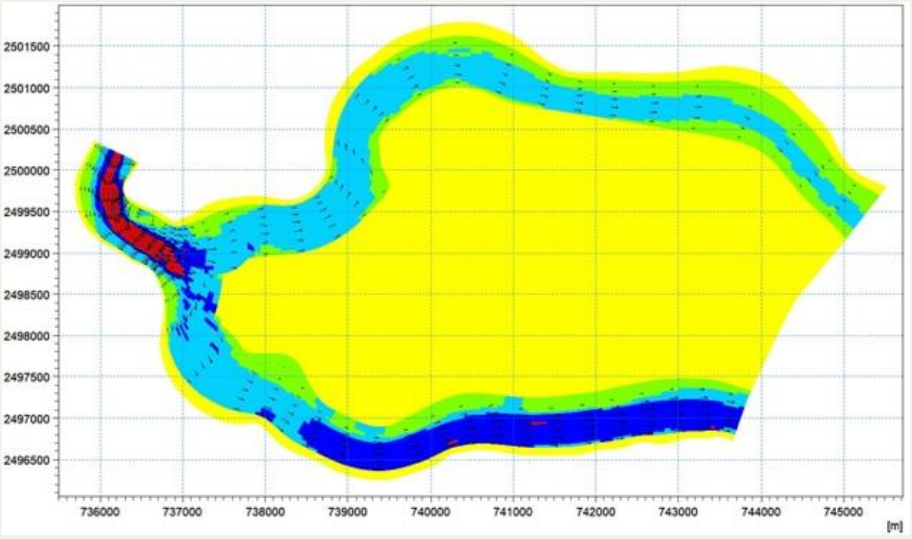
ANNUAL REPORT 2023-2024



76

Years of Excellence

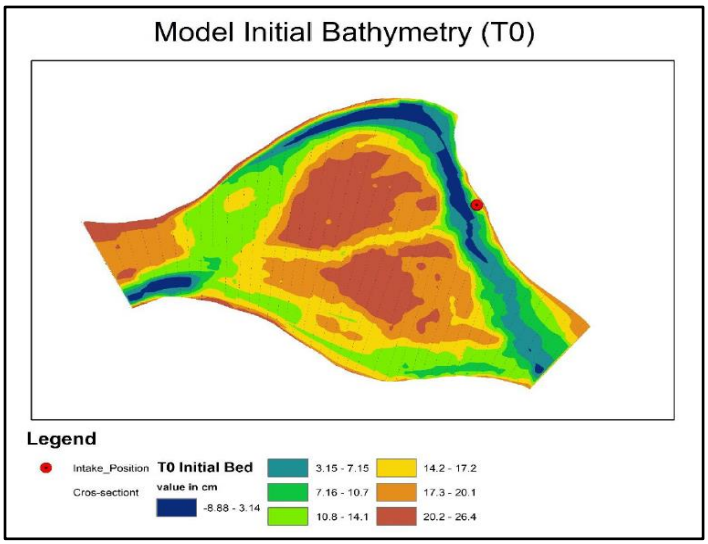
Since 1948

River Research Institute

RIVER RESEARCH INSTITUTE
Ministry of Water Resources
Government of the People's Republic of Bangladesh

River Research Institute

Rajshahi WASA Model Study



Mathematical Model Study

Arrangement for Hydraulic Conductivity Test

Published By:
River Research Institute
Faridpur-7800, Bangladesh
Copyright: @ 2024 RRI All rights reserved

Editorial Committee

Convener:
Engr. Md. Matiar Rahman Mondol

Executive Editor:
Md. Moniruzzaman

Members:
Engr. Zubayerul Islam
Engr. Md. Shahabuddin
Md. Azmal Hossain Fakir
Engr. Md. Masuduzzaman
Tarik Jamil Tamim

Printed By:

The publication is available in electronic form at http://www.rri.gov.bd/site/view/annual_reports

River Research Institute

ANR NO. 51

ANNUAL REPORT

JULY 2023- JUNE 2024

PUBLISHED IN OCTOBER 2024

RIVER RESEARCH INSTITUTE
Ministry of Water Resources
Government of the People's Republic of Bangladesh

River Research Institute

CONTENTS

EDITORIAL NOTE

It is with great satisfaction that I present this Annual Report of the River Research Institute, Bangladesh, for the fiscal year 2023-24. This report reflects the dedication and hard work of our institute, as well as our ongoing commitment to addressing the critical challenges related to the management of our nation's rivers.

I extend my sincere gratitude to our talented researchers, engineers, and support staff, whose tireless efforts are the foundation of our successes. Their commitment to excellence is evident in every aspect of our work. I also wish to acknowledge the support of our partners, both within the country and internationally, whose collaboration has been instrumental in our achievements.

Looking ahead, the River Research Institute remains committed to furthering its research capabilities and expanding its impact on national and regional water management strategies. We are determined to continue our efforts in safeguarding the rivers of Bangladesh, ensuring they remain a vital resource for our people and our economy.

I am confident that, with the continued dedication of our team and the support of our stakeholders, we will achieve even greater success in the years to come.

Engr. Matiar Rahman Mondol
Principal Scientific Officer
and
Convener
Editorial Committee

Syeda Rizwana Hasan
Advisor
Ministry of Water Resources
Government of the People's Republic of Bangladesh

Message

I am pleased to extend my congratulations to the River Research Institute (RRI) on the publication of its Annual Report for the fiscal year 2023-24. This publication reflects the significant contributions made by the institute in the field of river research, river management, and environmental conservation. The insights provided by RRI's research have been instrumental in shaping policies and strategies to tackle the challenges posed by climate change, river erosion, and water resource management in Bangladesh.

As a riverine country, Bangladesh's prosperity and sustainability are intrinsically linked to the health of its rivers. The research carried out by RRI is vital in addressing these pressing issues, ensuring the preservation and responsible use of our water resources. However, it is also imperative that we translate the findings from research into actionable strategies that can be implemented across the country.

In this regard, I would like to emphasize the importance of more applied research that directly addresses current challenges, such as river sedimentation, flood control, pollution, and ecosystem restoration. Research on innovative and sustainable practices in water resource management will not only benefit our rivers but also enhance the overall well-being of our people. Additionally, I would encourage the institute to focus on climate-resilient infrastructure development and river management systems that can withstand the increasing pressures of climate change.

To further enhance RRI's work, I direct the authority to prioritize research areas that offer implementable solutions for river management and conservation. Collaboration with local communities, international experts, and other relevant institutions should also be strengthened to exchange knowledge and best practices on river research. I also urge RRI to accelerate the dissemination of its findings to the broader public and stakeholders, fostering greater awareness and participation in river conservation efforts.

The Mistry of Water Resources will continue to extend its full cooperation to ensure that the institute's research contributes to effective policy-making and practical solutions. I am confident that, with the continued dedication of the institute and the support of all stakeholders, we will make significant strides in securing a resilient future for Bangladesh's rivers and the communities that depend on them.

(Syeda Rizwana Hasan)

MESSAGE

From Secretary

Ministry of Water Resources
Government of the People's Republic of Bangladesh

I am highly delighted to know that the Annual Report 2023-2024 of River Research Institute (RRI) is being published. As a statutory body under the Ministry of Water Resources, RRI has been providing remarkable services to the nation in its field of activities. RRI has been established with distinct mandates to play a vital role in water sector by providing technical assistance to government and non-government organizations concerned in managing rivers and developing vast water resources of the country. From its very inception, River Research Institute is serving the nation in the field of Water Resources Engineering, Geotechnical Engineering, Structural Engineering and Environmental Engineering. They do research in the context of the hydraulic, geotechnical, and environmental arena to support different government agencies and ministries for getting their job done properly and accurately. From its very inception, River Research Institute has been serving the nation in the field of Water Resources Engineering. Using the tools of physical modelling and mathematical modelling and technical know-how RRI has effectuated many studies efficiently for the development project of different ministries including the Ministry of Water Resources of GoB. They do research in the context of the hydraulic, geotechnical, and environmental arena to support different government agencies and ministries for `getting their job done properly and accurately. River Research Institute conducts tests on soil samples, water samples and construction materials received from government and non-government agencies for their development works. Conducting Environmental and Social Impact Assessment (ESIA) studies has become a critical task for sustainable development, this crucial task has also been conducted in recent years showing RRI's growing capacity.

The delta opportunities are many. The combination of soil and water of Bangladesh makes it a highly fertile land resulting in multiple cropping opportunities. Along with delta opportunities Bangladesh has challenges like temperature rise, change in rainfall pattern, floods, droughts, river erosion, sea level rise, salinity intrusion, cyclones and storm surges, upstream development activities in the upstream, water quality and waterlogging. Flood and river bank erosion are recurring problem in Bangladesh and need sustainable river management. RRI has a vital role in addressing these water-related problems and devising sustainable solutions. In this regard, RRI should undertake research activities to develop technically sound and innovative solutions.
Effective water resources management is crucial for ensuring the sustainable use and availability of water in a world facing increasing pressures from climate change, population growth, and industrial demands. By implementing integrated approaches that consider the entire water cycle—from source to consumption and eventual return to the environment—societies can optimize water use, reduce waste, and protect ecosystems. Advanced technologies, such as real-time monitoring, data analytics, and innovative water-saving techniques, play a key role in enhancing efficiency and resilience. Collaboration among governments, communities, and industries is equally important to balance competing needs and ensure that water resources are managed equitably and sustainably for current and future generations. I urge RRI scientists to leverage innovative solutions and cutting-edge technology to address the contemporary challenges in Water Resources Engineering.

I would like to extend my sincere gratitude to the editorial committee of RRI for their dedicated work in preparing this report annual report for the fiscal year 2023-24. I hope this report will serve as a valuable resource for readers to better understand the institute's functions and activities.

Nazmul Ahsan
Secretary, Ministry of Water Resources
Government of the People's Republic of Bangladesh

MESSAGE

From Director General

I take immense pleasure in expressing best wishes to River Research Institute (RRI) on the publication of its Annual Report 2023-24. This report encapsulates the collective efforts and achievements that have been made by River Research Institute during the fiscal year 2023-24.

Bangladesh being mostly a flat deltaic country with its unique geographic location is prone to different water related disasters. In this regard River Research Institute have been playing very crucial role from its inception by providing better understanding of the complex dynamics of Bangladesh's rivers, which are vital to the nation's ecology, economy and infrastructure. The institute has already proven its capability of providing sound technical solutions to different water related problems by means of physical and mathematical modeling. River Research Institute has laboratory facilities to test different physical and engineering properties of soil, quality of construction materials (cement, brick, MS rod, sand, concrete block and cylinder), sediment characteristics and water quality of the rivers etc. The testing results have been used for planning and design of hydraulic structures like bridge, groyne, barrages, sluice gate, drainage channels, irrigation canals, sluices, closures etc.

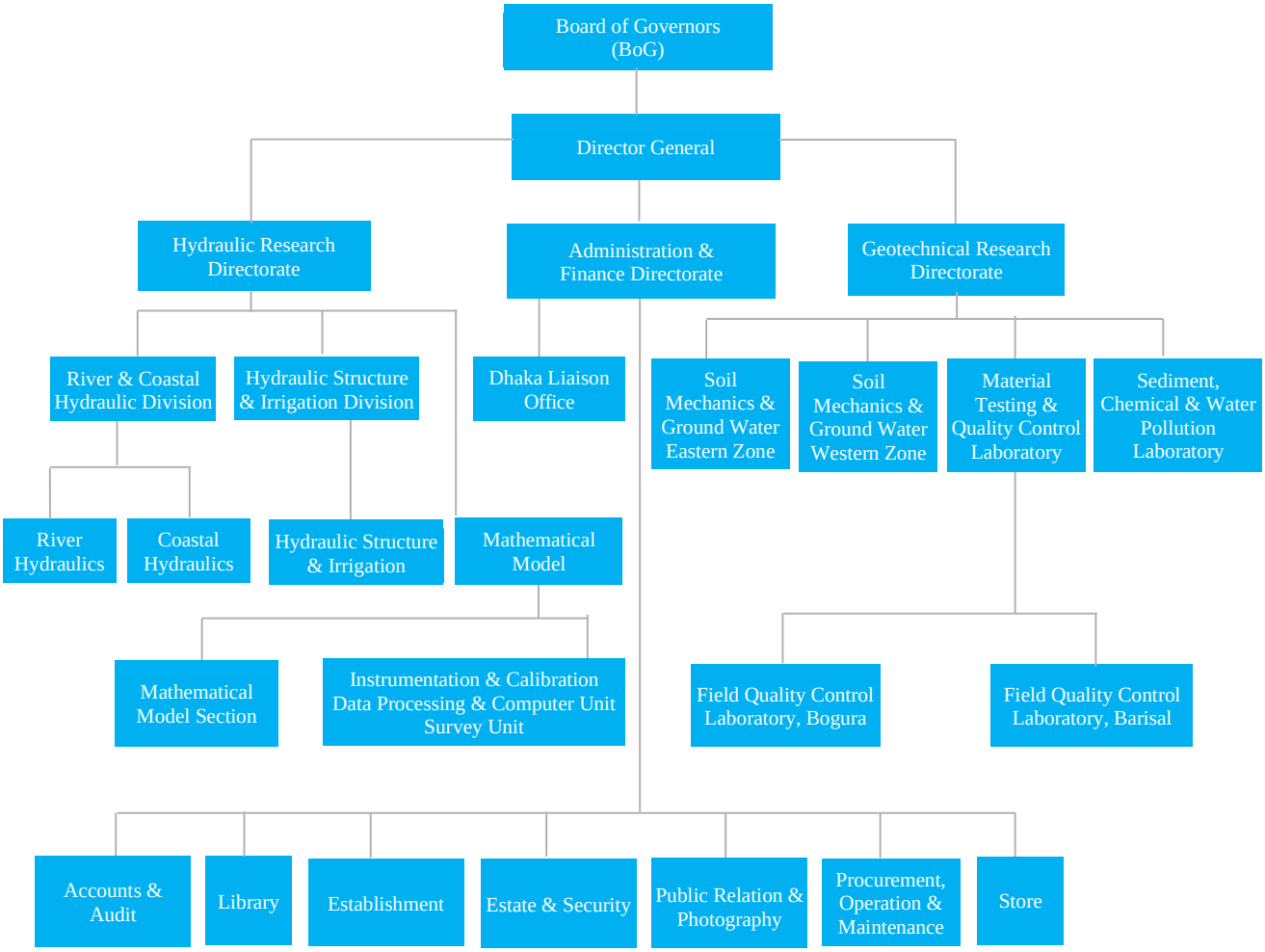
As we look ahead, we are aware of the increasing complexities posed by climate change, urbanization and other environmental pressures. These factors underscore the need for innovative solutions and adaptive management strategies. River Research Institute is committed to stay at the forefront of these developments, providing scientific guidance.

I extend my deepest gratitude to all officers and staffs of River Research Institute, whose hard work and dedication are the cornerstone of success of this institute. I also wish thank all partners and stakeholders for their unwavering support. Together, we are making meaningful progress in safeguarding Bangladesh's rivers for future generations.

I would like to express my warmest and most sincere thanks to the editorial committee for their conscientious efforts in preparation of the RRI annual report. I am hopeful that this report will provide the readers with good insight about the functions and activities of the institute.

S M Abu Horayra
Director General
River Research Institute

ORGANIZATIONAL STRUCTURE



ACTIVITIES OF RRI

The activities of RRI as per the River Research Institute Act, 1990 (Act 53 of 1990) are directed towards the achievements of the following objectives:

To carry out studies for design supports in river training, riverbank protection, flood control, irrigation and drainage works and to conduct research in river engineering, sediment control, estuary and tidal effects by means of physical model.

To conduct mathematical model studies on river flow and regional flow network, hydrology, surface and ground water utilization and environmental issues with special attention to salinity intrusion and water quality with a view to develop the water resources.

To perform tests on construction materials required for river training, riverbank protection, flood control, irrigation and drainage structures and to inspect and evaluate the quality of the construction works thereof.

To conduct training program on the above-mentioned subjects and to publish reports and periodicals related to technical aspects.

To advise the Government, Local Authority or any organizations regarding the problems and best approach towards the solution on the above-mentioned subjects.

To co-operate and conduct joint ventured research work with other similar local or foreign organizations.

To take any necessary steps for performing the above-mentioned works.

WHAT KIND OF SERVICE CITIZENS CAN EXPECT FROM RRI

Providing consultancy services for viable technical solutions to the problems related to riverbank erosion, flooding, drainage and irrigation.

Assisting in development of water resources by devising appropriate technological solutions for maintaining river flow, use of surface and ground water, environmental protection and reducing salinity.

Testing and assessment of quality of soil, sediment, water as well as materials used for construction of water infrastructures for water resources development and river management.

Conducting applied research on river management, sediment control of river, coast and estuary management etc. using physical and mathematical modelling technology and publishing the research results in report form as well as in periodicals and journals.

Field level implementation of research outcomes in limited form to assess its effectiveness.

Conducting basic research to develop understanding of river and coastal processes for the sake of applied research works.

Taking up problem oriented research and studies as to decrease in dry season flow of the rivers, sedimentation in river bed, loss of navigability of rivers, increase in flooding, long-term water logging etc. to furnish the outcomes to the planners and decision makers.

Taking up projects for capacity building of the institute as well as human resource development and conducting joint venture multi-disciplinary studies.

Determining the physical, chemical and engineering properties of sediment along with various chemical properties of surface and ground water such as arsenic, iron, calcium, magnesium, sulphate, carbonate, potassium, salinity, etc.

INTRODUCTION

River Research Institute (RRI) is a national research organization in Bangladesh. It is working as a statutory public authority under the Ministry of Water Resources (MoWR), Government of the People's Republic of Bangladesh. RRI has a Board of Governors (BoG) comprising ten members chaired by the Hon'ble Minister, MoWR, Government of the People's Republic of Bangladesh which reviews and evaluates the activities of RRI and approves important proposals so that it can run with all its activities properly. Director General is the Chief Executive of the institute and responsible for implementation of the decisions approved by the BoG. The activities of RRI are conducted by three directorates namely, Hydraulic Research Directorate, Geotechnical Research Directorate, and Administration and Finance Directorate. The first two directorates operate the research activities while the last is responsible for the overall administration and financial activities of RRI and works for its development.

RRI is set up with a view to devising plans and actions to develop water resources in a sustainable manner to meet the development needs of Bangladesh. Since its establishment, RRI has been conducting multi-disciplinary and problem-oriented tests and researches in the field of River Hydraulics, Hydraulics of Structure and Irrigation, Coastal Hydraulics, Soil Mechanics, Material Testing and Quality Control, Sediment Technology, Hydro-chemistry, Geo-chemistry and Instrumentation. The results of such tests and research are playing a vital role in providing information and recommendations regarding different water resources development plans and interventions.

