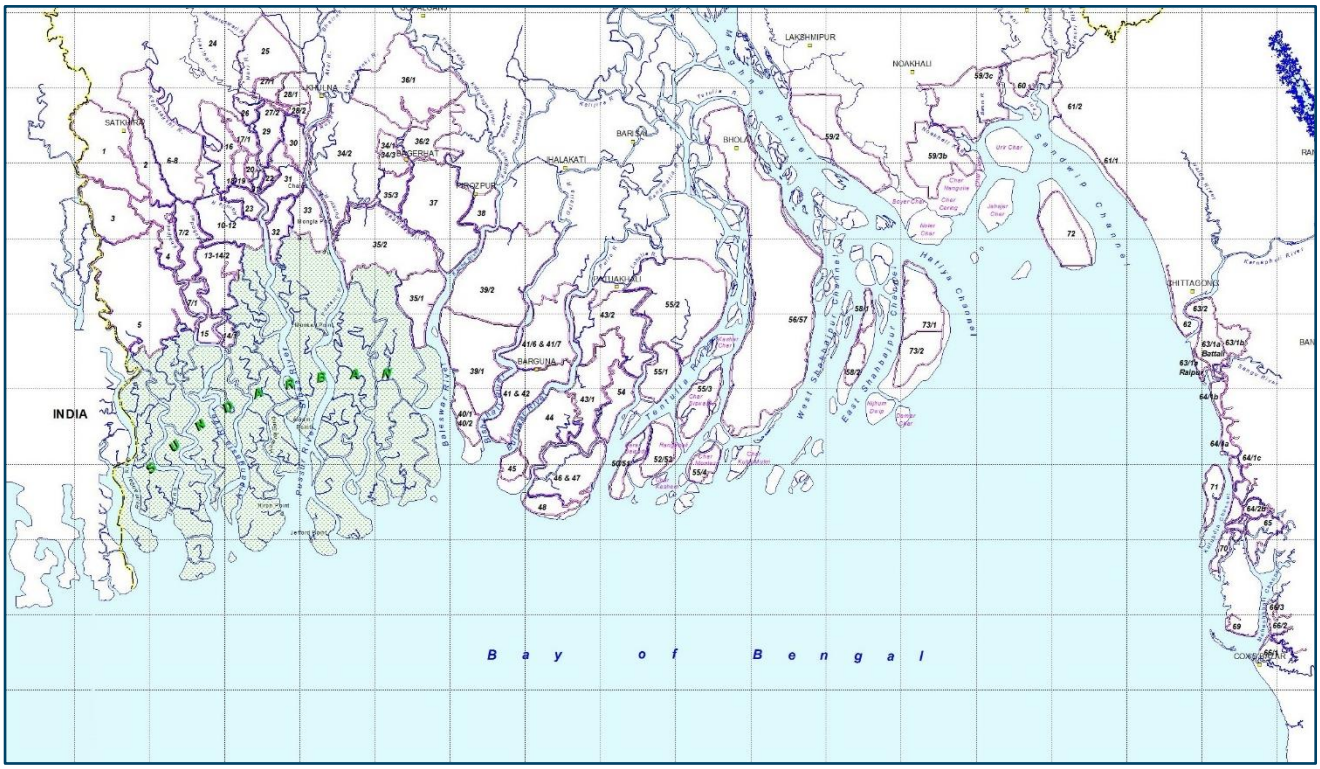
Ministry of Water Resources

Bangladesh Water Development Board

Coastal Embankment Improvement Project, Phase-I (CEIP-I)

Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone (Sustainable Polders Adapted to Coastal Dynamics)



Action Plan for Capacity Building

March 2020

Ministry of Water Resources

Bangladesh Water Development Board

Coastal Embankment Improvement Project, Phase-I (CEIP-I)

Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone (Sustainable Polders Adapted to Coastal Dynamics)

Action Plan for Capacity Building

March 2020

Contents

ACRONYMS AND ABBREVIATIONS

BWDB	Bangladesh Water Development Board
CGPA	Cumulative Grade Point Average
CEIP	Coastal Embankment Improvement Project
DG	Director General
FM-	Flexible Mesh
HD-	Hydrodynamic
IHE	Institute for Water Education
IWM-	Institute of Water Modelling
IWRM	Integrated Water Resources Management
LSU	Louisiana State University
MT	Mud Transport
PD	Project Director
ST	Sediment Transport
TRM	Tidal River Management

1 INTRODUCTION

1.1 Background

The objective of the Capacity Building component of the project is to build the capacity of the BWDB and related agencies/institute responsible for designing and managing the built as well as the natural environment in coastal zone of Bangladesh and strengthen the university level curriculum in water resources/coastal engineering and management.

