

A Preliminary Study on

Developing a Waterway Transport System for Baridhara, Rampura and Sonargaon through Hatirjheel



In association with



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BUET



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Abstract

Begunbari Hatirjheel project is now considered as a milestone in transportation sector and also a source of environmental purification in a polluted cities like Dhaka. A proper management and full utilization of this lake can change the scenario of Dhaka and can give people relief and recreation which is now scarce in this city. Inland Water Transport System in this Lake connecting Gulshan and Banani Lake can be a good enhancement and utilization of this area. It will not only save the valuable times of the city dwellers but will also add a new dimension to this city.

Therefore, an attempt has been taken in this study to conduct a feasibility study water transport in Hatirjheel-Gulshan-Banani Lake. Data required for the study has been collected through various participatory planning tools for such as Questionnaire Survey, Focus Group Discussion (FGD), and Key Informant Interview (KII).

The study has explicitly observed the demand and potentiality of water transport in Hatirjheel area. It also tried to show the impact of water transport on environment, transportation and economy of Dhaka.

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Chapter 01 Introduction

1.1 Background of the Study

Dhaka city, the capital of Bangladesh can be compared to the hub of commercial, cultural and political activities of the country. The city being national gateway has now been considered as top 16th mega city and 9th most populous city of the world (Newgeography, 2012). The fast growth of population with concomitant limited available space for new transport infrastructures have been aggravated the high congestion rate in Dhaka (The World Bank, 2005). Albeit the area of Dhaka city is less than one percent of country's total area, it supports about 7.2% of total population and 30% of total urban population (AddressBangladesh, 2014). It is time for the decision makers and the citizens living in the city to realize the about the dim future of Dhaka ahead. The congestion problem is taking away the productive hours of the inhabitants and creates new rooms of sufferings every day. For a better Dhaka, it is a duty of everyone to focus on brining on solutions rather than creating problems to damage the city further. The supply of different new transportation infrastructures on the land surface, is increasing the demand of new vehicles. Thus congestion is being increased and Dhaka's life is now at stake.

To step towards the sustainable development momentum, other mode of transportations must be explored apart from on road transport. Dhaka has a glorious history of having enormous water bodies, canals, ponds and other wetlands. But ironically the waterbodies had been grabbed in the name of development and thus the veins of the city is blocked. However these waterbodies have the potential to open opportunities of inland waterway transports.

Hatirjheel, a water retention body lying at the center of the capital has connected many prominent areas, stretching from the stretching from the eastern side of the Tongi Diversion Road up to the Rampura Bridge on the Pragati Shwarani. The aim of initiating the Hatirjheel project was to transforming this place into a transportation hub for minimizing traffic. Additionally, organized planning and architectural development of hatirjheel has converted the water body to one of the most celebrated tourist attraction point of the city. This delightfully decorated place is visited by the dwellers of this densely populated city to get rid of the suffocated environment of Dhaka and to seek for fresh air which it contains abundantly. The roads surrounding the lake and the viaducts over the lake are used by number of vehicles every day. However, no public transportation is available for the road users. Thus the middle class commuters who are majority of the users, suffering immensely. Considering all the problem

and prospects, a waterway transport service might be an effective solution to cut off the traffic congestion and split the road user to different environment friendly mode.

1.2 Project Description

Since Hatirjheel has importance from many perspectives. First of all, it connects a different important locations of the city which have both residential and commercial significances. Secondly, this place has its own recreational and aesthetic value. Moreover, a big number of people uses this route to move from one place to another in Dhaka.

The idea is to propose a waterway transport system to the citizens of Dhaka area at Hatirjheel. And Gulshan Banani Lake to connect a waterway transport system for the city dwellers. This will reduce the hassle of the commuters by reducing the travel time in a greater ratio and they will not have to face any congestion as well. The middle income group will have an opportunity to avail low cost transport mode. The productive hours will be thus saved and this will reduce the burden on the road traffic. As a result traffic, this approach will play an effective role to decrease traffic congestion in the surrounding areas. People living in different parts of Dhaka city can travel towards their work place, schools, universities and other institutions within a very short time since these lakes are wide spread in the city and if these can be connected this will provide an inland water transport network. The water transport network will be comprised of boating facilities and landing stations. To run the overall network the waste management, environmental aspects, water quality, people's accessibility, accessibility of differently abled persons. Thus this project will ensure people's mobility at a very cheap rate. Moreover this will reduce traffic volume on the roads, and let people use public transport facility which is environment friendly.

