

ASIAN DEVELOPMENT BANK



RETA 6498: Knowledge and Innovation Support for ADB's Water Financing Program

PILOT AND DEMONSTRATION ACTIVITY

Developing and Pilot Testing a Specialists' Course on River Bank Protection

INCEPTION REPORT



Bureau of Research, Testing and Consultation

Bangladesh University of Engineering & Technology

June 2009

The views expressed in this paper/presentation are the views of the author and do not necessarily reflect the views or policies of the Asian Development Bank (ADB), or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequence of their use. Terminology used may not necessarily be consistent with ADB official terms.

Table of Contents

1. Introduction	3
1.1. Background	3
1.2. Objectives	3
1.3. Location of the Work	3
1.4. Scope	4
2. Methodology	5
2.1. Identification of Topics Relevant to River Bank Protection	5
2.2. Identification of the Experts/Resource Persons	5
2.3. Preparation and Development of Course Material	7
2.4. Draft Course Material	8
3. Detailed Work Plan	8
3.1. List of Activities	9
3.2. Reporting Schedule	10
4. Project Management and Monitoring System	10
5. Financing Plan	11
6. Personnel and Logistic	11
6.1. Institutional Involvement	11
7. Expected Outcomes	12

1 Introduction

1.1. Background

Bangladesh is the lower riparian country of some of the largest rivers in the world, namely the Ganges, Brahmaputra, and Meghna. The total catchment area of these rivers covers about 1% of the world's land surface but is home of about 10% of the world's population. This environment is characterized by unpredictable dramatic changes, resulting from tectonics along the Himalayan Mountains and annual monsoons. The combination of mountain instability and monsoon formed the large rivers of Bangladesh and is the major driving factor of their instability. Dating back to the "Great Assam Earthquake" in 1950, the river system in Bangladesh is still adjusting to the entrained sediment loads. This caused substantial widening of the major rivers, leading to more than 1000 km² loss of land over the last 30 years along the Brahmaputra alone. The associated riverbank erosion is a major destabilizing factor in Bangladesh, affecting the important flood protection embankments and all other infrastructure in the vicinity of the rivers. The unpredictable and instable environment is characterized by over-proportionate numbers of poor people and lack of development opportunities.

Since independence, Bangladesh is struggling to counter large-scale river erosion, at least along the important places on the banks of the major rivers with little success. Until recently, when the development of a new technology, in combination with knowledge base, largely focusing on prediction, a comprehensive planning framework, and flexible implementation achieved successful and cost-effective protection of longer reaches. Based on these findings and the systematic analysis of the performance of past riverbank protection, new guidelines for riverbank protection were established with the support of BUET. The performance analysis of riverbank protection in large rivers plays a major role in the preparation of these guidelines and makes them a unique document.

BUET intends to develop specialized course for the incorporation of key planning, design, and monitoring elements into a specialist course for the future generation of engineers. This activity is expected to achieve a higher level of education, and over time to contribute the unique Bangladesh experience to the countries knowledge base and international knowledge networks.

1.2. Objectives

The main objective is the development of a specialist's course at post-graduate level on Riverbank Protection alongside alluvial rivers.

Secondary objectives are: developing of short courses for the engineers & scientists working in water sectors & the testing of first courses and the broadening of the knowledgebase through M.Sc. Engineering theses with potentials for incorporation into a regional knowledge hub.

1.3. Location of the Work

The work will be carried out at Bangladesh University of Engineering and Technology (BUET), located around the central area of capital city Dhaka of Bangladesh. BUET is considered to be the highest seat of quality education and centre of excellence in higher studies and research on Science, Engineering and Technology in Bangladesh. The location map of the workplace of the PDA course is shown in Fig. 1.



Fig. 1: Location map of workplace

1.4 Scope

The developed specialists' courses at post-graduate level of the Department of Water Resource Engineering of BUET, Dhaka, Bangladesh will cover the following topics as set LOA.

