



## Reflection on Learning Deltas Asia Initiative





# DeltA Alliance

## Colophon

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Publication date	1 November 2017
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## Delta Alliance

Delta Alliance is an international knowledge-driven network organisation with the mission of improving the resilience of the world's deltas. With increasing pressure from population growth, industrialization and a changing climate, it is more important than ever that these valuable and vulnerable locations increase their resilience to changing conditions. Delta Alliance brings people together who live and work in deltas. On an annual basis, the wings report on the knowledge developed and shared in their wings.

## Acknowledgements

This publication has been developed with the support of the Delta Alliance Wings and the Delta Alliance International Secretariat.

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## 1. Introduction

Delta Alliance, as a knowledge network, supports the sharing and development of knowledge on deltas worldwide. When consulted on a learning initiative for delta's, Delta Alliance continued its earlier engagement on Deltas with the Global Water Partnership, to explore such new initiative. Two members of the Delta Alliance core group from Wageningen Environmental Research and TU Delft, Catharien Terwisscha van Scheltinga and Marjan Kreijns, were requested to support the Learning Deltas Asia Initiative (LDAI) and provide support to the Delta Alliance wings involved in both Bangladesh and Myanmar, with the intention to learn about the initiative and reflect on it for further application in other wings as well. This intention could only be partly fulfilled, as the initiative started late, and has not yet been completed at the moment this report is written (June 2017).

## 2. Description of the Learning Deltas Asian Initiative

Towards the end of 2016 GWP initiated the Learning Deltas Asian Initiative as a means to enhance capacity development in a format of a holistic basin-wide programme instead of a project based approach.

In this first years of operation the Learning Deltas Initiative will focus on Asia and it will operate in cooperation with parties of the Delta Coalition. This so called LDAI (Learning Deltas Asia Initiative) focuses on urgent issues in Deltas and Delta Cities in Asia. These relevant issues are: Flooding, Drought, Saltwater intrusion, Land subsidence, Erosion, Sedimentation and Infrastructures on soft soils. In south-south cooperation the different Asian Delta countries learn from each other. The lead of the programme is in Bangladesh with the Bangladesh Water Partnership. Bangladesh has considerable experience in this field and will be the next Delta Coalition Chair. Therefore they are a very logical lead partner. An elaborate description of the LDAI is included in Annex 1.

The LDAI started small in 2017 with a pilot for learning exchange between Bangladesh and Myanmar. A delegation of Myanmar professionals visited Bangladesh from 25 February to 1st March 2017 to increase their understanding of the challenges faced by Bangladesh and to foster cooperation to develop joint solutions. From 31<sup>st</sup> May till 5<sup>th</sup> of June a delegation of Bangladesh professionals visited Myanmar accompanied by two experts from PROCASUR and from IWMI. During both visits a combination of presentations and field visits took place.

## 3. Observations

### Visit to Bangladesh

Four experts from Myanmar Water Partnership and Delta Alliance Myanmar Wing visited Bangladesh from 25 February till 1st March 2017. They were accompanied by an expert from Procasur. A representative of Delta Alliance International Secretariat joined the meetings on 26 and 28 February. The visit was organised by the Bangladesh Water Partnership (BWP) and presentations were held at the Institute of Water Modelling (IWM) on various topics including tidal river management, polders, mangrove management. A field visit was included on 27<sup>th</sup> February. Details of the programme are included in Annex 2. A detailed report on the visit is being prepared by the Bangladesh team and will be ready in July.

### Visit to Myanmar

Two experts from the Bangladesh Water Partnership: Prof Md Monowar Hossain and Ms. Ismat Ara Pervin visited Myanmar from 31 May till 5 June 2017. They were accompanied by an expert from Procasur and an expert from IWMI. This visit was organised by the Myanmar Water Partnership (MmWP) together with its host institution, the Irrigation and Water Utilisation Management department (IWUMD). Details of the programme are included in Annex 3.

The first day was spent on presentations to show and share Myanmar experiences both from government departments and international projects and international consulting firms. The rest of the visit was mainly spent

on learning from the field. Therefore the group went on a Field trip to the Ayeyarwady Delta. Places visited: Yangon, Panhlaing Project, Nyaung Done, Maubin, Kyaik Latt, Phya Pone, Dedaye, Kun Gyan Gon, Kaw Hmu, and Twante (Detailed programme is attached as Annex \*\*).

After the field visit a consultation meeting was organised for reflections on the fieldtrip and wrap up of the learning visit.

A detailed report on the visit is being prepared at this moment by the Myanmar team with Procasur and a draft will be ready first week of July. In the report also information on the Myanmar delta, including maps are included.

#### Follow up process:

At this moment it is too early to come up with conclusions. The first two exchange visits just took place and the third visit is scheduled for October 2017. At that moment it is the intention that a group of 15 to 20 practitioners from Myanmar will visit Bangladesh for a 10 days training. This training will focus on sharing the experiences from the Bangladesh Delta Management with the Myanmar group.

## 4. Key messages

The Myanmar Experts indicate that they can learn from Bangladesh. However, their interest is in real operational application e.g. how can we make our polder operation effectively and how can we learn from field experiences in Bangladesh. Bangladesh has much more experience and Myanmar indicates that they are very interested to learn from them about effective operation of polders and rivers.

It is less interesting to learn from PowerPoint presentations and much more important to visit field locations and learn from their design and operation.

The Myanmar experts have selected 3 topic which are of their interest with the following priorities:

1. Polder system management
2. Tidal River Management
3. IWRM in broad sense with a focus on mangrove systems

According to the learning Delta Asia Initiative a training will be organised in October in Bangladesh. The message from Myanmar is:



- Please do not combine the 3 topics but select one. Based on the topic Myanmar will decide who will follow the training
- Cost-sharing is not possible. Therefore Myanmar request: we do not mind to send 5-7 participants to the training instead of 15-20 participants as long as they are 100% funded. We will make sure that we send very good candidates. These candidates can upon return in Myanmar share what they have learnt in Bangladesh with colleagues. Or it might even be possible to send the trainer to Myanmar and share it with a larger group.

- Cost-sharing is only possible if we organise something in Myanmar. Then we can cover for example transportation costs. For a visit to Bangladesh it is not possible to find co-funding.

Suggestion: in the coming two years select a few themes on which per visit you will focus and make sure relevant experts from both countries share experiences and really learn from each other, including suggestions / discussions on how to implement it in a real life situation in the other country.

During the Delta Coalition meeting in Bangladesh (28-30 July) the LDAI is on the agenda. It is important to secure funding for the learning visits at that moment. Otherwise it will be very difficult to continue with this interesting initiative.

## 5. References

Report of LDAI Mission to Bangladesh, 25 February – 1 March 2017

Report of LDAI Mission to Myanmar, 31 May – 5 June 2017

## Annex 1 Concept Note on Learning Deltas Asia Initiative (November<sup>1</sup>, 2016)

### The Challenge



From water management point of view urbanized deltas are the most challenging regions in the world, considering their large concentration of population (half of world population by 2050), their significance for the world's economy and their roles in the world's ecosystems. At the same time they serve as food baskets as well – of regional and even global significance. Because of their low-lying location Deltas they are increasingly vulnerable to hazards of extreme weather, including flooding from 3 sources (rain, river and sea), salt-intrusion, soil subsidence and erosion/sediment starvation. Climate change, sea-level rise and upstream developments will aggravate these problems. This threatens their sustainability. Further urbanization and densification of both urban and rural land in deltas result in the disappearance of natural land-water transition zones and a decrease in the resilience of the system.

The **Global Water Partnership (GWP)**<sup>2</sup> seeks to foster water security through enhanced water governance and neutral Multi-Stakeholder Partnership processes. It is a network of partners in the Global South supported by an inter-governmental organisation GWPO and its Secretariat. Currently GWP counts with well over 2,500 pro-active partner organisations world-wide. GWP addresses the above mentioned challenges in urbanizing deltas and coastal areas through its mandated work on IWRM linking the network expertise to innovative processes in learning and knowledge to policies and practices via broad social inclusion for equitable sustainable development. The partners and their Country and Regional Water Partnerships in Asia want to build and own a strong South-South cooperation to achieve the challenges posed to populations in affected deltas.

In order to cope with the hazards and reduce exposure and vulnerability of deltas, 12 countries that are at the frontline of this challenge have joined forces in the **Delta Coalition (DC)**<sup>3</sup>. Collectively, they aim to 1) get urbanizing deltas on the agenda worldwide; 2) facilitate the development, availability and exchange of knowledge on deltas, resilience and (urban) sustainable development; and 3) promote practical implementation and cooperation to increase the resilience of urban deltas and to increase investments in sustainable urban delta management.

Much of the manifold investments in hard and soft infrastructure, information and institutions is public with intended leverage of private funding and action, including technical assistance and capacity development via the shared learning and knowledge dimensions. The role of the major IFIs (**World Bank, Asia Development Bank**), and growingly of Climate Funds, is key in this context with major engagement in deltas being captured by ambitious and long-term support to country-led delta and coastal zone sustainable development plans, e.g. in Bangladesh, Myanmar, China and elsewhere in Asia.

### The objective of the Learning Deltas Asia Initiative

To accompany urbanizing deltas in better connecting three processes that often unfold in relative isolation, and in learning from one another in so doing:

- Enable IWRM planning and implementation Adaptive Delta Management;
- Engage broader sectoral integrated and inclusive societal development processes that guide socio-economic resilience; and
- Support the planning and implementation of investment projects through innovative learning and knowledge processes building commitment and capacities.

<sup>1</sup> This version November 2016 reflects feedback and guidance from the Manila workshop (Oct 2016), meetings with Delta Coalition and initial consultations with Delta Alliance (Marrakech Nov 2016). Furthermore in-principle agreements with the Bangladesh Water Partnership/IWM and Myanmar Water Partnership as well as with Procasur are incorporated (November/December 2016).

<sup>2</sup> [www.gwp.org](http://www.gwp.org)

<sup>3</sup> <http://www.deltacoalition.net/about/>. The DC was created in 2016.

The end result of the initiative is an enhanced capacity of engaged stakeholders and institutions in policies and politics enabling higher levels of impact and sustainability allowing for scaling up of resilience of urban deltas and help them adapt to climate change.

### The context

Signatories of the Paris Climate Agreement have committed to mobilizing a minimum 100 billion USD investment per year in climate change adaptation and mitigation in developing countries as from 2020; a 50/50 balance between mitigation and adaptation investments is foreseen. ADB and World Bank are scaling up investments in adaptation. At the same time existing Climate Financing Facilities such as the Global Climate Fund are experiencing that bankable projects are scarce, in particular in the field of adaptation. Calls for a paradigm change to move from projects to more holistic basin-wide development programmes, the ethical aspects of securing natural resources for future generations, and the inclusion of more explicit social dimensions and equity as well as sustainability in the criteria for selection of investments are becoming louder<sup>4</sup>. Initiatives that contribute to sustainability and equity are urgently required. The **Learning Deltas Asia Initiative LDAI**, under the political auspices of and in operational cooperation with parties of the Delta Coalition, aims to contribute to fill this gap. The Plan of Action of the **High Level Panel on Water**<sup>5</sup> (HLPW), led by several countries in Asia, e.g. Bangladesh, details work on deltas as one of its action points.

This LDAI initiative, as a typical means of multi-stakeholder process-based implementation SDG [17], is also expected to help in the achievement of the Sustainable Development Goals (SDGs) on Water and Sanitation [6] as well as on Gender [5], Youth [9], Cities & Communities [11], Climate Change [13], Oceans [14] and Terrestrial Ecosystems [15] by reducing the Water-Related Disasters [11.1, 11.5] and Environmental Impact on Coastal Communities [11.6], strengthening the Resilience of Coastal Ecosystems to Climate-related Disasters [13.1, 14.2] and enhancing Sustainable Urbanization in Coastal Areas [11.3, 14.1, 15.3].

### Who engages in the Initiative and what will they bring to the table?

In order to connect the three types of processes listed in the objective, key players in each of them need to join forces. These include:

- The IWRM planners, globally connected through the GWP, and nationally organised in Country Water Partnerships (public, private, civil society, knowledge) as well as Delta actors represented through the Delta Coalition.
- Planning and economic as well as other sector ministries, including Social Welfare and Interior, and decentralized authorities, knowledge and learning institutes, research and academia/vocational training, parliaments and media, and Agenda 21 major groups.
- Finance, Infrastructure, Water, Environment and other sector ministries; multilateral development banks (WB, ADB, Islamic Development Bank, IFAD), pension and social funds, private (finance) sector representatives, chambers of commerce and bilateral donors.

Each party will bring their specific strengths to the table:

- GWP - country networks and TEC with knowledge as presented in publications such as “Securing Water Sustaining Growth, 2015”.
- National, regional and municipal/local agencies – project development capabilities.
- MDBs, Climate Funds and bilateral donors – capacity building, technical assistance, guidance and facilitation in development and delivery of integrated investment planning frameworks.
- MDB/Climate Funds – project financing and structuring capabilities for project financing.

The ultimate beneficiaries of the Learning Deltas Asia Initiative will be the local communities in the deltas. Relevant DRR communities, RBOs, NGOs, civil societies, private sector, etc. will be involved.

### Geographic scope

Learning Deltas will focus on Asia. This focus is for practical and cultural reasons. Other Delta Coalition or GWP affiliated countries (e.g. in Africa, South America) may be invited for selected activities. In a later phase Learning

<sup>4</sup> E.g. the Budapest Water Summit, December 2016

<sup>5</sup> See [https://sustainabledevelopment.un.org/content/documents/11280HLPW\\_Action\\_Plan\\_DEF\\_11-1.pdf](https://sustainabledevelopment.un.org/content/documents/11280HLPW_Action_Plan_DEF_11-1.pdf)

Deltas might be extended to include all Delta countries. An overview of Asian deltaic areas identified with listed issues is shown in

Table 1, from which the potential target areas could be chosen. The urgency of the issues is further illustrated in



Figure 1 which pictures the coastal cities in Asia in low lying areas.

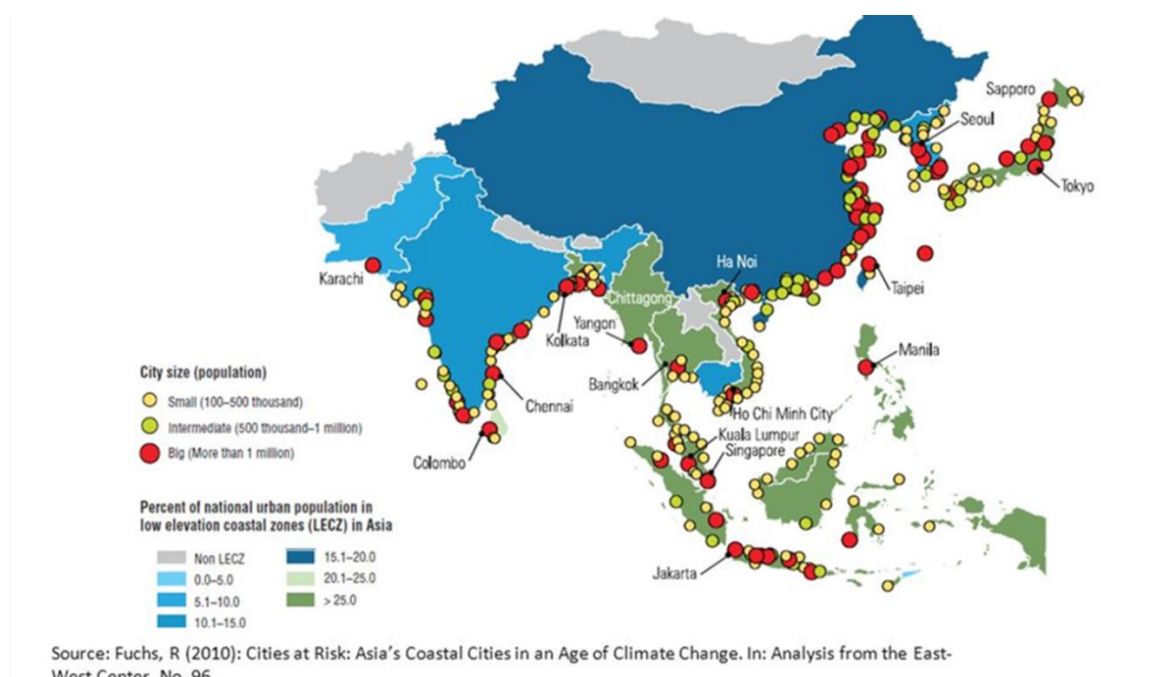
**Table 1 Potential target deltaic areas in Asia**

COUNTRIES	DELTAIC AREAS	MAIN CITIES	RELEVANT ISSUES
<b>Bangladesh</b>	Ganges – Brahmaputra – Meghna Delta	Mongla, Chittagong	<ul style="list-style-type: none"> <li>• Flooding/droughts</li> <li>• Saltwater intrusion</li> <li>• Land subsidence</li> <li>• Erosion/sediment starvation</li> <li>• Infrastructure on soft soils</li> </ul>
<b>Cambodia</b>	Tonlé Sap, Mekong Delta (transboundary), Bassac River	Phnom Penh	
<b>China</b>	Bohai Sea, Yangtze River Delta, Zhujiang Delta	Tianjin, Shanghai, Guangzhou	
<b>India</b>	Calcutta, Chennai, Mumbai		
<b>Indonesia</b>	Mahakam Delta	Samarinda, Jakarta	
<b>Pakistan</b>	Indus River Delta	Karachi	
<b>Philippines</b>	Pasig River Delta	Manila	
<b>Myanmar</b>	Ayeyarwady Delta	Yangon, Pathein	
<b>Singapore</b>	Singapore River	Singapore	
<b>Thailand</b>	Chao Phraya River Delta	Bangkok	
<b>Vietnam</b>	Mekong Delta (transboundary), Red River Delta	Ho Chi Minh, Hanoi	

The specific problems of deltas ask for specific approaches to turn them into sustainable systems. It requires an integrated approach with a multi-stakeholder involvement in which all levels of government are represented but also civil society organisations, academia and the private sector. In developing countries sustainable development of deltas plays a vital role in poverty eradication, food security, disaster risk reduction, improving livelihoods, economic growth as well as sustaining ecosystems. Projects and programmes are being carried out on increasing the resilience of delta systems. The challenge is to learn from the past and ongoing experiences that are being gained and share the lessons learned with each other. <sup>6</sup>

<sup>6</sup> See also: <http://www.eastwestcenter.org/publications/cities-risk-asias-coastal-cities-age-climate-change>

**Figure 1 Coastal cities in Asia and percentage of national urban population in low elevation coastal zones**



### Organisational Set-up

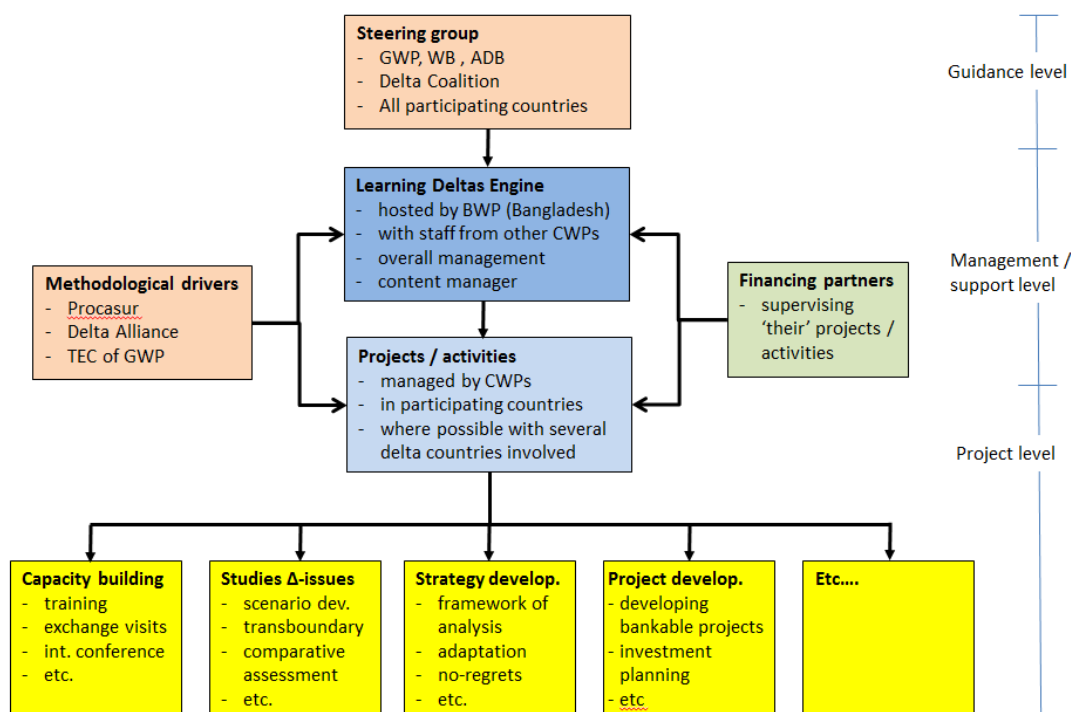
Learning Deltas Asia is an initiative of GWP, set-up in consultation with the Delta Coalition. Main corporate clients are DC participating countries drawing on ADB and WB as well as Climate Funds. Asian members of the Delta Coalition include Bangladesh, Indonesia, Japan, Korea, Myanmar, Philippines and Vietnam. Other Asian countries are expected to join later (e.g. China, Pakistan).