1.3 Objectives of the Study

1. To understand the potential of Hatirjheel to be used for water way transportation option.
2. To explore the benefits of providing waterway transport facility of Hatirjheel area.
3. To investigate the feasibility of implementing waterway transport approach at Hatirjheel.

1.4 Scopes and Limitations of the Study

Scope

1. The study might be used for formulating policies and guidelines for implementing the waterway transport facility at Hatirjheel.
2. This study can be used as a supporting document for further research works.
3. The study might be used as an important document for the decision makers for making decisions regarding transportation challenges.

Limitations

1. Different stakeholders are involved in the study, opinions varied from agency to agency.
2. Time was a constraint for the study.

1.5 SWOT Analysis

STRENGTH	WEAKNESS
<ol style="list-style-type: none"> 1. Hatirjheel Project is an example of successful project which helped to retrieve the lake. 2. The lake is surrounded by different areas of the city which can serve numerous areas and a large number of people will be benefitted. 3. Water transport will provide cheap transportation solution to the city dwellers. 4. Environment friendly transport solution. 5. Public transport system on the lake 6. Inland water transport ensures equality. 	<ol style="list-style-type: none"> 1. Water transport may hamper the water quality. 2. People may deteriorate the lake area. 3. The flora and fauna might be affected
OPPORTUNITY	THREAT
<ol style="list-style-type: none"> 1. Traffic volume on roads will be decreased 2. Travel time will be reduced. 3. Reduce hassle of people since they can move from one place to another very fast and 	<ol style="list-style-type: none"> 1. Different agencies are responsible for the lake and Hatirjheel project. Working under one umbrella will be a difficult task for different stakeholders.

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<p>they will not have to wait in the traffic congestion.</p> <p>4. Good for the health of people.</p> <p>5. Enhance the way of recreation while travelling.</p> <p>6. Enhance connectivity of the city.</p> <p>7. Different agencies and stakeholders are interested to implement the project.</p> <p>8. City dwellers are willing to avail the water transport service.</p>	<p>2. Which agency will take the authority of operation, maintenance and management will be a hard question to be addressed.</p> <p>3. Travel solution up to the landing station will be another aspect to be considered.</p> <p>4. Waste Disposal system, environmental protection these will be crucial factors to be considered.</p>
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Chapter 02 Literature Review

2.1 Introduction

In this chapter, available literatures have been reviewed along with subject matter of the research project, which aims at providing detailed account of earlier studies in order to provide an inclusive understanding over developing a waterway transport system. Case studies on inland waterway transport system over different countries of the world have also been studied with the intention of making the study more flexible as well as up to standard.

2.2 Defining Water Transport

Waterway refers to a river, canal or other form of water body, which serves as a route or way of travel or transport (Hossein & Lamtrakul, 2007). And water transport indicates the process of moving people, goods, etc. by barge, boat, ship or sailboat over a sea, ocean, lake, canal, river, etc. (Renaissance Planning Group, 2005).

2.3 Water Transport related Laws and Policies of Bangladesh

In Bangladesh, being a country of many rivers, Inland Water Transport has been a major mode for the transport of goods and people. It is important for the competitiveness and growth of the economy as it is the cheapest mode of transport compared to road or rail. However, the sector had received little attention from the Government of Bangladesh (GoB) with only limited resources allocated to its development. Although government of Bangladesh used to pay less attention towards this water transport sector, it has undertaken several policies and laws for establishing water transport system. These have been discussed below in brief:

- **The National Strategy for Accelerated Poverty Reduction (NSAPR)**

The National Strategy for Accelerated Poverty Reduction (NSAPR) issued in October 2005, emphasizes upon preserving the 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 (NSAPR, 2005).

