



Demonstration Investments in Eco-Waste Infrastructure Solutions: Thanlyin and Ayeyarwady Watersheds

Part I: Project Information

Name of Parent Program

Sustainable Management of the Bay of Bengal Large Marine Ecosystem Programme

GEF ID

Project Type

FSP

Type of Trust Fund

GET

Project Title

Demonstration Investments in Eco-Waste Infrastructure Solutions: Thanlyin and Ayeyarwady Watersheds

Countries

Myanmar

Agency(ies)

ADB

Other Executing Partner(s):

Ministry of Natural Resources and Environmental Conservation (MONREC)

Executing Partner Type

Government

GEF Focal Area

International Waters

Taxonomy

Focal Areas, International Waters

Rio Markers

Climate Change Mitigation

Climate Change Mitigation 0

Climate Change Adaptation

Climate Change Adaptation 0

Duration

60In Months

Agency Fee(\$)

412,844

A. Focal Area Strategy Framework and Program

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
IW-3_P5	5.1 Elimination or substantial decrease in frequency and extent of “dead zones” in sizeable part of developing countries’ large marine ecosystems (IW Objective 3 GEF 7)	GET	4,587,156	80,000,000
Total Project Cost(\$)			4,587,156	80,000,000

B. Project description summary

Project Objective

To monitor and reduce pollution discharged to the Thanlwin and Ayeyarwady Rivers, and ultimately the Bay of Bengal

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
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Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
1. Integrated Water Resources Management (IWRM) Strategic Action Plans (SAPs)	Technical Assistance	Pollution to Thanlwin and Ayeyarwady Rivers and Bay of Bengal (BOB) reduced (Mawlamyine Hpa-An and Mandalay IWRM SAPs implemented)	<p>1.1 Water resources management and climate resilience integrated with urban utilities through inter sectoral, IWRM SAPs for 3 project cities</p> <p>1.2 Methodology for Quality Assurance (QA)/Quality Control (QC) established and communicated to stakeholders</p> <p>1.3 Existing geographic information system (GIS) for inter -sectoral water quality data sharing /planning enhanced</p> <p>1.4 MONREC Environmental Conservation Departments' (ECD) water quality monitoring, analysis and modeling capacity upgraded</p> <p>1.5 ECDs industrial and non-point pollution monitoring capabilities enhanced: Recommendations for treatment , incentives and enforcement framework</p> <p>1.6. Environmental education, internships on the eco-demonstration subprojects and local environmental capacity building completed for target groups</p>	GET	2,420,388	7,900,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
2. Pollution Reduction for Bay of Bengal Through Demonstration Investments	Investment	Septage (domestic) waste identification, management, collection and treatment in coastal cities of Mawlamyine and Hpa-An; reducing pollution discharged to the BOBLME	<p>2.1 Eco-demonstration of using septage waste for its water content in the ADB financed biophilic [1] solid waste treatment system. Survey(s) of septic tanks, building tanks, markets and drainage canals; septic tank data entered into the city GIS</p> <p>2.2 Eco-demonstration of safe wastewater collection and treatment at 8 public markets in Mawlamyine and Hpa-An</p> <p>2.3 Eco-demonstration project(s) that transform polluted canals to safe waste collection and pedestrian byways; design of box culverts; design of pedestrian byway and assessment for wetlands expansion for wastewater polishing and biodiversity preservation</p> <p>[1] “Biophilia” refers to designing of construction projects with nature. https://grow-media.co.uk/grow-talk/biophilic-design-future-construction-environment/</p>	GET	1,586,810	71,100,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
3. Knowledge Management at National and Regional Level	Technical Assistance	Good practice on policy and waste infrastructure investments shared	<p>3.1 Environmental monitoring, analysis QA/QC scaled up:</p> <ul style="list-style-type: none"> - Across MONREC at national level - Integrated with cities utilities modeling and GIS <p>3.2 Knowledge products (KPs) developed and orientation workshops on septage design codes, maintenance, collection, treatment conducted</p> <p>3.3 Public awareness campaigns on socio-economic and health concerns related to IWRM implemented by women-owned businesses and non-government organizations (NGOs)</p> <p>3.4 Eco-waste infrastructure approaches and financing models shared across the BOBLME</p> <ul style="list-style-type: none"> - Baseline monitoring data shared; participation in wastewater (septage) and water benchmarking global database, the Global Partnership on Nutrient Management and IW: LEARN 	GET	361,522	

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
				Sub Total (\$)	4,368,720	79,000,000
Project Management Cost (PMC)						
				GET	218,436	1,000,000
				Sub Total(\$)	218,436	1,000,000
				Total Project Cost(\$)	4,587,156	80,000,000

C. Sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount(\$)
GEF Agency	Asian Development Bank	Loans	80,000,000
Total Co-Financing(\$)			80,000,000

D. Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount(\$)	Fee(\$)
ADB	GET	Myanmar	International Waters		No	4,587,156	412,844
Total Grant Resources(\$)						4,587,156	412,844

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)

PPG Amount (\$)

116,667

PPG Agency Fee (\$)

10,500

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount(\$)	Fee(\$)
ADB	GET	Myanmar	International Waters		No	116,667	10,500
Total Project Costs(\$)						116,667	10,500

Core Indicators

Indicator 5 Area of marine habitat under improved practices to benefit biodiversity (excluding protected areas)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
	30,000.00		

Indicator 5.1 Number of fisheries that meet national or international third party certification that incorporates biodiversity considerations

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Type/name of the third-party certification

Indicator 5.2 Number of Large Marine Ecosystems (LMEs) with reduced pollutions and hypoxia

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (achieved at MTR)	Number (achieved at TE)
0	1	0	0

LME at PIF	LME at CEO Endorsement	LME at MTR	LME at TE
	Bay of Bengual		

Indicator 5.3 Amount of Marine Litter Avoided

Metric Tons (expected at PIF)	Metric Tons (expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS Provide the expected project targets as appropriate. Corporate Results: 1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society Replenishment Targets: Improved management of landscapes and seascapes covering 300 million hectares Project Targets: 30,000 hectares More specific targets related to GEF 6 sub-indicators are provided in Attachment on Target Contribution to GEB, including worksheet on BOD reduction estimates.

PART II: Project JUSTIFICATION

1. Project Description

The original, basic project design and project outcomes from the original program framework document (PFD) submitted by the Food and Agriculture Organization of the United Nations (FAO) remain the same. The Project Preparation Grant to prepare ADB's separate Request for CEO Endorsement (for the original Outcomes 3.1 and 3.2 in FAO PFD) confirmed the need to re-consider approach. The original PIF focus was determined to be too narrow spatially, in the absence of required capacity for pollution control and reduction at the national level. Consultations with the Executing Partner, MONREC, notably the ECD supported a broadening of approach to strengthen capacity to implement the recently approved National Waste Management Action Plan at watershed scale, which would include Mandalay in the Ayerawaddy Basin and two cities in Thanlwin River Basin. Both areas are supported by ADB loans. The approach now addresses strategic action planning for integrated water resources management (IWRM) and Eco-demonstration projects. The Executing Partner will be the MONREC, with some involvement of the Department of Housing and Urban Development in the Ministry of Construction. In sum the project now supports:

- (i) A more comprehensive baseline; solicited a wider range stakeholders' inputs, especially from civil service organizations (CSOs) and women's groups;
- (ii) Subcomponents which focus on measurable outputs that reduce organic and inorganic loading to waterways, supports and enables the ADB Third Greater Mekong Subregion Corridor Towns Development Project (GMS3) loan and potentially ADB's Second Mandalay Urban Services Improvement Project (MUSIP2) to demonstrate approaches that can be upscaled in Myanmar and to other Bay of Bengal Large Marine Ecosystem (BOBLME); and
- (iii) Better defined tasks to accomplish the 'Demonstration Investments in Eco-Waste Infrastructure Solutions' that are intended to be upscaled nationally and regionally.

A.1. Project Description

A.1.1. Global Environmental Problems, Root Causes and Barriers to be Addressed

Even though the changes remain aligned with the original FAO PFD design, given the amount of baseline collected and the positive additions to the outputs, this baseline section is updated below as is the alternative scenario. The updated baseline repeats some of the narrative from the FAO PFD with additions and clarifications for global water pollution and the likely impacts on large marine ecosystems (LMEs); and adds significant baseline conditions for the near coastal cities of Mawlamyine and Hpa-An in the Thanlwin watershed and Mandalay in the Ayeyarwady watershed, and what is at stake for Myanmar's future pollution discharges to the BOBLME.

Bay of Bengal Domestic, Industrial and Agricultural Waste Likely Effects, Monitoring and Control

With over 6 million square kilometers, the BOBLME is one of the largest LMEs, providing food for nearly 400 million people, which is 7% of the value of the world's fish catch. This important LME with a high degree of biodiversity has eight adjacent countries that includes Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand (see project setting in Figure 1). The original BOBLME Project began in April 2009 and ran until December 2015 with the FAO as the GEF Agency and supported by the Global Environment Facility (GEF), the Norwegian Agency for Development Cooperation, Sweden through the Swedish International Development Cooperation Agency, the United States' National Oceanic and Atmospheric Administration and the World Bank. The project covered: conservation and management of fisheries and the marine environment; expanded knowledge and strengthened understanding of the ecological, human and governance dimensions; increased awareness of transboundary issues by undertaking transboundary diagnostic analysis and a strategic action plan (SAP); and strengthened the capacity of participating countries through knowledge products (KPs), regional meetings and exchanges.

The Bay of Bengal Large Marine Ecosystem Project (BOBLME)



Figure 1: Coverage of the Bay of Bengal Large Marine Ecosystem Programme

The FAO-led BOBLME Strategic Action Programme (2015)[1]¹ includes approaches that support better fisheries management, better coastal town development, marine area preservation, pollution control and coordination of monitoring and planning. The format for the BOBLME cooperation is an integrated water resource management (IWRM) approach and the primary focus is how to maintain the Bay of Bengal's (BOB) vibrant fishery and support continued marine vitality. In this context, the SAP rightfully identifies pollution as a factor in deteriorating fish stocks and marine water quality. Increasing nutrient inputs from rivers can lead to inner-shelf hypoxic zones that could adversely affect transboundary fish stocks and result in harmful algal blooms, also known as red tides. Widespread discharge of untreated or inadequately treated domestic, industrial and agricultural wastewater are the primary pollution sources. However, there is a general lack of information throughout the BOBLME on the distribution of persistent toxic substances and persistent organic pollutants, but they also are a serious transboundary issue.

Inorganic and organic waste from untreated domestic and agricultural sources cause algal blooms that ultimately rob the ecosystem's oxygen, warms the water and deteriorates habitat. A warming planet and faster warming oceans will exacerbate these deleterious effects. Untreated industrial wastes can also wreak havoc on the marine ecosystem and have an additional threat of long-term toxicity in fish stocks. Pollution discharged to the BOB from India and Bangladesh far exceed Myanmar's. However, both countries are investing in domestic waste treatment and industrial pollution control. Myanmar is a country in transition and offers a unique, least cost opportunity to build wastewater treatment and pollution control infrastructure as it develops at a much lower entry cost. Currently, domestic wastewater, industrial waste and agricultural runoff are untreated and eventually end up in the BOB. Controlling these sources in Myanmar and other BOBLME countries is a must in restoring the BOBLME

Global population growth will affect many LMEs and to a greater extent, the BOBLME. Although in the 20th century, Western countries overwhelmingly have been responsible for carbon dioxide emissions and urban waste. The new, rapidly growing sources are now in the developing world. Consider that the West, and now the People's Republic of China, have most of the urban capacity for sewage treatment but many of the countries have populations that have peaked, like most of Europe. By 2100, the People's Republic of China will have 300 million less people.[2]² Most of the population growth from now until 2100 is in the developing world, including Myanmar. These more rapidly growing countries that continue to lack water and wastewater infrastructure will significantly add to the total nutrient loading to freshwater and marine ecosystems.

Lessons and Best Practices from the Region on Controlling Water Pollution. Based on the lessons learned in other countries in Asia during the two-decade interruption of ADB operations in Myanmar, certain principles should be adopted to make future programs more efficient: (i) allow an initial period of effective policy dialogue, (ii) develop sector indicators for institutional reform and financial performance of urban service operators, and (iii) enhance borrower commitment to tariff adjustments. Examples of well-performing utilities are the Phnom Penh Water Supply Authority in Cambodia, the Manila Water Company and Manila Water Services in the Philippines, and the Hai Phong Water Supply Company in Viet Nam. These utilities have showcased best practices and tremendous improvements in various aspects of service delivery and management, such as: (i) streamlining governance and institutional arrangements; (ii) improving their operational performance; (iii) reducing nonrevenue water; (iv) improving their financial performance; and (v) expanding service coverage, particularly to the poor.

Child Project Areas: Mawlamyine, Hpa-An and Mandalay Water Quality Issues^[3]

Mawlamyine is the capital of Mon State and is located at the mouth of the Thanlwin River. Hpa-An is the capital of Kayin State and is located 50 kilometers (km) upstream on the Thanlwin river (see Figure 2). Mawlamyine and Hpa-An are similar towns with a population of 250,000 and 150,000 respectively. Currently domestic waste in both cities is not treated and nearly 100% of the waste drains directly in to the Thanlwin River.

