

RRI Newsletter

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NEWLY APPOINTED ADVISOR OF MINISTRY OF WATER RESOURCES

Syeda Rizwana Hasan has been appointed as an Honorable Advisor of the Ministry of Water Resources (MoWR). Syeda Rizwana Hasan is a Bangladeshi lawyer and environmentalist. As an environmentalist, her work is focused on regulations for the shipbreaking industry in Bangladesh. She was awarded the Goldman Environmental Prize in 2009 and Ramon Magsaysay Award in 2012 for her uncompromising courage and impassioned leadership in a campaign of judicial activism in Bangladesh that affirms the people's right to a good environment as nothing less than their right to dignity and life. On August 5, 2024, the autocratic and dictatorial Bangladesh Awami League government fell down in the face of the mass uprising of the students and on August 8, 2024, the interim government was formed under the leadership of Nobel laureate Prof. Dr. Mohammad Yunus. Accordingly, Syeda Rizwana Hasan has been appointed as honorable advisor of the MoWR. River Research Institute (RRI) is working under MoWR as the only statutory govt. research organization that is responsible for sustainable water resources development and management studies & researches. As per RRI act, Minister/Advisor of the MoWR is the chairman of the RRI Board of Governance (BoG) and Director General, RRI is the member secretary of the RRI, BoG. The Honorable Advisor was warmly greeted by the DG, RRI, S M Abu Horayra along with the MoWR management. The RRI family welcome her cordially.



Syeda Rizwana Hasan
Honorable Advisor
Ministry of Water Resources

BANGLADESH IS CURRENTLY RANKED AS THE MOST CLIMATE VULNERABLE COUNTRY IN THE WORLD: PERSPECTIVE BWDB AND RRI

-Dr. Engr. Md. Alauddin Hossain, PSO, RRI and S M Abu Horayra, DG, RRI



Bangladesh is the most disaster vulnerable country due to its geographical situation. The Location of the country is Bay of Bengal in the southern part, in the northern side of the Mountain Himalaya. According to the projection of the Inter-Governmental Panel on Climate Change (IPCC), both the frequency and intensity of cyclones in the Bay of Bengal are likely to increase and the depth and spatial extent of flooding in the Ganges, Jamuna-Brahmaputra Meghna Basin are

likely to alter because of climate change. This has significant implications across all sectors (such as agriculture, housing, transport, livestock) and consequently on economic development and poverty. Additionally, the likely consequences of sea level rise can cause economic losses of an unprecedented magnitude in low lying Bangladesh.,



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Physical Modelling Study in connection with Updating the Feasibility Study of Surface Water Treatment Plant for Rajshahi WASA

Brief Description of the Study: RRI was commissioned to conduct a Physical Model study of Intake for the Rajshahi WASA Surface Water Treatment Plant Project and at the end of the study RRI submitted to the Hunan Construction Engineering Group Co. Ltd. The overall objective of the physical model study was to assess the hydro-morphological impact of the proposed intake structure and associated works including river training works and to come up with optimum design of the intake structure to ensure favorable flow conditions at the inlet to the pump through appropriate piping design. This study employed two distinct models: a comprehensive, distorted overall sand bed morphological model of the study reach and a detailed, undistorted fixed bed intake model.



Figure: A view of the of the intake structure as reproduced in the model and flow condition at and around the proposed intake structure for bank full discharge in test T2 condition.

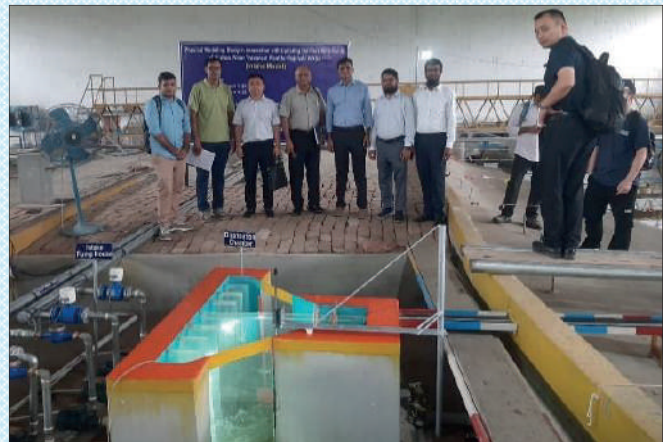


Figure: The RWASA-BUET-SMEC-HCEG team visited the Physical Model site at RRI on August 8, 2024.

Key Output of the Study:

- Godagari is a suitable place for the intake structure of the RWASA Surface Water Treatment Plant.
- The thalweg is around 400 m 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.