- (i) river morphology
 - (ii) river engineering/training techniques;
 - (iii) riverbank protection experiences;
 - (iv) planning of riverbank protection
 - (v) design of riverbank protection: structural, hydraulic, hydrologic & geotechnical
 - (vi) monitoring and performance evaluation of riverbank protection
- After completion, a lecture note will be prepared in bound form for the courses and it is expected that the courses will be approved by BUET for offering from October 2009.
 - A compact version of the course will be prepared for practitioners, specifically focusing on staff of the Bangladesh Water Development Board, an organization tasked with the implementation of riverbank protection works. This course is also expected to be offered from October 2009
 - The scope of work will also include the printing of 200 copies of the existing guidelines for students attending the course.

2. Methodology

The methodology will involve a number of activities as discussed below.

2.1. Identification of Topics Relevant to River Bank Protection

A brainstorming session was organized to identify the topics. The personnel and experts participated in the brainstorming session are those who were involved in the preparation of Guidelines for Riverbank Protection. In addition scientists and designers from Bangladesh Water Development Board, IWM & CEGIS were involved in the brainstorming session. The topics that were finalized after detail discussion are given in Article 1.4.

2.2. Identification of the Experts/Resource Persons

A rigorous search on identification of experts for the relevant topics was made. Emphasis were given to have a blending on the theory and practical aspects of the specialists course so that the final lecture materials fulfils the desire and expectations of the post-graduate students as well as junior engineers and scientist working in the field of riverbank protection. In this respect qualification and higher training of the experts in the relevant field, length of experience, ability to judge the complexity of river bank erosion problems in an alluvial environment and ability to guide the participants to obtain solutions to such problems. It may be mentioned that most of the experts are chosen from the Professors of BUET having PhD degree in relevant field and have significantly long experience both in research and teaching. The following experts have been identified for the preparation of the course materials for specialists' course and short course on Riverbank protection:

Professor Dr. AMM Safiullah, Vice-Chancellor, BUET

B.Sc. in Civil Engineering (1969), BUET; M.Sc. in Civil Engineering (1977), BUET; Ph.D. (1981), University of Strathclyde, Glasgow, U.K.

Expert in the field of: Geotechnical investigation, Specialization on soil characterization, ground improvement, embankment & earthen structures, long international experience, worked in expert panel on Bangabandhu Bridge and Padma Bridge.

Professor Dr. M. Monowar Hossain

B.Sc. in Civil Engineering (1976), BUET; M. Sc. in Water Resources Engineering (1981), BUET; Ph.D. (1984), University of Strathclyde, Glasgow, U.K.

Expert in the field of: river morphology and river training; sediment transport; scale modeling; watershed management.

Professor Dr. M. Mirjahan

B.Sc. in Water Resources Engineering (1977), BUET; M. Sc. in Water Resources Engineering (1980), BUET; Ph.D. (1984), Utah State University, Utah, USA.

Expert in the field of: irrigation and drainage problems; groundwater; water management.

Professor Dr. M. Abdul Matin

B. Sc. in Civil Engineering (1981), BUET; M. Sc. in Water Resources Engineering (1984), BUET; Ph. D (1988), University of Strathclyde, Glasgow, U.K.

Expert in the field of: open channel hydraulics; water ways engineering; hydraulic and scale modeling; rivers and coastal zone management; hydrology; hydraulic structures; professional practices and management in water resources projects.

Professor Dr. S.J.M. Yasin

B.Sc. in Civil Engineering (1987), BUET; M. Sc. in Civil Engineering (1990), BUET; Ph.D. (1998), University of Tokyo, Japan.

Expert in the field of: Geotechnical investigation, Specialization on soil characterization, strength and deformation characteristics, deep foundation.

Dr. U. K. Navera, Associate Professor

B. Sc. in Civil Engineering (1992), BUET; M. Sc. in Coastal engineering (1996), AIT, Bangkok; Ph. D (2004), University of Cardiff, U.K.

Expert in the field of: coastal engineering; estuarine hydraulics; open channel hydraulics; fluid mechanics; river hydraulics.

Dr. Sabbir Mostafa Khan, Associate Professor

B. Sc. in Civil Engineering (1996), BUET; M. Sc. in Water Resources Engineering (1999), BUET; Ph. D (2004), University of California Los Angeles, USA.

Expert in the field of: hydrology; climatology; statistical method in hydrology; integrated water resources management (IWRM); storm water runoff.

