus on the impact of IWT on the environment and how IWT can contribute to restore the ecological balance of the river environment.

205. A number of activities influence the water and sediment quality of the inland water systems. These activities originate both from the Inland Water Transport (IWT) sector itself and from other sectors, such as Industry, Agriculture, Housing and Urbanization. With respect to the latter, pollution of rivers can happen independently of their use for transport or not. The report will thus limit its analysis to the incremental impact on the environment resulting from development of other sectors as a result of development of IWT.

206. Inland Water Transport may cause increased level of water pollution through discharges of oily bilge water, accidental oil spills from ships (three accidents occur on average per year), effluence of toxic substances and increased contamination in rivers and port areas. Hot spot pollution may occur locally, e.g. in urban and industrial areas, ports and ghats, where discharges from ship transport are most numerous and the risk of accidental spillage from handling and storage of fuel and hazardous cargoes is higher. Safer navigation, safer loading and unloading operations, and better training of inland vessel operators can mitigate these impacts. Installation of new pontoons is likely to increase safety of loading and unloading, thus minimizing the occurrence of spillage of hazardous cargo and fuel supplies. Safer navigation, due to aids to navigation and procurement of other safety equipment is expected to reduce the number of accidental spillages, thus reducing the overall impact on environment.

207. Dredging activities may cause removal and disturbance of flora and fauna at the dredging sites, burial of biotopes in the disposal area, and impacts due to the dispersion of spilled sediment by spreading existing pollution, which in turn may be detrimental to the natural aquatic environment and fisheries. The environmental impact assessment of the sector carried out in 1989 for the preparation of the Third Inland Water Transport Project concluded at that time that sediments were generally little contaminated due to the high turbidity of rivers. It is likely that the situation today is different due to high population growth and industrial developments. Another issue is the potential acid or alkaline character of sediments and the accumulated impact on disposal sites of dredged materials. Similarly, dredging releases acid in water, which again can impact on riverine fish and habitats when it accumulates during the dry season where the water level is low and dredging is performed. This may happen in particular at ferry sites where dredging is performed annually. The analysis of dredging activities above has shown that little

¹¹ Environment Policy, 1992, and environmental action plan developed by Department of Environment (DOE).

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

recurrent maintenance is done other than at ferry sites and that other dredging activities consist mostly in one-time development.

208. Environmental monitoring of dredging activities is not executed although the capacity exists. TWITP helped establish a fully equipped laboratory for chemical testing of dredged materials, water, oil and oily substances used on ships, and to initiate monitoring activities. The laboratory is capable of carrying out a number of routine chemical analyses. The program included some 40 stations spread across the country to monitor various chemical parameters. The necessary laboratory equipment was procured under TIWTP.

209. IWT has a positive impact on environment by reducing engine emission of CO₂ and heavy molecules. IWT efficiency is such that average performance is 100-200 ton-km per liter of fuel whereas road transport performance is four to eight times lower with 25 ton-km per liter. With an estimated 1.95 billion ton-km performed by IWT in 2005, excluding country boats, about 58.5 million liters of fuel were saved by using IWT instead of roads. Using the Integrated Pollution Prevention and Control (IPPC)¹² conversion factors, this represents 155,000 tons of CO₂.

210. Improving the efficiency of engines used by country boats by adding a gearbox would further reduce consumption of CO₂. It is estimated that fuel consumption would be reduced by between 30 and 40 percent. Assuming that half of country boats are mechanized and that each country boat consumes 900 liters per year, the use of gearbox would save about 100 million of liters of fuel per year that represent about 260,000 tons of CO₂.

¹² European Community. Council Directive 96/61/EC of 24 September 1996

13. SOCIAL ISSUES

211. The social importance of IWT derives from the role that the sector plays in domestic and external transport of Bangladesh as well as in the rural sector where social impact is most significant. While IWT contributes directly to social benefits nationwide by providing a cheaper mode of transport and employment opportunities, in rural areas IWT provides essential communication for the poor and contributes to reducing poverty. The comparative cost analysis between IWT and other modes of transport is presented in another section of this report. This section will focus on the employment and economic opportunities generated by the sector and the contribution of IWT to reducing poverty in rural areas.

212. **Employment opportunities.** About 4.6 million people are estimated to be employed in the IWT sector. The private sector represents 99.8 percent of the sector workforce and country boats 82 percent. The details by type of employment are presented in Table 12.

Table 12: Employment in IWT Sector

Public sector	
BIWTA	4,000
BIWTC	5,000
DOS	60
Private sector	
Landing stations	668,000
Inland vessels	71,000
Dockyards	101,000
Country boats	
- Mechanized vessels	2,275,000
- Non-mechanized vessels	1,510,000
Country boats yards	10,000
TOTAL	4,644,060

213. **IWT in rural areas.** A substantial portion of the rural population has no access to road transport and is directly affected by availability of IWT services. From about 50 percent in 2000, the portion of the population living below the poverty line has increased to 57 percent in rural areas. The National Strategy for Accelerated Poverty Reduction (NSAPR) emphasizes that infrastructure may emerge as a binding constraint on the goal of accelerated poverty reduction unless the emerging challenges are effectively addressed. IWT can contribute to the objective of reducing poverty by improving access of the rural poor to economic opportunities and basic services. While the rural road network has considerably developed during the past ten years, many rural areas remain isolated, especially during the high water season, particularly in the South where road density is lower than in the rest of the country.

214. While road network development will continue, maintaining the IWT network, especially in regions where the road network is still underdeveloped, is key to provide to the rural population the accessibility that is targeted by the Millennium Development Goals (MDGs). In Bangladesh, taking into account the specificity of the country and the

importance of rivers, the IWT network should be acknowledged as a contributor to the rural accessibility index (an indicator associated to the MDGs), which measures the number of rural people who live within two kilometers (typically equivalent to a walk of 20-25 minutes) of an all-season road as a proportion of the total rural population. This indicator was estimated at 37 percent in 2000¹³. In comparison, the indicator is 77 percent in Pakistan, 60 percent in India and 15 percent in Nepal. The percentage of households, which have access to river transport, is 25.1 percent, which is quite high considering that the river network is much less developed than the road network. Adding roads and rivers, the rural accessibility index equals 52.4 percent, closer to the value of the index in India.

215. Particular attention should be given to the role that IWT plays for the 12.3 percent of the rural population that only have reasonable access to the transport system through IWT. It would be important to understand:

- a. whether this vital access might be at risk and what action is required to secure it;
- b. what proportion of the rural population which still does not have satisfactory access to any transport service might be more effectively included in the country's economy by facilitating extension of country boat operations rather than building rural roads.

216. Surveys and research works carried out for two years in the district of Barguna, in the southwestern coastal area of Bangladesh demonstrate the social importance of IWT. Located on the Ganges tidal floodplain the district is historically one of the poorest and least developed areas of Bangladesh. It is recurrently prone to cyclones. Major roads in Barguna district are in poor condition, almost impassable in the wet season. Certain parts of the network are closed to vehicle traffic due to inadequate structure of ferry connections. Cargo and passengers transport heavily rely on IWT and manually operated transport modes such as tricycles and human carriages. Short distance transports between villages and homesteads is by foot utilizing footpaths with narrow bamboo bridges. IWT is the dominant and popular mode of short, medium and long distance transport.

217. From the report mentioned in the previous paragraph, it can be easily perceived that the main effects of IWT have resulted in lowering transport costs and increasing people's access to social services. People can easily use their boat for transporting products to the market. Although the report could not ascertain to what degree the benefits of free or reduced transport costs are passed on to the consumers, it is understood that the producers, especially the small producers, feel some sort of convenience in using country-boats to transport their goods to the market.

218. IWT personnel are a population at risk with respect to HIV/AIDS similarly to truckers. They carry out long journeys. Vessels transport a large number of passengers which creates promiscuity. No specific evaluation has been made of the risk and no specific action has been identified targeting this particular population to mitigate this risk.

¹³ Source : Income/Expenditure Household Survey in Rural Access Index : A Key Development Indicator. Peter Roberts, Shyam KC, Cordula Rastogi. World Bank. Transport Papers. TP-10. March 2006.

14. IWT AND WATER MANAGEMENT

219. Water management will be one of the big challenges for Bangladesh in the years to come with huge social and economic implications. Multipurpose use of water (water supply, irrigation and drainage), conjunctive use of groundwater and surface water, continued expansion of minor irrigation, water for fisheries and wildlife, adequate upland flow in water channels to limit salinity intrusion and preserve estuary ecosystems, and availability and treatment of water in sprawling urban areas are key issues which will shape the life of rural and urban populations.

220. These socio-economic challenges have been addressed in the National Water Management Plan adopted by the Government in 2004 and IWT is part of the plan which recommends integrating development of waterways for navigation with the needs of the population for drainage and water supply. While the scope of the present study is generally limited to transport issues and it is not intended to propose a strategy for river management in relation with water management, this report is also expected to help better integrate the IWT strategy and the water management strategy.

221. An in-depth analysis of the social impact of IWT would serve this purpose. Sound water management does not have adverse effects on navigation, as it is often believed. In the case of Bangladesh there seems to be great potential for convergence of navigation and water management goals because of ample supply of water from the main three rivers. Combining resources from different sectors e.g., Agriculture and Fisheries, Water Resources and IWT, may ultimately give way to integrated water management schemes which would bring huge social benefits to the population in addition to the economic, social and environmental benefits of IWT development, an issue worth investigating in the long-term perspective.