RRI has been conducting physical modelling in the field of water resources since its establishment. RRI has also been involved in Mathematical modelling since 2009. Physical and mathematical modelling tools are complementary to each other. Both physical and Mathematical model have been proved very essential for sound engineering judgments to find out solutions for different water resources development projects. In view of this, RRI has adopted hybrid-modelling approach by using physical as well as Mathematical modelling to improve the understanding of different water systems, which may lead to safe and less expensive solutions for engineering problems. RRI has the mandate for conducting hydrodynamic and morphological study of the river mainly to derive and verify the design parameters of any hydraulic structures, bank protection and river training works.

RRI has conducted in-house training and seminars in 2023-2024 fiscal year for skill development of its scientists as well as other staffs and officials. In addition to these, there were other training courses with different title. Moreover, a number of officials and staffs are trained out-side training. Detailed description of in-house training, out-side training and seminar are also summarised under the section "Human Resource Development".

As per requirements of different clients, some proposals have been submitted for model studies and correspondence with the relevant organization is going on. A good number of soil, water, sediment and construction material samples are received from different projects of Bangladesh Water Development Board (BWDB) and other organizations. These samples are tested with the sophisticated laboratory equipment of RRI as routine works of Geo-technical Research Directorate. The results and findings are sent to the project authorities concerned. Recently, many pieces of equipment have been procured under IDCB project (Phase-II) for Geo-technical Research Directorate as well as Hydraulic Research Directorate. In addition, the operation and maintenance activities of office and residential buildings, roads, rest house, vehicles, water supply system, sewerage system, power distribution system including power generator etc. are routinely done as presented under the section Administration and Finance Directorate.

Qualified and trained personnel are very much essential to meet the objectives of RRI and maintain its standard to the international level. For this purpose, a number of officials have already been completed their higher studies and obtained training in the related fields at home and abroad. Many others are expected to be trained in the near future. At present RRI has shortage of junior officers to undertake more responsibilities. For this reason, recruitment of junior officials is under consideration. The existing manpower is, however, well experienced and well trained in the field of hydraulic, geotechnical and environmental engineering. Detailed list of existing scientists, supporting and managerial staffs is shown in Annexures. List of abbreviations is shown in the Annexures. RRI has also been publishing journal named 'Technical Journal' yearly since 1991. RRI's technical journal got recognition in 2000 by ISSN - International Centre, 20, rue Bachaumont, 75002 Paris - France and its serial has been registered as ISSN 1606-9277 with key- title: Technical journal - River Research Institute, abbreviated key- title: Tech. J. - River Res. Inst. Multidisciplinary research activities and case studies of different water resources projects are published in the journal.

RRI undertakes sports and cultural activities and observes all national days. RRI officials and staffs along with their families take part spontaneously in the sports and cultural activities. In addition, RRI takes part in different world and international days such as “world water day” and different national program taken by the government.

A view of in-house seminar titled “Necessity of Basin Scale Management of Rivers and it’s Challenges” held at Madhumati Conference Room, RRI

HYDRAULIC RESEARCH

The Hydraulic Research Directorate has three divisions such as (i) River and Coastal Hydraulics (ii) Hydraulic Structure and Irrigation and (iii) Mathematical Model. These three divisions carry out studies and research work in the field of flood control and drainage, river training and bank protection, coastal engineering, hydraulic structure and irrigation etc. by means of physical and mathematical modelling along with other laboratory testing and studies. This directorate is well equipped with physical and mathematical modelling facilities.

(i) River and Coastal Hydraulics Division

This division conducts studies and researches related to river training, river erosion, bank protection, flood control, river engineering, river sediment control, river estuary, tidal phenomena etc. by means of physical modelling. Local scour, 3-dimensional flow phenomena like eddy and vortex, morphological processes and developments etc. are only possible to reproduce well in the physical model. Moreover, the real phenomena that are happening in the field can only be visualized by physical modelling. This division also involves mathematical modelling of river and coastal-related problems.

(ii) Hydraulic Structure and Irrigation Division

This division conducts studies and researches to determine the proper alignment of different hydraulic structures related to civil engineering such as bridge, barrage, sluice, culvert, groyne, revetment etc as well as verify the design parameters through physical modelling. The physical processes/phenomena, which are not possible to describe well by empirical formula or mathematical expression, can easily be reproduced precisely in physical model. This division also involves mathematical modelling related to hydraulic structure & irrigation.

(iii) Mathematical Modelling Division

RRI conducts hydrological and morphological studies in the fields of flood control and drainage, river training and bank protection, coastal

engineering, hydraulic structure and irrigation etc. through mathematical modelling. Mathematical modelling is complementary to physical modelling for the correlation of results and also for any sound engineering judgment. It is a very useful tool for research and studies and also for the sustainable development of water resources projects.

Physical Modelling

Physical modelling is an authentic tool, which can be used confidently to verify the effectiveness of any structural intervention in the river and coastline protection works by reproducing the natural phenomena of river and coastal hydro-morphology at a reduced scale. The causes of any river and coastal engineering problems are identified and its mitigation measures are investigated through physical modelling. Local scour, 3-dimensional flow phenomena like eddy and vortex, morphological processes and developments etc. are possible to reproduce well in physical model. The important design parameters such as local scour around the structure, flow field, maximum velocity, appropriate location, dimension and orientation of hydraulic structures, spacing between groyne/spur like structures etc. can also be obtained by physical modelling. The physical process/phenomena, which are not possible to describe well by empirical formula and mathematical expression, can be easily reproduced precisely in physical modelling. Moreover, the real phenomena that are happening in the field can only be visualized by physical modelling. RRI has sufficient physical modeling facilities including indoor and outdoor model areas. Other available facilities include various measuring instruments, tide generator, wave generator, sediment feeder, power generator, workshop etc. So far, more than two hundred Physical model studies of different projects have been conducted by the Hydraulic Research Directorate since 1948. Some of the important Physical model studies carried out at RRI are given below.

Important Physical model studies conducted at RRI and achievements in the past

Name of the project	Year of completion	Objectives of the physical modelling
Physical Modelling Work for Rajshahi WASA Surface Water Treatment Plant Project	2024	To investigate suitability and sustainability of the proposed intake structure location as well as the sustainability of the river channel in terms of availability of flow round the year.
Physical Modelling in connection with "Detailed Study for Restoration and Development of Water Resources Management System of Polder 31 under Dacope Upazila in Khulna District"	2024	To investigate sediment transport and design sustainable solutions using physical modelling.
Physical Modelling to Support Feasibility Study for Augmentation, Conservation and Wise Use of Surface Water Resources through Dredging of the Upstream of Teesta Barrage and Bank Protection Work of the Teesta River in Kurigram District	2023	To investigate the feasibility of augmentation and conservation of surface water resources through the dredging of the upstream of Teesta barrage
The consulting services for Physical Modeling Study for Feasibility Study for the Management of Karatoa River System and Rehabilitation of FCD Projects on Both Bank of Nagar River in Bogura District	2023	To investigate the efficacy of dredging options, strategies and spoil disposal plan
Physical Modeling Study for feasibility Study for the Management of the Brahmaputra and Jinjiram River Basin Through Flood Control, Drainage Facility and Bank Protection in Kurigram District	2023	To investigate the efficacy of dredging options, strategies and spoil disposal plan
Sustainability of the Buriganga River Restoration Project (Revised)	2021	To augment 141 cumec dry season flow in the Buriganga river by diverting 245 cumec water from the Jamuna river through the New Dhaleswari-Pungli-Bangshi-Turag-Buriganga river system.
Padma River Dredging Management Project	2019	To investigate the efficacy of dredging options, strategies and spoil disposal plan

Sustainability of the Buriganga River Restoration Project	2019	To finalize the layout of the off-take structure such as guide bund, intake canal and sedimentation basin in order to get required discharge in Dhaleshwari River.
Bangabandhu Railway Bridge Project	2018	To determine the local scour around the proposed Bangabandhu Railway Bridge pier and to check the efficacy of the existing RTW with proposed railway bridge pier.
Laboratory Based Study Using Concrete Block Mats to control River Bank	2018	To determine the cost effectiveness and sustainability of Concrete Block Mats compared to traditional method of river bank protection.
Paira Bridge Project	2016	To finalize the type, location, dimension and hydraulic design parameters of the proposed river training works
Ganges barrage project	2013	To finalize the location, effectiveness and design parameters of the proposed barrage.
Padma multipurpose Bridge project	2013	To check the efficacy of river training structure.
3rdKarnaphully bridge project	2006	To decide the effectiveness and design parameters of bridge piers.
Gorai river restoration project	2001	To find out the suitable options for sustainable measures
Bangabandhu multipurpose bridge project	2000	To find out the efficacy of river training structure and to solve instantly arising any difficulties during the period of erection.
Paksey roadway bridge project	1996	To verify the efficacy of river training structure.
Silt trap model for Teesta barrage project	1994	To finalize the effectiveness and design parameters of the barrage component.

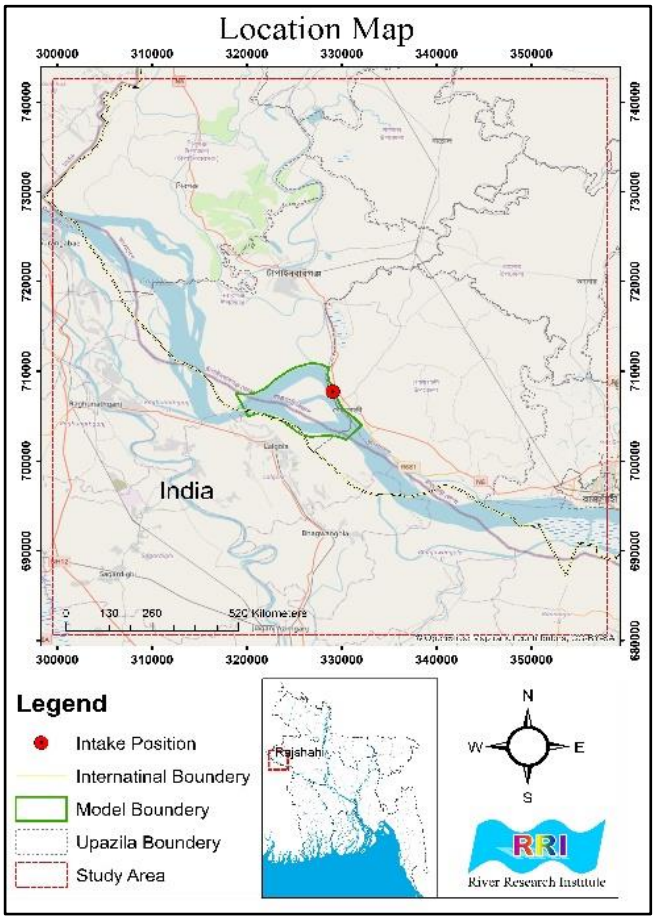
Physical model studies conducted at RRI during the financial year 2023-24

Physical Modelling Work for Rajshahi WASA Surface Water Treatment Plant Project

At present, the main source of drinking water supply of Rajshahi city is ground water. The population of this city is gradually growing up due to expanding in area. That's why the availability of ground water is gradually decreasing with increasing demand. The Ganges, one of the Mighty Rivers of Bangladesh is flowing nearby the city. This city is located on the northern side of the river. In this location, the river has enough flow to fulfil the increasing demand of water by the Rajshahi city. Even in extreme dry season, it is possible to fulfil the demand of water in the city area.

According to the recommendation of the Water Supply Master Plan for Rajshahi City developed by the Korean Environmental Industry and Technology Institute (KITI) in 2012, RWASA carried out a feasibility study in 2015 to find out a suitable location of intake on the Ganges river at Godagari for withdrawing surface water round the year to fulfill the increasing water demand of the Rajshahi city up to 2035. However, since then no further action has been taken in this regard before taking up the present mega project. Under these circumstances**,** RWASA has planned to conduct the feasibility study to have updated data and information based on the physical and mathematical modeling studies.

In Bangladesh, the River Research Institute (RRI) stands as the sole organization equipped with the necessary facilities and expertise for physical modelling. Therefore, HCEG has engaged RRI to conduct the physical model study. A formal contract agreement has been signed between HCEG and RRI on 30 October 2023 to facilitate and oversee this crucial aspect of the project.



The specific objectives of the study are stated below:

Two types of physical models have been planned and constructed in this study – (1) Comprehensive distorted sand bed morphological model and (2) Physical model for intake structure

The objectives of the comprehensive distorted sand bed morphological model:

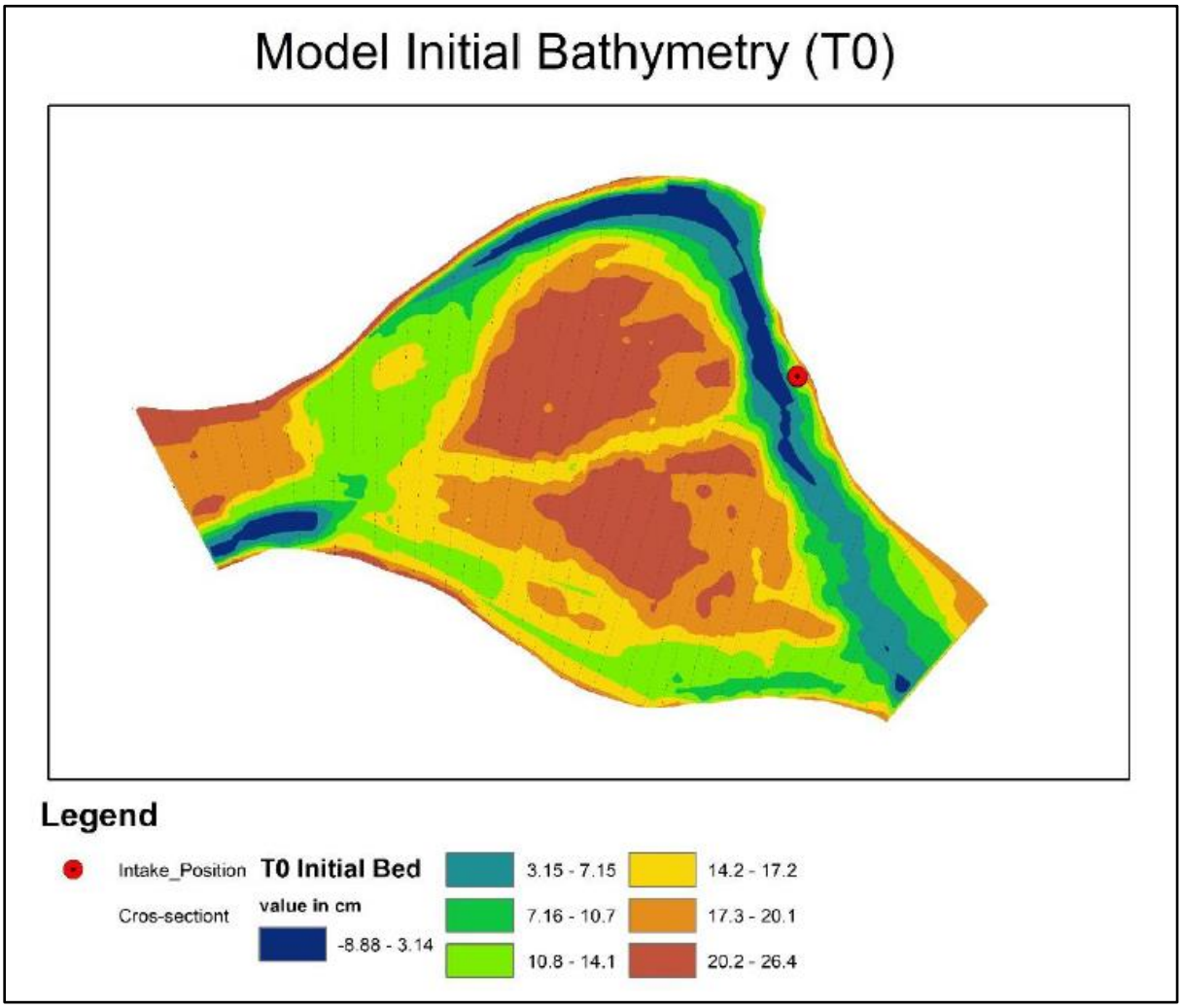
(i) Sustainability of the river channel where the intake structure will be located in terms of availability of flow round the year;
(ii) Investigation of the suitability and sustainability of the proposed intake structure location;
(iii) Determination of the short and long-term impacts of construction of intake structure at and upstream and downstream of the river;
(iv) Assessment of the need for bank protection works and scour protection works;
(v) Potential for formation of shoals and chars near the intake structure;

The objectives of the physical model for intake structure:

(i) Investigation of the uniformity of flow approaching the intake and uniformity of flow distribution within the intake structure;
(ii) Prediction of flow characteristics in the intake structure and pump sump.
(iii) Investigation of the occurrence of free surface and submerged vortices;
(iv) Investigation of the occurrence of swirl of flow entering the pump;
(v) Non-uniform spatial distribution of velocity at the impeller eye; and
(vi) Nature of entrained air/gas bubbles.

