

LABUTTA

TOWNSHIP ENVIRONMENTAL ASSESSMENT

2017

MYANMAR ENVIRONMENT INSTITUTE



**This report has been prepared by Myanmar Environment Institute
as part of BRACED Myanmar Consortium(2015-2017)**

Abbreviation and Acronyms

BRACED	Building Resilience and Adaptation to Climate Extremes and Disasters
CRA	Community Risk Assessment
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
ECD	Environmental Conservation Department
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
IEE	Initial Environmental Examination
Inh/km ²	Inhabitant per Kilometer Square
KBA	Key Biodiversity Area
MEI	Myanmar Environment Institute
MIMU	Myanmar Information Management Unit
MOECAF	Ministry of Environmental Conservation and Forestry
MONREC	Ministry of Natural Resource and Environmental Conservation
NCEA	National Commission for Environmental Affair
NGO	Non-Governmental Organization
RIMES	Regional Integrated Multi -Hazard Early Warning System
SEA	Strategic Environmental Assessment
TDMP	Township Disaster Management Plan
TEA	Township Environmental Assessment
TSP	Township

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Executive Summary

Introduction and Background

Myanmar Environmental Institute (MEI) has been commissioned under the Building Resilience and Adaptation against Climate Extremes and Disasters (BRACED) project to conduct Township Environmental Assessments (TEA) for selected townships which are identified as vulnerable to natural disaster and climate change. This study is undertaken as a part of BRACED Alliance Project which has aimed to build resilience of 350,000 people in the selected 8 townships from climate extremes and disasters.

As a part of full BRACED project (2015-2017), MEI has committed to undertake eight TEA reports for eight townships namely Taungup, Kyaukpyu, Kengtung, Meiktila, Dagon Myothit (Seikkan), Mawlamyine, Hpa-An and Labutta. All TEA reports focus on township level plans and economic developments related to that administrative boundary and provide recommendations for decision makers to apply in the planning process that incorporates environmental and social concerns. It furthermore allows for improved awareness of the environment in future planning process. This data will further help to identify potential environmental changes and impacts on communities that might impact on capacities of vulnerabilities within communities.

Environmental Legislative Framework & Enabling Environment for SEA

In Myanmar, EIA (Environmental Impact Assessment) procedure was introduced in December 2015. Since then, EIA has widely practiced in development projects in a number of sectors. According to procedure, investment proposals are required to conduct either EIA or IEE.

Under the Article 123 of section 10 of EIA procedure (2015), it is stated that MONREC may ask relevant authorities to conduct SEA for policy strategy development plan and program prepared by government organizations of state, regional and township administration, self-administered zone and division or private sector projects. However, this article does not provide details on application of SEA in decision making process or explicitly stresses where an SEA is required. An SEA is to be undertaken by a government department on a specific development plan or project or strategy upon the request of MONREC.

Hence, according to existing environmental regulations, there is no strong and mandatory requirement for conducting SEA.

This particular TEA study is not intended to replace or substitute any SEA requirement under the EIA procedure. The data presented should support the development of any further environmental studies undertaken by government or private sector actors in Labutta Township by giving a contextual overview of the situation in the township.

Environmental Scoping

The general scoping study was conducted in the earlier phase of project .During the field observation in Labutta Township in Aril 2016, the study team met a numbers of stakeholders in consultation meeting and focus group meetings. In January 2017 , second stakeholder meeting was conducted . Opinions and suggestion expressed by stakeholders in identifying environmental issues, major drivers and probable impacts. The identified common environmental and climate change issues are described as below.

- Intense heat, water scarcity and pollution
- Flood and storm
- River bank erosion
- Saline intrusion

Environmental Baseline

Labutta Township is one of the townships in Ayeyawady Region . The land area of the township is 1160 square miles. It is surrounded on the east by Bogale township, on the south by the Andaman Sea , on the west by Ngaputaw Township and on the north by Myaungmya, Wakema and Mawlamyinegyun Township. As it is in the delta region, there are many river and streams flowing in the township.

Climatology

The wet season starts in May, peaks in July and August, and starts receding from September. This rainfall pattern suggests high influence of Southwest monsoon over the rainfall in the township. Labutta has average annual rainfall of about 2,900mm. Analysis of extremes further suggests increasing occurrences of high intensity rainfall events in the township. The data 30-year data from Labutta minimum temperature shows that despite a slightly increasing trend in average minimum temperature, the occurrences of very warm nights are decreasing.

As Labutta township is flat plain region and shallow part of the sea, network of rivers and streams are commonly found in this township. The condition of forest coverage in Labutta Township is 12.56%. There is limited information available to understand the detail status of flora and fauna of township.

Environmental Status

Located in delta region, Labutta area falls within Myanmar coastal mangrove ecoregion However, there is no protected area in Labutta Township. Nearest designated protected area is Mainmahla Kyun wildlife sanctuary which is located in Bogale Township. It is an island of low flat land of delta area.

The study area has seen a general decline on biodiversity status due to continuing expansion of agricultural land. Similarly coastal mangrove forest coverage has been on a steady decline due to agricultural expansion and deforestation. A satellite study

indicates the significant losses of mangrove coverage between 2000 and 2013 in Ayeyawady Delta area.

River System

Mainstream Ayeyawady River, Pyinsalu River, Pyamalot River, Ywe River and Tetketaung River flow from North to South and empty into Adman Sea . The waters of these rivers are very turbid due to the silt load they carry. The sea along the coastal line is very shallow due to the large volume of sediment deposition from upper and middle catchment area.