222. The Country Water Resources Assistance Strategy issued by the World Bank in December 2005 presents the Bank's recommendations to improve country-level water management and the priorities for Bank involvement. These priorities have been selected because they are expected to have the most impact on long-term systemic challenges, they fit with the Bank's comparative advantages, and they support Bangladesh's Poverty Reduction Strategy implementation and complement the Bank's Country Assistance Strategy. They would concentrate around four themes:

- a. Institutional framework : including the responsibilities of different actors, standards for water quality and service provision (especially for the poor), for the environment, for land use management and for construction and management of infrastructure, which affects the quantity and quality of water resources at various levels;

223. Management instruments: including regulatory arrangements, financial instruments, standards and plans, mechanisms for effective participation of stakeholders, knowledge and information systems that increase transparency, motivate effective water allocation, use and conservation, and secure maintenance and physical sustainability of water resources;

224. Development and management of infrastructure for irrigation, floods and droughts and for water quality and source protection; and

225. Political economy of water management and reform with particular emphasis on the distribution of benefits and costs and the incentives that encourage or constrain more productive and sustainable resource use and in which there is a pragmatic, sequences and prioritized reform path.

226. Among the following list of activities that would be priorities for World Bank engagement, several would have a direct relationship with the IWT sector:

- a. Integrated water management of greater Dhaka region: While this would focus on water pollution, the program would also support the development of a policy on urbanization that addresses the uncontrolled growth of urban centers. Increased use of rivers for IWT would be an option for development of greater Dhaka. Addressing impact of IWT on water pollution would need to be part of the proposed integrated water management for Dhaka.

227. Rehabilitation and rationalization of infrastructure: While the program would focus on flood control and drainage infrastructure, inappropriate infrastructure has been identified as an obstacle to movements of country boats. The program would also help setting up standards and ensuring intermodal coordination.

228. Studies to better understand the major rivers: Management of the main rivers, namely the Ganges, Brahmaputra and Meghna, requires major investments. Studies are proposed to improve understanding of long-term and cost-effective development prospects. The studies would also serve to broaden the country's development perspective to include the rivers' basis and thus facilitate cooperation of these international rivers. Further investments resulting from the studies would help promote IWT both domestically and regionally.

229. Management of river erosion: These activities would help address riverbank erosion and channel instability. Deeper and more stable waters will have a positive impact on IWT.

230. Restoration of Gorai River: The objective is to increase dry season discharge and as a result increase the volume of fresh water as the Southwest region is presently suffering of increased salinity of surface water, groundwater and soils, deterioration of Sundarban ecosystems, sedimentation of the rivers, reduced crop and fish production and reduce navigability.

231. While water management and IWT projects need to be coordinated, development plans for the IWT sector should not be based on benefits resulting from better water management. Indeed it is not the responsibility of the IWT sector to propose projects with significant water management components and impacts. The IWT sector should establish its strategy using the water management strategy and development plans adopted by the Government as an input. This is particularly important for the establishment of the dredging strategy recommended above. It should be based on a given situation of river waters resulting from the water management conditions existing or expected in water management plans and should not be based on expectations that would assume unexpected changes in water management conditions.

15. SWOT ANALYSIS

15.1. STRENGTHS

232. A high degree of penetration of the IWT network providing access to 25 percent of the rural households.
233. A dynamic private sector which is the leader in most of the sector activities (passenger (excluding ferries), cargo transport, port management and operations, ship building).
234. A Government which seems to have taken the importance of IWT at heart and has started to acknowledge this importance in various recent documents.
235. High competitiveness of IWT for bulk and container transport compared to road and rail.

15.2. WEAKNESSES

236. Never ending dredging requirements and unstable rivers.
237. Sector prone to corruption because of the difficulty to monitor and control recurrent and capital expenditures.
238. Low productivity of IWT due to use of manual labor resulting in port congestion.
239. A position in the transport market which has eroded during the past ten years.
240. A weak position in the competition with road and rail for allocation of Government resources.
241. Weak sector management capacity (insufficient human resources for planning and monitoring) and capacity to enforce regulations.
242. Fragmented responsibilities and lack of intermodal coordination.
243. Regulated passenger tariffs that erode profitability and encourage overloading.
244. Low skilled and educated workforce with little interest beyond daily earnings.
245. Lack of knowledge of the actual situation of the IWT network and potential for huge maintenance backlog.
246. Weak environment for public-private partnership (procurement, contractual arrangements, political interference, limited competition).
247. Lack of Master Plan, including dredging strategy, as a basis for the mid-term sector development.
248. Lack of adequate financial management and information system in BIWTA resulting in poor control of revenues and expenditures.
249. Perception of IWT as unsafe.
250. Country Boats Associations with little influence beyond the local level.
251. Few donors interested in the sector.

15.3. OPPORTUNITIES

252. Existing dredging surplus capacity in the private sector.
253. Development of intra-regional traffic and India-to-India traffic through Bangladesh.
254. Development of container traffic between Dhaka and Chittagong in a growing market.
255. Private projects interested in using IWT for bulk cargo in large quantities.
256. Private sector interested in piloting mechanized cargo handling and longer-term lease or contractual agreements for port management and cargo handling.
257. Development and management of rural IWT infrastructure by Local Government Institutions having demonstrated this capacity with rural roads and markets.
258. New financing sources for the sector (from ferry revenues, from user charges, from petroleum products) benefiting from on-going discussions on developing similar sources for road maintenance.
259. Positive environmental impact of IWT compared to other transport modes.
260. Development of synergies between water management and IWT.

15.4. THREATS

261. Development of road network in competition with and in opposition to the IWT network.
262. Poor water management at national and regional level and lack of compliance with regional agreements.
263. Internal and external opposition to reforms from those who benefit unduly from the present situation or from those who would lose their jobs/positions.
264. Increased corruption may result from enhanced private participation. Corruption is a serious risk related to an increased role of the private sector in provision of dredging services. While private dredging companies are supposed to be contracted by BIWTA based on competition, there is an unusual practice of awarding contracts to dredger operator/company who do not have dredging equipment and lease equipment from other operators. This practice is contrary to good governance and basic principles of selection of contractors.
265. Similarly control of dredging operations is prone to corruption as there is no trace of the quantities dredged after they have been disposed. The use of performance-based contracts would limit human involvement in the control as performance would be measured using electronic equipment and with a lower frequency than when quantities are measured.
266. Negative environmental impact of dredging and IWT.

16. STRATEGIC RECOMMENDATIONS

267. The Government needs to develop a coherent mid-term vision of sector development which is affordable, sustainable and socially and economically acceptable. This vision will have to integrate the constraints that exist in the river environment in Bangladesh and agree to the future role for the various stakeholders in the sector. This will encompass the role of traditional country boats and modern commercial vessels, the share of investment versus maintenance, and the role of the public and the private sector. The following paragraphs propose elements as contribution to the establishment of this mid-term vision.

268. ***Network development and dredging strategy.*** In view of the constraints created by the environment outside of the IWT sector, the short-term priority for the Government should be to determine the core IWT network which would be justified to receive resources for development and maintenance. The impact of water management on IWT is the major challenge faced by IWT in the future. The constraint on the availability of water provides the environment for any IWT strategy as it is outside the sector and not under its control. River water is used for several purposes: water supply, electricity generation, irrigation and drainage. Availability of river water is also subject to regional agreements and the vagrancy in their implementation due to political reasons. Even with improved water management, increased extraction of water from rivers in the future combined with siltation resulting from deforestation will continue to impact significantly on IWT as it has increasingly done in the past decades. IWT has to face that reality and decide on the type of network and the type of services that are affordable, sustainable and socially and economically acceptable. The past strategy where network development was based on considerations internal to the IWT sector needs to be revised to take into account recent and future changes in the outside environment. This entails determining the core network that can be used by modern vessels which ply rivers which are deeper than those used by country boats and which require a significant amount of resources for maintenance, the remaining network being left to country boats which ply rivers that do not need maintenance.

269. The Government would thus need to define a new dredging strategy which :

- a. Ensures consistency between the resources allocated to the sector and the dredging requirements necessary to sustain the level of service defined in the classification of waterways;
- b. Defines criteria for the prioritization of waterways in order to establish their classification;
- c. Secures financing of maintenance of navigable waterways preventing these resources from being used for other dredging activities; and
- d. Defines the respective contributions of BIWTA, BWDB and the private sector to the dredging of navigable waterways.

270. A sector master plan should be prepared to provide the basis for the mid-term vision in terms of IWT infrastructure development and maintenance. Sector requirements for funding development projects should shift from the claim that resources should be allocated proportionally to the importance of the IWT sector in the total transport market

to requiring funds that are necessary to implement the mid-term vision for the sector. Projects are presently developed without evaluating their impact or their overall costs, especially recurrent costs (service of the debt, subsequent maintenance). The Planning Commission is conducting studies for preparing master plans for road and rail but not for IWT.

271. The second part of the ADP should be reviewed to be consistent with the revised sector policy. In particular, should the policy confirm that the role of the private sector in dredging works should be enhanced, the purchase of nine dredgers in addition to the three dredgers already financed by Spain may not be justified in view of the capacity already available or which can be developed in the private sector.