- **Integrated Multi-modal Transport Policy (IMTP)**

The draft of Integrated Multi-modal Transport Policy (IMTP) issued by the Government in November 2004 proposes an efficient, safe and cheap Integrated Water Transport (IWT) system with special attention to dredging, encouragement of further mechanization of country boats, and strengthening quality of shipmasters for improved safety. It 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 (National Land Transport Policy, 2004).

- **National Water Policy**

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. However, siltation 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 (WARPO, 2001).

- **National Policy for Ports, Ocean Shipping and Inland Water Transport**

The National Policy for Ports, Ocean Shipping and Inland Water Transport adopted by the Ministry of Ports and Shipping in 2000 has 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 (WARPO, 2001).

Apart from all these laws and policies, the Country Assistance Strategy (CAS) adopted by the World Bank acknowledges the importance of IWT in Bangladesh and, accordingly, the lending portfolio includes an IWT project. 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 (World Bank, 2010).

2.4 Impacts of Water Transport

Today around the world, more and more capacity restraints on road infrastructure are occurring, resulting in road congestion. All the forecasts for freight transport in an enlarged European Union point to a continuous increase of traffic in the future. Inevitably, road transport will account for the lion's share of this increase. This will affect the quality performance of the mainly road-based intra-European transport system negatively. In addition to that, road transport is becoming more expensive (Khan, 2013).

As railway transports face the similar problems as road transport (increase in energy costs, capacity restraints along important trade axes throughout the continent), it is useful to examine whether the integration of inland waterway transport can lead to advantages compared to the current transport system. On inland waterways, there is ample capacity available, so delivery can be carried out on time. The unit transport costs are smaller than for road and railway transport, which is a result of high energy efficiency and the reduced need for personnel. Inland navigation is safe and secure. Furthermore, from a macroeconomic perspective, inland navigation seems favorable with regard to external costs (costs incurred as a consequence of greenhouse gas emissions, noise, accidents etc.). This is one of the reasons why many European countries pursue a policy of modal shift from road to waterway, and why the European Commission has launched its action programs (Kervezee, 2011).

In spite of having all these advantages, inland navigation has some weakness, for example a low transport speed, and a limited network connectivity. This weakness can be compensated for by setting up intermodal transport chains in a way that one can benefit from the advantages of the different transport modes while overcoming some of their disadvantages. Carrying the cargo on different transport modes using one and the same loading unit which is transferred between the modes together with the cargo contained is characteristic for intermodal transportation (Inland Waterways Authority of India, 2006).

Chapter 03 Study Area Profile and Methodology Development

This chapter summarizes the profile of the study area including socio-economic, physical and environmental profile. Then, the methodology of the research has been portrayed. The methodology includes sequential process of how the study has been carried out.

3.1 Study Area Profile

Hatirjheel is a lakefront situated in Begunbari area in Dhaka. This area has been transformed by a transportation hub by Bangladesh Army and Bangladesh University of Engineering and Technology (BUET) with a view to reducing existing traffic condition. Besides, one of the objectives behind this project is to protect and restore the environment which has been destroyed and increase the drainage retention capacity of Dhaka city. Again, The Hatirjheel-Gulshan lake-Banani lake combined system is also proposed to serve as an integrated lake for possible future recreational and navigational purposes. At one time, Hatirjheel and Begunbari Lake was connected to Dhanmondi Lake, Mohakhali canal, Gulshan and Banani Lake. Due to the construction of Panthapath box culvert and box drainage at the intersection of Dhanmondi Lake and Begunbari canal, the connection was being cut off. But there is a still potential to connect Hatirjheel with Gulshan and Banani Lake for its close proximity.

This section has been divided into three categories for having a better perception of study area.

3.1.1 Physical Profile of the Study Area

Hatirjheel is located more or less in a central position of the Capital Dhaka with a coordinate of $23^{\circ}44'58.47''\text{N}$ and $90^{\circ}23'48.35''\text{E}$ (Wikipedia , 2015). This area runs through Tejgaon, Gulshan, Badda, Banashree, Niketon and Maghbazar. The south and east bank of canal passes through densely populated areas of low and middle income group like Merul Badda, Rampura, Noyatola, Madhubagh and Moghbazar. The project area has been stretched from Sonagaron Hotel to Banashree. The implementing bodies of this project was The Special Works Organization (Army Engineering Corps), Rajdhani Unnayan Katripakka (RAJUK), Dhaka Water Supply and Sewerage Authorities (WASA) and Local Government and Engineering Department (LGED). RAJUK is responsible for land acquisition, compensation, land excavation, site protection, waste disposal, etc. while LGED is responsible for construction of a two-lane road by the lake, a two

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meter wide footpath, a 2.5 meter wide walkway, bridge, overpass at Pathapath crossing and landscaping.