We have been conducted four test run among them (i) T0 was the Calibration Test. The purpose of calibration test is to calibrate the model i.e., to simulate the model with prototype conditions. This test is carried out with existing (without project) conditions and model bed is prepared according to the bathymetric survey of December, 2023. (ii) T1 was the Base run conducted in existing (without project) condition. The model bathymetry obtained after calibration test has been used as initial bathymetry for the base run. (iii) T2 Application Test which was the first application test with intake

structure in place. The model bathymetry obtained after calibration test has been used as initial bathymetry for this test run. The objective of this test is to assess the hydraulic and morphological impacts of the proposed intake structure in place. (iv) T3 was the second application test with intake structure in place also. The model bathymetry obtained after calibration test has been used as initial bathymetry for this test run. The objective of this test was to assess the hydraulic and morphological impacts of the proposed intake structure in place under changed approach flow condition. In test T3, the flow direction was changed by an amount of 14 degrees in the clockwise direction at the entrance of study area relative to the test T0/T1/T2. Here the angle between original flow direction and changed flow direction was 14 degrees at the entrance of study area



Initial bathymetry of the model within the study reach

Conclusions

The Ganges river in the study reach has undergone noticeable morphological changes over the last few decades in terms of bank erosion and point bar accretion. The morphological changes are triggered by both the upstream developments and occurrence of extreme events;

Construction of Farakka barrage at about 24 km upstream of the Indo-Bangladesh border at Chapai Nawabganj has led to the instability of the Ganges river in the downstream reaches;

The migration of the bend at Godagari was caused mainly by left bank erosion in the upstream part of the apex of the bend. The left bank in the downstream part of the same is composed of erosion resistant materials and also erosion protection measure was taken there;

The erosion prone left bank of the Godagari bend has been protected by implementing mainly cc block protection works. After implementation of the

protection works in 2017-18 the bank erosion has been stopped;

The outfall position of the Mahananda river has been shifted from near Sultanganj to its present position near Harma. This shifting of outfall position is caused by large scale left bank erosion;

- The Ganges river in the study reach has undergone noticeable morphological changes over the last few decades in terms of bank erosion and point bar accretion. The morphological changes are triggered by both the upstream developments and occurrence of extreme events;
- Construction of Farakka barrage at about 24 km upstream of the Indo-Bangladesh border at Chapai Nawabganj has led to the instability of the Ganges river in the downstream reaches;
- The migration of the bend at Godagari was caused mainly by left bank erosion in the upstream part of the apex of the bend. The left bank in the downstream part of the same is composed of erosion resistant materials and also erosion protection measure was taken there;
- The erosion prone left bank of the Godagari bend has been protected by implementing mainly cc block protection works. After implementation of the protection works in 2017-18 the bank erosion has been stopped;
- The outfall position of the Mahananda river has been shifted from near Sultanganj to its present position near Harma. This shifting of outfall position is caused by large scale left bank erosion;
- The continued left bank erosion at Godagari bend has led to corresponding accretion of the point bar along the right bank as well as formation of chute cutoff channel;
- At present a deep channel is formed near and all along the existing bank protection works leading to high flow concentration there. It has caused partial damage of the newly constructed bank protection works at several locations necessitating repair of the damaged parts;
- There is evidence of chute cutoff in the Lower Ganges river and there might be a critical cutoff ratio for the chute to occur;
- Godagari is the suitable place for the intake structure of the RWASA Surface Water Treatment Plant;
- The thalweg is around 400m away from the bank where the intake structure is to be constructed, which is a reasonably safe distance as far as suitability of the intake location is concerned;
- The maximum velocity at the intake structure may vary from 1.72m/s to 2.50m/s for different flood discharge;
- Despite large flow concentration along the left bank in the upstream and downstream of the intake location bank erosion is unlikely due to the presence of bank protection work and erosion resistant quality of bank materials at Godagari town;
- hydraulic and morphological impacts of the proposed intake structure are found only over a limited extent in the upstream and downstream of the same;
- it is unlikely that the left bank channel of the Ganges where the intake will be located may get abandoned in the long run;
- As per design provided by HCEG designed department, china, minimum required submergence should be 1.675m. Physical model has been conducted under total 08 scenarios at lowest water level as 8.0mPWD & 9.0mPWD in the Ganges river. The maximum design capacity for the intake system is 360MLD. During Physical model testing the maximum design capacity under phase -II has been operated smoothly/without any disturbance at the pump inlet. The WL at distribution chamber was obtained 7.63mPWD and the respective submergence was 2.13m corresponding to the Lowest Water Level 8.0mPWD in the Ganges river. On the other hand, the WL at distribution chamber was 8.60mPWD and the respective submergence was 3.10m corresponding to the Lowest Water Level 9.0mPWD in the Ganges river;
- Rotational flow and Weak free surface vortex formation in the vicinity of pump bell under scenario 5 (backwash/repair conveyance pipe) for flow rate 252MLD in Phase-II where, WL at distribution chamber obtained 7.33mPWD and

submergence was 1.83 m corresponding to the LWL 8mPWD in the Ganges River;

- Rotational flow and Weak free surface vortex formation in the vicinity of pump bell under scenario 8 (Normal extra 2) for flow rate 761MLD in Phase-II where, WL at distribution chamber obtained 7.60mPWD and submergence was 2.10m corresponding to the LWL 9mPWD in the Ganges River;
- Uniform flow distribution occurs within the distribution chamber of intake structure;
- No formation of air/gas bubbles entrained in the pump inlet.

Recommendations

- Godagari is the appropriate site for intake location of Rajshahi WASA Surface Water Treatment Plant. Because here the thalweg is located safely away from the left bank of Ganges River and the location is already protected against bank erosion. The left bank channel is likely to remain at this location in the long run. Therefore, it is recommended to construct the intake structure at Godagari.
- The intake length of 125m is suggested to implement in the field from hydro-morphological point of view.
- In design of the intake structure the reported maximum velocity near the intake structure and minimum scour level at the same should be taken into account. The foundation of the intake structure should be well below the reported minimum scour level.
- The proposed intake structure design provided by HCEG Design Dept. performs well as found from physical model testing. Therefore, this design is recommended for implementation in the field.
- Technical assistance of RRI may be sought during implementation of the structure, if necessary.

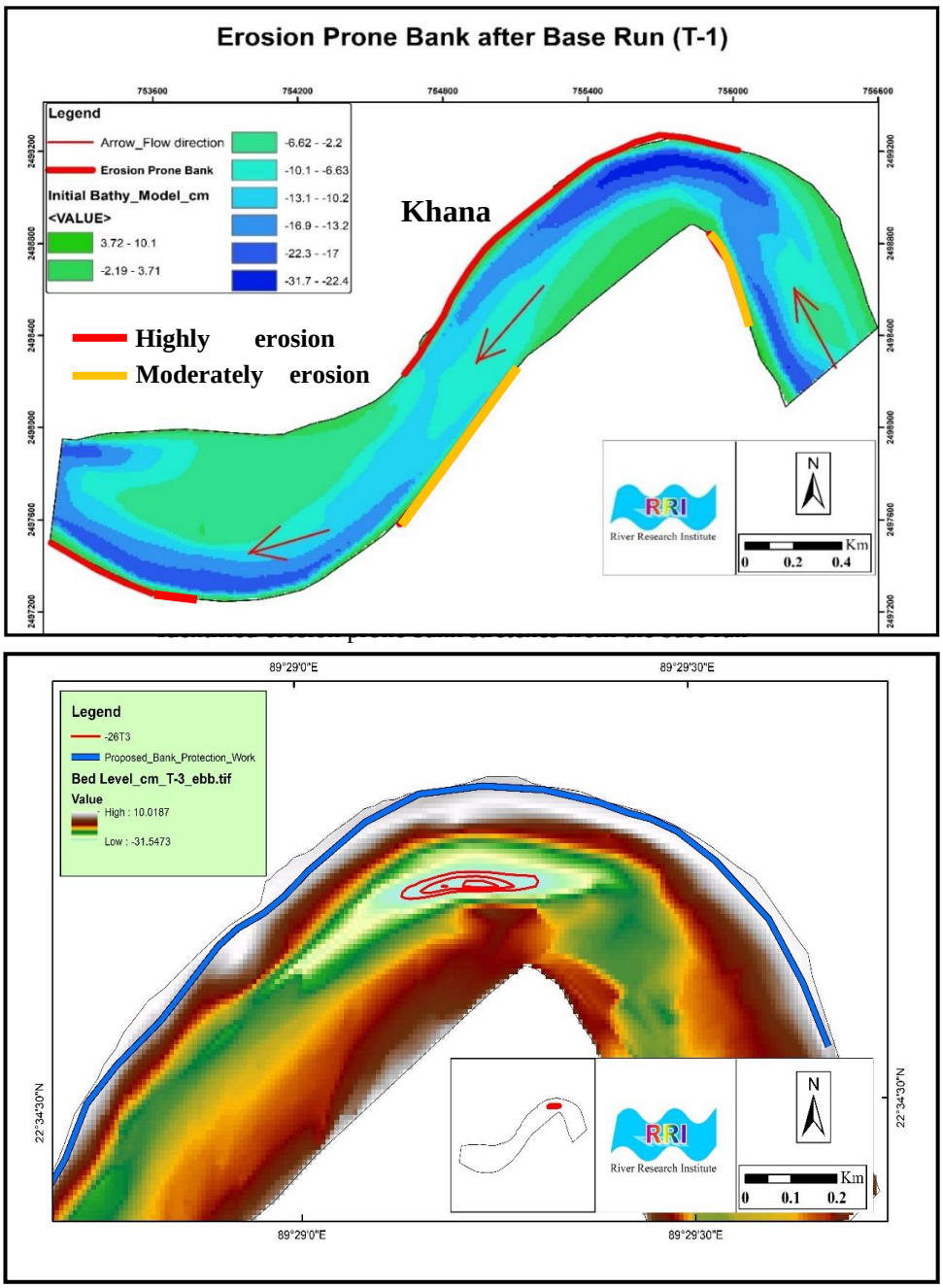
Physical Modelling in connection with "Detailed Study for Restoration and Development of Water Resources Management System of Polder 31 under Dacope Upazila in Khulna District"

In the early sixties and seventies, the Bangladesh Water Development Board (BWDB) built polders, including Polder 31, to protect low-lying coastal areas from saline water and flooding, enhancing agriculture and livelihoods. Initially, these polders significantly benefited the communities by improving socio-economic conditions. However, reduced freshwater inflow led to sedimentation, causing severe water logging and drainage issues, adversely impacting the environment and local economy. The region's vulnerability to climate change exacerbates these problems. To address these issues, BWDB initiated a feasibility study for bank protection and dredging, commissioning the River Research Institute (RRI) to investigate sediment transport and design sustainable solutions using physical modelling.

Study Objectives

The objectives of physical model investigation are:

- To improve understanding and gain insight into the physics of coastal and riverine processes;
- To test and optimize proposed designs by IWM;
- To provide data sets for improving numerical models;
- To study sediment transport issues such as evolution of river bed profile, erosion and scour mechanism around bottom-founded coastal structures and changes in bathymetry due to water flow;
- To assess potential flood risk effect;
- Afflux effects on hydraulic structures; and
- To assess the adequacy of hydraulic structures



Extent of high local scour under test T3 (100 year discharge)

Conclusions

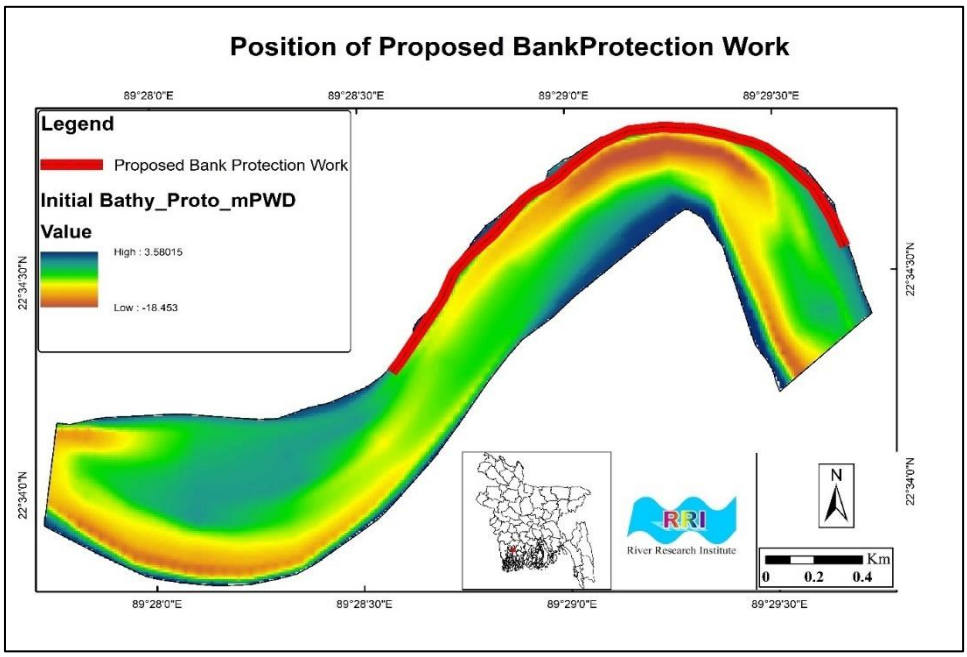
The following conclusions have been drawn based on the field data analysis and model test results.

- The Dhaki is an active tidally affected river that is undergoing morphological changes in terms of erosion and accretion;
- The proposed locations where bank protection works have been suggested appear to be erosion prone;
- The bank material of the Dhaki river is muddy. Progressive bank erosion occurs at a rather low rate;
- The stability of the proposed bank protective structures against tidal force as well as potential local scour near the same are important issues to be taken into account;

- It can be concluded from the results of the model calibration for both flood and ebb discharges that the model is capable of reproducing flow pattern and sediment transport in the model with reasonable accuracy and the model could be employed for investigating the effectiveness of proposed bank protection works under different flow conditions induced by tidal actions;
- There is presence of scale effects in the model. The scale effects will be assessed for making informed interpretation of the model test results;
- Ebb discharge appears to have generated relatively higher flow velocities in the model compared to that generated by flood discharge; and
- Progressive bank erosion of the Dhaki river has to be arrested to protect the existing flood control embankment and thereby to ensure safety of the polder communities against flooding;
- Model results indicate that large flow concentrations may occur at bend locations (near the outer bank) within the study reach. Progressive bank erosion may continue to occur if no protective measure is undertaken;
- Hard material protection could be a sustainable solution to the prevailing bank erosion problem;
- The proposed design of bank protection work appears to be stable against tidal forces;
- Maximum near bank velocity and maximum local scour are expected for ebb discharge condition;

Recommendations

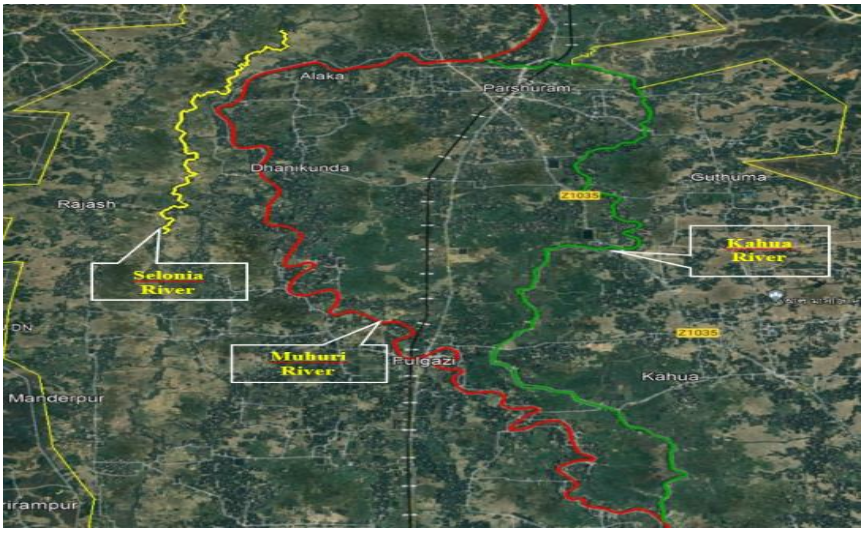
- The proposed protective structure (2.62 km along the right bank of upstream bend within the study area) tested in different tidal flow conditions works well in terms of stability of the protection materials and it is recommended to implement in the field. It is necessary to implement the bank revetment in the field immediately for the protection of the problem area and to prevent further bank erosion in the coming year.
- Test T2 (ebb discharge) is the recommended test in this study. The hydraulic design variables reported for this test may be taken into account; and
- Detailed layout of the recommended bank protective structure along the right bank of Dhaki river is shown in the following figure.



Layout of the recommended bank protective structure along the right bank of Dhaki river

Physical Modelling for Rehabilitation of Muhuri-Kahua Flood Control, Drainage and Irrigation Project in Feni District

The Muhuri-Kahua Flood Control, Drainage and Irrigation (MKFCDI) Project is located in Parashuram, Fulgazi, Feni Sadar and Chagalnaiya Upazilas of Feni District in the southeastern part of Bangladesh. The project area is mainly dispersed in the basin area of three rivers, namely Muhuri, Kahua and selonia. The natural drainage system in the area is formed by these river systems, along with their tributaries and chharas located to the east and west, as well as the internal khals. The intense monsoon rainfall that takes place outside the border leads to an excessive flow of these rivers and chharas in the downstream region adjacent to the border. The occurrence of short but catastrophic flash floods results in significant harm to the growth of crops and the destruction of local infrastructure. To overcome these issues, BWDB commissioned the River Research Institute (RRI) to investigate the Rehabilitation of Muhuri- Kahua Flood Control, Drainage, and Irrigation Project in Feni District using physical modelling as a part of the feasibility study for this project. However the study of this physical model is ongoing at RRI. After analyzing the available information, construction of two undistorted models (flood bypass model & loop-cut model) has been considered, and their geometric scale ratios have been selected based on the length, width and depth of the river within the study area. The tentatively selected geometric scale ratio for the flood bypass model is 1:50 and the same for the loop-cut model is 1:75.



Study area of the model

Objective of the Study

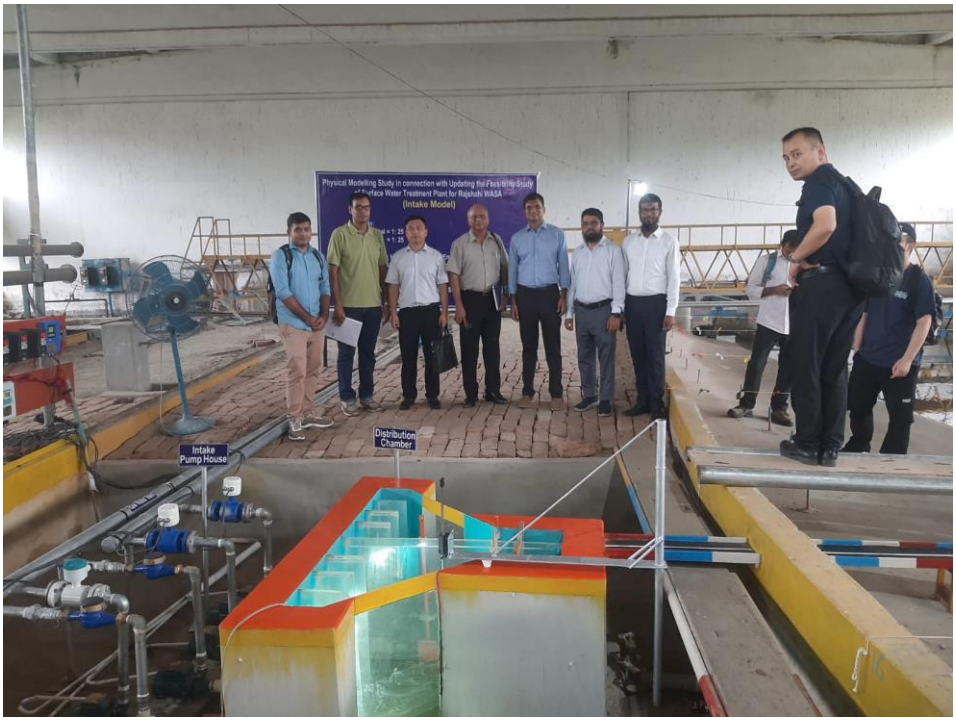
The main objective of the study is to assess the existing problems of Muhuri-Kahua FCDI Project and devise sustainable solutions and rehabilitation plan for the project.