This objective will be achieved through the following activities.

1) **On the job training:** This programme is currently on-going wherever the national staff is working closely with the international staff. There has been close collaboration between national consultants and their international mentors, and much progress has been made and some reports are being prepared on setting up, calibration and validation of several models on several model scales. The only drawback is that a large enough number of BWDB staff are not available to spend sufficient time on the job to benefit meaningfully from the interaction. However, there has been a more regular participation of BWDB staff in the project office.

   We intend to make proposals for the intensive involvement of a small number of (younger) BWDB engineers who will participate (if possible full time and embedded for periods up to three months) within the modelling teams comprising both international and national experts going through some formal training and learning to run models developed by the project, and run several model applications and then learn all the steps of developing a new models setup.

2) **Local lectures and training courses** conducted by project resource persons in Bangladesh: Lectures will be conducted at the project office in Banani or at the CEIP office while training courses of 1 to 2 days duration at the IWM training room. The training courses will be with formal course materials being distributed. No additional budget will be needed. A list if short courses is described in section 4. Facilities at the IWM training room would be utilised.

3) **MSc Courses at IHE:** The contract provides a budget for overseas training of BWDB staff at IHE Delft, the Netherlands. Following discussions and agreement between PD, Mr. Habibur Rahman, and Prof Dano Roelvink a selection process was undertaken during June 2019 and 3 candidates were selected amongst 17 applicants. The three students from BWDB commenced their studies under the MSc in Water science and engineering (specialisation in coastal engineering and port development), at IHE Delft in October 2019. The programme is supposed to end on April 2021.

4) **Overseas training on short courses**: The following short courses are planned:

   4.1 Study tour for senior to mid-level staff to Netherlands and to Denmark (two weeks)

   4.2 Short Courses for 4-6 persons each for two weeks duration in IHE

   4.3 Visit to US Universities

In the current situation (end March 2020), the Corona pandemic has caused numerous travel bans throughout the world and nobody knows when this will end. It is almost needless to stress that the proposed timing of the various activities may have to be revisited.

1.2 This report

This report is structured in the following way:

- Section 2 deals with on-the-job training
- Section 3 describes the in-country more formal training activities such as lectures and training courses
- Subsequently, the overseas training activities are presented
- Section 5 gives the anticipated schedule for the activities,
- The last section is conclusions and recommendations.

2 On-the-job training

2.1 General

The key element in almost any capacity development programme in TA projects is "**on-the-job training**". The active participation of national staff throughout the entire project implementation, through learning by doing together with the Consultant's international staff will ensure integrated capacity building and efficient embedding of new knowledge and capabilities. In particular, the on-the-job training should be planned in such a way that new skills will be taken up immediately after each training, so the national staff get a chance to apply and strengthen their newly acquired skills under guidance.

In this project there are ample opportunities for engagement of national staff in connection with for instance field work, simulation model development, calibration, sensitivity analysis and scenario simulation activities as well as investment planning etc. through active participation and discussion. Compared to traditional formal training, the "on-job-training" has the advantage of guidance and feedback while being productive and further the project and allows the training to be tailored specifically to suit the needs of the national staff. At the same time, the project team includes world leading academics in their respective fields and specialist from the leading water consulting companies in the world hence the opportunity for on-job-training is unique in this project and is fully used by the national staff.

The only drawback is that a large enough number of BWDB staff have not yet been available to spend sufficient time on the job to benefit meaningfully from the on-the-job training. This makes it very important to supplement the on-the-job training by a range of more traditional formal training courses, covering topics based on the needs of BWDB. The focus on these more traditional formal training courses will be to provide BWDB staff with an appreciation of what can be achieved through the various (modelling) activities under the project. These training activities are described in Section 3. This training, however, will not assure that BWDB staff will be able to operate and further develop the models developed under the project. This will require participation in on-the-job training.