Figure 2: Map Showing ADB/GEF Project Areas

Mandalay City, with a population of about 1.25 million, is the country's second-largest city, contributes around 8% of national gross domestic product. In the Mandalay Region, increased climate change vulnerability is observed, such as shorter monsoon periods, longer pre-monsoon droughts, and higher daily rainfall. These changing climatic conditions, combined with urban expansion, increase the demand for reliable water resources, effective wastewater collection and treatment and improved urban drainage. Despite high population density and pollution levels in received water, there is neither a piped sewerage system nor a centralized wastewater treatment plant. Most households and city latrines have septic tanks. However, there is no standard design nor requirement to periodically empty them. Most are one and two chamber tanks that at best reduce biochemical oxygen demand (BOD) levels by 50%. Most septic tanks ultimately drain to the ground water, roadside drains or canal. Environmental impacts are consequently high, with resulting pollution of watercourses and ground water. The pollution level in major creeks in the city are up to 80 milligrams per liter. Results of the water quality survey conducted for sample wells during project preparation shows that more than 70% of the sample wells were contaminated by coliforms. The following summarizes the water and pollution sources:

Drainage systems. Drainage systems in all 3 cities are characterized by unlined drainage ditches and canals. Mawlamyine and Hpa-An both have public markets, mostly close to the Thanlwin River, that drain directly to the river. Although Mandalay is located in the Central Dry Zone, rainstorms can be very intensive during the wet season and the city needs proper urban drainage facilities. The city has about 90 km of main canals and creeks, 115 km of secondary drains and 850 km of tertiary drains. Seasonal floods are caused mainly by: (i) lack of maintenance of canals (lots of garbage dumping occur and there is vegetation in the whole surface water system); (ii) small bridge openings at the crossing of drains and roads, reducing the discharge capacities of the drains; (iii) insufficient capacities of the existing pumping stations to discharge excess water out of the city area; and (iv) lack of maintenance (dredging) in the storage ponds. The Mandalay City Development Committee (MCDC) Roads and Bridges Department is responsible for maintaining the drainage systems

Industrial waste and non-point source pollution. Mawlamyine and Hpa-An are planning industrial parks and Mandalay has existing industrial parks. The former is an opportunity to provide adequate wastewater treatment, proper discharge and sustainable drainage systems. The latter is characterized by discharges of untreated industrial wastewater, with high levels of BOD and COD, from manufacturing and processing activities in the southern part of the city pour into nearby Taung Tha Man Lake and the Ayeyarwady River. Agriculture runoff and underperforming septic tanks are not monitored in all 3 cities and thus, they add to the nutrients entering the Thanlwin and Ayeyarwady Rivers.

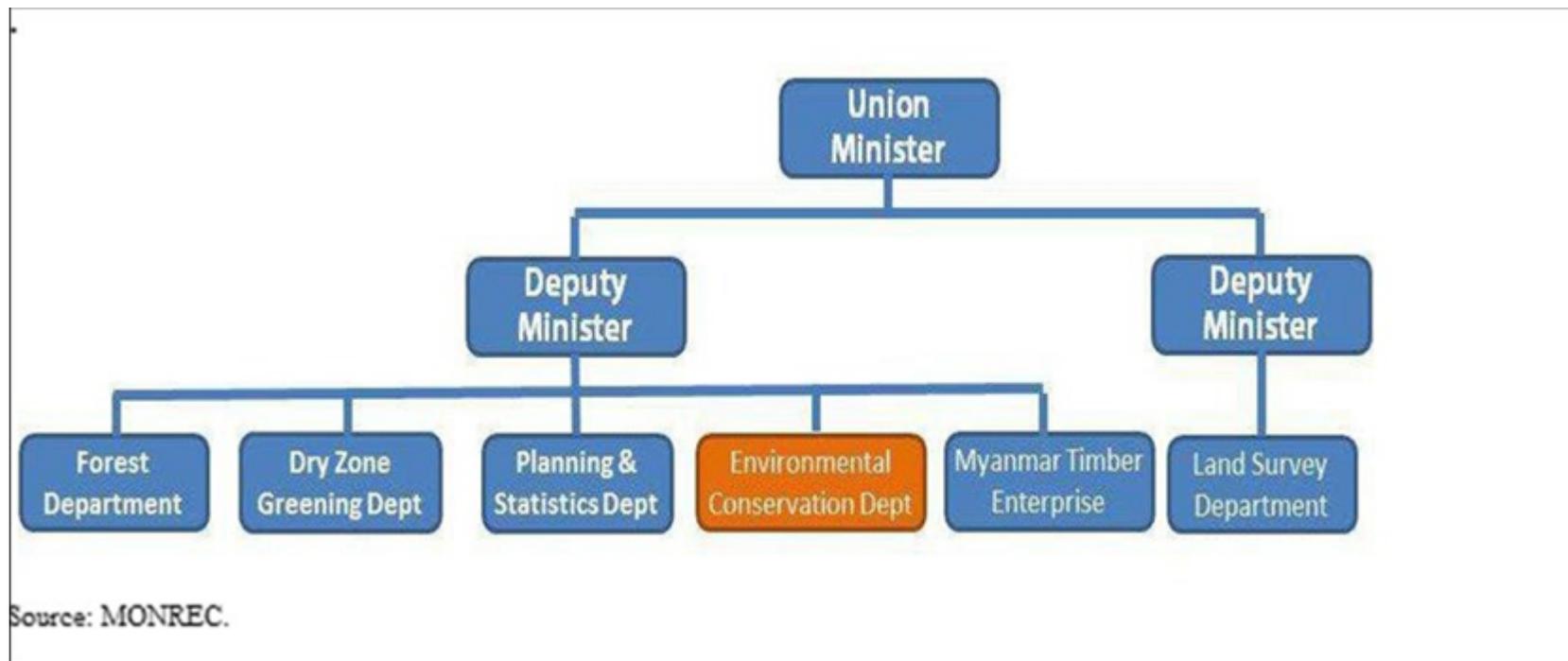
Water supply. The piped water supply systems in Mawlamyine and Hpa-An was mainly constructed between 1983 and 1992 under a project financed by ADB, which serves 55% of the city's population for 10 hours per day on average. The remaining residents use mainly private shallow wells. The piped system, fed by tube wells (90%) and untreated surface water, delivers about 100,000 cubic meters per day (m³/d) into the network of about 400 km. At the moment, water is not treated. Non-revenue water (NRW) is estimated at approximately 52%, of which at least 35,000 m³/day (about 70% of the total nonrevenue water) is due to physical losses from faulty meters and leaks; the remainder is due to uncertainties in meter readings and authorized unbilled consumption.

Thanlwin and Ayeyarwady Rivers water quality. Waterways and ground water in Mawlamyine, Hpa-An and Mandalay ultimately empty into the Thanlwin and Ayeyarwady Rivers respectively. High concentrations of ammonia nitrogen, coliforms and BOD enter the river daily. E. coli counts in the River range from 40 per 100 milliliters to 3,200 per 100 milliliters. Discharges of untreated industrial wastewater, with high levels of BOD and COD, are discharged to the Ayeyarwady and ultimately, the BOB via the Taung Tha Man Lake.

Environmental Regulation Issues

National environmental regulations and management. The Ministry of Forestry was upgraded in September 2011 as the Ministry of Natural Resources and Environmental Conservation (MONREC), the focal and coordinating agency for the overall environmental management in Myanmar (see organizational chart in Figure 3). The purview of the national Environment Conservation Department (ECD) under MONREC includes: (i) development of legislation related to environmental regulations, guidelines and procedures; (ii) coordination of environmental conservation activities; (iii) development of plans on climate change mitigation and adaptation, on desertification control and ozone layer protection; (iv) environmental impact assessment (EIA) review and approval; and (v) preparation of national report in relation with international agreements. ECD has presently 156 officers and 247 staff under the supervision of the Director General at the Head Office in Nay Pyi Taw and in 14 states/regions, including Mandalay. In 2014, MONREC released the draft Myanmar Environmental Quality Guidelines for water and air emissions. The final guidelines, with assistance from ADB, will be published by the end of 2020. ECD also has an ongoing, national inventory of industrial and hazardous waste emissions/discharges that is being conducted by a private contractor.

Figure 3: Organizational Structure of MONREC^[4]



City Water Quality

Monitoring, Wastewater Control and Regulatory System

Mawlamyine, Hpa-An and Mandalay districts' (State Capitals) ECD capabilities. District ECDs report equally to the ECD in Nay Pyi Taw and the Chief Minister of the Region; and has the responsibility to monitor the water quality, air quality, industrial pollution and non-point source (all EIA review is done by ECD Nay Pyi Taw). The ECDs' management fully appreciates that new, published environmental standards require supporting data, analysis and permitting system. A newly opened ECD lab, the first one in Mandalay, can analyze heavy metals, COD, BOD and soil. All staff has university degrees, and many have post graduate degrees in environmental science, engineering, chemistry or related field. **However, they lack practical experience in routine monitoring, analysis, modeling and regulating since this is such a new subject for Myanmar.**

ECD industrial pollution monitoring and control. There are no discharge permits, monitoring requirements or penalties for discharge violation. The largest dischargers by volume are the Mandalay breweries, pharmaceutical plants, tanneries and pulp and paper mills. Mandalay's small and medium size enterprises (SMEs) have smaller volume discharges but find it difficult meeting standards because the scale of wastewater treatment needed is beyond their financing capabilities. ECD's current approach is to offer the SMEs land to relocate like SMEs in industrial parks with a common treatment plant. One barrier is related to transferring land titles to the industrial parks which prevents SMEs from accessing bank financing

(to be addressed in the alternative scenario). An industrial wastewater treatment financing program ('Responsible Business Fund') funded by the Danish Government provides access to financing but ends in 2020. ECD has requested financing from MCDC to build a central facility for the main township but financing is not yet appropriated.

ECD Environmental Management Plans. There are no large industries in Mawlamyine or Hpa-An but the project includes an industrial park plan. Thus, both cities can learn from Mandalay's more advanced dealings with industry and the new industrial waste control initiatives by MONREC. Currently, ECD requires 232 Mandalay industries to submit environment management plans (EMPs) by 10 January 2020. ECD requires EMP preparation by a third party and selection from an ECD list of consulting companies. All industries need an EMP to get an operation permit (Department Instruction 2018). EMPs are thorough and meet international standards. Although ECD has received 52 EMPs, only one industry has an acceptable EMP. Mawlamyine and Hpa-An can learn from ECD Mandalay's EMP experience and require industries locating in the to-be-built industrial parks to prepare similar EMPs. Another lesson learned is the focus on co-locating industries with similar waste streams that can thus be co-treated; and the recognizing possibilities for industrial waste re-use within the industrial park.

Biodiversity protection. ECD Mandalay has a biodiversity protection program and a primary focal area is a rare migratory bat and they are currently restoring the Palik Wetland, the prime breeding area. Mawlamyine and Hpa-An do not have biodiversity programs (wetland biodiversity protection and enhancement are included in the project).

