JOINT COOPERATION PROGRAMME
BANGLADESH – THE NETHERLANDS

Delta Knowledge Days 2022

JOINT COOPERATION PROGRAMME
Bangladesh Netherlands
Knowledge development for a prosperous delta

Delta Knowledge Days 2022

November, 2022

Developing the partnership for applied research by

Deltares CEGIS Center for Environmental and Geographic Information Services

WAGENINGEN UNIVERSITY & RESEARCH

IWM Water Environment & Climate

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Key Project Information

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SUMMARY

In the Joint Cooperation Programme (JCP), IWM, CEGIS, WUR and Deltares as partner organizations, work together to answer upcoming questions related to BDP2100. During the last 4 years, JCP worked with various partners on applied research projects concerning an app to provide easy access to information on BDP2100, quantifying future water demand for food, monitoring clean and safe water for Dhaka city, ensuring the flow in the Old Brahmaputra, designing polders of the future and the Bangladesh Metamodel for assessing investments in BDP2100. Towards the end of the programme, JCP organized the Delta Knowledge Days, on 17 and 18 September 2022. The objective of the Delta Knowledge Days is to share knowledge and insights. Over 250 participants took part in this 2-day conference, with various backgrounds. High-level policymakers, like government officials, and ministry people attended the conference. And also, academicians from different universities, researchers, students, and private sector representatives attended the conference. The approach of the conference was to create platforms for sharing and to do so in an inclusive manner. Practitioners, scientists, and policymakers that can contribute, but were not necessarily part of the JCP set-up, were explicitly also invited to join. After an interesting 'setting the scene' opening session and a plenary session on assessment for investment, there were 8 parallel knowledge sessions and 5 training/ demonstration sessions held during the conference. Various types of topics were discussed during these sessions, such as the Bangladesh Metamodel, morphological challenges for adaptive river management, information services for decision support in uncertainty, agriculture and water management, agricultural transformation, coastal and polder design for future, building with nature, and water quality. The conference was held in the Lakeshore Hotel, Gulshan, Dhaka. The Delta Knowledge Days were closed with a forward-looking session, bringing key messages of the parallel session and follow-up questions together in a session in which there was a keynote on climate resilient adaptation. In interaction with the audience, key conclusions were drawn – focussing on the need to act and coordinate, while further developing useful knowledge addressing new and upcoming questions to support the implementation of the Bangladesh Delta Plan 2100.

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ACRONYMS AND ABBREVIATIONS

ATP	Agricultural Transformation Plan
BUET	Bangladesh University of Engineering and Technology
BIWTA	Bangladesh Inland Water Transport Authority
BWDB	Bangladesh Water Development Board
BWP	Bangladesh Water Partnership
CEGIS	Center for Environment and Geographical Information Systems
DKD	Delta Knowledge Days
DAE	Department of Agricultural Extension
DOE	Department of Environment
CEGIS	Center for Environment and Geographical Information Systems
EKN	Embassy of the Kingdom of the Netherlands
GED	General Economics Division (of the Planning Commission)
GOB	Government of Bangladesh
ICCCAD	International Centre for Climate Change and Development
IFPRI	International Food Policy Research Institute
ICZM	Integrated Coastal Zone Management
IUT	Islamic University of Technology
IWFM	Institute of Water and Flood Management
IWM	Institute of Water Modelling
IWRM	Integrated Water Resources Management
JCP	Joint Cooperation Programme
LUCK	Land Use Change Knowledge
MAR	Managed Aquifer Recharge
MOA	Ministry of Agriculture
MOWR	Ministry of Water Resources
NAAB	Netherland Alumni Association in Bangladesh
NAP	National Adaptation Plan
NSTU	Noakhali Science and Technology University
NWO	Netherlands Organization for Scientific Research
NWP	Netherlands Water Partnership
SIBDP	Support to the Implementation of the Bangladesh Delta Plan
UDW	Urbanizing Deltas of the World
UNDP	United Nations Development Programme
WARPO	Water Resources Planning Organization
WB	World Bank
WP	Work Package
WUR	Wageningen University Research

1 INTRODUCTION

The Joint Cooperation Programme Bangladesh – The Netherlands (JCP) is a four-year project, which started in November 2018, funded by the Embassy of the Kingdom of The Netherlands (EKN) in Dhaka, Bangladesh (80%) and R&D of the participating organizations. It is jointly conducted by Dutch institutes Deltares and WUR, and Bangladeshi institutes CEGIS and IWM. The knowledge developed as part of JCP is used to support the implementation of the Bangladesh Delta Plan 2100 (BDP2100). For sharing of knowledge and dissemination of project outputs, a conference "Delta Knowledge Days (DKD)" was organized on September 17th (Saturday) and 18th (Sunday), 2022 in Lakeshore Hotel, Gulshan, Dhaka, Bangladesh (see Annex 1 for the overall programme).

Over 250 participants took part in this 2-day conference, with various backgrounds: About 50% from research and related organizations, about one quarter from Government organizations, and the other quarter from the private sector and NGOs (see figure 1.1 and Annex 2 for list of participating organizations). High-level policymakers, like government officials, Ministry people attended the conference. And also, academicians from different universities, researchers, students and private sector representatives attended the conference. The approach of the conference was to create platforms for sharing, and to do so in an inclusive manner. Practitioners, scientists, and policymakers that can contribute, but were not necessarily part of the JCP set-up, were explicitly also invited to join.

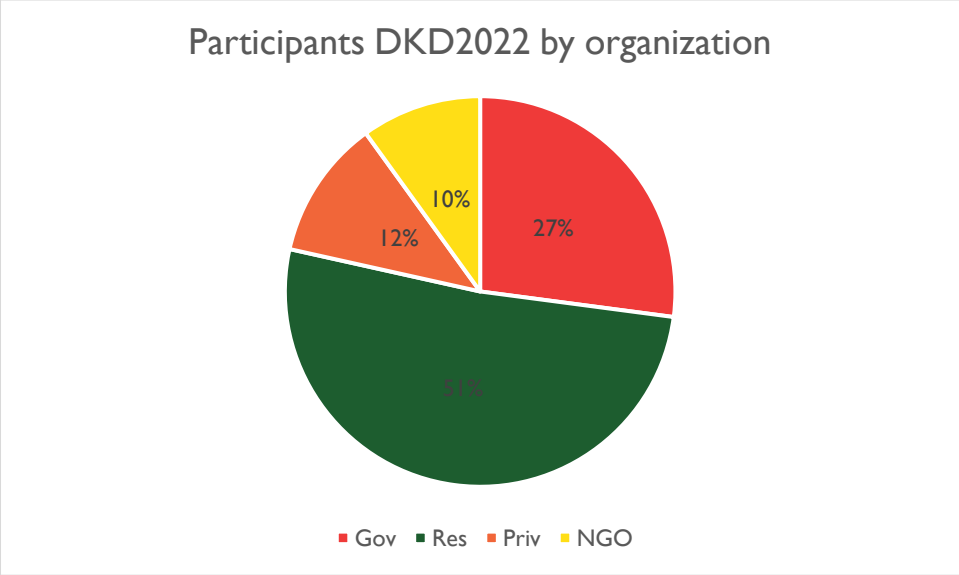


Figure 1.1: Participants DKD2022 by organization

Topics that were discussed were integrated assessment for investment and the Bangladesh Metamodel, geo-morphological challenges for adaptive river management now and in the future, (climate) information services for decision support in uncertainty, agriculture, and water management now and in the future (the nexus), agricultural transformation, coastal and polder design for future, building with nature, and water quality now and in the future.
Overall, each session in the DKD formulated key main insights and key questions for follow up – and in the final plenary session, this was brought together into a knowledge agenda for the years to come to further support the effective and efficient implementation of BDP2100.
This report provides an overview of the reports of the sessions.

2 CONTENT

In this chapter, the sessions are reported on one by one in detail, providing information on the program, keynotes, key messages and follow up questions.

2.1 Opening session

Coordinator	:	William Oliemans
Keynote Speakers	:	Zahirul Haque Khan, Malik Fida A Khan
Reflections	:	Arjan Budding, Dr. Toon Segeren
Guest of Honour	:	Folkert De Jager
Chief Guest	:	Mirza Md. Mohiuddin – on behalf of Dr. Md. Kawser Ahmed

- Welcome & Introduction:
    - Catharien Terwisscha van Scheltinga welcomed everyone in the program
    - William Oliemans gave an introductory speech and gave a brief on JCP.
- Welcome dance by Chhayanaut Dance Group, led by Dr Farhana Ahmed

Key note speech:

- The first keynote, titled **'Building up Knowledge for Development, and Outlook to the Future'** was presented by the newly appointed Executive Director of IWM, Zahirul Huq Khan. He stressed in his interesting keynote for instance the importance of the stability of the tidal prism for restoring tidal rivers. 'Our research shows how ecosystem services can be improved in river systems'. Further, he emphasized how forecasting river erosion will reduce the maintenance cost of infrastructure, and therefore is an important area of research.
- In his reaction, Dr. Toon Segeren, Director, International Affairs of Deltares stressed the importance of international collaboration, 'we like to work together.
- The second keynote was provided by Malik Fida A Khan, Executive Director of CEGIS, entitled **"Need for Transformative Change for Integrated Development**". He highlighted in his presentation the importance of spatial planning for the implementation of plans. Further, he stressed that Bangladesh has made important steps in moving from re-active (up till 2000) to pro-active (after 2000). He stated that 'the importance of integrated development is to avoid ad-hoc, mal-interventions and to include a wide range of beneficiaries. In the National Adaptation Plan, 11 climate stress areas have been identified, which can be the basis of innovation and transformation. A nice-looking animation showed how for a polder, adaptive management can look like.
- In his reaction, Arjan Budding of Wageningen University and Research, stressed the importance of an integrated approach. Further, he indicated that joint processes with many stakeholders are complex and need sufficient time. He mentioned the word 'polderen' which links to the Dutch word 'polder' and indicates how in such a protected area, people need time to talk in order to adjust various interests and come to joint action.

- Speech from Guest of Honour

  Folkert de Jager, First Secretary, Embassy of the Kingdom of the Netherlands to Bangladesh gave a speech. He mentioned in his speech that Bangladesh is a country where delta experts can learn about delta challenge better than other country. Adaptive delta management, as in BDP2100, allows alignment with the Five-Year Planning cycle. The forward-looking orientation that the country is taking for the implementation of the Bangladesh Delta Plan 2100 needs new governance, infrastructure, and also new knowledge. The latter requires engagement with the users of the knowledge. He also mentioned that he is looking forward to continuous knowledge cooperation between Bangladesh and the Netherlands in the field of integrated delta management, including aspects of both water and agriculture. He welcomed the meeting to share insights and knowledge, as this will be input for further steps in this regard. Together with the Netherlands Scientific Organization (NWO) the Embassy is currently exploring the set-up of a knowledge platform – engaging with long term action research to serve specific needs, leading to support for the implementation of BDP2100.

