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

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

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)[1] 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)[2] 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

[1] www.gwp.org

[2] http://www.deltacoalition.net/about/ . The DC was created in 2016.

well as sustainability in the criteria for selection of investments are becoming louder[3]. Initiatives that contribute to sustainability and equity are urgently required.

[3] E.g. the Budapest Water Summit, December 2016

2 THE LEARNING DELTAS INITIATIVE INTRODUCTION

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].

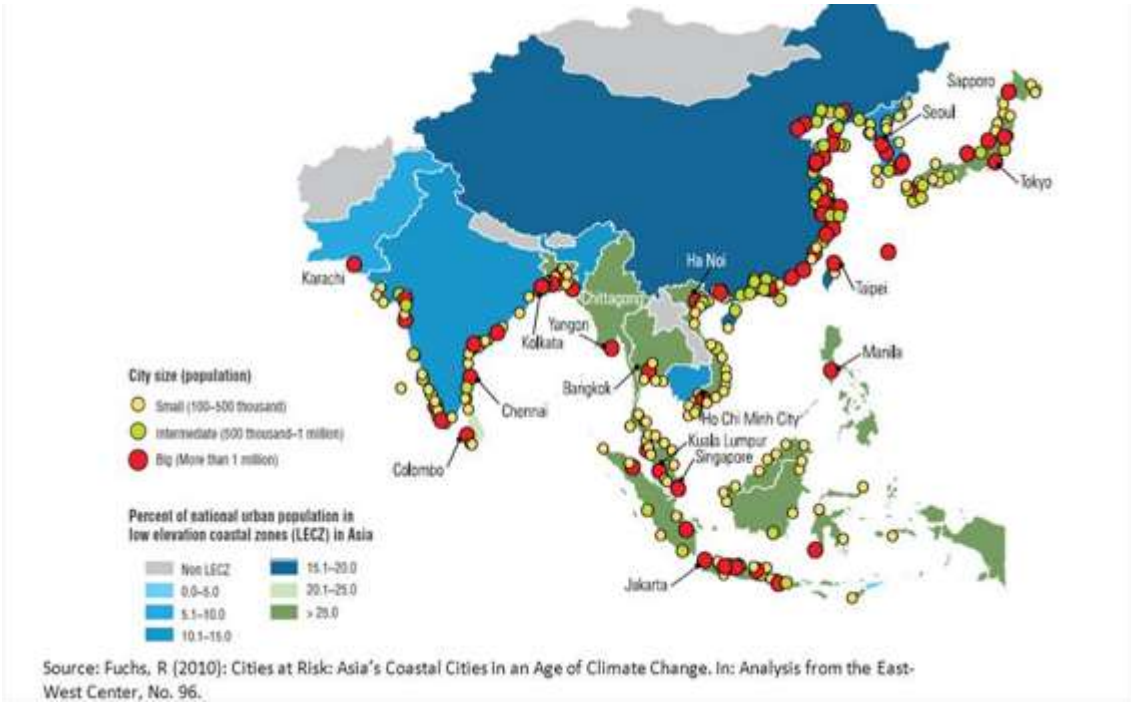
2.2 GEOGRAPHIC SCOPE

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	• Flooding/droughts • Saltwater intrusion • Land subsidence • Erosion/sediment starvation • Infrastructure on soft soils
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, Pathein	
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



Source: Fuchs, R (2010): Cities at Risk: Asia's Coastal Cities in an Age of Climate Change. In: Analysis from the East-West Center, No. 96.

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.

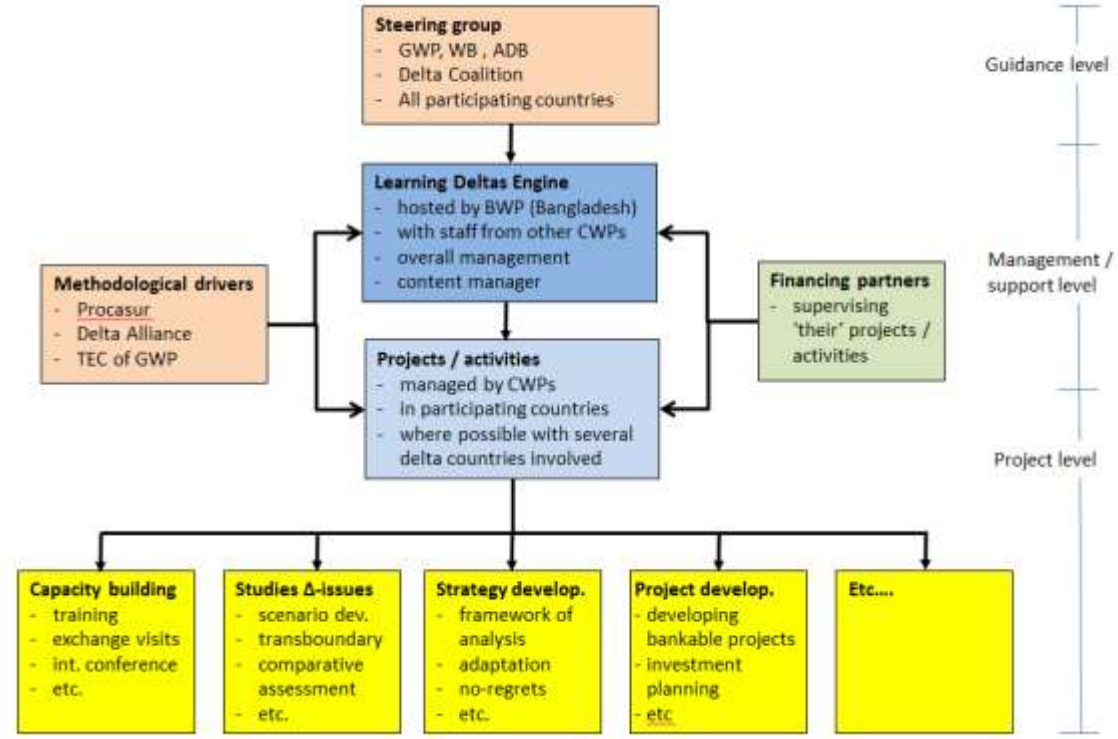
2.4 ORGANISATIONAL SET-UP

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[4], 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.