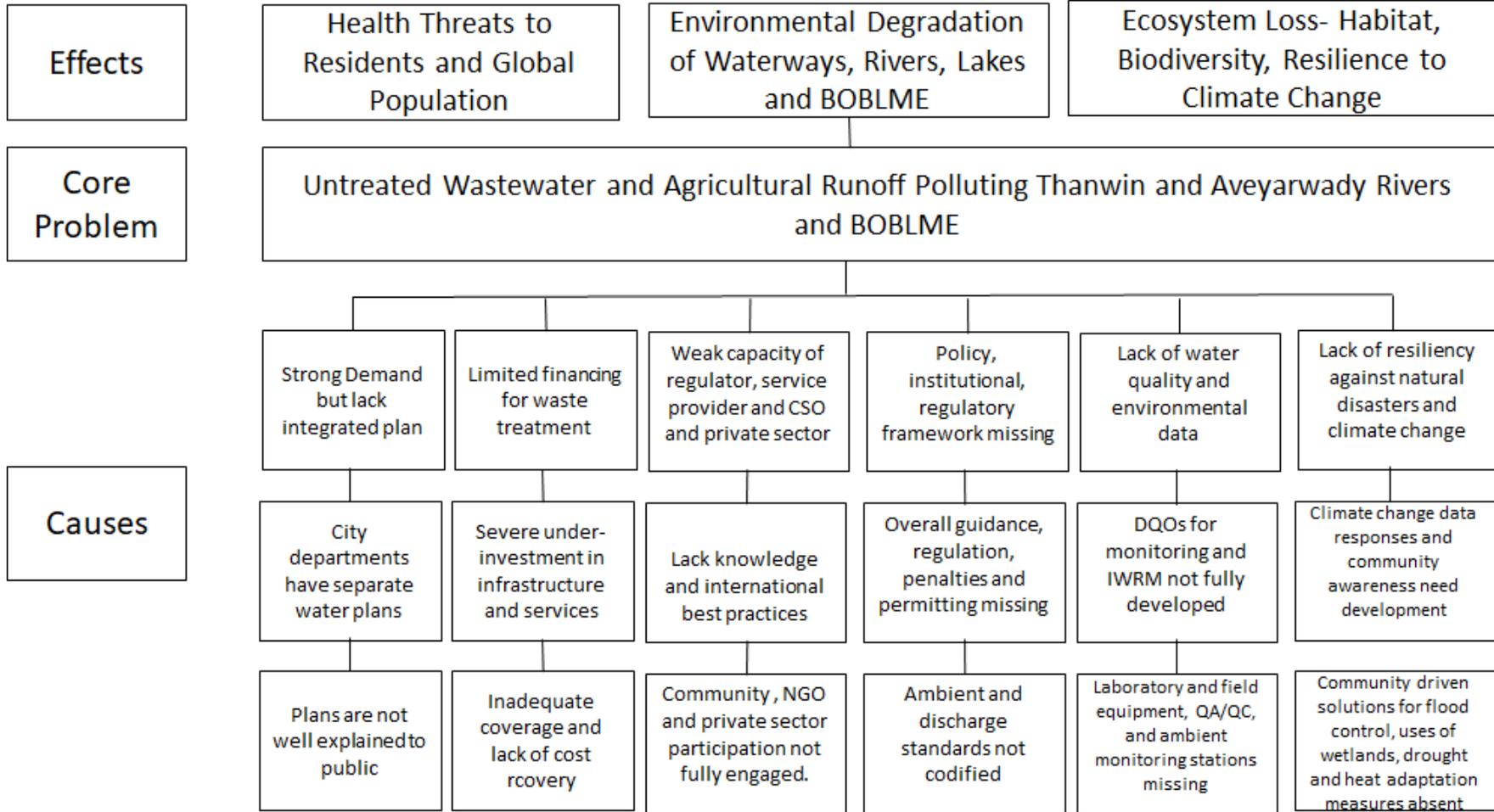
Other city departments' monitoring water quality. City government in all 3 cities manage wastewater treatment, septage waste and overall drainage and flood control. It maintains a water quality lab and takes regular samples in canals and drainage systems. The Ministry of Agriculture monitors surface and ground water and is fighting a growing water scarcity with increasing drought. Ground water levels have dropped precipitously prompting the Ministry of Agriculture to initiate a program to monitor water use and promote water conservation. The Ministry of Transport has a water quality department that focuses on water quality in the drainage networks adjacent to roads.

Summary Barriers to be Addressed

The GEF Child Project will address the following barriers:

- (i) Sectoral approaches that foster integrated urban development and strengthen inadequate policy and regulatory frameworks, as well as promote cross-sector institutional arrangements;
- (ii) Technical and management capacity limitations to implement water and environmental management initiatives at the city and regional government levels;
- (iv) Absence of long-term science-based data collection systems and supporting laboratory facilities in the water and environment sectors;
- (v) Limited public understanding and involvement with respect to environmental management; and
- (vi) Need for incentives, demand and financing mechanisms to sustain operations and maintenance (O&M) of water and environmental management infrastructure. **Figure 4** presents a theory of change framework that highlights these barriers.

Figure 4: Framework for Addressing Pollution Entering the Thanlwin and Ayeyarwady Rivers and BOBLME



Strong demand but lack integrated plan	Limited financing for waste treatment	Weak capacity of regulator, service provider and CSO and private sector	Policy, institutional, regulatory framework missing	Lack of water quality and environmental data	Lack of resiliency against natural disasters and climate change
City departments have separate water plans	Severe under-investment in infrastructure and services	Lack knowledge and international best practices	Overall guidance, regulation, penalties and permitting missing	DQOs for monitoring and IWRM not fully developed	Climate change data, responses and community awareness need development
Plans are not well explained to public	Inadequate coverage and lack of cost recovery	Community, NGO and private sector participation not fully engaged	Ambient and discharge standards not codified	Laboratory and field equipment; QA/QC; and ambient monitoring stations missing	Community driven solutions for flood control, uses of wetlands; drought and heat adaptation measures absent

EFFECTS

CORE PROBLEM

CAUSES

A.1.2. Proposed alternative scenario, GEF Focal Area Strategies^[5] with a brief description of

Baseline Scenario and Any Associated Baseline Projects

ADB Program in Myanmar. The ADB re-engaged with Myanmar in 2012 and focused on: i) building relationships and dialogue with the government, civil society, the private sector and other development partners; ii) providing knowledge and capacity-building support; iii) resuming lending operations and building a significant operational program involving sovereign and non-sovereign lending and nonlending activities; and iv) establishing a strong country presence.

The ADB Country Operations Business Plan, 2019–2021 for Myanmar focuses on transport (50%), energy (19%), agriculture, natural resources, and rural development (12%), water and other urban infrastructure and services (6%), education (6%), public sector management (5%), and health (2%). The Myanmar: Country Partnership Strategy, 2017–2021 aims to support government in laying the foundation for sustainable and inclusive economic development, and job creation for poverty reduction. ADB operations focus on: (i) improving access and connectivity to connect rural and urban areas and markets, and linking Myanmar with the regional and global marketplace; (ii) strengthening human capital to promote a skilled workforce and increased employment, and enable the poor and disadvantaged to benefit from economic growth; and (iii) promoting structural and institutional reform to support the modernization of the economy. In implementing these priorities, infrastructure (energy, transport and urban development) will remain the mainstay of ADB operations; to enhance inclusiveness, this focus will be complemented by support for rural development, and education and training. To help accelerate Myanmar's transformation process, ADB will intensify its focus on capacity development and governance; private sector development; environment and climate change, and disaster risk management; regional cooperation; and gender equity.

ADB Third Greater Mekong Subregion Corridor Towns Project (GMS3), ADB loan to Government of Myanmar will serve as main baseline. The loan will upgrade basic infrastructure and strengthen urban management capacities to develop the towns of Mawlamyine in Mon State, and Hpa-An and Myawaddy in Kayin State as competitive economic nodes along the Greater Mekong Subregion (GMS) East–West Economic Corridor (EWEC). Although 66.0% of Myanmar's population resides in rural areas, the urban population has grown by 2.5% per year, faster than the country's total population (0.8% per year). The percentage of the urban population in Myanmar increased from 27.0% of the total population in 2000 to 34.1% of the total population in 2015. It is expected to increase to 36.9% in 2020 and 42.8% in 2030.⁵ On the other hand, chronic underinvestment in urban

infrastructure has resulted in seriously deficient municipal services throughout Myanmar. Lack of urban infrastructure and limited capacity to manage municipal services are major disincentives to external investments, which are critical to socioeconomic development and growth. Kayin State and Mon State have significant potential for development due to (i) an expected increase in trade with Thailand, (ii) better access to Yangon, (iii) its link to the Bay of Bengal, (iv) expected increases in tourist visits, and (v) connection with a new international airport in Bago. Upgrading urban infrastructure and developing urban management capacity are essential to strengthen Kayin and Mon states' competitiveness and tie-in with wider economic growth in the GMS.

The ADB baseline loan will have three outputs: i) urban planning improved, ii) basic social infrastructure upgraded, iii) urban management capacity strengthened. Among other things, the project will invest in improved priority services of water supply and solid waste management in Mawlamyine and Hpa-An, specifically: (i) rehabilitate the existing dam, construct a new water treatment plant, extend the water distribution network, and construct new connections in Mawlamyine; and (ii) build a new water intake and treatment plant, extend water distribution network, and construct new connections in Hpa-An. The project will (i) upgrade the existing dump site to a waste management center, including sanitary landfill and compost plant, in Mawlamyine; and (ii) construct a new waste management center, including sanitary landfill and compost plant, and close the existing dump sites in Hpa-An. The loan project will also cover a number of ecosystem management activities, such as solid waste management, water supply, industrial park planning and restoration of an important cultural, religious and tourist site in Mawlamyine, Yadanar Bon Myint Monastery. **The current GEF project aims to support activities that are complementary to the loan project activities.**

ADB Mandalay Urban Services Improvement Project (MUSIP): An ongoing and planned set of initiatives is helping Mandalay city to improve its water and sanitation services. The project is building a new water treatment plant and upgrading and extending the existing supply network. It is also building the city's first centralized wastewater collection and treatment plant, which will produce biogas from sludge and help power the plant. A second phase would aim to include (i) water supply system improvements, (ii) drainage and flood protection, (iii) wastewater management, and (iv) institutional capacity strengthening and public awareness raising. Institutional capacity strengthening will comprehensively cover the areas of strategic urban planning, municipal finance and financial management, urban service operation performance, asset management, and operation and maintenance of the loan project facilities.

ADB Yangon Urban Services Improvement Project (YUSIP). An ADB loan to the Yangon City Development Committee (YCDC) is under preparation. Initial scoping and feasibility work is ongoing. Based on recent workshop proceedings, a number of priority areas are being explored: i) City-level land use management planning, ii) City-wide wastewater collection system, iii) Decision support-based flood mapping, iv) City level solid waste management, v) Expansion of water distribution network.[6]⁶

Greater Mekong Subregion Strategic Framework 2012-2022: The proposed project supports the thrusts of the GMS Strategic Framework 2012–2022 in facilitating cross-border trade, investment, and tourism;[7]⁷ and is included in the GMS Regional Investment Framework (2013–2022).[8]⁸ The development of sustainable cities and reduction of pollution

and environmental degradation are included in the policy measures to achieve the government's overarching goals toward inclusive and sustainable economic development.[9]⁹ The Asian Development Bank's (ADB) country partnership strategy for Myanmar 2017–2021 identifies infrastructure development as a main pillar of ADB operations.[10]¹⁰

Myanmar Waste Management Strategy and Action Plan (2017–2030), led by the ECD in MONREC. It will focus on the city development committee level as well as on scaling up at the national level, to address a number of goals and targets articulated in the strategy. The GEF project represents the first city-wide IWRMs for Myanmar, supported by strong environmental data; ground water and surface water physical data, all integrated in to an accessible, layered geographic information system (GIS) database. Under the GEF project, ECD will gain the capacity to implement a program to collect water quality data on ambient surface water conditions, wetlands, industrial pollution, septage waste and to model water quality conditions.

National Ambient Water Quality Guidelines and Discharge Limits. This first such proposed law in Myanmar, is scheduled for publishing in 2020 and requires supporting regulatory infrastructure, capacity building and investment for compliance. The general baseline scenario largely excludes the environmental infrastructure needed and as a result, the new ambient standards lack the support needed for successful implementation and compliance. The baseline will miss opportunities for integrated water resource and environmental management approach; data collection to support enforcement and decision making in support of the new ambient water quality standards; and support to capacity building, community organization and gender involvement that all help to implement and gain acceptance of the new standards.

The GEF project represents the first city-wide IWRMs for Myanmar, supported by strong environmental data; ground water and surface water (including wetlands) physical data, all integrated into an accessible, layered GIS database. Under the GEF project, ECD will gain the capacity to implement a program to collect water quality data on ambient surface water conditions, industrial pollution, septage waste and to model conditions.

The Myanmar Government and ADB began implementation of the \$117 million GMS3 in November 2019 . The existing project in Mawlamyine and Hpa-An will serve as main technical baseline project for the proposed GEF funding. The loan focuses on wastewater, drainage and flood control, solid waste management, fecal sludge management, industrial development, cultural heritage and environmental rehabilitation. Under the GMS3 and future loans, the GEF baseline will continue to support ecosystem services in the three cities and surrounding areas to: (i) increase water production capacity, expand distribution networks, and reduce water losses; (ii) improve septic tanks emptying and wastewater collection/treatment process, and (iii) develop city capacity in municipal financial management, urban and spatial planning, and O&M. The loan project will also cover a number of ecosystem management activities, such as solid waste management (**which will not be considered under the GEF project**). GEF financing will support the implementation of the recently formulated Myanmar Waste Management Strategy and Action Plan (2017–2030), led by ECD. It will focus on the national, regional and local levels of the ECD to help the country achieve the goals and targets articulated in the strategy.

A.1.3. Proposed alternative scenario, GEF Focal Area Strategies[11]¹¹ with a brief description of expected outcomes and components of the project

Proposed Alternative Scenario

Summary of the GEF project. The project captures some of the key recommendations of the BOBLME Strategic Action Programme and examines many of the pollutant flows from to the Thanlwin and Ayeyarwady Rivers and the BOB. The main project components which include:

Water resources management and climate resilience integrated with urban development through inter-sectoral planning mechanisms. To address, i) enhancement of existing GIS for inter-sectoral water quality data sharing/planning; ii) upgrading Mawlamyine, Hpa-An and Mandalay ECDs' water quality monitoring capacity; iii) providing instrumentation for water/industrial waste analysis; iv) assisting in the development of an industrial pollution control framework; and v) enhancing private sector ecosystem services and both industrial and non-point source pollution control.