3 Local lectures and training courses

Without BWDB staff continuously involved in project activities and on-the-job training at the project office, more traditional training activities are conducted in order to provide BWDB staff with a basic understanding and appreciation of opportunities and limitation of the analyses and outcomes of the various disciplines of the project. Local training courses conducted by project resource persons in Bangladesh will be the way to achieve this. We have already conducted some lectures and are planning to conduct more lectures and a range of formal training courses. The duration will vary from courses of few days down to lectures and seminars of a few hours. Lectures will mainly be held at the project office or at the CEIP office while the training courses will be conducted in the IWM training room.

Short lectures and seminars of a few hours' duration will be conducted as outlined in Table 3.1. The lectures will be tailored to specific needs and issues relevant for project/ coastal zone of Bangladesh.

The regular progress meetings which are being held when the international staff is at the project office also greatly contribute to knowledge sharing and training of staff.

Table 3.1 List of Lecture Topics

Name Expert	Topic for Lecture or Seminar	Status
Prof. Zheng Bing Wang	Long-term morphodynamic modelling for tidal regions	√
Dr. Bas van Maren	Impact of human interventions on estuarine fine sediment dynamics	
Mr. Reinier Schrijvershof	Morphological modelling in D-Flow FM	√
Mr. Mark de Bel	Economic and Financial Cost-Benefit Analysis	
Dr Mick van der Wegen	Estuarine morphodynamics under sea level rise: do we drown or not?	
Dr Alessio Giardino	Multi-hazard risk assessment in view of climate change	
Prof Dano Roelvink	Approaches to modelling coastal evolution in the context of global change	√
Dr Ferdinand Diermanse	Flood risk analysis in a changing climate (possibly to combine with lecture of Dr Alessio Giardino)	
Dr Soren Tjerry	Modelling of Bank Erosion	
Dr Steven Goodbred	Field Observations of Tidal Mass Transport and Channel Behaviour on the Lower Bengal Delta & Holocene Evolution of the Bengal Delta - Lessons for the Modern	
Dr Michael Steckler	Tectonics and Earthquake Hazard in Bangladesh	
Dr Irina Overeem	Hydrotrend: Empirical Basin Model for Future Water & Sediment Fluxes (Half day Seminar)	
Dr Bo Brahtz Christensen	Impact of Waves on Sediment Transport	
Dr Kim Wium Olesen	Modelling Bed Topography in River Bends	

3.1 Formal Training Courses

We intend to make proposals for the intensive involvement of a small number of (younger) BWDB engineers who will participate (if possible full time and embedded for periods up to three months) within the modelling teams comprising both international and national experts. We will conduct formal training course aimed at developing modelling skills for these BWDB engineers. These courses will not make the staff expert modellers but will provide the participants a good understanding and appreciation of opportunities and limitation of modelling. This will support the appreciation of the outcome of this project and its implication for a sustainable management of the coastal zone. The modelling training courses in combination with on-the-job training could bring these BWDB engineers up to a level where they can apply some of the developed models also beyond this project.

These courses below are proposed and can be conducted by the staff already assigned to the project. For all courses comprehensive training material is readily available.

2D Hydrodynamic modelling using flexible mesh

This two-day, hands-on course will teach you the fundamentals of 2D hydrodynamic modelling (HD) and give you an introduction on how to set up a hydrodynamic model using the MIKE 21 Flow Model HD FM model using flexible mesh bathymetry. The hydrodynamic module of MIKE 21 Flow Model HD FM provides the basis for computations of processes performed in many other modules such as sediment and mud transport, transport of heat and suspended matter, oil spill, agent-based modelling and ecology but can also be used as a stand-alone application. The module simulates unsteady flow taking into account bathymetry, sources and external forcing. Typical application areas of MIKE 21 Flow Model HD FM include assessment of hydrographical conditions in nonstratified waters, coastal flooding and storm surge, inland flooding and overland flow, forecast and warning systems.

COURSE TOPICS

- Selection of geographical coordinate system, bathymetry digitisation (mesh)
- Data organisation, import, editing and quality control
- Fundamentals of 2D flow modelling • Setting up simple hydrodynamic models
- Managing boundary conditions
- Calibration and validation procedures
- Using the utility software of MIKE 21/3 Flow Models
- Analyses of model input and output
- Interpretation of results and visualisation, including video animation
- Hands-on exercises
- Discussions of applications from the coastal zone of Bangladesh

Coastal Flooding – analysis and management

In this two-day, thematic course we teach you how to develop coastal flood risk assessments and maps. The course focusses on the estimation of extreme marine events, as well as introduction to the practical application of flood management tools. The effect of climate change on coastal floods is also discussed. Modelling tools are introduced through examples and project cases. The course contains presentations and discussions, but hands-on exercises are not included.