The specific objectives of the study are as follows:

- To investigate the appropriate alignment of the flood bypass;
- To determine the optimum design parameters and dimensions of the flood bypass;
- To identify the suitable location of loop cuts;
- To assess the long-term sustainability of flood bypass and loop cuts; and
- To identify the protective work for the proposed interventions.

Mathematical Modelling

At present time, Mathematical modelling tool is being widely used all over the world for research and studies in the field of water resources engineering. It has become an important tool for decision support in planning and management of water resources and sustainable water infrastructure development. In many cases Mathematical modelling is complementary to physical modelling to arrive at sound engineering judgment as to planning, design and implementation of water infrastructure projects. In view of this fact, the GoB has equipped RRI with mathematical modelling facilities (MIKE Series) to enhance its quality of works. It is expected that RRI will play a vital role in water sector as well as in other related sectors to make the water resources development cost effective and sustainable. It can be mentioned here that RRI has already completed a number of mathematical model studies from 2009 to till. Some of the Mathematical model studies conducted by RRI are mentioned hereafter.



Chinese delegates visited the Rajshahi WASA model

Important Mathematical model studies conducted at RRI in the past

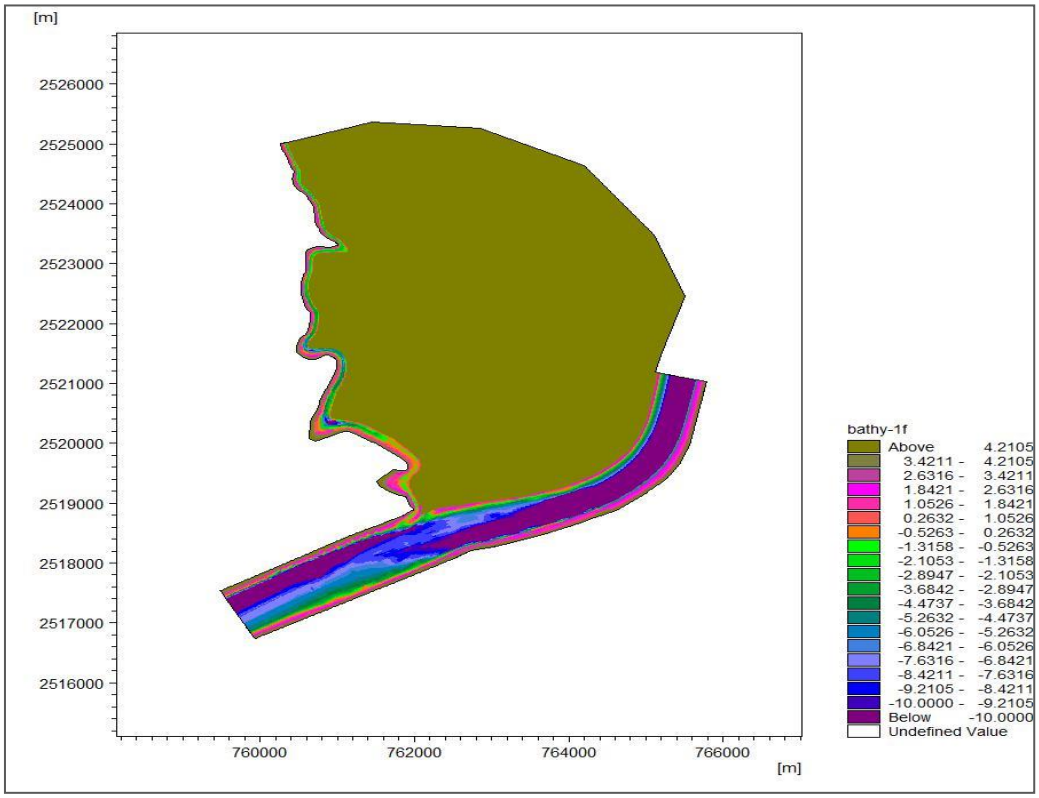
- Detail Engineering Design of Kurigram Irrigation Project (South Unit).
- Wazed Miah Bridge project in Rangpur District under Rangpur Road Division of RHD.
- Road Bridge over the Banar River on Mymensingh-Goffargaon-Toke Road in Mymensingh District under Mymensingh Road Division of RHD.
- Road Bridge over the river Lohalia at Boga in Patuakhali District under Patuakhali Road Division of RHD.
- Hydro-morphological Study for Pagla-Jagannathpur-Raniganj-Aushkandi Road Project in Sunamganj District under Sunanganj Road Division of RHD.
- Road Bridge over the Kalni River in Habiganj District under Habiganj Road Division of RHD.
- Road Bridge at Nalua-Baherchar over the river Pandab-Paira in Patuakhali District under Patuakhali Road Division of RHD.
- Road Bridge over the Monu River in Moulvibazar District under Moulvibazar Road Division of RHD.
- Hydro-Morphological Study for the Proposed Laxmipasha bridge at 23rd km of Barishal (Dinarer Pool)- Laxmipasha-Dumki Highway (Z-8044) on the Porar Dhon River under Roads and Highways Department (RHD.
- Hydro Morphological Study for the Proposed Banaripara bridge at 2nd km of Banaripara-Najirpur Highway (Z-7710) on the Sandha river under Roads and Highways Department (RHD)
- Hydro Morphological Study for the Proposed Atul Nagar Ghat Bridge at 28th km of Pirojpur-Najirpur-Matibhanga-Patgati-Gonapara Highway (Z-7704) on the Kaliganga River under RHD
- Hydro Morphological Study for the Proposed Bishkhali Bridge at 6th km of Binapani-Kachua-Betagi-Mirjaganj-Patuakhali Highway (Z-8052) on the Bishkhali river under RHD

Mathematical model studies conducted at RRI during the financial year 2023-24

Hydro-Morphological Study of the Moyur River for Construction of Moyur Bridge-2 over the Moyur River at 4th km of Bangabandhu Economic Zone Road under Road Division, Khulna.

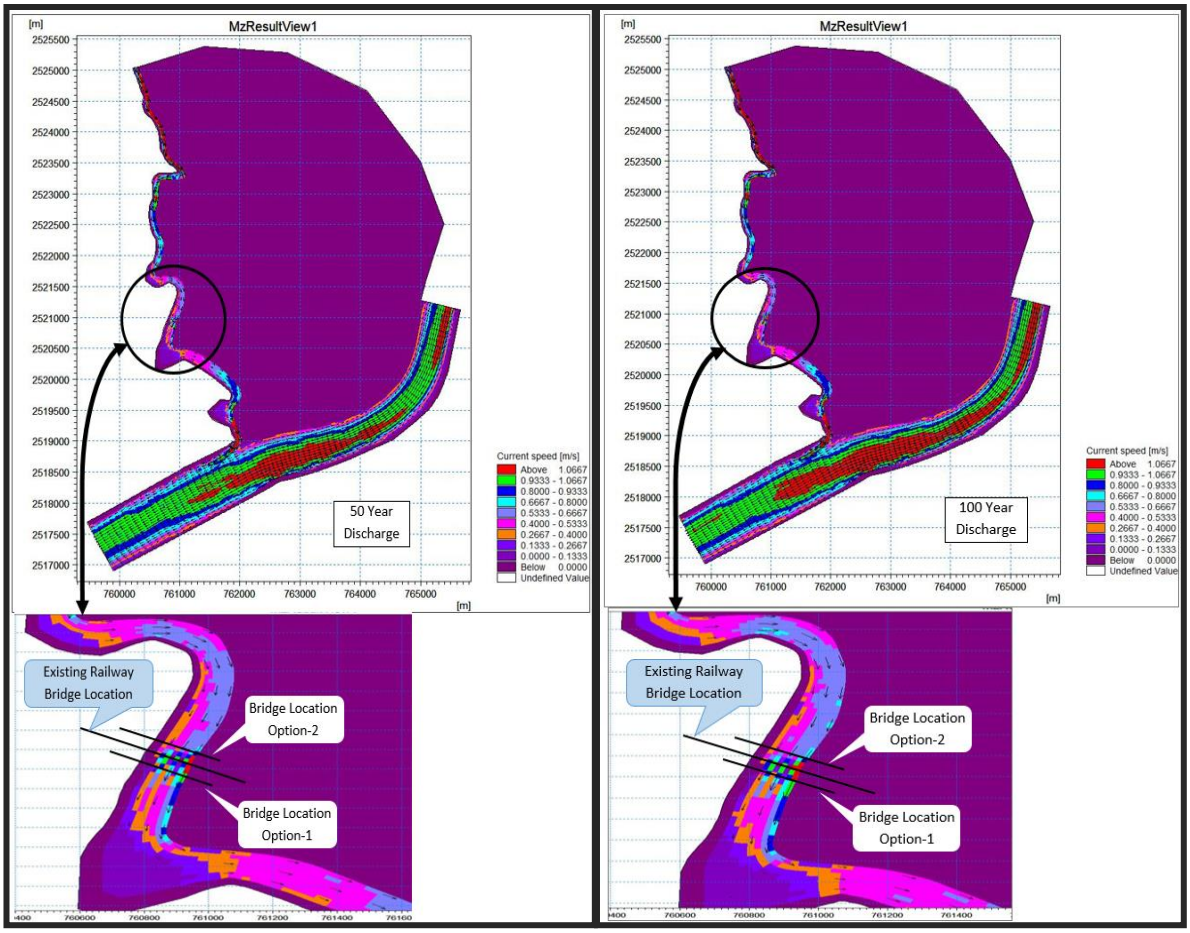
Khulna district is located in the South-Western Region of Bangladesh. The proposed Moyur Bridge-2 over the Moyur River is at 4th km of Bangabandhu Economic Zone Road under Road Division, Khulna. The bridge will provide a direct and uninterrupted connection between the two sides of the river facilitating smoother and more efficient transportation between Batiaghata, Paikgacha and Khulna city area, benefiting residents, businesses, and industries in the region. Moreover, the proposed bridge and associated link roads have immense significance in relation to the Bangabandhu Economic Zone. With the bridge and link roads in place, it will be easier to carry out economic activities of the Bangabandhu Economic Zone.

The Moyur is a meandering and tidally affected river. The Moyur River borders the west side of Khulna City Corporation (KCC), which is located on the bank of this river basin. Previously the river was active. But, the river, an important freshwater source in Khulna, is in serious trouble because of continuous encroachment and unchecked pollution, putting its existence at risk. Therefore, selection of a suitable bridge location and bridge waterway opening for the Moyur Bridge-2 over the Moyur River requires detailed verification of likely hydrological scenarios and the present erosion trend as well as future likely river planform development. Also, the vertical and horizontal clearance of the bridge, proximity to the existing road network, human settlements and different establishments on both sides of the river, existence of flood control embankments and other minor roads, number of drainage channels to be crossed, existing land elevation, navigational clearances etc. are some important issues to be addressed for planning and implementation of a bridge project. Under this circumstance, Road Circle, Khulna, commissioned River Research Institute to conduct this study for planning and design support of the bridge and associated river training works, if any. Necessary hydrological and sediment data have been collected through a field survey campaign. Historical hydrological data of the rivers concerned and satellite images of the study area have been collected from available sources. The collected data have been processed and analyzed to the extent of deriving necessary inputs for the MIKE21C model to be developed for hydraulic analysis of bridge and other information relevant to the proposed bridge. The initial bathymetry of the model is formed by using the recently surveyed bathymetric data.



Initial bathymetry of the model

Based on the model results it is observed that the flow patterns are almost similar for 100 year and 50 year discharges with only difference of a bit higher velocity for higher discharge. It can also be seen that the major flow of water is observed along the left bank of the Moyur River.



Velocity fields at and around the proposed bridge locations for different return period discharges

Objectives of the Study

Hydro-morphological study of a river is an essential part of the feasibility study and detailed design. Flood discharge highest flood level, velocity, depth, flow area, flood frequency, historic flow route of river, sediment load and characteristics, bank and bed erosion characteristics are the important parameters obtained from the hydro-morphological study. The specific objectives are as follows:

- To determine the actual width of opening of the bridge.
- To determine the suitable location of bridge along with alignment of approach road.
- To provide the hydraulic design of bridge and approach road including the river training works, if required from hydraulic hydrological and morphological considerations.
- To conduct Environmental Impact Assessment (EIA) of the bridge.

Conclusions

- Analysis of satellite images and recent cross-section data and model results show that no significant changes occur in both lateral and vertical stability at the bend locations in the immediate upstream and downstream of the proposed bridge location. The river is more or less stable at the proposed bridge location in terms of bank erosion;
- The thalweg profile in the vicinity of the proposed bridge shows that the potential for large bed degradation at the meander bends in

the upstream and downstream of the proposed bridge location is not significant. The minimum bed level along the bridge axis is -3.33mPWD whereas the minimum bed level in the study reach is found to be -13.72 mPWD, which is occurred at about 500m downstream of the existing railway bridge location.

- Between two considered options of bridge location and approach road alignment Option-1 appears to be suitable from multi-criteria analysis. The selected length of the bridge is 114m. Right end co-ordinate of the bridge is 760846.00 m E, 2520919.00 m N and left end co-ordinate of the same is 760947.68 m E, 2520906.87 m N;
- The design discharge for the bridge is 326 m^3/s and the design discharge for the bridge substructure and river training works is 340 m^3/s. The design water level for the bridge is 3.35 mPWD and the design water level for the bridge substructure and river training works is 3.43 mPWD. The standard high water level (SHWL) is 2.76 mPWD and the standard low water level (SLWL) is -0.22 mPWD;
- The approach road formation level at access road and at abutment is 4.33 mPWD and 8.39mPWD respectively. The length of the approach road is 203m on both sides of the bridge considering 2% longitudinal slope. The bottom level of the bridge girder at the center of the bridge should be kept at 6.89 mPWD;
- The main bridge consists of three spans, with the middle span of length 48.5m and the remaining two spans of 32.75m each.

Recommendations

- Option-01 may be considered as appropriate alignment for bridge and link road (approach road and access road). The bridge may be constructed at the suggested location. The length of the bridge may be considered as 114m. However, the length and other design arrangement can be revisited during the detailed design/construction stage.
- The suggested hydrological and hydraulic design parameters of the bridge may be considered ;
- The design scour level at the abutment is -4.93mPWD. The bottom level of pile foundation for the abutment should be placed well below this level. The design scour level for the bridge pier is suggested to be -9.04mPWD. The bottom level of the pile foundation should be set well below this level;
- The bridge location is fairly stable in terms of both lateral and vertical stability and the bridge is not likely to cause any bank erosion at and in the upstream and downstream of the same. Therefore, no bank protection work is suggested to protect the bridge from bank erosion;
- The abutments and slopes of the approach embankment should be protected against unforeseeable calamities. For this reason, the cc block slope protection works may be undertaken along both faces of the approach embankments at both ends of the proposed bridge upto an extent of at least 15m starting from the river end of the approach road.
- The Moyur River has undergone large scale siltation after construction of a regulator at its offtake. Gradual accumulation of city waste has caused the river bed to go up. In order to deal with this problem there is a plan to dredge the river. However, the proposed dredging is not likely to have any adverse effect on the hydraulics and morphology of the Moyur River at the proposed bridge location. The bridge is located outside of the main city where present conveyance capacity of the river is high enough to allow for the design discharge to pass under the bridge smoothly and safely.
- After implementation of the bridge project the developments in the river channel upstream and downstream of the bridge should be monitored very closely;
- Protection measures for abutments and approach embankments against unforeseeable calamities may be considered as suggested; and
- Technical assistance of River Research Institute may be sought for monitoring of hydraulic and morphological conditions in the vicinity of the bridge.

Hydro-Morphological Study for construction of Old Shibsa Bridge over the Old Shibsa River at 2nd Km of Paikgacha-Soladana-Batiaghata Road (Z-7608) under Road Division, Khulna

Khulna division is located in the south-western region of Bangladesh. Khulna, Satkhira, Bagerhat, Jashore, Narail, Jhenaidah, Kushtia, Magura, Meherpur and Chuadanga are ten districts under Khulna division where many polders are located. The proposed Old Shibsa bridge is at 2nd Km of Paikgacha-Soladana-Batiaghata Road at Ch. 1+2500m (Z-7608) under Road Division, Khulna. Paikgacha-Soladana-Batiaghata Road is a RHD zilla road (Z-7608) which starts from Paikgacha upazila and connects with the Batiaghata upazila under Khulna district. The road connects Paikgacha Upazila head quarter with Batiaghata Upazila head quarter and provide connection for entire population to schools, madrasa, markets, UP head quarter, fish cultivation area, small industries, clinics, shops, sawmills, mosque, temple, etc. through LGED and other union and village roads. This road is the shortest way of road communication for the people of the area with Satkhira and Khulna. The location of the proposed roadway bridge is at and around the existing Old Shibsa bridge over the Old Shibsa river. The river system at and around Old Shibsa is complex. At present, there exists a narrow bridge on the river which is constructed by LGED.

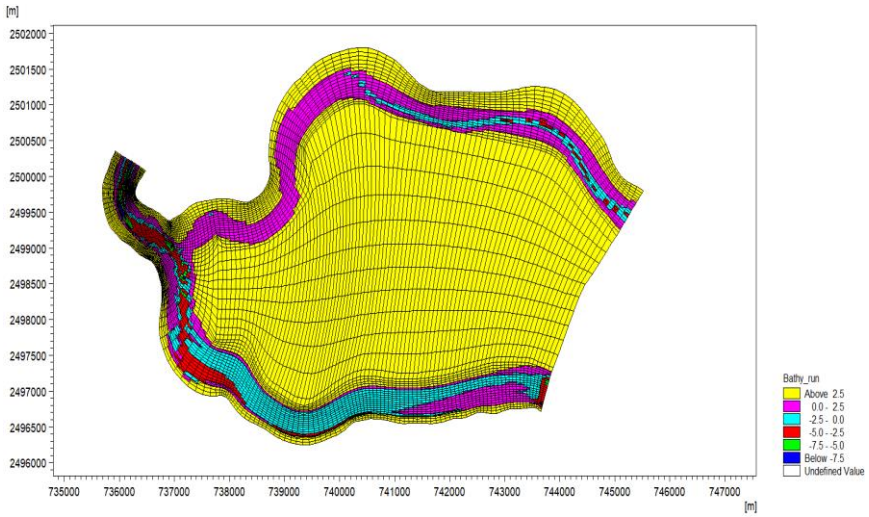
A roadway bridge over the the Old Shibsa river is very much needed to establish direct road communication between Paikgacha and Batiaghata upazilas as well as between Paikgacha and Dacope upazilas. Paikgacha upazila head quarter is situated on the left bank of the Old Shibsa river. The existing bridge on this river at upazila head quarter is not suitable for smooth movement of all motorized vehicles.