[4] 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[5] 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 introduce on a pragmatic hands-on basis ('improve as you go') which, when coupled to a smart dissemination and communication campaign to other DC and 3rd countries, would allow for early

[5] 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.

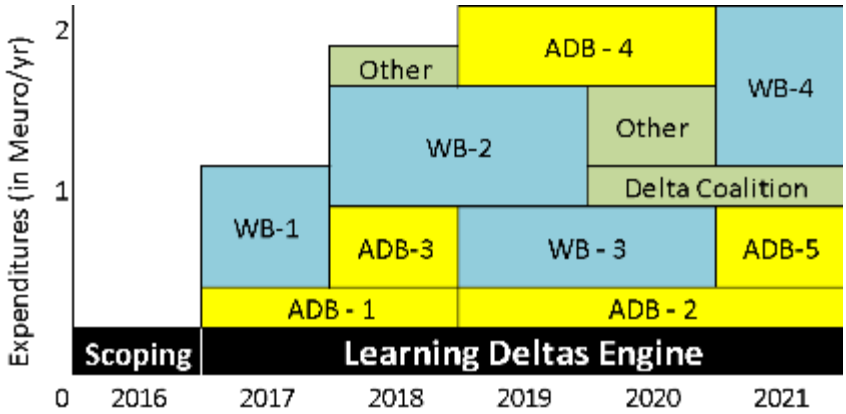
2.6 FINANCING STRUCTURE AND BUDGET

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

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 [6]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

[6] *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.

Phyu Dam, Hydraulic structure

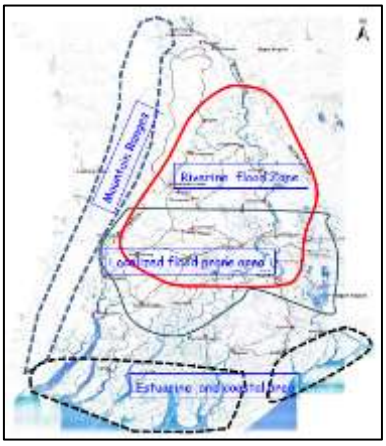
Tube wells

Retirement Embankment in

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 19th 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

A first mission to Bangladesh was undertaken on February 26-28, 2017 by a Myanmar [7]delegation to identify an opening learning agenda between the countries. A second Mission, of a Bangladesh [8]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.

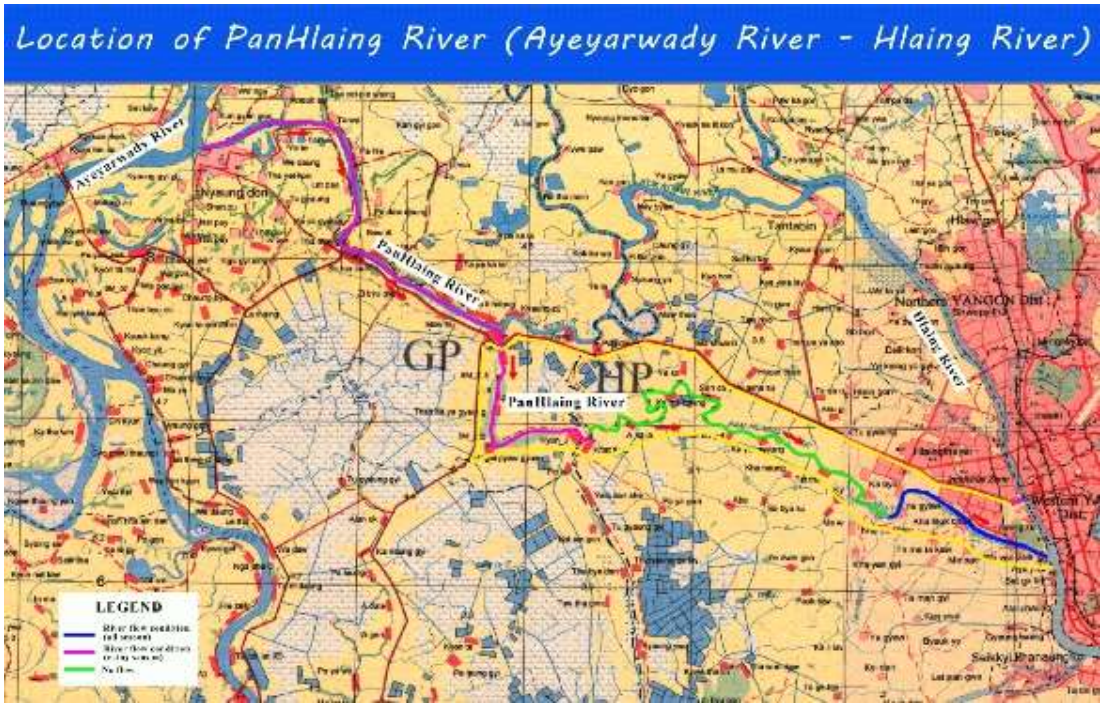
4.2 ACTIVITIES AND SITE VISITS DURING THE MYANMAR MISSION

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.