- Speech from Chief guest:

  Mirza Md. Mohiuddin, Senior Assistant Chief, GED gave a speech. He stressed in his speech the importance to align all other plans related to delta with Bangladesh Delta Plan 2100. He thanked the JCP team for organizing this workshop and providing training to over 75 officials, indicating that 3 further trainings on Bangladesh Metamodel are being planned in the upcoming 9 months. He also said that all possible solutions for delta should be nature based as it is an integrated part of us and indicated that training in this regard is required too. For the implementation of BDP2100, the Delta Knowledge Portal has been established – the current 82 data layers are not enough, and GED would like to make it a one-stop service for data, so all can use the Delta Knowledge Portal. A paradigm shift of development administration will shortly happen, he indicated, and after 2026 development budgets will be limited. 'We need to prepare the projects ourselves and it needs to be viable. The Bangladesh Metamodel helps for that'.

2.2 Plenary session: Knowledge and assessment for investment – use of the Bangladesh Metamodel to support BDP2100 programming

Lead : Morsheda Begum
Chair : Folkert De Jager

1. **Session Program/agenda:**
Thorough insight on Bangladesh Metamodel to support implementation of BDP2100

2. **Presentations and Presenters:**
Presenter: Marnix van der Vat, Deltares
Content:

- Short description on Metamodel, its objective, purpose, impacts and indicators
- The components (Both included and not included) of Metamodel was discussed.
- BDP 2100 scenarios, Different Modules and dashboard use with a flowchart.

Presenter: William Oliemans, Deltares
Content:

- Interactions with the guest about their perspective on the 4 selected issues for a Metamodel result of Barind area

Presenter: Md Mostafizur Rahman, CEGIS and Morsheda Begum, IWM
Content:

- Discussions on the result of two scenarios and base case of Barind region
- "Crop Diversification" and "Managed Aquifier Recharge" project's result demonstration for the base case and the two scenarios.

3. **Questions/Discussion/Panel:**
Question 1: What application do you use for Metamodel in your organization?
Answer: It was highlighted that BMM can provide information, but the decision on what is most important will be taken by people, not by the model. Tofiqul Islam, focal point BMM of MoWR mentioned 3 points of importance: 1. That a directive to follow BMM would be useful and can be provided in a circular from the Planning Commission. 2. More layers of data can be added to the Knowledge portal. MoWR can integrate 550 layers. 3. Input from a diverse group of people is needed. MoWR includes Delta Youth Forum representatives for every hotspot. Dr Akram H. Choudhury, focal point BMM at DAE highlighted the use of comprehensive and inclusive BMM in the multicriteria selection process. These new dimensions to the planning process take time to incorporate and capacity development and mainstreaming is important. DAE also has data available, and data use is a challenge for all agencies, so it is good see the role GED is playing in coordinating.

Question 2: What improvements/additions are necessary to achieve that?
Answer: Database upgradation (DoE), inclusion of plastic pollution and its impacts (Asian Food Security Network), inclusion of data layers on water level, depth, and navigability (BIWTA). Folkert de Jager, as the chair, indicated the importance of transfer of ownership to the knowledge client. He supported the call of Giasuddin A.

Choudhury to come up with suggestions for use, so that BMM is helpful in getting the BDP implemented. He appreciated the contribution of Judit Snethlage of WUR who indicated that the BMM is a tool for communication and called on visualising the results to the stakeholders. WB and ADB may be important in this regard, as they can appreciate further development of BMM as a tool, in order to facilitate implementation and making it cost-effective.

4. **Key Messages:**
   - The Bangladesh Metamodel has been successfully applied to quantify the impact of proposed projects for the BDP2100 Investment Program for the Northwest
   - Stakeholder involvement is important. A diverse range of inputs and people should be included
   - Continue application of the current version of the model for the other BDP2100 Investment programs
   - It is urgently required to make arrangements for hand-over, ownership, maintenance, and operation after JCP

5. **Key Follow up Questions**: How will we benefit from Metamodel?
   - What application do you see for the Bangladesh Metamodel?
   - What improvements/additions are necessary to achieve this?

2.3 Parallel Sessions

Parallel session 1a: Information Services for Decision Making to Support BDP2100 Implementation

Lead: Md Mostafizur Rahman and Catharien Terwisscha van Scheltinga

Chair: Md Mirza Mohiuddin, GED

Presentation by Md Mostafizur Rahman and K. H. Razimul Karim

- The BDP2100 app is an interesting 'all in your pocket' option to see maps on water and agriculture

Technical Feedback with the hands-on demonstration

- A lot of the participants experience bug reports for the app.
- The App stopped working in a number of cases (maybe due to overload).
- Even using the 4G network in mobile data, the app was crashing.

Interesting points raised in the discussion

- App is useful for researchers, but not for farmers. The facilities can be extended to the farmers.
- The language is in English, not in Bengali.
- Question raised about data updating while it was informed that the app will be hosted by GED server.
- The World Bank is interested in increasing the existing 82 data layers into 182 data layers.
- Agricultural portals can be linked with this app and thus, the information will be updated.
- WARPO data could be connected with the App.

- A demonstration or explanation on the adaptive management and knowledge agenda should be considered in the knowledge portal.
- The efficiency of the app can be improved offline which can be accessed by clicking a browser link.
- Monitoring data from the Ministry of Food and other food related data from National Food Council can be included in the app for updating information in the food section.
- Legal obligations should be initiated to share information with WARPO and then to incorporate them in the app.
- An MOU between CEGIS and GED will be signed soon for the continuation of updating data.

Parallel session 1b: Adaptive river management

Lead: Motaleb Hossain Sarker, Director, CEGIS

Chair: Chairman, BIWTA / Member Engineering, BIWTA

REPORTING:

1. Session agenda

- This session aims to share insights in new developments in river management and how it is adaptive and incorporating that we need to be ready for the future.

2. Presentations and Presenters

Title: Downstream of Jamuna River and Revetment to Protect against parallel flow.

Presenter: Dr. Robin Kumar Biswas, Superintending Engineer (Planning-3), BWDB.

Content:

- Not fixed river boundary.
- Find out the river corridor.
- Uses of flood plain as retention basin.
- Strategic river management plan.
- Establishment of the vision of Government.
- Sufficient knowledge.
- Development of Technology in Bangladesh.
- Reduction of riverbank erosion.
- Delta Plan.
- Low-cost structures compared to Sirajganj and Jamuna bridge.

- Recovery of Lost floodplain land.
- Navigation restoration.
- Flood risk, distributary, and environmental enhancement.
- Better adaptive river management.
- Monitoring system should be enabled for better adaptive river management.

Title: A case study of old Brahmaputra.

Presenter: Motaleb Hossain Sarker, Director, CEGIS

Content:

- Implementation of any plan follow learning by doing approach
- Single option cannot be managed in such dynamic river like old Brahmaputra.
- Finding out some options with some multiple measures.
- Other possible measures considering the maintenance dredging with capital dredging.

Title: Go with the flow - Old Brahmaputra.

Presenter: Mr Yusuf and Farhana Kamal.

Content:

- Uses of the concept of adaptive river management to enable the Old Brahmaputra offtake function.
- Learning by doing such as implementing one cycle, monitoring, evaluating, and implementing another cycle.
- 2D modeling.
- Showing some modeling results to show how the dynamics of the river.
- List of measures such as dredging, bank protection measures, etc.
- 1D Modeling considering the dredging results of BIWTA.
- Increase flows in distributary rivers such as Jhinai, Nagda, Bangshi.
- Ecosystem Services- Qualitative.
- Impact of Measures.

3. Comments on the Reflections:

-Dr. Shamal Chandra Das, Chief Engineer (Planning), BWDB.

- Compare between traditional river management vs adaptive river management to understand why we should go for the adaptive river management.
- Conflict between no-regret solution with adaptive river management.
- Trapping the silt into a basin.

Md. Zahirul Haque Khan, Executive Director, IWM.

- Divert the flow of Old Brahmaputra to the left channel.
- Smart dredging including riverbank.

- Mr. Rokibul Islam Talukder, Chief Engineer (Dredging), BIWTA.

- Water ways decreased from 6000 km to 3000 km in monsoon to dry period.
- Targeted water ways is 10000 km
- Presently 7000 km water ways in monsoon and 5000 km water ways in dry period.
- 56000 registered vessels uses these water ways.
- By narrowing the river like Jamuna, it increases the navigability.
- The channel shifts left bank to right bank if the offtake of Old Brahmaputra gets opened.
- Negative interest of local people.
- Dredge material management is a problem, financing the dredging every year is a problem.
- Single unit can be setup or dredging.

-Pintu Kanungoe, Director (Hydraulic Research) (Additional Charge), River Research Institute.

- There are many challenges for adaptive river management.
- Not having the plan during disaster.
- Restoring River in previous width.

- Dr. Toon Segeren , Director, Deltares.

- River dynamics and sediment management is complex.

Finally, Motaleb Hossain Sarker, Director, CEGIS summarized the discussion as

- It is very important to understand and practice adaptive river management.
- Adaptive river management can ensure proper navigability of our water ways.
- It is very important to understand the dynamics of river like Old Brahmaputra. For this, modelling is very important.
- Dredging, monitoring, dredged material management etc. are very important part of adaptive river management.

Parallel session 2a: Coast and polders

Lead: Shaikh Nahiduzzaman, IWM

Chair: Dr. Md. Ataur Rahman, Professor, Department of Water Resources Engineering, BUET

REPORTING:

1. Session agenda

- To share insights on the future challenges on water resources management for coast and polders, linking to the Bangladesh Delta Plan 2100
- Identify the adaptive measures to improve water management system and ensure food security under changing climate

2. Presentations and Presenters

Title: Polder drainage modelling in times of climate change

Presenter: Shaikh Nahiduzzaman, IWM

Content:

- Problems in the coastal polders of Bangladesh
- Polder inundation at present and future under changing climate
- Adaptive measures for drainage improvement

Title: Design of regulator gates by Fibre Reinforce Polymer (FRP)

Presenter: E. Bosman, Witteveen+Bos

Content:

- Merits and demerits of FRP
- Design concepts of regulator gates by FRP
- Components of FRP gate
- Construction procedures of FRP gate

Title: Cropping pattern in coastal polders at present and future considering climate change

Presenter: dr.ir. AJ (Stijn) Reinhard, Senior water economist, Wageningen University and Research

Content:

- Crop water modelling using SWAP WOFOST model
- Simulation of crop production at present and future under climate change and drainage improvement measures

3. Questions/discussion/panel

-Why Polder-40/1 selected is this study?