272. ***Financing of maintenance of IWT network.*** The strategic objective would be to commercialize financing of maintenance of IWT network by putting inland waterways on a fee-for-service basis. This strategic option is confirmed in the draft Integrated Multimodal Transport Policy which recommends the creation of a Waterway Maintenance Fund. While the Government increased significantly its resources allocated to dredging in 2005/06, cost recovery needs to be increased to improve sustainability of sector financing. Network development would remain dependent on Government financing through its investment budget. Options exist to develop financial participation of users in maintenance of the IWT network:

- a. As the Government is discussing the possibility of creating a Road Fund to sustain financing of road maintenance, the possibility exists to create a similar Water Maintenance Fund. It is recommended that the principles of so called "Second Generation Road Funds¹⁴" apply to the Water Maintenance Fund:
 - (i) The Fund would be a financially autonomous agency managed in accordance with commercial principles. To improve sector governance, the agency would be submitted to regular technical and financial audits.
 - (ii) The Fund would be overseen by a Board, which would include representatives from users. The Board would approve the maintenance program established by BIWTA and financed by resources from the Fund.
- b. Road users can contribute through the fare that they pay for the use of ferry services operated by BIWTC. The current amount spent by BIWTA for the maintenance of ferry channels is estimated at Tk 362 million, more or less equivalent to BIWTC's profit on ferry services. However, for transparency and sustainability reasons, maintenance of ferry channels should not be financed from the profit on ferry services but from a specific fee, ferry fares being reduced accordingly.
- c. IWT users' contribution to financing of maintenance of IWT network through conservancy, pilotage and channel dues can also be increased. At this time, compared to maintenance needs estimated at Tk 1,152 million, cost recovery

¹⁴ Ian G. Heggie and Piers Vickers. 1998. Commercial Management and Financing of Roads. Technical Paper 409. World Bank. Washington D.C.

is 6.4 percent only. The potential for increase is limited however and the initial target could be to double the cost recovery ratio.

- c. Additional resources would come from a user charge collected on petroleum products, the collection mechanism being the same than for the road user charge collected for the Road Fund. These resources will be collected in case a Road Fund is created. The part collected from IWT operators should be allocated to the IWT sector and not stay in the road sector.
- d. While port revenues are expected to cover expenditures related to port maintenance, port operators' benefit from good maintenance of the IWT network as this is a condition to access ports. Allocation of a percentage of port revenues to maintenance of the IWT network would be a possibility to explore to increase cost recovery in the sector. This would however require an analysis of the profitability of port operations, of the amount of resources actually needed for port maintenance and of the correct amount of revenues that can be expected to be collected from port operators in comparison to current revenues.
- e. A toll system is another possibility to finance dredging maintenance on certain sections of the class I and II network. In the road sector, tolls have been used as counterpart to a new service or to the improvement of an existing service. Otherwise, the toll is considered as additional taxation. Users are then reluctant to pay if no new revenues or new savings are generated and try to circumvent the toll through corruption.
- f. While resources for dredging can increase, actual costs of dredging executed by BIWTA should be carefully analyzed and measures should be taken to bring them at the level of the market. These measures include increased role of the private sector as recommended in the specific section on the role of the private sector in the proposed IWT strategy.

273. User charges can potentially cover the cost of maintaining the IWT network as shown in the following table.

Table 13: Potential Sources of Financing for Dredging

Source of funds	Amount (Tk million)	
Users of ferry services	362	Actual cost of maintenance of ferry channels
Increase in IWT user charges	147	Twice the present revenues
User charge on petroleum products	453	For 350 million liters
TOTAL	962	6 million m ³ at Tk 100 per m ³ plus the actual cost of maintenance of ferry channels

The increase in the price of the liter of diesel oil would be Tk 1.3 per liter¹⁵, which is reasonable compared to the current price of Tk 30 per liter. The actual amount of resources needed for IWT network maintenance needs to be clarified though. This

¹⁵ Based on a consumption of about 350 million liters of diesel per year (cf. para. on environment for data on consumption of diesel).

requires defining the core IWT network as recommended above, the level of service offered and the dredging requirements to maintain this level of service. A dredging strategy, which would conclude that half of the IWT network needs to be maintained, would result in a user charge on petroleum products of Tk 0.4 per liter, which is quite affordable. Progressive implementation of the user charge would also facilitate its acceptability.

274. The decision on developing a user charge on petroleum products needs also to take into account the impact on the rural poor and the equity among users. A strategy that would require all users to pay but would allocate resources only to part of the network would be highly inequitable and would be rejected by users. The Bangladesh Water Management Plan designates the Regional River Management and Improvement Program aimed at both navigation and drainage as a Public Obligation Service financed by the Government possibly with donor support.

275. **Country boats.** Government support should go beyond the commitment in the NSAPR to preserve navigation of country boats without actually taking actions or allocating resources to translate this commitment into results. It is proposed to support country boats through institutional and financial measures.

276. Responsibilities for regulation and infrastructure should be transferred to local governments. Registration of country boats will generate revenues to local governments and these revenues will be used at the local level, which is more appropriate. Local governments have the capacity to include investments in infrastructure for country boats in their development plans and can get funding more easily when such projects are giving a high priority locally. Local Governments also have more capacity to implement projects with the support of LGED that has demonstrated this capacity in the road sector and more recently in the river sector under the on-going Rural Transport Improvement Project financed by the World Bank.

277. Decentralization of these responsibilities at the local level will increase participation of country boats owners in decisions, which impact on their activity. This will ensure for example that investments in IWT are rightly located to respond to the demand of users. Similarly the central administration will need to ensure through a consultation mechanism that there is good coordination with country boats owners when investments that impact on IWT are decided at the central level.

278. A micro-finance mechanism should be promoted to develop private, small-scale investment in boat upgrading, and community-based development of adequate landing facilities. The lack of credit facilities in rural Bangladesh is the critical issue in this connection. Providing micro-credit facilities is expected to trigger straightforward development of this essential sub-sector of IWT. The communities themselves feel that they can solve their problems but need to be mobilized first. Thus, such improvements will only be effective on a community basis with the technical support of the Boat Owner's Association and established micro-credit facilities. This is an area to be further looked into with the view to promote IWT in rural areas and improve the quality of services through provision of much needed cash-flow.

279. To effectively address this issue recommendation is made for a Rural Navigation Development Project that is clearly segregated from other potential activities involving

the Formal IWT Sector. The Informal Sector needs recognition for the genuine economic and social role it plays in Bangladesh. It is believed that a stand-alone project dedicated to it would set the trend for the recognition it deserves. It is also expected that a stand-alone project would enhance its efficiency and impact through more autonomy. Funds would be clearly allocated to activities devoted to improvement of economic and social condition of the poor and to poverty reduction.

280. The Boat Owner's Association would coordinate the project, both in terms of credit and technical assistance. The Boat Owners' Association is regarded as the most appropriate operator of such micro-financing scheme since it already has an existing network of outposts and can reach most of the population of boat owners. In order for it to be viable, the line of credit would be implemented by one or more organizations with a proven track record in supplying credit for poor people. There are active NGO's with micro-credit financing facilities e.g., ASA (Association for Social Advancement), CODEC (Community Development Center), VOSD (Voluntary Organization for Social Development) or Bangladesh Krishi Bank, but they do not consider the boat owners to fall in their beneficiary criteria. However, some boat owner associations such as the Barguna Trawler Merchant Association reportedly help their members with repair and maintenance costs. NGOs such as BRAC, a development bank such as Grameen; or a foundation such as PKSF are other possible links and partnerships to be explored in the view to prepare a micro-finance project in this sector.

281. ***Institutional framework.*** The institutional framework would need to be revised to prevent overlapping of responsibilities in the sector institutions and to reflect the increased role of the private sector. One option would be to focus DOS on maritime shipping and give all responsibilities for IWT, including coastal waterways, to BIWTA. As important would be the need to ensure that the sector institutions have the capacity to enforce regulation, especially related to safety, planning of investments and sector monitoring. The Government should provide the human and financial resources to ensure that this capacity is in place.

282. ***Sector regulation.*** Passenger tariffs should be deregulated. Bangladesh Railways is expected to be granted the autonomy to define its tariffs with the exception of services that would be subsidized through Public Service Obligations. Public Service Obligations are contracts between the Government and a parastatal which define the services that the Government requests the parastatal to provide and the mechanism to compensate the parastatal when such service is not profitable. Should the Government want specific services to be operated with subsidized tariffs, it should sign Public Service Obligations with the operators providing the services. Deregulation would allow increased cost recovery from users by increasing user charges dedicated to financing of maintenance of the IWT network, operators having the capacity to reflect the new charges in the tariffs. However, strengthening of capacity to enforce safety regulation as recommended above should be implemented at the same time that tariffs are deregulated to prevent cut-throat competition and aggravation of overloading.

283. The obligation to pay tolls to nearby ghats even though country boats do not use the facilities should be discontinued. Similarly to the modern sector, passenger tariff for country boats should be deregulated as operators do not comply with them any way.

284. ***Stakeholder consultation and sector coordination.*** Stakeholder involvement in policy and sector investment decisions should increase and a mechanism should be defined that provide for regular consultation with stakeholders. Similarly, a procedure should be put in place to improve inter-sectoral coordination, especially between the road and the IWT sectors, to prevent other sectors to create physical obstacles to IWT.