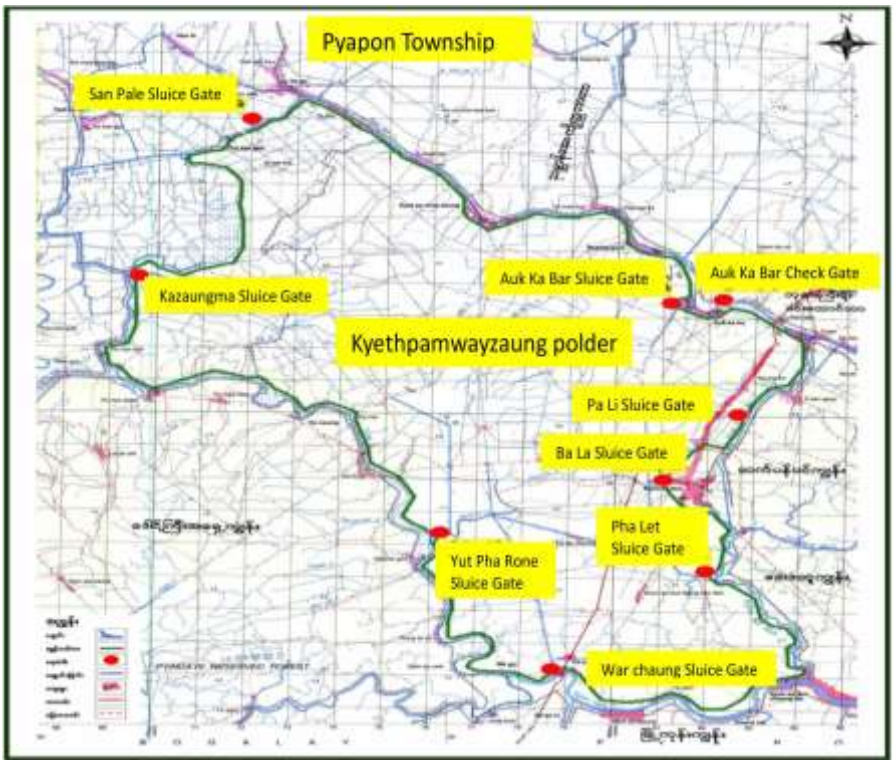
[7] ***Dr Zaw Lwin Tun****, Director, Irrigation and Water Utilization Management Department, Ministry of Agriculture, Livestock and Irrigation, Myanmar Water Partnership (MmWP) representative,* ***Mr. Hla Moe****, Director, Directorate of Water Resources and Improvement of River System, Ministry of 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*

[8] **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.

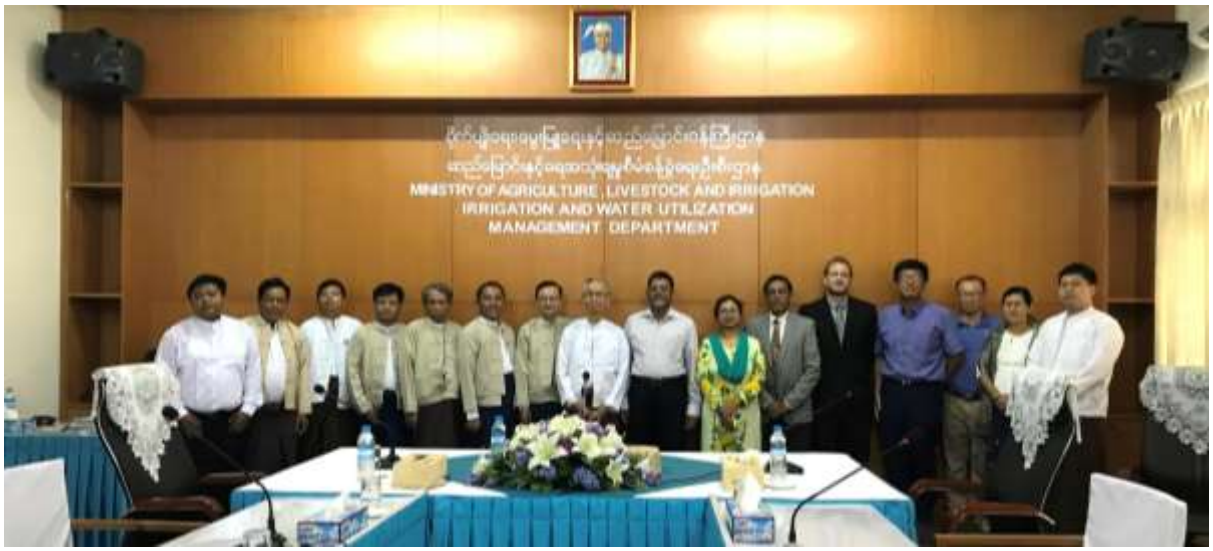
Site visit to Ayeyarwady Delta area

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

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.