Dr. M. Ataur Rahma, Associate Professor

B. Sc. in Civil Engineering (1998), BUET; M. Sc. in Water Resources Engineering (2002), BUET; Ph. D (2005), Nagoya University, Japan.

Expert in the field of: coastal engineering; coastal zone management; irrigation and water management; hydraulics and hydraulic structures.

Mr. Mukhles uz Zaman, Former Director General of Bangladesh Water Development Board (BWDB) and an independent consultant to ADB and World Bank.

B.Sc. in Civil Engineering (1966), M. Engineering in Hydraulics (2000) from IHE, Delft, the Netherlands

Expert in the field of: River Training, Water Resources Planning, Large River and water Resources Development Projects and their Design and implementation in the context of Bangladesh. He has a total experience of about 43 years.

Dr. Maminul Haque Sarker, Chief Morphologists, CEGIS

B. Sc. in Civil Engineering (1980), BUET; Diploma in Hydraulic Engg (1990), IHE Delft, the Netherlands; M.Sc. in Hydralic Engg (1996), IHE Delft, the Netherlands, Ph.D. (2009), University of Nottingham, UK.

Expert in the field of: River Morphology, River behavior, Sediment movement in alluvial river courses, Morphological survey and processing of data, has about 29 years of experience in his field of specialization.

Knut Oberhagemann

Diplom Engineer (German equivalent to M.Sc.) in civil engineering.

Expert in: River engineering and hydrotechnical studies with focus on the Brahmaputra River in the lower part in Bangladesh over the last decade. Work on FAP 21/22 since 1993 (Riverbank Protection Pilot Project and River Training and Active Flood Plain Management Pilot Project), work on the Jamuna-Meghna River Erosion Mitigation Project where geobag revetments were systematically developed, and work in Assam on the preparation of the Assam Integrated Flood and Riverbank Erosion Risk Management Project since 2006 where an integrated approach is developed to deal with Brahmaputra floods and riverbank erosion in Assam

Mr. Makbul Hossain, Additional Chief Engineer, BWDB & Project Director, JMREMP

B.Sc. in Water Resources Engineering (1977), BUET; PG Diploma in Water Resources Engineering from AIT, Bangkok (1980)

Expert in the field of: Design and Planning of River Bank Protection and related works, Informatics and project management; Experience of about 32 years.

Mr. Md. Jasimiddin Ahmed, Additional Chief Engineer Design, BWDB;

B.Sc. in Civil Engineering (1977), BUET; Master of Soil and Water Resources Management (1989), University of Philippines, Manila

Expert in the field of: Design and Planning of water resources project including bank protection works, Field experience on supervision and monitoring of protection works; Experience of about 32 years.

Md. Syedur Rahman, Chief Planning, BWDB;

B.Sc. in Civil Engineering (1977), BUET; M.Sc. in Hydraulics (1985), IHE, Delft, the Netherlands

Expert in the field of: Planning of water resources project including bank protection works, Field experience on execution and monitoring of water resources projects; Experience of about 32 years.

Mr. Abdur Rahman Bhuiyan, Project Director, Emergency Disaster Damage Rehabilitation Project, BWDB

B.Sc. in Water Resources Engineering (1977), BUET; M.Sc. in Water Resources Management (1982), AIT, Bangkok, Thailand

Expert in the field of: Project Planning & administration, Mathematical modeling, Field experience on survey and investigation; Experience of about 32 years.

2.3. Preparation and Development of Course Material

Several meetings have been organized in this respect to determine the modus operandi. The experts are being entrusted with the task of developing the lecture notes on the topics assigned to each expert vide letter of the Team Leader/Course coordinator. The titles of the lectures have been tentatively identified as follows:

Lecture 1	An overview of Riverbank Protection works in Bangladesh
Lecture 2	River morphology and erosion processes
Lecture 3	Designs of Bank and Bed Protection Methods
Lecture 4	Integrated approach for planning, design and management of bank erosion protection structures