285. ***Role of private sector.***

- a. **Port management:** Leasing arrangements for port management should be revised to transfer maintenance responsibility to private port managers moving beyond the only responsibility for revenue collection. These arrangements, which would also involve an extension of the leasing period, could be piloted in ports where port managers are interested in expanding their role.
- b. In the main ports where BIWTA is the port manager, the possibility of conceding port management to private operators should be explored. This would be consistent with the decision to grant management to private operators of the new inland container facility which is being developed. While this could be piloted in one port as a test of the new arrangement, the management framework in other ports should evolve to give more autonomy to port managers similarly to the framework existing for sea ports.
- c. **Cargo handling:** Mechanization of cargo handling could be piloted by an operator which expresses an interest. The licensing period should then be extended beyond the current one-year period to ensure that the licensee can recoup the investment costs during the period.
- d. **Container transport:** Private operators should be the only operators for container transport. During the preparation of this report, they expressed an interest in transport of containers. At this time, they do not want to invest as the land infrastructure is not yet available. With the development of inland container depots, this obstacle will be removed. Container vessels being purchased by BIWTC should be leased to private operators who should then be left to develop themselves this type of transport without further Government intervention.

286. ***Role of BIWTC.***

- a. General cargo activities should continue to be phased out as they continue to generate losses even if they are reduced by leasing out part of the fleet to private operators. The policy of divesting of general cargo transport should be pressed further by selling the related assets to the private sector.
- b. While the use of PSO for coastal passenger services is acceptable, the cost of services should be in line with market prices. BIWTC costs are higher than those of the private sector, which likely explains why the Government does not want to fully compensate BIWTC for losses on these services.
- c. BIWTC should finance dredging of ferry channels from revenues collected from road users. This, however, would require a careful analysis of the dredging costs as well as the costs of ferry services to ensure that road users

pay a price that is in line with market prices. Progressive opening of competition for ferry services would allow for gradual alignment of costs to market prices.

287. **Cross-border IWT.** The Government of Bangladesh should continue to promote IWT for intra-regional trade. This is however subject to the quality of relationships between neighboring Governments which is not a sector-related factor. Bangladesh has a keen interest in increasing intra-regional trade as it can significantly reduce the cost of transport for the import of containers of fly-ash used in cement factories. Bangladesh therefore should unilaterally take measures that promote IWT by developing infrastructure such as an inland container facility in Dhaka and facilitating customs procedures.

288. **IWT Safety.** Measures to improve waterways safety are listed below. While they will not prevent all accidents, they all are within the power of the Government and address the real causes of the accidents beyond the reasons which are often given such as overloading or bad weather:

- a. Authorize selling of boarding tickets by vessel owner in the terminals and improve control of overloading by both, BIWTA and DOS;
- b. Improve the level of comfort and number of passenger terminals;
- c. Make Inland Ship Safety Administration at DOS operational with the necessary staff, funding and equipment;
- d. Ensure presence of DOS representatives at ports to regulate vessel operation or transfer this regulatory function to BIWTA's port manager;
- e. Increase the number of pilots with mandatory pilotage at more dangerous reaches;
- f. Expand the number of well-trained ship crews;
- g. Increase the number of ship inspectors and surveyors;
- h. Expand hydrographic surveys at more dangerous reaches and provide ship operators with more current nautical charts;
- i. Improve communications between ships and provide timely weather reports;
- j. Modernize floating salvage cranes;
- k. Negotiate with insurance companies to adjust their rates proportionally to actual frequency of accidents and make insurance mandatory for ship licensing; and
- l. Examine the possibility of developing Safe Haven harbours.

289. **Environment.** Strengthening the institutional capacity to assess environmental impacts, monitor and enforce mitigation measures in the sector is a pre-requisite to achieve the objectives set up by the Government for the environment in the IWT sector.

290. **Social aspects.** Country boat owners should be sensitized to improve the quality and safety of their services. The use of a gearbox would be a major improvement which would require informing owners on the savings in fuel consumption which are large

enough to compensate for the investment. Also toilets should be built on the country boats similar to the practice in East Asia.

291. IWT plays a particularly important role for the 12.3 percent of the rural population that only have reasonable access to the transport system through IWT¹⁶. Little is known of this population, of the services that are provided by IWT and the opportunities that they offer but also of the threats that may endanger the provision of these services in the future with the negative social consequences that this would imply. This makes it then essential to understand:

- a. whether this vital access might be at risk and what action is required to secure it;
- b. what proportion of the rural population which still does not have satisfactory access to any transport service might be more effectively included in the country's economy by facilitating extension of country boat operations rather than building rural roads.

292. ***Sector Governance.***

- a. Contracting procedures and financial terms of leasing arrangements: Contracting procedures should be reviewed to ensure transparency and better results of the procedures in an imperfect market environment. Financial terms should also be revised to arrive at more homogeneity in port revenues compared to traffic.
- b. Collection of port revenues: Procedures to collect revenues from passengers in the main ports managed by BIWTA should be revised to reduce pilferage and corruption. Involving the private sector could be explored similarly to what Bangladesh Railways has introduced.
- c. Financial management of BIWTA: Financial management in BIWTA should be strengthened to increase transparency in the use of resources by providing better information on the costs of services provided by BIWTA and thus provide the basis for future decisions on the role of BIWTA versus the role of the private sector.

293. The following table summarizes the building blocks and actions that are part of the proposed strategy.

¹⁶ National Income and Expenditure Household Survey for 2000

Table 14: Proposed IWT Strategy - Building Blocks and Actions

Building block	Action
Ensure adequate allocation of financial and human resources	Define new dredging strategy to ensure consistency between resources, maintenance requirements and priorities Prepare IWT sector master plan Review three-year development program consistently with revised sector policy Commercialize financing of IWT network maintenance (creation of Water Maintenance Fund, contribution of road users to maintenance of ferry channels, increased contribution of IWT users through user fees)
Focus the Government's role on regulation, enforcement, planning and monitoring	Revise the institutional framework
Promote private sector participation in provision of services	Revise leasing arrangements for port management and port operations Lease out BIWTC container vessels to private operators Phase out freight activities in BIWTC
Sustain the provision of IWT services to the poor, in particular in remote areas	Transfer responsibilities for rural IWT regulation and infrastructure to local government institutions Promote micro-finance mechanism to develop country-boat upgrading and community-based landing infrastructure Stop obligation made to country boats to pay tolls to nearby ghats even though the facilities are not used Adopt Public Service Obligations for service delivery in poor and remote areas
Make IWT safe and dependable	Deregulate passenger tariffs Implement IWT safety action plan
Improve sector governance	Restructure organogram and introduce capacity-building measures in BIWTA Implement transparent financial management system in BIWTA Involve stakeholders in sector planning Revise contracting procedures and financial terms of leasing arrangements with port managers and operators Revise procedures to collect port charges from passengers Implement transparent financial management system in BIWTA
Promote IWT as an environmentally friendly mode of transport while protecting the environment from IWT-related negative impacts	Strengthen the institutional capacity to assess environmental impacts, monitor and enforce mitigation measures Promote the use of a gearbox on country boats
Promote IWT as an instrument of regional integration	Develop infrastructure for cross-border IWT and facilitate transit procedures

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

17. POSSIBLE WORLD BANK SUPPORT

294. From the above assessment of the IWT sector, including of achievements under TIWTP, it can be concluded that World Bank involvement in the sector ended in 2000 with an unfinished agenda. Since TIWTP was completed, the sector has continued to evolve building on and pursuing TIWTP achievements. Sector development opportunities exist and the sector has strengths that justify enhanced donor support to the sector. World Bank support could be provided to increase sector efficiency through reforms and investments. Based on the experience of TIWTP however, it is suggested to separate support to reforms and investments, using Development Policy instruments for the first one and sectoral investment instruments for the second.

295. Development Policy support is proposed to focus on the following aspects:

- a. Adoption of a new sector strategy;
- b. Adoption of a network development and dredging strategy providing a mid-term vision for the sector encompassing investment needs, financing of recurrent costs and the role of the private sector;
- c. Setting up of a new framework for sustainable sector financing with enhanced participation of IWT users (financing of maintenance of ferry channels, waterways maintenance fund);
- d. Adoption of a new institutional framework for country boats with responsibilities for IWT regulation and infrastructure transferred to Local Government Institutions;
- e. Deregulation of passenger tariffs;
- f. Adoption of a new institutional framework for IWT to streamline and improve sector management;
- g. Adoption of a new framework for public-private partnership in port management and cargo handling;
- h. Improvement of governance in sector institutions (selection procedures for port managers and port operators, financial management system in BIWTA);
- i. Improvement of capacity to manage and monitor the sector with particular emphasis on safety and environment.

296. **The Government has identified the following list of priority projects proposed for World Bank financing.** The proposed investment program is being reviewed by the Bank and will be subject to economic and financial feasibility studies before any World Bank financing is considered. Further discussions will need to be held to define more precisely the content of the proposed projects and determine their justification as well as confirm their sustainability, in particular in view of their mode of operations including by the private sector.

297. While environment would be fully integrated during preparation and implementation of any future lending in the IWT sector, the possibility will be explored to use carbon finance to promote the use of a third gear on motors used by country boats.