Populations increase on the coasts all over the world, putting in danger a growing number of people facing the coastal flooding risk. Climate change further increases this risk.

Coastal flood risk assessment is vital for decision makers in order to monitor urbanisation and to minimise the costs related to extreme flooding. This assessment requires integrated analysis of extreme sea conditions, overtopping, assessment of flow through breaches and over dikes, as well flood hazard mapping.

COURSE TOPICS

- Overview of tools for coastal floods analysis
- What to request and expect from a model
- Assessment of extreme marine events: - Definition of statistical water levels and wave heights from coastal models - Use of joint probabilities
- How to set up a flood model
- Definition of boundary conditions: overtopping, overflows, flow through breaches
- Mapping flood risks, values and economic costs related to flooding
- Methods to evaluate the effectiveness of proposed adaptation measures
- Examples of coastal flooding modelling from Bangladesh

Sand transport modelling using flexible mesh

This two-day, hands-on course will teach you the fundamentals of sand transport modelling for both pure currents and a combined waves and current regime. You will learn how to set up a sand transport model and simulate the sand transport and morphological changes using a coupled setup with flow and wave models. We shall also discuss when to apply a 3D approach. The sand transport module in MIKE 21 Flow Model HD FM calculates the sediment transport capacity, the initial rates of bed level changes and the morphological changes for non-cohesive sediment (sand) due to currents or combined currents/waves.

Typical applications include the ability to predict sediment transport and resulting morphological changes along coasts and in estuaries. This will support the investigation and optimisation of coastal and estuarine infrastructure projects.

COURSE TOPICS

- Fundamentals of sand transport modelling
- Application of MIKE 21 ST FM
- Setting up wave and flow conditions

- Specifying sand properties
- Generating sand transport tables
- Calculating sediment transport
- Decoupling, dynamic coupling and morphological changes
- Factors for when to apply a 3D approach
- Overview of MIKE 21 Flow Model HD module and MIKE 21 spectral wave module
- Using the utility software of MIKE 21 Flow Models
- Hands-on exercises
- Examples from Bangladesh

Sediment transport using sand and mud (2D) modelling

This one-day, hands-on course will teach you the fundamentals of sand transport modeling and mud transport modelling for both pure currents and a combined waves and current regime. You will learn how to set up a sand/mud transport model and simulate the sand/mud transport and morphological changes using a coupled setup with flow and wave models. The ST module in MIKE 21 Flow Model HD FM calculates the sediment transport capacity, the initial rates of bed level changes and the morphological changes for non-cohesive sediment (sand) due to currents or combined currents/waves. The MT module calculates the erosion, transport, settling and deposition of cohesive sediment. Mechanisms such as flocculation and resuspension are also accounted for.

Typical applications include the ability to predict sediment transport and resulting morphological changes together with suspended sediment concentration along coasts and in estuaries. This will support the investigation and optimisation of coastal and estuarine infrastructure projects.

COURSE TOPICS

- Fundamentals of sand and mud transport modelling
- Applications of MIKE 21 ST FM and MIKE 21 MT FM
- Specifying sediment/particle properties
- Generating sand transport tables
- Calculating sediment transport
- Factors for when to apply a 3D approach
- Hands-on exercises
- Discussion and demonstration of TRM (Tidal River Management) application

4 Overseas Training Activities

4.1 Introduction

The capacity building programme includes overseas training activities such as MSc courses at IHE, Delft, the Netherlands, short courses also at IHE and at Lamont, USA as well as a study tour for senior to mid-level BWDB staff to the Netherlands and to Denmark with the purpose of sharing Experiences of the BWDB Engineers and policy makers with similar organisations in Europe.

Conducting the activities overseas has several advantages. For instance, the trainees are completely relieved from their daily obligations and can devote their attention 100% to the training and the trainees will be exposed to new ways of doing things, can take in a new working culture, etc.

The overseas training activities are described in the following.