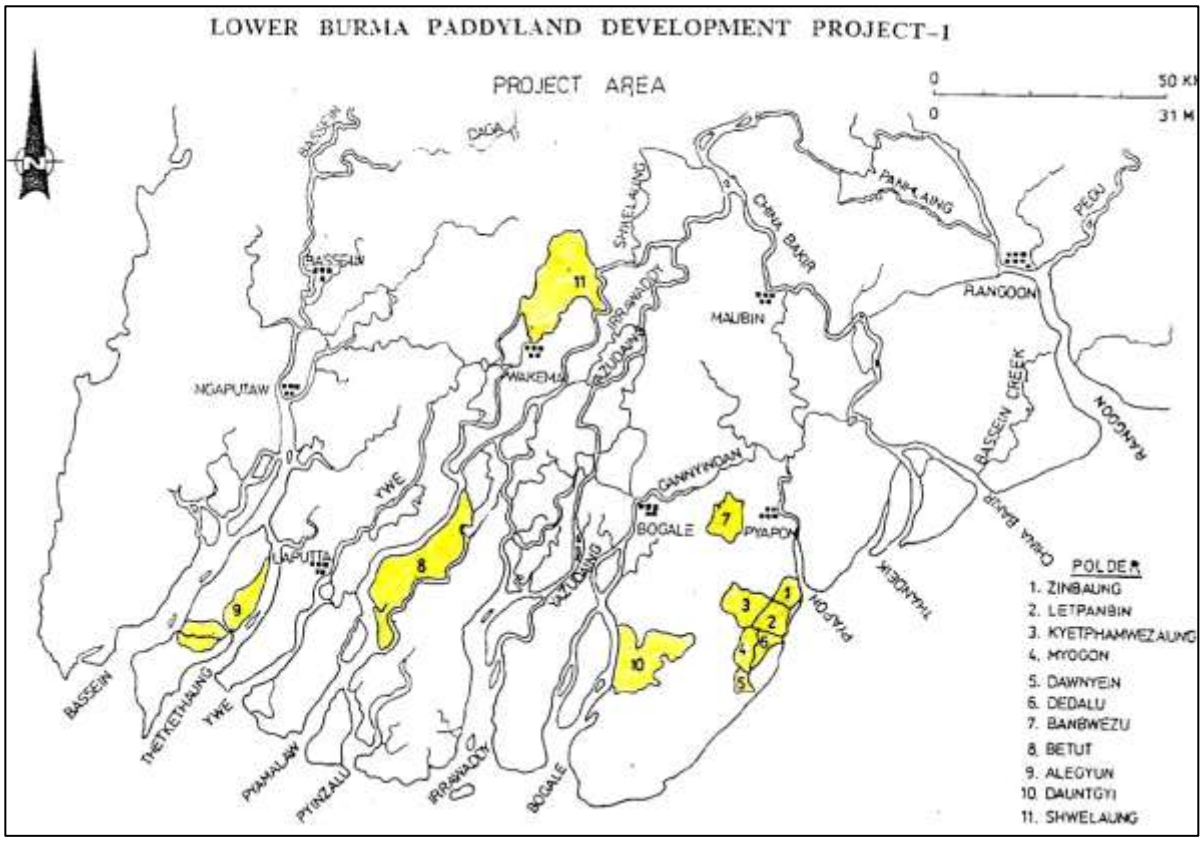
5.2 LEARNING PRIORITIES

5.2.1 Flood embankments and Polders' Management

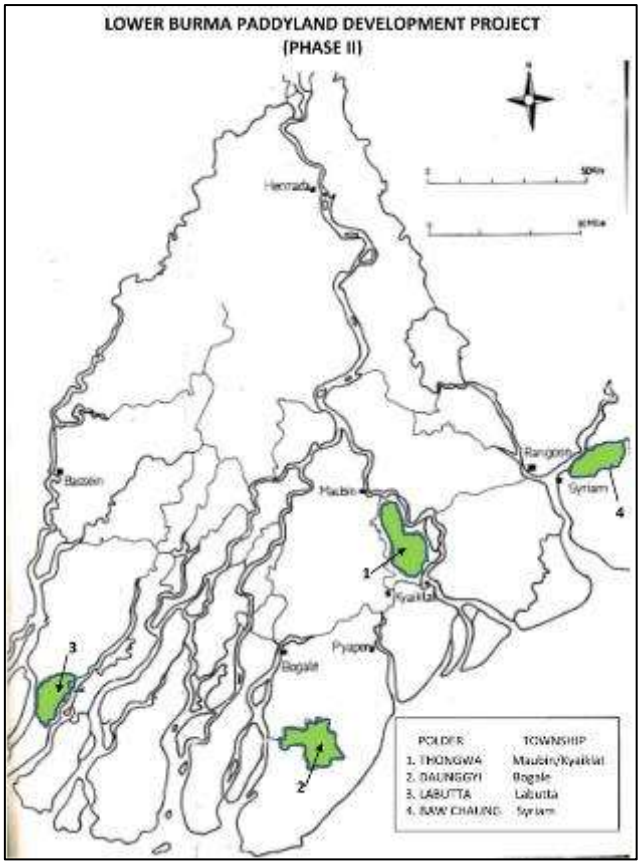
The Ayeyarwady Region is situated over an area contiguous with the Bago Region in the north and east, Yangon Region in the east, Andaman Sea in the south, Rakhine State and Bay of Bengal in the west. In the Ayeyarwady Region, 6.15 million people reside in 26 townships, 2165 wards and village tracts which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

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: Pathein (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.