Social Baseline

In 2014, total population in Labutta Township was 315,218 people. 89% of total population (281,815 people) lives in rural area and the rest of population (11%) lives in urban area. The population density is 126.5 inh./km².

Agriculture and fishery are prime economy for local residents of Labutta Township. Depending on location , livelihood profile is different . In southern part of township where is close to river and sea , fisheries and crab hunting are predominant livelihood.

However, residents of northern section of the township practice both , agriculture and fisheries due to the vast flat land . Other prominent businesses are rice mill, livestock, trading, salt production and some construction works.

Finding from Environmental Impact

A number of environmental impacts by the removal of mangrove community are identified as follows.

<i>Human Encroachment, Expansion of Agricultural Land and Mangrove Forest</i>
<p>Deforestation</p> <p>Deforestation causes loss of ecosystems, loss of flora and fauna species and habitats.</p>
<p>Loss of Spawning Ground and impact to aquatic species</p> <p>Mangrove forest serves as best spawning place, food and shelter for aquatic species and birds. Loss of these forests means significant impact for those aquatic species. With degradation of forest, fish population could be decreased and livelihood of residents who rely on fishery would be significantly affected.</p>
<p>Riverbank and coastal line erosion</p> <p>One of the ecosystem services provided by mangrove community is retaining water flow and sediment. Mangrove vegetation growing along the riverbank and coastal habitats could protect the erosion through retaining flash flood, slope stability and consolidating sediment. Clearing vegetation could lead to decrease the stability of slope and to increase the frequency of riverbank and coastal erosion.</p>
<i>Solid Waste Management and Environmental Analysis</i>

Improper solid waste management systems is resulting a number of detrimental effects on the environment in Labutta which are described as follows.

- Blockage to the drain causing localized flood and spreading of vectors and forming stagnant water with fouling smell
- Employees responsible for waste collection and disposal are exposed to harmful substance
- Due to the absence of landfill, the dumping site attracts domestic livestock which eats the rotten vegetable and kitchen refuse
- Increase breeding ground for rat and other vermin.
- Presence of fire hazard by flammable and combustible material
- Soil and water contamination due to the lack of leaches control
- Burning of solid waste emits toxic chemical compounds which could impair the health of human living in the vicinity of waste dumping site

Recommendation and Generic Environmental Management

General Recommendation for Major Actors

A series of recommendations is summarized for government organization, Industry and business, community and civil society. Although there is not much development in industrial sector in Labutta , some recommendations made in the box are for business activities, considering future potential .

Recommendations for Government:

1. Existing environmental and related regulations and laws highlighted in chapter 2 of this report should be reviewed by local government departments and enforcement measures established including identification of responsible agencies and departments
2. Establish and convene a joint environmental working committee within township and regional level government structures to agree, adopt and implement an environmental management framework , oversee enforcement of laws and regulations and develop monitoring mechanism to monitor progress in tackling environmental and social issues
3. Promote community environmental awareness campaign highlighting the importance of ecosystem services and its relation to community resilience
4. Township waste management plan should be developed including a sustainable waste management campaign, design and development of waste collection and storage facilities and disposal plans in line with national waste management strategy
5. Increase capacity building of staff from relevant departments for enforcement and implementation of environmental legislations and guidance
6. Improve capacity of staff for inspection and monitoring of environmental performance of business activities
7. Encourage industry and business to initiate transparency and information disclosure about their activities and service which are likely to impact on

environment and community resilience

8. Township departments and regional department should review both TEA impact section and Community Resilience Assessment Reports produced under BRACED to identify climate change and disaster shocks and stresses and further impacts caused by ongoing development activities. Activities identified by communities should be consolidated and plans drawn up for broader processes to enhance the resilience of most vulnerable communities of Labutta. These can include maintenance and improvement of ecosystem service of natural biodiversity by channeling small grants and funds to joint community and government environment and ecosystem management projects.

Recommendations for Industry and Business

9. Improvement in public participation and consultation in project development phase of new projects and activities in accordance with EIA procedure
10. Initiate transparency and openness about project and business operations with publication of environmental, health and safety standards and policies.
11. Share information and findings of how businesses activities will affect community services and systems (food, water, energy, health etc.) and their resilience to climate extremes and environment and establish a mitigation plans
12. Encourage business investment in service provision and business practices that will improve the availability of resilience services to communities that will also contribute to economic development and profit margins (e.g agricultural services, community infrastructure, energy and water services etc.)
13. Prioritize environmental conservation and pollution prevention mechanisms in business operations
14. Develop project specific environmental management framework with local government departments and implementation in accordance with existing EIA procedure
15. Adopt environmental training program to operatives to ensure the service and activities undertaken by business do not adversely affect the resilience of local communities and the environment
16. Initiate Corporate Social Responsibility programs focusing on enhancement of community resilience, protection of ecosystem service and environmental management

Recommendations for Community and Civil Society

17. Actively participate in stakeholder consultation meetings. Share local knowledge and experience in the and express concerns about the project
18. Actively participate in environmental campaigns to be initiated by government organization and other organizations
19. Develop a private sector oversight mechanism that tracks adherence to environmental laws and procedures of all new development activities and projects

20. Oversee the implementation of generic EMP and encourage accountability and transparency in business and development practices