The maximum scour level near the intake structure is found to be -3.54 mPWD for 100-year discharge. It is to be noted here that this model reproduces local scour qualitatively because of the presence of scale effect in reproduction of local scour.

FUTURE COLLABORATION ATTEMPT

An exchange meeting with Mr. Md. Rezaul Maksud Jahedi, Director General of the Water Resources Planning Organization (WARPO) and Honourable member of the Governing Board of RRI, and Mr. Md. Akhtaruzzaman, Director General of the Department of Bangladesh Haor and Wetland Development was held on 2nd July of 2024. Both of them were welcomed by the Director General of RRI. Officers and employees of River Research Institute expressed their gratitude to both Director General and requested to work in collaboration in the future for the betterment of the respective organization and the country.



An exchange meeting held at RRI conference room with DG, WARPO and DG, DBHWD

Instrument: Auto controlled Menard Pressure Meter

-Engr Md. Zubayerul Islam, Senior Scientific Officer



River Research Institute (RRI) currently uses a state-of-the-art instrument in the Geotechnical Research Directorate purchased during the Institutional Development and Capacity Building (IDCB-Phase II) project. The name of the instrument is Auto controlled Menard Pressure Meter (ACMPM). Menard pressure meter performs in situ-controlled load-deformation test by applying pressure to the sidewalls of a borehole using a radially expanded probe. From the test readings (volume variation based on controlled pressure), a stress-strain curve can be obtained.

The Auto-Controlled Ménard Pressure Meter (ACMPM) is an advanced tool that operates automatically, managing the entire testing process, including calibration, pressure application, and deflation. Its unique water circuit ensures precise pressure regulation, crucial for obtaining reliable data on soil properties. The system collects and stores data during tests, enabling thorough analysis with specialized software. As a key tool in geotechnical engineering, it aids in the design of foundations and other structures by providing essential data on soil strength and stability. The ACMPM enhances the efficiency and accuracy of soil testing, making it indispensable in engineering and construction sectors.



FAREWELL CEREMONY

Mrs. Uma Saha, Director (In charge) of Geotechnical Research Directorate of the River Research Institute was given a farewell by RRI with a grand ceremony on 05th September 2024. In her career life, Mrs. Saha joined the RRI in 1990 as a Scientific Officer. She completed her B.Sc. (Hons) and M.Sc. (Physics) from Jahangirnagar University in 1986 & 1987 respectively. She has also completed MBA in Management Information System from Prime University, Dhaka in 2009. She took participation on PGT program in The Netherlands, Malaysia and India. Her area of interest in research was Soil mechanics and Soil physics. Mrs. Saha was a very honest, sincere and dedicated researcher of RRI and contributed a lot in RRI. After a very successful career, her post retirement leave (PRL) started from 07th September 2024. The RRI family wish her good health, good time and all the success in the future.



JOINING AS A NEW DIRECTOR



Engr. Md. Azizul Hoque Podder, Chief Scientific Officer has been assigned as a Director (Additional charge), Geotechnical Research Directorate of RRI on 07th September 2024. In his career life, he joined RRI in 1993 as a Scientific Officer. He completed his B.Sc. Agril. Engg. (Irrigation and water management) from Bangladesh Agricultural University, Mymensingh and M.Sc. (Watershed Management and Conservation) from Twenty University under the faculty of Geo-Information Science and Earth Observation (ITC), The Netherlands. He took participation on PGT program in different countries and visited Spain, Kenya, UK, Germany, Belgium, France, and China. His area of interest in research is Hydrology and River Morphology. He has many publications in National and International journals.

WE DEEPLY MOURN

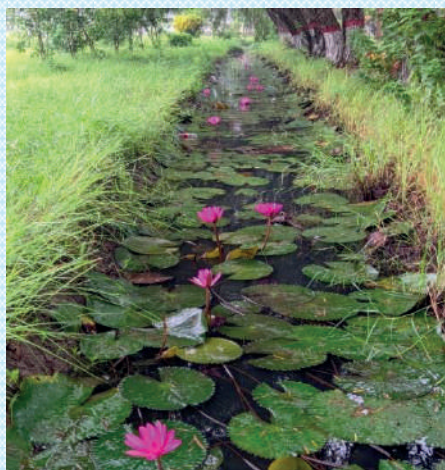


With deepest sorrow, sharing with you all that Mr. Md. Abdul Jabbar, Gardener of RRI, has passed away (Inna lillahi wa inna ilaihi rajeun) on 03 August 2024 at around 12.00 PM due to heart disease. He was a very honest, sincere and dedicated staff of RRI and contributed a lot in RRI. He was only 58. He left behind his beloved wife, two sons and two daughters. His funeral was arranged at his hometown Patuakhali Sadar, Patuakhali. All the members of RRI are heartbroken at the sad demise of Md. Abdul Jabbar. RRI family is extremely grieving for his immature and sudden departure. Our heartiest condolences and sincere sympathy to the bereaved family members on this difficult time. RRI's thoughts and prayers are forever for his work and active contribution. May his soul rest in eternal peace and may Allah grant him a place in paradise.