Hatirjheel area is 244.74746 acres while Begun Bari Khal area is only 30 acres. Of them, RAJUK has 46% of the area which includes an area of 81 acres to court of walks, 141 acres for public lands and 1 acre for Bangladesh Television (BTV). An enhanced communications system connecting Tongi Diversion Road and the Pragati Sarani to ease the chronic congestion particularly of Mouchak, Maghbazar and Tejgaon intersections has been constructed. The canal ring road includes six bridges, four overpasses, one expressway, U-loops, serviceable road and 2.5m walkway (Mazid, 2013).



Figure 3.1: Map of the Lake of Hatirjheel
Source: Google Map, 2016



Figure 3.2: Begunbari Area before Hatirjheel Project
Source: Ahmed, 2011



Figure 3.3: Present Photo of Begunbari Hatirjheel Area
Source: Field Survey, 2015

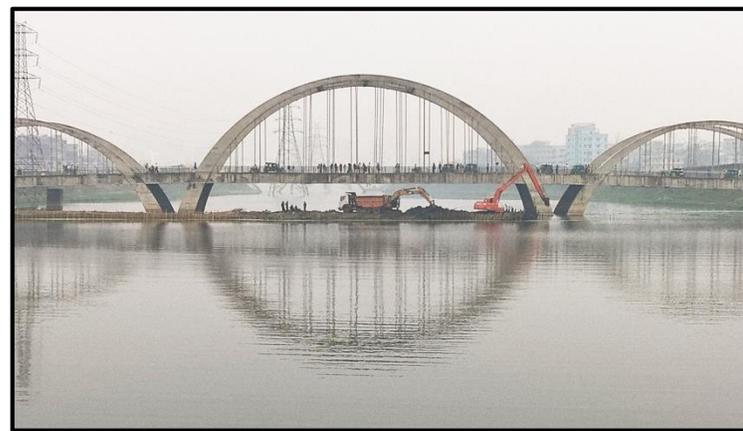


Figure 3.4: Ongoing Dredging Works at Hatirjheel Lake
Source: Field Survey, 2015

3.1.2 Socio-Economic Profile of the Study Area

Total project cost is Tk. 1971.3 crore of which RAJUK is spending Tk. 1113.07 crore, LGED is spending Tk. 276 crore and Dhaka WASA is spending Tk. 86.67 crore.

Hundreds of people residing in Begunbari area were affected by the project. About 139 acres of land was under private ownership and another 79 acres were state owned khas land and Courts of Awards land which have been acquired by RAJUK. The rest of the lands have been acquired from different government organizations. However, some of the victims have managed to keep their land out of the project area by giving bribe to the survey officials. But majority of the residents lost their lands and homes because of the acquisition. Though RAJUK decided to compensate the victims by providing flats near Hatirjheel Area, this initiative has not reached to mass victims yet.

This project has been restricting the entrance of public transport passing over it like buses or rickshaws by allowing only private cars, CNG auto rickshaws and pedestrians movement. This led to serious disputes from public as walking waste their time while going to their work places especially from the middle/low income areas. As a result, some informal microbus or CNG movements were launched for office going people for passing the Hatirjheel area. This movement was held basically from West Rampura to Bangladesh Film Development Corporation (BFDC) or Banglamotor area. The fare of such trips are Tk. 15-20 per person.

Recently, public bus service in Hatirjheel has been inaugurated by Housing and Public Works Minister Mosharraf Hossain. Initially four minibuses with the capacity to accommodate twenty seven persons will pick up and drop passengers at ten locations through Mohanagar, Madhubagh Rampura, Moghbazar, Begunbari-Kunipara, Gulshan Aarong-Police Plaza and Merul Badda, starting from Rampura Bridge. The HR Travels Limited will be operating the bus services. They have fixed Tk. 10 as the lowest fare while the fare will be Tk. 15 to get to Karwanbazar from Rampura and Tk. 30 for a ride around the project area. The bus company will pay the Rajdhani Unnayan Kartripakkha (RAJUK) Tk 1,80,000 per month (The Daily Star, 2015).