The character of Learning Deltas Asia will be South-South cooperation with an important role of the Country Water Partnerships of GWP and its partners. North-South exchange is already taking place in various other projects and programmes such as the various Delta Plan projects funded by the Netherlands (e.g. in Bangladesh, Vietnam, Myanmar and Indonesia). It is planned to put the lead of the programme in Bangladesh with BWP (Bangladesh Water Partnership). Bangladesh has gained considerable experience on Sustainable Delta Planning, has a developed knowledge infrastructure in this field (e.g. CEGIS, IWM, BUET) and will from this fall be the next chair of the Delta Coalition. BWP will set-up a Task Force for the Learning Deltas Asia Initiative. This Task Force will have a dedicated focal point and be supported by external knowledge groups (e.g. by the Delta Alliance and Procasur).

A Steering Group, at full development, will be established to guide the activities, consisting of representatives from all other participating countries, WB, ADB and GWP.

Figure 2 illustrates the proposed organisational set-up.

Figure 2 Organisational set-up Learning Deltas



The South-South cooperation, at the request of the Delta Coalition Chair Secretariat<sup>7</sup>, will follow a phased approach. Activities will start small, with a pilot learning exchange between Bangladesh and Myanmar. These activities should preferably link up with ongoing processes such as the Bangladesh Delta Plan 2100, the AIRBM project in Myanmar, or any other ongoing projects of ADB or WB. A multi-stakeholder approach will followed. After first tangible results at pilot level have been produced, Learning Deltas will scale up to include other interested stakeholders and DC countries. As appropriate other countries may participate under their respective flood and/or drought DRR and pertinent resilience building programmes.

### Projects / Activities

Phase 1 (January-April/May 2016): The activities of the Learning Deltas Asia programme will be determined in cooperation with all partners. A first programming of activities, mainly awareness raising and acquainting partners with the initial LDAI concept, was undertaken during a scoping workshop organised during the Singapore Water Week<sup>8</sup> and in the second half of October 2016<sup>9</sup>. Follow up was given by GWP at a DC meeting in Marrakech, November 2016. Bilateral meetings with GWP/BWP and IWM as well as CEGIS followed<sup>10</sup>.

The road map for Phase I foresees a scoping phase before the monsoon 2017 and an initial roll-out afterwards. The scoping would have a dual nature:

(i) the definition in operational terms of the methodological approach where Bangladesh is considered a first 'learning territory' due to its pronounced leadership in the region with 'learning champions' (knowledge holders in a position to share) on adaptive delta management for resilience. This innovative value-adding, and its anchoring in country-level institutions such as GWP partner organisations, would address the learning and knowledge stakeholders ('learning exchange participants') and appropriate processes bringing tacit knowledge<sup>11</sup>

<sup>7</sup> Informal request from DC Secretariat, Marrakech, October 2016

<sup>8</sup> July 2016

<sup>9</sup> Manila, October 2016.

<sup>10</sup> November/December 2016

<sup>11</sup> See <http://ieg.worldbank.org/video-can-world-bank-create-culture-learning-and-results>

from and to practitioners for subsequent application in their respective institutional setting. This latter aspect is labeled 'innovation plan' and actually represents the innovative value-adding of LDAI. It would cover the political/policy, regional/municipal and community level domains. The practitioners would come from government, civil society, and private sector and academia/CB institutions. They would include youth and gender representatives as well as staff from MDB/Climate Funds. Access to lesson learning would be crucial. The methodological approach would be led by a GWP partner, Procasur, in cooperation with the focal point mentioned earlier. Myanmar and Bangladesh would be the two countries covered.

(ii) the establishment of a content inventory, including a knowledge landscaping exercise which would define the elements of a marketplace of supply/demand (hence in both Bangladesh and Myanmar), lessons learnt, ongoing ADM programmes and future investment portfolio projections, a menu of priority areas and hotspots ('lighthouse projects'), their systematization, identification of tools such as erosion and flood level prediction or drought monitoring/forecasting (IWMI/IDMP-GWP/WMO) and assessment models for farmer level decision making (CEGIS), and an initial exchange between BWP and MWP representatives to define initial priorities and a timeline for the Learning Menu options. Access to lessons learned on monsoon ADM and non-monsoon ADM, i.e. the seasonal adaptation, would be crucial. BWP and MWP partners include organisations affiliated to the Delta Alliance, a Dutch ADM expertise holding pool.

Management modalities of the supply/demand, the logistics and organisation of learning routes, training of the learning champions will be entrusted to the BWP/IWM consortium in cooperation with MWP and Procasur/Delta Alliance (as appropriate). Similarly the ways and means of selection and financing of participants in the learning routes and the space and funding for the coaching/mentoring required for application of the subsequent innovation plans established by the exchange participants in the context of MDB funded ADM programmes merits attention in this Phase 1. Key here is an innovative peer-to-peer review ('mentoring/coaching') of such innovation plans in order to establish a sustainable and accessible knowledge platform for practitioners allowing for good practices to be considered for scaling up. Hence LDAI would be snugly wedged between Objectives 2 and 3 of the DC. Ideally participants would come from an environment where there is an *ex ante* definition of scope and space of learning and learned. Such would contribute to improve the quality of outreach to target audiences and vulnerable groups of investment programmes, accelerate the delivery and disbursement capacities of participating institutions and enhance the prospects of impact and sustainability. Metrics for these ambitions would need to be developed in RMF contexts of the host investment programmes for Phase II.

Close monitoring of the performance would be set up by involved parties. Modifications would be introduced on a pragmatic hands-on basis ('improve as you go') which, when coupled to a smart dissemination and communication campaign to other DC and 3<sup>rd</sup> countries, would allow for early scaling up to Phase II. The supervisory structure of Phase I would be light with intensive counselling and cooperation in order to allow all involved parties to learn for a Phase II.

Indicative budget for Phase I would be approximately USD 80,000-100,000 for preparation and delivery of one learning route (without the coaching of the innovation plan which would be charged to the host 'project' of the learning exchange participants). Dissemination via a reflection workshop and communication campaigns, including attractive documentation and reporting via ICT and media, would represent incremental costs estimated at USD 20,000. Initially a total of 20 participants from Myanmar are expected to engage with Bangladesh. GWP would largely fund the conceptualization and design of the scoping and would contribute to the delivery cost of the learning exchange between Myanmar and Bangladesh. Participants are expected to be largely self-funded, i.e. be sponsored from their host investment projects funded by ADB or WB.

Phase II: The scaling up of actual activities will depend on the needs defined in the DC countries in the framework of operational activities of agreed between government and MDBs, e.g. ADB and WB. Additional MDBs such as Islamic Development Bank, IFAD or KfW may be approached to strengthen LDAI. For both Phase I and Phase II the learning menu may be modified to include:

**Typical activities might include:**

- *Capacity building*
  - exchange visits between Asian Delta countries
  - training programmes, local and international
  - development of training material for local use

- international conference on delta management in the South
- *Joint research activities on typical delta issues*
  - being carried out by local knowledge institutes, supported by international institutes
  - topics to be determined by partners; might include scenario development, adaptive delta management, decision making under uncertainty, (upstream) trans-boundary issues, environmental flow, green growth, etc.
  - might be executed in cooperation with programmes such as REACH, Blue Gold, etc
- *Strategy Development*
  - framework of analysis for delta planning
  - relation of delta planning with national and regional economic development goals and strategies
  - adaptive planning techniques
  - scheduling of investments
  - investment planning
- *Project Development*
  - developing proposals (e.g. for Climate Fund)
  - translate national and regional strategies in bankable projects
  - institutional requirements for implementation

#### **(Likely) Expected Results**

A thorough knowledge exchange mechanism between key Asian deltas is expected to be established, that will:

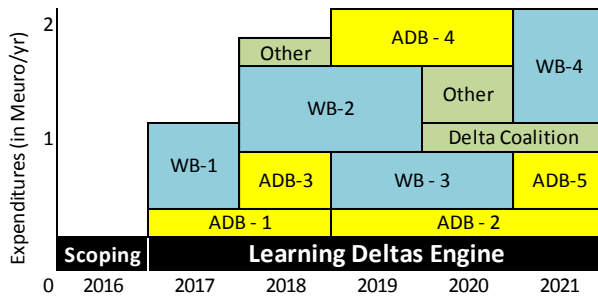
- Increase the understanding of challenges faced by communities/populations living in Asian deltas.
- Foster cooperation to develop joint solutions for increased water security and climate resilience in Asian deltas.
- Strengthen the capabilities of local institutions to enhance targeted outreach, impact and sustainability of MDB/Climate Fund co-financed projects and to improve the quality of project pipeline proposals.
- Eventually lead to strengthened resilience of populations living in coastal/deltaic areas in Asia.

#### **Financing Structure**

The ultimate programme is planned for 5 years with a total budget of about 10-12 million Euro. The major part of the financing will come from 'projects', carried out in the framework of Learning Deltas but financed as separate Technical Assistance/Training/Capacity Building activities as part of on-going loans or grants of the WB and ADB or Climate Fund readiness programmes. Continuity of the programme has to be secured by 'the Learning Deltas Engine' which comprises the management level as given in

Figure 2. The financing of this Engine will have to come from GWP, bilateral donors (e.g. the Netherlands, member countries of or related to the Delta Coalition) and from management contributions of the ADB/WB/Climate Fund activities. This is illustrated in Figure 3. This figure shows only the structure; the actual start, duration and size of the LDAI will depend on the capacity building components of projects as they are defined by borrower countries and Operations of the WB and ADB. Phase I would cover 2016 and most of 2017. Scaling up in Phase II could start as early as 2018.

**Figure 3 Financing structure Learning Deltas**



#### Added value of the project

Besides the direct benefits for the delta (countries) that will be addressed in the Learning Delta project (see objective) several other added values for the participating institutions can be identified:

- Get acquainted with latest developments on implementing IWRM (e.g. integrated urban management, water pricing, trans-boundary water management, decision making under uncertainty) and participate (also as ADB and WB staff) in locally anchored institutional learning exchanges on how to transform the usually wish-lists that come out of IWRM planning exercises into concrete knowledge-supported action by practitioners in the context of ongoing and/or future bankable and implementable project.
- Access the extensive network of country water partnerships of GWP and affiliated partners to:
  - exchange lessons learned and successful experiences on water management between ADB and WB member countries (south-south exchange)
  - make use of this GWP network to convey ADB and WB work and experiences
  - expand beyond the original set of DC countries in Asia and possibly other continents.
- Cooperation between WB and ADB to explore where WB and ADB have added values and can make complementary contributions in delta countries.

#### Next steps

This is a first note on the objective and set-up of Learning Deltas. The next steps for Phase I are:

- This concept note 2.0 to be shared with ADB and WB for their feedback, etc. (by end 2016)
- Drafting of a full concept note (BWP/IWM-MWP of GWP, Procasur) on Learning Deltas (by end 2016/January 2017), to be:
  - discussed with Delta Coalition, WB/ADB and Delta Alliance (December 2016, January/February 2017)
  - disseminated to relevant CWPs for their comments and operational buy-in (December 2016)
- Scoping of learning menu and knowledge holders (BWP/IWM-MWP of GWP, Procasur, Delta Alliance-as appropriate, January-April 2017)
- Learning Deltas Asia to be 'launched' during Ministerial Conference of Delta Coalition in Dhaka-Bangladesh, May 2017
- Roll-out of pilot in 2017 (incl. metrics and monitoring/reporting and feedback; design of Phase II)



## Annex 2 Programme and participants visit Bangladesh

Visit programme for delegation from Myanmar Water Partnership (MWP) & Delta Alliance Myanmar Wing (DAMW) during 25 Feb-1Mar 2017, Under Learning Deltas Asia Initiatives (LDAI)

Day	Time	Item
<b>Day1:</b> <b>25Feb 2017</b>	10:00-13:00	Meeting between PROCASUR and the organisers.
	13:00	Lunch & Closing
	17:00	Arrival of Myanmar delegation & drop to Hotel Riggs Inn

<b>Day2:</b> <b>26Feb 2017</b>	9:30 -10:00	Opening and self-introduction
	10:00-10:55	Introduction and salient features of BDP 2100 by Prof. Dr. Shamsul Alam, Member (Senior secretary), GED, Planning commission
	10:55-11:10	Tea break
	11:10-12:05	Presentation on Climate Change Modelling and Coastal Resilience in Bangladesh Delta by Mr. Zahirul Haque Khan, Director, CPE division, IWM
	12:05-13:00	Presentation on Community level flood management in Bangladesh Delta by Mr. Waji Ullah, Executive Director, CEGIS
	13:00-14:00	Lunch
	14:00-14:55	Presentation on Upgrading of Flood forecasting system in Bangladesh using Jason-2 satellite Altimeter by Md. Sohel Masud, Director, FMG division, IWM
	14:55-15:50	Presentation on Experiences from Ecosystem services for poverty alleviation (ESPA) Delta Project by Dr. Mashfiqus Salehin, Professor & Director, IWFM, BUET
	15:50-16:05	Tea break
	16:05-17:00	Climate Change and Water Governance in Bangladesh Delta by Dr. Md. Abu Sayed, Fellow, BCAS
	17:00	Closing

<b>Day3:</b> <b>27Feb 2017</b>		Visit to land reclamation area using capital (pilot) dredging of the Jamuna River at Sirajganj of Bangladesh Water Development Board, Government of Bangladesh.
	6:30	Pick up from hotel Riggs Inn
	9:00-9:30	Breakfast at Jamuna Resort
	10:30	Reach at project site
	10:30-13:30	Visit to capital dredging area
	13:30-14:30	Lunch
	15:00	Start return journey for Dhaka
	20:00	Reach at hotel Riggs Inn

<b>Day4:</b> <b>28Feb 2017</b>	10:00-10:15	Recap by Dr. Engr. Khondaker Azharul Haq, President, Bangladesh Water Partnership (BWP)
	10:15-11:10	Presentation on Tidal River Management by Prof. Dr. Monowar Hossain, Executive Director, IWM
	11:10-11:25	Tea break
	11:25-13:00	Discussion on follow-up, future programme and development of (concept note for the 2 <sup>nd</sup> phase of LDAI, Scoping Phase road map need to be developed. ie. Identify country focal points, TOR, identify knowledge gaps

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		as a result of need assessment, what will be the outcome of bridging these knowledge gaps etc.)
	13:00-14:00	Lunch
	14:00-16:00	Continue the Discussion
	16:00	Closing
	19:00-21:00	Dinner

<b>Day5:</b> <b>1Mar 2017</b>	12:00	Departure of Myanmar delegation
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Four participants from Myanmar, accompanied by Ariel Halpern, Procasur Catharien Terwisscha van Scheltinga, Delta Alliance International Secretariat joined the meetings on 26 and 28 February

## Annex 3 Programme and participants visit Myanmar

### Learning Delta Asia Initiative Agenda for Bangladesh Delegation Visit to Myanmar

Item	Time	Particular	Remarks
31 <sup>st</sup> May Day 1	Afternoon	Arrival of Bangladesh delegation to Myanmar	Mya Yeik Nyo Royal Hotel
1 <sup>st</sup> June Day 2	9:00- 9:30	Welcome remarks Self-introduction from both parties	Meeting room, IWUMD office, Yangon
	9:30 – 10:00	Introduction to Myanmar Water Partnership (MmWP), Delta Alliance (Myanmar), Delta Coalition (Myanmar) Introduction to IWUMD	Dr. Zaw Lwin Tun, SC member of GWP- SEA SC for MmWP
	10:00-10:45	Disaster Risks in Ayeyarwady Delta, Irrigation, Drainage and Flood Protection Measures	U Phyo Myint, Director, Ayeyarwady Region, IWUMD
	10:45-11:00	Discussions	
	11:00-11:45	Introduction to DWIR Improvement of River System in Ayeyarwady Delta	U Sein Lwin, Deputy Director, DWIR
	11:45-12:00	Discussions	
	12:00- 13:00	Lunch	
	13:00 – 13:45	Introduction to FD Governmental Strategy on Mangrove Forest Management and Conservation in Ayeyarwady Delta	Dr. Toe Aung, Assistant Director, Mangrove Conservation Unit, Watershed Management Division, Forest Department
	13:45-14:00	Discussions	
	14:00- 14:45	Introduction to FREDA Mangrove Reforestation Activities in Ayeyarwady Delta, NGO Context	U Kyaw Nyein, Executive Committee Member, FREDA
	14:45-15:00	Discussions	
	15:00-15:15	Tea break	
	15:15-16:00	Integrated Ayeyarwady Delta Strategy, Plan, Progress and Future	U Khin Latt, Deputy Team Leader, IADS Team, NEPS Co. Ltd.
	16:00-16:15	Discussions	
	16:15-16:35	Integrated Water System Development Exemplified by PanHlaing River Rehabilitation Project	Dr. Zaw Lwin Tun, Director, IWUMD
	16:35-17:00	Panhlaing River Integrated Development Plan	U Kyaw Lin Htet, Team Leader, Water Business Line, Royal HaskoningDHV, Myanmar
	17:00-17:15	Discussions	
	17:15-17:30	Closing of Day 1	

Item	Time	Particular	Remarks
2 <sup>nd</sup> June Day 3		Field trip to Ayeyarwady Delta Yangon, Panhlaing Project, Nyaung Done, Maubin, Kyaik Latt, Phya Pone	Check out from Mya Yeik Nyo Royal Hotel and halt at Phya Pone (City of Ayeyarwady Delta)
3 <sup>rd</sup> June Day 4		Field trip around Phya Pone area and return trip to Yangon via Dedaye, Kun Gyan Gon, Kaw Hmu, Twante	Mya Yeik Nyo Royal Hotel
4 <sup>th</sup> June Day 5		Meeting for Follow-up Program	Meeting room, IWUMD office, Yangon
5 <sup>th</sup> June Day 5		Yangon City visit in the morning and Departure of Bangladesh Delegation	

MmWP: Myanmar Water Partnership

IWUMD: Irrigation and Water Utilization Management Department

DWIR: Directorate of Water Resources and Improvement of River System

FD: Forest Department

FREDA: Forest Resources Environment Development and Conservation Association

NEPS: National Engineering and Planning Services

IADS: Integrated Ayeyarwady Delta Strategy

Participants from Bangladesh:

Prof Md Monowar Hossain – IWM

Mrs Ismat Ara Parveen – IWM

Accompanied by:

Mr Ariel Halpern, Procasur

Mr Lal Induruwage, GWP South Asia

## **Annex 4 Report of LDAI Mission to Bangladesh, 25 February – 1 March 2017**

Prepared by Institute of Water Modelling (IWM) and Submitted to Bangladesh Water Partnership (BWP).

## **Annex 5 Report of LDAI Mission to Myanmar, 31 May – 5 June 2017**

Prepared by Myanmar Water Partnership with the support of PROCASUR Corporation for the Global Water Partnership Myanmar Water.



# LEARNING DELTAS ASIA INITIATIVE (LDAI)

Mission Report-Phase I

July 2017

Report prepared by Institute of Water Modelling (IWM) and Submitted to Bangladesh Water Partnership (BWP)

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# Bangladesh Mission Report

## 1 Background

The Learning Delta Asia Initiative (LDAI) concept was built mainly for awareness raising and acquainting and sharing knowledge among the Delta Countries concerned Institutions and Agencies. The initial LDAI concept was undertaken during a scoping workshop organized during the Singapore Water Week<sup>1</sup> and in the second half of October 2016<sup>2</sup>. Follow up was discussed by GWP at a DC meeting in Marrakech in November 2016. Bilateral meetings with GWP/BWP and IWM as well as CEGIS was held on November/December 2016<sup>3</sup>.

## 2 Overview

Under the broad framework of scoping of Phase-1; Bangladesh and Myanmar is considered as 'learning territories' due to its pronounced leadership in the region with 'Learning champions' (knowledge holders in a position to share) on adaptive delta management (ADM) and Delta issues for resilience. GWP/BWP and IWM, as partner organization, invited concerned Myanmar delegation for anchoring these two countries and to gain and share knowledge on ADM. A representative of PROCASUR was also present to develop the methodology of the learning approach and routes.

The visit program of Myanmar delegation team was held from 23 February to 28 February 2017. The learning program included lectures on Delta issues, Q&A and field visit on nine learning areas:

1. Presentation on Coastal Vulnerability and Resilience Measures in Times of Climate Change, by Mr. Zahirul Haque Khan, Director, Coast, Port and Estuary Management Division, IWM, Dhaka
2. Flood forecasting in Bangladesh and Implementation of Jason-2 Satellite Altimeter based Flood Forecasting System, by Md. Sohel Masud, Director, Flood Management Division, IWM, Dhaka
3. Community Based Flood Early Warning System and Information Dissemination in Bangladesh Delta by Mr. Waji Ullah, Executive Director, CEGIS, Dhaka, Bangladesh
4. Experiences from Ecosystem Services for Poverty Alleviation-ESPA Deltas Project by Prof. Dr. Mashfiqus Salehin, Director, Institute of Water and Flood Management, BUET
5. Climate Change Adaptation and Water Governance in Bangladesh Delta by Dr. Md. Abu Sayed, Senior Fellow, BCAS, Dhaka, Bangladesh
6. Introduction and Salient features of Bangladesh Delta Plan (BDP) 2100 by Mr. Mafidul Islam, Joint Chief, GED, Planning Commission, GOB
7. Tidal River Management by Prof. Dr. Monowar Hossain, Executive Director, IWM, Dhaka, Bangladesh
8. Mangroves in Bangladesh by Prof. Dr. Monowar Hossain, Executive Director, IWM, Bangladesh

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<sup>1</sup> July 2016

<sup>2</sup> Manilla, October 2016.