4.2 MSc Courses at IHE

The contract provides, under Item No. R-9, for 300 kEuro for overseas training of BWDB staff at IHE Delft. During meetings between PD Mr. Habibur Rahman and Prof Dano Roelvink it was decided to invite interested BWDB staff for an extensive meeting to make an inventory of the training needs and interests. This meeting took place on June 17th, 2019. After an overview of research and education programmes at IHE by Prof Roelvink, 17 BWDB staff expressed their interests and sent in CV's. The interests expressed concerned PhD study, MSc study and short courses. As for PhD studies, these would not fit within the project duration and these interests were kept for consideration should other funding be available. After a thorough discussion with the PD and confirmation by the DG, it was decided that it would be beneficial for the longer-term uptake of knowledge gained during the project if 3 BWDB staff were given the opportunity to do a 1.5 year MSc course at IHE, during which the research period of half a year would be dedicated to a project-related topic and of which approximately 3 months would be spent at the project office in Dhaka.

For the short courses, the PD and DG expressed their wish that these would generally not exceed a duration of 2 weeks in order to limit the time away from office of staff members. In the following sections, we detail the progress in the MSc studies presently ongoing (section 4.3.1) and we propose a 'menu' for the short courses that can be provided to best fit the training needs expressed by the BWDB staff members (section 4.3.2).

Appendices A-C contain 3 worksheets with A) the list of candidates; B) the qualifications and preferences of all candidates; and C) a matching of the preferences of the candidates, not selected for MSc, and available short courses at IHE.

As for the selection of the MSc candidates, the candidates who expressed an interest in the 1.5-year course were ranked according to the criteria: CGPA (Cumulative Grade Point Average) for BSc, motivation and skills, Relevance for project and Experience. The persons ranked 1, 2 and 3 were all academically admitted at IHE and are well into their first year, as detailed in 4.3.1.

4.2.1 MSc courses for 3 BWDB staff

The three students from BWDB, currently taking the MSc in Water science and engineering (specialisation in coastal engineering and port development), at IHE Delft are: Ms. Marzia Israt, Mr. Oli Afaz Chowdhury, and Mr. Nazmul Islam. They have stared their studies in October 2019. The

programme is supposed to end on April 2021 (18-month duration). They are fully integrated in IHE's academic life, living in student accommodation in Delft.

The IHE Delft MSc programme is organised in modules, taken sequentially, with the following structure:

- Module 1 - Introduction to water for development
- Module 2a - Introduction to water science and engineering
- Module 2b - Hydrology and Hydraulics
- Module 3 Introduction to Coastal Science and Engineering
- Module 4 - Port planning and infrastructure design
- Module 5 - Coastal systems
- Module 6 - Design of breakwaters and dikes
- Module 7 - Process based coastal modelling
- Module 8 - Climate change impacts and adaptation in deltas
- Module 9 - Field trip and field work
- Module 10 - Geotechnics engineering and dredging
- Module 11 - Elective module
- Module 12 - Summer course
- Module 13 - Water science and engineering group work
- Module 14 - MSc research proposal development (with Delft 3D course)

After the completion of the 14 modules, students start their thesis research, for a period of about 6 months.

At this date, the three BWDB students have completed module 6 so far, with good results, and will soon start module 7. Before the end of the spring they will choose their thesis topic. Their research topics will be related to the present project, and the students are supposed to spend part of their research time in Bangladesh (about 3 months). They will present and defend their MSc thesis in early April 2021.

4.2.2 Short Courses for BWDB staff at IHE Delft

The worksheet 'Matching with short courses' (Appendix C) indicates the topics selected by the candidates that were not selected for MSc and on the right-hand side the short courses available at IHE that largely cover these topics. Several remarks must be made here.

- Because of the Coronavirus no courses can be taken before summer 2020. Available courses run into May 2020 in some cases, but their organisation and invoicing can be arranged fully before the project end date.
- Many short courses run for 3 weeks and their content will be adapted to fit the 2-week schedule for the BWDB staff where required
- In some cases, the short course can be divided between lectures and dedicated assignments and on-the-job training in Delft.
- Budget-wise, between 10 and 20 components (2-week courses per student) out of the 39 listed can be selected; this should be done in the coming months in discussion between IHE, the PD and the candidates.
- Depending on the availability of BWDB staff for overseas training and the number of components selected as described above, the remaining budget will be spent on a number of dedicated training sessions provided online or, if possible, in Dhaka.