အကျဉ်းချုပ် အစီရင်ခံချက်

မြန်မာ့ပတ်ဝန်းကျင်သိပ္ပံသည် အစွန်းရောက် ရာသီဥတုများ၏ ဘေးဒဏ်ခံနိုင်စွမ်း တည်ဆောက်ခြင်း နှင့် လိုက်လျောညီထွေ စွာနေထိုင်ခြင်း (BRACED) စီမံကိန်း၏ အစိတ်အပိုင်းတစ်ရပ်အဖြစ် မြန်မာနိုင်ငံအတွင်း ရွေးချယ်ထားသော မြို့နယ်(၈)မြို့နယ်တွင် ဗဟုတရားပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း ပြုလုပ်ရန် တာဝန်ယူခဲ့ပါသည်။ BRACED စီမံကိန်းသည် ရွေးချယ်ထားသော မြို့နယ်ရှစ်မြို့နယ်အတွင်း လူဦးရေ သုံးသိန်းငါးသောင်းကျော် တို့တွင် အစွန်းရောက် ရာသီဥတုများကြောင့်ဖြစ်ပေါ်သော သဘာဝဘေးဒဏ် ခံနိုင်စွမ်း တည်ဆောက် ရန် ရည်မှန်းထားပါသည်။

BRACED စီမံကိန်းကာလ(၂၀၁၅-၂၀၁၇)အတွင်း ရွေးချယ်ထားသော တောင်ကုတ် ၊ဘားအံ၊မော်လမြိုင်၊ကျောက်ဖြူ၊ လပွတ္တာ၊မိတ္ထီလာ၊ကျိုင်းတုံနှင့် ဒဂုံမြို့သစ်(ဆိပ်ကမ်း) မြို့နယ် များအတွက် မြန်မာ့ပတ်ဝန်းကျင်သိပ္ပံမှာ မြို့နယ်ပတ်ဝန်းကျင် ဆန်းစစ်လေ့လာမှုများ ပြုလုပ်လျက် ရှိပါသည်။

အားလုံးသော ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း အစီရင်ခံစာများသည် မြို့နယ်အတွင်း လုပ်ဆောင်နေသော ဖွံ့ဖြိုးရေး စီမံကိန်းများနှင့် အခြားသော လုပ်ငန်းစဉ် များကြောင့် ဖြစ်ပေါ်လျက်ရှိသော ပတ်ဝန်းကျင်နှင့်လူမှုရေးဆိုင်ရာ ဆိုးကျိုး သက်ရောက်မှုများကို အဓိကထား လေ့လာပါသည်။ အစီရင်ခံစာမှ ထွက်ရှိလာသော အကြံပြုချက်များကို လက်ရှိနှင့် အနာဂတ် တွင် ဖြစ်ပေါ်လာနိုင်သော စီမံကိန်းစီမံချက်များ တွင် ထည့်သွင်းစဉ်းစား နိုင်ရန် တင်ပြထားပါသည်။ အနာဂတ်စီမံကိန်းများ စီမံချက်များ ရေးဆွဲရာတွင်လည်း ပတ်ဝန်းကျင်ဆိုင်ရာ အသိအမြင်များ ပေါင်းစပ်၍ ထည့်သွင်း အသုံးပြုနိုင်မည် ဖြစ်ပါသည်။

ဤအစီရင်ခံစာပါ အချက်အလက်များသည် ဒေသခံပြည်သူလူထု အစုအဖွဲ့များ၏ ဒဏ်ခံနိုင်စွမ်း ကို ထိပါးသွားနိုင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ ဆိုးကျိုးသက်ရောက်မှုများကို ဖော်ထုတ်ပြီး မြို့နယ်ဆိုင်ရာ ဖွံ့ဖြိုးရေးနှင့်အခြား စီမံချက်များအတွက် လိုအပ်နေသော ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံ လမ်းညွှန်ချက်တစ်ရပ် ဖြစ်လာစေရန် ရည်မှန်းထားပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေ မူဘောင်

၂၀၁၅ ခုနှစ်တွင် ပြဋ္ဌာန်းထားသော ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်း အခန်း (၁၂၃) အပိုဒ် (၁၀) တွင် ဗဟုတရားပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာဆန်းစစ်ခြင်းနှင့် ပတ်သတ်၍ ထည့်သွင်းဖော်ပြထားပါသည်။ သယံဇာတနှင့်ပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ကြီးဌာနသည် လိုအပ်ပါက အခြားဝန်ကြီးဌာနများ၊ ပြည်နယ်နှင့်တိုင်း ဒေသကြီးများ၊ ခရိုင်နှင့်မြို့နယ်များ၊ ကိုယ်ပိုင်အုပ်ချုပ်ခွင့်ရ တိုင်းဒေသများနှင့် အခြား ပုဂ္ဂလိက အဖွဲ့အစည်းများမှ ရေးဆွဲသော မူဝါဒများ၊ဗဟုတရားများ၊ဖွံ့ဖြိုးရေးစီမံချက်များ အတွက် ဗဟုတရားပတ်ဝန်းကျင်ဆိုင်ရာ အစီရင်ခံစာပြုစုရန် သက်ဆိုင်ရာ တာဝန်ရှိသူများကို တောင်းဆိုမည်ဖြစ်ပါသည်။