ATTENDING TRAINING PROGRAM

RRI Officials participated in different training programs in different organisation during July to September 2024 for Human Resources Development.

Officer Name	Designation	Training/Course name	Duration	Organiser Entity
S M Abu Horayra	Director General (Joint Secretary)	113th Senior Staff Course (SSC)	14 th July to 27 th August, 2024	Bangladesh Public Administration Training Center (BPATC)
Tarik Jamil Tamim	Store Officer	Procurement Management Course	14 th to 25 th July, 2024	Regional Public Administration Training Center (RPATC)
Nasima Khatun	Personal Secretary to Director General	Workshop on Election Manifesto 2024	18 th July, 2024	Regional Public Administration Training Center (RPATC)
Md. Abul Ehsan Mian	Deputy Director (Additional Charge)	Workshop on Right to Information	22 nd August, 2024	Regional Public Administration Training Center (RPATC)
Md. Dulal Bawali	Senior Scientific Officer	Environmental Modelling and ESIA	25 th to 31 st August, 2024	Institute of Water Modelling (IWM)
Engr. Md. Zubayerul Islam				
Engr. Khondokar Razib Ahmed	Senior Scientific Officer	Financial Management Course	01 st to 12 th September 2024	Regional Public Administration Training Center (RPATC)



Beauty of Nature in RRI campus (left) and guitar shape rain water reservoir (right).

PROFESSIONAL VISITS

A group of high officials including Director General of Rural Development Academy (RDA), Bogura visited River Research Institute (RRI), Faridpur campus on 17 August 2024. Mr. Md. Abdul Malek, Director General (Additional Secretary) with his wife, Md. Ferdous Hossain Khan, Director (Training Division) and Md. Delwar Hossain, Joint Director (Farm Technology, Irrigation and Water Management), RDA were warm welcomed by Director (Geotechnical Research Directorate), Chief Scientific Officer and other officials of River Research Institute.



Mr. Md. Abdul Malek, DG, RDA, Bogura visited RRI and welcomed by RRI officials.



Mrs. Uma Saha, Director, GRD is welcoming Mrs. Abdul Malek, wife of DG, RDA, Bogura.

VISITORS AT RRI FROM IWM OFFICIALS AND IUT STUDENTS



DG, RRI welcoming IWM Officials during visit.



Giving a visual representation of RRI's activity to IWM officials and IUT students



Mr. Md. Moniruzzaman, SSO, describing GR Laboratory's facility to the visitors.



IWM officials and IUT students visited RRI's physical modelling facility in open air model.

BANGLADESH IS CURRENTLY RANKED

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Bangladesh has been treated as most vulnerable country of the world. Due to climate change number of disaster (multiple hazards like floods, cyclones, droughts, salinity, waterlogging, river and coastal erosion, sedimentation, hailstorms, tornados, tidal surge, earthquake, landslides, tsunami and fire) and its devastation is increasing rapidly. In the world risk report Bangladesh is the 5th vulnerable country within the 173 countries of the world. According to the statistics of the Centre for research on the epidemiology of disaster nearly 70 million people have been affected in different types of disaster from 2000-2010 and the economy near about US\$ 5.8 billion. Last two decades near about 1.8% of national GDP have been lost due to disaster. To reduce the risk of disaster, Climate change adaptation in Agriculture, Water and Livestock sectors are very important.

Besides, the country remains as one of the worst sufferers of cyclone casualties in the world. Riverbank erosion causes the loss of productive land areas annually. Other than regular flooding which has traditionally been beneficial in Bangladesh, low frequency but high magnitude floods have devastating impacts on livelihoods and the economy. Droughts are also common occurrences resulting in less or no yield of crops. Because of the high vulnerability and occurrences of the worst sufferings, Bangladesh is currently ranked as the most climate vulnerable country in the world.