Objectives of the Study

- to determine the suitable location of bridge along with alignment of approach road;
- to provide the hydraulic design of bridge and approach road including the river training works, if required from hydraulic hydrological and morphological considerations.

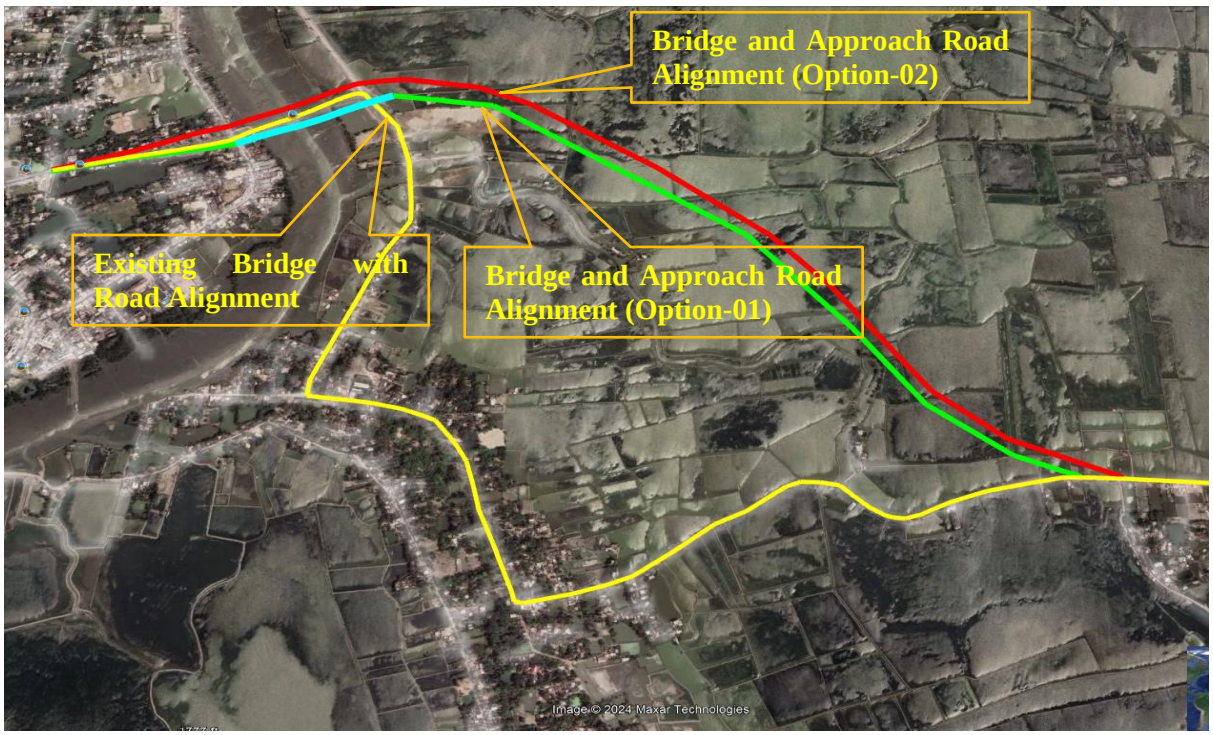
In order to conduct the study necessary hydrological data of the Old Shibsa river, satellite image of the study area and other relevant information have been collected. A field survey campaign has been conducted to collect the recent bathymetric data of the river, nearby road alignment data, discharge and sediment data etc.

The collected data have been processed and analyzed to the extent of gaining understanding of the present physical conditions of the river at the bridge location and physical settings of the study area and also deriving information to use as model inputs. The initial bathymetry corresponding to the computational grid generated for hydrodynamic and morphological simulations is prepared. The initial bathymetry is prepared based on the October-November, 2023 bathymetric survey data collected under this study. After completion of the bathymetric survey the data are processed. The initial bathymetry is then prepared using standard MIKE21C bathymetry preparation module. Suitable interpolation procedure is followed to generate bathymetry information at locations where bed level information is unknown. The generated bathymetry is then checked for consistency. The initial bathymetry corresponding to the generated grid is shown below.



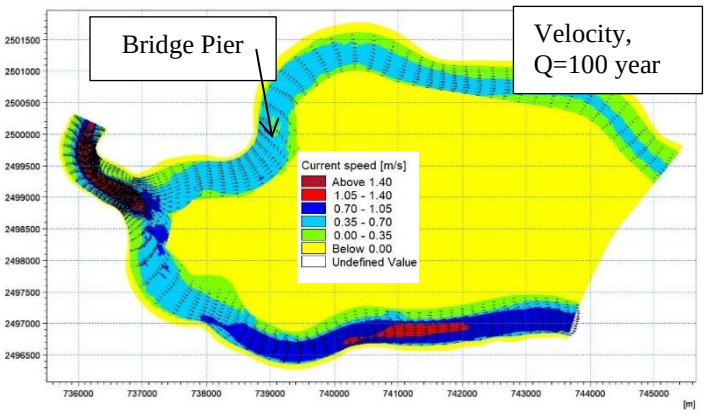
Initial bathymetry of the model

Generally the orientation of the bridge should be perpendicular to the flow direction. It reduces bridge constriction and thereby, reduces scour depth around the bridge piers and abutments. The bridge location is selected at 25m upstream of the existing bridge. After careful examination the proposed position and orientation of the bridge have been shown below.



Proposed position and orientation of the Old Shibsa Bridge

Hydrodynamic and morphological assessment of the Old Shibsa river has been made through scenario simulations using a developed two dimensional numerical model. The hydrodynamic simulations are made in base condition (without bridge in place) for three distinct return period discharges namely 50 year, 100 year and 500 year discharges. It is understood from the preliminary investigations that the suitable bridge location could be in the crossing between two consecutive meander bends of Old Shibsa river around the existing bridge, the focus of the study is hydro-morphological conditions of the river at this river stretch (including upstream and downstream bends) under different hydrological scenarios and the model results have been extracted for demonstration accordingly. The velocity fields at and in the vicinity of the likely bridge location (at 25m upstream of existing bridge) in hydrodynamic conditions for 100 year return period discharge is shown below. It can be seen from the figure that velocity is higher in the left bank than right and maximum simulated velocity around the pier is 0.90m/s. It can also be seen from figure that major flow occurs through the main river channel at the upstream of the bridge location after then towards right bank for all discharges. Flow over the nearby floodplains does occur with relatively low velocities (< 0.3m/s) due to high resistance to flow.



Velocity field at and around the proposed Old Shibsa Bridge for 100 year return period discharge

Conclusions

The following conclusions have been drawn based on study results:

- Considering two options of bridge location and approach road alignment Option-01 appears to be suitable from multi-criteria analysis;
- The selected length of the bridge is 200m;
- The design discharge for the bridge substructure and river training works is 195m^3/s;
- The design water level for the bridge is 4.10mPWD;
- The design water level for the bridge substructure and river training works is 4.10mPWD;
- The approach road formation level at access road and at abutment is 5.0mPWD and 9.23mPWD respectively. The length of the approach road is 282m in both sides of the bridge considering 1.5% longitudinal slope;
- The bottom level of the bridge girder at the center of the bridge should be kept at 8.43mPWD;
- The main bridge consists of five spans, with the spans of 40.0m each.
- The design scour level at the abutment is -4.67mPWD. The bottom level of pile foundation for the abutment should be placed well below this level;
- The design scour level for the bridge pier is suggested to be -7.70mPWD. The bottom level of the pile foundation should be set well below this level;

Recommendations

The following recommendations have been made for implementation of the proposed bridge over the Old Shibsa river:

- Option-01 may be considered as appropriate alignment for bridge and link road;
- The bridge may be constructed at the suggested location. The length of the bridge may be considered as 200m. However, the length and other design arrangement can be revisited during the detailed design/construction stage.
- The suggested hydrological and hydraulic design parameters of the bridge may be considered for proposed bridge design;
- The developments in the river channel upstream and downstream of the bridge should be monitored very closely after implementation of the bridge project.

GEO-TECHNICAL RESEARCH

Geo-technical Research Directorate comprises of three divisions. These are Soil Mechanics and Groundwater Division, Material Testing & Quality Control division and Sediment, Chemical & Water pollution division. The scope of works and facilities available in each division are narrated in the following sections.

Soil Mechanics and Ground Water Division

Soil Mechanics and Groundwater Eastern and Western Zone of Geo-technical Research Directorate is an utmost important wing of RRI. It has been conducting tests and research work for the determination of different physical parameters of soils which are required for planning and design of the infrastructures of flood control, irrigation, drainage, water development and other development projects. Ground Water Circle (GWC) of BWDB and other organizations explore site and complete their boring and collect soil samples from different project sites in
connection with construction of hydraulic structures like bridges, dams, barrages, regulators, sluices, weirs, flood control and river training works and other relevant works. Site investigation and boring logs are prepared by them are sent to RRI with collected samples. RRI has developed sufficient laboratory facilities for testing of soil samples received from the clients. The soil samples of these zones are tested with great care by the scientists and trained / skilled soil technicians. Finally, the reports on the tested soil samples are prepared based on field investigation and laboratory analysis of data. The reports focus on the engineering characteristics of the soil samples according to the foundation needs. Then the approved report is sent to the respective clients along with bill. The works executed in connection with soil testing, analysis and publication of reports during 2023-2024 have been discussed briefly in this section.

Receiving procedure of soil samples

The disturbed soil samples were collected by driving split spoon sampler and undisturbed soil samples in Shelby tubes by the clients and sent to the Soil Mechanics and Groundwater laboratory of Geo-

technical Research Directorate of RRI. A total 401 nos. of samples from GWC of BWDB and other organizations in fiscal year 2023-24 were received in the laboratory. All the samples were tested and reports were sent to the respective clients.

Testing of soil samples

At first all the soil samples are visually examined in the laboratory and representative samples are selected for necessary testing. Generally, tests are conducted for determining Natural Moisture Content (NMC), Grain Size Distribution, Atterberg Limits, Density (γ), Void Ratio (e), Compression Index (Cc), Unconfined Compressive Strength (q_u), Shear Strength (cohesion c and angle of internal friction Φ), by Direct Shear, Tri-axial Shear with or without pore pressure, California Bearing Ratio (CBR) value and Permeability value etc. As per planned schedule, different tests are performed simultaneously in order to work out all necessary parameters quickly within the shortest possible time. Other necessary soil parameters are also tested according to client's requirements.

Sample collection by RRI Personnel from Palongkhali and Balukhali Khal at Ukhia & Teknaf, Coxs Bazar under Coxs Bazar O & M Division, BWDB, Coxs Bazar (left), sample preparation at RRI laboratory for Field Density and Particle Size Analysis Test (right)

List of samples received (project-wise in chart), billed amount and volume of work executed during 2023-24 fiscal year in Soil Mechanics & Ground Water Division

Sl No.	Report No.	Name of Division / Client	Name of Project/ Work	No. of Sample Received & Tested	Billed amount (Taka)
01	01 (2023-2024)	Executive Engineer Lakshmipur O & M Division, BWDB, Lakshmipur.	Meghna River Bank Protection at Barokheri, Ludhua Bazar and Kader Panditer Hat under Ramgati Upazila and Komolnagar Upazila, of Lakshmipur.	320	1793200.00
02	02 (2023-2024)	Sakil Ahmed, Engineer, Development Construction Ltd.	Testing of Soil Sample from Design and Build Jetty and other associated works at Mongla Port, Mongla	04	16200.00
03	03 (2023-2024)	The survey of Center for Environmental and Geographic Information Services (CEGIS), Dhaka.	Analysis of Bed Materials of Jamuna and Kirtonkhola Rivers for a feasibility and ESIA study under BWDB Project.	48	333900.00
04	04 (2023-2024)	Director, River Delta and Coastal Morphology Division. CEGIS, Dhaka.	Morphological study of Dholeshwari and Kaligonga Rivers for River Crossing Transmission Line of PGCB.	02	12000.00

05	05 (2023-2024)	Managing Director, ECOSURV, Green Road, Dhaka-1205.	Riverbed Soil Sample Test of Sandwip Channel and Feni River, Feni.	15	107438.00
06	06 (2023-2024)	Assistant Engineer (Construction) BADC, Faridpur Zone, Faridpur	Construction of 2000MT Steel Fabricated Fertilizer Go-down in Tepakhola, Faridpur under BADC, Faridpur.	01	29700.00
07	07 (2023-2024)	Executive Engineer Coxs Bazar O & M Division, BWDB, Cox Bazar	Construction of 10.00km Embankment along the left/right bank of Palongkhali Khal and Balukhali Khal of Polder no 67/A & Polder no 67/A (Ext) in c/w Rehabilitation of Polder no (67/A, 67, 67/B, 68) along border river of Naf for Improving Bangladesh- Myanmar Security at Upazila –Ukhia & Teknaf, District: Coxs Bazar under Coxs Bazar O & M Division, BWDB, Coxs Bazar.	10	312000.00
08	08 (2023-2024)	Director, River Delta and Coastal Morphology Division. CEGIS, Dhaka.	Morphological Study of Tentulia Branch River for river Crossing Transmission Line of PGCB.	01	6000.00
			Total	401	2610438.00

Dr. A.N.M. Bazlur Rashid, Additional Secretary and Abdul Latif Mollah, Additional Secretary Ministry of Water Resources visited the Soil Mechanics and Ground Water Laboratory

Material Testing and Quality Control Division

The Material Testing and Quality Control discipline of Geo-technical Research Directorate deals with the determination of physical and engineering properties of concrete and concrete materials normally used for different types of river training works, hydraulic structures and other infrastructures. It also involves 'Laboratory Trial Mix' and computation of concrete mix design to attend particular design strength with materials to be used in the construction works. At present this discipline has two types of working facilities viz. laboratory oriented testing & research facilities and the other is monitoring & evaluation of construction works by conducting field tests and investigations for quality control of concrete to the ongoing projects.

Laboratory activities in 2023-24 fiscal year

During the fiscal year 2023-24, a total of 416 samples/specimens of cement, sand, shingles/stone chips, bricks, concrete cylinders were received from the different ongoing projects under the different divisions of BWDB and other Govt. and Non-Govt. organizations for conducting tests as specified by the clients.

Category-wise list of samples received from different BWDB Divisions and other organizations during the fiscal year 2023-24

Sl.	Name of division/ Other organization/ Field laboratory	Cement	Sand	Stone/ Khoa	Concrete cylinder	MS Rod	Concrete Core Block	Brick/ Hollow Brick	Total sample
1	Faridpur O&M Division, BWDB, Faridpur.	07	12	07	12	0	05	0	43
2	Shariatpur O&M Division, BWDB, Shariatpur.	54	81	46	30	105	0	0	316
3	Madaripur O&M Division, BWDB, Madaripur.	02	02	02	0	0	0	0	06
4	BADC, Faridpur Zone. Faridpur.	0	0	0	03	12	0	0	15
5	BADC, Shariatpur Zone. Shariatpur.	0	0	0	03	12	0	0	15
6	DPHE, Faridpur Division,Faridpur.	01	01	01	0	04	0	03	10
7	Bay Dredgers Ltd. 01 Kawran Bazar,Dhaka.	0	02	0	0	0	0	0	02
8	Nationtecch Communications Ltd. Adabar, Dhaka-1207.	0	0	0	0	0	04	0	04
9	M/S MOTIUR RAHMAN NANNU. Chawk Bazar, Faridpur.	02	0	0	03	0	0	0	05
	Total	66	98	56	51	133	09	03	416

Name of the Projects, total no. of samples received and billed amount & recovery amount of different BWDB Divisions and other organization during the fiscal year 2023-24.

Sl. No.	Name of division/Other organization/ Field laboratory	Total nos. of sample tested	Billed amount (in Taka)	Recovery (in Taka)
1	Faridpur O&M Division, BWDB, Faridpur.	43	186375.00	186375.00
2	Shariatpur O&M Division, BWDB, Shariatpur.	316	1221525.00	1221525.00
3	Madaripur O&M Division, BWDB, Madaripur.	06	32400.00	32400.00
4	BADC, Faridpur Zone. Faridpur.	15	9525.00	9525.00
5	BADC, Shariatpur Zone. Shariatpur.	15	9825.00	9825.00
6	DPHE, Faridpur Division,Faridpur.	10	22950.00	22950.00
7	Bay Dredgers Ltd. 01 Kawran Bazar,Dhaka.	06	3300.00	3300.00

Sl. No.	Name of division/Other organization/ Field laboratory	Total nos. of sample tested	Billed amount (in Taka)	Recovery (in Taka)
8	Nationtecch Communications Ltd. Adabar,Dhaka-1207.	04	21300.00	21300.00
9	M/S MOTIUR RAHMAN NANNU. Chawk Bazar, Faridpur.	05	25875.00	25875.00
Total		420	1533075.00	1533075.00

Concrete crushing machine (Controls, Italy) (left) and Core cutter machine (Hilti, Switzerland) (right) used for cutting concrete block and extract core.

Technicians conducting consistency test of Cement

Field services (Deputation of Technicians)

For quality control of works, a few numbers of trained technicians were deputed in the field in response to the request from the project authority. During the fiscal year 2023-24, three number of technicians were deputed in the different work sites of BWDB.

Sediment, Chemical and Water Pollution division

Sediment, Chemical and Water Pollution division is one of the important testing and research discipline of Geo-technical Research Directorate of RRI. There are two laboratories under this division, namely Sediment Technology laboratory and Chemical and Water Pollution laboratory. Test and analysis of various kinds of sediment samples of different rivers of Bangladesh are being carried out in the Sediment Technology laboratory. The test results are used for planning and designing of hydraulic structures like barrages, drainage channels, irrigation canals, flushing sluices, closures etc. Sediment testing results are also used in physical and mathematical model studies. In the chemical and water pollution laboratory, samples of surface and ground water are being analysed for using water in different purposes.