Proposed Investment Projects:

1. Dredging of three important river routes, Chandpur- Baghabari, Bhairab-Chhatak and Aricha-Godagari.
2. Replacement of existing five old dredgers of BIWTA by procuring new ones.
3. Construction/ Procurement of 2 Nos. Ro-Ro ferry and 2 Nos. of Ro.-Ro. Pontoon for ferry services provided by BIWTC in Mawa ferry sector.
4. Construction/ Acquisition of 4 Nos. of Container Vessels for BIWTC.
5. Strengthening of the Department of Shipping (DOS) through: Implementation of the Inland Ship Safety Administration (ISSA), improvement of Ferry Safety, updating the policy and laws and reorganization of the DOS.
6. Modernization of existing light houses and installation of new ones.

Proposed Technical Assistance Projects:

7. Modernization and development of important river ports, including mechanization of equipment for cargo handling and berthing facilities.
8. Technical Assistance to hydrographic survey and periodic chart preparation along with reclassification of inland waterways.
9. Study on sustainable river routes maintenance through river training, dredging predictability and maintenance dredging.
10. Study for the construction of Inland Container Terminal (ICT) in Dhaka and other potential places of Bangladesh.
11. Preparation of an IWT Master Plan.
12. Study on institutional strengthening through legal and technical reforms and training of different categories of manpower involved in IWT sector.
13. Regional study on transit and inter-country trade through river routes of Bangladesh and its neighboring countries.
14. Study on restructuring BIWTC's organizational structure, manpower, infrastructure, equipment, inventory, capacity building and identify the weaknesses along with projection of its future services including the type of cargo and passenger vessel and its operation modalities.
15. Study on existing inland shipping fleet profile.

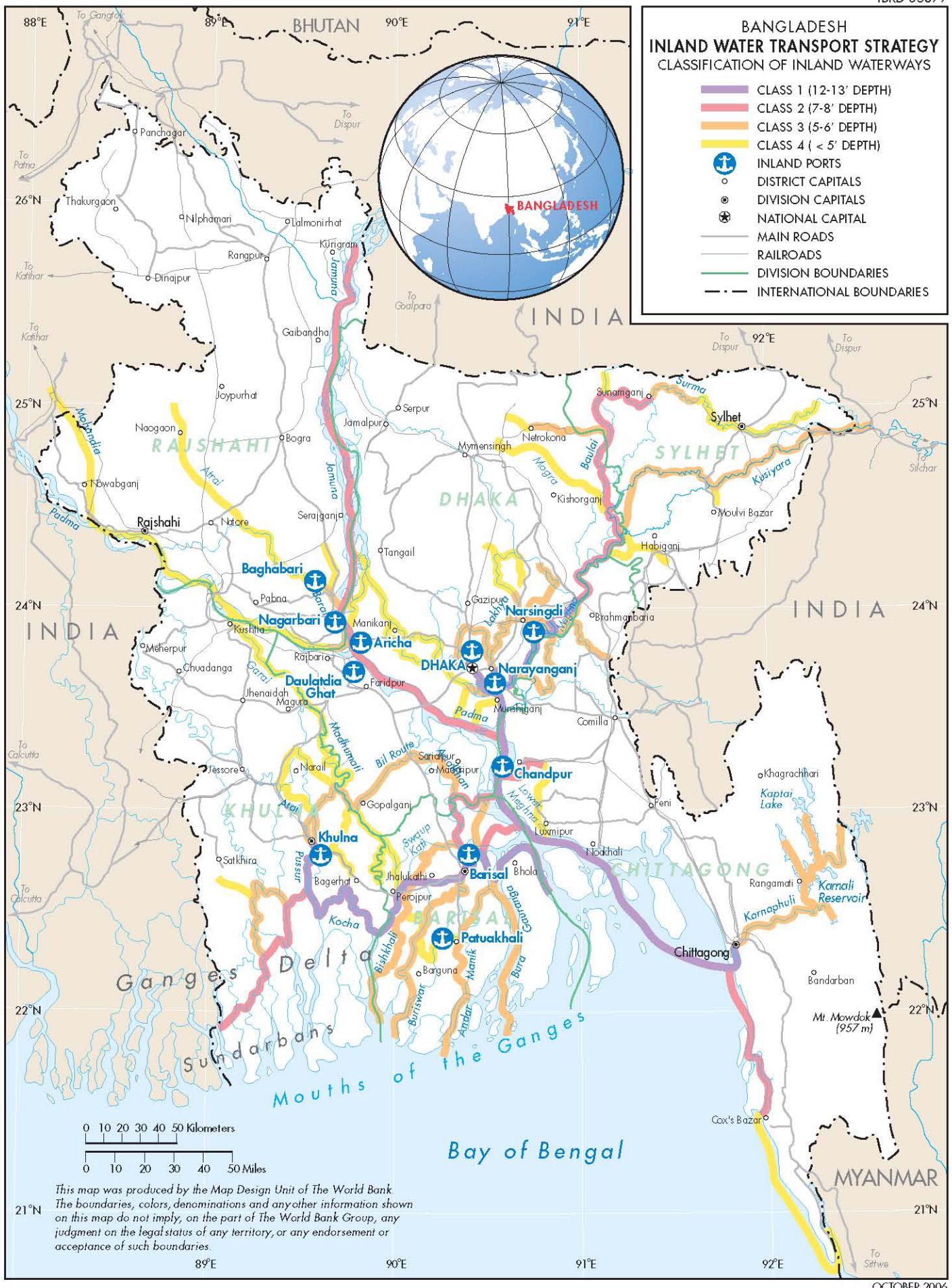
MAP SECTION

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

BANGLADESH INLAND WATER TRANSPORT STRATEGY

CLASSIFICATION OF INLAND WATERWAYS

- CLASS 1 (12-13' DEPTH)
- CLASS 2 (7-8' DEPTH)
- CLASS 3 (5-6' DEPTH)
- CLASS 4 (< 5' DEPTH)
- INLAND PORTS
- DISTRICT CAPITALS
- ◎ DIVISION CAPITALS
- ★ NATIONAL CAPITAL
- MAIN ROADS
- RAILROADS
- DIVISION BOUNDARIES
- INTERNATIONAL BOUNDARIES



People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

BANGLADESH INLAND WATER TRANSPORT STRATEGY PROTOCOL ROUTES

PROTOCOL ROUTES

CLASS 1 (12-13' DEPTH)

CLASS 2 (7-8' DEPTH)

CLASS 3 (5-6' DEPTH)

CLASS 4 (< 5' DEPTH)

INLAND PORTS

○ DISTRICT CAPITALS

◎ DIVISION CAPITALS

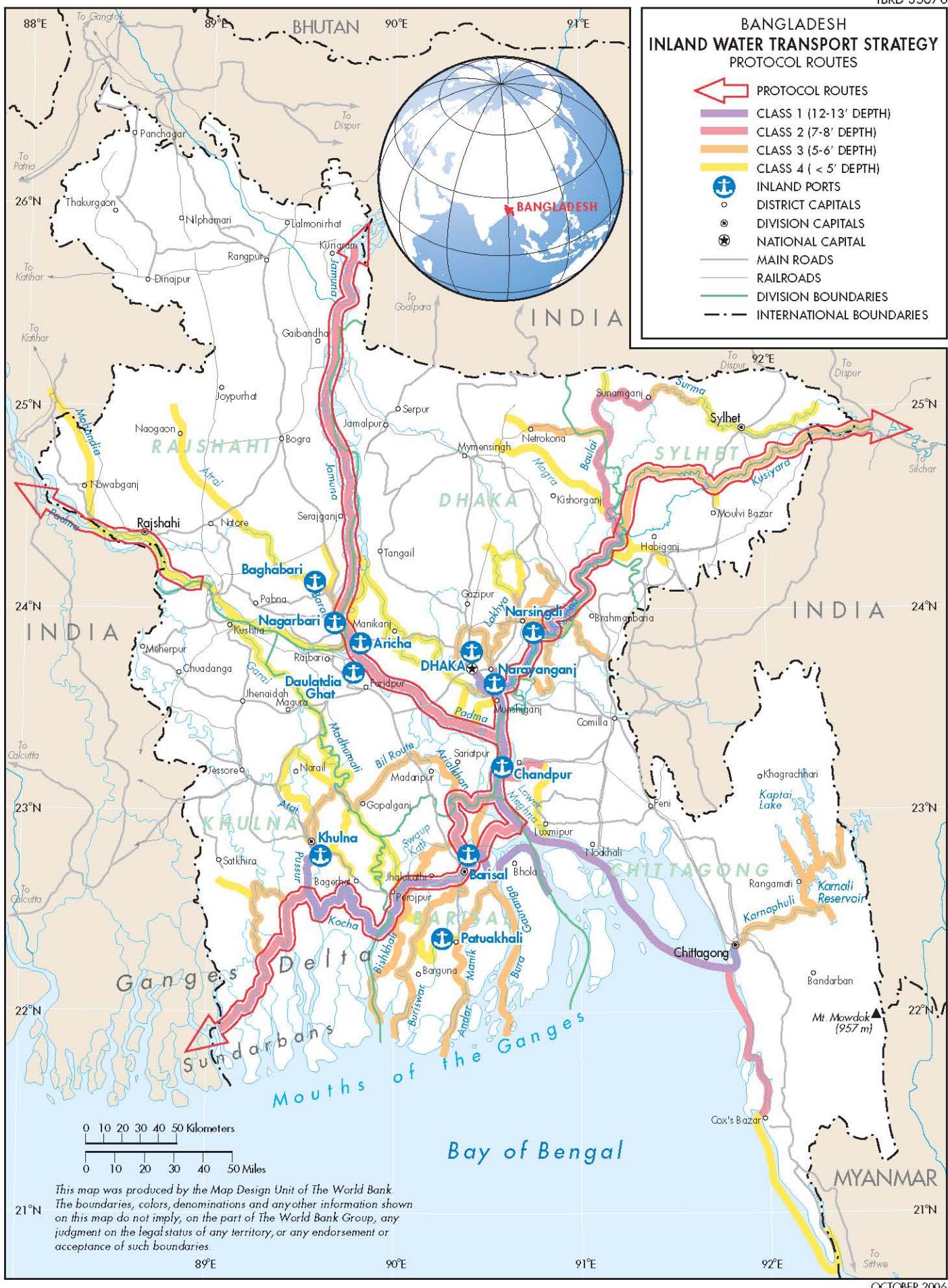
★ NATIONAL CAPITAL

— MAIN ROADS

— RAILROADS

— DIVISION BOUNDARIES

- - - INTERNATIONAL BOUNDARIES



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People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