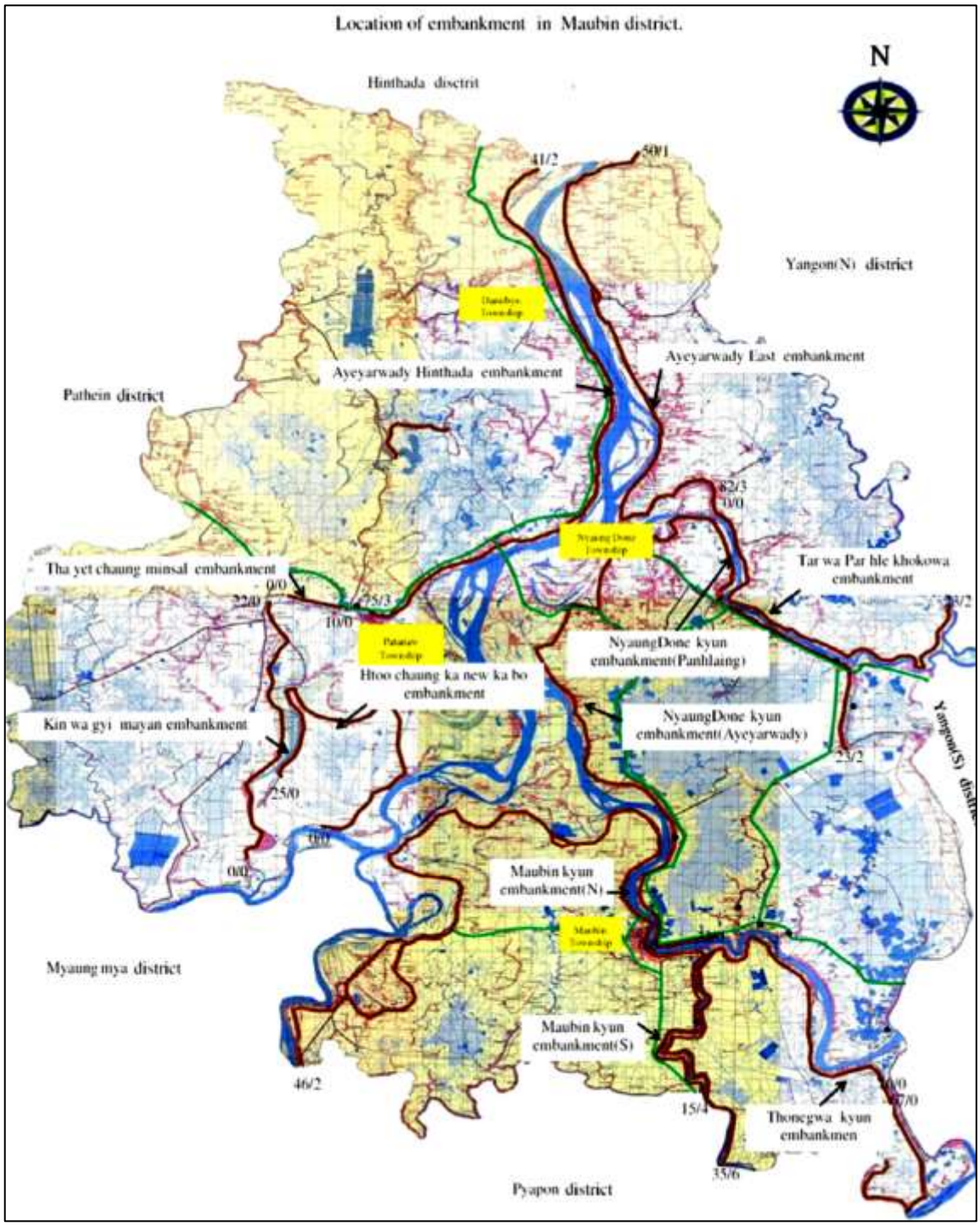
Map of Lower Burma Paddy Land Development Project Phase I (Paddy I)



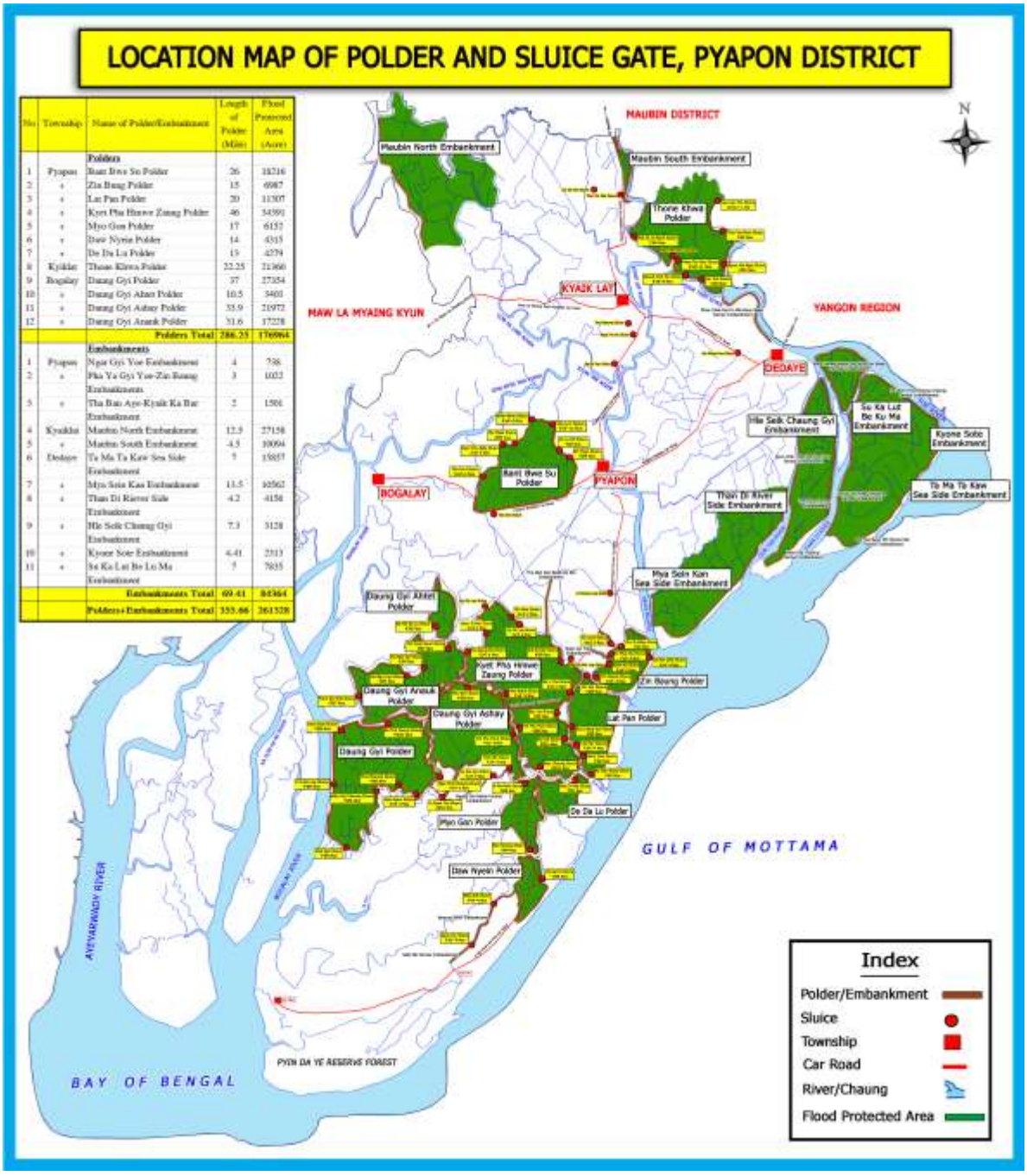
Map of Lower Burma Paddy Land Development Project Phase II (Paddy II)