အကယ်၍ ထိုမူဝါဒများ၊ဗဟုတရားများ၊ဖွံ့ဖြိုးရေးစီမံကိန်းနှင့်မူဘောင်များ၊စီမံချက်များမှ ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများ ရှိနိုင်သည်ဟု ယူဆပါက သက်ရောက်မှုများကို ဖော်ထုတ်နိုင်ရန်၊သင့်တော်သော လေ့လာဆန်းစစ်မှုများ ပြုလုပ်နိုင်ရန်၊ မဟာဗျူဟာမြောက် ပတ်ဝန်းကျင်အစီရင်ခံစာတွင် လေ့လာစောင့်ကြည့်ရေး မူဘောင်များ ထည့်သွင်းရေးဆွဲရန် တောင်းဆိုနိုင်ကြောင်း ဖော်ပြထားပါသည်။

ဤ လုပ်ထုံးလုပ်နည်းကို ပြန်လည်သုံးသပ်ကြည့်ပါက မဟာဗျူဟာမြောက်ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း အစီရင်ခံစာ နှင့်ပတ်သတ်၍ ယေဘုယျသော ဖော်ပြထားသည်ကို တွေ့ရှိရပါသည်။ မည်သို့လိုအပ်သည် မည်သို့လုပ်ဆောင်ရမည်ဟု

အသေးစိတ် ဖော်ပြထားနိုင်ခြင်း မရှိသလို မည်သို့ဆက်လက် ဆောင်ရွက်မည်ဟုလည်း ဖော်ပြနိုင်ခြင်း မရှိပါ။ ယေဘုယျအားဖြင့် ဗျူဟာမြောက်ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းလုပ်ငန်းကို အစိုးရ သို့မဟုတ် အစိုးရက တာဝန်ပေးထားသော အဖွဲ့အစည်းမှသာ လုပ်ဆောင်လေ့ ရှိပါသည်။

ထို့ကြောင့်တည်ဆဲဥပဒေများအရ မဟာဗျူဟာမြောက် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း အစီရင်ခံစာ ပြုလုပ်ရန် ဥပဒေအရ လိုအပ်ချက်များ နည်းပါးနေကြောင်း တွေ့ရှိရပါသည်။

ယခုအစီရင်ခံစာသည် လက်ရှိ ပတ်ဝန်းကျင် သက်ရောက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း မှ ဖော်ပြထားသော အစိုးရ၏ စီးပွားရေးဖွံ့ဖြိုးတိုးတက်မှု စီမံချက်များ မူဝါဒများအတွက် ဗျူဟာမြောက် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း လိုအပ်ချက်ကို ဖြည့်ဆည်းရန်သို့မဟုတ် အစားထိုးရန် ရည်ရွယ်ခြင်းမဟုတ်ပါ။ ဒေသ အခြေအနေနှင့် ပတ်သတ်၍ ဖော်ပြထားသော အချက်အလက်များကို နောင်တွင် ပြုလုပ်မည့် ပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာမှုများအတွက် အသုံးပြုနိုင်ရန် သို့မဟုတ် အထောက်အကူပြုရန်သာ ရည်ရွယ်ပါသည်။

နယ်ပယ် အတိုင်းအတာ သတ်မှတ်ခြင်း

ကနဦးနယ်ပယ် အတိုင်းအတာ သတ်မှတ်ခြင်းကို လက်တွေ့ကွင်းဆင်းစဉ်နှင့် သက်ဆိုင်သူများထံမှ အကြံတောင်းခံခြင်း လုပ်ငန်းစဉ်များ ပြုလုပ်စဉ်ကတည်းက လုပ်ဆောင်ခဲ့ပါသည်။ ပါဝင်သူများ၏ အကြံဉာဏ်များ များ ထင်မြင်ချက်များကို မူတည်ကာ ဒေသအတွင်းရှိ ပတ်ဝန်းကျင်ပြဿနာများ၊ အဓိက တွန်းအားများ ၊ပတ်ဝန်းကျင် သက်ရောက်မှုများကို မှတ်တမ်းတင်ခဲ့ပါသည်။ ထိုသို့ခွဲခြားဖော်ထုတ်ထားသော ပတ်ဝန်းကျင်နှင့်ရာသီဥတုဆိုင်ရာ အဓိက ပြဿနာများမှ

- အပူချိန်မြင့်မားခြင်း၊ ရေရှားပါးခြင်းနှင့် ညစ်ညမ်းမှုများ
- ရေကြီးခြင်းနှင့် မုန်တိုင်းဒဏ်ခံရခြင်း
- မြစ်ကမ်းပါးပြိုခြင်း
- ဆားငံရေပင်ရောက်ခြင်းတို့ ဖြစ်ပါသည်။

ပတ်ဝန်းကျင်အခြေခံအချက်အလက်များ

တည်နေရာ

လပွတ္တာမြို့နယ်သည် ဧရာဝတီတိုင်းအတွင်းရှိ မြို့နယ်တစ်ခုဖြစ်ပါသည်။ မြေပြင်အကျယ်အဝန်း အားဖြင့် ၁၁၆၀ စတုရန်းမိုင် ရှိပါသည်။ အရှေ့ဖက်တွင် ဘိုကလေးမြို့နယ်၊ တောင်ဖက်တွင် ကပ္ပလီပင်လယ်၊ အနောက်ဖက်တွင် ငပုတော မြို့နယ်နှင့် မြောက်ဘက်တွင် မြောင်းမြ၊ ဝါးခယ်မ နှင့် မော်လမြိုင်ကျွန်းမြို့နယ်များက ပိုင်းရံလျက်ရှိပါသည်။