Lecture 5	Design aspects of Riverbank Protection Works in Bangladesh: a case study
Lecture 6	Design considerations of various types of groynes
Lecture 7	Design examples of impermeable and permeable groynes
Lecture 8	Use of Remote Sensing and GIS in the Study of River & Coastal Morphology
Lecture 9	Prediction of Riverbank shifting using Remote Sensing data (MH, CEGIS)
Lecture 10	Hydrologic parameters and Statistical Considerations in River Protection works
Lecture 11	Methods of Stability Analysis
Lecture 12	Application of various methods of Stability Analysis
Lecture 13	Filters and its application in River Bank protection
Lecture 14	Morphological Surveys and Data Processing
Lecture 15	Planning considerations of Riverbank Erosion Management
Lecture 16	Experiences of Bank Protection Works-Part I
Lecture 17	Experiences of Bank Protection Works-Part II
Lecture 18	Monitoring and related aspects of Riverbank protections
Lecture 19	Monitoring and Quality Control of River Bank Protection works
Lecture 20	Implementation and Construction aspects of Riverbank protections
Lecture 21	Design specifications of construction materials for water front construction
Lecture 22	Theoretical consideration of Riverbank Slope Protection works
Lecture 23	Geo-technical investigation for Riverbank Protection works
Lecture 24	Geo-technical design considerations for Bank Protection works
Lecture 25	Wave Hydraulics and its application in Bank Protection works
Lecture 26	Design of Innovative Revetments using Geo-synthetic and Geo-textile materials

After developing of lecture materials by the experts, these will be reviewed by a review Committee to maintain consistency and quality. It may be noted that the each lecture on the above topics will be of one and a half hour duration, so that while designing a new post-graduate course on Riverbank Protection at BUET we will have 39 hours of lectures which matches the existing contact hour requirements laid by the Academic Council of BUET. The sequence of lectures will be finalized in due course of time.

2.4. Draft Course Material

Draft course materials are expected to be ready by August 2009. It will be finalized by September 2009 for offering to post-graduate students and young professionals working in various water sector Organization of Bangladesh from October onward.

Pilot Testing

Pilot testing of the developed course materials will be conducted during October-November 2009. The participants will mainly comprise of post-graduate students of the Department of Water Resources Engineering, BUET. However since a significant part of post-graduate students are from various water sector organizations including BWDB, BADC, IWM, CEGIS, thus the pilot testing in effect will composed of a mixture of students from various water sector Organization of Bangladesh. Thus it can be expected that the pilot testing and the follow-up activities will be very meaningful in the context of Bangladesh and even in the region. The effectiveness of pilot testing will be evaluated by an independent evaluator who is a renowned water expert of the country and has participated in many previous evaluation processes in similar kind of projects.

3. Detailed Work Plan

Detail work plan includes a number of activities such as identification of topics, identification of relevant experts, organizing meetings to discuss progress of preparation of specialists' course materials etc. The list of activities under this work is given in the following article.

3.1. List of Activities

(a) Preparation of Specialists Courses:

Preparation of Specialists Courses will be accommodated more or less in accordance with the following bar chart shown in Fig. 2. The item of activities is also given below:

Starting:	May 26 2009
Development of course materials:	until August 2009
Discussion and approval in BUET:	until September 2009
Start teaching:	October 2009
Review and update:	April 2010
Completion:	May 2010