Devastating effects of floods, drought, riverbank erosion and sedimentation must be controlled for rapid development of the country. Water resources should be utilized properly to increase food production and generation of hydroelectricity. Crops as well as crops

land must be protected from saline water inundation and riverbank erosion respectively. For overcoming this prevailing situation, the rivers need to be trained and dredged to increase their hydraulic efficacy and to protect riverbank from erosion. Irrigation, drainage and communication systems should be developed by constructing hydraulic structures to increase food production & healthy economy and rivers need to be restored to develop biodiversity of natural environment. Bangladesh Water Development Board (BWDB) is responsible organization for implementing such type of water resources development projects and RRI is responsible for providing planning & design support of hydraulic structures to the planners and designers through the research, investigations and studies by means of both Physical and Mathematical Model study to make the project sustainable and cost effective.

It is needed to mention here that due to climate change for the development of flood management and drainage system scheme or project in future; the structures such as embankment, polder and other water resources management structure's (Hydraulic structures such as Groyne, Spur, Barrage, Dam, sluice gate, Revetment, River training works etc.) repairing, re-construction, design modification or change as per needed and the activities of river excavation or dredging etc. through feasibility study are included in Bangladesh Delta Plan 2100, which is directly related with Bangladesh Water Development Board (BWDB) and River Research Institute (RRI) activities. So, BWDB and other concerned organizations should take necessary and proper steps before launching a scheme or project in the field.

MAGNETIC NANOTECHNOLOGY

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Despite its potential, magnetic nanotechnology for water treatment faces several challenges. The large-scale production and stabilization of MNPs can be complex and costly. There are also concerns about the potential release and toxicity of nanoparticles in the environment, necessitating further research on their long-term effects. Future research directions include the development of more efficient and sustainable synthesis

methods for MNPs, the exploration of new functionalization techniques to target emerging contaminants, and the integration of magnetic nanotechnology with other water treatment technologies to enhance overall performance. As research and development continue, magnetic nanotechnology has the potential to revolutionize water treatment processes and ensure access to clean and safe water for all.

MAGNETIC NANOTECHNOLOGY FOR WATER TREATMENT



Water scarcity and pollution are two pressing issues facing the world today. As the population increases and industrial activities expand, the demand for clean water rises while the quality of available water resources declines. Traditional water treatment methods, such as chemical coagulation, filtration, and biological processes, are often insufficient, expensive, or environmentally detrimental. In response to these challenges, magnetic nanotechnology has emerged as a promising and innovative solution for water treatment. Magnetic nanotechnology involves the use of magnetic nanoparticles (MNPs) to remove contaminants from water. These nanoparticles typically range from 1 to 100 nanometers in size and exhibit unique magnetic properties due to their small size and large surface area. Common materials used for MNPs include iron oxide, which is biocompatible, non-toxic, and highly magnetic.

The fundamental mechanism behind magnetic nanotechnology in water treatment is the adsorption of contaminants onto the surface of MNPs, followed by magnetic separation. MNPs can be engineered to target specific pollutants, such as heavy metals, organic compounds, and microorganisms. Once the contaminants are adsorbed onto the nanoparticles, an external magnetic field is applied to separate the MNPs from the water, effectively removing the pollutants. This process is efficient, rapid, and can be conducted at ambient temperatures and pressures.

-Nayan Chandra Ghosh, MPhil, Senior Scientific Officer

Heavy metals, such as chromium, lead, cadmium, mercury, etc. pose significant health risks when present in drinking water. MNPs functionalized with specific ligands or coatings can selectively adsorb heavy metals from contaminated water. Organic pollutants, including pesticides, pharmaceuticals, and dyes, are persistent in the environment and difficult to remove using conventional methods. Using MNPs functionalized with organic compounds that can interact with and adsorb these organic pollutants. MNPs with antimicrobial properties or functionalized with biocidal agents can effectively reduce microbial contamination. MNPs can also be used to clean up oil spills from water.

MNPs can be engineered to have high selectivity and affinity for specific contaminants, resulting in efficient removal even at low concentrations. The use of an external magnetic field allows for quick and straightforward separation of MNPs and bound contaminants from water, reducing the time and energy required for treatment. MNPs can often be regenerated and reused multiple times without significant loss of efficiency, making the process cost-effective in the long term. Magnetic nanotechnology can be designed to minimize environmental impact. For example, biocompatible and non-toxic materials such as iron oxide are commonly used, and the process can be conducted under mild conditions. Magnetic nanotechnology can be applied to various scales, from small-scale portable water purification systems to large-scale industrial wastewater treatment plants. Its versatility allows for the treatment of diverse types of contaminants and water sources.

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