ရာသီဥတု

စိုစွတ်သောမိုးရာသီသည် မေလတွင်စတင်ပြီး ဇူလိုင်နှင့် ဩဂုတ်လတို့တွင် မိုးရေချိန်အမြင့်ဆုံး ရောက်လာပါသည်။ စက်တင်ဘာလတွင် ပြန်လည်ဆုတ်ခွာလေ့ ရှိပါသည်။ ဤဒေသသည် အနောက်တောင် မုတ်သုန်ရာသီ အဓိက သက်ရောက်ပါသည်။ မြို့နယ်၏ ပျမ်းမျှမိုးရေချိန်မှာ ၂၉၀၀ မီလီမီတာ ဖြစ်ပါသည်။ နှစ်သုံးဆယ်အတွင်း လေ့လာ ထားရှိချက်များအရ ဒေသအတွင်း မိုးရွာသွန်းမှုပိုမိုများပြား လာကြောင်း တွေ့ရှိပါသည်။ အနိမ့်ဆုံးအပူချိန်မှာ အနည်းငယ်မြင့်တက် နေသော်လည်း ပူပြင်းသောညများ အရေအတွက်မှာ ကျဆင်းလာကြောင်း တွေ့ရှိရပါသည်။

ပတ်ဝန်းကျင်

ကျယ်ပြန့်သော မြေပြင်နှင့် ပင်လယ်၏ ရေတိမ်ဒေသတို့ ရှိနေခြင်းကြောင့် မြစ်ချောင်းများစွာသည်ကွန်ယက်သဖွယ် ယှက်ဖြာ စီးဆင်းလျက်ရှိကြောင်း တွေ့ရှိရပါသည်။ သစ်တောဖုံးလွှမ်းမှုမှာ မြို့နယ်၏ ၁၂.၅၆ ရာခိုင်နှုန်းသာ ရှိပါသည်။ ဒေသ၏ အပင်များ ကျင်လည်ကျက်စားရာသတ္တဝါများအကြောင်း အသေးစိတ်လေ့လာမှုများကို မတွေ့ရှိခဲ့ရပါ။

ဒေသသည် လယ်ယာမြေများ ချဲ့ထွင်လာခြင်းကြောင့် မူလ ဇီဝပတ်ဝန်းကျင်အနေအထားသည်တဖြည်းဖြည်း ဆုတ်ယုတ်လာကြောင်း လေ့လာ တွေ့ရှိရပါသည်။ ဒီရေရောက် သစ်တောများမှာလည်း အလားတူ ကြုံတွေ့နေရပါသည်။ ဂြိုဟ်တုခါတ်ပုံ လေ့လာမှုများအရ ၂၀၀၀ ခုနှစ်နှင့် ၂၀၁၃ ခုနှစ်များအတွင်း ဒီရေရောက်တောများ သိသာစွာ နည်းပါးလာကြောင်း တွေ့ရှိရပါသည်။

မြစ်များ

အဓိကမြစ်များ ဖြစ်သော ဧရာဝတီမြစ်၊ ပြင်စလူမြစ်၊ပြန်မလောမြစ်နှင့် ရွှေမြစ် နှင့် သက္ကယ်သောင်မြစ်တို့သည် ဒေသအတွင်း မြောက်မှတောင်သို့ စီးဆင်းကာ ကပ္ပလီပင်လယ်ပြင်အတွင်း စီးဝင်သွားပါသည်။ မြစ်ရေများသည် အနယ်အနှစ်များဖြင့် နောက်ကျို နေလျက်ရှိပါသည်။ အပေါ်ပိုင်းနှင့် အလယ်ပိုင်း ရေပေးရေလဲဒေသများမှ အနယ်အနှစ်များစွာ သယ်ဆောင် ပို့ချမှုကြောင့် ပင်လယ်ကမ်းစပ် တစ်လျှောက်လုံး သည် ရေတိမ်ဒေသ အဖြစ် တည်ရှိနေပါသည်။

လူမှုရေး အခြေခံအချက်များ

၂၀၁၄ ခုနှစ်တွင် လပွတ္တာမြို့နယ်အတွင်း လူဦးရေ ၃၁၅၂၁၈ နေထိုင်ပါသည်။ စုစုပေါင်းလူဦးရေ၏ ၈၉ ရာခိုင်နှုန်းမှ ကျေးလက်ဒေသတွင်နေထိုင်ပြီး ကျန် ၁၁ ရာခိုင်နှုန်းမှာ မြို့ပြများတွင် နေထိုင်ကြပါသည်။ လူဦးရေသိပ်သည်းဆမှာ တစ်စတုရန်းကီလိုမီတာတွင် ၁၂၆.၅ ယောက်နေထိုင်ပါသည်။

စိုက်ပျိုးရေးနှင့် ရေလုပ်ငန်းများမှာ အဓိက အသက်မွေးဝမ်းကြောင်းလုပ်ငန်းများ ဖြစ်ပါသည်။ ပထဝီဒေသပေါ်မူတည်ပြီး သက်မွေးဝမ်းကျောင်းလုပ်ငန်း ခြားနားပါသည်။ မြစ်များ ပင်လယ်များနှင့်နီးသော တောင်ဖက်အပိုင်းတွင် ရေလုပ်ငန်းသည် အဓိကဖြစ်ပါသည်။ သို့ရာတွင် မြို့နယ်၏ မြောက်ပိုင်းနေထိုင်သူအများစုမှာ စိုက်ပျိုးရေးနှင့် ရေလုပ်ငန်းများ လုပ်ကိုင်ကြသလို မြောက်ဖျားပိုင်းများတွင် စိုက်ပျိုးရေးကိုသာ အဓိက လုပ်ကိုင်ကြောင်း တွေ့ရှိရပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာ ဆိုးကျိုးများ