In conclusion, an efficient and effective schedule of short courses can be set up based on the preferences and available modules as listed in the appendix. A final choice per candidate and an overall plan will be made in the coming months, which gives ample time for execution. Although for efficiency and interaction with the international IHE community most of the courses will be combined with existing courses, there is considerable flexibility to tailor each training to the participants' needs.

4.3 Study tour for senior to mid-level staff.

We plan a 2-week programme centred in Copenhagen and Delft for managers introducing them to best ICZM / IWRM practices and modern techniques and ideas, including an extended field trip to sites in Denmark and Holland. The anticipated program is shown in Table 4.1.

Table 4.1 Program for study tour for senior to mid-level staff.

Day	Activity
1 (Sunday)	Arrival in Copenhagen
2	At DHI: Presentation of infrastructure projects in the coastal zone. Exchange views with DHI management
3	Transport to Odense Meeting with The Danish Nature Agency (overall responsible for water management in Denmark). Discuss IWRM implementation in Denmark and Bangladesh.
4	Transport to Lemvig Meeting with the Danish Coastal Authority (the government body which is concerned with coastal matters in Denmark). Discuss ICZM and coastal protection
5	Transport to Skjern Visit Skjern River – the result of the most ambitious river restoration project in Denmark Transport to Tønder

Day	Activity
6	Visit Kammerslusen at Højer: storm surge barrier and polder management Return by plane to Copenhagen
7	Day off in Copenhagen Transfer to the Netherlands
8	Day off in Delft
9	Visit Deltares (including facilities) and IHE Premises
10	Visit South Western Delta and Deltaworks - Haringvliet Barrier- EasternScheldt Barrier
11	Visit Maeslant barrier and Sand engine
12	Meeting with Waterboard Wrap up
13	Departure for Bangladesh

4.4 Visit to US universities

The US research component of the project includes scientists at 5 different U.S. universities working on different aspects of the project including sediment and stratigraphic accumulation, shallow and deep land subsidence, hydrodynamic and sediment dynamics of rivers, hydrodynamic modeling of river systems, and remote sensing of landscape and land use changes, as well as integration of these research subjects into a more holistic understanding of the poldered area of Bangladesh. We propose a visit of 4-6 Bangladeshis. We suggest that they be primarily drawn from the people at Dhaka University, Barisal University and IWM that we have already been working with us. The trip would consist of a field trip (up to a week) followed by training at the different universities (1-2 weeks). The length of the trip will depend on the number of participants.

We propose that at the beginning, the entire group travels to Louisiana State University and that all of us participate in a field trip to the Mississippi Delta. The Mississippi Delta in Louisiana provides a contrasting situation of delta management in which upstream damming and control of flooding has exacerbated land loss. Potential locations include Louisiana Universities Marine Consortium for visits to salt marshes and barrier islands, the LSU River Studies Center for large-scale physical model of the river basin, the Army Corps of Engineers Old River Control Structure that manages the river flow, the Atchafalaya floodway and fresh water swamp, a tour of New Orleans Hurricane Katrina impacted areas and museum, and a visit to a Mississippi River point bar. Additional activities could include collecting and analysing auger sediment cores. In the evening, we can provide background material on the research activities of each of the U.S. universities.

Following the field trip, the group would split up and travel to different universities to obtain more detailed training on specific research topics, depending on their research interests. At LSU, they could collect and analyse shallow cores for sediment properties and accretion/accumulation rates. At ODU, they could make ship-based measurements of ADCP and water-column properties, as well as deployed instrumentation collecting time series data on their littoral research vessel, the RV Fay Slover. At UC Boulder, they could obtain more in-depth knowledge on Hydrotrend modeling. At Vanderbilt, they could learn about the sediment and stratigraphic analysis using Bangladesh sediment cores. At Columbia, they could learn about processing GPS data and analysis of

subsidence and optical/IR remote sensing analysis of land and vegetation changes using mixture modeling.

Due to the disruption of our schedules by COVID-19 and existing and delayed commitments, we propose the visits take place in the Spring of 2021. It is unclear whether travel and research conditions will be re-established by Fall of 2020.

5 Course Schedule

Scheduling of the various capacity building activities is somewhat difficult during the current situation with lockdowns and travel restrictions all over the world due to the on-going Corona pandemic. The schedule below is based on the assumption that the situation will normalise mid-July 2020.