Demonstration investments in covering: increasing septage collection and treatment. To support, i) demonstration of wastewater collection at eight (8) large public markets; ii) demonstration/design of box culverts in wastewater drainage canals and greening of key areas to convert to pedestrian walkways that lead to tourist attractions including the Yadanar Bon Myint Monastery, and iii) review of ecosystems restoration options for polishing wastewater in wetlands as both a treatment and preservation method (indicators and baseline are provided in the summary and project results framework in Annex A) that will result in reduced domestic pollution loads.

Knowledge management. In addition to increasing public awareness, the project will support regional and international best practices and models integrated, demonstrated, and shared for potential upscaling for BOBLME countries.

The current GMS3 and the future investments in Myanmar will benefit from this GEF investment which showcases: i) IWRM plans that provide access and supporting data across all city departments, ii) baseline environmental data needed for decision making, iii) nutrient loading data from wastewater and non-point sources, iv) a platform for regulating industrial wastewater, and increased environmental climate change resilient urban planning capacity using community groups and the private sector. The GEF-supported ecosystem services development will assist Mawlamyine and Hpa-An to address additional water pollution sources that are not covered in the ADB GMS3 loan-financed project. The project components below identify the outcomes and then lays out the outputs from each component /outcome (reference project results framework in Annex A).

How will the GEF intervention provide additionality, and juxtapose with the baseline investment?

Baseline Investment	GEF Additionality
Outcome	

Households with access to improved water supply increased to 24,000 (2016 baseline: 5,000) in Mawlamyine, and 14,000 (2016 baseline: 1,000) in Hpa-An

Nonrevenue water reduced to 30%. (2016 baseline: 80%) in Mawlamyine, and 25% (2015 baseline: 70%) in Hpa-An

Solid waste collection rate increased to 80% of the total households. (2016 baseline: 50% of the total households) in Mawlamyine, and 80% of the total households (2016 baseline: 45% of the total households) in Hpa-An

Pollution to Thanlwin and Ayeyarwady Rivers and Bay of Bengal (BOB) reduced (Mawlamyine, Hpa-An and Mandalay IWRM SAPs implemented)

Outputs and Indicators

Urban Planning Improved

1a. General Administration

Department building renovated and upgraded in Mawlamyine (2016 baseline: not applicable)

1b. Hpa-An Industrial Zone development plan developed (2016 baseline: not applicable)

1c. Joint spatial development plan for Myawaddy and Mae Sot developed (2016 baseline: not applicable)

Integrated Water Resources Management (IWRM) Strategic Action Plans (SAPs) – Thanlwin and Ayeyerawaddy Watersheds

1.1 Water resources management and climate resilience integrated with urban utilities through inter-sectoral, IWRM SAPs for 3 project cities

1.2 Methodology for Quality Assurance (QA)/Quality Control (QC) established and communicated to stakeholders

1.3 Existing geographic information system (GIS) for inter-sectoral water quality data sharing / planning enhanced

1.4 MONREC Environmental Conservation Departments' (ECD) water quality monitoring, analysis and modeling capacity upgraded

1.5 ECDs industrial and non-point pollution monitoring capabilities enhanced: Recommendations for treatment, incentives and enforcement framework

1.6. Environmental education, internships on the eco-demonstration sub-projects and local environmental capacity building completed

Basic Social Infrastructure Upgraded

2a. Water production capacity increased to 22,000 m³/day (2016 baseline: 10,000 m³/day) by rehabilitating the existing dam and constructing a new water treatment plant in Mawlamyine, and 12,000 m³/day (2016 baseline: 2,000 m³/day) by constructing a new water intake and treatment plant in Hpa-An

2b. Water distribution network extended to 190 km (2016 baseline: 50 km) in Mawlamyine, and 110 km (2016 baseline: 30 km) in Hpa-An

2c. 19,000 new water connections (2016 baseline: 5,000) constructed in Mawlamyine and 13,000 (2016 baseline: 1,000) in Hpa-An

2d. Existing dump site upgraded to waste management center comprising sanitary landfill and compost plant in Mawlamyine (2016 baseline: 0), and existing dump site closed, and new waste management center constructed in Hpa-An (2016 baseline: not applicable)

Septage (domestic) waste identification, management, collection and treatment in coastal cities of Mawlamyine and Hpa-An; reducing pollution in BOBLME

2.1 Eco-demonstration of using septage waste for its water content in the ADB financed biophilic[1] solid waste treatment system. Survey(s) of septic tanks, building tanks, markets and drainage canals; septic tank data entered into the city GIS

2.2 Eco-demonstration of safe wastewater collection and treatment at 8 public markets in Mawlamyine and Hpa-An

2.3 Eco-demonstration project(s) that transform polluted canals to safe waste collection and pedestrian byways; design of box culverts; design of pedestrian byway and assessment for wetlands expansion for wastewater polishing and biodiversity preservation

Urban Management Capacity Strengthened

3a. Capacity development assessed, training programs in urban management developed, and attended by at least 30 participants from KSG and MSG (2016 baseline: not applicable)

3b. Urban and Regional Development Planning Law implemented (2016 baseline: none)

3c. Awareness materials on environmental protection and public health developed, and awareness programs attended by at least 100 persons (with equitable share of male and female participants) (2016 baseline: not applicable)

3d. Gender awareness and GAP implementation programs attended by all PMO and PIU staff increased (2016: baseline not relevant)

Knowledge Management at National and Regional Level

3.1 Environmental monitoring, analysis QA/QC scaled up:

- Across MONREC at national level
- Integrated with cities utilities modeling and GIS

3.2 Knowledge products (KPs) developed and orientation workshops on septage design codes, maintenance, collection, treatment conducted

3.3 Public awareness campaigns on socio-economic and health concerns related to IWRM implemented by women-owned businesses and non-government organizations (NGOs)

3.4 Eco-waste infrastructure approaches and financing models shared across the BOBLME

Baseline monitoring data shared; participation in wastewater (septage) and water benchmarking global database, the Global Partnership on Nutrient Management and IW: LEARN

[1] “Biophilia” refers to designing of construction projects with nature. <https://grow-media.co.uk/grow-talk/biophilic-design-future-construction-environment/>

Outcome 1: Integrated Water Resources Management (IWRM) Strategic Action Plan (SAP) for Mawlamyine in Mon State, and Hpa-An in Kayin State, and Mandalay in the Ayeyarwady Watershed

Introduction. Water pollution abatement and developing climate resiliency in the 3 project cities requires identifying and limiting untreated sewage flows into their respective canals, rivers and lakes; preventing untreated industrial discharges to any body of water or soil; and preventing nutrient loading near targeted rivers and lakes. Myanmar has no national water quality standards but there is a current National Discharge Directive (2018), Industrial Pollution Directive (2018), Industrial Waste Inventory (2019) and now under review are the proposed National Ambient Water Quality Standards (2020). Under this component, the new standards will be reviewed and incorporated into the cities’ IWRM SAPs. It is expected that given the variability of ECD capabilities, staffing and the amount of domestic and industrial waste loading to the respective rivers that the IWRM SAPs for Mawlamyine and Hpa-An will provide a basic framework for water resource management, pollution control and capacity building recommendations; and the Mandalay IWRM SAP will provide more detailed institutional recommendations for expanding domestic, industrial and nutrient discharges to the Ayeyarwady River.

Currently, there is limited ambient water quality data from the 3 cities’ surface and ground water to support decision making that is now needed with the new ambient water quality guidelines. Thus, this component will also support: baseline ambient data for the existing conditions of the targeted canals, rivers and lakes; water quality data from industrial and domestic discharge points; integrated data use and associated decision making; institutional capacity to implement a pollution control regime; and a set of environmental quality objectives that are shared by all stakeholders and set forth in the SAPs.

The tasks below serve as foundations to achieve these objectives. They will be encased in sustainable IWRM SAPs with the following components: stakeholder engagement, quality assured water quality data, shared data, institutional capacity and adequate financing to implement the programs. One note is the prevalence of wetlands near Mawlamyine (Mon State) and Hpa-An (Kayin State) that are natural habitats for a variety of migratory species and indigenous biodiversity. The wetlands are not only natural habitats that support biodiversity, they also recharge ground water, help control flooding, act as natural filters of runoff and provide surface water to nearby ecosystems. Although not a focus of the project wetland areas near Mawlamyine and Hpa-An will be inventoried and reviewed for potential use for wastewater polishing as a method to reduce organic waste while also preserving

wetland density. These will also be upscaled by the ECDs and incorporated into the environmental monitoring, testing and analysis guidance for the soon-to-be enacted Myanmar Ambient Water Quality Standards. Specifically, the IWRM SAP outputs (tasks) include:

Task 1.1. Water resources management and climate resilience integrated with urban utilities through inter-sectoral, IWRM SAPs (3 cities)

- (i) Project review and stakeholder engagement. The IWRM SAPs will upgrade information collection and sharing in advance of the national ambient water quality standards, which will enable better pollution control decision making. Initially, existing national and city specific IWRM institutional issues, key stakeholders, organizational issues, data sharing needs, relevant regulations and/or directives and status of current related projects all need to be identified. Only then can an integrated plan be set forth.
- (ii) Setting data quality objectives. Currently, environmental and water quality data is lacking and what is collected is not verified or readily available to all the stakeholders. Given that new water quality standards are at hand, the data quality objectives (DQOs) can now be established and supported. ECD and other city stakeholders should agree on the DQOs in the preparation of the SAP. The DQOs will provide a target and define the process to achieve that target.
- (iii) Preparing the IWRM SAPs. Building on existing plans and stakeholder input, the IWRM SAP will lay out the DQOs and provide a roadmap of how water quality data is to be: collected; entered in to the new database and GIS; and used transparently across all city departments and ECD divisions. The IWRM SAP will also: look at how surface, ground and wetland water are connected and managed and recommend data needed to better manage and protect water resources (integrated with national and local plans/directives; include a design framework; and provide a roadmap for other Myanmar cities to follow).

Task 1.2. Methodology for quality assurance/quality control, including:

- (i) Verifying data: Quality assurance (QA)/quality control (QC) requirements for biological, chemical and physical data (methodology in task below) and inclusive of the proposed Myanmar Ambient Water Quality Standards.
- (ii) Integrated data that is geospatially located across GIS layers that includes socioeconomic, physical and environmental layers; and integrated across the city utility departments and ECD divisions.

Task 1.3 Enhancement of existing GIS for inter-sectoral water quality data sharing / planning, including:

- (i) Uniform data and uniform GIS requirements.
- (ii) A website for easy data retrieval, sharing and referencing of water quality data, in addition to the geospatial data entered on the existing GIS will provide more readily available public access.
- (iii) Server, workstations and software license upgrade to support the spatial location of sampling data each cities' new urban GIS systems for water delivery, wastewater collection and solid waste collection that is being installed and updated under their relevant ADB loan projects. Water quality and environmental data will be captured in an additional

GIS layer, managed by ECD and added to the city GIS system. Assistance with preparing procurement and selection; and assistance with data entry, integrating with the existing GIS; running models and other GIS training.

Task 1.4. Upgrading ECDs' water quality monitoring, analysis and modeling capacity. Once the DQOs are established, then each ECD needs to collect and interpret data. To start, current monitoring data, equipment and capacity at ECD but also at city utility departments, as well as local universities need to be summarized (e.g., water/sewer, transport). Then, based on the DQOs, a needs assessment for additional data collection, supporting equipment, capacity, such as QA/QC training, database needs and protocols will confirm the proposed investments included in this task. Items that are needed to support this task, at the time of review, include:

- (i) **Laboratory.** The ECDs in Mawlamyine and Hpa-An (November 2019) have new laboratory buildings with limited monitoring equipment and limited capacity for collecting, analyzing and interpreting results. Both ECDs require basic water quality monitoring equipment, laboratory equipment and training for staff. ECD Mandalay (September 2019) also has a new laboratory that is better equipped with capabilities to analyze BOD, COD, heavy metals, soils and many physical measurements. The laboratory manager and staff all have university degrees and training at the university level in sample collection and analysis. They lack routine sampling and analysis training as well as routine QA/QC analysis. Additional equipment is needed to monitor industrial waste that will be provided by the project and include total organic carbon and poly aromatic hydrocarbons which is needed specifically in Mandalay with the extensive industrial waste discharges to monitor. Additional supporting laboratory equipment, such as benches, autosamplers, sample bottles, bottle washer, ice machine and air conditioners are needed for all 3 laboratories. ECD also needs field sampling equipment for ambient water quality and industrial discharge sample collection and a sampling vehicle.
 - (ii) **Staffing and capacity.** ECD Mawlamyine has 32 staff, of whom 22 are women; [13]¹² and ECD Hpa-An has 32 staff with 25 women (22 in Hpa-An and 11 at the District ECD). [14]¹³ Both have limited, monthly sampling programs that take grab samples in the river, drainage canals, wells and lake outlets. Parameters monitored include pH, dissolved oxygen, turbidity, salinity, BOD and COD. Both lack capabilities and resources for routine sampling, analysis and interpretation, which will be provided in the project. ECD Mandalay is adding 60 staff that includes, field technicians, chemists, fecal sludge technicians, industrial pollution technicians, GIS technicians and modelers. Many of the proposed water quality data requirements under this project are new technical areas to Myanmar. Although there are many ECD staff that are technically qualified, having graduated from Myanmar universities, they are young and lack field experience. They need training and capacity building in each of the following areas: sample collection, preservation, laboratory analyses and operations, and QA/QC of sample results; fecal sludge and septic tank testing, fecal sludge collection/treatment; and fecal sludge composting; industrial pollution sampling protocols, health and safety; and running water quality models. Outputs for this task include: O&M manual for QA/QC; capital expenditure and operation expenditure for key equipment defined; potential for private sector participation operator in fecal sludge management/composting; and integrated GIS data layer for water quality data.
 - (iii) Based on the laboratory review, DQOs, staff capabilities and the revised list of equipment, assistance will be provided to each ECD to prepare the specifications (with full, warranties) and bidding documents according to ADB international shopping (under \$250,000) procurement rules; training requirements and relevant manuals for operation; and staffing requirements.
-

Task 1.5. Enhancing ECD's industrial and non-point pollution monitoring capabilities; recommendations for treatment, incentives and enforcement framework.