Test activities during 2023-2024 fiscal year

A total number of 590 samples including general suspended sediment, bulk suspended sediment, river bed and bank soil samples and water samples were received and tested in the sediment technology laboratory as well as chemical laboratory during the fiscal year 2023-2024. The general suspended sediment and bulk suspended sediment samples were collected by the field personnel of 4 (four) measurement divisions under the Surface Water Hydrology Circle-I of BWDB. The samples were collected as a routine work by the Surface Water Hydrology Circle-I of BWDB. A total of 41 reports were published from this division during 2023-2024 fiscal year.

Testing Facilities in Chemical and Water Pollution Laboratory

The Chemical and Water Pollution laboratory is well equipped laboratory with modern instruments. Recently RRI has procured Particle size analyzer, Total Organic Carbon (TOC) analyzer, Carbon-Hydrogen-Nitrogen-Sulphur (CHNS) analyzer, Computerized Microscope Stemi 305 and Portable Air Monitoring System with rain gauge for Chemical Laboratory under Institutional Development and Capacity Building (IDCB) Project (Phase-II).These equipment are designed with cutting-edge technology and are ideal for a wide range of applications including environmental, materials, geological, food safety, clinical, petrochemicals and agricultural purposes.

Portable Air Monitoring System with rain gauge (HAZ SCANNER, Model: HIM-600) is mainly used for EIA purpose. It is noticed that it is used specifically to determine Air particulate matters, humidity, temperature, wind speed with direction etc. Computerized Microscope Stemi 305 is used to determine shape & particle size of soil, bio-physical organism of water samples such as phytoplankton, Zoo plankton etc. Hach Spectrophotometer is used to detect substances such as Al, Ba, B, Cd, Cr, Mg, Fe, Cl, C, Ni, Fl, SO_4, etc. in soil, sediment and water samples. Hach portable colorimeter is used to detect substances in the field as Hach spectrometer does in the laboratory. Portable Multiparameter meter is used to determine pH, DO, EC, TDS, Salinity, etc. from the river. Aqua-culture kit is used to measure Ammonia, Cl^-, CO_2, Hardness, etc. Digital Turbidity meter can be used in this Laboratory to detect turbidity of water samples. TOC analyzer is used to determine the organic and inorganic carbon for water and wastewater samples in mg/l. Particle Size Analyzer is used to determine the particle size soil and sediment samples from 10 nm to 3500 mm. CHNS Analyzer is used to determine the percentage of soil, sediment and water samples. Besides these, the following facilities also exist in the Chemical and Water Pollution laboratory:

- Determination of pH, arsenic, Salinity electrical conductivity, turbidity, free carbon di-oxide, bi-carbonate, sulphate, chloride, nitrate, sodium chloride, total solid content, hardness, calcium, magnesium, iron, silica, total dissolved solid, dissolved oxygen etc.

Revenue Earned from Sediment, Chemical and Water pollution division

A total of Tk. 590675.00 has been billed during the fiscal year 2023-2024 for testing of sediment and water samples. In total Tk. 1077287.00 has been received in this fiscal year 2023-2024 where TK 578675.00 is from current and remaining amount from previous fiscal years. A total of Tk. 31358.00 is remaining unpaid up to June 2024 from different clients of BWDB and other organizations.

Equipment for Chemical Laboratory: (a) HACH DR 6000 Spectrophotometer & HRCH DRB 200 (b) Particle Size Analyzer (Malvern Panalytical, UK)

Dhaka Liaison Office Laboratory

Dhaka Laboratory was established in October 2021 at 72 Green Road, Dhaka-1205. The laboratory is well-equipped and has the facilities to test soil, sand, sediment, water, and cement samples. The Specific Gravity, Natural Moisture Content, Sieve & Hydrometer Analysis, Unit Weight, Organic Content, Liquid Limit & Plastic Limit, etc. parameters of soil samples; Fineness Modulus (F.M.), Unit Weight, Specific Gravity, Organic Impurities of sand samples; Normal Consistency and Setting Time of cement samples; Sediment Concentration, Specific Gravity; Sieve & Hydrometer analysis of sediment samples; pH, Electrical Conductivity, Color (True or Apparent), Carbon-di-Oxide/Acidity, Carbonate/Bi-Carbonate, Alkalinity, Sulfate, Orthophosphate, Chloride, Fluoride, Chlorine Content Total/Free, Iodine Content, Bromine Content, Ammonia-Nitrogen, Nitrate-Nitrogen, Nitrite-Nitrogen, Salinity, Hardness, Ca-Hardness, Mg-Hardness, Turbidity, Total dissolved solid, Total solid content, Total Suspended/Insoluble Solids, Total Iron: UV-VIS, Ferrous Iron/Ferric Iron, Silica Content, Manganese: UV-VIS, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand, Arsenic (Kit Method), etc. parameters of water samples can be determined in Dhaka Laboratory.

The important equipment of Dhaka Laboratory are HACH DR1900 Spectrophotometer, HACH DRB 200 Reactor, HACH BOD Trak-II, Shel Lab Incubator, HACH HQ30D Multi-parameter, Turbidity Meter, Duran Vacuum Filtration Device, Constance Force Convection Laboratory Oven 200°C and 300°C, Constance Muffle Furnace 1200°C, Controls Limit Device, Controls Sample Mixture, Controls Sieve Shaker and Set, Controls Compaction Device, Shimadzu Precision Balance, Kyowa Optical Microscope, Humboldt Setting Time Device, Cole-Parmer Micropipette, Soil Hydrometer, Magnetic Stirrer, Autoclave, Burettes, Glassware, Reagents, etc.

During the 2023-2024 fiscal year, Dhaka Laboratory tested 1110 samples and published 13 reports. The total billed amount of those reports is 764,325.00 BDT, of which 327,075.00 BDT (including VAT and TAX) has been received from the client, and 437,250.00 BDT is due. The total collection of Dhaka Laboratory for 2023-2024 is 806,175.00 BDT (including VAT and TAX), consisting of the collections from previous dues. At the end of 2023-2024, the total dues of Dhaka Laboratory are 437,250.00 BDT.

Equipment of Dhaka Liaison Office Laboratory

Soil resistivity meter used for sub soil investigation and ground water detection

ADMINISTRATION AND FINANCE

This Directorate consists of several sections namely, i) Establishment, ii) Accounts & Audit, iii. Public Relation & Photography, iv) Library, v) Estate & Security and vi) Store. The other activities include procurement, operation & maintenance of physical facilities.

Activities of Administration & Finance Directorate

The activities of Administration & Finance Directorate include overall administration of RRI, establishment, human resources development, financial management, photography, public relations, internal security, storing of materials, plantation, arrangement of different kinds of training, publications of annual reports, journal, newsletters etc. The approved and existing manpower employing in this institute is 257 and 161 respectively. The details of manpower are given in the following table as shown below:

Class-wise approved and existing manpower in RRI

Sl. No.	Class	Approved manpower	Existing manpower
1	1st Class	68	35
2	2nd Class	03	02
3	3rd Class	119	73
4	4th Class	64	41
	Total	257	151

This directorate also collects a number of books both from home and abroad, journals, research reports, newsletter and many other publications every year for library. Many researchers, students and teachers from different institutions use this library for their necessary documents. The total number of reading materials (including books, journal, newsletter reports and publications) is 16139 nos. and the total expenditure under this directorate during the fiscal year 2021-22 is 1831.76 lakh.

Total collection of items in the library

Sl. No.	Description	Collection in 2023-2024	Total
1	Books	26	2626
2	Journal	5	2676
3	Reports	69	5839
4	Other publications	22	5261
	Total	122	16402

Total expenditure in establishment

Sl. No.	Description	Amount (Tk. In lakh)
1	Officers' salary	273.18
2	Staffs' salary	407.14
3	Allowances	403.65
4	Supply and services	300.70
5	Capital expenditure	16.87
	Total	1128.36

Other activities

In addition to the above activities, this directorate also provides technical support services to the other directorates and divisions. This directorate is also responsible for procurement, operation & maintenance, and mechanical & electrical works of physical facilities. The work completed by operation and maintenance, and mechanical and electrical section during the fiscal year 2021-22 is outlined below.

Works executed by Operation and Maintenance (Civil Engineering)

Repair and maintenance of different office buildings such as administration, medical centre, mosque, ansar camp as well as residential buildings. The repair and maintenance works include stripping of old plaster and replacing by new plaster works, white washing, plastic painting, synthetic enamel painting to window gratings, door polishing, woodwork in door frames and replacing of glass panes in window shatters and replacing of doors under establishment budget.

- ✓ Purchase & replacing of plumbing materials of different buildings with new ones.
- ✓ Purchase of stationery, plumbing, and construction materials for general use as well as model use.
- ✓ Cleaning of water tank in all office and residential buildings.
- ✓ Cleaning and maintenance of surface drain of RRI campus.

Works executed by Mechanical Section

- ✓ Installation, repair & maintenance of pump, motors, tailgates, gate valves, foot valves, model bridges etc.
- ✓ Repair and maintenance of mechanical tools.
- ✓ Repair, fitting & fixing of grill, window etc at residential and office buildings.
- ✓ Repair and maintenance of all the vehicles of RRI.
- ✓ Purchase of raw materials for mechanical workshop of RRI.
- ✓ Repair and maintenance of photocopy machines, air cooler and refrigerators.

Works executed by Electrical Section

- ✓ Purchased of fuel & batteries for generator.
- ✓ Routine maintenance of computer, printers, UPS, IPS and other electronic equipment.
- ✓ Purchased of computer accessories, electrical materials.
- ✓ Purchased of electric wires of different sizes.
- ✓ Electrification in the model area.

RRI Officres Stand inside the stall in Innovation Shocasing Fair held at Pani Bhaban, BWDB

BUILDING OF HUMAN CAPITAL

RRI has been putting special emphasis to human resources development since its establishment in order to achieve its goals as mandated by the Government of the People's Republic of Bangladesh. Scientists and engineers are working at RRI whose efforts are being put with a view to reach the research standard through innovation of new technologies and ideas in the related fields of activities. RRI is a relatively new organisation of this kind of research in the country. As the technologies of the disciplines concerned are fast developing, the necessity of higher studies and advanced on the job training of the research personnel in the academic and research institutions of similar activities at home and abroad (especially in developed countries) has strongly been highlighted in order that it can keep them abreast of the latest development in the related fields of research. Some of the RRI personnel attended higher studies and training program both at home and abroad.

RRI scientists and officers participated in different trainings and workshops during the 2023-2024 fiscal year at RRI and outside of RRI. The title and duration of these training programs and seminars were as the following:

A view of the in-house training held at Madhumati conference room, RRI

List of training RRI officers and staffs attained in the fiscal 2023-24

SL. No.	Title of the training / Seminar	Duration
1	Fundamental Training Course. RPATC, Dhaka	23.07.23-03.08.23
2	Application of Mathematical Modelling and GIS Technology for Feasibility Study of Water Development Project. IWM, Dhaka.	23.07.2023-03.08.2023
3	Training on Office Management and ICT Course. RPATC, Dhaka.	03.09.2023-14.09.23
4	Workshop on e-Participation on National Web Portal	
5	Fundamental Training course. RPATC, Dhaka	27.08.23-14.09.23
6	Website Content Management and Development using Laravel. Mirpur, Dhaka	09.10.23-23.10.23
7	Training on AMS Software	01.11.2023
8	Seminar on Bangladesh Delta plan 2100, prospect, Implementation	13.12.2023
9	Training on Development Budget Management. Planning Commission, Dhaka	14.12.2023
10	Seminar on Wetland and Human wellbeing. Conference Room, Ministry of Water Resources.	04.02.2024
11	Learning Season on Climate change and what to do in Bangladesh. Madhumati Conference Room RRI.	11.05.2024
12	Training on Office Management and ICT Course. RPATC, Dhaka.	19.05.24-30.05.24
13	Smart office Management using Smart Tool. BCC, Faridpur Regional office.	26.05.2024
14	Fundamental Training Course. RPATC, Dhaka.	26.05.2024-13.06.2024
15	Training on Right to Information Act 2009 and Rules RRI. Madhumati Conference Room RRI.	27.05.2024
16	Seminar on Role of Smart Water Resources Management to Build Smart Bangladesh. Madhumati Conference Room RRI.	28.05.2024
17	Training on Cyber Security. Conference Room, Ministry of Water Resources	
18	Training of D-nothi Course. RPATC, Dhaka	02.06.2024-06.06.2024
19	Necessity of Basin Scale Management of Rivers and it's Challenges. Madhumati Conference Room, RRI.	13.06.2024
20	Training on different work plans under APA for the fiscal year 2023-24. Computer Lab, Pani Bhaban, 72 Green Road, Dhaka.	05.09.2024
21	Workshop on Election manifesto 2024. RPATC, Dhaka.	

Conferences attended by the RRI scientists

In the year 2023-2024 RRI scientists have attended several scientific conferences and presented their research findings in those conferences. The list of the conferences attended by the RRI scientists has been shown below:

Sl.	Publication Details	Presented by
1	Nayan Chandra Ghosh and Kabir Bin Anwar, "Water quality index determination for the upper reaches of the Sangu and Matamuhuri rivers in Bangladesh", 5th International Conference on Physics for Sustainable Development and Technology (ICPSDT-2023), 07-08 September 2023, Department of Physics, Chittagong University of Engineering and Technology, Chittagong, Bangladesh.	Nayan Chandra Ghosh Senior Scientific Officer
2	Uma Saha, Fatima Rukshana, Nayan Chandra Ghosh, Md. Moniruzzaman, Sumiya Ferdhous, Bikash Roy and Kazi Rezaul Karim, "Prediction of stream bank failure at Paturia ferry ghat of Padma River of Bangladesh in terms of bank materials", 9th International Conference on Water and Flood Management (ICWFM-2023), 14-16 October 2023, Institute of Water and Flood Management, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.	Uma Saha Chief Scientific Officer
3	Uma Saha, Md. Moniruzzaman, Nayan Chandra Ghosh, Khandaker Rajib Ahmed, Bikash Roy, Kazi Rezaul Karim and S M Abu Horayra, "Geotechnical investigation and slope stability analysis of the right bank of Arial Khan River of Bangladesh", 9th International Conference on Water and Flood Management (ICWFM-2023), 14-16 October 2023, Institute of Water and Flood	Uma Saha Chief Scientific Officer

Sl.	Publication Details	Presented by
	Management, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.	
4	Md. Matiar Rahman Mondol and Md. Abdul Jalil, "Removal of Iron, Manganese and Arsenic from groundwater by contact oxidation in multistage stone chips beds", 9th International Conference on Water and Flood Management (ICWFM-2023), 14-16 October 2023, Institute of Water and Flood Management (IWFM), Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.	Md. Matiar Rahman Mondol Principal Scientific Officer
5	Md. Tofiquzzaman and Mohammed Alauddin, "Minimization of scour near the first groin in a series", 9th International Conference on Water and Flood Management (ICWFM-2023), 14-16 October 2023, Institute of Water and Flood Management (IWFM), Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.	Md. Tofiquzzaman Senior Scientific Officer
6	Omar Al Maimun, Md. Tofiquzzaman and Md. Shahabuddin, "Assessment of the accuracy of satellite precipitation products with ground observed stations in the north-east region of Bangladesh", 7th International Conference on Civil Engineering for Sustainable Development (ICCESD 2024), 07-09 February 2024, Department of Civil Engineering, (Khulna University of Engineering and Technology, Khulna, Bangladesh.	Omar Al Maimun Senior Scientific Officer
7	Abdullah Al Imran and Md. Jahir Uddin, "Assessing the hydro-morphological change due to the confliction of Old Brahmaputra and Dasani rivers", 7th International Conference on Civil Engineering for Sustainable Development (ICCESD 2024), 07-09 February 2024, Department of Civil Engineering, (Khulna University of Engineering and Technology, Khulna, Bangladesh.	Abdullah Al Imran Senior Scientific Officer
8	Md. Emran Ali Mondal, Abdullah Al Imran and Md. Jahir Uddin, "Understanding the bank erosion-accretion of Padma River multi-temporal satellite images using GIS and RS approach", 7th International Conference on Civil Engineering for Sustainable Development (ICCESD 2024), 07-09 February 2024, Department of Civil Engineering, (Khulna University of Engineering and Technology, Khulna, Bangladesh.	Md. Emran Ali Mondal Scientific Officer
9	Md. Zubayerul Islam and Md. Matiar Rahman Mondol, "The Mahananda River: water quality assessment", International Conference on Environmental Science and Resource Management (ICESRM 2024), 16-17 May 2024, Department of Environmental Science and Resource Management Mawlana Bhashani Science and Technology University Tangail-1902, Bangladesh.	Md. Zubayerul Islam Senior Scientific Officer

SIGNING OF MEMORANDUM OFUNDERSTANDING (MoU)

To strengthen and increase the prospect and potential of an institution it is very crucial to avail all relevant up for grabs resources. In this era of 4IR every single institution should care about the activities of similar institutions. To achieve this objective, an MoU can play a vital role in this connection. In the fiscal year 2023-24 River Research Institute signed MoU with two prominent institutions, they are Chittagong University of Engineering and Technology (CUET) and Institute of Water Modelling (IWM) Institute of Water Modelling (IWM).

S M Abu Horayra, DG RRI and Prof. Dr. Sheikh Muhammad Humayun Kabir, Registrar CUET are seen signing MoU on behalf of respective authority

S M Abu Horayra, DG RRI and Md. Zahirul Haque Khan, Executive Director, IWM hands over MoU to each other

FINANCIAL MANAGEMENT

River Research Institute is a national organization having mandate of a statutory Public Authority under the Ministry of Water Resources, Government of the People's Republic of Bangladesh. The annual expenses are being borne by its own income and some grant from the Government revenue budget.