Polder 40/1 is selected considering its degrees of vulnerabilities, risks and opportunities

Does the remote sensing technology is used in this study?

Remote sensing is used extensively in this study for identifying the drainage khals, watershed delineation, land use pattern and also for planning of improved water management system

Suggestions

- Minimum 2.5m width FRP gate for passing the country boat through the regulator
- Internal khals should be designed for both drainage and irrigation
- Polder water management should be planned in integrated way considering drainage, sediment, drainage capacity of internal drainage khals as well as peripheral river and people's participation
- Planning for river dredging during polder drainage improvement in an integrated and holistic approach

KEY MESSAGES:

- Polder water modelling is mandatory for planning and revisiting of drainage systems considering climate change, land use and socio-economic development including drinking water
- Re-modelling of water control structures are mandatory
- Construction of regulator gates by composite material (FRP) is important
- Participatory water management is essential for effective water management
- Internal canal system should be designed considering both drainage and irrigation

KEY FOLLOW UP QUESTIONS:

- How to arrange the composite gate can be built in Bangladesh?
- How to integrate the remodeling of drainage structures in comprehensive manner to be applied by BWDB?

Parallel session 2b: Clean and safe water

Lead: Hans Aalderink

REPORTING:

1. Session programme/agenda

Timing	Activity	Who
15.30 – 15.35	Opening	Mr. Hans Aalderink

15.35 – 15.40	The use of water quality models in planning	Ms. Ismat Ara Pervin
15.40 – 15.45	Monitoring of emerging pollutants	Mr. Hans Aalderink
15.45 – 15.50	Implementation of measures	Mr. Md. Motaleb Hossain Sarker
15.50 – 16.30	Interactive session on adaptation pathways in groups	Dr. Farhana Ahmed
16.30 – 16.40	Plenary feedback on main findings	Ms. Ismat Ara Pervin
16.40 – 16.45	Conclusion	Mr. Hans Aalderink

2. Presentations and presenters

Title 1: Use of water quality models in planning

Presenter: Ms. Ismat Ara Pervin, Senior Specialist, Institute of Water Modelling (IWM)

Content: Ms. Pervin gave an insight about the use of water quality models for better management of water resources. The utility of WQ models includes forecasting, investigations, planning and overall management. In her presentation, she also covered major sources of water pollution such as industries, agricultural activities, domestic sewage, etc. Then she gave an overview about D-Emission model developed under JCP and the EcoLab module of Mike 11. After that, she covered how D-Emission and MIKE 11 EcoLab Modeule has been coupled to develop the updated model for the Dhaka watershed. Finally, she concluded that WQ modelling tools can be effectively used for measuring effectiveness of different strategies.

Title 2: Monitoring of Emerging Pollutants

Presenter: Mr. Hans Aalderink, Strategic Advisor, Deltares

Content: Mr. Aalderink gave a presentation on the emerging/micro pollutants, their types and sources, impacts and challenges in sampling and monitoring them. Then, he mentioned about use of passive samplers and their advantages in monitoring of emerging pollutants. After that, he shared the case of Dhaka rivers (at 10 hotspots during dry and wet seasons) and Meghna River with results obtained under this JCP sub-project. Then, he stressed that emerging pollutants are a serious problem in Dhaka watershed. He further said that monitoring of emerging pollutants is important for ensuring safe water, policy development on ecosystem protection and for ensuring future investment in water treatment technology. Finally, to achieve the above goals, capacity building and further research on cost-effective monitoring method development are required as well.

Title 3: Institutional framework for Water Quality Monitoring

Presenter: Mr. Md. Motaleb Hossain Sarker, Director, Water Resources Management Division, Center for Environmental and Geographical Information System (CEGIS)

Content: Mr. Sarker covered the institutional management framework of water quality monitoring. He presented different sectors such as agriculture and irrigation, drinking water, industrial and urbanization, domestic and livestock, aquaculture and fisheries and ecological services for water quality monitoring. Then he shared the different sector wise stakeholders identified for water quality improvement measures. After sharing the potential implementation measures, he presented the institutional framework for water quality monitoring.

Title 4: Group work: Adaptation Pathways on Urban Water Quality

Facilitator: Dr. Farhana Ahmed, Senior Specialist, Center for Environmental and Geographical Information System (CEGIS)

Content: Dr. Farhana Ahmed facilitated the group work on adaptation pathways on urban water quality. First, she presented the scenarios of Bangladesh Delta Plan (BDP) 2100 in context of changing climate and socio-economic condition. Then she shared the strategic vision and linkages of different scenarios in light of BDP 2100. After that, she presented an example of adaptation policy pathways and involvement of different stakeholders with timelines. Then she facilitated a workshop for finding out adaptation strategies for clean and safe water for Dhaka city sub-project. The participants were divided among four groups such as domestic wastewater, industrial pollution, agricultural pollution and pollution from inland water transport. The participants actively participated in the workshop and contributed to suggest adaptation strategies which will be valuable input for this JCP sub-project.

3. Questions/discussion/panel

- Question/topic/panelist 1: Is passive sampling used by GoB or other recognized institutions?

- Answers/discussion 1: This is the first application of passive samplers in Bangladesh under JCP. More research is needed by different organization in this filed.

Parallel session 3a: Nexus of water, food and agriculture

Lead: Judit Snethlage

Chair/discussants:

- Chair: Dr Md. Akram Hossain Chowdhury
- Moderator: Catharien Terwisscha van Scheltinga
- Presenters: Marnix van der Vat, Abdur Rashid, Abdul Halim Farhad and Judit Snethlage

REPORTING:

1. Session programme/agenda

Timing	Activity	Who
10:00-10:05	Welcome and introduction	Catharien Terwisscha van Scheltinga Md. Akram Hossain Chowdhury
10:05-10:20	Managed Aquifer Recharge	Marnix van der Vat
10:20-10:35	Make It Real	Abdur Rashid and Abdul Halim Farhad
10:35-10:45	Interactive discussion with Mentimeter	Judit Snethlage
10:45-11:05	Reflections from the experts in the audience on application of knowledge insights.	Catharien Terwisscha van Scheltinga
11:05-11:15	Summary, and reflection	Md. Akram Hossain Chowdhury

2. Presentations and presenters

Introduction by Chair – Md. Akram Hossain Chowdhury

The chair opens the session and welcomes the participants. He addresses the increasing pressure on water in Bangladesh following population growth, development, urbanization and other factors. Agricultural land is on the other hand decreasing. He addresses climate change, changing river flows and altering water availability in the cropping time. This can be from too much, to too little water. Also, salinity and water scarcity are emerging problems.

To fulfill the food demand of growing population, we need water, but in an optimal way; not too much, not too little. The nexus of water and food is therefore important as well as assessing the water demand. Scenarios for this

have been made in the JCP research, which are shared in this session. Chair introduces the program and welcomes all again.

Managed Aquifer Recharge – Marnix van der Vat

Marnix presents on behalf of colleagues from Deltares, CEGIS, IWM, Acacia Water and University of Rajshahi. He shares research on the Barind area, where thousands of deep tube wells were installed, dry season "boro rice" was cultivated increasingly and underground pipelines were made. This led to poverty reduction and increased food security.

However, there are concerns on sustainability, as ground water levels are dropping, locally about 1m per year. This topic currently gets a lot of attention. MAR (Managed Aquifer Recharge) has been the topic of the research. This is active groundwater replenishment. Often mentioned as a potential solution for groundwater issues. This is a proven method, but challenging to apply in the Barind area, due to thick layer of clay above the aquifer.

In the incubator study, there are three parts; 1) Improve understanding groundwater system, 2) Identification of feasible technical designs and suitability and 3) Determine economic feasibility.

Then, the presenter addresses the groundwater system and how it has changed over the past 10 years in the Barind region. Trends are different for different locations in the area. Overall, in the central part of the Barind, there is a declining trend in groundwater levels.

The Metamodel has been used to compile the water balance. The balance shows that around 50% of the water that is currently in the river, should go into MAR to compensate.

Regarding suitable locations, there are not many options due to thick clay layer and land use. Best is recharging from canals or roof tops. Clogging of sediment is causing trouble in recharge wells, even though they are easy to install. A sedimentation pond and sand filter are good options to reduce this. However, then more space is needed, as well continuous operation.

Overall, a lot of MAR is required to reach a net water balance. However, MAR can still help locally and can help to improve the groundwater balance towards a more sustainable situation. MAR is not the silver bullet in the Barind region, but one of the measures that can help.

Make It Real – Abdur Rashid and Abdul Halim Farhad

The goal of the Make It Real sub project is to establish the current and future interrelated water and food need with climate change, land use change and transformation taken into account. Therefore, the following points are of importance

- Understand the current water availability for optimization of water for irrigation purposes and current food demand.

- Knowledge on relation between water supply and food supply in future
- Awareness of potential gap between future food supply and demand
- Assess whether measures are necessary for future food security.
- Awareness of potential gap between future water supply and demand for agriculture and other water uses,
- Increase capacity using climate change scenarios and modelling.

After going through the context of Bangladesh, the main research question is introduced: How can Bangladesh feed itself now and in the future with the available water?

To answer this question, hydro-crop models have been used. Stakeholder participation was included in the beginning, during and end of the modelling process, via interviews and group discussions.

The linkages between water and food are visualised and explained in the session, as shown in the figure below (figure 2.3.1).

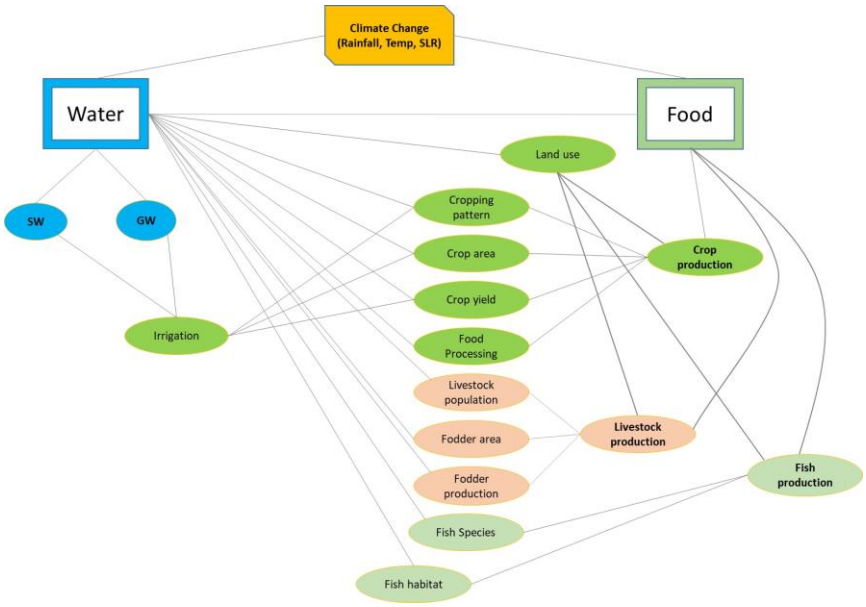


Figure 2.3.1: The linkages between water and food

Then, results are being shared on the projections for temperature and precipitation. Temperatures are expected to increase heavily. Regarding precipitation, for some seasons increased precipitation can be expected, while for others it will be reduced.