ANNEX 1: DREDGING WORKS EXECUTED DURING THE PAST 13 YEARS

Table A.1: Dredged Quantities for the Year 2002-03 to 2004-05 by location

Name of Shoal	Name of River	Quantity (Million m³)		
		2002-03	2003-04	2004-05
Daulatdia Ferry Ghat Basin and Approach Channel	Padma	0.54	1.14	0.52
Paturia Ferry Ghat Basin and Approach Channel	Padma/Jamuna	0.40	0.15	0.77
Mawa-Charjanajat Ferry Route	Padma	0.15	0.08	0.20
Aricha-Nakalia-Baghbari River Route (Kanaidia, Nakalia and Munshiganj)	Hurasagar/Baral	0.15	0.08	0.11
Barisal Port Area	Kirotonkhola	0.08	0.14	0.16
Dhaka-Barisal-Chittagong River Route	Meghna	0.31	0.18	0.13
Patuakhali Port Area	Lohalia		0.03	
Narayanganj Port Area	Sitalakhya		0.03	
Rajbari Launch Ghat	Sarupkathi		0.01	
Gabkhan Khal	Gabkhan Khal	0.05		
Sashan Ghat	Buriganga	0.03		
Banaripara Launch Ghat	Shandha	0.03		
SharupKathi Lauch Ghat	SharupKathi	0.04		
Shaheberhat	Shaheberhat Khal	0.11		
Alibahar char	Buriganga	0.13		
C&B Ghat	Padma	0.06		
Katpatty	Dhaleswari	0.02		
Sub-Total		2.1	1.84	1.89

Table A.2: Dredged Quantities for the Year 2002-03 to 2004-05 by type

Year	Development	Maintenance	3rd Party	Total
1992-93	0.977	1.300	0.275	2.552 (BIWTA-2.552)
1993-94	1.288	1.144	0.497	2.929 (BIWTA-2.929)
1994-95	1.818	0.915	0.363	3.096 (BIWTA-3.096)
1995-96	1.621	1.246	0.100	2.968 (BIWTA-2.968)
1996-97	1.740	1.477	0.174	3.391 (BIWTA-3.391)
1997-98	2.200	0.934 (BIWTA-0.6 BYMB-0.334)	0.141	3.275 (BIWTA-2.941 BWDB-0.334)
1998-99	0.257	2.071 (BIWTA-1.894 BWDB 0.177)	0.369	2.697 (BIWTA-2.520 BWD13-0.177)
1999-2000	3.005 (FRP: BIWTA-2.786 BWDB-0.219 (LTP-0.087)	0.114 (BIWTA-0.114)	0.246	3.365 (BIWTA-3.146 BWDB-0.219)
2000-2001	0.368 (LTP-0.368)	2.247 (BIWTA-1.919 BWDB-0.328)	0.452	3.067 (BIWTA-2.739 BWDB-0.328)
2001-2002	0.762 (LTP-0.538 CWP-0.224)	2.153 (BIWTA-1.783 BWDB-0.370)	0.164	3.079 (BIWTA-2.709 BWDB-0.370)
2002-2003	0.954 (LTP-0.684 CWP-0.270)	2.099 (BIWTA-2.099)	0.100	3.153 (BIWTA-3.153)
2003-2004	1.371 (LTP-.858 CWP-0.463 MPP-0.050)	1.847 (BIWTA-1.751 BWDB-0.096)	-	3.218 (BIWTA-3.122 BWDB-0.096)
2004-2005	1.585 (LTP-0.636 CWP-0.453 GCP-0.265 4RP-0.179 PFT-0.052)	1.887 (BIWTA-1.362 BWDB-0.525)	0.008	3.480 (BIWTA-2.875 BWDB-0.605)
2005-2006	3.500	3.000	0.0	6.500

ANNEX 2: SECTIONS OF IWT NETWORK WITH SILTATION PROBLEMS

1. A major recurrent siltation problem in the Jamuna river system north of Nagarbari causes disruption of navigation up to the port of Baghabari. This port is of strategic importance. It contains a major oil depot and fertilizer storage used to supply the northern region of the Country. Whereas the passage is usually not seriously affected, major siltation problems have begun to occur in recent years. Tankers have to sail at half load for 4 months of the year. During the December 2005-January 2006 period, navigation of tankers came to a complete stand-still for one month causing wide-spread shortages of fuel in the northern districts. This has entailed a dramatic rise of fuel prices and had a huge economic and social impact. There is no alternative route for oil products on this corridor because Bangladesh railways do not operate tanker wagons. The road transport industry does not have the capacity to supply that part of the country either. Fuel is primarily used to irrigate land, and also for IWT and road transport. The shortage of fuel has resulted in losses of crops and disruption of social life across an estimated number of 20 districts representing almost one third of the country's population. As to the reason why this stretch of the river cannot be trained or dredged, it is said to be due to the high current velocity. The dredgers cannot operate because of the force of the water flow. Bandalling has been attempted on some sections but does not prove efficient. Major training schemes may be required to channel the river and assist in maintaining water depth by self-dredging.
2. As a general rule siltation affects all navigation routes serving the north of the country (Jamuna and Meghna river systems) for a period of 6 months per year. There is hardly any waterborne traffic of passengers in the northern part of the country (other than local traffic of country boats, which are operated everywhere in Bangladesh). Cargo traffic can only take place on waterways in the north of the country during the high water period. Conversely the road network in the northern areas and through to neighboring India is reportedly good. Consequently there is relatively less potential for IWT improvement in those areas. Extending LAD would require large schemes (dams, river training) to master water resources and maintain sufficient depth the year-round.
3. The route from Chittagong to Borisal is affected by recurrent siltation in the vicinity of Borisal. Ships have to wait for high tide to access to the port city. Three 600-seats, 4 m draft passenger vessels are regularly operating on this line providing three weekly passenger services. Vessels loaded with 600 passengers eventually have to wait 7-8 hours for the tide to access Borisal, causing much delay on a 24-hour journey. The route is a Class I waterway with a design LAD of 4.0 m. The actual depth of the section comprised in the lower Meghna, also used for the traffic from Chittagong to Dhaka, meets the prescribed LAD. But the depth available in the connecting distributary branch to Borisal is only 3.5 m. BIWTA regularly attempts to cope with recurrent siltation by dredging of the affected section on a regular basis, but siltation is high and BIWTA has failed so far to tackle the problem. This problem also affects the traffic on the important Dhaka-Khulna route, which uses the same channel to access to Borisal.
4. Several ferry channels are prone to recurrent siltation and riverbed morphology instability. This is the case at Chandpur, Mawa and Paturia ferry landing places (Padma

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

and lower Meghna Rivers). Two or three units of BIWTA dredgers are believed to operate almost continuously at this location, whereby diverting some 54 % of BIWTA dredging potential away from IWT, each year.