လူများအခြေချနေထိုင်ခြင်း၊ လယ်ယာမြေများ တိုးချဲ့ခြင်း နှင့် ဒီရေရောက်သစ်တောများ

သစ်တောပြုန်းတီးခြင်း
သစ်တောပြုန်းတီးခြင်းများကြောင့် ဒေသ၏ ဂေဟနစ်များ ပျောက်ဆုံးခြင်း ၊ အပင်နှင့် သတ္တဝါမျိုးစိတ်များ ဆုံးရှုံးခြင်းများ ဖြစ်ပေါ်နေပါသည်။
ရေနေသတ္တဝါများ အမှီသဟဲပြုရာနှင့်မွေးဖွားရာနေရာများ ပျောက်ဆုံးခြင်း
ဒီရေရောက်သစ်တောများသည် ရေနေသတ္တဝါများအတွက် အကောင်းဆုံးသော မှီခိုရာ၊ဥချရာ၊မွေးဖွားကြီးပြင်းရာ နေရာများဖြစ်ပါသည်။ ဒီရေတောများ ကွယ်ပျောက်ခြင်းသည် ရေနေသတ္တဝါများအတွက် ကြီးမားသော ထိခိုက်မှုများ ဖြစ်ပါသည်။ သစ်တောများဆုံးရှုံးမှုများကြောင့် ရေနေသတ္တဝါများပေါက်ဖွားမှုနှုန်း လျော့နည်းလာကာ ၎င်းတို့အပေါ်မှီခိုနေရသော ဒေသခံများအတွက်လည်း နစ်နာမှုများ ဖြစ်ပေါ်လာနိုင်ပါသည်။
မြစ်ကမ်းပါးများနှင့် ပင်လယ်ကမ်းခြေများ ပြိုခြင်း
ဒီရေရောက်သစ်တောများက ပေးအပ်သောဝန်ဆောင်မှုတစ်ခုမှာ ရေစီးရေလာများ နှင့် အနယ်အနှစ်များ

ထိန်းညှိခြင်း ဖြစ်ပါသည်။ မြစ်ကမ်းပါးများနှင့် ပင်လယ်ကမ်းခြေများတွင် ပေါက်ရောက်နေသောဒီရေရောက် သစ်တောများသည်ရေကြီးခြင်းများကို အရှိန်လျော့စေခြင်း၊မြစ်ကမ်းပါးစောက်များကိုတည်ငြိမ်စေခြင်းနှင့်အနယ်အနစ်များကို စုဆောင်းကာ ထိန်းသိမ်းထားခြင်းတို့ကို လုပ်ဆောင်ခြင်းဖြင့် ကမ်းပါးပြိုခြင်း ကမ်းခြေပြိုခြင်းများကို ကာကွယ်ပေးပါသည်။ ထိုသစ်တောများကို ရှင်းလင်းပစ်သောကြောင့် ကမ်းပါးစောက်များမတည်မငြိမ်ဖြစ်ကာ မြစ်ကမ်းပါးများမကြာခဏပြိုခြင်း ပင်လယ်ကမ်းစပ်များ ရေတိုက်စားခြင်းများ ကြိမ်ဖန်များစွာ ဖြစ်ပေါ်လာနိုင်ပါသည်။

စွန့်ပစ်အမှိုက်များနှင့် ပတ်ဝန်းကျင်ပြဿနာ

အမှိုက်များကိုတာဝန်ခံစွာ စွန့်ပစ်ခြင်းကြောင့် လပွတ္တာမြို့နယ်အတွင်း ဖြစ်ပေါ်နေသော ပတ်ဝန်းကျင်ဆိုးကျိုးများကို အောက်ပါအတိုင်း တင်ပြထားပါသည်

- ရေနုတ်မြောင်းများကို ပိတ်ဆို့ခြင်းကြောင့် ရေကြီးမှုအဟုန်မြင့်လာခြင်းနှင့် ရေဆိုးများစုပြုံကာ မလိုလားအပ်သောမြစ်များယင်များပေါက်ဖွားခြင်း၊ အနံ့ဆိုးများ ဖြစ်ပေါ်ခြင်း
- အမှိုက်များကိုသိမ်းဆည်းသော လုပ်သားများ ဘေးအန္တရာယ်ရှိသော ပစ္စည်းများနှင့်ထိတွေ့ခြင်း
- အမှိုက်များစနစ်တကျဖျက်ဆီးစွန့်ပစ်သော နေရာမရှိခြင်းကြောင့် အမှိုက်ပုံများအတွင်း ရှိသော အစားအစာများကို ဒေသရှိကျွဲနွားတိရစ္ဆာန်များက စားသုံးခြင်းကြောင့် အန္တရာယ်များခြင်း
- ကြွက်နှင့်အခြားသတ္တဝါများ ပေါများလာခြင်း
- မီးလောင်နိုင်ခြင်း
- မြေထုနှင့်ရေထုညစ်ညမ်းခြင်း
- အမှိုက်များမီးရှို့ခြင်းကြောင့် အန္တရာယ်ရှိသော ဓါတ်ငွေ့များ ထွက်လာကာ အနီးအနားရှိ ဒေသခံများအား ကျန်းမာရေးထိခိုက်နိုင်ခြင်း

အကြံပြုချက်များနှင့် အခြေခံ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု

မြို့နယ်နှင့်ပတ်သတ်သော အဓိက အဆုံးအဖြတ် ပေးသူများ၊လက်တွေ့အကောင်အထည်ဖော်သူများ၊ အစိုးရအဖွဲ့အစည်းများ၊ စီးပွားရေးလုပ်ငန်းစုများနှင့် အရပ်ဘက်အဖွဲ့အစည်းများအတွက် လုပ်သင့်လုပ်ထိုက်သော ပတ်ဝန်းကျင် ဆိုင်ရာ အကြံပေးချက်များကို အောက်ပါ အတိုင်း ဖော်ပြထားပါသည်။

- အစိုးရ ဌာနဆိုင်ရာ အဖွဲ့အစည်းများ**
1. ဤအစီရင်ခံစာ အခန်း(၂) တွင်ဖော်ပြထားသော ပတ်ဝန်းကျင်နှင့် အခြား ဆက်စပ်ဥပဒေများကို အစိုးရဌာနဆိုင်ရာ များအနေနှင့် လေ့လာသုံးသပ်ပြီး ဥပဒေစိုးမိုးရေး အတွက် တာဝန်ရှိသည့် အဖွဲ့အစည်းများ ဌာနများကို တာဝန်ပေးခြင်းများ ပြုလုပ်ရန်
 2. ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အခြေခံမူဘောင်ကို တည်ဆောက် အကောင်အထည်ဖော်နိုင်ရန် ၊ ဥပဒေစိုးမိုးမှုများကို လေ့လာစောင့်ကြည့်ရန် နှင့် ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကိစ္စများကို လေ့လာစောင့်ကြပ်ရေး နည်းလမ်းများကို တည်ဆောက်နိုင်ရန်အတွက် မြို့နယ်နှင့် ပြည်နယ်ဒေသ အတွင်း ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အဖွဲ့အစည်း၊ ကော်မတီဖွဲ့စည်းရန်
 3. ဂေဟစနစ်မှ ပေးသော ဝန်ဆောင်မှုများနှင့် ဒဏ်ခံနိုင်စွမ်းဆက်စပ်ပုံများကို အခြေခံသော ပတ်ဝန်းကျင်ဆိုင်ရာ အသိပညာပေး လုပ်ငန်းများကို ဒေသခံလူထုအတွင်း ဆောင်ရွက်သွားရန်
 4. အမှိုက်သိမ်းဆည်းနည်းများ၊ အမှိုက်ပစ်နည်းများ နှင့် ရေရှည်ဖွံ့ဖြိုးတိုးတက်မှုကို ဦးတည်သော အမှိုက်များစီမံခန့်ခွဲမှု များနှင့် ပတ်သတ်သော အသိပညာပေး လုပ်ငန်းများ ပါဝင်သည့် မြို့နယ်ဆိုင်ရာ

- အမှိုက်စီမံခန့်ခွဲမှု၊ စီမံချက်များ တည်ဆောက်နိုင်ရန် (ထိုသို့ရေးဆွဲရာတွင် အမျိုးသား စွန့်ပစ်အမှိုက် စီမံခန့်ခွဲရေး မဟာဗျူဟာနှင့် လိုက်လျောညီထွေ ဆောင်ရွက်သင့်ပါသည်)
5. ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဌာနနှင့်အခြားဆက်စပ်ဌာနများမှ ဝန်ထမ်းများကို ပတ်ဝန်းကျင်ဆိုင်ရာ ပြဋ္ဌာန်းချက်ဥပဒေများ လက်တွေ့အကောင်အထည်ဖော်ရေးဆိုင်ရာ အရည်အသွေးမြှင့်တင်မှုများ ပြုလုပ်ရန်
 6. ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဌာနမှ ဝန်ထမ်းများကို စီးပွားရေးလုပ်ငန်းများ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ အကောင်အထည်ဖော် ဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြပ်မှုနှင့်ပတ်သတ်သော အရည်အသွေး ဆိုင်ရာ သင်တန်းများ ပို့ချပေးခြင်းများ ပြုလုပ်နိုင်ရန်
 7. ဖွံ့ဖြိုးရေးလုပ်ငန်းများကြောင့် ပတ်ဝန်းကျင်နှင့် ဒေသခံလူထုတို့၏ ရာသီဥတုဆိုးဝါးမှု ဒဏ်ခံနိုင်စွမ်းကို မည်သို့မည်ပုံ သက်ရောက်မှုရှိနိုင်ကြောင်း ကုမ္ပဏီများ အဖွဲ့အစည်းများမှ ပွင့်လင်းစွာ တင်ပြနိုင်ရေးအတွက် တွန်းအားပေးရန်
 8. မြို့နယ်အတွင်းရှိ ဌာနဆိုင်ရာများ အနေနှင့် ရာသီဥတုပြောင်းလဲမှုများ၊ ရာသီဥတု ပြောင်းလဲမှုများကြောင့် ဖြစ်ပေါ်လာသော ဘေးနှင့်ဖိစီးမှုများ၊ လက်ရှိစီမံကိန်းများမှ နောင်တွင် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင် ဆိုးကျိုးသက်ရောက်မှုများကို ဖော်ထုတ်နိုင်ရန်အတွက် BRACED စီမံကိန်းမှ ပြုစုခဲ့သော ဗျူဟာမြောက် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် ကျေးရွာလူထု၏ ဘေးအန္တရာယ်ဒဏ် ခံနိုင်စွမ်း စစ်တမ်းများကို လေ့လာ သုံးသပ်ရန်။(ဒေသအတွင်းရှိ အင်အားအနည်းပါးဆုံး ဒေသခံတို့၏ ဘေးဒဏ်ခံနိုင်စွမ်း မြင့်မား လာစေရေးအတွက် ဒေသခံတို့မှာ ရှာဖွေ ဖော်ထုတ်ထားသော လုပ်ဆောင်ရမည့် လုပ်ငန်းများ အားလုံးကို အတူတကွ ပေါင်းစည်း၍ ပိုမိုကျယ်ပြန့်သော စီမံချက်များ ရေးဆွဲသင့်ပါသည်။ ထိုသို့ပြုလုပ်ရာ တွင် " အစိုးရနှင့် ပြည်သူတို့ အတူတကွ လုပ်ကိုင်နိုင်မည့် ပတ်ဝန်းကျင်နှင့် ဂေဟစနစ်ဆိုင်ရာ စီမံကိန်းများအတွက် အသေးစားရံပုံငွေများ ရရှိအောင်ဆောင်ရွက်ခြင်းဖြင့် ဇီဝမျိုးစုံမျိုးကွဲ၏ ဂေဟစနစ်ဆိုင်ရာ ဝန်ဆောင်မှုများ မြှင့်တက်လာနိုင်သည်" ဆိုသော အချက်ကိုလည်း ထည့်သွင်းနိုင်ပါသည်)