3.1.3 Environmental Profile of the Study Area

Hatirjheel area has become an oasis for the city dwellers where they get fresh air and sitting and resting places. There is a plan for building amphitheater in open air by the side of the lake, a water deck at Magh Bazar for entertainment and a forest island in the middle of the lake near Badda and

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West Rampura which will be named as ‘Eco-Centre’. It will be a heaven for all sorts of flora and fauna. There is also plan for boating around the island and also in the lake but only for recreation purpose. All these plans have not been implemented yet. If these are really being taken in operation, the environmental quality will get improved to a significant extent.

The lake not only serves recreational purposes it is also a major source of water retention and drainage of Dhaka city. It has been estimated that during dry season, the lake can store approximately 3.06 billion liter of water and in the rainy season the amount is 4.81 billion liter (Mazid, 2013). Besides, there is a special cleaning team dedicated for waste management in the Hatirjheel area which is conducted by a private organization. This team is playing a vital role for waste removal and maintaining a healthy environment. The organization has provided a number of garbage bins in every spaces in a fixed distance but some of the bins have been misused by public by either damaging or stealing.



Figure 3.5: The Cleaning Team for Hatirjheel Area
Source: Field Survey, 2015



Figure 3.6: Misuse of Bins in Hatirjheel Area
Source: Field Survey, 2015



Figure 3.7: Microbus and CNG Auto-rickshaw Service near West Rampura in Hatirjheel
Source: Field Survey, 2015

3.2 Methodology of the Study

- **Project Initiation:** At first, the project has been initiated by WBB trust to address the potentiality of water transport in Baridhara, Banani, Rampura and Hatirjheel area. Then after discussion, title of the project has been defined as ‘A Preliminary Study on Developing a Waterway Transport System for Baridhara, Rampura and Sonargaon through Hatirjheel’.
- **Determination of Objectives:** Two relevant objectives have been formulated which satisfy the project aim considering scopes and limitations.
- **Review of Relevant Studies and Policies:** For better understanding of the project relevant projects, research reports, documents, government publications, thesis reports, newspapers and policies from home and abroad have been reviewed.
- **Selection of Study Area:** The study route has been determined the connecting lake among Baridhara, Banani, Rampua and Sonargaon area. The surrounding areas of this route is the study area of this project as it validates the title most.
- **Reconnaissance Survey and Justification of Study Area Selection:** A pilot survey is conducted to realize the present condition of study route and check the feasibility whether this area is justified for the project or not.

- **Preparation of Questionnaire:** After reconnaissance survey, questionnaires have been prepared for all stakeholders including users and owners of water transports to distinguish the demand of this project and also the potentialities and constraints.
- **Data Collection:** Data has been collected from both primary and secondary sources for this project. From secondary sources, data on government policies, acts, laws, relevant projects and researches, demographic and socio-economic profile of study area will be collected. Primary data will be collected through various surveys such as questionnaire survey, Focus Group Discussion, Physical Feature Survey and Key Informant Interview.
- **Data Processing and Analysis:** All data collected from primary and secondary sources have been compiled and processed for various analysis needed for this project.
- **Submission of Report:** The whole study will be summarized and described in a report and it will be submitted after finishing all the preceding tasks.

Chapter 04 Findings from Analysis of Data

This chapter contains all findings from data collection which is helpful to identify the feasibility of the project. To fulfill the objectives of the project, necessary data was collected by questionnaire survey, physical feature survey and key informant interview.

4.1 Identification of User's Willingness

Usually, regular users of the study area have to cross a long route; they have to face severe traffic jam in Badda, Rampura, Banani route that kill their valuable time resource. The project is to initiate water bus service in Hatirjheel Lake along the study area which can be greatly beneficial for people. People can save their valuable time which is frequently killed because of horrible traffic jam of the study area. Moreover at the present people have to pay more transport fare than expected fare of the water bus; implementation of the project can minimize their expense and important time value.