It is our experience that face-to-face training is more effective than on-line training and moreover require less resource to prepare, hence we have not scheduled any lecture/training course activities during the Corona lockdown period. If the current situation drags on, however, we will have to reconsider this, and we will have to prepare on-line lectures. On-the-job training of national staff will continue online.

Table 5.1 Schedule for training activities.

Capacity Building Schedule	2018			2019												2020												2021			Remark
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
On-the-job Training																															
Local traing courses and lectures																															
Lectures at project office or at CEIP Office																															A few lectures already held
Training Courses (1 or 2 days duration)																															
Overseas training courses																															
MSc courses for 3 BWDB staff at IHE																															This is ongoing
Short Courses for BWDB staff at IHE Delft																															Subject to end of travel ban
Study tour for senior to mid-level staff to NL and DK																															Subject to end of travel ban
Visit to US Universities																															Subject to end of travel ban

Legend:

Intermittent

Continuously

6 Conclusions and Recommendations

The project has developed a comprehensive plan for capacity building.

The two key elements of the capacity building are on-the-job training and MSc courses at IHE:

- On-the-job training is an integral part of almost all project activities undertaken by international and national project staff and works very effectively. Scope for improvement is a more comprehensive participation of BWDB staff.
- Three students from BWDB commenced their studies under the MSc in Water science and engineering (specialisation in coastal engineering and port development), at IHE Delft in October 2019. The programme is supposed to end on April 2021.

In addition, the following training activities have been or will be conducted during the project:

- Local lectures and training courses conducted by project resource persons in Bangladesh. Some lectures have already been given, while others have bene planned. In addition, more formal training courses of 1 to 2 days duration at the IWM training room have been planned. For the time being these lectures and training courses have been planned as traditional face-to-face classroom training. If the current situation with lockdowns and travel bans drag on it will be required to conduct some of these activities on-line
- Overseas training on short courses: The following short courses are planned:

  a) Study tour for senior to mid-level staff to Netherlands and to Denmark (two weeks)

  b) Short Courses for 4-6 persons each for two weeks duration in IHE

  c) Visit to US Universities

In the current situation (as of end of March 2020), the Corona pandemic has caused numerous travel bans throughout the world and nobody knows when this will end. It is almost needless to stress that the proposed timing of the various activities may have to be revisited.

APPENDICES

A List of candidates for overseas training

Abbreviation	Full name	Email
ART	Abdur Rahman Tazkia	tazkiace08@gmail.com
RK	Rashidul Kabir	ranawre@gmail.com
SKD	Sourav Kumar Das	souravce1004064@gmail.com
SA	Shariful Alam	sharif.ce07@gmail.com
MI	Masbahul Islam	masba.tutul@gmail.com
ASM	Abu Saeed Masum	masumsayeed3001@ gmail.com
KH	Kamrul Hasan	kamrulhasance07@gmail.com
MAH	Mohammad Akbar Hossain	akborgazi@yahoo.com
OAC	Oli Afaz Chowdhury	afazchy@gmail.com
UR	Udoy Raihan	udoyraihan@gmail.com
MI	Marzia Israt	marzia.dc4.bwdb@gmail.com
FA	Farzana Ahmed	farzanabwdb@gmail.com
NI	Nazmul Islam	mnazmul@live.com
JP	Jakaria Pervez	jakariapervez@gmail.com