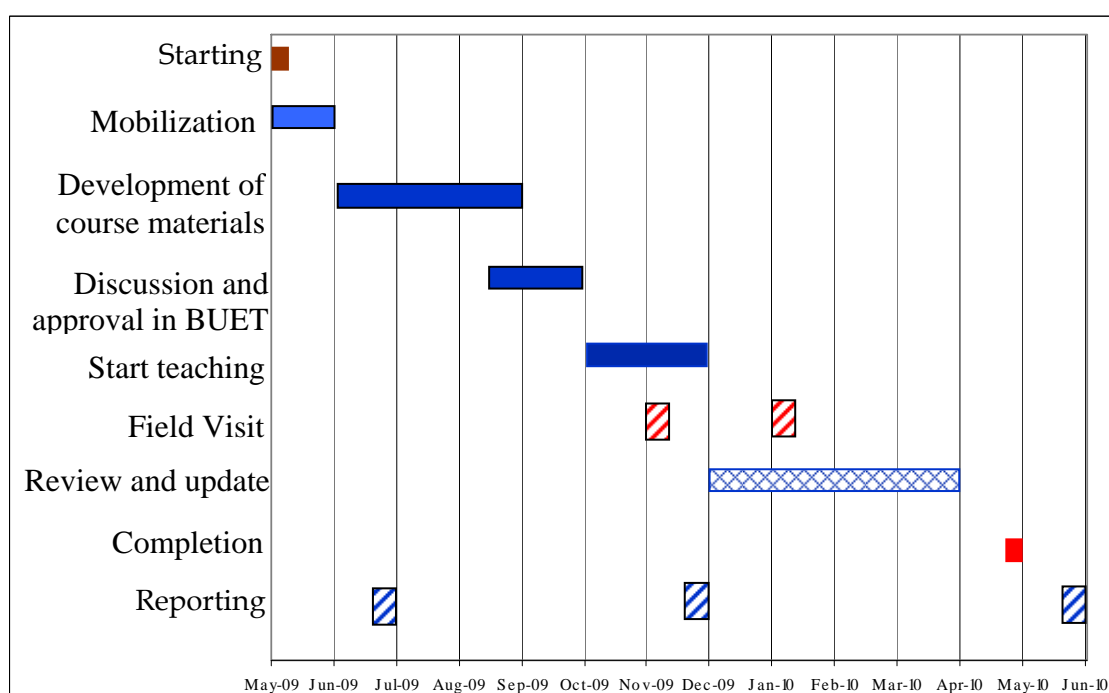


Fig. 2: Detail Work Plan

(b) Short course for practitioners:

The detailed work plan for Short course for practitioners are also tabulated in the next bar chart as in Fig. 3.

Start of preparation of course materials:	May 26 2009
Completion of course materials:	August 2009
First course for practitioners:	October-November 2009
Training impact and review of course	December-January 2010
Incorporation into annual short course program	April 2010

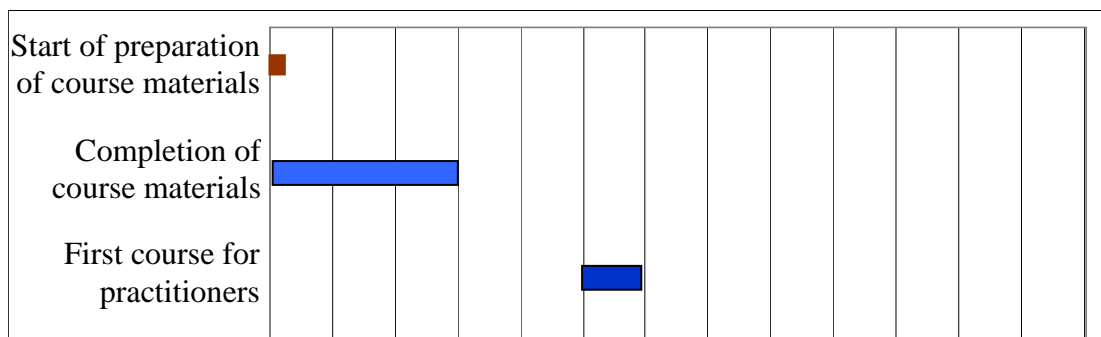


Fig.3: Detail Work Plan of Short course for practitioners

3.2. Reporting Schedule

The reporting schedule will be as per the terms and conditions of the LOA. In this context the Inception report (this report) will be submitted within one month after signing of LOA. Due to delay in payment of mobilization money this report will be submitted within June 30, 2009. Mid term report will be submitted after six months of the start of work and the completion report will be submitted within one month of the completion of the program. This schedule is shown in the bar chart shown in Fig.2.

4. Project Management and Monitoring System

The main activities of the ADB funded project on Developing and Pilot Testing a Specialists' Course on River Bank Protection will be divided into two closely related activities, namely, short course and specialist course (see figure 4). There are four feedback loops. Two loops are from end users (post graduates students and young BWDB engineers and other water sector professionals). Other two feedback loops are from management teams to the Team Leader. Monitoring on each feedback loop makes the success of the total project.

To assist various activities involved in the PDA three research assistants will work in close association with the Team Leader Prof. Dr. M. Monowar Hossain.