Linking these data and projects to food, a food status of 2020 is shown. This shows that for some agricultural products there is more produced than demanded at national level. This also differs per region. When looking into the future, the food status under existing dietary patterns, desirable dietary patterns and desirable dietary patterns + land use change + climate change.

In the end, a summary of some main points is provided.

- The target production could be achieved through accelerating genetic gain, minimizing yield gap and replacing high yielding modern variety.
- In general, the water demand for T. Aman rice can't be met without additional water supply in near future. So, infrastructure should be developed for supplementary irrigation.
- In addition, drainage conditions may deteriorate due to climate change and SLR resulting in a loss of acreage
- During the dry winter season, water demand is not met by natural supply. The water gap for Boro rice is significant

- Winter crops like pulses have a shorter growing season and less water consuming, resulting in a lower water gap

Interactive discussion with Mentimeter – by Judit Snethlage and Catharien Terwisscha van Scheltinga

Some outcomes from the Mentimeter:

- All people think future irrigation water scarcity will increase. A representative from DAE mentions that is related to rainfall patterns. As they change, and cropping seasons are fixed, water scarcity will increase. Also, flows from rivers will change and salinity will increase, leading to increased water scarcity. Another attendee mentions that lower rainfall is already being experienced in recent history. According to him, rainwater harvesting is a promising option. Also, related livelihoods are of importance to consider.
- Most people expect that farmers will change their cropping pattern. Selim Reza from Solidaridad mentions that different developments are taking place, therefore cropping patterns need to change. Therefore, we also need research on what suitable cropping patterns are. Farmers normally immediately change when needed. More info and research is needed to know more about how to adapt in future, and this information should be easily available for farmers. Another attendee mentions that it might be not interesting for farmers, though the rainfall might make it logical to do that. Due to other aspects, like regular income and labour, farmers might wish not to change.
- Regarding the food security of Bangladesh in the future, around 50% of the participants expects it will increase while the other 50% think it will decrease. An attendee working on food security mentions that food and nutrition have been increasing a lot in the past, mentions that it is possible to further increase food security, but steps need to be taken.
- Most attendees think that their work will change if farmers change their cropping pattern. A representative from IWM mentions to be not sure to what extent cropping patterns will change in future, but that things will change.
- Regarding the role of the guests' organisation to achieve food security in Bangladesh, the following are amongst others mentioned: Capacity building, Provide knowledge, Retain soil health, Technology broker, Knowledge Management, More quality graduates, Increase milk production with proper rearing, Minimise yield gap.

Summarizing reflections from experts in the audience on application of knowledge insights, Catharien mentions that pressure on water in agriculture will increase, and that insights on that have been given in the MAR presentation.

Also, water for food of the future has been mentioned, and the need for reliable and easy accessible information is mentioned in the session.

Summary and reflection – Md. Akram Hossain Chowdhury

The chair looks back on a nice and interactive session. Through this, we can find out what we need to do to reach future food security. To fulfill our food security, is of our great concern. For that we need water. Technology is one of the crucial factors towards the future. Currently, in Bangladesh it is aimed to increase production. Therefore, new cropping patterns must be introduced and used. Rice cultivation is currently being shifted, to different seasons and varieties. This allows to cultivate an additional crop, and improvement of livelihoods. The chair mentions that there are many factors that need to be considered when addressing the water food nexus. Capacity building and knowledge sharing are among important factors to move forwards. The chair thanks all for the interactive and interesting session.

KEY MESSAGES:

The pressure on water will increase in future (socio-economic developments, diet, land-use, competition of other sectors and climate change). Therefore, availability of water for agriculture will become more uncertain. Reliable and sufficient knowledge for government, farmers and private sector is needed for;

- Translating model outcomes to field-scale (farmers)
- Monitoring for validation of model outcomes (government)
- Exploring future scenario agricultural scenarios (research)

KEY FOLLOW UP QUESTIONS:

How to include different and validated crop, climate and water availability scenarios in the future modelling including socio-economic developments and climate zones for specific agro-ecological zones in Bangladesh?

Parallel session 3b: Coastal Rivers/ building with nature

Lead: Farhana Akhter Kamal, IWM
Chair: Mohammad Abdus Salam Sikder, IWM

REPORTING:

Session agenda

- To provide insight in coastal rivers and building with nature.
- To provide an overview on the effectiveness of nature-based solutions such as Tidal River Management, mangrove afforestation etc. in coastal disaster management.

2. Presentations and Presentors

Title: Tidal River Management

Presentor: Shaikh Nahiduzzaman, IWM

Content:

- Problems in the coastal rivers and polders of Bangladesh (Sedimentation in the peripheral rivers, water logging problem etc.).

- Concept of Tidal River Management (TRM).
- Practices of TRM in the coastal zone of Bangladesh.
- Lessons Learnt from the past TRM projects.
-

Title: Nature Based Solutions for Coastal Disaster Management

Presentor(s): Upal Mahamud and Md. Raqubul Hasib, IWM

Content:

- Hazards that are faced by the coastal zone of Bangladesh.
- Practices of nature-based solutions in Bangladesh (Oyster reef, afforestation etc.).
- Modeling case study on afforestation in reducing the storm surge height and construction coast.
- Modeling case on Sand Engine for Cox's Bazar Sea beach erosion problem.

3. Questions/discussion/panel

- Which nature-based solutions can be implemented in the coastal zone of Bangladesh? What are implementation challenges of nature-based solutions?

Potential nature-based solutions that can be implemented in the coastal zone of Bangladesh are mangrove afforestation, green SAB (Silt Accumulation Basin), sand engine, coral reef etc. Some of the main implementing challenges of these solutions can be land availability, time required to grow or become fully functional, coastal environment (temperature, salinity) etc.

- What can be the alternatives of Tidal River management? What are the benefits and challenges of these alternatives?

The alternatives of tidal river management can be excavation rivers and khals, pumping and regulating structures in the main rivers. The dredged material can be used for land development. But these alternatives are costly and can only be used as short-term solutions.

KEY MESSAGES:

KM 1: Nature based solutions are very promising to attenuate the effects of coastal disasters. These solutions can be made effective and sustainable ensuring ecosystem and development balance.

KM 2: Potential nature-based solutions are mangrove afforestation, development of coral reef near the shore, salinity resilient vetiver, green SAB (Silt Accumulation Basin), sand engine etc.

KM 3: However, some hard measures such as slipping defense, dredging, pumping, embankment can also be combined with nature-based solutions.

KEY FOLLOW UP QUESTIONS:

Q 1: What are the benefits of the suggested nature-based solutions?

Q 2: What are the challenges of implementing the nature-based solution in coastal rivers?

Parallel session 4a: Agriculture transformation

Lead: Stijn Reinhard, Wageningen University and Research

Chair: Wais Kabir, retired Executive Chairman of BARC and KG

Programme

Time	Subject	Who
11:30 – 11:35	Welcome and introduction	Facilitator dr Stijn Reinhard (Wageningen University and Research)
11.35 – 11.45	Setting the scene by chair of this session	Wais Kabir (retired)
11.45– 11.50	Agricultural Transformation in Bangladesh	Akram Chowdhury (DAE)
11:50 – 12:00	Presentation 1 Theory of Change Agricultural Transformation with link to knowledge agenda	Catharien Terwisscha van Scheltinga, (Wageningen University and Research)
12:00 – 12:20	Securing the food system of Asian Mega Deltas for climate and livelihood resilience; Applied research and partnerships in BD	Tim Krupnik, (CIMMYT, CGIAR)
12:20 – 12.25	Introduction panel discussion	Moderator William Oliemans (Deltares)
12:25 – 12:30	Pitch panelist 1	Selim Reza Hasan (Solidaridad BD - NGO)
12:30 – 12:35	Pitch panelist 2	Wajiha Khatun (IFPRI - research)
12.35 – 12.40	Pitch panelist 3	Sadman Sadek (Digital innovation for impact – private sector)
12:40 – 12:55	Panel discussion	Moderator and panelists Questions from audience are taken
12:55 – 13:00	Wrap-up and closure by chair	Wais Kabir

Key messages

a. Bangladesh agriculture is transforming quickly
b. Digitalization, including financial digitalization, is important to reduce transaction costs in the supply chain
c. Empowerment of women is important for implementation of a more nutritious diet, they are in charge of the household food decisions
d. An innovation accelerator will enlarge the uptake of innovations by private sector. Young professionals should be stimulated to participate

Key follow up question

- How to organize coordination for agricultural transformation to fulfill all goals simultaneously: access to nutritious food, resilient to shocks, sustainable, equitable, and socially embedded

Parallel session 4b: Resilient infrastructure and land use

Lead: Dr. Farhana Ahmed, Senior Specialist, CEGIS

Discussant 1: Gopal Krishna Debnath, LGED

Discussant 2: Giasuddin Ahmed Choudhury, DTL, SIBDP

Moderator: Dr. Farhana Ahmed, Sr Specialist, CEGIS

Reporter: Anindya Banik, CEGIS

REPORTING:

1. Session programme/agenda

Session programme: Opening by the Session Lead- Dr. Farhana Ahmed, Senior Specialist, CEGIS

Session Chair: Giasuddin Ahmed Choudhury, DTL, SIBDP opened the session

Presentation- Resilient infrastructure and Development by Dr. Farhana Ahmed, Senior Specialist, CEGIS

Discussant: Gopal Krishna Debnath, LGED provided some discussion points

Group Exercise- Dr. Farhana Ahmed, Senior Specialist, CEGIS

Closing remarks: Gopal Krishna Debnath, LGED and Giasuddin Ahmed Choudhury, DTL, SIBDP

Agenda: This session presented knowledge on how to develop resilient infrastructure in the face of disasters

2. Presentations and presenters

Presenter: Resilient infrastructure and Development by Dr. Farhana Ahmed, Senior Specialist, CEGIS

- Provided a background on resilience then showcasing examples of projects conducted at different levels (planning level and design and implementation level) and the use of Tools developed under JCP e.g metamodel and Land use change modelling in Resilience Assessment.