ANNEX 3: IWT FLEET

Cargo	1998/1999		2005		
	Number	Static Capacity (tons)	Number	Static Capacity (tons)	Total capacity (million tons)
Vessels + launches	1,913	520,000	2000	1,000,000	24.0
Tankers	118	101,000	118	101,000	3.6
Bay crossing	143	100,000	170	160,000	7.6
Total	2,174	721,000	2,288	1,261,000	35.2

The total capacity is the product of the static capacity by twice the number of trips as the capacity is offered in each of the two directions of the trip. Only for tankers the total capacity is the product of the number of trips by the static capacity as tankers are loaded in one direction only.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

ANNEX 4: IWT OPERATING COSTS

Operating Costs	Country Boat	Passenger Vessel	Cargo Barge Mechanized	Cargo Barge Manual
Acquisition	450,000 Tk 30 persons Mongla Area	25,000,000 Tk 594 persons Dhaka-Bolna	15,000,000 Tk 500 DWT	15,000,000 Tk 500 DWT
Capacity	4 per day	30 km	4.3 per month	2 per month
Operating Line (Case study)	8 km	110 km	400 km	400 km
Number of one-way trips	2.5 l/hr	1800 l/one way trip	2000 l/one way trip	2000 l/one way trip
Distance One way	30 Tk/liter	30 Tk/liter	30 Tk/liter	30 Tk/liter
Consumption	5% of fuel costs	5% of fuel costs	5% of fuel costs	5% of fuel costs
Cost of diesel oil	10% of fuel costs	10% of fuel costs	10% of fuel costs	10% of fuel costs
Cost of lubricants	1 tk/km/pass	0.75 tk/km/pass	0.92 tk/T.km	0.92 tk/T.km
Cost of repair and maintenance	10 Tk	500 Tk	500 Tk	500 Tk
Fare	-	250 Tk	250 Tk	250 Tk
Port fees per call	-	200 Tk	200 Tk	200 Tk
Channel Dues	-	40,000 Tk	20,000 Tk	20,000 Tk
Channel fees	-	Per month	Per month	Per month
Cost of registration	2000 Tk	50,000 Tk	15,000 Tk	15,000 Tk
Variable Costs				
Salaries	-	0 Incl above	0 Incl above	0 Incl above
Social security	-	83,333.33	50,000.00	-
Depreciation	-	-	-	-
Interest on capital	-	-	-	-
Major overhaul	-	40,000 Tk	40,000 Tk	40,000 Tk
Fuel	150 Tk	1,620,000 Tk	257,143 Tk	120,000 Tk
Lubricants	7.5 Tk	81,000 Tk	12,857 Tk	6,000 Tk
Maintenance	15 Tk	162,000 Tk	25,714 Tk	12,000 Tk
Management fee	-	-	-	-
Income Tax	-	-	-	-
Net Operating Costs	172.5 Tk	2,036,333 Tk	400,714 Tk	153,000 Tk
Port Fees	40 Tk	15,000 Tk	2,143 Tk	1,000 Tk
Channel Dues	-	7,500 Tk	1,071 Tk	500 Tk
Channel fees	-	6,000 Tk	857 Tk	400 Tk
Registration	5.5 Tk	3333.3 Tk	1666.7 Tk	54.8 Tk
Total Operating Cost	218 Tk	2,068,167 Tk	406,452 Tk	154,955 Tk
Number of trips (one way)	4	30	4.3	2
Loading Rate	27%	80%	40%	40%
Number of passenger.trips or tons	32.4	14,256	857	400
Income for one trip (one way)/pax or T.	8	82.5	368	368
Revenues	259.2 Tk	1,176,120 Tk	315,429 Tk	147,200 Tk

ANNEX 5: ECONOMIC JUSTIFICATION OF DREDGING

1. The volume of cargo traffic transported on waterways by formal operators is estimated at 1.95 billion ton-km in 2005. The average distance of transport is estimated at 138 km, similar to the distance found in 1995-1996. The cost is calculated using the model developed for the present study and is estimated at Tk 0.972 per ton-km. The total cost of transport of freight by IWT is then estimated at Tk 1.9 billion. The cost of handling at the port plus the cost of the terminal transport between the port and the origin/destination of the freight is estimated between Tk 3.9 and 5.0 billion.
2. The same tonnage is assumed to be transported by road, but the average distance of transport is higher (150 km) based on the results of the 1995-1996 survey on road transport. The cost is calculated as the average between the tariffs between Dhaka and Chittagong and between Dhaka and Sylhet and is estimated at Tk 4.42 per ton-km. The total cost of transport of freight by road is then estimated at Tk 9.4 billion
3. The volume of dredging on the entire waterway network is estimated at 6 million cubic meters. The cost is taken at Tk 100 per cubic meter. The total cost of dredging is then estimated at Tk 600 million.
4. The minimum traffic necessary to justify dredging is obtained by dividing the average cost of dredging by the average benefit from dredging per kilometer. The average cost of dredging per kilometer is obtained by dividing the total cost of dredging by the length of the navigable network (5,968 km). The average benefit from dredging per kilometer is obtained by dividing the difference between IWT and road costs by the number of ton-km for IWT traffic.

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

ANNEX 6: GOVERNMENT AND BIWTA RESOURCES FOR DREDGING

	ADP allocation	Expenditures	BIWTA revenues (development dredging)	BIWTA revenues (Government grants)
1994	402	361.2		
1995	312.4	318.8		
1996	347.6	347.3		
1997	450.5	485.8		
1998	587.3	587.8		
1999	639	675		
2000	917.3	955.9	80.53	177.50
2001	140.8	86.4	28.21	209.50
2002	65	65.8	35.16	225.50
2003	139.7	138.7	43.50	234.02
2004	346.9	254.1	69.26	278.65
2005	371.6	251.3	115.01	318.79
2006	1325.4		87.49	530.40
2007			104.80	474.50

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

ANNEX 7: IWT AND ROAD ACCIDENTS

Maritime Accidents					Road Accidents							
Date /Year	Name of Marine Vessel	Place of Accident	No. of Persons Killed	No. of Accidents	Year	No. of Accidents	No. of Persons Killed	No. of Persons Injured				
1991	N/A	N/A	5	2	1991	N/A	N/A	N/A				
1992	N/A	N/A	0	0	1992	4,012	2,317	4,506				
1993	N/A	N/A	74	3	1993	3,134	1,487	2,434				
1994	M.V. Dinar	Chandpur Meghna Dakatia crossing	180	8	1994	1,884	1,315	2,078				
1995	N/A	N/A	20	4	1995	N/A	N/A	N/A				
1996	N/A	N/A	17	1	1996	2,881	2,159	3,216				
1997	N/A	N/A	1	1	1997	2,860	2,161	3,232				
1998	N/A	N/A	45	5	1998	3,568	2,707	2,959				
1999	M.V. Deepraj & Manoshi		65	2	1999	3,809	2,951	3,106				
12/28/2000	M.V Jalkapot & Rajhangsha	Eklaspur of Chandpur	222	7	2000	3,419	3,050	2,653				
2001	N/A	N/A	4	1	2001	3,317	2,794	2,708				
2002	M.V. Salahuddin-2	Near Shatnol of Chandpur	245	2	2002	3,791	2,919	3,267				
5/23/2002	M.V. Subha	In river Dhaleswari of Mothbaria	30	N/A	2003	3,406	2,518	3,052				
2003	M.V. Mitalee-3	In river Buriganga in Pagla, Dhaka	135	4	2004	N/A	N/A	N/A				
4/21/2003	M.V. Mojlishpur	In River Meghna in Sarail Police Station	51	N/A	2005	N/A	N/A	N/A				
4/12/2003	M.V Sharifpur	Leather Port, Karimganj, Kishoreganj	30	N/A								
7/8/2003	M.V. Nasrin	Chandpur Meghna-Dakatia crossing	500	N/A								
5/22/2004	M.V. Lighting Sun	In river Meghna at Anandabazar	83	2								
5/22/2004	M.V. Diganta (Not Found)	N/a	N/A	N/A								
2/19/2005	M.V. Moharaj	Buriganga, Pangaon, Dhaka	149	3								
5/17/2005	M.L. Raipura	Near Aricha	127									
5/15/2005	M.V. Prince of Patuakhali	In river Buri Gouranga at Golachipa	85									
Average No./Yr			148	3		3,280	2,398	3,019				

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

ANNEX 8.1: BIWTA THREE-YEAR INVESTMENT PROGRAM

SI No.	Project Title (Implementation Period)	Approval Status	Estimated Project Cost			Cumulative Expenditure up to 30-06-2005			Allocation 2005-2006			Allocation 2006-2007			Allocation 2007-2008			
			Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	Agency: BIWTA	Approved	2,010.5 8	1,110.58 900.-		170.95 170.95		-	144.- 144.-	144.- 100.-		680.- 630.-	50.- 630.-	630.- 770.-	500.- 770.-	500.- 170.-		
1.a	On-Going Projects : IP Long-term dredging programme for maintaining waterways navigable including procurement of 3 No. dredgers and 1 No. booster pump with other accessories. (July,98 - June, 2009)																	
	2. Construction of Bus and truck terminal including infrastructure at Patuna ferryghat. (July, 2003 - June, 2006)	Approved	32.10	32.10					13.50	13.50		18.60	18.60					
	3. Widening and development of navigability by dredging of Gabkhan Khal connecting Dhaka-Monga and Chittagong-Monga river route. (July, 2004 - June, 2007)	Approved	160.10	160.10					24.-	24.-		77.80	77.80		58.30	58.30		
	4. Providing landing facilities 3(three) coastal Upazillas(Cox's Bazar Sadar, Sandwip & Monpura) for river crafts. (January, 2005 - Dec, 2006)	Approved	97.92	97.92					0.20	0.20		59.-	59.-		38.70	38.70		