B Qualifications and preferences of BWDB candidates

Candidate	ART	RK	SKD	SA	MI	ASM	KH	MAH	OAC	UR	MI	FA	NI	JP
Year of birth	1991	1979	1993	1990	1989	1981	1989?	1977	1989?	1990?	1991	1985	1990	1980
Year BSc	2014	1999	2016	2013	2011	2005	2012	2001	2012	2013	2016	2009	2013	2004
	BUET	BUET	BUET	BUET	BUET	BUET	KUET	CU	CUET	BUET	BUET	BUET	BUET	BUET
Year MSc	2016	2011						2003		2019?				2019?
	BUET	IHE						CU		BUET				BUET
Year PhD														
M/F	M	M	M	M	M	M	M	M	M	M	F	F	M	M
Interest in MSc			1		1	1	1		1		1	1	1	
Interest in PhD	1	1								1				
Interest in courses	1		1	1	1	1	?	1	1	1	1	1	1	1
CGPA BSc	3.53	3.19	3.53	3.13	?	2.57	3.59		3.35	3.48	3.56	3.41	3.59	2.71
CGPA MSc	3.42	7.7/10								?				
Motivation and skil	4	3	4	2	3	3	3		4	3	4	3	5	3
Relevance for proje	5	5	3	3	3	4	4		5	4	4	4	5	3
Experience (years a	5	20	3	6	8	14	7	18	7	6	3	10	6	15
Ranking for MSc			**5**				**4**		**2**		**3**	**6**	**1**	
Topics														
coastal numerical r	1			1		1			1			1		
river morphology d	1			1	1	1								1
long-term river morphology modelling														1
river basin modellir	1													
coastal engineering			1	1		1			1			1		
coastal structures									1					
coastal morphological modelling			1			1						1	1	
hydrological modelling			1							1		1		
hydraulic structures			1	1								1		
climate change adaptation					1			1					1	
ground water mining					1									
salinity intrusion groundwater					1		1							
salinity hazards							1							
River Basin Development and Environmental Impact Assessment								1			1			
storm surge modelling									1	1			1	
storm impact modelling									1					
GIS and remote sensing										1				
Integrated Hydrological and River Modelling.										1	1	1		
River Flood Analysis and Modelling										1	1			
Modelling theory and Computational Hydraulics											1			
Modelling and information Systems Development											1			
River Basin Modelling											1	1		
Dams and Hydropower											1			
Marine climate change and its effect on the coastal zone												1	1	

C Matching of preferences with (modified) short courses

Candidate	ART	SKD	SA	MI	ASM	KH	MAH	UR	FA	JP	Total courses	Title of module/short course
Year of birth	1991	1993	1990	1989	1981	1989?	1977	1990?	1985	1980		
Year BSc	2014	2016	2013	2011	2005	2012	2001	2013	2009	2004		
	BUET	BUET	BUET	BUET	BUET	KUET	CU	BUET	BUET	BUET		
Year MSc	2016						2003	2019?		2019?		
	BUET						CU	BUET		BUET		
Topics												
coastal numerical modelling	1		1		1				1		4	Modified (2 weeks) M7 CEPD Process bassed coastal modeling
river morphology dynamics	1		1	1	1					1	3	Modified (2 weeks) M7 HERBD River morphodynamics
long-term river morphology modelling										1	1	Modified M8 (2 weeks) Hydroinformatics riverbasin modeling
river basin modelling	1										1	Modified M8 (2 weeks) Hydroinformatics riverbasin modeling
coastal engineering		1	1		1				1		4	Modified M6 (2 weeks) Design of breakwaters and dikes
coastal morphological modelling		1			1				1		3	Modified (2 weeks) M7 CEPD Process bassed coastal modeling
hydrological modelling		1						1	1		3	Modified M8 (2 weeks) HWR Integrated hydrological and river modelling
hydraulic structures		1	1						1		3	Modified M6 (2 weeks) Design of breakwaters and dikes
climate change adaptation				1			1				1	Modified M8 (2 weeks) HERBD or Land and water developmet
salinity intrusion groundwater				1		1					1	Modified (2 weeks) M7 CEPD Process bassed coastal modeling
salinity hazards						1					1	Modified (2 weeks) M7 CEPD Process bassed coastal modeling
River Basin Development and Environmental Impact Assessment							1				2	Modified HERBD M(2 weeks) 4 River Basin Development and Environmental Impact Assessment
storm surge modelling								1			1	Modified (2 weeks) M7 CEPD Process bassed coastal modeling with case study
GIS and remote sensing								1			1	M2b WSE (2 week) Hydrology and Hydraulics
Integrated Hydrological and River Modelling.								1	1		3	Modified M8 (2 weeks) Hydroinformatics River Basin Modelling (see repeated above)
River Flood Analysis and Modelling								1			2	Modified M8 (2 weeks) Hydroinformatics River Basin Modelling
Modelling theory and Computational Hydraulics											1	Modified (2 weeks) M7 CEPD Process bassed coastal modeling
Modelling and information Systems Development											1	Modified M11 (2 weeks) Hydroinformatics Strategic planning for river basins and deltas
River Basin Modelling									1		2	Modified M7 HERBD River morphodynamics
Marine climate change and its effect on the coastal zone									1		1	Modified M8 (2weeks) CEPD Climate change impacts and adaptation in deltas
TOTAL											39	Total