Group Exercise- Dr. Farhana Ahmed, Senior Specialist, CEGIS

- What kind of measures can be taken up to make the infrastructures resilient in the face of disasters occurring at different hydrological regions?

3. Questions/discussion

Q. What kind of measures can be taken up to make the infrastructures resilient in the face of disasters occurring at different hydrological regions?

Ans. Discussed the measures that are applicable for the different hydrological regions.

Key Message:

"Development of Resilient Infrastructure is essential for a better future"

KEY FOLLOW UP QUESTIONS:

- How to incorporate ecosystem resilience in road construction?
- How to adapt design of all-weather roads considering climate change?
- How to incorporate blue-green design principles and Reduce-Reuse-Recycle concepts in urban resilient infrastructure design?

2.4 Training and Demonstration

Training on Land Use Change Knowledge

Lead: Dr. Farhana Ahmed, Senior Specialist, CEGIS

Resource Persons: Prof. Dr. Shaikh Shamim Hasan, Professor, Dept. of Agricultural Extension and Rural Development, Bangabandhu Sheikh Mujibur Rahman University (BSMRAU)

REPORTING:

1. Session programme/agenda

Session programme: Opening by the Session Lead- Dr. Farhana Ahmed, Senior Specialist, CEGIS,

Presentation- Prof. Dr. Shaikh Shamim Hasan, SMRAU

Lecture Demonstration and Group Exercise- Anindya Banik, CEGIS

Q&A and Discussion- Prof. Dr. Shaikh Shamim Hasan, SMRAU

Agenda: To provide a training on the application of landuse modelling in generating land use change knowledge

2. Presentations and presenters

Presenter 1: Application on Land Use Modeling /Prof. Dr. Shaikh Shamim Hasan, SMRAU

- Land use and Land cover, Land use Modeling, Monitoring Land cover change, Importance and need of LUC modelling, driving forces and output products, Factors affecting LUC, Categories of LUC Models, Application of different LUC models, Requirements and sources of LUC data, LUC Scenario Development,

Presenter 2: Training on Land Use Change Knowledge - Dr. Farhana Ahmed, Senior Specialist, CEGIS

- Introduction about different LUC model, Process of LUC Model, Drivers of Land use change, Brief description of JCP-LUCK project

Lecture Demonstration and Group Exercise- Anindya Banik, CEGIS

3. Questions/discussion

Ques: Why there is a huge change in Land use from Mughal period to present day?

Ans: Population density of our country is the main problem and it is the main cause of changing the Land Use in a wide far range.

How has this population growth been incorporated in the LUC model?

Ans: Yes, the population is added as a driver in the iClue Model

Ques: Are there any anthropological factors involved in the model?

Ans: Uncertainty factors like, Anthropological factors are very critical and complicated, so generally, it is not involved in the model.

Key Message:

"Land Use Change Knowledge is the key for integrated spatial planning and robust development pathways"

KEY FOLLOW UP QUESTIONS:

- There are opportunities mentioned in the LUC models but challenges need to be addressed e.g. impact of economic growth and population increase?
- Intergovernmental Panel on Climate Change (IPCC) publishes results of Climate Change. Is the latest Climate change predictions of the ICC sixth Assessment results considered in the LUC model? If not, then how that can be done?

Training on Bangladesh Metamodel

Lead: Morsheda Begum

Resource Persons:

- Marnix van der Vat, Deltares
- Md. Mostafizur Rahman, CEGIS
- Dr. Farhana Ahmed, CEGIS
- Morsheda Begum, IWM
- Saeed Moghayer, WUR
- Moshiur Rahman Rimu, CEGIS
- Anindya Banik, CEGIS

REPORTING:

1. **Session programme/agenda**

Session programme: Introduction- JCP Team

BDP2100 Implementation and Bangladesh Metamodel- JCP Team

Features of Bangladesh- JCP Team

Exercises on Water Balance Module and Food Security Module

Objective: Explaining role of Bangladesh Metamodel in implementation of BDP2100 to the end-users. To introduce the participants with water balance and food security modules through conceptual hands-on exercises.

2. **Presentations and presenters**

- Training on Bangladesh Metamodel – Marnix van der Vat, Dr. Farhana Ahmed & Morsheda Begum
- Exercise on Water Balance Module – Anindya Banik
- Exercise on Food Security Module – Saeed Moghayer & Moshiur Rahman Rimu

3. **Questions/discussion/panel**

Ques: Are the Metamodel indicators showing results for a specific year or some average value?

Ans: The Metamodel shows average values for the entire hydro-meteorological simulated period of 1988-2017. It calculates values for each timestep of ten days within this period. When the dashboard is prepared, for most indicators the values are aggregated as average over the years. The definition of the indicators as presented in the technical documentation provides details of the aggregation for each indicator.

Ques: Which year's data have been used for driving parameters and baseline values?

Ans: The driving parameters have been derived using publically available data in 2018, when the development started, e.g., population data from BBS 2011, agriculture data from agricultural yearbook 2017-18. The baseline values are shown for 2020. The hydro-meteorological input data cover the period 1985-2017.

Key Messages:

- Metamodel provides quantification of the societal impact of possible investment projects
- This can be used to evidence based decision making on investments
- Common platform for different agencies
- Apply the Metamodel now that it is there to assess the impact of investment projects
- Be aware of its limitations in scope and accuracy
- Maintain it to keep it up-to-date
- Improve existing modules
- Add new modules only when new detailed models and knowledge becomes available

Key follow Up Questions:

- What application do you see for the Bangladesh Metamodel?
- What improvements / additions are necessary to achieve this?

Demonstration on Water Food Nexus

Training on Polder of the Future

2.5 Plenary session: Knowledg for resilient climate adaptation

Chair: Folkert de Jager, First Secretary, Embassy of the Kingdom of the Netherlands

Keynote speech Prof Saleemul Huq

Prof Saleemul Huq addressed 3 points in his captivating speech:

1. **Climate change** is a persistent problem. It is happening already. 'The future will be different and worse. We need to take action in a different way. We need better knowledge for that. What can happen and what can we do about it.'
2. **Knowledge.** With regard to Knowledge, Prof Saleemul Huq mentioned the aspect of the knowledge industry and the knowledge platforms. In the knowledge industry, meaning the academic and research organizations, faculty needs to do more joint research, and more focus should be on learning from each other. He further stressed that we need to build more on the knowledge base that is

created with our Ph.D. students. Besides, Bangladesh can also host Ph.D. students from the Netherlands, as we can learn from each other, for mutual benefit. All MSc in Bangladesh should know and be able to think about the future, so an online course on BDP will be appropriate. It needs to be user-friendly. Faculty should be trained in this regard, so they may include it in their programmes. With regard to the Knowledge platform – he stressed not reinventing the wheel. There is a climate change platform, Gobeshona, which has already collected over 2000 papers on Bangladesh and climate change. Gobeshona has gone global, with a focus on locally-led adaptation.

3. **Action**. Tackling climate change is urgent. And the world is not ready. Prof Huq; 'We need urgent action! Bangladesh and the Netherlands are both ahead. We can help each other – and the whole world – by creating global public goods with our knowledge on how to adapt'. The collaboration so far, is an excellent foundation and needs to be taken to the next level.

In his reaction, Folkert, as the Chair, indicated that 50 years of friendship between Bangladesh and the Netherlands shows that we have a strong friendship. Both are delta countries. He supported the joint responsibility for action: 'We should build on this and need to share this knowledge to the world also'.

Video of Mrs Han van Dijk, Netherlands Scientific Organization (NWO)

Mrs Han van Dijk referred in her video to the Urbanizing Deltas of the World programme (UDW) and stressed the importance of the co-creation of knowledge with the involvement of stakeholders.

Bangladesh is with the BDP2100 working on a longer terms result and therefore wishes to strengthen its knowledge base. It is the NWO strategy, to work on international collaboration and facilitate robustness of knowledge with an emphasis on creating synergies. NWO foresees continuing the collaboration and doing more, for more effective use of existing knowledge and locally led new knowledge development.

Presentation of Key Messages and Key Questions by Dr. Farhana Ahmed

On behalf of the JCP team, Dr. Farhana Ahmed presented the key messages and key questions of the various sessions.

Opening session:

- Bangladesh and the Netherlands have much to share and learn from each other: people, knowledge, and deltas
- JCP supports BDP2100 implementation
- Nature-based solutions in Bangladesh offer tremendous opportunities, from which the Netherlands can learn
- Transformative change is needed, at policy, implementation and knowledge level

Plenary Session | Knowledge and assessment for investment – use of the Bangladesh Metamodel to support BDP2100 programming:

- The Bangladesh Metamodel has been successfully applied to quantify the impact of proposed projects for the BDP2100 Investment Program for the Northwest
- Stakeholder involvement is important. A diverse range of inputs and people should be included
- Continue application of the current version of the model for the other BDP2100 Investment programs
- It is urgently required to make arrangements for hand-over, ownership, maintenance, and operation after JCP
- Key follow-up questions:
  - What application do you see for the Bangladesh Metamodel?
  - What improvements/additions are necessary to achieve this?

1A | Information Services for Decision Making to Support BDP2100 Implementation

- Information is essential for stakeholders at all levels Information services like the Knowledge Portal of BDP2100 and the BDP-App address this need. They need to be available easily and maintained and updated all the time. An MoU for the **continuation** will be signed.
- *Key follow up questions*
  - Which info does the government of Bangladesh like to add and can also other sources of information be included?
  - What are the needs of civil society and the private sector and how do we communicate and tailor the knowledge portal and app to meet the needs?

1B | Adaptive River management

The dredging of the Old Brahmaputra, by BIWTA, including the offtake are in line with the Go with the Flow findings. Now, a pilot is needed to offer smart solutions for the Old Brahampautra offtake and master the approach for other offtakes

- The adaptive river management concept offers opportunities for sustainable management of the offtake of the Old Brahmaputra, and other offtakes
- Ecosystem services assessment makes the holistic approach of the BDP2100 operational
- It is important to consider the large-scale planform of the Jamuna to ensure that the anabranching system favours a left-hand branch near the Old Brahmaputra offtake. For that, a large-scale approach is needed.
- Dredging (and dumping) is the most effective approach for the offtake management of the old Brahmaputra. After implementation (and monitoring) for 3 to 5 years, it may be combined with bank fixation measures.
- *Key follow up questions*
  - How will the pilot take place?

2A | Coast and polders

Key messages

- To improve water management systems, re-modelling of water control structures is mandatory and construction of regulator gates by composite material is important
- A changing climate means changing needs: irrigation and freshwater conservation for drinking water are a top priority
- Farmers need tailored and localized information including salinity forecasting: modelling, monitoring and messages

Key follow up questions

- How to arrange that composite gates can be built in Bangladesh?
- How to integrate the remodelling of drainage structures in comprehensive manner to be applied by BWDB?