The main sources of RRI's own income are revenue received from model studies (physical and mathematical model), and geo-technical testing fee (testing of soil, concrete, water and sediment sample). Detailed budgetary information (income and expenditure) for the fiscal year 2020-2021 and 2021-2022 are given hereafter–

Earnings and Expenses for the fiscal year 2023-2024

Earnings		Expenses	
Items	**Taka (Lakh)**	**Items**	**Taka (Lakh)**
Govt. grant	1763.97	Establishment: Officers' salary 273.18 Staffs' salary 407.14 Special benefits 29.03 Allowances 403.65 Goods and services 300.70 Retirement benefit assistance 150.00 Research Grant 45.40 Other Grant 79.99 ICT Grant 8.25 Capital Expenditure 16.87 Reserved in PL Account 47.21 Non expensed money 2.55 Retirement benefit assistance (expensed from self income) 93.10	1857.07
Model study	240.79	Model study	194.56
Geotechnical testing fee	49.05	Geotechnical testing	23.50
Others	22.62	Surplus (+)	1.30
Total	**2076.43**	**Total**	**2076.43**

Earnings and Expenses for the fiscal year 2022-2023

Earnings		Expenses	
Items	**Taka (Lakh)**	**Items**	**Taka (Lakh)**
Government grant	1643.85	Establishment: Officers salary 281.87 Staff salary 331.71 Allowances 395.98 Supply and services 253.22 Retirement benefit assistance 100.00 Research Grant 41.69 Other Grant 72.66 ICT Grant 9.56 Capital Expenditure 6.92 Reserved in PL Account 147.53 Non expensed money 2.71 Retirement benefit assistance (expensed from self income) 56.42	1700.27
Model study	263.63	Model study	186.45
Geotechnical testing fee	15.95	Geotechnical testing	8.17
Others	34.18	Surplus (+)	62.72
Total	**1957.61**	**Total**	**1957.61**

Earnings and Expenses for the fiscal year 2021-2022

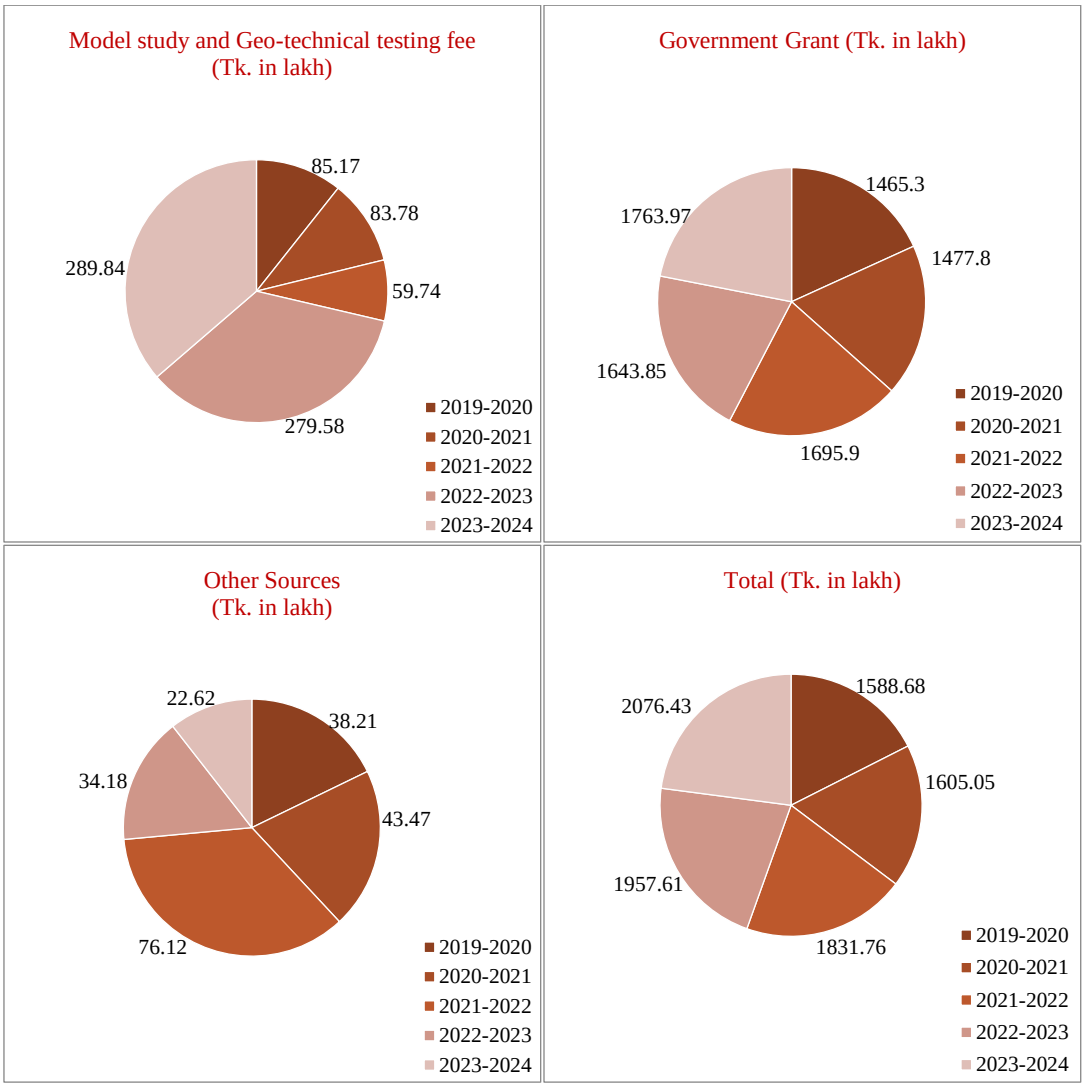
Earnings		Expenses	
Items	**Taka (Lakh)**	**Items**	**Taka (Lakh)**
Govt. grant	1695.90	Establishment: Officers salary 282.93 Staff salary 402.52 Allowances 439.85 Supply and services 329.91 Retirement benefit assistance 150.06 Research Grant 34.57 Capital expenditure 20.74 Refund of non-expended money 35.32	1695.90
Model study	59.74	Model study	57.09
Geotechnical testing fee	23.41	Geotechnical testing	14.08
Others	52.71	Surplus (+)	64.69
Total	**1831.76**	**Total**	**1831.76**

Significant features of RRI's earnings, expenses and closing balance in recent years (last 5 years) are given here.

Scenario of earnings for last five years

Sources of income	Total (Tk. in lakh)				
	2019-2020	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**
Model study & geo-technical testing fee	85.17	83.78	59.74	279.58	289.84
Govt. grant	1465.3	1477.80	1695.90	1643.85	1763.97
Other Sources	38.21	43.47	76.12	34.18	22.62
Total	**1588.68**	**1605.05**	**1831.76**	**1957.61**	**2076.43**

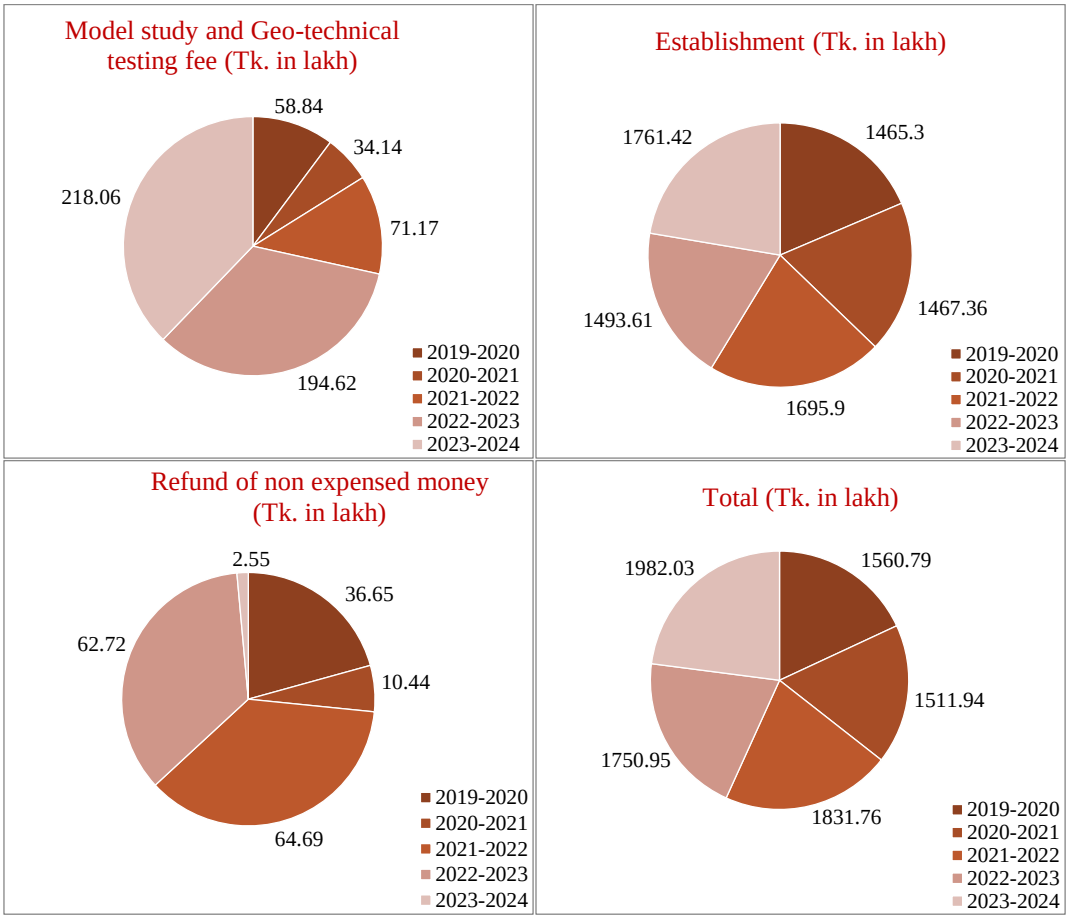
Graphical representation of scenario of earnings for last five years



Scenario of expenses for last five years

Sl. No.	Description	Total (Tk. in lakh)				
		2019-2020	2020-2021	2021-22	2022-2023	2023-2024
1	Model study and Geo-technical testing	58.84	34.14	71.17	194.62	218.06
2	Establishment	1465.3	1467.36	1695.90	1493.61	1761.42
3	Refund of non-expended money	36.65	10.44	64.69	62.72	2.55
	Total	**1560.79**	**1511.94**	**1831.76**	**1750.95**	**1982.03**

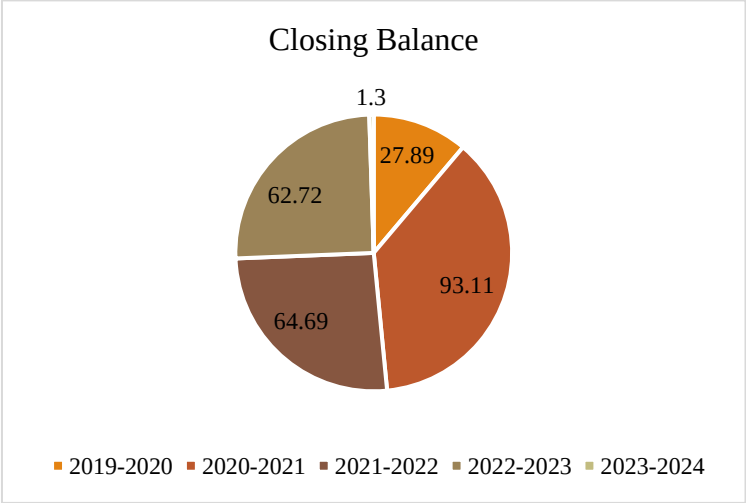
Graphical representation of scenario of expenses for last five years



Scenario of closing balance for last five years

Sl. No.	Description	Total (Tk. in lakh)				
		2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
1	Closing balance on the basis of self-earnings and govt. grant	(+) 27.89	(+) 93.11	(+) 64.69	(+) 62.72	(+) 1.3

NB: (+) indicates surplus



FUTURE PROSPECTS AND PLANNING

Since its establishment as a national organization with distinct mandates for rendering services to deal with river related problems and to devise economic and sustainable solutions to the problem RRI has been discharging its responsibilities using established facilities and available man power. At the beginning, the main focus was physical modelling and soil and material testing mainly to support planning and design of different water infrastructures and Bangladesh Water Development Board (BWDB) was the main client. With the passage of time physical modelling technology has been applied to address wide range of river related issues namely sediment management at the off-take, river restoration, bridge and barrage hydraulics, river dredging etc. However, the application of physical modelling technology was very limited for tidal and coastal systems due to lack of required modelling facilities. In order to meet the growing need for comprehensive and multidisciplinary studies RRI adopted mathematical modelling technology in 2007 as a tool for conducting model studies side by side physical modelling technology. At the same time a number of RRI engineers and scientists pursued higher education in different disciplines and many of them are trained at home and abroad to enable RRI to carry out multidisciplinary studies. Under an institutional development and capacity building project a number of sophisticated equipment were procured to upgrade testing facilities. However, some facilities are yet to be established to carry out all mandated activities as well as to deal with new challenges and emerging issues in water sector. With this end in view the second phase of institutional development and capacity building project has begun in the financial year 2017-18.

For RRI to function as a pioneering organization in water sector and to cope with the increasing demand of the time in the competitive market; institutional development, instrumentation, sustainable technology and highly trained manpower are very essential to enhance the standard of service to international level. From this point of view the following future development prospects are important to be mentioned:

Now-a-days, Information Technology (IT) has become a very useful tool for research and studies, sound management and transparent administration in the world. RRI has to encounter this new challenge to meet the demand for quality services.

RRI has already established a network system by connecting all the activities of this institute. For this RRI has completed all the installations and collected software, hardware and networking components required. By this time, LAN is working at RRI. A complete wing (manpower & logistics) wing will be required to govern the IT sector in RRI.

Two Material Testing and Quality Control field laboratories at Bogura and Barisal have already been established. A liaison office is situated at 72, Green Road, Dhaka. In the liaison office soil, building materials, sediment & water samples are being received from BWDB and other Govt, Semi-Govt, NGOs and consulting firms. There is system for bringing the collected samples to RRI headquarter in Faridpur within a short period of time to complete the tests in due time. The test results are furnished to the clients in report form to execute the work of the projects in scheduled time. RRI is contemplating to establish field laboratory in all district headquarters of the country to make its services easily available.

RRI has already established well-equipped Math Model LAB with internet facilities and uninterrupted power supply required to support mathematical modelling. However, existing facilities need to be expanded and upgraded by purchasing more computers and accessories, installing updated modelling softwares, introducing modelling in new areas and imparting training to the modellers. Some of the needs are expected to be fulfilled under the on-going IDCB project. It is understood that in order to further expand the RRI mathematical modelling services a full-fledged Math Model LAB has to be established in Dhaka.

RRI successfully completed the physical model studies of some of the biggest projects of Bangladesh namely Bangabandhu Railway Bridge Project, Paira Bridge Project, Bangabandhu Bridge Project, Padma Multipurpose Bridge Project, Ganges Barrage Project, Gorai River Restoration Project, Arial Khan Roadway Bridge Project, 3rdKarnafullyRoadway Bridge Project, Kushtia Town Protection Project etc. However, due to lack of needed facilities RRI could not do much in physical modelling of coastal systems. Initiatives have already been taken to establish the tidal and coastal modelling facilities and to train scientists in this field.

RRI may act as a focal institution of its peripheral region to investigate regional water resources problems. A monitoring cell may be established at RRI to monitor the natural hazards like flood, draught, bank erosion, earthquake etc. As a focal institution, RRI may provide consultancy services to the Government, Local Authority of any organizations or may directly advise the beneficiaries to take precautionary measures against those hazards.

RRI is working in collaboration with BUET and is willing to work with similar foreign institutions like CWPRS (India), DHI (Denmark), Delft Hydraulics (The Netherlands), HR Wallingford (UK), NHC (Canada), SMEC (Australia), LHI (Sri Lanka) etc. Efforts are being made by RRI to start joint venture/bi-lateral study/research projects with these similar international institutions.

More opportunities should be extended for RRI research personnel for imparting higher studies leading to MS/Ph D degree and other advanced on-job training. There should also have enough scope for RRI officials to participate in the national/international seminar, symposium, congress, workshop etc.

It can be mentioned here that though RRI is primarily catering the needs for national agencies, with the gradual development of manpower and technology, the institute will fulfil the demands for international bodies and organizations in future.

Farewell of Engr. Kazi Rezaul Karim, Director, Geotechnical Research

Farewell of Engr. A. K. M. Ashrafuzzaman, Director (Incharge), Hydraulic Research

NATIONAL DAYS OBSERVATION

National Days in Bangladesh are momentous occasion celebrated with great pride and enthusiasm across the country. So as a national institute, no exception is the River Research Institute in this regard. RRI marks the anniversary of Bangladesh's independence and victory day on 26th March and 16th December respectively every year. On these days, RRI is adorned with the national flag, and various ceremonies and events are held to honor the courage and sacrifice of those who fought for independence of Bangladesh. February 21st, known as Martyrs' Day and International Mother Language Day, is a day of profound significance in Bangladesh. RRI commemorates the Language Movement of 1952, when students and activists sacrificed their lives to preserve the right to speak and write in their mother tongue, Bengali. On this day, RRI honor the martyrs of the movement by laying flowers at Shaheed Minars (martyrs' monuments) in a solemn and respectful manner. The day begins with the singing of the national anthem and the offering of prayers for those who lost their lives. Cultural programs, poetry recitations, and discussions are held to celebrate the richness of the Bengali language and culture.

Independence Day Discussion and Rally held at RRI

Martyrs' Day and International Mother Language Day Discussion and Procession held at RRI

Participants at Victory Day Discussion and Victory Day Rall

SPORTS AND CUTURAL ACTIVITES

Sports and cultural activities play a vital role in the holistic development of individuals and communities. They foster physical health, mental well-being, and social connections by encouraging teamwork, discipline, and perseverance. Participation in sports enhances physical fitness and teaches valuable life skills like leadership and resilience. Meanwhile, cultural activities nurture creativity, critical thinking, and an appreciation for diversity, helping individuals connect with their heritage and the broader world. Together, these activities contribute to a balanced, enriched life, promoting harmony, understanding, and a sense of belonging within society. During the fiscal year 2023-24 volleyball tournament and table tennis tournament have been held on occasion of victory day celebration. As part of the cultural activities a Pitha Utsab was celebrated in fiscal year 2023-24.

Champion Teams of volleyball and table tennis tournament

Different types of Pitha exhibited in the Pitha Utsab

KEEPING THE ENVIRONMENT CLEAN AND SUSTAINABLE

Keeping the environment clean and sustainable is crucial for the health and well-being of all living beings and the planet itself. A clean environment ensures that air, water, and soil remain free of harmful pollutants, which are essential for maintaining biodiversity and supporting ecosystems. Tree plantation plays a pivotal role in keeping the environment clean and sustainable. Trees act as natural air purifiers, absorbing carbon dioxide and releasing oxygen, which helps combat air pollution and reduces the effects of climate change. They also stabilize soil, prevent erosion, and maintain water cycles, ensuring the health of ecosystems. Additionally, trees provide habitats for countless species, supporting biodiversity and contributing to the balance of nature. RRI conducts regular cleaning program to keep the campus premises clean. All officers and staffs take part in the cleaning program. Every year RRI carry out tree plantation program to the campus green and environmentally friendly.