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.

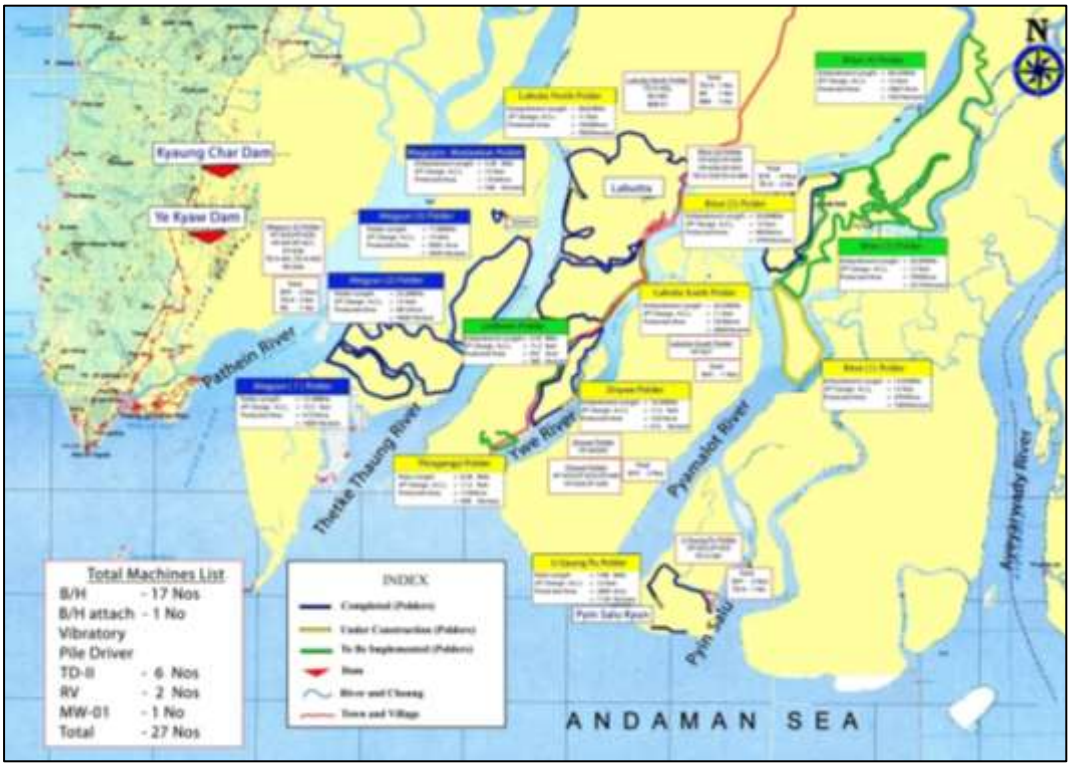


Map of Location of Embankments in Maubin District



No	Township	Name of Polder/Embankment	Length of Polder (Mile)	Flood Protected Area (Acre)
		Polders		
1	Pyapon	Baut Hwe Su Polder	26	18216
2	"	Zin Baung Polder	15	6987
3	"	Lat Pan Polder	20	11307
4	"	Kyet Pha Hmwe Zaung Polder	46	34391
5	"	Myo Gon Polder	17	6152
6	"	Daw Nyein Polder	14	4315
7	"	De Da Lu Polder	15	4279
8	Kyaikkat	Thone Khwa Polder	22.25	21960
9	Bogalay	Chaung Gyi Polder	37	27354
10	"	Chaung Gyi Ahlet Polder	10.5	3401
11	"	Chaung Gyi Ashay Polder	33.9	21972
12	"	Chaung Gyi Aneauk Polder	31.6	17228
		Polders Total	**286.25**	**176864**
		Embankments		
1	Pyapon	Ngat Gyi Yoe Embankment	4	736
2	"	Pha Ya Gyi Yoe-Zin Baung Embankments	3	1022
3	"	Tha Ban Aye-Kyaik Ka Bar Embankment	2	1501
4	Kyaikkat	Maubin North Embankment	12.5	27158
5	"	Maubin South Embankment	4.5	10094
6	Dedaye	Ta Ma Ta Kaw Sea Side Embankment	5	15857
7	"	Mya Sein Kan Embankment	13.5	10562
8	"	Than Di River Side Embankment	4.2	4158
9	"	Hle Seik Chaung Gyi Embankment	7.3	3128
10	"	Kyone Sote Embankment	4.41	2313
11	"	Su Ka Lat Be Lu Ma Embankment	5	7035
		Embankments Total	**69.41**	**84364**
		Polders+Embankments Total	**355.66**	**261328**