2B | Clean and safe water

Key messages

- There is need for regular monitoring of emerging pollutants for policy development on ecosystem protection and future investments in water treatment technology. This requires research on methods for cost-effective monitoring.
- Emission modelling is effective to assess the pollution loads from different sources required for cost-effective pollution control strategies and impact assessment.
- Adaptation pathways are an effective approach to deal with uncertainties and follow an integrated approach

Key follow up questions

- How can we ensure ownership of the developed tool and methods, which is essential for the sustainability of the project outcomes and impacts

3A | Nexus of water, food and agriculture

Key message is

- The pressure on water will increase in future (socio-economic developments, diet, land-use, competition of other sectors and climate change). Therefore, availability of water for agriculture will become more uncertain. Reliable and sufficient knowledge for government, farmers and private sector is needed for;
  - → Translating model outcomes to field-scale (farmers)
  - → Monitoring for validation of model outcomes (government)
  - → Exploring future scenario agricultural scenarios (research)

Key follow up question

- How to include different and validated crop, climate and water availability scenarios in the future modelling including socio-economic developments and climate zones for specific agro-ecological zones in Bangladesh?

3B | Coastal Rivers & Building with Nature

Key messages are

- Nature-based solutions are very promising to attenuate the effects of coastal disasters. These solutions will be effective and sustainable ensuring ecosystem and development balance.
- Potential nature-based solutions are mangrove afforestation, green silt accumulation basins, sand engine, coral reef etc.
- Some hard measures such as defenses, dredging, pumping and embankments can also be combined with nature-based solutions.

Key follow up questions

- What are the benefits of nature-based solutions suggested?
- What are the challenges of implementing the nature-based solutions in coastal areas?

4A | Agriculture transformation

Key messages are

- Bangladesh agriculture is transforming quickly.
- Digitalization, including financial digitalization, is important to reduce transaction costs in the supply chain.
- Empowerment of women is important for implementation of a more nutritious diet; they are in charge of the household food decisions.
- An innovation accelerator will enlarge the uptake of innovations by private sector. Young professionals should be supported to take action.

Key follow-up question

- How to organise coordination for agricultural transformation to fulfill all goals simultaneously: access to nutritious food, resilient to shocks, sustainable, equitable, and socially embedded?

4B | Resilient infrastructure Development

- Development of resilient Infrastructure is essential for better future.
- *Key follow up question*
  - How to consider ecosystem resilience in road construction?
  - How to adapt the design of all-weather roads considering climate change?
  - How to incorporate blue-green design principles and Reduce-Reuse-Recycle concepts in urban resilient infrastructure design?

Interaction and discussion by Catharien Terwisscha van Scheltinga and Judit Snethlage

With an interactive menti-meter session, the audience provided feedback on the Delta Knowledge Days and formulated and shared their insights. From the audience in the 'Knowledge for Resilient Climate Adaptation' session, about 2/3 participated in the menti-meter. First question was about the audience. Corresponding with the overall presence in the audience (see chapter 1) also here the researchers were the majority (43%) while government, private sector, NGO and others were the other half.

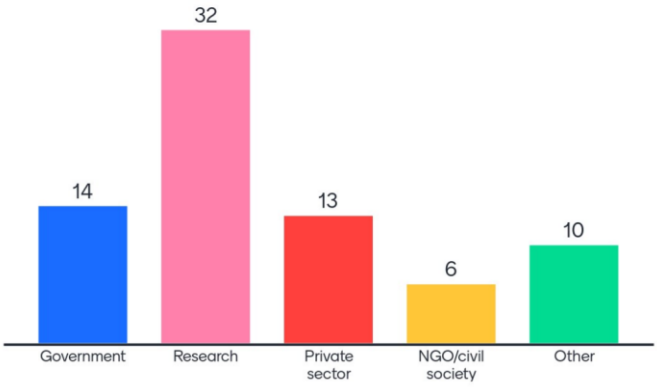


Figure 2.5.1: Participants in plenary session Knowledge for climate resilient adaptation (n=75)

The next question was about the attendance in the sessions. People participated in all the sessions, thus giving quite a representation of the conference in the final session (figure 2.5.2).

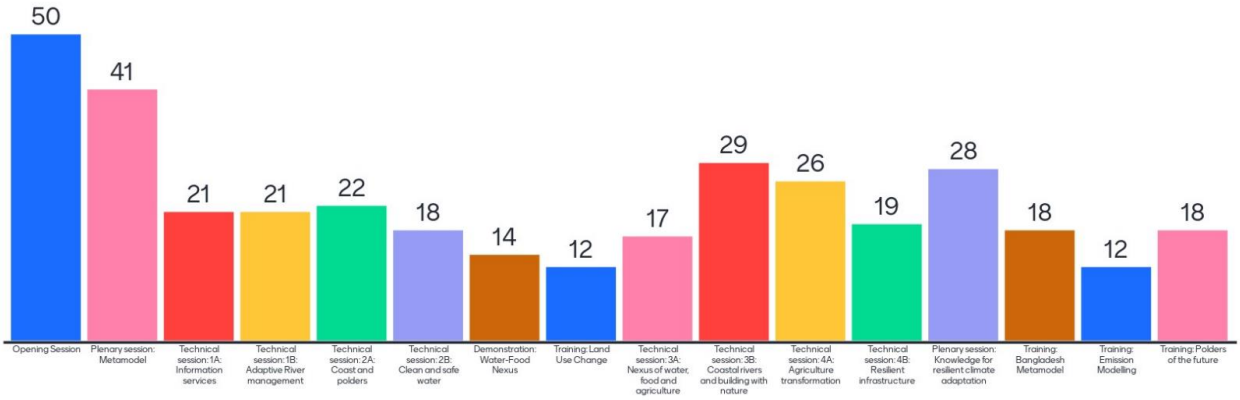


Figure 2.5.2: Participants attending in plenary session Knowledge for climate resilient adaptation attended also other sessions (n=79)

Then the group were requested to express their 'Take home messages' and the 'Most useful newly gained insight'. Detailed responses have been included as Annex 4 and Annex 5.

Take home messages

It is not easy to provide a short summary of the take home messages (n=117) because of the diversity of reactions. Some respondents focussed on the new information they got, either in general, or in detail (nature based solutions, agricultural transformation, emission model, Bangladesh Metamodel, managed acquifer recharge, adaptive delta management, dredging, coastal management). Some linked to the wider setting and learned more about BDP2100, climate change, resilience, 'coordination and integration for inclusive development'. Some took home the message 'Bangladesh can do a future plan like BDP2100' or 'Bangladesh is moving ahead with new knowledge from JCP in BDP2100'. It was also noted that it is complex, that there is need for attention of integration, involving stakeholders in research, and the high potential for applied research was mentioned. Elements like taking ownership of tools, the need to improve and manage knowledge, the need to invest in knowledge and to share that knowledge, were mentioned several times. 'Engagement with knowledge clients/stakeholders is essential to succesfull applied research'. Also the reflection was given in various ways, that the meeting was interesting and knowledge sharing took place in a good atmosphere, e.g. 'Motivating to be together for these important topics and discuss wide variety of topics'.

Most useful newly gained insights

A lot of the responses (n = 99) were very interesting detailed reflections on what was found very useful insight: e.g. about models (BMM and specific hydrological, agriculture, land use, emission models, and much more). And from general to specific knowledge and application of knowledge (e.g. BDP2100 App, drainage, adaptive river management, nature based solutions, use of composite gates etc, etc).

Insights were also on the way research is done, mentioning e.g. about 'data sharing in a common platform', 'research should not be only done in paper, but brought to practise'.

Further, there were insights on what to do with knowledge, and why research is done: 'Knowledge cooperation', 'Focus on application', 'know more, talk less, act more and more' 'informed decision making'.

In the next question, the audience was asked which themes are, in their opinion, most critical for the implementation of the Bangladesh Delta Plan 2100. The answer was to focus on all areas suggested, with emphasis on disaster management, river management, and food security.

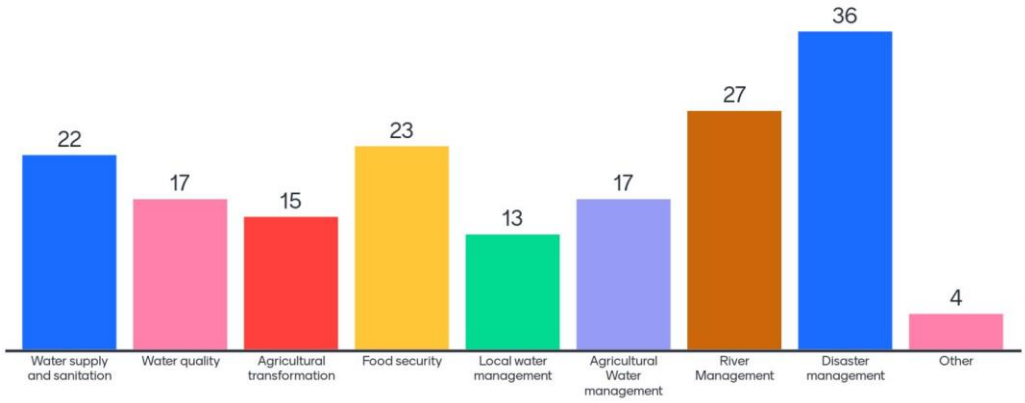


Figure 2.5.3: Themes most critical to focus on for BDP2100 (n=69)

Catharien then highlighted the statement of Additional Chief Engineer Sayeed Ahammad, Project Director of CDSP, who in an earlier session said 'We do not only need Meta model, we also need Meta communication and Meta Coordination'. The majority of the audience agreed on the statement (90%).

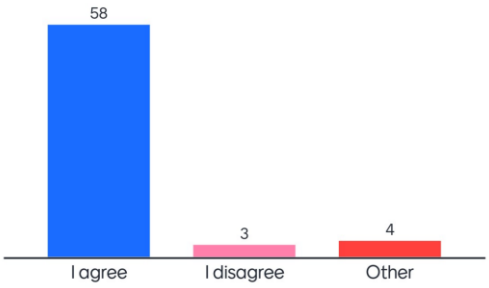


Figure 2.5.4: Statement 'To support BDP2100 with knowledge, we need research on meta models, meta communication meta coordination' (n=65)

Reaction of the 4 directors and the key note speaker

The Chair then gave the opportunity to the 4 directors and the key-note speaker, to react.