<sup>3</sup> November/December 2016



## 9. Field Visit to Land reclamation activities in Bangladesh, by BWDB

The delegation of Myanmar was composed of four people and was active and take decision regarding i. Selection of priority learning areas, ii. Setting the objectives and planning the upcoming mission to Myanmar by the Bangladeshi delegation, iii. Initial discussion on the key institutions and organization and considering invitation to participate in the Learning Route.

### 3 Learning Route in Bangladesh

The BWP and IWM played a significant role in organizing a menu on Bangladesh's best practices as did MWP in leading the further exploration on particular learning areas and real experiences of interest for Myanmar. This exchange conducted and discussion held based on presentations provided clarifications to definitions of some Delta Management Concepts for a common understanding. The definitions and areas identified will be refined as process goes on through in country consultations, led by the CWPs and finalized during the upcoming mission to Myanmar.

### 4 Comprehensive introduction to the three learning areas prioritized in Bangladesh

The presentations, discussion and field visit give food for thought to the Myanmar Delegation for selecting on particular learning areas and real experiences and prioritizing them. The exchange mission to Myanmar will further assist through in country consultations in Myanmar led by the CWPs.

Among many issues of Delta Management the team (Bangladesh & Myanmar) has selected the following three learning areas in Phase-II in Bangladesh:

1. Tidal river management
2. Polder management
3. Management of water resources project

Myanmar delegation comprising of 15 to 20 participants will visit the learning areas in Bangladesh and conduct field training, meeting, discussion with the proper institutions, organizations, community and public & private stakeholders. The duration of the mission program may be 10 days in post monsoon preferably starting in last week of September or in October 2017.

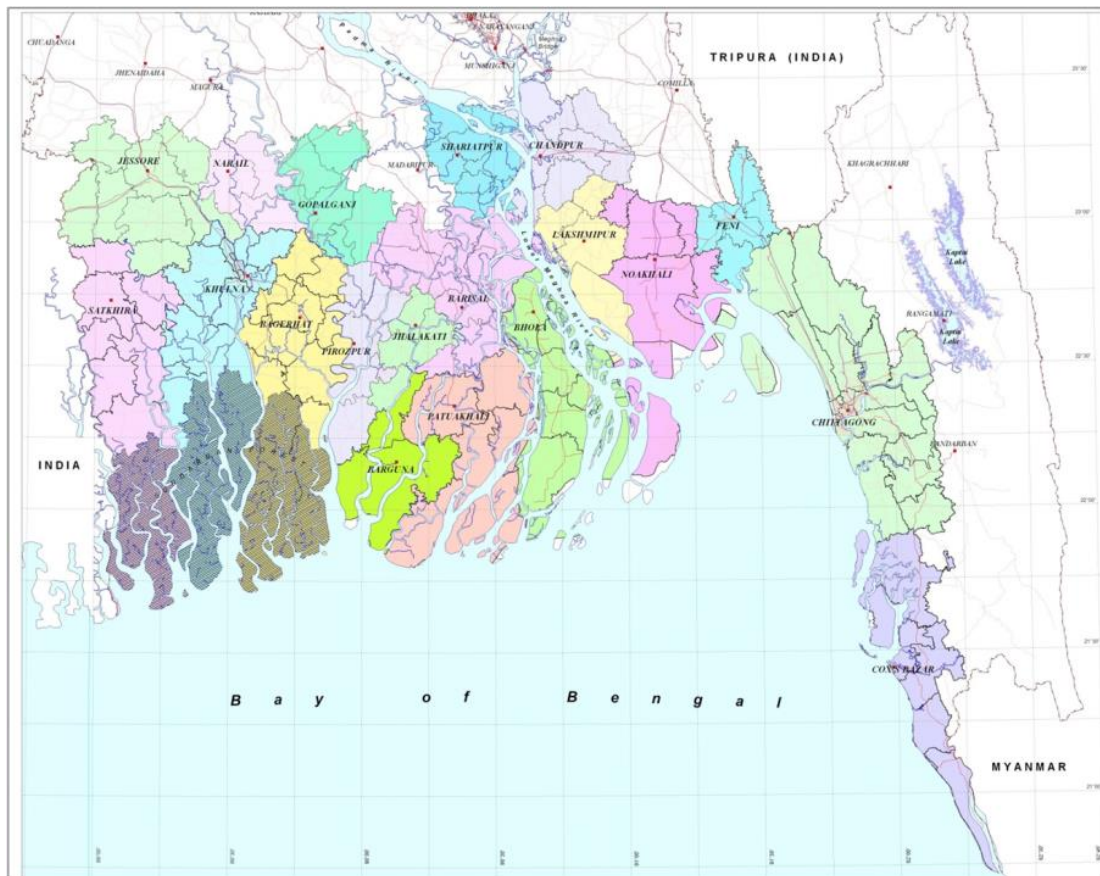
There is a need for concentration as well as a desire to incorporate some exemplary 'hot spots' for learning approach. Myanmar Delegation has selected 2 'hot spots' areas for focusing with extra emphasis. The probable 2 'hot spots' areas area:

1. Coastal area
2. Barind Project Area

Especially emphasis would be given in learning directly from the public and private stakeholders from their experiences, in particular to understand the challenges, good practices and lessons learned throughout the inception/conception, design, implementation and M&E of the Intervention/Program.

#### 4.1 Coastal Hot Spot area

Out of 64 districts, 19 districts in the south-west to south-east and eastern-hill zone of Bangladesh is defined as coastal area which are mainly influenced by two natural phenomena: tidal influence and salinity intrusion. Cyclones and storm surges are very common natural calamities for coastal area. The coastal land area covers over 32% of the country and about 26% population of the country live there (Figure 1). It covers an area of 47,150 km<sup>2</sup> with a population of 38.5 million (BBS 2011) resulting in an average population density of 817 persons per km<sup>2</sup>.



**Figure 1: Coastal area of Bangladesh (Source: ICZMP, WARPO 2005)**

Polder management and tidal river management is best practices in coastal areas to overcome the problems & challenges in Coastal area. The major problems in Coastal area are:

1. Due to siltation in the tidal rivers water logging and drainage problem is very serious in the southwest (Satkhira, Jessore, Khulna and Bagerhat) and south east (Noakhali, Feni) coastal zones.
2. Cyclones hit almost every year in the coastal area mainly in the early summer (April–May) or late rainy season (October–November). During the period 1960–2009, 19 severe cyclones have hit the coast of Bangladesh, the most recent one and most devastating is the Cyclone Aila in 2009 (Source: BMD website).
3. Salinity intrusion in the river system depends on the volume of freshwater flow from the upstream, the salinity level of the Bay of Bengal near the coast and the coastal currents. The salinity in the river system is high in dry season and severe in

the south-west and eastern-hilly coastal zone. In the south east and south central zone the salinity problem is low.

4. About 0.1 Million ha area in 2009 in the coastal zone is effected by soil salinity (Source: SRDI, 2014).
5. In the coastal area, the shallow (from 50 to 100m from ground) and the main (250-350m from ground) aquifer to be used for domestic or irrigation purpose. The knowledge and data on the deeper aquifer is very limited.
6. Due to over exploitation, the groundwater quality is often affected by arsenic, iron and/or manganese, which make the water unsafe or unsuitable for domestic uses. Arsenic contamination is detected up to 150m depth aquifer (SDP, 2011).
7. The huge amount of sediment load with water flow are responsible for coastal bank erosion in some islands (Sandwip, Hatia, Bhola and Ramgati island) as well as formation of new lands.
8. Mangrove forest, estuary and marine diversified ecosystem are in threat due to some human activities and salinity.

The main challenges to overcome the difficulties in Coastal area are:

1. Coastal area of Bangladesh is under threat of climate change and sea level rise. According to IPCC (IPCC, AR5 2014) the mean sea level rise may be 0.3m in 2050 and 0.63 in 2100 (in RCP 8.5 scenario).
2. In the coastal zone the land subsidence rate vary from 2 mm/year to 6 mm/year (Brammer, 2013).
3. Water diversion through Farrakka barrage and upstream dams in Ganges and Brahmaputra river basin lead to changes the freshwater flow pattern in the coastal rivers which will aggravate the water resources, agriculture and domestic water supply, fisheries, forestry, navigation, industry, biodiversity, and socio-economy development in the coastal regions.
4. Increasing over population and unplanned urbanization put pressure on land and water resources.
5. Cooperation among the agencies is a big challenge for integrated water resource management (IWRM) in coastal area.

#### 4.1.1 Tidal river management

Tidal River Management (TRM) is a very effective measure to improve the drainage capacity of the tidal rivers by natural dredging the river at downstream of the basin. It allows the sediment to deposit inside the TRM basin. TRM allows natural movement of tidal flows from the river to an embanked low lying area (beel) through a link channel. During flood tide, water with huge sediment load enters to the low-lying area where the sediments are deposited due to reduction of flow velocity and storage for long duration. During ebb tide water from the low-lying basin flows out with reduced sediment load which erodes the river bank and bed at the downstream. Thus, drainage capacity/conveyance of the river increases which also maintains the river navigability. Over time the low-lying area is raised considerably due to deposition of silt. The average life of TRM basin is 5-6 years. The TRM process is a good example to mitigate water logging, river sedimentation and subsidence using natural water hydraulic.

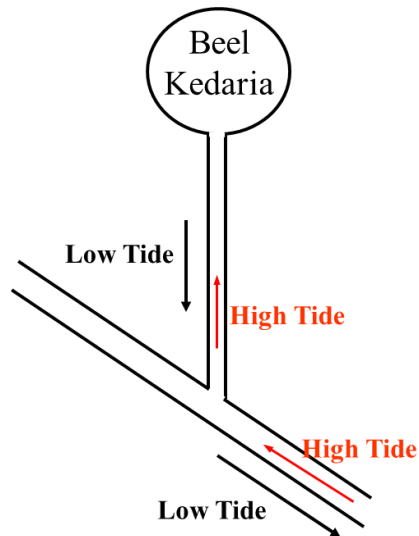


Figure 2: Conceptual Flow Diagram of TRM (Source: IWM)

**Tidal River Management (TRM) in Khulna-Jessore Drainage Rehabilitation Project (KJDRP)**

The Khulna-Jessore Drainage Rehabilitation Project (KJDRP) of BWDB was initiated in the year 1994 by the Government of Bangladesh to reduce the water logging problem inside the two polders under Jessore and Khulna districts. In the early 90s agricultural land in these area remained submerged for a long period in wet season which caused sufferings of the people and economic loss of the communities due to siltation of the rivers. In the post monsoon huge sediment is brought into the river system naturally by tidal pumping and deposits at the dead end of the river but ebb tide can't erode this deposited sediment. This process results river siltation.

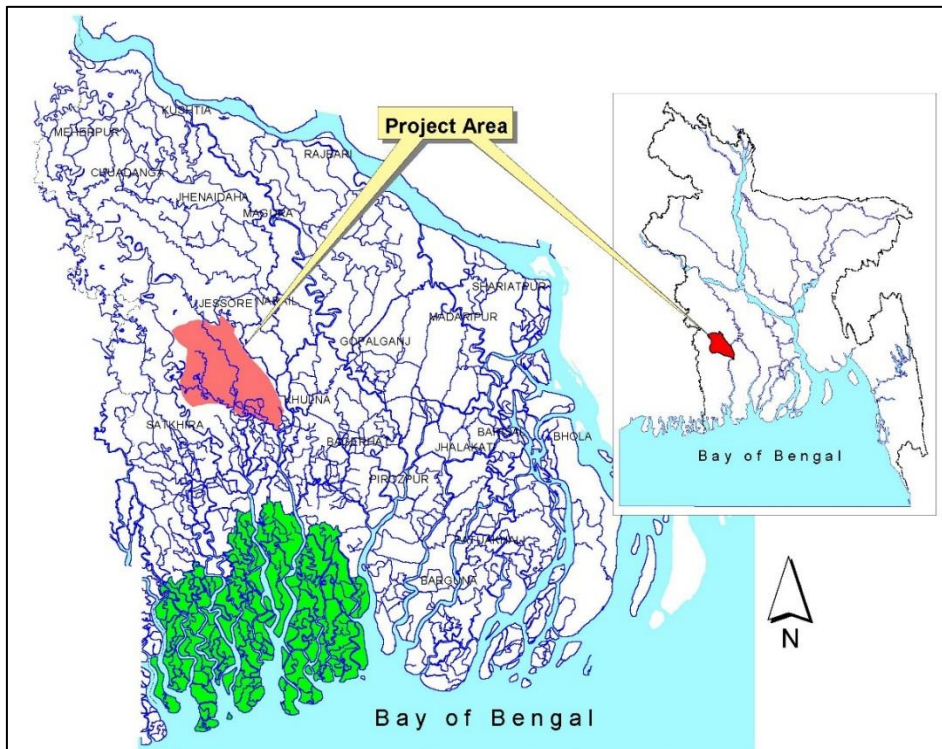


Figure 3: KJDRP Project area (Source: IWM)

Engineering solution with re-orientation and re-excavation of the drainage network and constructing additional sluices where necessary was given initially. The solution worked well to remove the water-logging from beel Dakatia of polder 25. But this structural solution could not be implemented in polder-24 of Jessore area due to strong opposition from local communities, LGI and NGOs as they thought construction of Bhabadaha sluice across the Hari River was the main cause of water-logging in that area.

After the devastating flood in 1997 and in 1998 flood (monsoon) season the local people, LGI and local NGO's drew attention of the donor agency to apply Tidal River Management in all the beels adjacent to Hari River sequentially as a tool to remove water-logging from the inundated beels. BWDB adopted the technique of TRM for increasing tidal prism and raising low-lying beels.

Initially the people of beel Kedaria were very much in favour of operation of TRM and there was no water logging in the area during 2002 to 2004. But the land owners lost their interest to operate TRM by submerging their own land without getting any yield at least for three years. This created a negative impact on TRM and ultimately BWDB could not find any new beel to operate TRM in the year 2005. As a result the Hari River again became silted-up in the dry season and water-logging take place in the area during the monsoon of 2005.

**TRM in East Beel Khuksia:** The challenges of TRM operation are mainly social and institutional. Though people realized that TRM is the best solution for reducing submergence problem, People are unwilling to provide their land for TRM operation since they cannot cultivate the land during TRM operation. To overcome this challenge a compensation mechanism for crop and fisheries has been established. However, the process of providing compensation is very complex and needs further improvement. Having no other alternate solution, TRM in beel Khuksia was started in November 2006. About 2.5 meter depth of water was removed from 18100 hector of land of 193 villages, 21 unions and 2 municipalities. The area was brought under Boro cultivation at the end of year 2008. The Hari River was restored and the land of the beel also was raised about 2 to 4 feet.

**Road Map for Long Term Solution by TRM:** According to the long term planning prepared by IWM, the next beel for TRM is Beel Kapalia which would started in 2018 with consultation with land owners for obtaining land on compensation basis.

**Table 1: Possible sequence of the Tidal Basins or the TRM in Bhabodah area**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052					
<b>For Hari River</b>																																								
Beel Kapalia	█																																							
Beel Payra								█																																
Beel Baruna															█																									
West Beel Khukshia																							█																	
Beel Singa																																					█			
<b>For Upper Bhadra River</b>																																								
Beel Buruli	█																																							
Beel Pathra-Pajja								█																																
Beel Nurnia															█																									
Beel Goralia																							█																	
<b>For Gengrail River</b>																																								
Gengrail Basin-First Compartment		█																																						
Gengrail Basin-Second Compartment								█																																
Boyersinge Beel															█																									
Putimari Beel																							█																	
Badurgacha Beel																																					█			
<b>For Hamkura River</b>																																								
Beel Madhugram		█																																						
Madhabkathi Beel								█																																
Raghunathpur Beel															█																									
Ramkrishnapur Beel																							█																	
Joykali Beel																																					█			

*TRM in Kobadak River Basin (Source: IWM 2017)*

The drainage congestion and sedimentation suddenly aggravated after the year 2000 in the Kobadak River basin. In order to relieve local people from this suffering, the Kobadak river was re-excavation from 2003-05. But river was silted up again after 2008 dry period due to lack of maintenance dredging and due to non- implementation of Tidal River Management (TRM), which had been recommended as follow up activities of capital dredging. For improving the situation BWDB started TRM operation at Pakhimara Beel from July 2015 and monitoring activities is going on. For sustainable drainage and flood management of Kobadak River Basin TRM is one of the most important tools. There are 5 (five) potential beels identified near Kobadak River for TRM basin.

**Table 2: Sequence of Beels for TRM in Kobadak river basin in present & future**

Beels	Gross Area (ha)	Year					
		2015-2021	2022-2028	2029-2035	2036-2042	2043-2049	
Pakhimara	1273	█					
Hariharnagar & Raruli	1758		█				
Rajapur Harinkhola	1320			█			
Delua	1020				█		
Jalalpur	1126					█	

**4.1.2 Polder management**

Bangladesh Water Development Board completed 139 polders for intensification of agriculture by protecting the land from saline water intrusion and flood protection. By polderization about 1.2 million hectares of land is under permanent agriculture. Recent devastating cyclones damaged the embankments which causes intrusion of saline water

inside the polder and threatened the functionality of the polders. Siltation of peripheral rivers surrounding the embankments, poor maintenance and inadequate management of the polders caused the inside polder areas suffering from water logging, which lead to environmental, social and economic degradation. The water logging and salinity intrusion decline the soil fertility and good agriculture production in some polder areas.

### Coastal Embankment Improvement Project (CEIP)

Cyclones SIDR (in 2007) and AILA (in 2009) hit the coastal zone causing severe damage to the infrastructure, life and property which have led the Government to re-thinking its strategy that the polder should protect the land from regular high tide as well as from frequent storm surges. In 2007, the Government of Bangladesh (GOB) obtained an IDA/credit for Emergency Cyclone Recovery and Restoration Project (ECRRP) and carry out the Feasibility Study to support Bangladesh Water Development Board (BWDB) in preparation of The Coastal Embankment Improvement programme (CEIP) and implementation of first phase project CEIP-1. Under the first phase, 17 coastal polders in 6 districts has been selected to upgrade and rehabilitate with the financial support from the World Bank (USD 400 millions).

Main objectives of the CEIP project are as follows:

- Increase the coverage of protection area from tidal flooding and frequent storm surges, which are expected to worsen due to climate change
- Improve agricultural production by reducing saline water intrusion inside the polders
- Improve the capacity of GoB to respond sharply and effectively during any disaster or emergency.

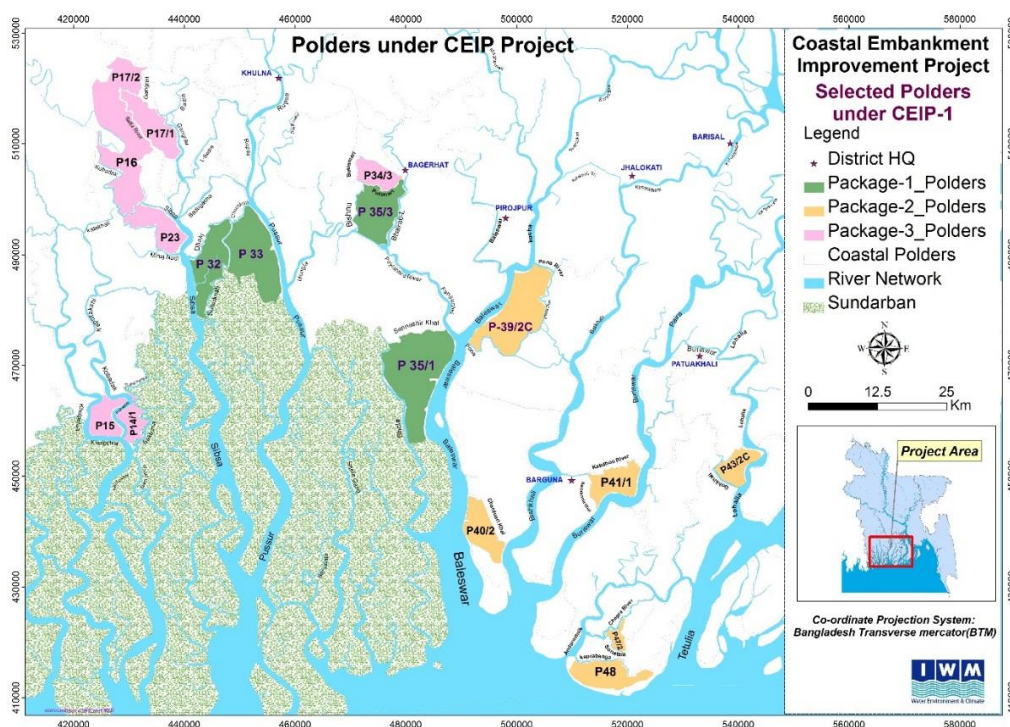
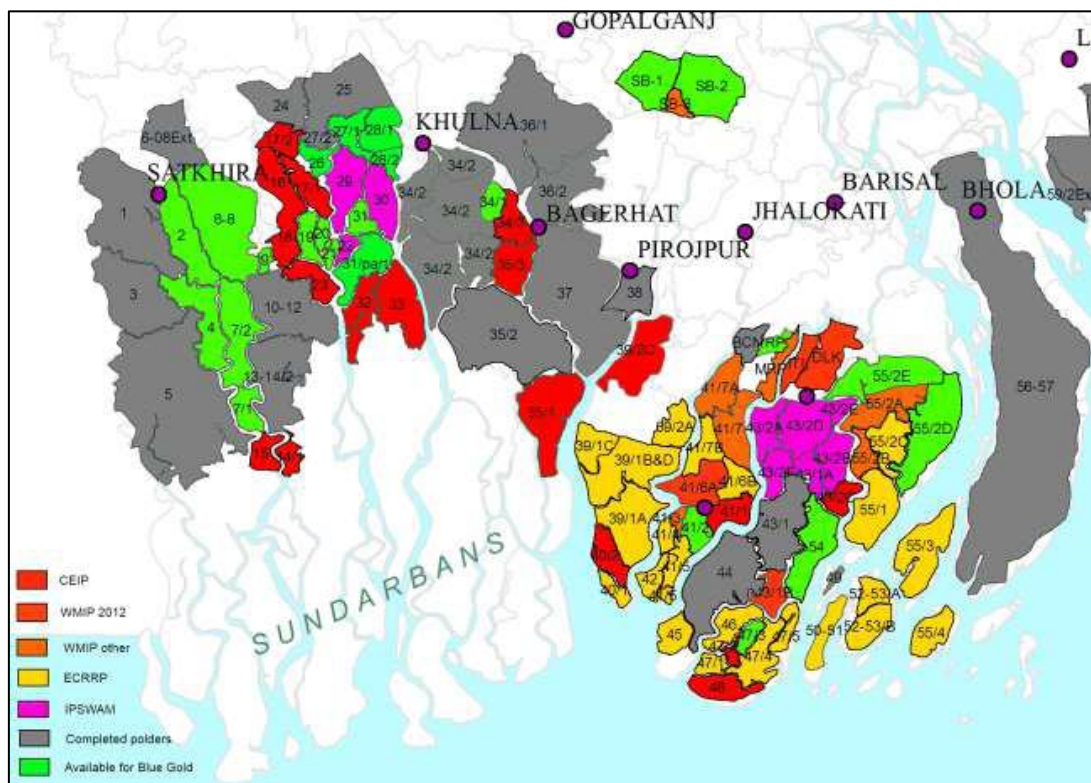


Figure 4: Selected polders under CEIP-1 project

## Blue Gold Project

For integrated and sustainable management of water resources in the coastal zone with empowering community organization, the Blue Gold Program has been built which cover 25 polders with a combined area of 160,000 ha and 150,000 household. It is a collaboration project between the Government of Bangladesh and the Government of the Netherlands. The objective of Blue Gold Program is to manage the water resources and drainage and irrigation infrastructures through establishment and empowerment community organizations based on the priorities in the area of agriculture, livestock and fisheries development. The Program aims to create strong cooperation between the public and private organizations that play a important role in the development of the area. Figure 5 shows the project areas under Blue Gold Program. The main challenges identified for the development of this area under this program are: the hydrological dynamics which is influenced by climate change, the production systems (mainly based on paddy cultivation) and an inadequate institutional capacity for provide services to the community.