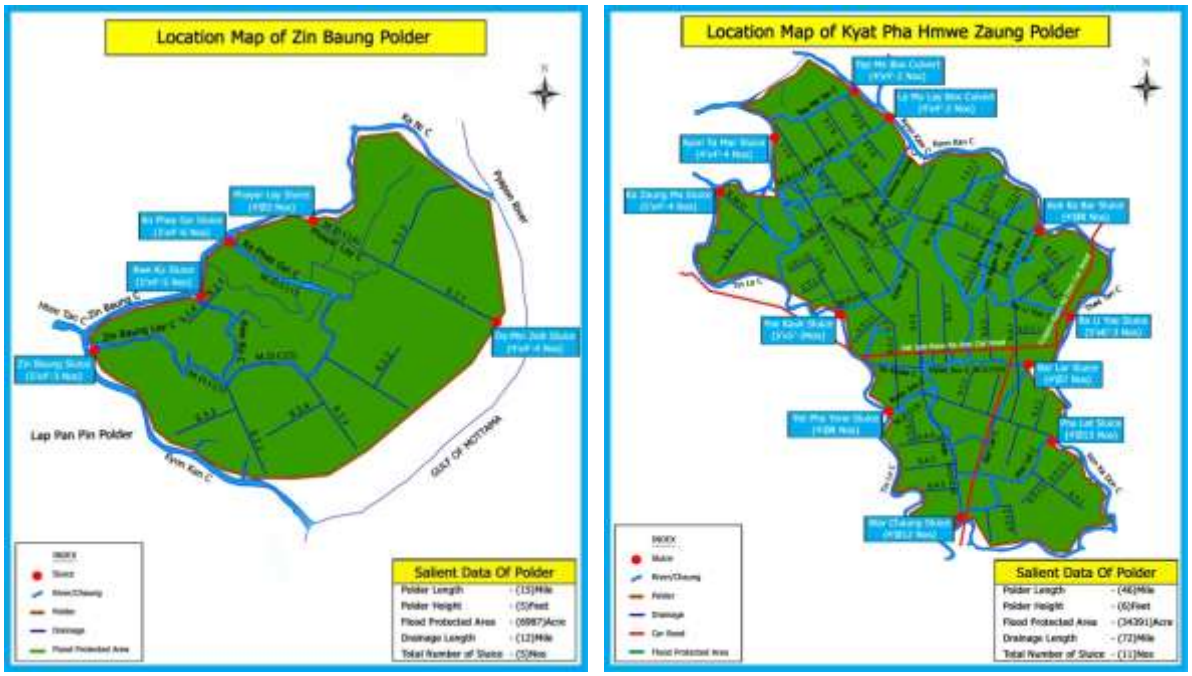
Map of Location of Polders and Sluice Gates, Pyapon District



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.

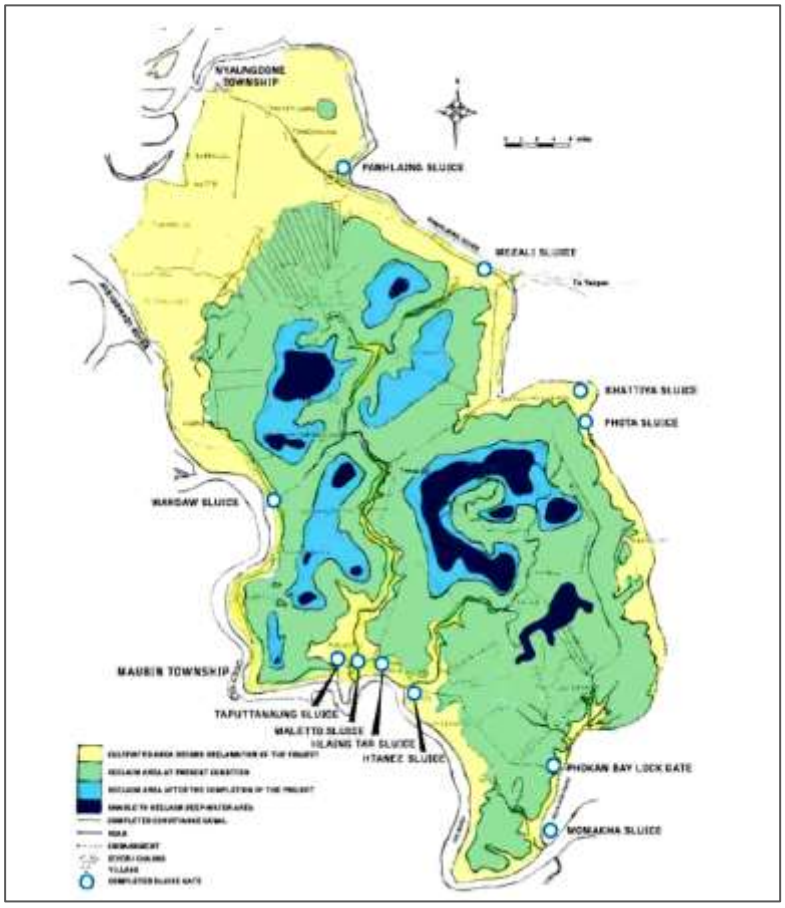
Location Map for Polders and Embankments in Ayeyarwady Region