But it is very much important to identify User's perception regarding the necessity of waterbus project; their interest for minimizing time and expense need to be analyzed. User's willingness for the project is explored by questionnaire survey; they are asked about some specific aspects of the project.

User's feeling of necessity for installing inland water transport system in this area is analyzed; almost all respondents are interested for initiating water bus. In Hatirjheel area, occasionally boat tournament is arranged, but regular water traffic is never introduced. Most respondents tell that they are highly interested to save their valuable time.

30% respondents have used water transport in the study area, they are moderately satisfied about their journey expense but safety is not properly maintained. Other 70 % respondents are habituated to road traffic, they have not experienced water traffic; 40% among them are highly interested for water bus which can bring dynamic vibrancy to the urban life. Other 30% respondents told about their unwillingness because of security fear. Overall, 70% respondents are interested for the project. On average, they are willing to pay for Tk. 10 per trip.

Following the opinion of the respondents, existing transportation system is mainly helpful for car users, because rickshaw is not allowed here. People who don't have the option of private car, they are forced to live in hell of traffic jam or they have to suffer by walking long route; or they have to spend more expense for taxi. Another option is opened for them, sharing of passenger system is run by some taxi and microbus; but this system is not legal regarding the design of hatirjheel project.

According to the respondents, the proposed water bus system can solve their problem in a great extent. Those respondents who are highly in need of using public transport they now have a preferable way for minimizing time because their required route length is minimized. They need not face terrible traffic jam in inland water transport which is a regular occurrence in road traffic.

4.2 Identified Aspects of the Study Area

4.2.1 Ownership of Area

The construction process of Hatirjheel Lake is not completed still now, so now the lake of the study area is under RAJUK while adjacent surround lands are under city corporation. But when the construction is completed, then RAJUK will hand over the lake to City Corporation.

4.2.2 Preferable Transfer Stations

Physical feature survey was helpful to identify advantage of the location which can be beneficial for the project.

Some specific preferable transfer stations are identified for loading and unloading of passengers. From figure 4.1 and 4.2, this roadside is at west Rampura opposite of “Nijhum Residential Area” which can be used for transfer station for passengers; because it is well designed having space necessary for waiting passengers.



Figure 4.1: Proposed Transfer Station



Figure 4.2: Proposed Transfer Station

From figure 4.3 and figure 4.4, another identified transfer station is opposite of “Mahanagar Residential Area” which is located at Rampura. From figure 4.3, the allocated place has the space for provision of necessary aspects. Figure 4.4 indicates enough road width of the attached road of the proposed transfer station.



Figure 4.3: Proposed Transfer Station



Figure 4.4: Proposed Transfer Station

4.2.3 Ongoing Construction Process

Figure 4.5 show that dredging process is on the process in Hatirjheel area which will increase depth of the lake. This indicates that the depth of the lake can be increased in some part of the lake which makes easy for transporting water bus.



Figure 4.5: Construction activities

- **Existence of Bridge**

Figure 4.6, there already exists bridge for easy convenience from one part to other of lake. This indicates that after implementation of the project these bridges of the lake will be more helpful for better access.



Figure 4.6: Existence of bridge



Figure 4.7: Existing Drainage facility

- **Existing Drainage facility**

Figure 4.7 shows provision for drainage facility which will be very much helpful for running the project.

4.3 Sustainability of the Project

Sustainability of the project is evaluated from the view of expert opinion from key informant interview. A number of expert opinions are collected from responsible authorized people from all related sectors.

According to Anisur Rahman, an expert of DTCA (Dhaka Transport Coordination Authority), height of bridge will not be problematic for water boat. Preferable transfer point can be at behind of Sheraton and middle of Hatirjheel. But existing design of lake may be

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changed for transfer point construction. Water bus can be run by battery but probable mitigation measures need to be ensured.

According to another expert of BIWTA, they deal with registered spaces; this study area is not under their supervision. Minimum 6 ft depth is required for water based movement or for the purpose of tourism which is not maintained in all parts of Hatirjheel. Only craning is needed for transporting elements from one side to another of the lake. If pump engine is used, minimum eight minutes are required.