**Figure 5: Polders under Blue Gold and other projects (Source: Blue Gold 2012)**

The programme consists of 5 components:

- Component 1 - Community Mobilization and Institutional Development.
- Component 2 – Integrated water resources management (six-step approach to participatory water resource management)
- Component 3 - Food Security and Agricultural Development (support to WMGs in responding to existing or potential market demands for the end goal of generating additional income for rural households).



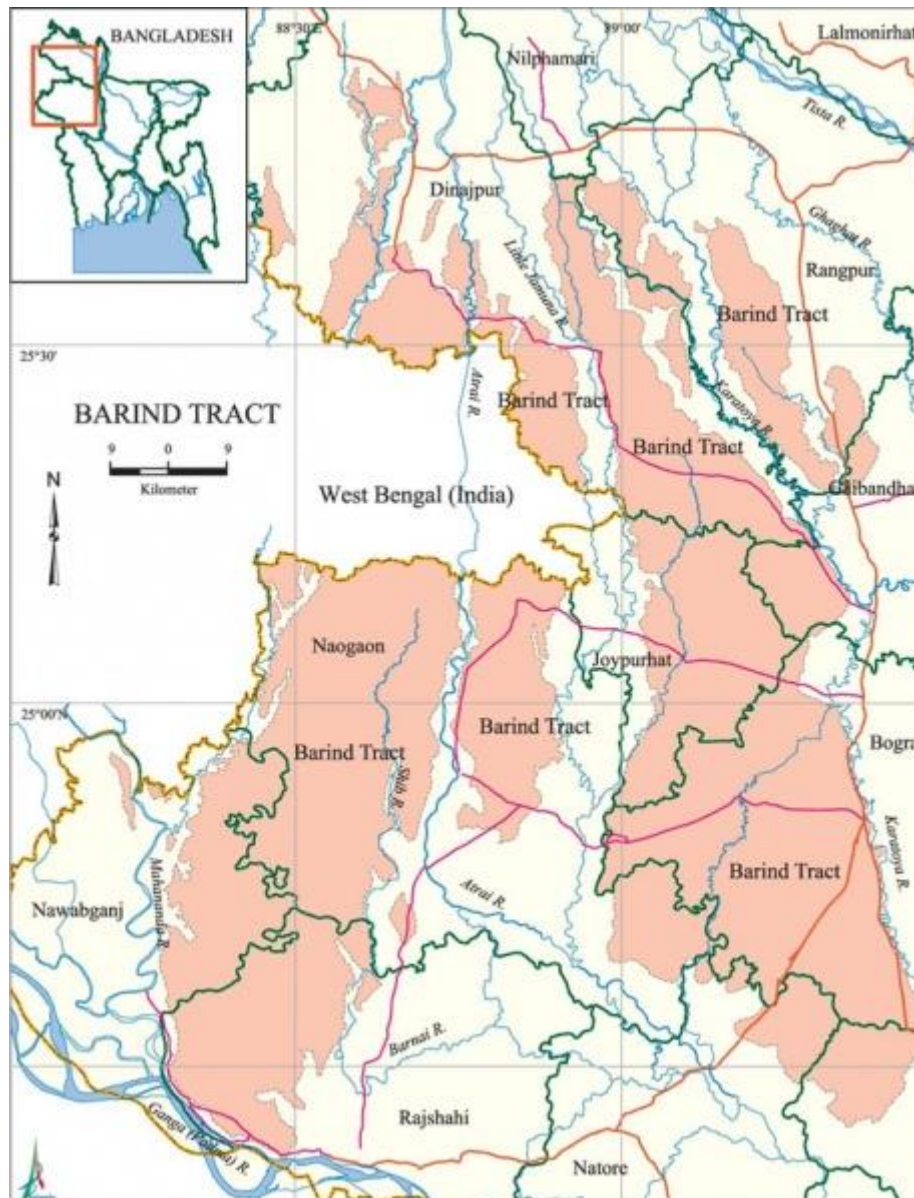
- Component 4 - Business Development and Private Sector Involvement (market development for the farmers in the polders)
- Component 5 – Livelihood Improvement and Cross Cutting Issues

The plan is to create 600 new co-operatives – to work alongside the 250 that have already been formed – and equipping them with technical, advocacy, communication and project management skills to strengthen water management assets. Furthermore, advice will be given on irrigation, drainage, land and fisheries management techniques to improve agricultural and aquacultural productivity to create more income.

#### 4.2 Barind Hotspot area:

The Barind Tract region is located in the North-West Hydrological Region in Bangladesh and covers most of Dinajpur, Rangpur, Pabna, Rajshahi, Chapai Nawanganj, Bogra, and Naogaon districts of Rajshahi Division and Rangpur Division. It consists of three physiographic subdivisions: i) the Level Barind Tract, occupying 5,048 km<sup>2</sup> or 65% of the whole unit; ii) the High Barind Tract, in the west, covering 1,600 km<sup>2</sup> or 21%; and iii) the North-Eastern Barind Tract, covering 1,079 km<sup>2</sup> or 14% of the whole unit (Brammer, 1997). The weather of this area is very dry and lesser rainfall occur compare to other parts of the country. . It covers roughly an area of about 7,770 sq km. It has long been recognized as a unit of old alluvium, which differs from the surrounding floodplains. This physiographic unit is bounded by the Karatoya to the east, the Mahanada to the west, and the northern bank of the Ganges to the South. A lower fault scarp marks the eastern edge of the Barind Tract, and the little Jamuna, Atrai and Lower Punarbhaba Rivers occupy fault troughs. The western part of this unit has been tilted up; parts of the western edge are more than 15m higher than the rest of the tract and the adjoining Mahananda floodplain. The southern part of the main eastern block of the Barind Tract is tilted down towards the southwest and passes under lower Atrai basin sediments in the south.

The Barind area is a severely drought prone area. Drought is especially severe in the High Barind (Natore, Bogra, Thakurgoan Districts). Perennial river flows are present in the major regional river systems, but many of the minor rivers lack sufficient environmental flows in the dry period. Since the main source for water use is groundwater, lowering of groundwater levels in aquifers due to rainfall deficit leads to water scarcity for households, industry and agriculture. Due to intensive groundwater use and development of (boro rice) irrigation systems, the groundwater table has gradually declined, particularly in the high Barind tract.



**Figure 6: Locations of Barind area (IWM 2006)**

Depending on the availability of water, prospective agricultural development and constraints the Barind area can be divided into 3 irrigation zone: Surface water, Mixed Mode (DTW & STW) and purely DTW zone. The ground water quality is suitable for both domestic and agricultural uses. The main issues and challenges in water management are:

- Shortage of water - even during rainy season, sometimes irrigation required
- Shortage of drinking water (December-January and March-May)
- High presence of Iron in some area.
- Due to cold storage problem farmers are unwilling to diversify crop cultivation.
- Lower profit in vegetable cultivation.
- Drinking water layer is low.
- Set up of shallow machine at low ground for water extraction.
- There is no alternative cultivation in “Boro” season because cost of other cultivation is high.

- Lack of knowledge of efficient water irrigation among farmers.
- Irregularities in agricultural inputs.
- River sedimentation
- Sand layer in crop field
- Illegal possession of water bodies hampering fish farmers
- Internal channels disconnected from river
- Low quality of seed
- Insufficient Credit facility
- Marketing system needs to improve
- Storage system needs to improve

To overcome the challenges some strategy can be taken such as:

- Sprinkler irrigation method can be used in crop fields
- Use of Water hyacinth in pond fish farming.
- 'Mulching' method for fruit farming
- Usage of pipe (drip irrigation) in crop fields
- Canal water storage after monsoon season.
- High yield seeds and low water consuming crops for cultivation.
- During monsoon season use roof top water to restore the underground water.

The probable solution given by the community and stakeholders area:

- River and canal (khal) re-excavation and freed from illegal possession
- Water storing during monsoon using "Sluice gate"
- Suitable market price for alternative crops
- Good quality of seed should be supplied
- Farmers training/school
- Diversify crop cultivation (mango, banana, potato, mustard)
- Provide government subsidy
- Alternate Wet and Dry (AWD) irrigation method can be used to save water

## 5 Concluding Remarks

The problems & challenges in Coastal & Barind area in Bangladesh are different as they are situated in different hydrological regions. Both the areas are very vital for crop production and ensure food security for Bangladesh. Many projects have been taken by the Government of Bangladesh for sustainable and integrated management of water, land and food. Learning from these two diversified regions would be valuable for other Delta countries of the region

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# LEARNING DELTAS ASIA INITIATIVE

SCOPING PHASE –  
MYANMAR MISSION REPORT

July 2017

Prepared by Myanmar Water  
Partnership with the support of  
PROCASUR Corporation for the  
Global Water Partnership

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## ACRONYMS AND ABBREVIATIONS

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ADB	Asian Development Bank
ADM	Adaptive Delta Management
AIRBM	Ayeyarwady Integrated River Basin Management
BDP2100	Bangladesh Delta Plan 2100
BUET	Bangladesh University of Engineering and Technology
BWP	Bangladesh Water Partnership
CEGIS	Center for Environmental and Geographic Information Services
CWP	Country Water Partnership
DC	Delta Coalition
DRR	Disaster Risk Reduction
DWIR	Directorate of Water resources and Improvement of River systems
FD	Forest Department
FREDA	Forest Resource Environment Development and conservation Association
GWP	Global Water Partnership
HLPW	High Level Panel on Water
IADS	Integrated Ayeyarwady Delta Strategy
ICT	Information and Communication Technologies
IFAD	International Fund for Agricultural Development
IFIs	International Financial Institutions
INGO	International Non-Governmental Organisation
IWM	Institute for Water Modelling
IWRM	Integrated Water Resource Management
KfW	KfW Development Bank
LDAI	Learning Deltas Asia Initiative
MDB	Multilateral Development Bank
MmWP	Myanmar Water Partnership
NGO	Non-Governmental Organisation
NWRC	Myanmar National Water Resources Committee
PROCASUR	PROCASUR Corporation
SDG	Sustainable Development Goal
SC	Steering Committee
WB	World Bank

# 1 BACKGROUND

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From a water management point of view urbanized deltas are the most challenging regions in the world, considering their large concentration of population (half of world population by 2050), their significance for the world's economy and their roles in the world's ecosystems. At the same time they serve as food baskets of regional and even global significance. Because of their low-lying location, deltas are increasingly vulnerable to hazards of extreme weather, including flooding from three sources (rain, river and sea), salt-intrusion, soil subsidence and erosion/sediment starvation. Climate change, sea-level rise and, upstream developments are aggravating these problems and threatening their sustainability. Further urbanization and densification of both urban and rural land in deltas would result in the disappearance of natural land-water transition zones and a decrease in the resilience of the system.

In order to address these issues several initiatives are now in place, among them:

- The **Global Water Partnership (GWP)**<sup>1</sup> seeks to foster water security through enhanced water governance and neutral Multi-Stakeholder Partnership processes. It is a network of partners in the Global South. Currently GWP counts with well over 2,500 pro-active partner organisations worldwide. GWP addresses the above mentioned challenges in urbanizing deltas and coastal areas through its mandated work on Integrated Water Resource Management (IWRM) linking the network's expertise to innovative processes in learning and knowledge to policies and practices via broad social inclusion for equitable sustainable development. The partners and their Country and Regional Water Partnerships in Asia want to build and own a strong South-South cooperation effort to achieve the challenges posed to populations in affected deltas.
- The **Delta Coalition (DC)**<sup>2</sup> aims at addressing hazards, reducing exposure and vulnerability of deltas. A total of 12 countries that are at the frontline of this challenge have joined forces. Collectively, they aim to: 1) get urbanizing deltas on the agenda worldwide; 2) facilitating the development, availability and exchange of knowledge on deltas, resilience and (urban) sustainable development; and 3) promoting practical implementation and cooperation to increase the resilience of urban deltas and to increase investments in sustainable urban delta management.
- Major International Financial Institutions (IFIs) such as the **World Bank (WB) and the Asia Development Bank (ADB)** provide investments in hard and soft infrastructure, information and institutions while leveraging private funding and action, including technical assistance and capacity development via shared learning and knowledge dimensions. Their role and growingly Climate Funds are key in this context with major engagement in deltas being captured by ambitious and long-term support to country-led delta and coastal zone sustainable development plans, e.g. in Bangladesh, Myanmar, China and elsewhere in Asia.

Climate Financing Facilities, such as the Global Climate Fund are experiencing that bankable projects are scarce, in particular in the field of adaptation. Calls for a paradigm change to move from projects to more holistic basin-wide development programmes, the ethical aspects of securing natural resources for future generations, and the inclusion of more explicit social dimensions and equity as

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<sup>1</sup> [www.gwp.org](http://www.gwp.org)

<sup>2</sup> <http://www.deltacoalition.net/about/> . The DC was created in 2016.



well as sustainability in the criteria for selection of investments are becoming louder<sup>3</sup>. Initiatives that contribute to sustainability and equity are urgently required.

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<sup>3</sup> E.g. the Budapest Water Summit, December 2016

## 2 THE LEARNING DELTAS INITIATIVE INTRODUCTION

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### 2.1 OBJECTIVES AND OUTCOME OF THE LEARNING DELTAS ASIA INITIATIVE (LDAI)

The **principal objective** of the LDAI is to accompany urbanizing deltas in better connecting three processes that often unfold in relative isolation, and in learning from one another in so doing:

- Enabling IWRM planning and implementation of Adaptive Delta Management (ADM);
- Engaging broader sectorial integrated and inclusive societal development processes that guide socio-economic resilience; and
- Supporting the planning and implementation of investment projects through innovative learning and knowledge processes building commitment and capacities.

The **outcome** of the initiative would be enhanced capacity of engaged stakeholders and institutions in furthering policies and political efforts to enable higher levels of impact and sustainability while allowing for scaling up of resilience of urban deltas and assisting in climate change adaptation.

The LDAI, as a thorough knowledge exchange mechanism between key Asian deltas would:

- Increase the understanding of challenges faced by communities/populations living in Asian deltas.
- Foster cooperation to develop joint solutions for increased water security and climate resilience in Asian deltas.
- Strengthen the capabilities of local institutions to enhance targeted outreach, impact and sustainability of MDB/Climate Fund co-financed projects and to improve the quality of project pipeline proposals.
- Eventually lead to strengthened resilience of populations living in coastal/deltaic areas in Asia.

This LDAI initiative, as a typical means of multi-stakeholder process-based implementation would contribute to address Sustainable Development Goal-SDG [17]: Revitalise the global partnership for sustainable development. It would also help in achieving SDGs on Water and Sanitation [6] as well as on Gender [5], Youth [9], Cities and Communities [11], Climate Change [13], Oceans [14] and Terrestrial Ecosystems [15] by reducing the Water-Related Disasters [11.1, 11.5] and Environmental Impact on Coastal Communities [11.6], strengthening the Resilience of Coastal Ecosystems to Climate-related Disasters [13.1, 14.2] and enhancing Sustainable Urbanization in Coastal Areas [11.3, 14.1, 15.3].

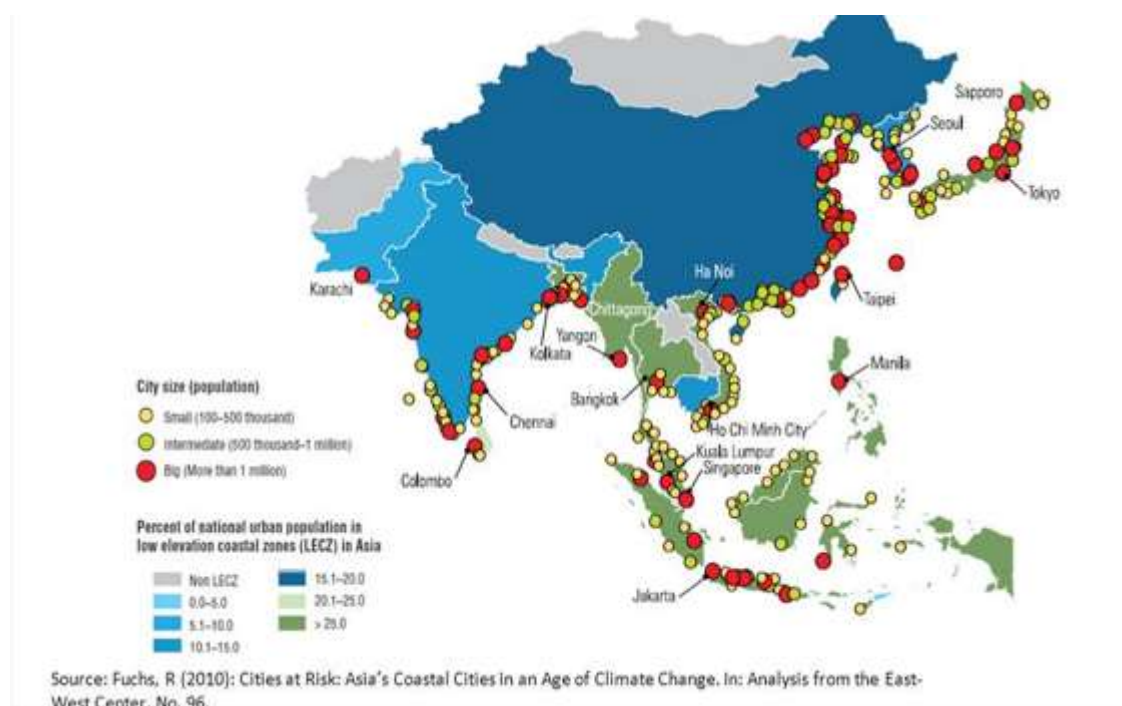
### 2.2 GEOGRAPHIC SCOPE

The start if the LDAI will be focused on Asia. This focus is for practical and cultural reasons. Other Delta Coalition or GWP affiliated countries (e.g. in Africa, South America) may be invited for selected activities. In a later phase Learning Deltas might be extended to include all Delta countries. An overview of Asian deltaic areas identified with listed issues is shown in Table 1, from which the potential target areas are being chosen. The urgency of the issues is further illustrated in Figure 1, which pictures the coastal cities in Asia in low-lying areas.