Mawlamyine and Hpa-An currently have only light industry and small enterprises. The ADB GMS3 includes preparing an industrial park plan. Thus, this is a good opportunity to develop capacity at ECD to monitor industrial waste; review options for industrial waste control and review the specific industrial park EMP. Currently, MONREC is preparing a national inventory of industrial waste which will help identify waste streams that ECDs should monitor. Mandalay is more advanced and ECD Mandalay is now reviewing 212 EMPs and is assisting like industries to voluntarily co-locate in sponsored industrial area with a wastewater treatment plant. The project will provide Mandalay ECD with the necessary monitoring equipment to verify industrial discharges and provide a database to track and benchmark industrial pollution. The project will also review options for ECD and nationally, MONREC, to consider for industrial discharge permitting, compliance verification, incentives and enforcement. Regional and international examples will provide a basis for the options.

Task 1.6. Environmental education, internships and local environmental capacity building. Although there are environmental courses offered in some high schools and universities, they lack practical experience, examples and exposure to regional and international best practices. The project will help build capacity and awareness by engaging students in practical experience and exposure to regional best practices. The ECDs in each city will have interns from high school for short term projects, such as working on the eco-demonstration projects and environmental campaigns organized under the project. The ECDs in each city will engage undergraduate and graduate students from the Hpa-An and Mandalay technical universities with sampling, analysis, modelling and potential thesis projects. The project will also bring in regional and international environmental engineering and environmental chemistry professors to assist with developing curricula and assisting with regional university cooperation with strong environmental engineering and science graduate programs, such as with the Asian Institute of Technology based Thailand. The project will help strengthen ECDs' public environmental awareness campaigns capabilities, knowledge products and regional understanding. The Hpa-An and Mandalay ECDs now run environmental campaigns, such as World Environment Day, and they work with non-government organizations (NGOs), CSOs and women-owned organizations. This will be expanded with both and with the Mawlamyine ECD and will include assistance by international and regional environmental campaign and women-owned environmental organizations.

Outcome 2: Septage (domestic) Waste Identification, Management, Collection and Treatment

Task 2.1 Eco-demonstration of using septage waste for its water content in the ADB financed biophilic solid waste treatment system. Mawlamyine and Hpa-An survey(s) of septic tanks, building tanks, markets and drainage canals will confirm the waste amount and provide data on the access to the tanks. In both cities, septic tanks are the primary household wastewater treatment method but their design, access and emptying practice are unknown. Approximately 70% of each cities' households are serviced by septic tanks with the remainder serviced by pit latrines and direct discharge to drainage canals. Many of the septic tanks are likely to treat only 50% of the BOD concentration, at best, and there is no national standard for septic tank construction nor are there building codes that require new construction to have an ECD-approved septic tank installed. This task will help to quantify septic tank use, construction, codification, regular desludging and treatment. The septic tank data will be entered into the Mawlamyine and Hpa-An cities' GISs, currently managed by the respective city development committees and currently the water systems are being populated by the supervision consultants; the septage waste. (wastewater) will be an additional layer to the existing GIS. After the survey, the system at the city level will be upgraded to regular emptying septic tanks and providing delivery to the ADB financed biophilic landfill. The biophilic process needs water for compaction and there is no access to water at either the Mawlamyine or the Hpa-An landfill sites. Thus, the septage waste will be used for the water content; but the digestion of the sludge and disinfection from the high temperature in the biophilic process are side benefits. Each landfill has complete leachate collection

systems that recycles any runoff back into the process. After completion, KPs will assist with public education of the process and assist with upscaling the process to other Myanmar communities. Subcomponents include

- (i) Assessment of both the number of septic tanks in use, frequency of desludging, access and the capacity of the City to deliver the service; and an overview of the quality and performance of septic tanks. Working with the cities' development committees and ECD to validate the effluent water quality of the 'average' septic tank (BOD analysis from five different septic tank effluents) will confirm the BOD estimates and assist with estimating loading from septic tanks and suggest needs for fecal sludge management, including septage waste collection frequency and sludge treatment.
- (ii) Assessment of the current septic and construction codes and recommend codifying of a septage design for all new construction.
- (iii) A review options for delivering desludging and treatment that includes recommendations for frequency of regular desludging and fees; a review of any proposed wastewater tariffs and if the tariff can be applied to desludging; and a review of the proposed use of the fecal sludge in the biophilic landfill, primarily for its water content. Mawlamyine and Hpa-An purchases of additional 8 m3 vacuum trucks each is subject to available funds and not funded under the GEF project.
- (iv) Capacity building and curricula development at the Mawlamyine Technical University and the Mandalay Technological University on environmental testing, sanitation wastewater management, GIS and environmental public awareness. ECD will work with an international institution to assist with the curricula

Task 2.2. Eco-demonstration of safe wastewater collection and treatment at 8 public markets in

Mawlamyine and Hpa-An. The 8 public markets in Mawlamyine and Hpa-An are one of the largest single sources of pollution in both cities and the eco-demonstration will prevent wastes from the market flowing in to the Thanlwin River. Subcomponents include:

- i) Surveys of the current wastewater flow and discharge from 4 public markets in Mawlamyine and 4 markets in Hpa-An will show that pollution is discharged directly to the rivers and the BOB.
- ii) Based on the surveys, a design of 4 wastewater collection and septic tanks, or modifications to the existing systems, will be given to each city and ADB for approval. Based on the design a procurement according to ADB guidelines will be prepared.
- iii) KPs on the market waste treatment will be disseminated to other communities in Mon and Kayan State by ECD and made available nationwide by MONREC.

Task 2.3. Eco-demonstration project(s) that transform polluted canals to safe waste collection and pedestrian byways. The eco-demonstration project includes design of box culverts; design of pedestrian byway and assessment for wetlands expansion for wastewater polishing and biodiversity preservation. Eventually the transformed canals can deliver wastewater to a treatment system.

- (i) Survey of drainage canals and water quality in Mawlamyine. Design of box culverts for primary discharge canals with the potential to use the canals and initial wastewater collection/interceptors. In addition the new, Mawlamyine box culverts will serve as pedestrian walkways that lead from the waterfront hotels and markets to the historical and religious sites, including the ADB financed renovation of the Yadanar Bon Myint Monastery.
- (ii) Review wastewater treatment options for canal wastewater, including using nearby wetlands or new wetland construction for treatment and polishing. Survey local wetlands and conduct a feasibility study for the potential of upgrading or new wetland construction to treat wastewater. Also, there will be an assessment of wetland effluents from both flood and wastewater flows, and the potential use of wetland overflow for non-food agricultural or forestry.
- (iii) A review and assessment, with ECD, of non-point sources from agriculture and specifically estimate the total phosphorus (P) and nitrogen (N) loading.

Outcome 3: Knowledge Management at National and Regional Level

The project will support the sharing and dissemination of good practice on policy and waste infrastructure investments.

Task 3.1. Environmental monitoring, analysis QA/QC knowledge sharing. Includes the following: upscaling nationally with MONREC; KPs on QA/QC manuals and standard operating procedures prepared, approved by MONREC and distributed; and modeling/GIS, integration across city utilities and KPs disseminated via workshops.

Task 3.2. Knowledge sharing with KPs and workshops on septage design codes, maintenance, collection, treatment. Currently Myanmar lacks design codes and guidelines for septage waste collection, treatment and disposal. The project KPs on these areas will be distributed to appropriate ministries and disseminated through workshops.

Task 3.3. Women-owned groups and NGOs to implement environmental public awareness campaigns. The examples set in Mawlamyine, Hpa-An and Mandalay will be upscaled to other Myanmar cities and showcase how to build the capacity of NGO and CSO in water resources management, climate resilience, environmental management and sustainable integrated urban development.

Task 3.4. Sharing of eco-waste management demonstrations, financing and community participation with BOBLME members. Good practices and models for investments from the IWRM approach will be shared across BOBLME region through: KPs from Components 1, 2 and 3; site visits by BOBLME members (self-financed) or by international lending partners interested in similar investments in BOBLME stakeholders; and annual BOBLME stakeholder meetings financed under the project.

- (i) Regional coordination with the BOBLME networks. Knowledge sharing and networking of BOBLME local governments and related stakeholders with various regional and global 'green cities' and 'sustainable cities' initiatives, through various channels, including the BOBLME program management unit and regional coordination mechanism/consortium. FAO's annual BOBLME coordination meetings and the budget allows for Myanmar representatives to attend. These coordination meetings may also involve investment roundtable meetings to mobilize financial resources for urban infrastructure programs and projects across BOBLME region.
 - a. Upscaling community involvement throughout the BOBLME. KPs and experiences on how communities can work to reduce wastewater and non-point source pollution will be captured and disseminated to other BOBLME stakeholders via the BOBLME website and through meetings and workshops.

b. Benchmarking ambient water quality. Baseline data can be shared across states, Myanmar and with BOBLME stakeholders.

(iii) Demonstrate that DQOs can be met with existing financing; show participation by NGOs and CSOs and promote gender empowerment; have a capacity development and training program for selected stakeholders; recommend national and regional workshops; define coordination with regional and global institutions, such as other BOBLME participants, regional environmental monitoring agencies and global organizations, such as the Global Partnership on Nutrient Management; and dissemination of best practices through KPs and on the IWRM SAPs' websites.

Task 3.5 Mid-term review and Terminal Evaluation Review conducted. Consultants will work with the MONREC, ECDs and other stakeholders in the preparation of both the mid-term and terminal reviews and evaluation – which will follow GEF guidance.

Annexed to this document are: i) terms of reference for key personnel and ii) provisional project work schedule.

Alignment to GEF Focal Area Strategies

The alternative scenario strongly aligns with GEF-6 and specifically with the IW Focal Area Strategy 1: 'Catalyze sustainable management of transboundary water systems by supporting multistate cooperation through foundational capacity building, targeted research and portfolio learning'. GEF's success with supporting LME transboundary cooperation has led to cooperative knowledge sharing, data integration, legal and institutional frameworks, increased capacities, and LME stakeholder agreed actions. Implementing participatory and cross-sectoral transboundary diagnostic analyses and developing SAPs provide the framework for all stakeholders to participate, including strong participation of CSOs, NGOs and women's organizations through local demonstration investments.

The Demonstration Investments in Eco-Waste Infrastructure Solutions: Thanlyin and Ayeyarwady Watersheds supports the larger BOBLME Strategic Action Programme by demonstrating the aforementioned GEF-6 targets with particular focus on the participation of CSOs and women's organizations, which is a unique model for South Asia. Other GEF-6 targets are also addressed and include bringing more science (environmental data and models) to decision making; use of data for benchmarking investments but also monitoring climate variability; and the demonstration involves opportunity for an emerging Myanmar private sector to participate.

Parenthetically this will align with IW 3 Program 5, 'Reduce Nutrient Pollution Causing Ocean Hypoxia', is also Objective 3 in GEF-7 and is the primary focus of the GEF investment. ADB's investment(s) in wastewater, septage waste, industrial waste and water systems will reduce nutrients entering the Ayeyarwady River and the BOBLME. The GEF investment creates a framework to make the investments more participatory, sustainable and resilient. Public-private partnerships, CSOs, women's organizations and students participating in the Thanlyin and Ayeyarwady Watersheds Eco-Waste Infrastructure Solutions help drive better results, build capacity and ultimately, growth and sustainability of the program.

In summary, the GEF Project supports the 'source to sea continuum' control model that seeks to reduce pollutant flows in catchments draining into sensitive coastal environments and flows of waste in river basins that ultimately reach the open ocean.

Meeting Environmental and Social Safeguards

Overall supervision of GEF funds is subject to ADB due diligence and safeguards system and all environmental and social safeguards will be ensured through this system. GEF funds are used to provide associated technical support and capacity development to the baseline. The following is a summary of the ADB environmental and social safeguards as they relate to the project.