Iqbal Habib, the designer of Hatirjheel Project told that provision of water transport was not the mandatory part of the designed lake.

Chapter 05 Feasibility of Study and Reflection on the Project Idea

5.1 Project Mechanism

The total project can be divided into two major components. They are Human component and material component. Proper integration among the both component is must to ensure the success of the project.

5.1.1 Material Components

After conducting physical feature survey in the study area, it has been found that the lake is already been used for transport purpose informally. But only boat is used currently. The provision of motorized water vehicle can be provided. In the literature review section different types of low height water vehicle has been reviewed. It's very important to keep the height of the bridge in mind during selecting the water vehicle. A positive thing is during KIA of different officers of Dhaka North City Corporation It's been found that The DNCC has already taken initiative to increase the height of the bridges at some locations along the lake.

During the survey a number of suitable locations is identified for building the landing station. The locations are chosen depending on it's easy accessibility from the nearest hub where general public's movement is high. So that people can use the water transport to travel from one place to another.

5.1.2 Human Components

In an overcrowded City like to develop and maintain a sustainable water transport system the authority need to be very efficient. The surrounding area of gulshan-banani-hatirjhil lake is under the jurisdiction of Dhaka North City Corporation but the lake is owned by Rajuk. And though BIWTA manages water transport in all over the country but their policy restrict them in involving any water transport development work inside Dhaka city. But the DNCC can call for technical support from the BIWTA for managing water vehicle. For proper management DNCC has making arrangement for transferring the lake into DNCC's property after the completion of Hatirjheel Project fully completed. DNCC's existing traffic engineering department can be assigned to perform the responsibility of managing the water transport system in gulashan-banani-hatirjheel Lake.

5.3 Feasibility of the Study

For a city like Dhaka where rivers are like arterial in a human body connected most of the parts of the city water transport can be very effective mode of transport. Developing water transport will not only reduce pressure from the road but also helps to reduce infrastructural cost of building roads, bridges, culverts etc.

In our study area already informally some people use water transport for crossing the gulshan-bnanni lake. Moreover in the hatirjhil project there is provision for water transport for recreational purpose at the original plan. So it would be very much effective the government can take initiative to formalize the movement of passengers and freight by modifying the policies if necessary. This will at the same time fulfill the recreational purpose as well as transport demand. Along with this to some extent the pressure on the road will also be decreased. This study highlights the potentials for developing water way ingushan-baridhara-banani lake and how to overcome the shortcoming in initiating water transport here.

5.4 Reflection of the Study

- The results of the study can be readily explained to government agencies and users with simple examples from different countries. It is also recommended that the results should be shared in media so that everyone can know would know about the possibility of water transport.
- Provision of establishing co-operative association will help the government to maintain the service properly.
- Existing inland water transport policies about water transport system inside Dhaka and might be modified for smooth operation of inland water transport inside Dhaka.
- A range of public and private sector investments and initiatives are needed to realize the potential for growth of water transport inside Dhaka and expanding economic output from this sector. They should also come forward to help the government by providing technical and financial support.
- The realization of this water ways potential must be aided by improvements in making the outmost sustainable use of this resource. It will be helpful to increase accessibility of people and reduce the pressure on road transport.
- More research would be required as quantitative and qualitative environmental impacts for sustainable water transport system in Gulshan-Baridhara-hatirjhil lake.

Chapter 06 Conclusion

Hatirjheel Project has been an essential transportation and recreational hub for the residents of Dhaka. Its role at present cannot be denied as the whole city is being benefitted from it. However, the scope of this project can be enhanced either by completing all the proposed works of the project and also by introducing new activities which will satisfy the aim of the project. Inland water transport system can be such an initiative as at present it has both public demand and potentiality in the Lake. More detailed study is needed for the implementation of such activity and some modification or improvement works may also be necessary for successful operation of this project.

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Work for A Better Bangladesh (WBB) Trust, Dhaka
 Questionnaire on
**A Preliminary Study on Developing a Waterway Transport System for Baridhara,
 Rampura and Sonargaon through Hatirjheel**
(Questionnaire for users of the route)

We would like to state that we are intern of Work for A Better Bangladesh (WBB) Trust, Dhaka. We are working on a project titled “A Preliminary Study on Developing a Waterway Transport System for Baridhara, Rampura and Sonargaon through Hatirjheel”. For the purpose of this project information about the demand and prospects of inland water transport of this route is necessary. These information will be confidential and used only for research purpose. It would be great if you kindly cooperate fulfilling the questionnaire. Thanks in advance.