Tree Plantation Program

Cleaning Program

ANNEXURES

WHO'S WHO

RRI PERSONNELS

S M Abu Horayra
B.S.S (Hons), M.S.S. (Public Administration), University of Dhaka
MBA (HRM), Begum Rokeya University, Rangpur
Joint Secretary and Director General
E-mail: dg@rri.gov.bd
: horayra6823@yahoo.com
Cell Phone: 01334769601

Engr. Pintu Kanungoe
B.Sc. Engg. (Civil), BUET, M.Engg. (Hydraulic Engg.), IHE, Delft, The Netherlands; PGT in Nepal, The Netherlands, Myanmar and Indonesia; F-IEB.
Director Admin and Finance &
Director (In Charge), Hydraulic Research
E-mail: pintu_kanungoe@yahoo.com
Cell Phone: 01334769602

Engr. Kazi Rezaul Karim
B.Sc. Engg. (Civil), BUET, PGD Belgium
Director Geotechnical Research (on PRL)
E-mail: razu6511@yahoo.com

Physicist Uma Saha
B.Sc. (Hons), M.Sc. (Physics), JU, MBA (MIS), PU; PGT in The Netherlands, Malaysia & India; LM-BPS.
Director (In Charge), Geotechnical Research
Chief Scientific Officer
E-mail: umasaha_65@yahoo.com

Engr. A. K. M. Ashrafuzzaman
B.Sc. Engg. (Civil), BUET, M. Engg. (Water Resources), BUET; M. Sc. (Hydrology & Water Resources), IHE, Delft, The Netherlands; PGT in IIT, Roorkee, India, Trained in BPATC; F-IEB.
Chief Scientific Officer
E-mail: ashrafcebuet89@gmail.com

Engr. Md. Azizul Haque Podder
B.Sc .Engg. (Agril), BAU, M.Sc. (WRS), ITC, The Netherlands; F-IEB.
Chief Scientific Officer
E-mail: mdazizul66@yahoo.com
Cell Phone: 01334769605

Engr. Md. Matiar Rahman Mondol
B.Sc. Engg. (Civil), BUET, M.Sc. Engg. (Civil & Environmental Engg.), BUET, Trained in RPATC; F-IEB.
Principal Scientific Officer
E-mail: mrmondol68@gmail.com
Cell Phone: 01334769606

Dr. Engr. Md. Alauddin Hossain
B.Sc. Engg. (Agril), BAU, Mymensingh,
M. Engg. (WRM), UNESCO-IHE, Delft, The Netherlands; Ph.D. RU;
PGT in IRBM (China), Building Flood Disaster Resilience of cities (Nepal), River Delta Planning (Vietnam), PGD in Groundwater Governance (India &Nepal); Trained in e-govt. mgt. and ICT, PATC; GIS, DU and IWRM, CEGIS.
Life F-IEB, M-KIB, M-BSAE.
Principal Scientific Officer
E-mail: alauddin_1968@yahoo.co.uk, babulala68@gmail.com

Dr. Engr. Moniruzzaman Khan Eusufzai
B.Sc. Engg. (Agril), M.S (IWM), BAU, Mymensingh;
PhD (Environmental Science), Japan; Post doc (Climate Change), Japan;
Senior Postdoctoral Fellow (Eco-Environment), RCEES, CAS, China; F-IEB
Principal Scientific Officer
E-mail: mzk1973_82@hotmail.com
Cell Phone: 01334769608

Dr. Engr. Fatima Rukshana
B. Sc. Engg. (Agril), M.S (FPM), BAU; Mymensingh;
PhD (Soil and Environmental Sci.), LTU, Australia; PGT (GIS and Remote Sensing for Water Sector), UNESCO-IHE, The Netherlands; F-IEB, M-ASSI, M-IUSS.
Principal Scientific Officer
E-mail: frukshana11@gmail.com
Cell Phone: 01334769609

Engr. Gias Uddin Ahmed
B.Sc.Engg. (Agril), BAU, Mymensingh; Trained in BPATC.
Senior Scientific Officer
E-mail: mguahmed@rri.gov.bd
Cell Phone: 01332844800

Engr. Shailen Kumer Ghosh
B.Sc. Engg. (Mechanical) BIT, Dhaka; M-IEB, Trained in BPATC, RPATC, BIM
Senior Scientific Officer
E-mail: shailenghosh1967@gmail.com
Cell Phone: 01334769610

Engr. Md. Johurul Islam
B.Sc. Engg. (Civil), BUET, Trained in BUET, BPATC, RPATC, BIM; M-IEB.
Senior Scientific Officer
E-mail: johurul1999@yahoo.com
Cell Phone: 01334769611

Engr. Mohammad Mehedi Hasan (On Leave)
B.Sc. Engg. (Agril), BAU, Mymensingh;
M.Sc. (Env. Engg.), BUET; M. Sc. Engg. (WRE), KU Leuven, Belgium; M-IEB.
Senior Scientific Officer (On Leave)
E-mail: mhsn.rri.bd@gmail.com

Md. Dulal Bawali
B.Sc. (Hons), M.Sc. in Applied Physics Electronics and Communication Engineering, Islamic University, Kushtia.
Senior Scientific Officer
E-mail: dulal.bawali@gmail.com
Cell Phone: 01332844801

Engr. Md. Zubayerul Islam
B.Sc. Engg. (Agril), M.S in Farm Structure, BAU, Mymensingh; M. Engg. (Hydrology & Water Resources), Hohai University, China, M-IEB.
Senior Scientific Officer
E-mail: zubi_ageng@ yahoo.com
Cell Phone: 01332844802
: 01912400203

Engr. Md. Tofiquzzaman
B.Sc. Engg. (Civil), DUET, Gazipur.
Senior Scientific Officer
E-mail: tofiqrri@gmail.com
Cell Phone: 01332844803

Physicist Nayan Chandra Ghosh, M.Phil.
B.Sc. (Hon's), M.Sc. (Physics), Jagannath University; M.Phil (Physics), BUET;
PhD. (Physics) (Ongoing), BUET;
PGT (Oceanography), NOAMI; CCFGIS, DU; CCFRS, DU; CCPGIS, GeoSRF
Trained in Drones (UAV and USV) Operation, HS, Republic of Korea
Life Member- BPS, NOAMI; Member- BCA, Isabela Foundation.
Senior Scientific Officer
E-mail: ncghosh@rri.gov.bd
Cell Phone: 01332844804

Md. Moniruzzaman
B.Sc. (Hons), M.Sc. (Physics), RU, Rajshahi,
PGD (WRD), (Ongoing), IWFM, BUET.
CCFGIS, DU; CCFRS, DU; CCPGIS, GeoSRF
Senior Scientific Officer
E-mail: mmoniruzzaman@rri.gov.bd
Cell Phone: 01334769613
: 01722548389

Engr. Md. Shahabuddin
B.Sc. Engg. (Civil), DUET, Gazipur.
Senior Scientific Officer
E-mail: mshahabuddin@rri.gov.bd
Cell Phone: 01332844805

Engr. Abdullah Al Imran
B.Sc .Engg. (Civil), KUET, Khulna.
Senior Scientific Officer
E-mail: imran_0301086@yahoo.com
Cell Phone: 01332844806

Engr. Khondoker Rajib Ahmed
B.Sc. Engg. (Civil), BUET, Dhaka.
Senior Scientific Officer
E-mail: krahmed147@gmail.com
Cell Phone: 01332844807

Engr. Sajia Afrin
B.Sc. Engg. (Civil), CUET, Chittagong.
Senior Scientific Officer
E-mail: shithi_cecuet02@yahoo.com
Cell Phone: 01332844809

Engr. Omar Al Maimun
B.Sc .Engg. (Civil), DUET, Gazipur.
M. Engg. (Hydrology & Water Resources), Hohai University, China
Senior Scientific Officer
E-mail: maimunduet@gmail.com
Cell Phone: 01332844808

Md. Abul Ehsan Miah
B.S.S RU, Trained in Photography, BPI, Dhaka.
Deputy Director (AC)
&
Photographer/ PRO
E-mail: ehsanrubel68@gmail.com
Cell Phone: 01334769612

Engr. Taznin Naher
B.Sc. Engg (Agril), BAU, Mymensingh. M.Sc. (WRD), IWFM, BUET, Dhaka,
M. Sc. (Hydraulic Engineering and River Basin Development), IHE Delft Inst. for Water Education, The Netherlands
Scientific Officer
E-mail: tnaher.hrdrri@gmail.com

Engr. Emran Ali Mondal
B.Sc .Engg. (EEE), DUET, Gazipur
Scientific Officer
E-mail: emranhossainduet@gmail.com
Cell Phone: 01332844810

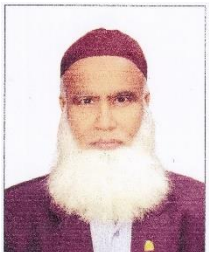
Engr. Bikash Roy
B.Sc .Engg. (ME), DUET, Gazipur
Scientific Officer
E-mail: bikashduet60gmail.com
Cell Phone: 01332844811

Engr. Sumiya Ferdhous
B.Sc. Engg. (EEE), CUET, Chittagong.
Scientific Officer
E-mail: sumiya_eee@yahoo.com

Md. Azmal Hossain Fakir
B.A (Hons), M.A (Geography); PGD in Library & Information Science, RU; PGT in New Delhi, India; Trained in RPATC.
Librarian
E-mail: azmal1966@gmail.com
Cell Phone: 01332844813

Md. Abu Zafar
M.A (NU), LLB, Trained in RPATC.
Assistant Director
E-mail: mazafar@rri.gov.bd
Cell Phone: 01334769614

Nasima Khatun
B.A, NU, Diploma in Computer Science; Trained in RPATC.
PS to DG
E-mail: nkhatun@rri.gov.bd
Cell Phone: 01334769615



Md. Jahangir Alam
B.Com, DU; Trained in RPATC.
Accounts Officer
E-mail: Jahangir_rri@yahoo.com
Cell Phone: 01334769616

Engr. Md. Masuduzzaman
B.Sc .Engg. (CSE), DUET, Gazipur
Assistant Programmer
E-mail: masud.rri23@gmail.com
Cell Phone: 01332844812

Tarik Jamil Tamim
B.Sc. (Hons) Agriculture, Patuakhali Science and Technology University
M. Sc. Agriculture Chemistry, Patuakhali Science and Technology University
Store Officer
E-mail: tjtamim03214@gmail.com
Cell Phone: 01334769617

Goswami Bilwa Mongal
Dip. in Civil Engg., Trained in RPATC & BIM
Sub-Assistant Engineer
E-mail: goswamibilwa@yahoo.com
Cell Phone: 01332844814

Note: Sequence of the officials in the list has been maintained in accordance with the official gazette of the Government of the People's Republic of Bangladesh published on February 9, 2020.

ABBREVIATIONS AND ELABORATIONS

A	AD	Assistant Director
	ADB	Asian Development Bank
	AFPM	Active Flood Plan Management
	A & F	Administration and Finance
	AIT	Asian Institute of Technology
	ASTM	American Society for Testing Materials
	ASO	Assistant Scientific Officer
B	B.A	Bachelor of Arts
	BAU	Bangladesh Agricultural University
	BARD	Bangladesh Academy for Rural Development
	BCA	Bangladesh Crystallographic Association
	BCL	Bangladesh Consultant Limited
	BCSIR	Bangladesh Council of Scientific and Industrial Research
	BIAM	Bangladesh Institute for Administrative Management
	BIM	BIM Bangladesh Institute of Management
	BIT	Bangladesh Institute of Technology
	BIWTA	Bangladesh Inland Water Transport Authority
	BIWTC	Bangladesh Inland Water Transport Corporation
	BoG	Board of Governors
	BPATC	Bangladesh Public Administration Training Centre
	BPI	Bangladesh Photographic Institute
	BPS	Bangladesh Physical Society
	BRRP	Buriganga River Restoration Project
	BUET	Bangladesh University of Engineering & Technology
	BWDB	Bangladesh Water Development Board
C	CBM	Concrete Block Mats
	CBR	California Bearing Ratio
	CC	Certificate Course
	CCFGIS	Certificate Course on Fundamentals on Geographic Information System
	CCFRS	Certificate Course on Fundamentals on Remote Sensing
	CCPGIS	Certificate Course on Professional Geographic Information System
	CERP	Coastal Embankment Rehabilitation Project
	CEGIS	Centre of Environmental and Geographic Information Services
	CPT	Cone Penetration Test
	CPU	Central Processing Unit
	CPTU	Central Procurement Training Unit
	CSO	Chief Scientific Officer
	CT	Concrete Technician
	CUET	Chittagong University of Engineering & Technology
	CWPRS	Central Water and Power Research Station
	CZEM	Coastal Zone Engineering and Management
D	DDC	Design Development Consultants Limited
	DC	Deputy Commissioner
	DD	Deputy Director
	DG	Director General
	DHI	Danish Hydraulic Institute
	DIFPP	Dhaka Integrated Flood Protection Project
	Dip.	Diploma
	DPP	Development Project Proforma
	D/S	Downstream
	DU	Dhaka University
E	EC	Electrical Conductivity
	EEE	Electrical & Electronics Engineering
	EGIS	Environmental and Geographic Information Service
	EGB	East Guide Bund

	EIA	Environmental Impact Assessment
	EMP	Environmental Management Plan
E	ESIA	Environmental impact statement
	ENGG.	Engineering
F	FAP	Flood Action Plan
	FCDI	Flood Control, Drainage & Irrigation
	F-IEB	Fellow of the Institution of Engineers, Bangladesh
	FM	Fineness Modulus
	FPM	Farm Power and Machinery
G	GBSP	Ganges Barrage Study Project
	GDP	Gross Development Profit
	GeoSRF	Geospatial Science & Research Foundation
	GHH	Ground Water Hydrology
	GIS	Geographic Information System
	GO	Government Order
	GoB	Government of Bangladesh
	GR	Geotechnical Research
	GRRP	Gorai River Restoration Project
	GWC	Ground Water Circle
H	Hons	Honours
	HP	Horse Power
	HR	Hydraulic Research
	HRL	Hydraulic Research Laboratory
	HS	Hojung Solutions
I	IAD	Integrated Agricultural Development
	IBAIS	International Business Administration and Information System
	ICDDRB	International Centre for Diarrheal Disease Research and Rehabilitation, Bangladesh
	IDCB	Institutional Development and Capacity Building
	IEB	Institution of Engineers, Bangladesh
	IHE	International Institute for Infrastructural, Hydraulic and Environmental Engineering
	IIT	Indian Institute of Technology
	IMED	Implementation, Monitoring and Evaluation Department
	IRD	Integrated Rural Development
	ITC	International Institute for Aerospace Survey and Earth Sciences
	IUSS	International Union of Soil Science
	IWFM	Institute of Water and Flood Modelling
	IWM	Institute of Water Modelling
	IWRM	Integrated Water Resources Management
J	JOCL	Japan Overseas Consultants Limited.
	JU	Jahangirnagar University
	JnU	Jagannath University
K	KUET	Khulna University of Engineering & Technology
	KUL	Katholic University of Leuven
	KVA	Kilo Volt Ampere
L	LA	Laboratory Attendant
	LAB	Laboratory
	LGB	Left Guide Bund
	LHI	Lanka Hydraulic Institute
	LLB	Bachelor of Law
	LM	Life Member
	LOI	Letter of Intent
	LT	Laboratory Technician
	LTU	La Trobe University
M	M.A	Master of Arts
	M-ASCE	Member of American Society of Civil Engineer
	M-BAAS	Member of Bangladesh Association for Advancement of Science

	MBA	Master of Business Administration
	M-BCS	Member of Bangladesh Computer Society
	M-BES	Member of Bangladesh Environmental Society
M	MC	Main Consultant/Moisture Content
	M-IEB	Member of the Institution of Engineers, Bangladesh
	MIS	Management Information System
	M-JSCE	Member of Japan Society of Civil Engineers
	MLSS	Member of the Lower Class Subordinate
	M-NOAMI	Member of National Oceanographic and Maritime Institute
	MoU	Memorandum of Understanding
	MoWR	Ministry of Water Resources
	MP	Member of the Parliament
	MPA	Mongla Port Authority
	MS	Mild Steel
	M.S/M.Sc.	Master of Science
	M. Phil.	Master of Philosophy
N	NHC	North Hydraulic Consultants Limited
	NMC	Natural Moisture Content
	NU	National University
	NAHRIM	National Hydraulic Research Institute Malaysia
	NHC	North Hydraulic Consultants Limited
	NOAMI	National Oceanographic and Maritime Institute
O	O & M	Operation & Maintenance
	OTM	Open Tendering Method
P	PABX	Public Automatic Branch Exchange
	PATC	Public Administration Training Centre
	PC	Personal Computer
	PD	Project Director
	PGD	Post Graduate Diploma
	PGT	Post Graduate Training
	PhD	Doctor of Philosophy
	PLOI	Provisional Letter of Intent
	PPM	Parts per Million
	PS	Private Secretary
	PSO	Principal Scientific Officer
	PU	Prime University
	PWD	Public Works Department
R	RAC	Regional Accounts Centre
	RDPP	Revised Development Project Proforma
	REBRFM	Research on the Effect of Bandalling on River Flow and Morphology
	RFQ	Request for Quotation
	RGB	Right Guide Bund
	RHD	Roads & Highways Department
	RPATC	Regional Public Administration Training Centre
	RRI	River Research Institute
	RS	Remote Sensing
	RTW	River Training Work
	RU	Rajshahi University
	RUET	Rajshahi University of Engineering & Technology
S	SAE	Sub-Assistant Engineer
	SICT	Support to Information and Communication Technology
	SMEC	Snowy Mountain Engineering Corporation
	SO	Scientific Officer
	SRNDP	Southwest Road Network Development Project
	SSD	Submerged Soil Density
	SSO	Senior Scientific Officer
	SSFCDI	Small Scale Flood Control, Drainage & Irrigation

	ST	Soil Technician
	SWH	Surface Water Hydrology
	SWMC	Surface Water Modelling Centre
T	TDS	Total Dissolved Solids
	ToR	Terms of Reference
	TU	Technical University
U	UAV	Unmanned Aerial Vehicle
	UGC	University Grant Commission
	UK	United Kingdom
	UNESCO	United Nations Educational, Scientific and Cultural Organization
	UPM	University Putra Malaysia
	U/S	Upstream
	USA	United States of America
	USV	Unmanned Surface Vehicle
	UTM	Universal Testing Machine
W	WR	Water Resources
	WRD	Water Resources Development
	WRDP	Water Resources Development Project
	WRE	Water Resources Engineering
	WRM	Water Resources Management
	WRS	Water Resources Survey

River Research Institute

ANNUAL REPORT 2023-24

River Research Institute
Faridpur-7800
Bangladesh
Telephone: 880248803007