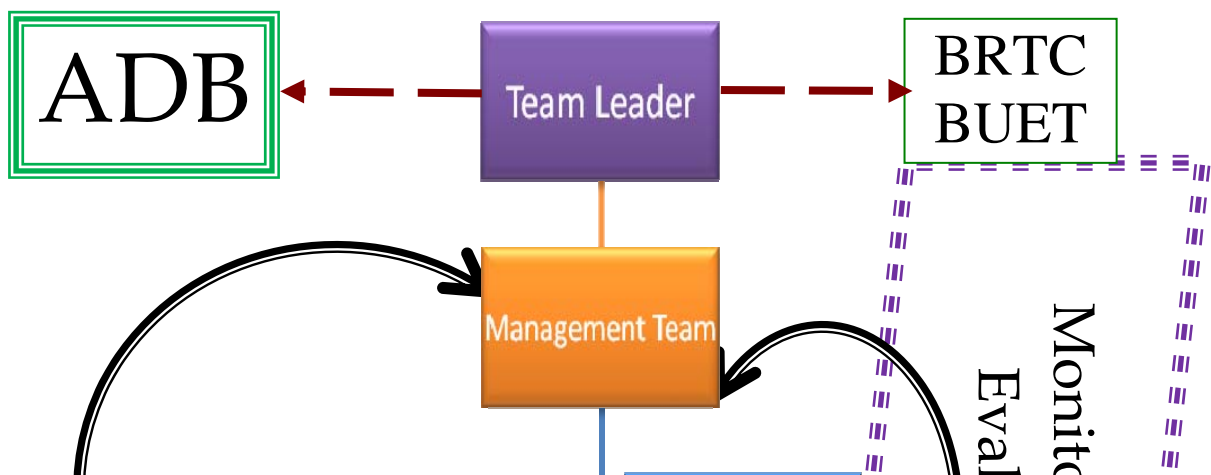


Fig. 4: Project Management and monitoring system flow chart

The project evaluation will be an integral part and will start immediately after preparation of the PDA course materials.

5. Financing Plan

All financial transactions will be made through the bank account of Director, BRTC, BUET. The rule practiced at BUET is that the Head of the Department of Water Resources Engineering, BUET will send a written note to bring money to his account in the Department for the purpose of meeting the direct costs, cost of meetings, stationeries etc related to the PDA course in consultation with the Team Leader. The Head of the Department/Team Leader will maintain that part of the accounts. The payments to the experts and personnel including Professors, individual expert, researcher, evaluator etc involved in the PDA course will be made by account payee cheques from the Office of the Director, BRTC, BUET as per advice of the Head of the Department/Team Leader. All the expenditures made in this processes will be recorded by the Team Leader and it will be reported to ADB using the forms supplied in appendix 3.

6. Personnel and Logistic

The logistics and personnel will be involved as per condition set in the LOA and its appendices.

6.1. Institutional Involvement

The course materials will be developed by BUET under a contract between Bureau of Testing & Consultation (BRTC) of BUET and the funding agency, i.e., ADB. BUET has conducted similar programs/projects earlier with a very good track record of works. BUET is also the centre of excellence in Bangladesh in this respect. The work will be accomplished following the guidelines practiced at BUET.

The main development work will be undertaken by a team of professors who will work in close attachment and guidance of the team leader Prof. Dr. M. Monowar Hossain with associated

outside relevant researchers and practitioners. The major Institutions that are involved in the PDA course are:

Bangladesh University of Engineering and Technology (BUET)

Bangladesh Water Development Board (BWDB)

Centre for Environmental and Geographic Information Services (CEGIS)

Institution of Water Modeling (IWM)

In addition to the above, other relevant stakeholder working in water sector will be involved in the process of developing the PDA course and its future offering.

7. Expected Outcomes

The outcome will be development of specialists' courses at PG level and short courses for practitioners especially for young engineers and professionals working in various water sector organizations. Another outcome is the development of a post-graduate course at BUET at the Department of Water Resources Engineering. The Title of the Course and Course Number will be identified by relevant Boards of Post Graduate Studies, Faculty and finally be approved by the Academic Council so that the course can be offered on a regular basis after field testing.

Advantage of developing the course materials by following this process would lead to improved knowledge & experience of engineers leading to better and more cost effective river management; contribution to regional knowledge about stabilization of large alluvial rivers and improved knowledge & experience of engineers leading to better and more cost effective river management.