For further query, contact Work for A Better Bangladesh (WBB) Trust, Dhaka.
 Phone: 88 02 9112446, 88029121110
 Mobile: 8801552493518
 Email: info@wbbtrust.org, www.wbbtrust.org

Questionnaire No.:

1. Name of the respondent:
2. Present address:
3. Workplace and Designation:
- 4. General information about the respondent:**

Gender	Age (yrs.)	Educational Qualification	Marital Status
<input type="checkbox"/> Male	<input type="checkbox"/> Below 18	<input type="checkbox"/> Illiterate	<input type="checkbox"/> Single
<input type="checkbox"/> Female	<input type="checkbox"/> 18-25	<input type="checkbox"/> Primary	<input type="checkbox"/> Married
	<input type="checkbox"/> 26-32	<input type="checkbox"/> Secondary	
	<input type="checkbox"/> 33-39	<input type="checkbox"/> S.S.C	
	<input type="checkbox"/> 40 and above	<input type="checkbox"/> H.S.C	
		<input type="checkbox"/> Vocational Education	
		<input type="checkbox"/> Bachelor degree	
		<input type="checkbox"/> Masters or doctoral degree Others	

5. Do you think it is necessary to install an inland water transport system in this area?

Yes No

If yes, then please state some reason for which you think it is necessary

.....
.....

6. Do you face any problem while travelling your destination using existing modes?

Yes No

If yes, then please state some of the problems you face regularly

.....
.....

7. Do you think if inland water transport system is available, it will lessen your problems and discomforts?

Yes No

If yes, then how will you be benefitted from this system?

.....
.....

8. Have you ever used any water transport in this area while going to your destination?

Yes No

If 'Yes' then how much it cost? (In Tk.)

Please state about your level of satisfaction of the journey

.....

9. If this project is being implemented, how much you are willing to pay for per trip?

..... (In Tk.)

10. According to you, which locations will be suitable for transfer stations for loading and unloading of passengers?

.....
.....

11. If you have some recommendation regarding better management of Inland Water Transport System, please mention:

.....
.....

Questions for Key Informant Interviews

1. What will be the prospects and potentials of water transport network in “Hatirjheel Project”?
2. What will be the aspects and benefits of the water transport network?
3. What will be the positive impacts on the transportation system, economy, and environment of the city?
4. Revised structure plan is still an ongoing process, how can be the inland water transport network idea in the canals inside Dhaka city can be incorporated in that?
5. Will there be prospects of initiating PPP in this project?
6. How will be the coordination among different agencies for the project? How will be the probable institutional relationship among the agencies?
7. How can the promotion and marketing of the project be done?
8. How will the budget of the project be raised from different organizations?
9. Will there be any impact on the ecology of the lake area if water transport system is initiated? if yes, then how those can be mitigated?
10. What will be the impact on the water of the lake area?
11. Will it hamper the water treatment facility of the lake?
12. Will the height of the bridge create obstacle on the movement of the water transports in the lake?
13. Will it have severe impact on the surrounding environment? If yes then what will be the level?
14. What will be the effect after initiating water transport considering the surrounding land use?
15. What are the laws and regulations which have to be kept in mind?
16. What will be the pollution level if water transport facility is initiated?
17. What will be your opinion regarding the landing station?
18. What should be the safety and security concern for water transport?

19. Do you think this project may be a threat for sustainability of “Hatirjheel” project?
20. How this project can be useful? Which type people may be beneficiary of the project?
21. What do you think about willingness of people regarding this initiative?
22. General people may not be aware of solid waste management; they may throw waste in water body resulting environmental degradation. What do you think about restrictions regarding solid waste management? If proper facilities will be given along with proper awareness measure, how will you see the prospects of changing people’s behavior?
23. Which proposals can be facilitated people with special needs?
24. Water transport will run for which time duration of a day? Which can be special facilities at night? How lightning can help people to at this situation?