**Table 1 Potential target deltaic areas in Asia**

COUNTRIES	DELTAIC AREAS	MAIN CITIES	RELEVANT ISSUES
Bangladesh	Ganges – Brahmaputra – Meghna Delta	Mongla, Chittagong	<ul style="list-style-type: none"> <li>● Flooding/droughts</li> <li>● Saltwater intrusion</li> <li>● Land subsidence</li> <li>● Erosion/sediment starvation</li> <li>● Infrastructure on soft soils</li> </ul>
Cambodia	Tonlé Sap, Mekong Delta (transboundary), Bassac River	Phnom Penh	
China	Bohai Sea, Yangtze River Delta, Zhujiang Delta	Tianjin, Shanghai, Guangzhou	
India	Calcutta, Chennai, Mumbai		
Indonesia	Mahakam Delta	Samarinda, Jakarta	
Pakistan	Indus River Delta	Karachi	
Philippines	Pasig River Delta	Manila	
Myanmar	Ayeyarwady Delta	Yangon, Patheingyi	
Singapore	Singapore River	Singapore	
Thailand	Chao Phraya River Delta	Bangkok	
Vietnam	Mekong Delta (transboundary), Red River Delta	Ho Chi Minh, Hanoi	

**Figure 1 Coastal cities in Asia and percentage of national urban population in low elevation coastal zones**



## 2.3 IMPLEMENTATION PARTNERS AND CONTRIBUTION

Implementation partners include:

- The IWRM planners, globally connected through the GWP, and nationally organized in Country Water Partnerships (public, private, civil society, knowledge) as well as delta actors represented through the Delta Coalition.
- Planning and economic as well as other sector ministries, including Social Welfare and Interior, and decentralized authorities, knowledge and learning institutes, research and academia/vocational training, parliaments and media, and Agenda 21 major groups.
- Finance, Infrastructure, Water, Environment and other sector ministries; multilateral development banks (WB, ADB, Islamic Development Bank, International Fund for Agricultural Development-IFAD), pension and social funds, private (finance) sector representatives, chambers of commerce and bilateral donors.

Each party will bring their specific strengths to the Initiative:

- GWP - country networks and Technical Committees with knowledge as presented in publications such as “Securing Water Sustaining Growth, 2015”.
- National, regional and municipal/local agencies – project development capabilities.
- Multilateral Development Banks (MDBs), Climate Funds and bilateral donors – capacity building, technical assistance, guidance and facilitation in development and delivery of integrated investment planning frameworks.
- MDB/Climate Funds – project financing and structuring capabilities for project financing.

The ultimate **beneficiaries** of the Learning Deltas Asia Initiative will be the local communities in the deltas. Relevant Disaster Risk Reduction (DRR) communities, River Basin’s Organizations (RBOs), Non-governmental Organisations (NGOs), civil societies, private sector, etc. will be involved.

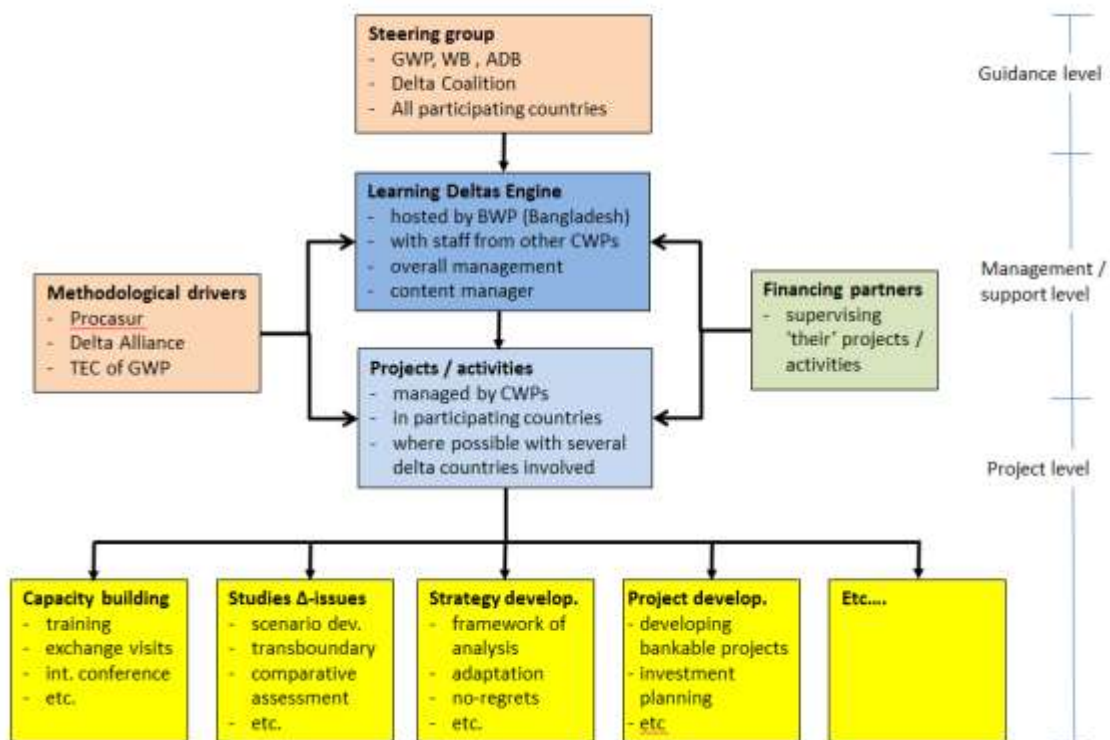
## 2.4 ORGANISATIONAL SET-UP

LDAI is an initiative of GWP, set-up in consultation with the Delta Coalition (DC). Main corporate clients are DC participating countries drawing on ADB and WB as well as Climate Funds. Asian members of the Delta Coalition include Bangladesh, Indonesia, Japan, Korea, Myanmar, Philippines and Vietnam. Other Asian countries are expected to join later (e.g. China, Pakistan).

One of the lead agency is the Bangladesh Water Partnership (BWP) as Bangladesh has gained considerable experience on sustainable delta planning, has a developed knowledge infrastructure in this field (e.g. Centre for Environmental and Geographic Information services-CEGIS, Institute of Water Modelling-IWM, Bangladesh University of Engineering and Technology-BUET) and ~~will be the next~~ currently serving as the chair of the Delta Coalition. BWP will set-up a Task Force for the LDAI, which will have a dedicated focal point and be supported by external knowledge groups (e.g. by the Delta Alliance and PROCASUR).

A Steering Group, at full development, will be established to guide the activities, consisting of representatives from all other participating countries, WB, ADB and GWP. Figure 2 illustrates the proposed organizational set-up.

**Figure 2 Organizational set-up Learning Deltas**



South-South Cooperation, at the request of the Delta Coalition Chair Secretariat<sup>4</sup>, will follow a phased approach. Activities are starting small, with a pilot knowledge between Bangladesh and Myanmar. These activities are linked up with on-going processes such as the Bangladesh Delta Plan 2100 (BDP2100), the Ayeyarwady Integrated River Basin Management (AIRBM) project in Myanmar, among other on-going projects of ADB, WB, IFAD and KOICA. A multi-stakeholder approach will be followed. After first tangible results at pilot level have been produced, LDAI will scale up to include other interested stakeholders and DC countries. As appropriate other countries may participate under their respective flood and/or drought DRR and pertinent resilience building programmes.

The logistics and organization of learning routes, training of the learning champions will be entrusted to the BWP/IWMBD consortium in cooperation with the MmWP, Procasur Corporation and, Delta Alliance (as appropriate). Similarly the means of selection and financing of participants in the learning routes and the coaching/mentoring required for application of the subsequent innovation plans would include governments, IFIs and other partners.

<sup>4</sup> Informal request from DC Secretariat, Marrakech, October 2016

## 2.5 STRATEGY AND METHODOLOGY

Implementation strategies and methodologies were arrived at following a **scoping phase** that began in February 2017 between Bangladesh and Myanmar. The scoping had a dual nature:

1. To define in operational terms the methodological approach with Bangladesh considered a first ‘learning territory’ due to its pronounced leadership in the region with ‘learning champions’ (knowledge holders in a position to share) on adaptive delta management for resilience. This innovative value-adding approach, and its anchoring in country-level institutions such as BWP, would address the learning and knowledge stakeholders (‘learning exchange participants’) and appropriate processes bringing tacit knowledge<sup>5</sup> from and to practitioners for subsequent application in their respective institutional settings. This latter aspect labelled an innovation plan would represent the innovative value adding of LDAI. It would cover the political/policy, regional/municipal and community level domains. The practitioners would come from government, civil society, the private sector and academia and community based institutions. They would include youth and gender representatives as well as staff from MDB/Climate Funds.
2. To establish a content inventory, including a knowledge landscaping exercise which would define the elements of a marketplace of supply/demand (hence in both Bangladesh and Myanmar), lessons learnt, on-going ADM programmes and future investment portfolio projections, a menu of priority areas and hotspots (‘lighthouse projects’) by BWP and MmWP are structuring the initial priorities and building the timeline for the larger exchanges. Access to lessons learned on monsoon ADM and non-monsoon ADM, i.e. the seasonal adaptation, would be crucial. BWP and MmWP partners include organisations affiliated to the Delta Alliance, a Dutch ADM expertise holding pool.

Following completion of a proposed Scoping Phase, a **Phase II** would scale up activities depending on the needs defined in the DC countries in the framework of operational activities agreed between government and MDBs. Additional MDBs such as the Islamic Development Bank, IFAD or KfW may be approached to strengthen LDAI.

The LDAI methodological approach is led by PROCASUR as a GWP partner. Myanmar and Bangladesh are the two countries covered. Ideally participants would come from an environment where there is an *ex ante* definition of scope and space for learning and innovation. Such would contribute to improve the quality of outreach to target audiences and vulnerable groups of investment programmes, accelerate the delivery and disbursement capacities of participating institutions and enhance the prospects of impact and sustainability. Metrics for these ambitions would need to be developed in contexts of the host investment programmes for Phase II.

Close monitoring of the performance would be set up by involved parties. Modifications would be introduced on a pragmatic hands-on basis (‘improve as you go’) which, when coupled to a smart dissemination and communication campaign to other DC and 3<sup>rd</sup> countries, would allow for early

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<sup>5</sup> See <http://ieg.worldbank.org/video-can-world-bank-create-culture-learning-and-results>

scaling up to Phase II. The supervisory structure of Phase I would be light with intensive counselling and cooperation in order to allow all involved parties to learn for a Phase II.

LDAI activities encompass: a) capacity building including exchange visits between Asian Delta countries, local and international training programmes, preparation of training material for local use and organization of an international conference on delta management in the South; b) Joint research activities on typical delta issues being carried out by local knowledge institutes, supported by international institutes. Topics would be determined by partners and include scenario development, adaptive delta management, decision making under uncertainty, (upstream) trans-boundary issues, environmental flow, green growth; c) Strategy Development including framework of analysis for delta planning and establishment of relationships between delta planning with national and regional economic development goals and strategies. Other issues would cover adaptive planning techniques, scheduling of investments and investment planning.

LDAI will also assist in project development including assistance in developing proposals (e.g. for Climate Fund), translating national and regional strategies in bankable projects and establishing institutional requirements for implementation.

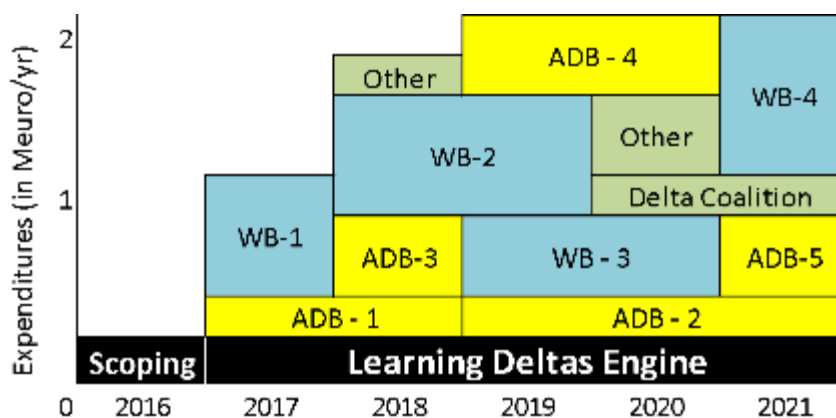
## 2.6 FINANCING STRUCTURE AND BUDGET

The programme is planned for 5 years with a total budget of about 10-12 M Euro. The major part of the financing would come from ‘projects’, carried out in the framework of LDAI but financed as separate Technical Assistance/Training/Capacity Building activities and as part of on-going loans or grants of the WB and ADB or Climate Fund readiness programmes.

Continuity of the programme would need to be secured by ‘the Learning Deltas Engine’ which comprises the management level as given in Figure 2. The financing of this Engine would have to come from GWP, bilateral donors (e.g. the Netherlands, member countries of or related to the Delta Coalition) and from management contributions of the ADB/WB/Climate Fund activities. This is illustrated in Figure 3. This figure shows only the structure; the actual start, duration and size of the LDAI will depend on the capacity building components of projects as they are defined by borrower countries and by Operations of the WB and ADB. .

Indicative budget figures for Phase I have been estimated to be approximately USD 80,000-100,000 for preparation and delivery of one learning route without the coaching of the innovation plan which would be charged to the host ‘project’ of the learning exchange participants. Dissemination via a reflection workshop and communication campaigns, including attractive documentation and reporting via Information and Communication Technologies (ICT) and media, would represent incremental costs estimated at USD 20,000. Initially a total of 20 participants from Myanmar are expected to engage with Bangladesh. GWP would largely fund the conceptualization and design of the scoping and would contribute to the delivery cost of the learning exchange between Myanmar and Bangladesh. Participants are expected to be partially self-funded, i.e. be sponsored from their host investment projects funded by ADB, WB or KOICA.

**Figure 3 Financing structure Learning Deltas**





## 2.7 LDAI BENEFITS

Besides the direct benefits for the delta countries included in the LDAI, other added values for participating institutions would include:

- Acquainting participants with latest developments on implementing IWRM (e.g. integrated urban management, water pricing, trans-boundary water management, decision making under uncertainty) and participation in locally anchored institutional learning exchanges on how to transform the usually wish-lists that come out of IWRM planning exercises into concrete knowledge-supported action by practitioners in the context of on-going and/or future bankable and implementable project.
- Providing access to the extensive network of country water partnerships of GWP and affiliated partners to exchange lessons learned and successful experiences on water management between ADB and WB member countries (south-south exchange)
- Deepening cooperation between WB and ADB to explore where both organizations provide added values and can make complementary contributions in delta countries.

### 3 INTRODUCTION TO MYANMAR WATER SECTOR

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Myanmar is primarily an agricultural country. It has been endowed with an abundance of land, water resources and also adequate manpower. Regarding water use, Myanmar can be identified as a low stress country. About 3.5 percent of the nation's water resources are utilized and the physical potential for their further development is quite substantial. Notwithstanding, nowadays the use of water resources presents numerous issues. The delta of the Ayeyarwady River- the backbone of the country- is Myanmar's rice bowl and the largest delta in Asia. Rain fed paddy cultivation and agriculture on the delta's fertile land providing a staple food supply for the country's ever growing population. Horseshoe shape flood protection embankments, polders and fresh water tidal gravity irrigation initiatives have already been implemented in the Ayeyarwady Delta. Nevertheless, improved and integrated solutions for sustainable management of water resources to meet development needs have become an absolute necessity.

Myanmar Water Partnership (MmWP) firstly introduced the Integrated Water Resources Management (IWRM) concept with the support of Global Water Partnership (GWP) in the country. MmWP is a country water partnership hosted within the Irrigation and Water Utilization Management Department (IWUMD), acting as a semi-governmental organization under the umbrella of the National Water Resources Committee (NWRC), the national apex body for water related matters. MmWP, established in 2007, is one of the Country Water Partnerships (CWP) of the GWP Network and also the member of Global Water Partnership-South East Asia (GWP-SEA). Myanmar Water Partnership<sup>6</sup> Partner organizations are composed of ten governmental organizations, two academic institutions, one consulting services institution, as well as three non-governmental organizations related to the water sector with all partners abiding to GWP network's principles and values. All partner organizations of the Myanmar Water Partnership have been accepted by GWP global as certified partners.

The objective of MmWP is to promote the Integrated Water Resources Management (IWRM) approach in Myanmar to ensure the sustainable management of water resources. MmWP has conducted activities at least twice a year with various topics concerning with water related matters. Among them a Comparative Assessment of the Vulnerability and Resilience of the Ayeyarwady Delta conducted jointly by IWUMD, MmWP, Delta Alliance and Deltares with partial support provided by GWP.

Several agencies and departments use water resources independently making it essential to further coordination and cooperation at present. Even though the country's development may divert to the industrial sector, irrigation for agricultural water use is the first priority. Irrigation combined with hydropower generation for industrial and domestic water supply together with environmental

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<sup>6</sup> *Irrigation and Water Utilization Management Department, Department of Agricultural Research, Land Use Division, Department of Agriculture, Department of Urban and Housing Development, Directorate of Water Resources and Improvement of River System, Occupational and Environmental Health Division, Department of Public Health, Pharmaceutical and Foodstuff Industries, Engineering Department (Water and sanitation), Yangon City Development Committee, Mandalay City Development Committee, Environmental Conservation Department, Nationalities Youth Resource Development Degree College, Yangon, Technological University, Kyaukse, Biodiversity and Nature Conservation Association (BANCA), Water Research and Training Centre, Myanmar (WRTC), National Engineering and Planning Services (NEPS), Forest Resource Environment Development and Conservation Association (FREDA)*

sustainability is important considerations requiring Integrated Water Resources Management (IWRM) to effectively manage the nation’s water resources.

The Irrigation and Water Utilization Management Department (IWUMD) is the governmental organization under the Ministry of Agriculture, Livestock and Irrigation (MoALI). Main responsibility of IWUMD is sustainable operation and maintenance of (Irrigation) water management. Irrigation water comes from surface water / river water as well as ground water. IWUMD (Irrigation) is responsible for surface water and IWUMD (Water Resources Utilization) addresses river water and ground water. Another responsibility of IWUMD is operation and maintenance of flood protection embankments and the polders system all over the country. IWUMD operates, maintains and manages 581 irrigation facilities as well as 479 flood protection and drainage facilities in the country.



Myanmar aims to develop the Ayeyarwady Delta to become food secure and, flood climate resilient. Flood protection works such as embankments, dykes, polders and sluice gates; rehabilitation works on drainage systems have been constructed and others are being planned. River dykes along the Ayeyarwady River, and Sittaung River and Ngawun River were built in the 19<sup>th</sup> century and, urban dykes along Ayeyarwady and Ngawun Rivers constructed continuously during the colonial era. Before the rainy season, activities to control flooding is a compulsory task which requires working in organizing all stakeholders in order to ensure their participation including assigning duties for flood watching on the embankments and regular inspection along the dykes during the whole rainy season.

Polders were constructed as early as 1975 under the Lower Burma Paddy Land Development Project Phase I (Paddy I) and Lower Burma Paddy Land Development Project Phase II (Paddy II) financed by the, World Bank. Polders are very important for agriculture development and provide protection from salt-water intrusion. Constructed irrigation and drainage systems as part of the polder system furthers a food secure delta. After the Nargis Cyclone, cyclone shelters, drinking water ponds and storm shelter embankment (Hillock) were built for local people to evacuate when the storm came. There is recognition that developing and implementing an early warning system is of considerable importance together with disaster preparedness in the delta area. Awareness of main issues by local people is not adequate and needs to be improved. Addressing the need to fully develop the delta, many difficulties are at the present stage. Issues requiring attention include salt intrusion, lack of infrastructure and asset management, mangroves and delta degradation, adverse water and environmental quality, public health, flooding and lack of drainage, livelihood limitations and lack of knowledge and innovation. Strong collaboration between the government, INGOs and NGOs is also an important factor.



Flood protection works



Vulnerable areas in Ayeyarwady Delta

In the delta, vulnerable areas are divided into riverine flood zone, localized flood prone area and estuarine and coastal area. Rivers are active with bank erosion, emergence of sand bars, which are progressively high. Changes in river flow patterns by climate impact worsen the sedimentation in the estuaries of the Ayeyarwady Delta. Improvement of the river system for navigational purpose, protection of riverbanks erosion and managing the prevention of river water pollution are main responsibilities of the Directorate of Water Resources and Improvement of River System (DWIR) under the Ministry of Transport and Communication.



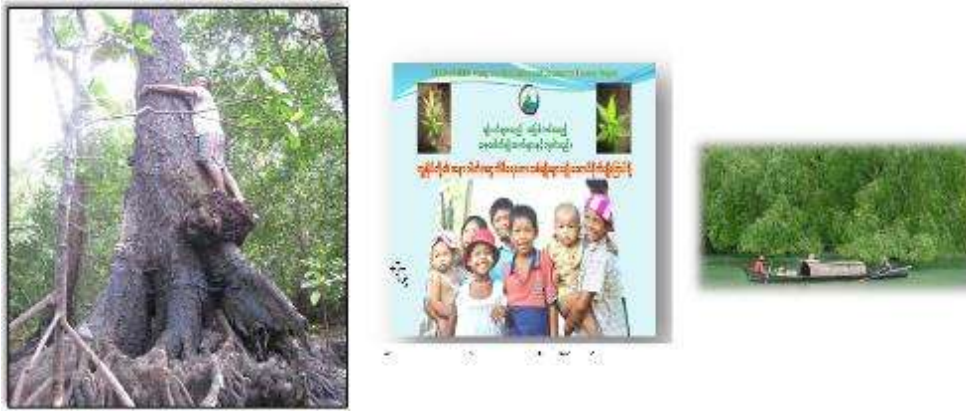
River banks protection works



River dredging works

The Ayeyarwady Delta is the highest populated area in Myanmar with changes in land use representing approximately 80 percent land mostly to rice cultivation. Frequent migration and unstable settlements have contributed to mangrove forest degradation. Mangrove forests are said to have saved thousands of people’s lives during the Cyclone Nargis in 2008. They served as a buffer area to storm surge, providing ideal nursery grounds for fish and wildlife species. Legal frameworks that cover mangrove forest conservation and management are controlled by the Forest Department whose responsibility includes increasing people awareness on the value of mangroves and their protection. In addition, there are international commitments in relation to mangrove such as SDG, Aichi targets, Myanmar Agenda 21, REDD+ and the Paris Agreement. Myanmar is committed to increase reserved forests/protected public forests by 30 percent and, protected area systems by 10 percent of national total land area. Additionally to governmental organizations, NGO such as Forest Resource Environment Development and Conservation Association (FREDA) are working for environment conservation in the Ayeyarwady Delta. Sustainable forest management, natural environment conservation, wildlife protection, grass root level community development, disaster risk reduction, sustainable land use, human resource development and responsible eco-tourism are

essential tasks to promote participation of the local people requiring the need to establish joint partnerships.