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

Sl No.	Project Title (Implementation Period)	Approval Status	Estimated Project Cost			Cumulative Expenditure up to 30-06-2005			Allocation 2005-2006			Allocation 2006-2007			Allocation 2007-2008		
			Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA
	5. Placement, replacement, modernization & expansion of navigational equipment for smooth & safe day and night navigation for IWT-vessels. (January, 2005 - Dec, 2006)	Approved	266.04	266.04	-	0.90	0.90	-	166.-	166.-	-	99.10	99.10	-			
	6. Development of navigability of 4 nos. important inland waterways by dredging. (January, 2005 - Dec, 2006)	Approved	460.-	460.-	0.-	20.-	20.-	0.-	310.-	310.-	0.-	130.-	130.-	0.-			
	7. Introduction of circular waterways in & around Dhaka city (2nd phase) (July, 2005 - June, 2008)	un-approved	1,413.30	1,413.30	0.-	0.-	0.-	0.-	300.-	300.-	0.-	435.-	435.-	0.-	678.30	678.30	
	8. Construction of Pontoons in Inland River Ports. (January, 2006 - June, 2007)	Approved	922.92	922.92	0.-	0.-	0.-	0.-	245.90	245.90	0.-	677.-	677.-	0.-	0.-	0.-	0.-
	9. Salvage Vessel Procurement (January, 2006-Dec, 2007)	Approved	2,632.70	812.70	1,820.-	0.-	0.-	0.-	0.10	0.10	0.-	1,870.90	50.90	1,820.-	761.70	761.70	0.-
	10. Construction of Port facilities in order to Prevent unauthorized encroachment of the Buriganga river and its foreshore land. (January, 2006 - June, 2008)	Un-approved	388.22	388.22	0.-	0.-	0.-	1.-	1.-	0.-	101.40	101.40	0.-	285.80	285.80	0.-	
	Sub-Total (1-10)		8,383.18	5,663.88	2,720.-	229.55	229.55		1,322.40	1,222.40	100.-	4,090.40	1,640.40	2,450.-	2,395.80	2,225.80	170.-

Annex 8.1: BIWTA Three-Year Investment Program

SI No.	Project Title (Implementation Period)	Approval Status	Estimated Project Cost			Cumulative Expenditure up to 30-06-2005			Allocation 2005-2006			Allocation 2006-2007			Allocation 2007-2008		
			Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Ib.	New Projects: IP																
	11. Development of navigability of Torki-Hosnabad river route by dredging. (July, 2006 - June, 2009)	Un-approved	228.13	228.13													
	12. Prevention of River Craft Accident. (July, 2006 - June, 2008)	- Do-	549.-	549.-													
	13. Construction of landing stations for mechanized country boat in the rural areas of Bangladesh (July, 2006 - June, 2008)	- Do-	333.25	333.25													
	14. Procurement of 9 Dredgers with accessories for Maintaining the navigability of Inland Waterways. (February, 2006 - June, 2008)	- Do-	5,016.94	5,016.94	3,469.10												
	15. Rehabilitation of 2(two) nos Dredger and related Ancillary crafts. (July, 2006 - June, 2008)	- Do-	2,182.67	2,182.67													
	16. Establishment of river port-facilities at Nowapara, Bhairab, Ashuganj, Bhola and Borguna (July, 2006 - June, 2009)	- Do-	4,230.-	4,230.-													

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

Sl No.	Project Title (Implementation Period)	Approval Status	Estimated Project Cost			Cumulative Expenditure up to 30-06-2005			Allocation 2005-2006			Allocation 2006-2007			Allocation 2007-2008		
			Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA
	17. Construction of Ferry Ghat at Kazirhat in the district of Pabna, Providing Berthing facilities at madrasa ghat in Chandpur, modernization of riverport at Barisal and Extension of terminal building at Sadarghat, Dhaka. (July-2006 - June 2009)	- Do-	2,686.10	2,686.10	0							250.-	50.-			1,400.-	
	18. Construction of ferry ghat and allied facilities for providing ferry service at Gopalpur in the District of Dhaka and Kartikpur in the District of Shariatpur. (July, 2006 - June, 2009)	Un-approved	197.-	197.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	10.-	10.-	0.-	79.40	79.40	
	19. Introduction of ferry service at Bhola-Laximpur river route. (July, 2006 - June, 2009)	- Do -	1,775.53	1,775.53	0	0.-	0.-	0.-	0.-	0.-	0.-	10.-	10.-	0.-	0	1,217.80	0
	20. Procurement of 4 (four) nos. hydrographic survey vessels fitted with sophisticated hydrographic surveying equipment. (July, 2007 -June, 2009)	- Do -	625.-	225.-	400.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	200.-	5.-	195.-
	21. Replacement of 50 H.F. radio Telecommunication sets and construction of a bleyo yard (July, 2006 - June, 2009)	-Do-	100.-	100.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	5.-	0.-	0.-	40.-	0.-	0.-

Annex 8.1: BIWTA Three-Year Investment Program

SI No.	Project Title (Implementation Period)	Estimated Project Cost			Cumulative Expenditure up to 30-06 2005			Allocation 2005-2006			Allocation 2006-2007			Allocation 2007-2008		
		Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA	Total	Taka	PA
	22. Beautification of river side adjacent to Ashulia landing station and providing allied facilities. (July, 2006 - June, 2009	- Do -	224.79	224.79	0.-	0.-	0.-	0.-	0.-	0.-	5.-	5.-	0.-	140.-	140.-	0.-
	23. Rehabilitation of some old vessels in BIWTA Fleet. (July, 2006 - June, 2008)	- Do -	231.-	231.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	0.-	0.20	0.20	0.20
	Sub-total (11-23)		18,379.41	17,979.41	3,869.10	0.-	0.-	0.-	0.-	0.-	1,850.90	1,650.90	0.-	12,690.80	7,627.35	3,664.10
	Grand total (1-23)		26,763.29	23,643.29	6,589.10	229.55	0.-	1,327.40	1,222.40	100.-	5,941.30	3,291.30	2,450.-	15,086.60	9,853.15	3,834.10

ANNEX 8.2: BIWTC INVESTMENT PROGRAM

Project	Estimated cost (Tk millions)
Rehabilitation of 6 Ro-Ro ferries, 2 K-type ferries and 7 landing stations	195
Construction of 4 sea-trucks for coastal passenger services	170
Rehabilitation of 4 Ro-Ro ferries	198
Rehabilitation of Ro-Ro pontoon-3	14
Modification of passenger steamer	77
Construction of container vessels	
First phase : 2 vessels	610
Second phase : 4 vessels	1464
Rehabilitation of dockyards	400
Navigation Equipment for ferries	100
Construction of 2 coastal ferries and 2 pontoons (Bhola Luxmipur route)	1883
Rehabilitation of 4 medium-type ferries	140
Construction of 2 ghat pontoons and 14 spuds	135
Construction of salvage tug	300
Construction of 2 oil tankers	600
Total	6286
	The equivalent of US\$97 million

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

ANNEX 8.3: DEPARTMENT OF SHIPPING.

LIST OF PROJECTS

- Establishment of a database to manage inland shipping related data
- Strengthening of Inland Ship Safety Administration (provision of infrastructure facilities)
- Institutional capacity building of the Department of Shipping, including office space
- Establishment of Research and Development cell for accident investigation of inland ships
- Establishment of computer network in Department of Shipping and associated offices
- Establishment of computerized examination and certification cell for inland shipping

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

ANNEX 9: BIWTC. PROFIT AND LOSS A/C FORM
2001 -2002 TO 2005 - 2006

SL.N	Head of Accounts	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
		(Audited)	(Audited)	(Audited)	(Audited)	Provisional
<u>Earnings:</u>						
1	Traffic Earnings:					
	Passenger Service	481.76	753.26	864.96	790.98	837.79
	Ferry Service	8010.64	8782.90	9525.48	9574.59	10416.07
	Cargo Service	228.98	145.06	129.71	89.71	37.19
	Charter Hire	526.54	504.02	584.49	714.41	848.31
	Sub-Total	9247.92	10185.24	11104.64	11169.69	12139.36
2	Misc. Income:					
	Others	149.92	219.47	170.33	157.06	185.24
	Income on Investment	574.93	556.28	540.87	835.02	1080.00
	Sub-Total	724.85	775.75	711.2	992.08	1265.24
3	Total Earnings (1+2)	9972.77	10960.99	11815.84	12161.77	13404.60
<u>Expenditure</u>						
4	Direct Fleet Exp.	5431.87	5188.56	5223.35	5263.10	6255.15
	Pay of Floating Staff	1595.52	1569.20	1602.98	1636.71	1828.42
	Liquid Fuel consumption	2894.69	2814.39	2750.89	2804.75	3698.23
	Running Repair	724.09	555.47	541.35	502.82	479.35
	Other	217.57	249.50	328.13	318.82	249.15
5	Traffic Operation Exp.	5431.87	5188.56	5223.35	5263.10	6255.15
6	Shore Establishment Exp.	1334.47	1366.82	1372.16	1575.26	1852.04
7	Shore Contingencies	311.83	314.42	299.07	287.86	264.81
8	Sub-Total (4+5+6+7)	7241.77	7041.11	7090.12	7354.87	8587.12
9	Operational Surplus (3-8)	2731.00	3919.88	4725.72	4806.90	4817.48
10	Provision for Bad Debts	11.86	7.91	13.70	15.21	20.00
11	Interest on Loan	841.65	1070.71	1199.58	1171.02	1127.64
12	Depreciation	875.69	1032.91	1027.77	10220.37	1002.12
13	Sub-Total (12+13+14)	1729.20	2111.53	2241.05	2206.60	2149.76
14	Total Expenditure (8+15)	887.97	905.64	923.17	946.47	10636.88
15	Net Profit / loss (3-16) before subsidy	1001.80	1808.35	2484.67	2600.30	266.72
16	Subsidy	50.00	50.00	50.00	50.00	50.00
17	Net Profit / loss after subsidy	1051.80	1858.35	22534.67	2650.30	2717.72

People's Republic of Bangladesh
Revival of Inland Water Transport: Options and Strategies

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