Malik Fida Khan, ED of CEGIS stated the importance of the final validation of the National Adaptation Plan (NAP), in which about 52% of the budget is for MoWR, like in BDP2100 also 80%. Further, he indicated that the good bonding between IWM and CEGIS is providing quality knowledge to the country, and he likes to continue that. In this respect, the MoU between MoWR and Deltares and IHE are important.

Toon Segeren, Director of Deltares stated that Bangladesh is an excellent partner although challenges are ahead. Partners worldwide are to work together.

Zahirul Huque Khan, ED of IWM stated that JCP brought the 4 institutes together. 'We need more knowledge and knowledge for various work areas'. He emphasized on the best practices from both Bangladesh & Netherlands and mainstreaming the delta plan. He welcomes continued cooperation.

Arjan Budding, Programme Manager Water of Wageningen University and Research stated the importance of integrating knowledge and working together to achieve impact of the knowledge produced.

Prof Saleemul Huq, Director of ICCCAD stated the need to be going forward. Climate change makes things worse. The Netherlands and Bangladesh as delta countries are ahead and can go help others as knowledge hub.

After a brief intermezzo, in which a group picture was taken, the Chief Guest gave his speech.

Speech of the Chief Guest, Mr Kabir bin Anwar, Sr Secretary, Ministry of Water Resources

Mr Kabir bin Anwar, Sr Secretary of the Ministry of Water Resources stressed in his speech that we need to work alongside with nature for resilient infrastructure as nature is absent im most of our programs/plan. Each area of Bangladesh has unique indigenous knowledge which can be . Water quality, with the ground water level going down rapidly, need to be addressed and should not be neglected. 'It should not happen that we only use 8% of all the river water, we may use another 10%. The point is, where to store it.' The excess fresh water can be stored in hundreds of thousands of wetlands. Internal water management inside the polders, with half of the sluice gates not functioning, need to be addressed. 'For how you can solve things in deltas, you may wish to go to the Netherlands. And if you want to see resilience, you look at Bangladesh'. Both countries are close to each other. He added that the water sector will be more technology friendly in the future and youth will run the future show. Youth are interested in integrated impact & assessment.

The session was formally closed by the chair and the audience enjoyed the performance of Mrs Rezwana Choudhury Bonna, a renowned singer in Bangladesh. She sang various songs, related to water and delta management. A picture impression of the cultural programme is included in the next pages.

3 CONCLUSIONS AND RECOMMENDATIONS

Further development under conditions of climate change will require continuous further development of knowledge. Further developments in the country, like the implementation of the Bangladesh Delta Plan 2100, ATP and NAP, will bring new questions. Research should take place in a way, where research organizations work side by side with the actual implementation agencies and the research results link clearly to the day-to-day process of organizations. In this way, it will help all to learn more efficiently, and will ensure to save money.

Conclusion 1: Knowledge is an important part of the Bangladesh Delta Plan 2100 or other plans.

Conclusion 2: Innovation requires new types of collaboration and new knowledge. Invest and explore actively, with all stakeholders, and create the relevant knowledge infrastructure.

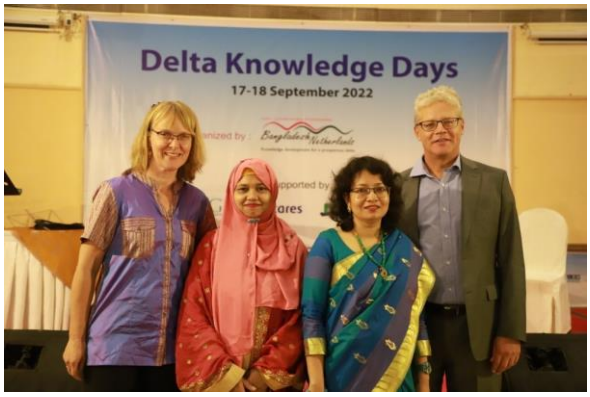
Recommendation 1: Organize Delta Knowledge Days every 2 years, with both knowledge providers and users

Recommendation 2: Create a Knowledge Agenda on Bangladesh Delta Plan 2100 related topics, e.g. linked to the update of the Bangladesh Delta Plan 2100

Recommendation 3: Organize research as a 'side-by-side' process with implementation, where the question for the research has an 'owner', and ensure that the answer links to the 'owner' of the question

Recommendation 4: Formulate a knowledge programme as part of each of the larger scale implementation programmes

Critical areas were mentioned related to adaptive delta management, like disaster management, river management, enhancing food security and addressing water quality. The Delta Knowledge Days 2022 helped to provide and discuss an overview of respective knowledge fields.



4 CULTURAL PROGRAMME

Annex 1: Program schedule

Delta Knowledge Days Programme Schedule

Venue: Lakeshore Hotel, Gulshan, Dhaka **Date:** 17th and 18th September, 2022

Saturday 17 September – Day 1

Time	La vita Hall		
9:00	**Registration**		
10:00	**Opening session** • Welcome & Introduction: William Oliemans, Coordinator Joint Cooperation Program, Deltares • Welcome dance by Chhayanaut Dance Group • Keynote Speaker: Speech on building up knowledge for development, and outlook to the future by Zahirul Haque Khan, Executive Director, IWM • Reflection by Dr. Toon Segeren, Director International Affairs, Deltares • Keynote Speaker: Transformative Change: From Sporadic to Integrated Planning for Implementation by Malik Fida A Khan, Executive Director, CEGIS • Reflection by Arjan Budding, Programme Leader Sustainable Water Management, Wageningen University & Research • Speech from Guest of Honour Folkert de Jager, First Secretary, Embassy of the Kingdom of the Netherlands to Bangladesh • Speech from Chief guest Dr. Md. Kawser Ahmed, Member (Secretary), GED		
11:15	**Tea Break**		
11:30	**Plenary session: Knowledge and assessment for investment – use of the Bangladesh Metamodel to support implementation of BDP2100** • Chaired by Folkert de Jager, First Secretary, Embassy of the Kingdom of the Netherlands to Bangladesh • Key-note presentation JCP Team • Reflection by Giasuddin Ahmed Choudhury, Deputy Team Leader, SIBDP and other prominent experts		
13:00	**Lunch**		
Time	**La Vita Hall**	**Ikebana Hall**	**Akota (training room)**
14:00	**Parallel session 1a: Information Services for Decision Making to Support BDP2100 Implementation**	**Parallel session 1b: Adaptive river management**	**Training on Land Use Change Knowledge**
15:15	**Tea Break**		
15:30	**Parallel session 2a: Coast and polders**	**Parallel session 2b: Clean and safe water**	**Demonstration on Water Food Nexus**
16:45	**End of the day**		

Sunday 18 September – Day 2

Time	La vita Hall	Ikebana Hall	Akota (training room)	Alap (training room)
9:00	**Registration**			
9:15			**Training on Bangladesh Meta Model**	**Training on Emission Modelling for Urban Water Quality**
10:00	**Parallel session 3a: Nexus of Water, Food and Agriculture**	**Parallel session 3b: Coastal Rivers and Building with Nature**		
11:15	**Tea Break**			
11:30	**Parallel session 4a: Agriculture Transformation**	**Parallel session 4b: Resilient infrastructure and development**	**Continuation of training on Bangladesh Meta Model**	**Training on Polder of the Future**
13:00	**Lunch**			
Time	**La Vita Hall**			
14:00	**Plenary session: Knowledge for resilient climate adaptation** • Chief guest: Kabir Bin Anwar, Senior Secretary, Ministry of Water Resources • Chaired by Folkert de Jager, First Secretary, Embassy of the Kingdom of the Netherlands to Bangladesh • Key-note speakers ➢ Prof Saleemul Huq, Director, ICCCAD ➢ Han van Dijk, Senior Programme Officer, NWO • Presentation of key messages and follow up questions • Interactive session			
16:00	**Closing session with cultural contribution of renowned Bangladeshi artists**			
16:30	**End of the day with tea and snacks**			

Annex 2: Participants number from Different Organization

Organization	Number of people
AFSN	1
Ahnaf Textile Consultant	2
Altech	1
BARC	1
BD police	4
BEPZA	1
BIWTA	9
BSMRAU	1
BUET	4
BWDB	10
BWP	2
CCDB	2
CDSP	1
CEGIS	35
CEITS	1
Chayanaut (dansers)	4
CIMMYT	2
CNRS	1
DAE	12
DELTARES	5
DOE	2
DWASA	4
EKN	3
EPRC	1
ERBB	1
FloWater	3
GED	1
ICCCAD	1
IFPRI	1
IUT	2
IWFM	1
IWM	32

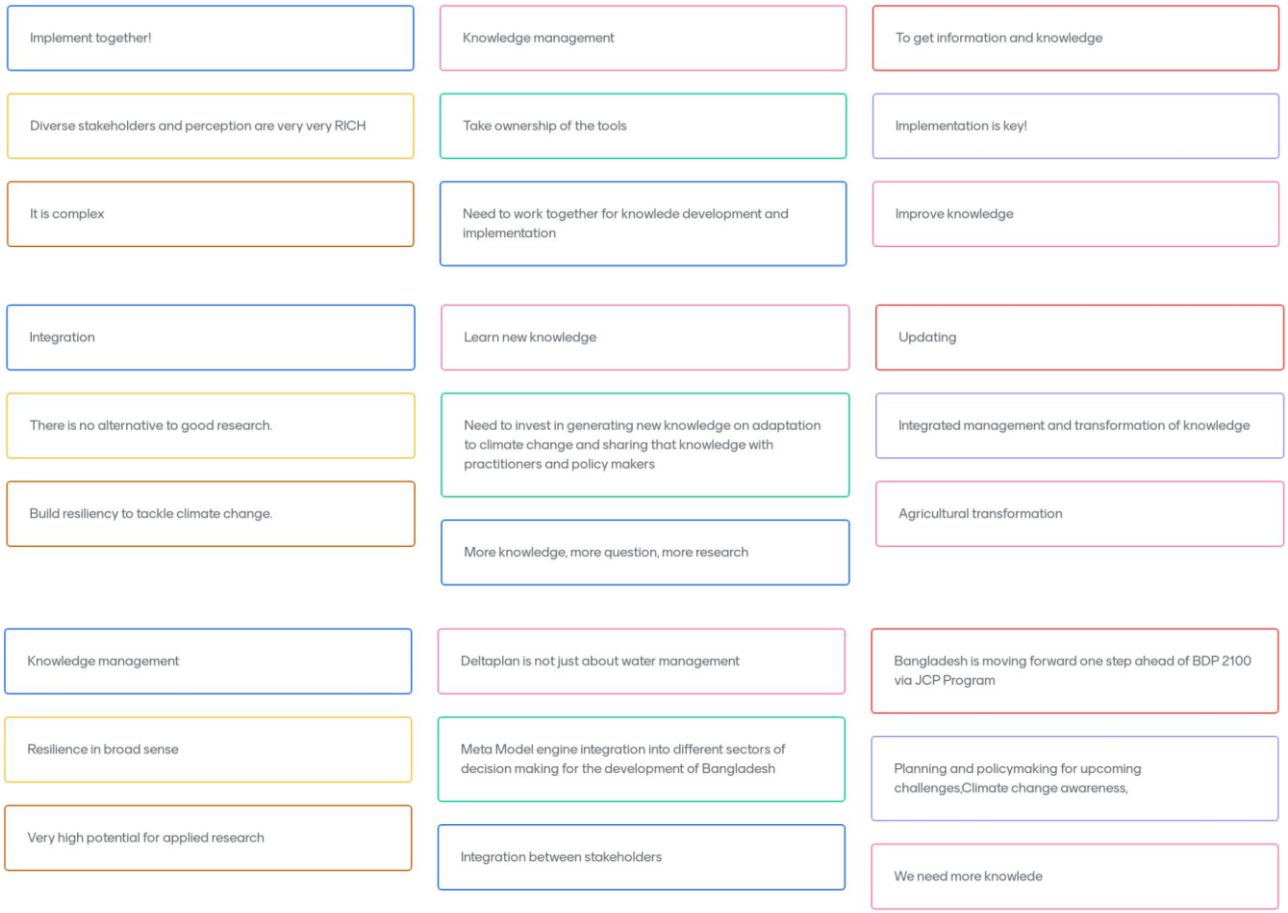
Organization	Number of people
JU	3
LGED	2
Milk Vita	1
MOA	1
MOE	1
Mott MacDonald	2
MOWR	5
MPBNDIZP	1
NAAB	3
NAAFCO	1
NAS	1
NOW	1
NSTU	2
Ocreeds	5
PM office	4
PPLIUB	1
Redorange	2
RHD	2
RRI	1
SAU	16
SB	2
SIBDP	4
Solidaridad	1
UAP	3
UNDP	1
US Forest Service	1
WARPO	4
WDB	2
WUR	5
Musician	6
Organizers / Volunteers	13
Total	**251**