Mangrove forest conservation works

## 4 BRIEF DESCRIPTION OF THE MISSION TO MYANMAR

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A first mission to Bangladesh was undertaken on February 26-28, 2017 by a Myanmar <sup>7</sup>delegation to identify an opening learning agenda between the countries. A second Mission, of a Bangladesh <sup>8</sup>delegation, visited Myanmar between 1-4 June 2017.

Both missions focused on Adaptive Delta Management, including learning on management of polders, tidal river management and Integrated Water Resources Management. The missions agreed to organize a Learning Route and practical/theoretical training in Bangladesh for 7 to 10 days during late October 2017, when the Monsoon season is ending.

### 4.1 OBJECTIVES

These missions were in line with the LDAI objective to build up an effective South-South cooperation learning and innovation initiative in rural and urbanizing deltas by connecting three processes that often unfold in relative isolation, and in learning from one another.

### 4.2 ACTIVITIES AND SITE VISITS DURING THE MYANMAR MISSION

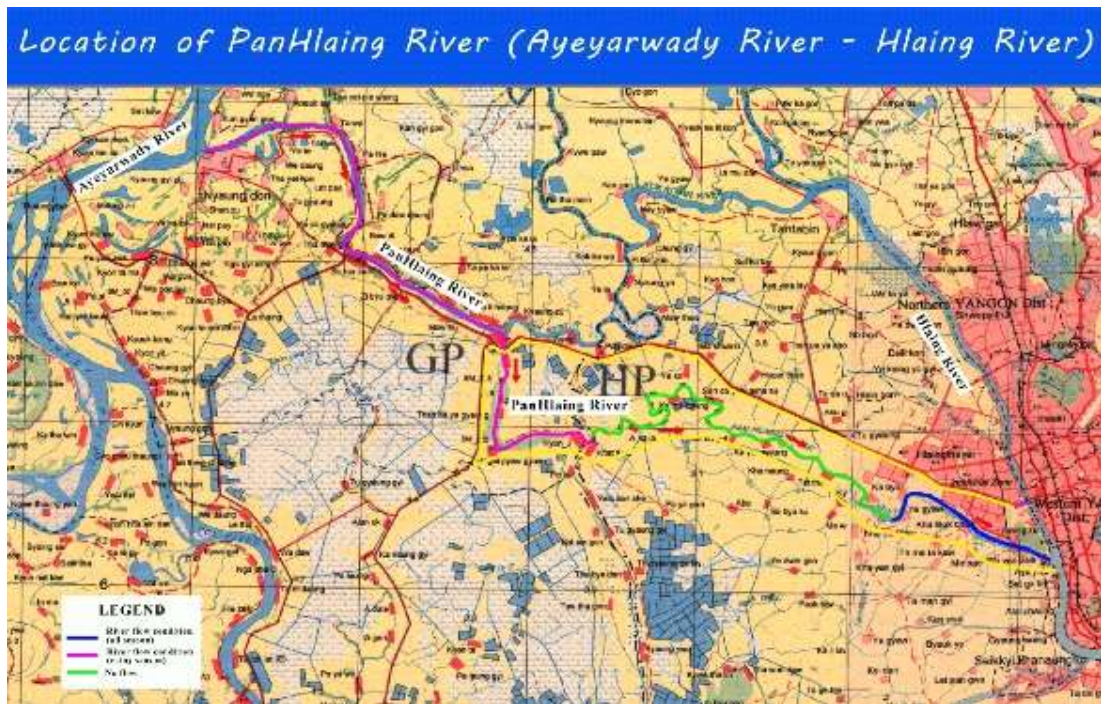
During the four-day mission several activities were undertaken, including a **consultation with stakeholders** at IWUMD's offices in Yangon around their engagement in Delta Management. The Mission's Agenda is attached as Annex 1 and welcome remarks by the Director of Irrigation and Water Utilisation Management Department as Annex 2. Eight different topics were presented by governmental organizations, NGO's, a national company working together with a Dutch consulting firm and two Dutch consulting firms working together with IWUMD in the Ayeyarwady Delta.

Another highlight from the mission was a two-day **field visit** organised by the host to the Ayeyarwady Delta. The officials from respective organisations/departments were met in the field by the mission explaining their project with maps and charts followed by discussion. The field trip to the Ayeyarwady Delta began by visiting the Mezali Sluice Gate located in Yangon Region and next to Pan Hlaing Sluice Gate located in the Ayeyarwady Region which functions and is operated by IWUMD.

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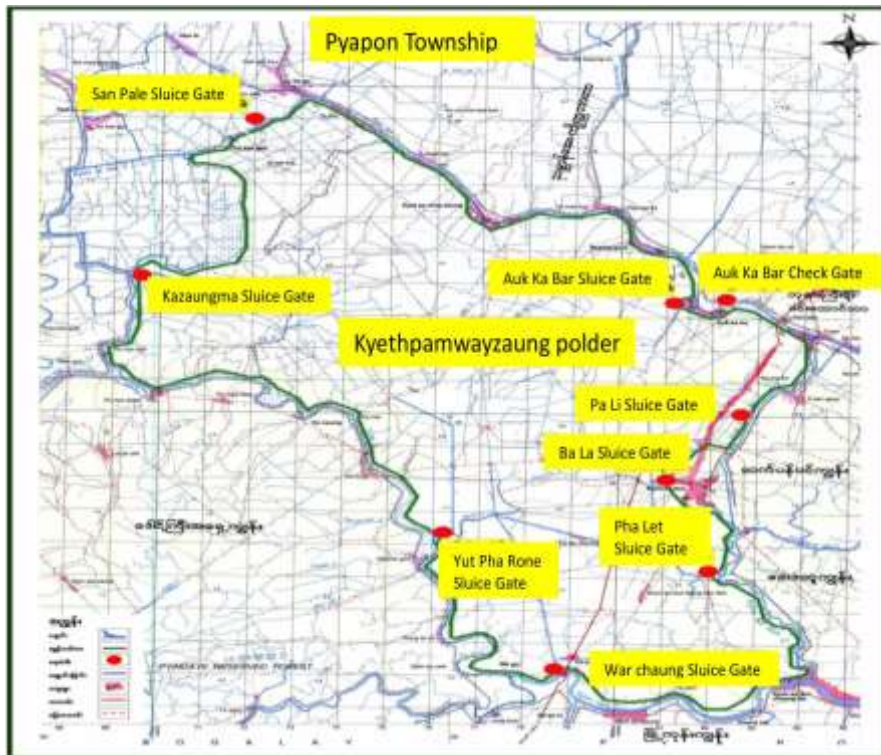
<sup>7</sup> **Dr Zaw Lwin Tun**, Director, Irrigation and Water Utilization Management Department, Ministry of Agriculture, Livestock and Irrigation, Myanmar Water Partnership (MmWP) representative, **Mr. Hla Moe**, Director, Directorate of Water Resources and Improvement of River System, Ministry of Transport and Communication, Representative MmWP Partner, **Mr. Aye Myint**, (Private Sector), Senior Consultant, National Engineering and Planning Services (NEPS) Co., Ltd, Representative MmWP Partner, **Mr. Kyaw Nyein**, (Non-Governmental Sector), Executive Committee Member, Forest Resource Environment Development and Conservation Association (FREDA), Representative MmWP Partner

<sup>8</sup> **Dr. Mohammad Monowar Hossain**, Executive Director, Institute of Water Modelling, **Ms. Ismat Ara Pervin**, Associate Specialist, Water Resources Planning Division, Institute of Water Modelling, **Mr. K L Induruwage**, Regional Coordinator, GWP South Asia Regional Office, C/O International Water Management Institute, **Mr. Ariel Halpern**, Vice President, PROCASUR Corporation, Procasur Asia



Location map of Pan Hlaing River Rehabilitation Project area

In Nyaung Done Township, the team visited two project sites, riverbank protection works of Nyaung Done Town and bank protection at Bo Myat Tun Bridge Project site near Nyaung Done Town that are the works of DWIR.



Kyet hpa mway zaung Polder at Pyapon Township

The mission visited IWUMD works including Kyet Pha Mye Zaung Polder, Pyapon Township. This Polder length is 46 miles ensuring protection for 3,491 acres. Water management operations include 11 sluice gates constructed together with the dyke between 1975-1985, by the Paddy I, World Bank Project. Among 11 sluices, the team reached to Auk ka bar Check Gate and Auk ka bar Sluice Gate by boat. Over 10,000 persons are living in the polder and working in agriculture and fishing.

Pyapon Town river bank protection works by DWIR were explained and visited and later the Mission visited the Bogalay River on its way to Mangrove island where Mangrove Service Network (MSN) and the Environment Education and Research Centre operates. The island is seven miles away from Bogalay Town. Some of the activities reviewed include public forest management training and integrated farm training. The Mission also visited Dedaye, Kungyan Gon, Kaw Hmu, Twante, including Kun Gyan Gone Sluice Gate, Kun Gyan Gone Township, Yangon Region which is operated and maintained by IWUMD and the Paddy III project.

On the last day, a wrap up workshop was held at IWUMD. 18 participants from governmental and other various organizations attended and discussed the findings of the mission and agreed on a few next steps, including an assessment of their interest in joining the Learning Route in Bangladesh.



Site visit to Ayeyarwady Delta area

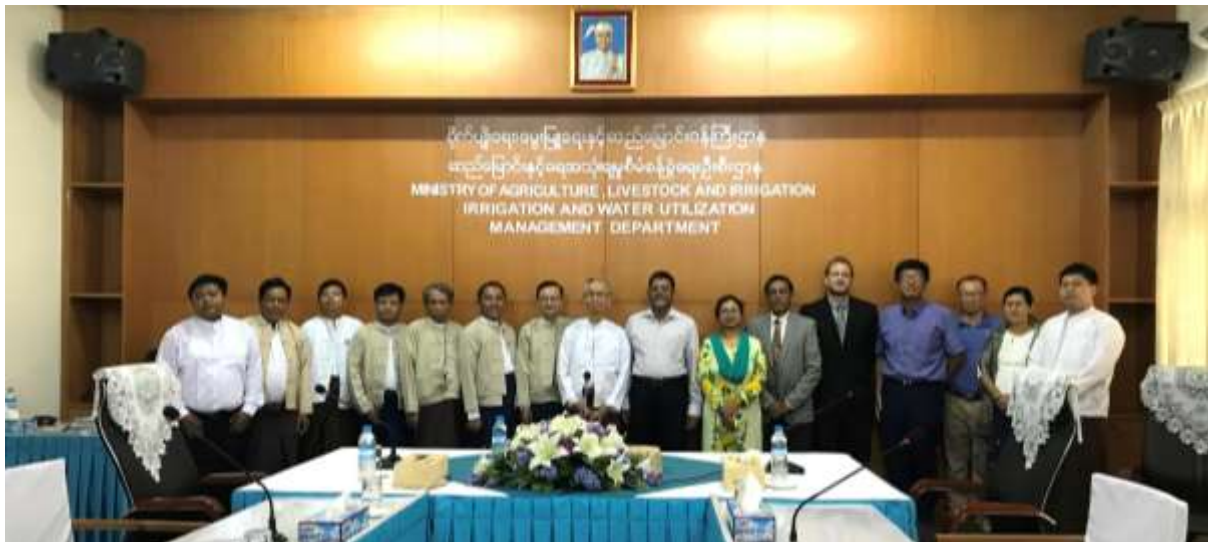


### 4.3 PARTICIPANTS

The Mission to Myanmar had a total of 24 participants. The visiting Bangladesh team was composed of representatives of IWMBD, in addition the lead expert from PROCASUR and the Regional GWP SAS supported the implementation.

A total of twenty Myanmar officials participated in the meeting early described including government organizations such as IWUMD, DWIR, FD, the Embassy of the Kingdom of the Netherlands, Representatives from the Korea Rural Community Corporation (KRC) and KOICA, Delft University of Technology, Arcadis and Royal HaskoningDHV, National Engineering and Planning Services (NEPS) Co., FREDA .

The list of participants is presented in Annex 3.



Participants of the consultation workshop in Yangon organized by Myanmar Water Partnership

## 5 MAIN CONCLUSIONS

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### 5.1 LEARNING TERRITORY

The selection of Myanmar's Learning Territory is solid: The Ayeyarwady Delta is the priority for Myanmar's rural and urban development expectations. As explained in previous chapters, the growing impact of climate change, the size of the actual population and rapid urbanization, its relevance in terms of national's food security and agricultural engagement with the ASEAN Economic Community (AEC), the navigable network in place, the physical and human assets existing in the region under management of public and private institutions makes from the Ayeyarwady Delta the large territory where the LDAI will focus.

The meaning of this selection:

1. The learning agenda will be fit to the context, the aspirations and current investment in the Ayeyarwady Delta.
2. The team of Myanmar to participate in the upcoming Learning Route to Bangladesh will be directly involved in the management and improvement of the Ayeyarwady Delta.
3. The LDAI will follow up on the significant changes that the exposure intense knowledge exchange among practitioners and the start-up of an innovation plan has been supportive of.

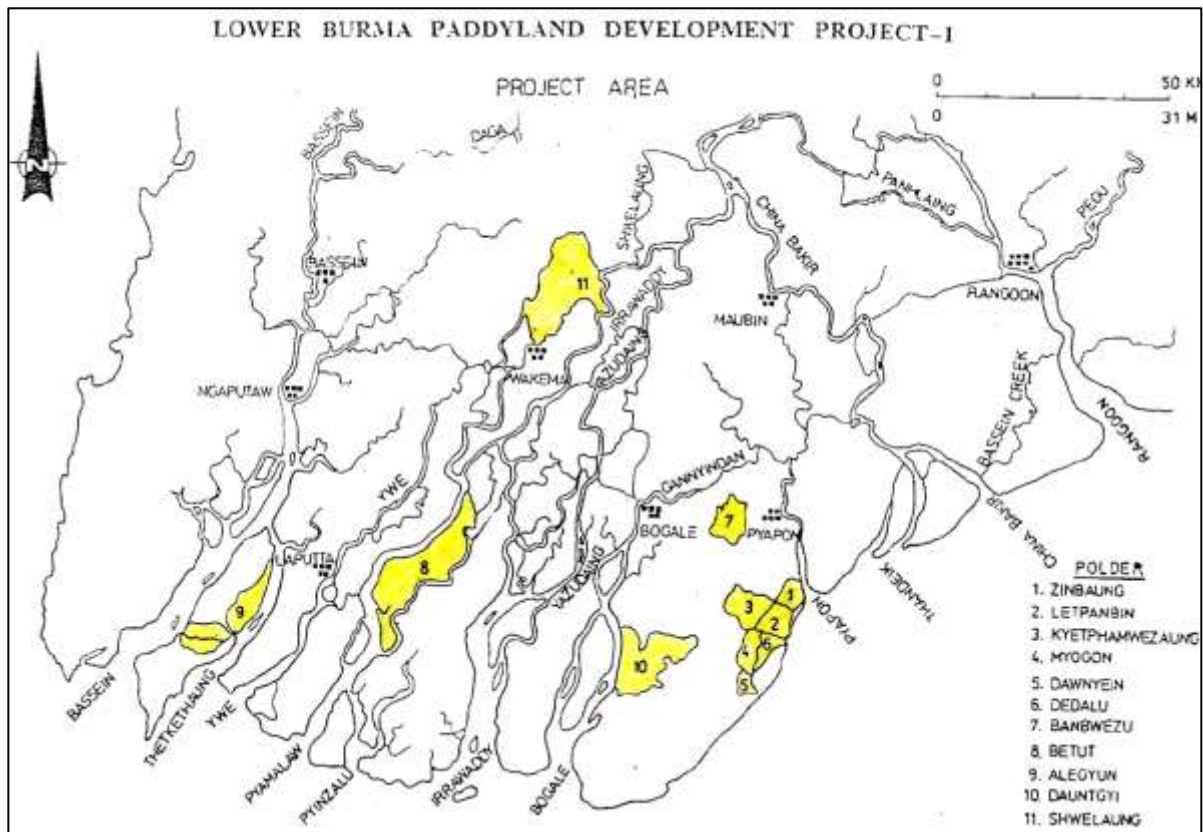
### 5.2 LEARNING PRIORITIES

#### 5.2.1 Flood embankments and Polders' Management

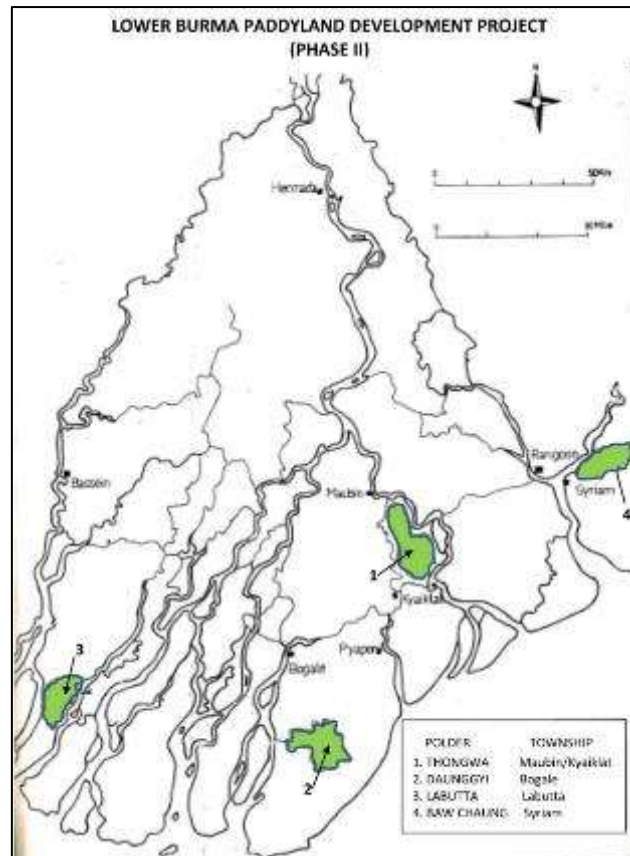
The Ayeyarwady Region is situated over an area contiguous with the Bago Region in the north and east, Yangon Region in the east, Andaman Sea in the south, Rakhine State and Bay of Bengal in the west. In the Ayeyarwady Region, 6.15 million people reside in 26 townships, 2165 wards and village tracts which are situated inside the total land area of 13 525.88 square miles. Its capital is the city of Patheingyi.

The Ayeyarwady Delta is one of the largest classical shape (triangle) deltas in the world. From the apex to the sea it covers about 300 km and widening to about 250 km in the coast. It includes 11 ocean outfalls: Patheingyi (Bassein), Thetkethaung, Ywe, Pyamalaw, Pyinzalu, Ayeyarwady, Bogale, Pyapon, Thandi, Toe (China Bakir) and Yangon Rivers. There are approximately 140 channels with 75 junctions and from these channels seawater intrudes into the delta during the summer time. The major flood embankments were originally built in the period of 1863-80. Presently, the Irrigation and Water Utilization Management Department builds flood embankments and polders to protect many of the islands in the lower delta.

Polder systems in the Ayeyarwady Delta were firstly introduced by the Lower Burma Paddy Land Development Project I (Paddy I) financed by the World Bank in 1975-1985. The Paddy I project areas consisted of one polder in the mid Ayeyarwady Delta, ten polder systems in the southern part of the lower Ayeyarwady Delta to protect flood and tidal intrusion by construction of embankments, sluice gates, drainage excavation and some rehabilitation works for a total of 185,000 acres of farm land, including the reclamation of 65,000 acres of abandoned and cultivable wasteland. The project was completed in May 1985. Additionally, four polder systems situated in the lower Ayeyarwady Delta were implemented by the Lower Burma Paddy Land Development Project II (Paddy II) also financed by the World Bank in 1978-1990. The objective of the Paddy II project was to protect flood and tidal intrusion by construction of embankments, sluice gates, drainage excavation and some rehabilitation works for total of 175,000 acres of farmland, including the reclamation of 50,000 acres of abandoned and cultivable wasteland.