- (i) No sub-project ranked as category A for environment, involuntary settlement or indigenous people will be supported. All sub-projects will be category B or C.
- (ii) The ADB Safeguard Policy Statement (2009) applies and includes a Program Safeguard Systems Assessment to identify gaps and weaknesses; and a Program Action Plan to determine the steps to be taken in order to fill the gaps.
- (iii) All components are category B or C where potential adverse impacts, if any, are site-specific, few, and will be reversible, and mitigation measures can be readily designed. During GMS3 implementation, an initial environmental examination will be prepared for each subproject, which will include an EMP that is updated during detailed design and procurement.
- (iv) For involuntary resettlement, category B or C means that, at most, subprojects are expected to have minimal involuntary resettlement impacts on a small number of households. The GEF administered funds will not be involved in the parts of the project related to resettlement. For each baseline Category B subproject, a resettlement plan will be prepared based on an assessment of impacts and consultations with affected persons. Affected people and local stakeholders will be consulted and provided with relevant information. The subproject's involuntary resettlement impacts are assessed, and remedial measures are presented in a resettlement plan.

To ensure compliance with the GEF Agency Minimum Standards on Environmental and Social Safeguards updated on 19 February 2019, the following processes will be included in project implementation: (i) the hiring of an Environmental and Social Safeguards specialist to prepare an Environmental and Social Management Plan for the project, oversee and ensure compliance with environmental and social safeguards requirements, and monitor, evaluate and report against environmental and social management plan indicators; (ii) preparation, evaluation and approval project activities, workplan and budgets taking into account safeguard regulations; and (iii) regular and timely monitoring of and reporting on risk mitigation measures/safeguards.

A.1.4. Incremental cost/additional cost reasoning and expected contributions from the baseline, from the GEF, from LDCF and co-financing

In-situ flora and fauna biodiversity will be recorded and studied (not defined in the project, but a core task for all 3 ECDs in the project).

ADB's current GMS3 loan will serve as baseline project funding, providing around \$ 80 million in co-financing. Additional co-financing is now under consideration but not confirmed at this time. The contributions from the baseline include the current septage collection, planning for industrial waste and the sewage collection network and wastewater treatment. Contributions from GEF provide additionality with additional pollution reduced from entering the rivers and the BOB; providing the enabling conditions for sustainability, community involvement; and upscaling per the project outcomes/outputs below:

- (i) Mawlamyine, Hpa-An and Mandalay IWRM SAPs. GEF contribution in addition to the baseline to develop the IWRM SAPs (Output 1) and the enabling conditions to ensure a cross department, integrated database that will lead to further and sustained pollution reduction (Outcome 1. Pollution to the Thanlwin River, Ayeyarwady River and Bay of Bengal reduced).
- (ii) Septic tank waste management. GEF contribution in addition to the baseline will reduce pollution loading and specifically targets capacity for urban service and regular emptying of septic tanks. Currently the biophilic landfill under the ADB GMS3 project lacks sufficient water for compaction prior to methane extraction and the additional septage waste will enable the process. Also the project includes environmental monitoring by CSOs, NGOs and student participation investments that not provided for in the baseline (Outputs 1, 2 and 3).
- (iii) IWRM and pollution control KPs. GEF contribution to knowledge sharing (Output 3) targets upscaling the demonstration in Myanmar and allows knowledge sharing with the other BOBLME stakeholders through web-based sharing and annual BOBLME meetings/workshops.

A.1.5. Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

The global environmental benefits include a reduction in organic and inorganic nutrient pollution that causes ocean hypoxia and impacts marine life (GEFTF) from reductions in effluents entering both the Thanlwin and Ayeyarwady Rivers. Septage collection from domestic and market sources in Mawlamyine and Hpa-An includes: 150,000 kg/yr of BOD removed; 34,000 kg/yr of N removed; 3,000 kg/yr of P removed (the future MUSIP2 project is estimated to remove an additional 50,000 kg BOD/yr from entering the Ayeyarwady River). Currently the biophilic landfill under the ADB GMS3 project lacks sufficient water for compaction prior to methane extraction and the additional septage waste will enable the process. Thus, the septage waste is being used for its water content while still providing digestion and disinfection (by temperature) of the fecal sludge. Indirect benefits, in addition to the baseline, will reduce pollution loading and specifically targets designs for box culverts in Mawlamyine's and Hpa-An's waste canals that will eventually be collection systems for wastewater treatment. Defining the process for regulating industrial pollution will result in future limiting high concentration of COD in wastewaters from entering the BOB. By 2025, methane will be collected from the landfill and will partially result from the fecal sludge resulting in carbon dioxide equivalent savings (to be estimated during the project). Also, the project includes environmental monitoring by CSOs, NGOs and student participation investments that are not provided for in the baseline (Outputs 1, 2 and 3).

IWRM and pollution control KPs. GEF contribution to knowledge sharing (Output 3) targets upscaling the demonstration in Myanmar and allows knowledge sharing with the other BOBLME stakeholders through web-based sharing and annual BOBLME meetings/workshops.

Performance indicators for Output 1 (Pollution to the Thanlwin and Ayeyarwady Rivers and to the BOB reduced) are:

- (i) Septic tanks in phase 1 in Mawlamyine and Hpa-An regularly emptied into biophilic landfill, 120 m³/d (Baseline: 85,000 m³/d);
- (ii) 8 markets provide with wastewater collection and treatment, 240 m³/d (Baseline: 480 m³/d);
- (iii) Industrial pollution monitoring program identified and implemented; permitting and enforcement program recommendations provided;

- (iv) Mawlamyine and Hpa-An waste canals redesigned with box culverts to control domestic pollution; and
- (v) Mandalay wastewater collection and treatment, 18,000 m³/d (Baseline: 92,000 m³/d, 2014); direct discharge of wastewater to receiving waters reduced to 25,000 m³/d (Baseline: 85,000 m³/d, 2014).

The outcome is achieved by demonstrating eco-waste infrastructure solutions that can be upscaled in Myanmar and throughout the BOBLME. Other benefits from the project that are not tracked using the indicators include: (i) adaptation benefits, such as reduced flooding, river resiliency, ground water recharge and planted open spaces; (ii) mitigation, greenhouse gas emission benefits from the project (LDCF/SCCF), include planting a minimum of 10,000 trees; minimum of 120 large, solar LED street lights and use of compost for fertilizer (reduces methane); (iii) social and community benefits (see the stakeholder and gender action plans).

A.1.6. Innovativeness, sustainability and potential for scaling up

Innovation

The project demonstrates several innovations that include developing an IWRM SAPs for 3 cities on key watersheds that will guide the implementation of the soon-to-be promulgated water quality standards. The IWRM approach provides a cross cutting, integrated framework to manage water data across all departments that will result in science-based decision making as Myanmar develops their nascent environmental and pollution management system.

Another innovation is not only the joint involvement of the environmental agency (ECD) and the city engineering departments, as well as community service and women organizations, in pollution control and raising environmental awareness. The latter is a key feature and is highlighted in the items to be scaled-up below.

Sustainability

Sustainability is addressed in several levels and includes building local capacity to develop and implement the IWRM SAPs. The investment provides the tools needed to monitor and analyze ambient conditions and pollution discharges. The database system allows all stakeholders access and the ability to adapt to changing conditions as the cities continue to grow.

Each component builds individual capacity and the institutional mechanisms to ensure continuous use beyond the GEF and ADB project funding. Programs developed to train ECD, NGO CSO and women-owned organizations can be replicated and catalyze further capacity at each organization.

Linkages between Components 1, 2 and 3 are designed to create momentum and the capacity as well as incentives for sustained work after GEF support. The success of the components will compel city governments to further expand their sewage collection and treatment network; to control industrial pollution discharges; and to address non-point source pollution.

Potential for scaling up

The demonstration is designed for scaling up throughout Myanmar and to share with other BOBLME stakeholders. As mentioned above, the demonstration is to develop local demand for the expansion of pollution control in Mandalay. Done successfully, the project will encourage other Myanmar mayors to address their cities' pollution and water quality issues.

Providing the necessary training and operation manuals to the ECDs and MONREC at a critical moment in implementing the new Myanmar water quality standards can be upscaled to other ECDs throughout Myanmar.

Also, the project has a unique approach involving CSOs, NGOs, students, and women-owned organizations in environmental monitoring, pollution control and urban ecosystem services provides a platform to expand the demonstration elsewhere in Myanmar and share the experience with other BOBLE stakeholders.

[1] BOBLME. 2015. *Strategic Action Programme. Bay of Bengal Large Marine Ecosystem*. <https://www.boblme.org/documentRepository/BOBLME%20SAP-Final.pdf>

[2] D. Webster. 2019. China's Overbuilt Infrastructure Presentation, Arizona State University.

[3] Adapted from the ADB Project Preparation Technical Assistance, Report and Recommendations to the President and GEF Project Concept Note.

[4] ADB. 2013. *Project Preparatory Technical Assistance Report: Proposed loan to Myanmar for the Mandalay Urban Services Improvement Project*. Manila.

[5] For biodiversity projects, in addition to explaining the project's consistency with the biodiversity focal area strategy, objectives and programs, please also describe which Aichi targets the project will directly contribute to achieving.

[6] <https://www.livablecities.info/yangon-urban-resilient>

[7] ADB. 2011. *The Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2012–2022*. Manila.

[8] ADB. 2013. *Greater Mekong Subregion Economic Cooperation Program: Overview of the GMS Regional Investment Framework (2013–2022)*. Manila.

[9] Government of Myanmar. 2016. *Economic Policy of the Union of Myanmar*. Nay Pyi Taw.

[10] ADB. 2017. *Country Partnership Strategy: Myanmar, 2017–2021: Building the Foundations for Inclusive Growth*. Manila.

[11] For biodiversity projects, in addition to explaining the project's consistency with the biodiversity focal area strategy, objectives and programs, please also describe which Aichi targets the project will directly contribute to achieving.

[12] “Biophilia” refers to designing of construction projects with nature. <https://grow-media.co.uk/grow-talk/biophilic-design-future-construction-environment/>

[13] Interview with U Aung Aung Lay, Director, Mawlamyine ECD in November 2019.

[14] Interview with U Keji Thar Hlaing, State Officer, Hpa-An ECD in November 2019.

A.2. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

Table 1 below highlights the project components, the outcomes/outputs and how they contribute to the overall program impact.

Table 1: How the GEF Child Project Contributes to the Overall Program Impact

Program Component	Outcomes and Outputs	Comments
<p>1. IWRM SAPs for Mawlamyine, Hpa-An and Mandalay</p>	<p>Outcome 1. Pollution to the Ayeyarwady River and BOB reduced</p> <p>Output 1: IWRM SAPs</p> <p>1.1. Water resources management and climate resilience integrated with urban utilities through inter-sectoral, IWRM SAPs (3 cities)</p> <p>1.2. Methodology for QA/QC</p> <p>1.3. Enhancement of existing GIS for inter-sectoral water quality data sharing/planning</p> <p>1.4. Upgrading the ECDs' water quality monitoring, analysis and modeling capacity</p> <p>1.5. Enhancing ECD's industrial and non-point pollution monitoring capabilities; recommendations for treatment, incentives and enforcement framework</p> <p>1.6. Environmental education, internships and local CSO, NGO and women owned organization environmental capacity building</p>	<p>Outcome 1 aligns with IW 3, Program 5, is the overall goal of the project; Component 1 provides a framework for collecting and sharing pollution and ambient data needed for decision making.</p> <p>IWRM SAP will institutionalize the system for cross department use and access.</p>

<p>2. Septage (domestic) waste identification, management, collection and treatment in coastal cities of Mawlamyine and Hpa-An</p>	<p>Outcome 1. Pollution to the Ayeyarwady River and reduced</p> <p>Output 2. FSM in Mawlamyine and Hpa-An</p> <p>2.1. Survey(s) of septic tanks, building tanks, markets and drainage canals; septic tank data entered into the city GIS</p> <p>2..2 Demonstration investments in ecosystems services in Mawlamyine and Hpa-An that will result in reduced domestic pollution loads to the Thanlwin, Ayeyarwady Rivers and to the BOB</p>	<p>Component 2 also aligns with IW 3, Program 5, and enhances the ADB investment to restore a now polluted rivers and Bay of Bengal.</p>
<p>3. Knowledge sharing events with other Myanmar cities, government and with BOBLME members</p>	<p>Output 3: KPs from the project upscaled throughout Myanmar and regional with BOBLME members</p> <p>3.1. Environmental monitoring, analysis QA/QC (3 cities), upscaled nationally with MONREC, modeling/GIS and integration across city utilities and KP dissemination via workshops</p> <p>3.2. Knowledge sharing with KPs and workshops on septage design codes, maintenance, collection, treatment</p> <p>3.3. Women-owned groups and NGOs to implement environmental public awareness campaigns; and upscale to other Myanmar cities</p> <p>3.4. Sharing of eco-services demonstrations, financing and community participation with BOBLME members through yearly cooperation meetings, baseline monitoring data shared; participation in wastewater (septage) and water benchmarking global database and the Global Partnership on Nutrient</p>	<p>This component allows the demonstration activities to gain a wider audience in Myanmar and with the BOBLME stakeholders.</p>

A.3. Stakeholders

Please provide the Stakeholder Engagement Plan or equivalent assessment.