Annex 3: Presentations

Available on request

Annex 4: Take home messages

Take home messages as expressed in the session (n=117):



Transformation

Knowledge management

Engagement with knowledge clients is the key to successful applied research.

Emission model

Make Delta Plan 2100 happen to save the coast from climate change

We need to continue cooperation on Knowledge for Water resources management

To get information and knowledge

Cordination and integration for inclusive development

More research is needed. Also the research impacts should be assessed.

Think rethink, work and establish policy level decision on deltaplan and meta delta

Learn more on the specific topic and initiate

A clear conception of delta plan and other aspects of it

Knowledge sharing with working together

More integrated approach is needed to fight against climate change

It was motivating to all be together for these important topics

Learn about meta model ,MAR, Agriculture practices..

Integrated cooperation is essential

Climate change is real and now is the time to act. We are already late but better late than never.

Transformational agriculture considering climate change

Knowledge need to be dissimitted.

Need to invest in knowledge generation and dissemination to practitioners and policy makers

Involvement

Incredible knowledge base in Bangladesh

Meta data is essential for climate change adaptation

Ownership is essential

I have gained some knowledge on agricultural transformation, & land use planning which I would like to apply in my agricultural sector.

Learning the Meta Model. Ccimate resilient water structure and Polder Management

Knowledge exchange with different sectors

Nature based solutions for adaptation

Proper management of delta requires knowledge and coordination among stakeholders

Knowledge interchange can benefitted each other.

Involve communities!

Water Management for food and transformation might keep in mind for ag sectoral planning

More research, get more people involved from various sectors.

We need to consider the impacts of climate change for planning of future water management. Nature based solution is important. More research is required

Bangladesh can do future plan.

knowledge on Transforming agriculture and food and water nexus

Land use planning

Involve young researchers

1. Bangladesh Metamodel is a powerful tool to anlayze the vialibity of a proJect.2. JCP collaboration has been quite enlightening and an eye-opener in many researches.3. There is room for further research and model development for the future.

It needs to take necessary dredging.

Scope for more research works

Delta plan is more than water management

Knowledge sharing between Netherlands and Bangladesh should go on in the future. Sharing of knowledge among various groups/institutions brings changes in our knowledge and thinking.

More Research

Climate change challenge and adaptation to cope up with this is be main focus to implement delta model

More research on nature based solution

Understand concept on offtake management, meta midal and polder system in coastal zone

Adaptive River management needs further attention.

More future adaptive models are required

Deltas have always been vulnerable to climatic catastrophies. However, due to climate change, these deltas are now in more danger than ever. We need to act now, together!

More research needed with much more accurate data to develop the models thus help the policy maker to adapt a plan for future climate change.

Nature should get top Priority for Resilience infrastructure

Coastal management

Agriculture in polder region

Need for Integrated water resources management

আমরা একত্রিত হলে যে কোনো স্বপ্ন বাস্তবায়ন করতে পারি।

This is very interesting for me.I know lot term.which is updated me.

Make delta plan happened

Nature base solution

Meta model means meta coordination and meta communication

River erosion rate need to be included in metamodel

Chose the correct/ appropiate project acoording to current senario

We can prioritise project for implementation

We have to acknowledge the role of climate changes on water resources and integrate it in planning and implementation of project

New knowledge and data to be shared and disseminated and make it accessible by all levels of people

JCP need follow-up.OwnershipCooperation is needed and honesty

Rain water harvest and climate action for sustainable livelihood

Consideration of Agricultural approaches in Barind region

Emerging pollutants are a threat

We need more colabrative researches for dynamic alternatve pathways for implemention with changed situation

Integrated coastal management system is amendatory need

Access to the information and knowledge about BDP2100 and using technology to get into it. Interaction with Dutch knowledge and technology that creates the opportunity to apply those in our situation.

BDP is a great initiative to develop a resilient Bangladesh which lead to support the SDGs. connected in knowledge-base community

nature base solutions need to be implemented

Data availability for all

Sharing knowledge and best practices

Intensive knowledge sharing from applied research, meta data analysis on water management, climate change, food security and agricultural transformation

Nature based solutions, Meta model, FRP, Resilience; all will guide our future design and planning.

We need more study to Resilient infrastructure

Need action-based research

Know more, talk less, act more

We need to apply multi stake holder meta model app in planning, design, and implementation to take up future projects under Bangladesh Delta Plan 2100 for meta coordination among ministries and agencies.

There are many complexities in managing deltas and accelerated actions are required

more research are needed in Meta model

We need grey green and blue solutios

Multi sector multidisciplinary multi National coordination is necessary to develop appropriate updated knowledge and share, pilotting elsewhere, evaluate and identify best solutions to address upcoming problems due to CC.

Application of meta model in agricultural planning

Lack of data and intersectoral committment

Share knowledge but don't follow blindly

Annex 5: Most useful newly gained insights

Most useful newly gained insights as expressed during the DKD2022 (n=99):

- Potential for nature based solutions and experimenttion
- Meta model concept in project planning
- Mera model
- Wofost model
- Emission modeling
- LUC and Meta Model
- Land Use
- Know more, talk less, act more and more
- Using the meta model
- Knowledge sharing is important
- Delta Plan 2100 app
- Knowledge about modeling work and its application
- Integrated Planning. Application of Meta Model for Project Planning
- New sediment transport for the Jamuna.
- Climate Change information
- Lpjml model
- Meta model, Resilience
- Crop modeling will be phenomenal in building better Bangladesh
- Knowledge and information
- Chalan beel project
- Adaptive river management
- Metamodel can be most useful for policy making but need to update the model with more vast data.
- Meta model to plan for future intervention and implementation projects
- Focus on application
- Training in hydrological modelling
- Using the adaptation pathways in multiple filelds
- Nature based solutions
- Knowledge Dissemination and Enhance knowledge capacity
- Knowing the projects under Joint Corporation Program, knowing about a new type of regulator for polders.
- Knowledge cooperation
- Drainage resilience structure, ecosystem resilience
- Nature based solution to water resources problems
- Land use change, swaf wofos model
- Data sharing in a common platform
- Opportunity and imitations of the models
- Bangladesh Delta plan short course
- Metamodel, Resilience and Deltaplan components
- No go for implementation
- Transformative change
- The use of Metamodel to determine the viability of a project.
- Delta Plan app
- Emmision Modeling
- Cross pollination of innovation and learning between Water, Agriculture, Food security and Nutritional nexus
- Alternatives of TRM
- Infrastructure development and resilient economic development

Bangladesh metamodel needs continuous updating and improvement.Knowledge sharing is important

Make your money more valuable, spent it through to most appropriate project

Knowledge shareing and institutinal training.

Adaptation pathways make engagement easier

Adaptive River management can be made tangible.

Land Use model and metamodel

emission modeling of water quality and Wofost model

Theory of change on agricultural and food system transformation

Technical knowledge for implementing delta plan

Wafost model. Nature based solution for erosion control.

Knowledge cooperation

Water management is a wicked problem, managing delta too!

Start implementation

Tidal river management

Informed decision making

Adaptive rivermanagement

Nature based solutions challenges

Nature based solutions

Adaptation,pathways stimulate integrated and long term thinking

Meta model 2100 for proper forecast for the Delta

Combination of Greyand nature based solutions

Knowledge cooperation

Use of composite gate for our coastal polders

Emission model course

Meta model and it's usefulness.Perform HD model smoothly.

Policy should be updated with new reality.

Deltaplan app

Resilient infrastructure and development

Knowledge cooperation

Climate change adaptation techniques

Multi-secctoral integrated planning scenario anaylsis with Meta Model.

Fresh water availability in coastal area

Insight about different models

Adaptive River Management

Knowledge share

Bangladesh meta model updating

Planning, designing and implementing Resilient infrastructure, echo friendly infrastructure to adjust with changing climate conditions.

Metamodel is helpful prior taking any development projects

Nature based solutions are difficult to implement and need multi sector collaboration

Release funding for routine water quality monitoring

Land use model and metamodel

Sustainable urban drainage management

D-emission Modelling might give an overview of pollution at large scale and give opportunity to take decision or plan for pollution control.

Course development on delta plan

Nature based solution

Need updated data

Introduction of crop diversification

Consider erosion in metamodel

Meta model..MAR model application as meta model

Doing by learning need to apply in implementation

Meta model application in MAR technique..

Resilient solutions identification using meta model exercise. Consider all possible changes, climate change and related changes in anthropogenic activities and demand. Special emphasis on Research, pilotting and find the best possible approach.

Sometimes research is only found in paper, mechanism or effort to bring it practice many times found absence

Ok


Joint Cooperation Programme
Bangladesh Netherlands
Knowledge development for a prosperous delta