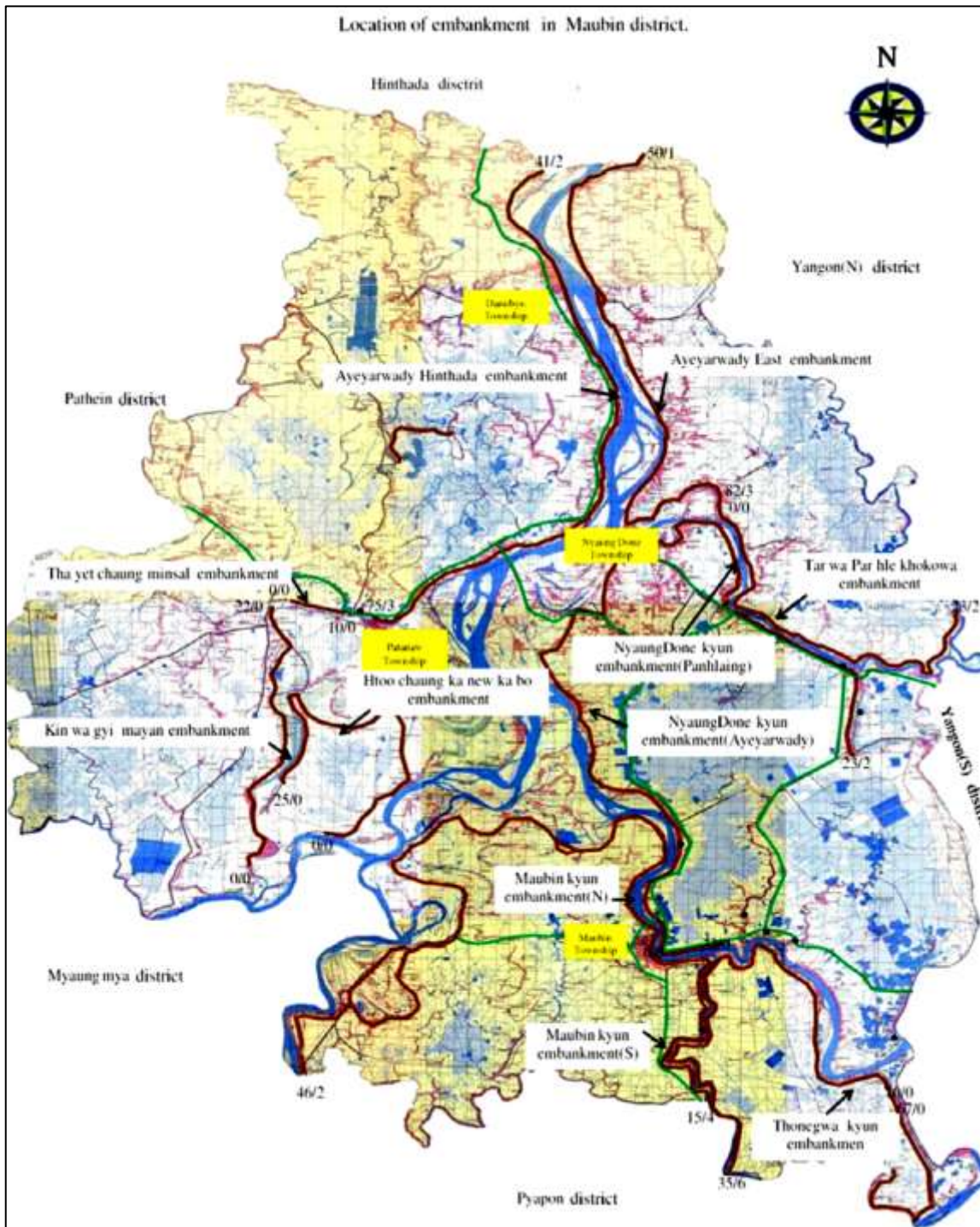
Map of Lower Burma Paddy Land Development Project Phase I (Paddy I)



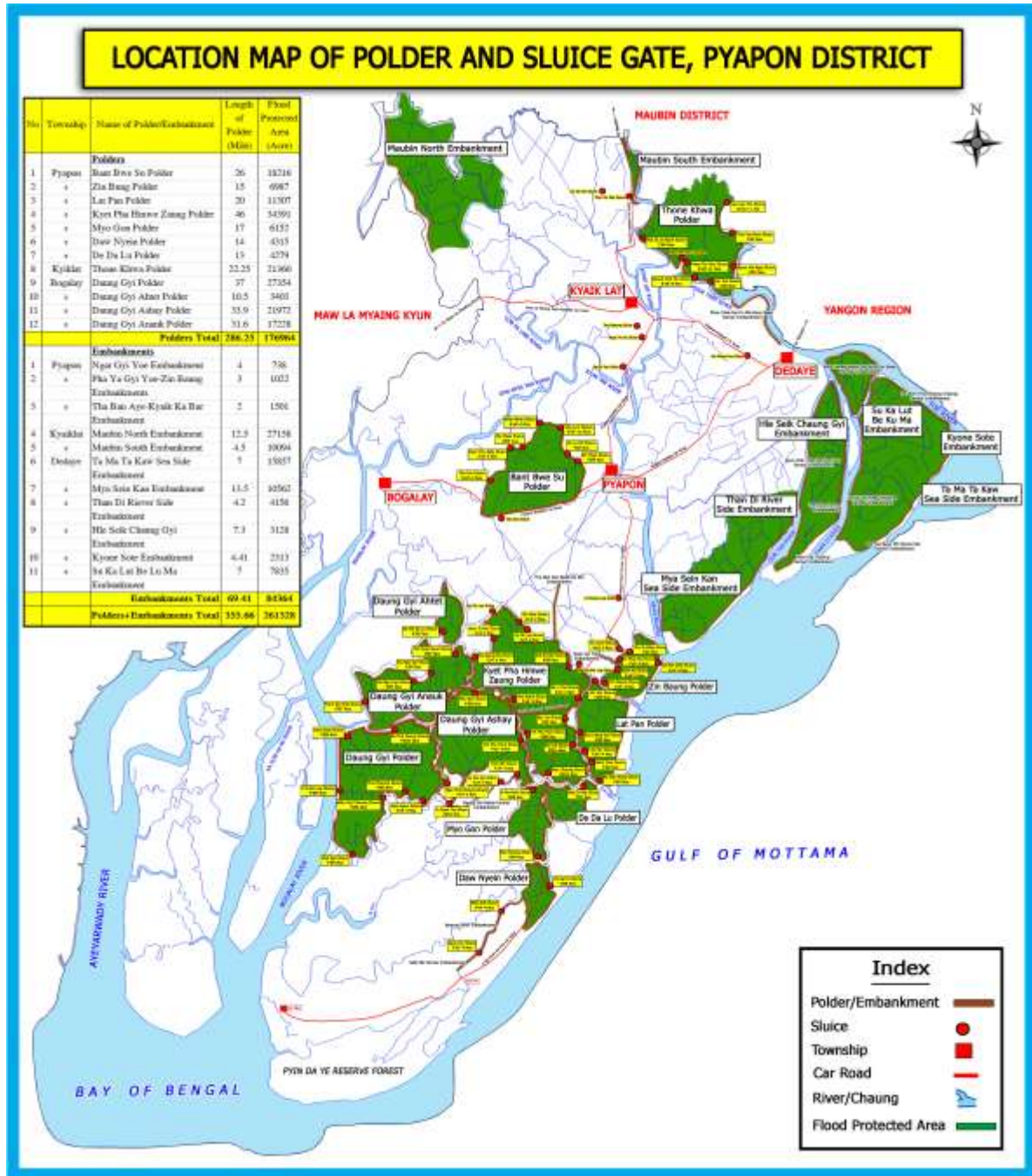
Map of Lower Burma Paddy Land Development Project Phase II (Paddy II)

After completion of the Paddy I and Paddy II Projects, substantial development of paddy land areas were increased in the Ayeyarwady Delta. Polder system management was also introduced in these developed polder systems and certain level of experience related to operation and maintenance of these system was gradually gained.

In May 2008 Cyclone Nagis struck part of the Ayeyarwady and Yangon Regions, which included some of the Paddy I and Paddy II project areas. These polder systems had been severely damaged and their renovation has been done by IWUMD with partial support provided by the Japan International Cooperation Agency (JICA). Along these activities, not only the renovation of Paddy I and Paddy II project's polder systems but also the development of new polder systems in the Ayeyarwady Delta has been implemented. The current situation of polder systems in Maubin, Pyapon and Labutta Districts is shown in the following figures.



Map of Location of Embankments in Maubin District



Map of Location of Polders and Sluice Gates, Pyapon District

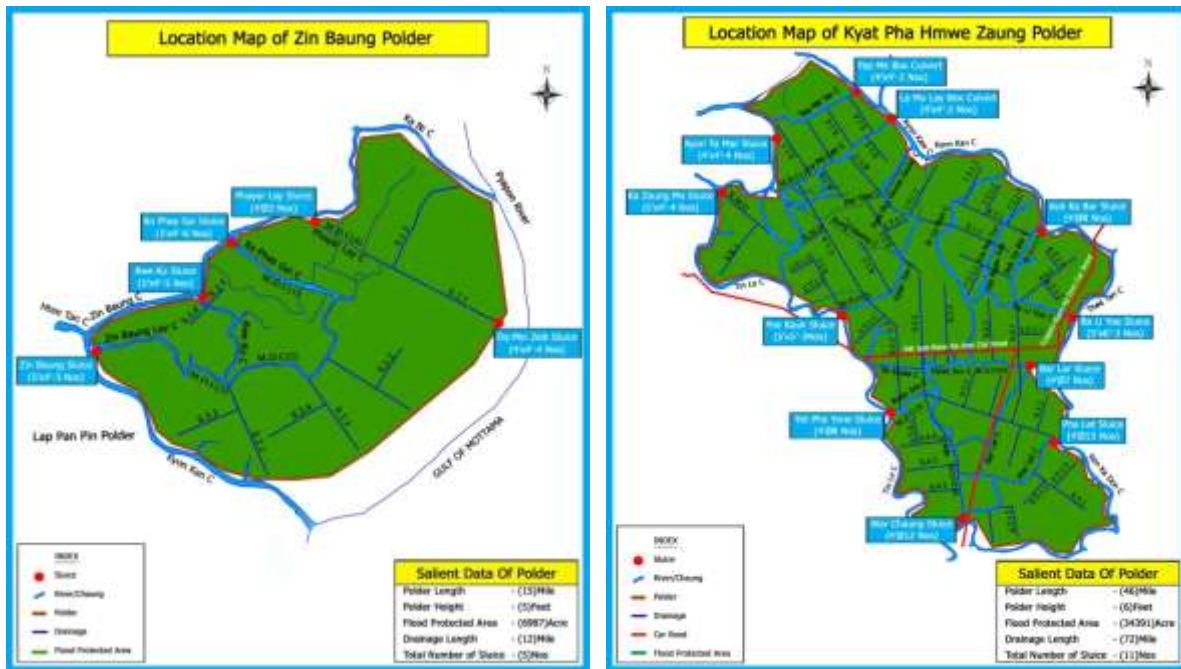


Location Map of Polders in Ayeyarwady Delta in Labutta and Ngaputaw Township

Some polder systems in Myanmar are totally closed by embankments together with sluice gates and drainage channels. However, other polder systems are not closed as they are only intended to protect flooding of tidal and salt-water intrusion into the land.



Location Map for Polders and Embankments in Ayeyarwady Region

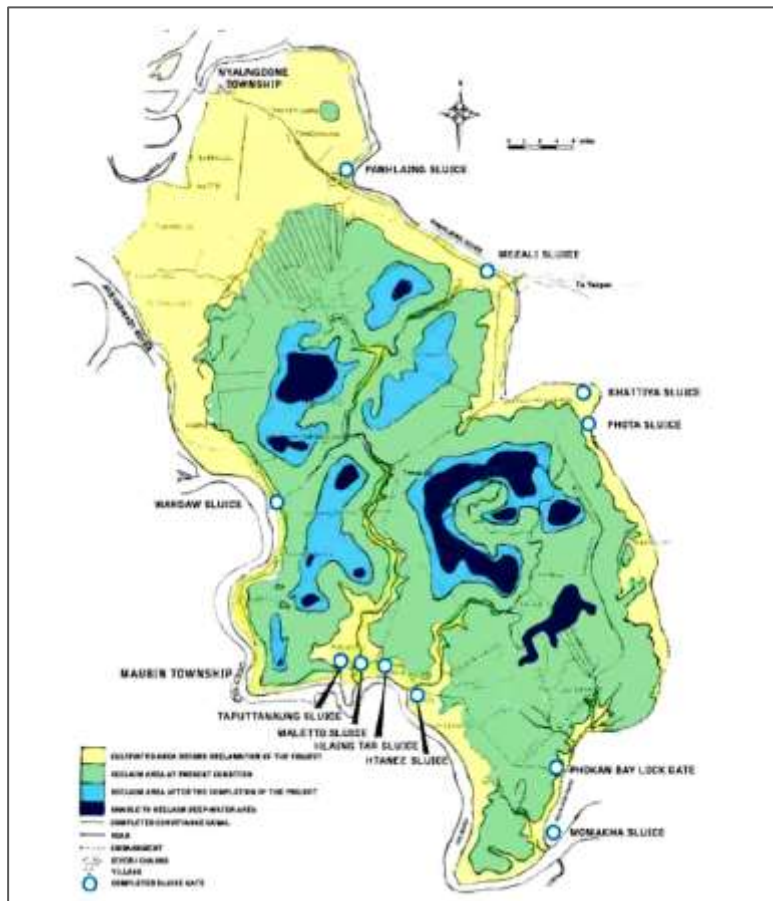


Location Map of Kyat Pha Hmwe Zaung Polder and Map of Zin Baung Polder

One of the new polder system developments, implemented by IWUMD is the Nyaung Done Island (polder), which is situated in Maubin District at the central east of the Ayeyarwady Region and about 40 miles far from the sea. The island is surrounded by the Pan Hlaing River in the north, the Ayeyarwady River in the west, the Toe River in the south and Kattiya Creek in the east. The profile level of the land is high around the circle while the centre part is depressed low lands and wetlands. The island is tidal affected throughout the year. There are numerous natural drainages and creeks in the area encompassing about 200,000 acres. The island has a tremendous potential for land and water resources development in agriculture as well as for fresh water fish culture inside the polder. The Nyaung Done Island reclamation project was implemented between 1996 and 2000. Fresh water resources are abundant and can be used all season. The Yangon-Pathain highway road crosses the island and contributes towards supply of food and water for the people of Yangon city, which is only 30 miles away.

In this context, there are challenges ahead for future development of polders in the area such as conflict between farmers and fishermen inside the polder for water sharing of their respective purpose. Upstream development activities in the Ayeyarwady River, together with possible sea level rise, and salt-water intrusion may impact on Nyaung Done Island so that monitoring of tidal range, height, inflow and salinity of supply water at the intake sluices around the Nyaung Done Island should be done regularly. An integrated approach for optimal and multi-sectorial use of fresh water is a requirement in the time of climate change.





Layout Plan of Nyaung Done Island (polder) Reclamation Project

To achieve substantial benefits and better production from the polder systems, it is essential to operate and maintain the polder systems effectively. Although responsible staffs of IWUMD have done this routinely, some of the staff has retired from their positions so that new generation with less experience have to take over these responsibilities. While operating and maintaining polder systems, community stakeholder involvement is important. In this regard, participation of polder user groups is necessary in order to achieve successful outcomes. Due to shortcomings and challenges, practical field training for better operation and incorporation of up to date innovated knowledge related to polder systems management is very much welcome to enhance the capacity of polder system operators.



Field trip at Nyaung Done Town river bank protection works

## 5.2.2 Preparedness for future Climate Change and mitigation measures

Some infrastructure to combat disasters has already been constructed such as cyclone shelter, hill locks, drinking water ponds, new embankments, all weather roads and new bridges. Some soft measures such as awareness raising for local people concerning with climate change and disaster preparedness has been done by both government institutions and NGOs. Assessment and analysis of the impact of future climate change on natural ecosystems, agriculture, water resources, forestry, fishery, etc. are necessary and research works are still needed. Flood hazard maps together with flood risk analysis are also required for preparedness of future climate change and mitigation measures. Weather forecast, cropping pattern and cropping calendar should be drawn in advance. Water management and wise use of canal water within the polder should be done effectively by local farmers to counter the impact of climate change throughout the cropping season. Drainage facilities such as canals and sluices should be timely operated to reduce rainy season flood as well as to supply sufficient irrigation water for the crops in the polder throughout the year.

Projections for mean and annual seasonal temperature change above the baseline across Myanmar					
	Model baseline (1980 to 2016)	Warming by 2011-2040	Temperature range 2011-2040	Warming by 2041-2070	Temperature range 2041-2070
Annual	23.6 °C	0.7-1.1° C	24.2-24.7° C	1.3-2.7° C	24.8°-26.2° C
Hot Season	25.1° C	0.8-1.2° C	25.9-26.3° C	1.4-2.9° C	26.5°-27.9° C
Wet Season	25.1° C	0.6-1.1° C	25.7-26.2° C	1.1-2.4° C	26.2°-27.5° C
Cool Season	20.5° C	0.7-1.2° C	21.2-21.6° C	1.3-2.8° C	21.8°-23.2° C

(Source: NASA NEX GDDP, 2015)

Projections for mean and annual precipitation change relative to 1980-2005 across Myanmar					
	Model baseline (1980 to 2016)	Percent Change 2011-2040	Precipitation range 2011-2040	Percent Change 2041-2070	Precipitation range 2041-2070
Annual	2029	+1% to +11%	2039 to 2242	+6% to +23%	2146 to 2480
Hot Season	285	-11% to +12%	252 to 319	+7% to +19%	266 to 338
Wet Season	1657	+2% to +12%	319 to 1854	+6% to +27%	1753 to 2084
Cool Season	87	-23% to +11%	69 to 96	-16% to +11%	77 to 99

(Source: NASA NEX GDDP, 2015)



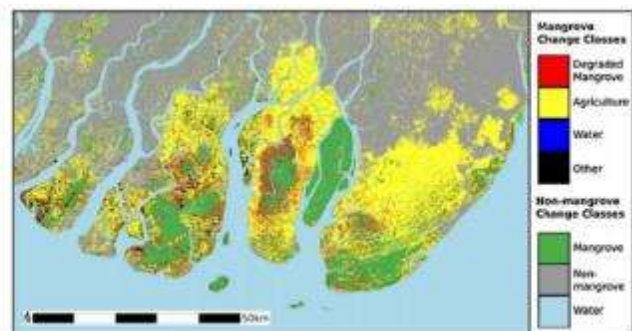
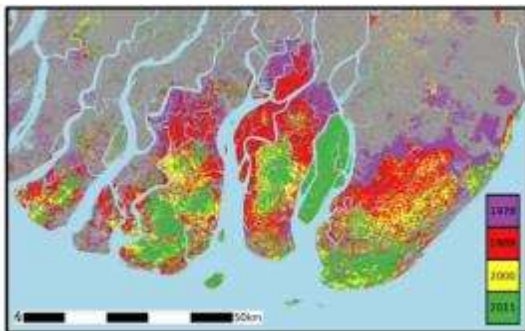
Middle-range projections of sea level rise above 2000-2004 base period levels in Myanmar (cm) (Source: Assessing Climate Risk in Myanmar: Summary for Policymakers and Planners. CCSSR U. of Columbia, WWF-US WWF-MYA, UN-Habitat MYA; 2017)



Impact of climate change effect the social, economy and transportation of the delta area people

### 5.2.3 Mangrove conservation and management

In most of the deltas all over the world, sustainable mangrove forest management is an essential requirement since they serve as natural storm surge barriers as well as a buffer strip for agriculture land. Mangrove forests also contribute to the freshwater ecosystem by means of surrounding environment for various fresh water biodiversity. Although mangrove forests are very valuable, local people are gradually deteriorating these forests due to their use as firewood. These situations are also common in Myanmar. To be able to achieve benefits of mangrove forests, it is important to conserve these forests as much as possible. Raising awareness of local people to conserve mangrove forests and rehabilitate those deteriorated with new innovative techniques and upgraded practises are certainly required.<sup>9</sup>



Left: Map on the left is showing mangrove land cover in the Ayeyarwady Delta, Myanmar, in 1978, 1989, 2000 and 2011. Right: Mangrove land cover change map showing 2011 mangrove land cover (green) and transitions into other land uses by 2011 (“Mangrove Change Classes”).

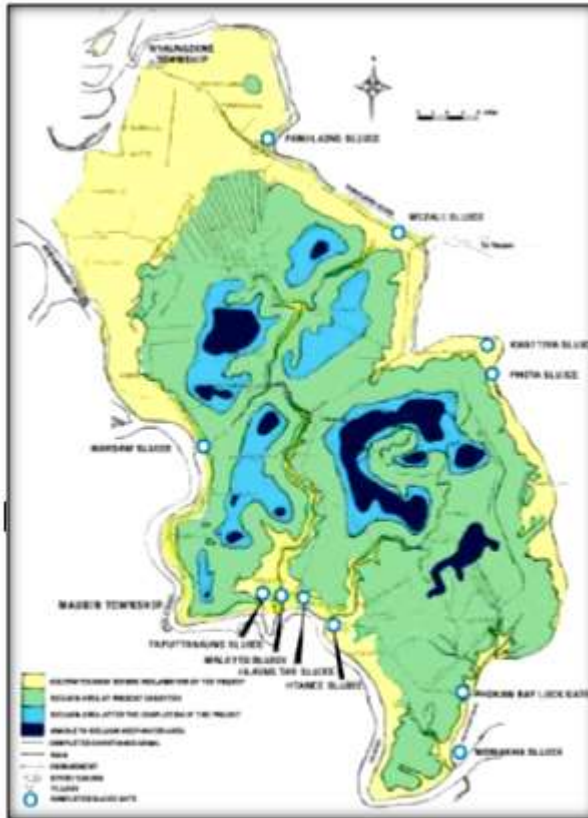
<sup>9</sup> For more on the mangroves’ situation in Myanmar refer to Deforestation in the Ayeyarwady Delta and the conservation implications of an internationally-engaged Myanmar. Edward L. Webb, Nicholas R.A. Jachowski, Jacob Phelps, Daniel A. Friess, Maung Maung Than, Alan D. Ziegler.