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-Pathein 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

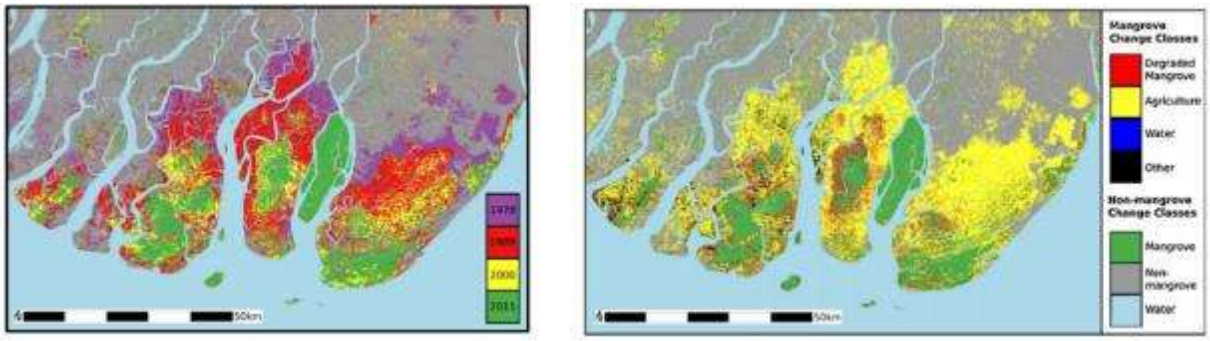
(Source: NASA NEX GDDP, 2015)

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. CCSR U. of Columbia, WWF-US WWF-MYA, UN-Habitat MYA; 2017)

Impact of climate chage 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.[9]



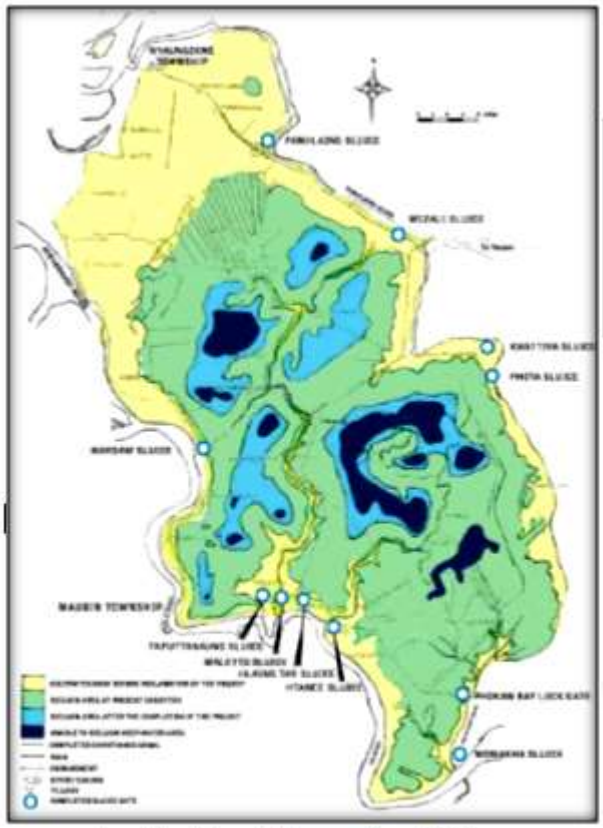
Left: Map on the left is showing mangrove land cover in the Ayeyarwady Delta, Myanmar, in 1978, 1989, 2000 and 2011. Right: Mangrove land cover change map showing 2011 mangrove land cover (green) and transitions into other land uses by 2011 (‘‘Mangrove Change Classes’’).

[9] 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

ANNEX 1 AGENDA FOR BANGLADESH DELEGATION VISIT TO MYANMAR

LEARNING DELTA ASIA INITIATIVE

Time	Activity	Remarks
DAY 1: May 31st		
Afternoon	Arrival of Bangladesh delegation to Myanmar	Mya Yeik Nyo Royal Hotel
DAY 2: June 1st		
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 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	Closure of Day 2	
DAY 3: June 2nd		
	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 3rd		

	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 4th		
	Meeting for Follow-up Program	Meeting room, IWUMD office, Yangon
DAY 6: June 5th		
	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

1st 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 Guangzohu, 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 5th 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, 1st June 2017

Consultation Meeting on LDAI on 1st 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 2nd June 2017

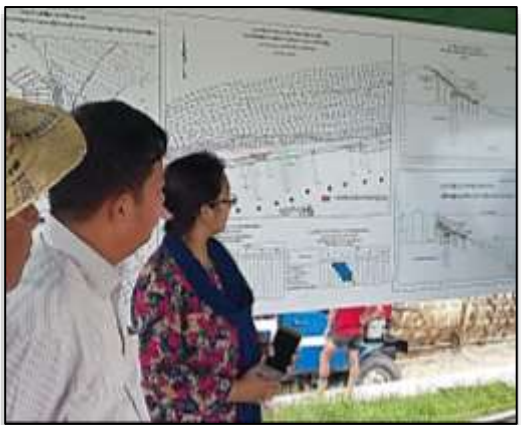
Explanation about Pan Hlaing Sluice Gate and Mezali Sluice Gate function and works by IWUMD at Project briefing hall

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

Discussion at Mezali Sluice Gate

Field Trip Photo of 2nd June 2017

Explanation about Nyaung done Land Reclamation Project by U Phyo 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 2nd 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 2nd 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 3rd 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 3rd 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 3rd 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