Effective stakeholder engagement is a key element to the attainment of project objectives and the sustainability of results. In accordance with ADB guidelines, a comprehensive stakeholder analysis was undertaken in a participatory manner. Table 2 summarizes key stakeholders and their roles and responsibilities during project implementation.

Table 2: Stakeholder Engagement Plan

Organization	Role in the Project
A. National and Sub-National Governments	
MONREC	Chair of Project Steering Committee member <ul style="list-style-type: none">· Oversee and supervise project activities· Review and approve long term plans, annual workplans and procurement plan· Ensure compliance of project implementation with ADB and GEF policies on safeguards, gender, procurement etc.

ECDs – Mawlamyine, Hpa-An and Mandalay

Project Steering Committee member and implementing agency.

- Coordinate and monitor project activities
- With support the project team, prepare the inception report with incorporate comments from stakeholders
- Review and approve procurement documents and contract awards
- With assistance from an international consultant, advertise and procure goods and services
- Establish a robust financial management system, submit timely financial reports, conduct regular financial audits and carry out recommended action
- Supervise progress reporting on project implementation by the project management office to the executing agency
- Supervise the smooth transition and transfer of project facilities and equipment at the end of the project

Implementation partner for Components 1 and 2

- Monitor water quality, analysis and modeling
- Monitor industrial and non-point pollution; review and assess non-point sources from agriculture
- Supervise high school internship program for short term environment projects; engage undergraduate and graduate students with water quality sampling, analysis, modelling and explore potential thesis projects
- Validate effluent water quality of the ‘average’ septic tank in Mawlamyine and Hpa-An

B. International Agencies

ADB	<p>General financial and administrative oversight and technical direction.</p> <p>Observer status on PSC.</p> <p>Manage and supervise procurement processes and delivery of outputs</p>
FAO	<p>GEF agency for the PFD</p> <p>General collaboration on BOBLME platform, joint reporting, data and knowledge sharing</p>
Global Partnership on Nutrient Management	Information sharing and conduct training on regional environmental monitoring
USAID and JICA	Information sharing on waste management strategy project to inform and improve donor coordination
World Bank	Information sharing and conduct training on wastewater company performance benchmarking
C. Non-Government and Civil Service Organizations	
Civic Engagement Network	Liaise with their CSO network members to encourage participation in educational campaigns, training, capacity building, and other project events
Gender Equality Network	Information sharing on water and sanitation services improvement project in Amarapura to inform and input to Component 3 and improve donor coordination
Kayin Women Organization	Liaise with communities in Hpa-An to encourage participation in educational campaigns, training, capacity building, and other project events
Konhongsar	Liaise with communities to encourage participation in educational campaigns, training, capacity building, and other project events
Mandalay Region Committee on Women	Liaise with communities in Mandalay to encourage participation in educational campaigns, training, capacity building, and other project events
Melinda and Bill Gates Foundation	Information sharing on fecal sludge project to inform and input to Component 2 and improve donor coordination

Mon Women Organization	Liaise with communities in Mawlamyine to encourage participation in educational campaigns, training, capacity building, and other project events
Mon Youth Educator Organization	Liaise with communities in Mawlamyine to encourage participation in educational campaigns, training, capacity building, and other project events
Mon Youth Progressive Organization	Liaise with communities in Mawlamyine to encourage participation in educational campaigns, training, capacity building, and other project events
Myanmar Alliance for Transparency and Accountability and Myanmar China Pipeline Watch Consortium	Liaise with their CSO network members to encourage participation in educational campaigns, training, capacity building, and other project events
Vitens Evides International	Information sharing on WaterWorX project Donor coordination on ongoing water-related initiatives in Mandalay
Women Empowerment Project	Liaise with communities to encourage participation in educational campaigns, training, capacity building, and other project events
Academic Institutions	
Hpa-An Technology University; Mandalay Technological University	Implementation partner for Component 1 <ul style="list-style-type: none"> · Conduct graduate student research · Support for monitoring ecosystem health, citizen science, water quality observations and water use efficiency · Curricula development on environmental testing and sanitation and wastewater management. · Record and study in-situ flora and fauna biodiversity

Documents

Title

Submitted

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement.

See Table 2: Stakeholder Engagement Plan

Select what role civil society will play in the project:

Consulted only;

Member of Advisory Body; Contractor;

Co-financier;

Member of project steering committee or equivalent decision-making body;

Executor or co-executor;

Other (Please explain)

See Table 2: Stakeholder Engagement Plan

A.4. Gender Equality and Women's Empowerment

Please briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

A Gender Action Plan (GAP) for the project has been prepared and is shown in Annex G. The GAP will be reviewed by the project team during the inception phase and will be incorporated into the workplan.

Documents

Title

Submitted

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?

Yes

If yes, please upload document or equivalent here

See attached Gender Action Plan (GAP)

If possible, indicate in which results area(s) the project is expected to contribute to gender equality:

Closing gender gaps in access to and control over natural resources; Yes

Improving women's participation and decision making Yes

Generating socio-economic benefits or services or women No

Will the project's results framework or logical framework include gender-sensitive indicators?

TBD

To confirmed during inception.

A.5. Risks

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being, achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.

Table 3 highlights project risks and measures to avoid/mitigate those risks.

Table 3: Risks and Mitigation Measures

Project and Component Risks	Impact Probability (scale 1 to 5)	Mitigation Measures
Project: EA slow with procurement and payment	I-3, P-2	Regular communication with the EA and IA can avert implementation issues; ADB's Resident Mission in Nay Pyi Taw assists with borrower contact, issues and capacity development. The latter is a key issue in Myanmar and assistance with preparing procurement documents, capacity building and assistance with evaluation are essential.
Project: Changes in river and ground water flows changes the hydrology	I-4, P-1	Climate and hydrology changes are difficult to predict. Engineering designs need to take into consideration in the project designs changing hydrology and flows.
Project: Institutional capacity	I-3, P-2	Capacity to deliver the project outcomes is always an issue but this is actually a major goal of the project to develop the sustainable capacity to deliver the ecosystem services; there is sufficient budget for capacity development.
Component 1: IWRM SAPs are not implemented in Mawlamyine, Hpa-An or Mandalay	I-3, P-2	ADB monitors consultant progress on IWRM SAPs and assists with presenting/implementing across city departments.
Component 2: FSM cost overruns prevent project completion	I-4, P-2	ADB monitors project progress; reviews procurement plan; assists with bidding—all projects are bid and procured according to ADB procurement rules.
Component 3: Knowledge is not shared or disseminated	I-2, P-3	ADB, ECDs and project consultants need to promote the project results at forums, meetings and KP distribution.

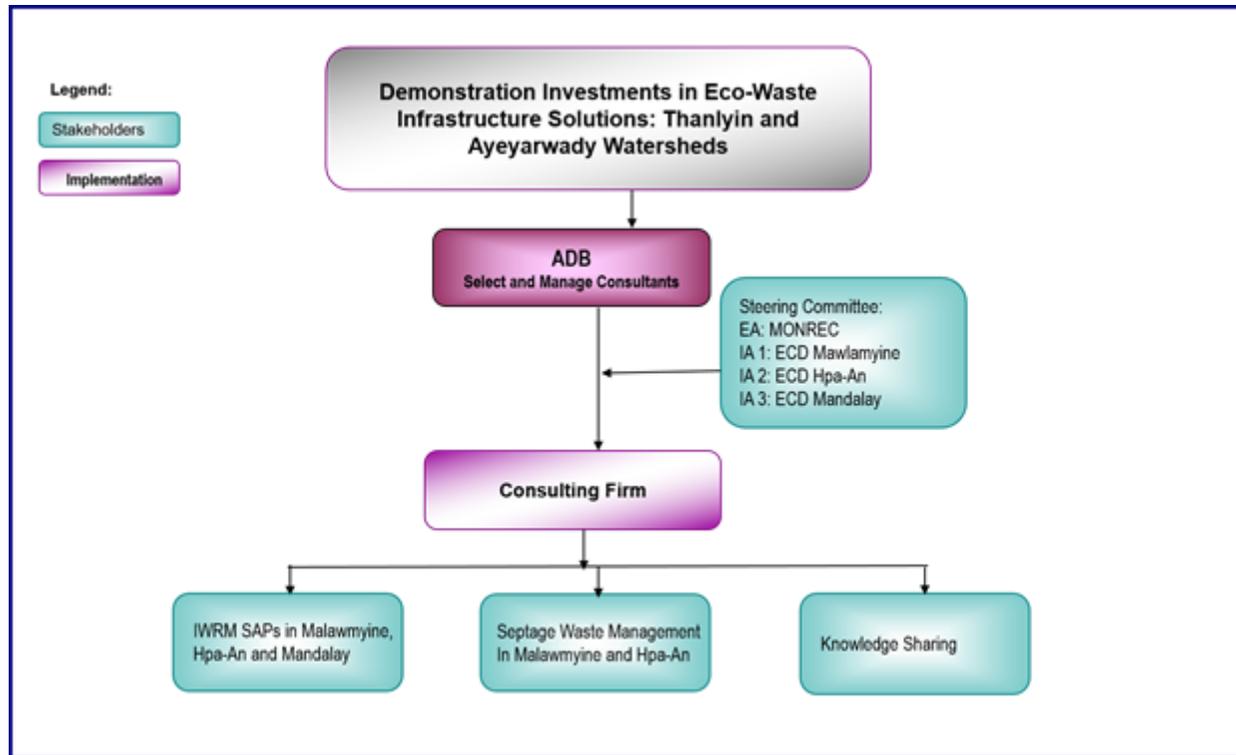
A.6. Institutional Arrangement and Coordination

Describe the Institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

The Executing Agency for the ADB baseline project is the Myanmar Ministry of Construction (and within this the Department of Housing and Urban Development). On ground implementation for Components 1 and 3 are Mawlamyine, Hpa-An and Mandalay ECDs (under MONREC); and for Component 2 are Mawlamyine City Development Corporation, Hpa-An City Development Corporation.

For the GEF co-financing, MONREC, in particular the ECD will be the main agency for on ground implementation, given their mandate. Figure 2 (above) shows the MONREC and ECD organization. Figure 6 below shows the organizational structure of the project.

Figure 6: GEF Project Implementation



Additional Information not well elaborated at PIF Stage:

A.7. Benefits

Describe the socioeconomic benefits to be delivered by the project at the national and local levels. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptaion benefits (LDCF/SCCF)?

Socio-economic co-benefits are numerous and contained in each output of the project. The following are benefits from the GEF contribution:

- (i) Reducing the pollution load (domestic and industrial wastewater) to the Thanlwin and Ayeyarwady Rivers decreases exposure to potential harmful pathogens and toxic chemicals reduce the human health exposure and in particular, benefits the more vulnerable, poorer residents;
- (ii) Provides science-based data that defines the baseline conditions and allows decision makers and stakeholders to make better decisions about improving the urban environment;
- (iii) Provides ecosystem services that involves/includes CSOs, NGOs, communities, women organizations and students;
- (iv) Educates the public on the Government's new, ambient water quality standards;
- (v) Provides investment in water quality improvement and by showing success creates demand for further investment;
- (vi) Facilitates growth in an urban centre, increasing the land-capture value, stimulating economic activity, reducing congestion (pedestrian byway), cultural heritage (notably increased tourism); and
- (vii) Provides a more pleasant, safer and more secure urban environment, especially for pedestrians and vulnerable groups.

In particular, the project will deliver co-benefits to lower income residents, women and vulnerable groups that suffer disproportionately from inadequate access to water, sanitation and drainage (flood-prone areas).

Estimates of the impact of lack of access to water and sanitation are not available for the project cities, but Asian regional studies suggest that the adverse effects of poor water quality can have an economic cost of 2% of gross domestic product. These initiatives aimed at improving Mandalay's water quality deliver significant dividends in terms of public health, access to clean water and upscaling the experience to other Myanmar cities.

A.8. Knowledge Management

Elaborate on the Knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives (e.g. participate in trainings, conferences, stakeholder exchanges, virtual networks, project twinning) and plans for the project to assess and document in a user-friendly form (e.g. lessons learned briefs, engaging websites, guidebooks based on experience) and share these experiences and expertise (e.g. participate in community of practices, organize seminars, trainings and conferences) with relevant stakeholders.

KM is a key cross-cutting tool in the project to build the capacity of project stakeholders to collect, analyze, store, and utilize information; stimulate and increase awareness and understanding on environmental management and enhancement; and facilitate the flow and sharing of knowledge among project stakeholders, beneficiaries and decision makers within the project sites, the national level, and the wider regional scope covering the BOBLME to improve stakeholder engagement and collaboration and ultimately, advance the achievement of project objectives.

Significant resources have been allocated to monitoring, data collection, report writing, documentation and publications. Considerable amount of KM, training and KPs woven into this project. Training of ECD staff to collect and analyze routine ambient water and pollution discharge samples; and enter data into the GIS database and run models will significantly increase their technical knowledge of the local environment for the benefit of the communities and as leverage for fostering strategic partnerships. The IWRM GIS will be developed as a shared database city-wide and across all departments to promote the sharing of information within MONREC ECDs and the coordinated transfer of data from field operations to the district, regional offices and the central office in Nay Pyi Taw. Training programs and workshops on the use of the common database will also build capacity and help to work out weaknesses in the system.