Rehabilitation, conservation, public awareness raising works for Mangrove Management done by the Forest Department and Mangrove Service Network (NGOs) in Bogalay area

#### 5.2.4 Tidal River Management

The research on the Beel Bhaina coastal polder underlined that waterlogging problems were solved with tidal river management. Similarly, in the Ayeyarwady Delta, the Nyaung done polder was constructed for flood protection by embankments, in a horseshoe shape, along the northern periphery, opened at the southern portion with three major drainage channels. These main drainage channels drain out floodwater in accordance with the river water level outside the island and it is subjected to silting and scouring alternately every year. To protect seawater intrusion from the southern part, four sluice gates were constructed. For irrigation, the system has a flap gate installed in landside so that river water is allowed to flow into the system at high tide and another outlet gate leaf is installed in riverside for drainage. Operation and control of tidal water for drainage and irrigation are different during the rainy and dry seasons. The Nyaung done Island has a variety of functions and its utilization by local people has repeatedly led to many conflicts, especially regarding paddy cultivation versus fishing. Development of Nyaung done Island Reclamation Project can only be successful and sustained if all interests are thoroughly considered and wisely managed for the land and water resources.



Location Map of Nyaung Done Polder controlled by Tidal River Management



Mezali Sluice Gate



Paddy Cultivation



Drainage Channel



Fishing and Aquaculture

The main learning interest in on planning and design, operation and maintenance to optimize benefits by using tidal river management and formation of water management groups are relevant in terms of tidal river management.

## 5.2.5 Integrated Water Resources Management

The Bangladesh and Mekong delta plans already have been established. Like these, the Ayeyarwady delta plan should be a major component to be included in potential future developments. Based on knowledge and lessons learned from other world delta countries, a short and long-term strategy for the Ayeyarwady delta is needed.

For proper utilization and balanced development of Integrated Water Resources Management (IWRM) in delta areas, capacity building is a must and foremost priority at all levels, including at grass root and at decision maker levels. With this in mind, policy makers and local leaders should be included in a capacity building and development process.

The existing polders of the Paddy I and Paddy II projects should be reassessed to conform to the modern IWRM approaches. Formerly identified future potential polders in the Ayeyarwady Delta should be reassessed and new polder development works identified by IWRM approaches and implementation should be undertaken on a short and long term basis.



Deep Tube Wells by IWUMD(WRUD)



Sluice Gates by IWUMD(ID)



Improvement of river system by (DWIR)



Flood protection embankments by IWUMD (ID)



Local people work together with governmental institutions for flood protection embankments



River bank protection works by DWIR



Mangrove reforestation activities



Plants survival counting activities



Extension and organizing activities

## References

1. Lower Burma Paddy Land Development Project (Phase I), Irrigation Department, May 1986,
2. Lower Burma Paddy Land Development Project (Phase I), Completion Report, Irrigation Department, July 1986,
3. Lower Burma Paddy Land Development Project (Phase II), November 1984, Irrigation Department
4. Lower Burma Paddy Land Development Project (Phase II), Completion Report, Construction Circle (1), Irrigation Department, June 1991
5. Tidal Gravity Fresh Water Supply for Integrated Water Resources Management in Nyaungdone Island for Food Security of Yangon City Urban Population: A Case Study by Aye Myint, Senior Water Resources Engineer, National Engineering and Planning Services Company Limited (E-mail: uamyint@gmail.com)
6. Disaster Risks in Ayeyarwady Delta and Flood Protection Measures by Phyo Myint, IWUM Department, Myanmar

## 6 ANNEXES

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### ANNEX 1 AGENDA FOR BANGLADESH DELEGATION VISIT TO MYANMAR

#### LEARNING DELTA ASIA INITIATIVE

Time	Activity	Remarks
<b>DAY 1: May 31<sup>st</sup></b>		
Afternoon	Arrival of Bangladesh delegation to Myanmar	Mya Yeik Nyo Royal Hotel
<b>DAY 2: June 1<sup>st</sup></b>		
9:00- 9:30	Welcome remarks Self-introduction from both parties	Irrigation and Water Utilization Management Department (IWUMD) - Meeting Room, Yangon
9:30 – 10:00	Introduction to Myanmar Water Partnership (MmWP), Delta Alliance (Myanmar), Delta Coalition (Myanmar) Introduction to IWUMD	Dr. Zaw Lwin Tun, SC member of GWP- SEA SC for MmWP

10:00-10:45	Disaster Risks in Ayeyarwady Delta, Irrigation, Drainage and Flood Protection Measures	U Phyo Myint, Director, Ayeyarwady Region, IWUMD
10:45-11:00	Discussions	
11:00-11:45	Introduction to DWIR Improvement of River System in Ayeyarwady Delta	U Sein Lwin, Deputy Director, DWIR
11:45-12:00	Discussions	
12:00- 13:00	Lunch	
13:00 – 13:45	Introduction to FD Governmental Strategy on Mangrove Forest Management and Conservation in Ayeyarwady Delta	Dr. Toe Aung, Assistant Director, Mangrove Conservation Unit, Watershed Management Division, Forest Department
13:45-14:00	Discussions	
14:00- 14:45	Introduction to FRED A Mangrove Reforestation Activities in Ayeyarwady Delta NGO Context	U Kyaw Nyein, Executive Committee Member, FRED A
14:45-15:00	Discussions	
15:00-15:15	Tea break	
15:15-16:00	Integrated Ayeyarwady Delta Strategy, Plan, Progress and Future	U Khin Latt, Deputy Team Leader, IADS Team, NEPS Co. Ltd.
16:00-16:15	Discussions	
16:15-16:35	Integrated Water System Development, exemplified by PanHlaing River Rehabilitation Project	Dr. Zaw Lwin Tun, Director, IWUMD
16:35-17:00	Panhlaing River Integrated Development Plan	U Kyaw Lin Htet, Team Leader, Water Business Line, Royal HaskoningDHV, Myanmar
17:00-17:15	Discussions	
17:15-17:30	Closure of Day 2	
<b>DAY 3: June 2<sup>nd</sup></b>		
	Field trip to Ayeyarwady Delta Yangon, Panhlaing Project, Nyaung Done, Maubin, Kyaik Latt, Phya Pone	Check out from Mya Yeik Nyo Royal Hotel and halt at Phya Pone (City of Ayeyarwady Delta)

**DAY 4: June 3<sup>rd</sup>**



Field trip around Phya Pone area and return trip to Yangon  
via Dedaye, Kun Gyan Gon, Kaw Hmu, Twante      Mya Yeik Nyo Royal Hotel

**DAY 5: June 4<sup>th</sup>**

Meeting for Follow-up Program      Meeting room, IWUMD office,  
Yangon

**DAY 6: June 5<sup>th</sup>**

Yangon City visit in the morning  
Departure of Bangladesh Delegation

## ANNEX 2 OPENING REMARKS FOR CONSULTATION MEETING ON LEARNING DELTAS ASIA INITIATIVE BY DR. ZAW LWIN TUN

1<sup>st</sup> June 2017, IWUMD Meeting Room, Yangon, Myanmar

Bangladesh Delegation led by Prof. Dr. Monowa Houssain, Regional Coordinator for GWP-SA, Mr. Lal Induruwage, Vice President for PROCASURE Corporation Asia Branch and all participants of the Meeting, very good morning. On behalf of Myanmar Water Partnership and Officials of IWUMD, all of our guests are warmly welcome to Myanmar.

It is my honoured to give opening remarks for the opening of the consultation meeting on Learning Deltas Asia Initiative. For your information, I would like to explain a short introduction to Learning Deltas Asia Initiative. It is the initiative of Global Water Partnership. Global Water Partnership started this initiative since 2014 with “Enabling Delta Life Initiative”. Series of discussions had done in Regional Workshop on Flood Management in Guangzhou, China in December 2015, Meeting of High Level Panel on Water Security and SDGs in Yangon, Myanmar in May 2016, GWP Pan Asia Workshop on Urban Water Management in Singapore International Water Week in July 2016 and the implementation of initiative was finalized in the Workshop on Learning Deltas Asia Initiative in ADB Head quarter, Manila in October 2016.

The key objectives of LDAI are to enhance the resilience of rapidly urbanizing deltas (water security); to implement structural and non-structural projects to increase the resilience including no-regret measures, green infrastructure; to develop sustainable bankable proposals for those projects; and to build capacity to increase the knowledge on deltas (physical, socio-economical, environmental, cultural, institutional, etc.). To be able to achieve these objects, bring keys players together to learn of the successes, failures, and lessons learnt in delta management and development, promote exchanges of the lessons between deltas, focus on south-south exchange and cooperation and taking into accounts the SDGs, specifically IWRM process are intended to implement.

The first realized event of LDAI was held among the two delta countries, Bangladesh and Myanmar. In Feb/March 2017, Delegation from Myanmar had paid visit to Bangladesh firstly and learned and exchanged of knowledge and experiences concerned with delta management among professions of both countries. This is the second event of LDAI. This time delegation from Bangladesh has made visit to Myanmar and intended to learn and exchange experiences and knowledge related to delta management in Myanmar context.

I do hope that fruitful discussions, sharing of knowledge and experiences, valuable lessons learned and necessary follow-up activities will come out from this consultation meeting and program of LDAI schedule for today to 5<sup>th</sup> June. I also do hope that safe, healthy and pleasant stay of our guests the Bangladesh delegation members all are very first visit to Myanmar. Thank you very much.

## ANNEX 3 CONSULTATION WORKSHOP – PARTICIPANTS LIST

**Learning Deltas Asia Initiative**  
**Meeting Participants List**

Venue: Meeting room, IWUMD office

Date: 1-6-2017

Sr. No.	Name	Designation	Organisation
1	Dr Mohammad Monowar Hossain	Executive Director	Institute of Water Modelling
2	Ms. Ismat Ara Pervin	Associate Specialist	Water Resources Planning Division, Institute of Water Modelling
3	Mr. K L Induruwage	Regional Coordinator	GWP South Asia Regional Office C/O International Water Management Institute
4	Mr. Ariel Halpern	Vice President	PROCASUR Corporation, Procasur Asia
5	Dr Zaw Lwin Tun	Director	Irrigation and Water Utilization Management Department
6	Dr Armand Evers	Counsellor Water Affairs	Embassy of the Kingdom of the Netherlands
7	Dr Oh,Young In	Representative	KRC Myanmar Office
8	Ms. Tanya Huizer	Project Coordinator Myanmar	Water and Environment Arcadis
9	Mr. Alwin Commandeur	Resident Project Coordinator, Myanmar	Delft University of Technology
10	Mr. Hla Baw	Deputy Director General(Retired)	Irrigation and Water Utilization Management Department
11	Mr. Khin Latt	Deputy Director Leader	National Engineering and Planning Services Co., Ltd,
12	Mr. Aye Myint	Senior Water Resources Engineer	National Engineering and Planning Services Co., Ltd,
13	Mr. Phyo Myint	Director	Irrigation and Water Utilization Management Department
14	Mrs. Hla Oo Nwe	Deputy Director	Irrigation and Water Utilization Management Department
15	Mr. Kyaw Nyein	Executive Committee Member	FREDA

Sr. No.	Name	Designation	Organisation
16	Dr Toe Aung	Assistant Director (Mangrove Conservation Unit)	Watershed Management Division, Forest Department
17	Mr. Sein Lwin	Deputy Director	Directorate of Water Resources and Improvement of River System
18	Mr. Aung Myint Oo	Water Resources Officer	Embassy of the Kingdom of the Netherlands
19	Mr. Kyaw Lin Htet	Team Leader, Water Business Line	Royal HaskoningDHV, Myanmar
20	Mr. Kyaw Soe Htun	Professional Assistant	FREDA
21	Mr. Jung Young Jin		KRC (Myanmar Office )
22	Ms. Wai Wai Lwin	Staff Officer	Irrigation and Water Utilization Management Department
23	Mr. Zaw Myo Thant	Staff Officer	Irrigation and Water Utilization Management Department
24	Ms. Hla Pa Lwin	Staff Officer	Irrigation and Water Utilization Management Department

## ANNEX 4 WRAP UP MEETING ATTENDANCE LIST

**Learning Deltas Asia Initiative**  
**Wrap Up Meeting Participants List**

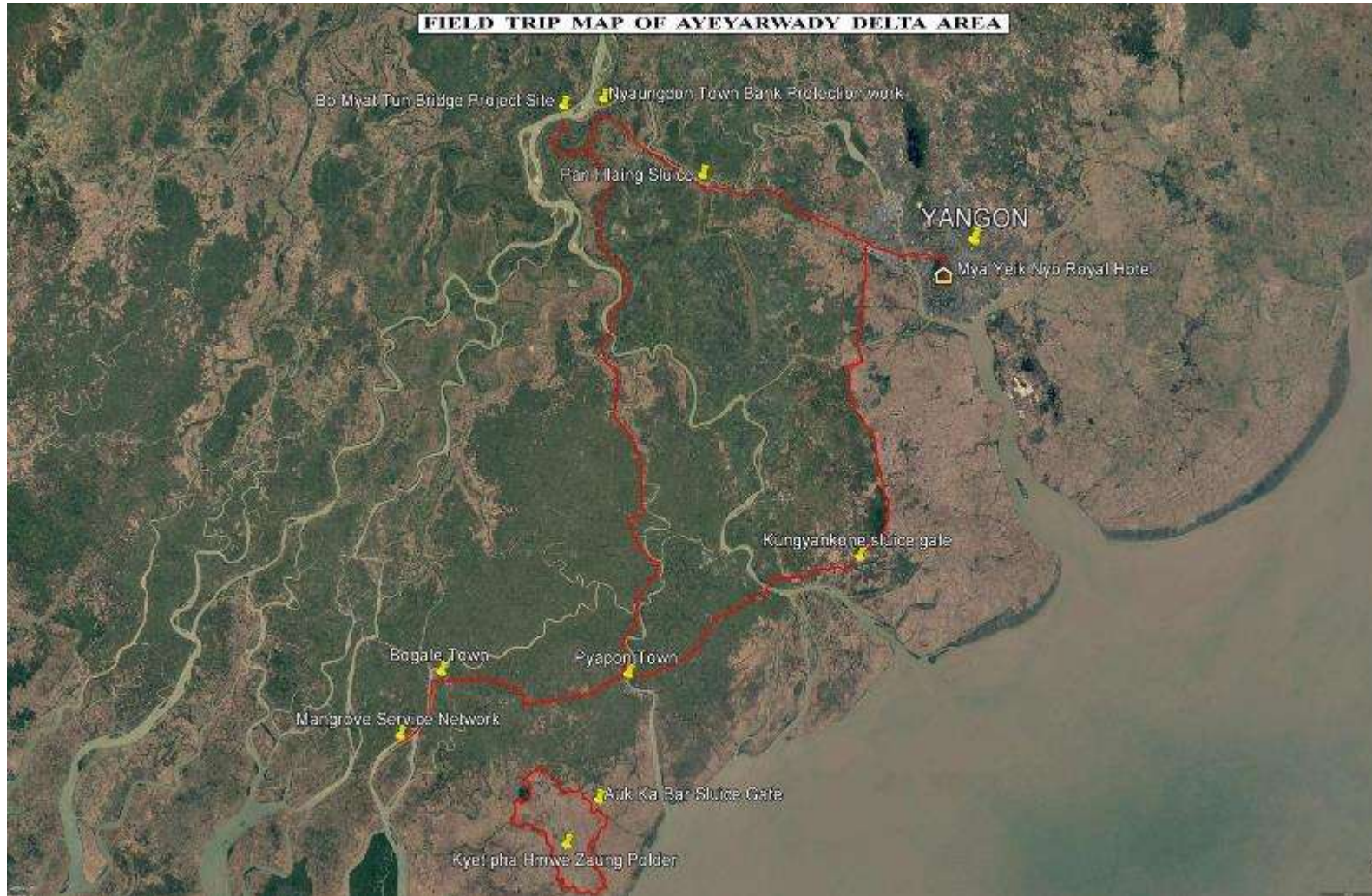
Venue: Meeting room, IWUMD office

Date: 4-6-2017

Sr. No.	Name	Designation	Organisation
1	Dr Mohammad Monowar Hossain	Executive Director	Institute of Water Modelling
2	Ms. Ismat Ara Pervin	Associate Specialist	Water Resources Planning Division, Institute of Water Modelling
3	Mr. K L Induruwage	Regional Coordinator	GWP South Asia Regional Office C/O International Water Management Institute
4	Mr. Ariel Halpern	Vice President	PROCASUR Corporation, Procasur Asia
5	Dr Zaw Lwin Tun	Director	Irrigation and Water Utilization Management Department
6	Mr. Phyo Myint	Director	Irrigation and Water Utilization Management Department
7	Mr. Hla Baw	Deputy Director General(Retired)	Irrigation and Water Utilization Management Department
8	Mr. Khin Latt	Deputy Director Leader	National Engineering and Planning Services Co., Ltd,
9	Mr. Aye Myint	Senior Water Resources Engineer	National Engineering and Planning Services Co., Ltd,
10	Mr. Zaw Win	Deputy Director General(Retired)	Irrigation and Water Utilization Management Department
11	Mr. Sein Lwin	Deputy Director	Directorate of Water Resources and Improvement of River System
12	Mrs. Hla Oo Nwe	Deputy Director	Irrigation and Water Utilization Management Department
13	Mr. Aung Myint Oo	Water Resources Officer	Embassy of the Kingdom of the Netherlands

Sr. No.	Name	Designation	Organisation
14	Mr. Kyaw Lin Htet	Team Leader, Water Business Line	Royal HaskoningDHV, Myanmar
15	Mr. Johannes de Groot	Engineer, Water management	Arcadis
16	Mr. Zaw Myo Thant	Staff Officer	Irrigation and Water Utilization Management Department
17	Ms. Wai Wai Lwin	Staff Officer	Irrigation and Water Utilization Management Department
18	Ms. Hla Pa Lwin	Staff Officer	Irrigation and Water Utilization Management Department

## ANNEX 5 FIELD TRIP OF AYERYARWADY DELTA AREA



## ANNEX 6. PHOTO REPORT OF THE MISSION TO MYANMAR

### Consultation Meeting on Learning Deltas Asia Initiative, 1<sup>st</sup> June 2017



Consultation Meeting on LDAI on 1<sup>st</sup> June at IWUMD meeting room, Yangon, Welcome remarks by Dr. Zaw Lwin Tun, SC member of GWP SEA for Myanmar, MmWP



Presentations made from Myanmar side, Government Organizations, NGOs and International Organizations



Discussion by Bangladesh Mission, Dr. Monowar, Executive Director, Institute of Water Modelling, Bangladesh





Comments from Mr K L Induruwage Regional coordinator (Actg), GWP SA Regional Office and Mr Ariel Halpern, Vice President, PROCASUR Corporation



Participation of Korea Rural Community Corporation



Group Photo of some attendees

### Field Trip Photo of 2<sup>nd</sup> June 2017



Explanation about Pan Hlaing Sluice Gate and Mezali Sluice Gate function and works by IWUMD at Project briefing hall



Members accompanied in the Ayeyarwady Delta Field trip from 2<sup>nd</sup> June to 3<sup>rd</sup> June 2017



Discussion at Mezali Sluice Gate

**Field Trip Photo of 2<sup>nd</sup> June 2017**



Explanation about Nyaung done Land Reclamation Project by U Phyto Myint, Director, Ayeyarwady Region, IWUMD and back ground history of the project by U Aye Myint, Senior Consultant, NEPS Co., Ltd



Explanation on River bank protection works of Nyaung don town by U Sein Lwin, Deputy Director, DWIR



Explanation about bank protection at Bo Myat Tun Bridge Project site near Nyaung don town by DWIR

**Field Trip Photo of 2<sup>nd</sup> June 2017**



Natural stream re-excavation near Kyet Pha Mye Zaung polder, Pyapon District, Ayeyarwady Region



Auk Ka Bar Check Gate, operated by IWUMD

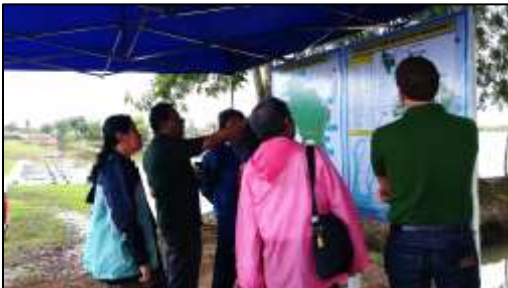


Village near the polder

**Field Trip Photo of 2<sup>nd</sup> June 2017**



Location map of Polders and Sluice Gates in Pyapon District, Ayeyarwady Region



Field visit of Auk Ka Bar sluice gate, Kyat Pha Hmwe Zaung Polder in Pyapon District, operate and maintain by IWUMD



Rainwater harvesting pond at the Auk Ka Ba sluice gate site

### Field Trip Photo of 3<sup>rd</sup> June 2017



Pyapon town  
River bank  
protection  
works by  
DWIR



Pyapon Jetty  
and market  
place



Boat trip at  
Bogalay River  
towards Mangrove  
Island, Mangrove  
Service Network,  
Environment  
Education and  
Research Centre

**Field Trip Photo of 3<sup>rd</sup> June 2017**



Mangrove Service Network, Environment Education and Research Centre 7 miles away from Bogalay Town



Presentation about Mangrove Service Network on the island and continue with some discussion



Mangrove Forest

### Field Trip Photo of 3<sup>rd</sup> June 2017



Explanation about Mangrove Forest from Forest Department



On the way back to Bogalay Town



Kun Gyan Gone Sluice gate, Kun Gyan Gone Township, Yangon Region, operate and maintain by IWUMD and explanation about Paddy III Project by Dr. Zaw Lwin Tun