The project will also involve participatory approaches, such as awareness raising campaigns involving women's organizations, CSOs and NGOs that have strong relationship with the communities and an internship/mentorship program with local high school, undergraduate and graduate students and ECDs.

KPs will be prepared and shared across city departments; national ECD and other relevant national agencies. KPs will be linked with the broader FAO BOBLME Strategic Action Programme and shared with BOBLME stakeholders at annual meetings, through the BOBLME website and via the The International Benchmarking Network for Water and

Sanitation Utilities activities (which may offer twinning opportunities). Site tours in Myanmar and to similar restoration projects in Asia will broaden the demonstration project's exposure.

ADB is committed to ensuring that all knowledge generated by the project and all lessons learnt will be disseminated in an appropriate manner, through the ADB networks and partner organizations. Towards this end, a KM plan will be prepared at the beginning of the project to serve as roadmap for communications and outreach-related activities. The KM plan will be reviewed annually and revised accordingly.

A KM specialist will be hired as part of the project management team with the central role of preparing the KM plan; managing and coordinating all communications and outreach-related project activities across stakeholders to ensure the effective implementation; conducting KM training to project staff and implementing partners to familiarize them with KM protocols and processes; and monitoring, evaluating and reporting on the progress of the KM plan as input to the regular review requirements of the project. The specialist will work closely with the social safeguards and gender specialist to ensure that all KM activities follow the GAP to ensure gender mainstreaming, including accessibility of and benefit to both sexes of knowledge generated and disseminated. Implementation of and reporting on the KM plan will be the responsibility of the EA and IAs.

With focus on knowledge generation and sharing as a driver of change in addressing the priority development challenge of water pollution in the pilot areas, Myanmar at the national level and the BOB the regional level; strengthening the knowledge capacity in Myanmar and BOB for development effectiveness; building and enhancing communications and information resources and systems; and involving communities, government, the academia, development partners, and decisionmakers in the planning, monitoring and implementation of knowledge solutions, KM initiatives set out in the project align well with ADB and GEF KM approaches to ensure effective and sustainable impacts.

B. Description of the consistency of the project with:

B.1. Consistency with National Priorities

Describe the consistency of the project with nation strategies and plans or reports and assessments under relevant conventions such as NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

The project is consistent with Myanmar's environmental ecosystem services and regulatory development. Table 4 lists relevant laws, regulations, national strategies and plans as they relate to the GEF project.

Table 4: Consistency of the Project with Myanmar National Priorities

Relevant Laws and Initiatives	Description of Relevant Portions	Relevance to the Project
National Environmental Policy of Myanmar (2019)	<p>(7) Environmental service provisioning (including waste management, wastewater treatment, drinking water purification, ambient air and water quality monitoring and management) will be included as necessary parts of infrastructure planning and development for urban and human settlement areas, with resource efficient and zero waste approaches used.</p> <p>(15) Institutional and legal frameworks for implementing and enforcing environmental laws and policies will be strengthened through clear definition of rights and responsibilities, and greater collaboration among different institutions within the government at all levels, as well as with non-government stakeholders.</p> <p>(17) Environmental decision making at all levels will be inclusive, transparent and accountable to relevant stakeholders, with communities and citizens having the right to participate in decision making processes and access information that could affect their lives and property.</p> <p>(18) Gender equality and the empowerment of women and girls will be integrated into all aspects of environmental protection and management.</p> <p>(19) Environmental education, public awareness raising, and quality research will be promoted to enhance respect for the country’s environmental values, understanding of environmental challenges, and commitment to environmental conservation and sustainable development.</p>	<p>The GEF project is consistent with:</p> <p>(7) Addressing wastewater management and zero waste approaches</p> <p>(15) IWRM follows the policy intent to integrate urban data with all stakeholders; develops framework for enforcing environmental regulations</p> <p>(17) Develops transparent database for community use</p> <p>(18) Gender is enhanced in all project components</p> <p>(19) Training, education and community involvement all designed to raise public awareness</p>
Myanmar Climate Change Policy (2019)	Monitor, evaluate and report the implementation and progress towards achieving the purpose of this Policy and strengthen the capacities of all stakeholders in this regard.	The GEF project allows collection and sharing of baseline environmental data that includes climate data

Myanmar Sustainable Development Plan (2018–2030)	<p>Pillar 3: People & Planet; Goal 5: Natural Resources & the Environment for Prosperity of the Nation</p> <p>Strategy 5.1: Ensure a clean environment together with healthy and functioning ecosystems</p> <p>Strategy 5.2: Increase climate change resilience, reduce exposure to disasters and shocks while protecting livelihoods, and facilitate a shift to a low-carbon growth pathway.</p> <p>Strategy 5.3: Enable safe and equitable access to water and sanitation in ways that ensure environmental sustainability</p>	The GEF project aligns with reduces exposure to disasters (floods) and enabling access to water and sanitation.
Environmental Conservation Law 2012	To implement the National Environmental Policy; to set up basic principles and guidelines for sustainable development and systematic integration of environmental conservation; to conserve the clean environment, natural and cultural heritage for present and future generation, to prevent degradation of natural resources and for sustainable use, to build up public understanding on environmental awareness.	The GEF project assists with development environmental guidelines; environmental education; and promotes cultural heritage
Myanmar Environmental Conservation Rules 2014	The Rules reinforce the obligation for project developers to submit an EIA or an initial environmental examination. It aims to establish and adopt the necessary programs for the conservation and enhancement of environment, protection, control and reduction of pollution in environment, and conservation.	The GEF eco-demonstration projects including pollution control and wetland use for wastewater treatment will likely be incorporated in Myanmar's EIA process.

C. Describe The Budgeted M & E Plan:

At a project level, monitoring and evaluation will follow both ADB and GEF guidance. The GEF project results framework (see Annex A) is aligned with similar indicators so monitoring and reporting on the PRF generally follows the loan project. Monitoring the PRF will be undertaken by the Government, ADB TA consultants and review missions, and in line with ADB procedures. Table 5 lists the monitoring mechanisms and identifies that the reporting does not add significant cost.

Table 5. Project Monitoring and Evaluation

ADB Monitoring Activity	Addition or Modification for GEF Components	Additional costs (\$)	Time Frame
<p>Project performance monitoring. Before each ADB Program Administration Mission (2 to 4 times per year), EA prepares submits quarterly progress report</p> <p>EA also prepares Annual Program Report on oversight and monitoring, per the project action plan (PAP).</p>	No addition or modification required.	0	Ongoing
<p>Compliance monitoring and safeguards monitoring</p> <p>Covered by PAP monitoring</p>	No addition or modification required.	0.	Ongoing
<p>Gender and social dimensions monitoring</p> <p>Covered by PAP monitoring</p>	No addition or modification required	0	Ongoing

<p>Reviews and Evaluation</p> <p>1. Quarterly</p> <p>2. Annually</p> <p>3. Project completion report</p>	<p>1, In addition, the annual project implementation review is to be prepared in line with GEF requirements No addition or modification required.</p> <p>2. As appropriate, a mid-term review of GEF funded activities may be prepared and reported upon separately.</p> <p>3. Final evaluation: final review of GEF funded activities may be prepared and reported upon separately.</p>	<p>0</p> <p>20,000</p> <p>35,000</p>	<p>1. Ongoing</p> <p>2. 30 months</p> <p>3. After 54 months</p>
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PART III: Certification by GEF partner agency(ies)

A. GEF Agency(ies) certification

GEF Agency Coordinator	Date	Project Contact Person	Telephone	Email
Bruce Dunn, Director, Safeguards Division, OIC Environment Thematic Group and ADB/GEF Executive Coordinator	12/3/2019	Antonio Ressano-Garcia, Senior Urban Specialist	63286324444	aressano@adb.org

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

Impact the Project is Aligned with: Organic and inorganic loading to the Thanlwin and Ayeyarwady Rivers reduced, urban environment improved, and National Water Quality Standards implemented (Comprehensive Development Plan, 2016–2021; Myanmar National Water Quality Standards, expected 2020) ¹			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
<p>Outcomes:</p> <p>1. Pollution to the Thanlwin and Ayeyarwady Rivers and to Bay of Bengal reduced</p>	<p>By 2028:</p> <p>a. Domestic septage management in Mawlamyine and Hpa-An regularly emptied, 170 cubic meters per day (m³/d) and 120,000 kilograms of biochemical oxygen demand per year (kg BOD/yr) (baseline 85,000 m³/d)²</p> <p>b. Wastewater at eight (8) public markets in Mawlamyine and Hpa-An reduced at rate of, 240 m³/d and 40,000 kg BOD/yr (baseline 480 m³/d)</p> <p>c. Domestic pollution control implemented in Mawlamyine and Hpa-An waste canals through box culverts</p> <p>d. Mandalay wastewater collection and treatment, 18,000 m³/d (baseline 92,000 m³/d, 2014); direct discharge of wastewater to receiving waters reduced to 25,000 m³/d (baseline 85,000 m³/d, 2014)</p> <p>e. Industrial pollution monitoring program institutionalized in Ministry of Natural Resources and Environmental Conservation and other stakeholder agencies at national level</p>	<p>Annual reports</p> <p>Terminal Evaluation Report</p>	<p>Environmental Conservation Department (ECD) and other stakeholders do not sufficiently integrate data into a transparent integrated water resources management (IWRM) framework</p>

<p>Outputs</p> <p>1. Three city-level IWRM Strategic Action Plans (SAPs)</p>	<p>By 2024:</p> <ul style="list-style-type: none"> a. IWRM SAP completed for project areas b. ECD monitoring and technical capacity upgraded for three (3) project cities c. Septage monitoring, collection and treatment alternatives identified and costed in Mawlamyine and Hpa-An d. Industrial waste manifest, permitting and treatment options examined in three (3) cities; with environment management plans demonstrated (replicated) in Mawlamyine and Hpa-An, based on the Mandalay model e. Water quality monitoring stations established; and point discharges monitored in three (3) project cities f. At least 50 civil service and non-government organizations' staff trained (national) g. Internship program with ECD for at least 20 university students implemented h. Awareness creation programs on socioeconomic and health benefits of waste management conducted 	<p>Quarterly reports</p>	<p>ECD staff does not have sufficient knowledge and experience in implementing externally funded projects</p>
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<p>2. Domestic septage management investments for cities of Mawlamyine and Hpa-An</p>	<p>By 2024:</p> <ul style="list-style-type: none"> a. Septic tanks under City Phase 1 plans for Mawlamyine and Hpa-An regularly emptied into biophilic landfill b. Wastewater collection and treatment facilities installed in eight (8) public markets in Mawlamyine and Hpa-An c. Industrial pollution monitoring and enforcement program developed and implemented by ECD d. Box culverts designed to upgrade Mawlamyine and Hpa-An waste canals; and alternatives for use and preservations of wetlands by using for wastewater polishing 	<p>Quarterly reports</p>	<p>City staff does not have sufficient knowledge and experience in implementing externally funded projects</p>
<p>3. Knowledge sharing at national and regional (Bay of Bengal Large Marine Ecosystem) levels supported</p>	<p>By 2024:</p> <ul style="list-style-type: none"> a. At least 2 orientation / training workshops on environmental monitoring, analysis QA/QC, and integration with cities utilities modeling and GIS b. At least two (2) national workshops on eco-waste management infrastructure conducted in Myanmar c. At least three (3) knowledge products developed on basin level waste management systems d. At least one (1) regional conference on investment opportunities to improve river basin water quality management 	<p>Annual report; end of project survey</p>	<p>ECD and city staff does not have sufficient knowledge and experience in implementing externally funded projects</p>

1 Ministry of National Planning and Economic Development. 2015. National Comprehensive Development Plan, First Five-Year Plan & Nay Pyi Taw Accord. Nay Pyi Taw. (Presentation).

2 Mawlamyine and Hpa-An have 70% septic tank coverage, assume emptying every 4 years, 5 m3.

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Not applicable.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS.

A. Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF:			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent Todate</i>	<i>Amount Committed</i>
Consultants	95,700	37,921	81,886
Travel	11,600	4,732	12,814
Reports and Communications	1,000		
Misc. Administrative and Support Cost	2,000		
Trainings Seminars and Conferences	4,000		
Contingencies	2,360		

Total	116,660	42,653	94,700
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ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/CBIT Trust Funds or to your Agency (and/or revolving fund that will be set up)

Not applicable.

ANNEX E: GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, Table G to the extent applicable to your proposed project. Progress in programming against these targets for the program will be aggregated and reported at any time during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

This is a GEF 6 project. Please refer to the estimates on BOD reductions in the attached worksheet.

ANNEX: Project Taxonomy Worksheet

Use this Worksheet to list down the taxonomic information required under Part1 by ticking the most relevant keywords/topics//themes that best describes the project

This is a GEF 6 project.



Submitted to GEF Secretariat Review

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