စက်ရုံအလုပ်ရုံများ နှင့် စီးပွားရေးလုပ်ငန်းများ

9. စီမံကိန်းအသစ်များ စတင်တည်ဆောက်ပါက တည်ဆဲEIA လုပ်ထုံးလုပ်နည်းနှင့်အညီ ဒေသခံပြည်သူများ ပတ်သတ်ဆက်စပ်သူများနှင့်တွေ့ဆုံက အကြံဉာဏ်များ ရယူရန်
10. စီမံကိန်းနှင့် စီးပွားရေးလုပ်ငန်းများ၏ ပတ်ဝန်းကျင် ကျန်းမာရေးနှင့် လုပ်ငန်းခွင်ဆိုင်ရာ ဘေးအန္တရာယ် ကင်းရှင်းရေး ဆိုင်ရာ မူဝါဒများ၊ စံနှုန်းများကို တရားဝင်ထုတ်ပြန်ခြင်းဖြင့် ပွင့်လင်းမြင်သာမှုများကို ဖော်ဆောင်ရန်
11. ရပ်ရွာလူထု ဝန်ဆောင်မှုလုပ်ငန်းများ နှင့် စနစ်များ(အစားအသောက်၊ရေစွမ်းအင်နှင့်ကျန်းမာရေး)၊ ရပ်ရွာလူထု၏ အစွန်းရောက် ရာသီဥတုများ၊ ပတ်ဝန်းကျင် ဆိုးကျိုးများအပေါ် ဒဏ်ခံနိုင်ရည်စွမ်းကို မည်သို့ သက်ရောက်နိုင်သည် ဆိုသော တွေ့ရှိချက်များကို ဝေမျှဖြန့်ဖြူးရန်၊ ဆိုးကျိုးများကို လျော့ပါးစေသော အစီအမံများ ဆောင်ရွက်ရန်
12. ဖွံ့ဖြိုးရေးစီမံကိန်းများနှင့် စီးပွားရေးလုပ်ငန်းများသည် စီးပွားရေး တိုးတက်မှုနှင့် အကျိုးအမြတ် ရနိုင်မှုကို ဦးတည်သော ဘေးဒဏ်ခံနိုင်စွမ်း ဆိုင်ရာ လုပ်ငန်းများ ပါဝင်သည့် စီးပွားရေး ဆောင်ရွက်မှုများ ပိုမိုများပြားလာစေရန်အတွက် တွန်းအားပေးရန် (ဥပမာ- စိုက်ပျိုးရေးနှင့်သက်ဆိုင်သော လုပ်ငန်းများ၊ ရပ်ရွာလူထုအတွက် အခြေခံ အဆောက်အအုံများ၊စွမ်းအင်နှင့် ရေ ဖြန့်ဖြူးရေး ဝန်ဆောင်မှု လုပ်ငန်းများ)
13. အခြား စီးပွားရေးဆိုင်ရာ လုပ်ငန်းများနှင့်အတူ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် ပတ်ဝန်းကျင်ညစ်ညမ်းမှုများ ကာကွယ်ရေး တို့သည်လည်း အရေးကြီးကြောင်း သတ်မှတ်ထားနိုင်ရန်
14. တည်ဆဲ EIA လုပ်ထုံးလုပ်နည်း နှင့်အညီ စီမံကိန်းနှင့်ဆိုင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံချက်များကို ရေးဆွဲအကောင်အထည်ဖော်ရန်

- 15. စီးပွားရေးနှင့် ဖွံ့ဖြိုးရေးလုပ်ငန်း များကြောင့် ပတ်ဝန်းကျင်ဆိုးကျိုးနှင့် ဒေသခံတို့၏ အစွန်းရောက် ရာသီဥတုဒဏ်ခံစွမ်းရည်များကို မထိခိုက်စေရန်အတွက် မိမိတို့၏ လုပ်သားထုများကို ပတ်ဝန်းကျင်ဆိုင်ရာ သင်တန်းများပေးရန်အတွက် အစီအစဉ်များ ရေးဆွဲရန်
- 16. ဒေသခံတို့၏ ရာသီဥတုဒဏ်ခံနိုင်စွမ်းရည် မြှင့်တက်လာစေရန် ၊ ဂေဟစနစ်မှပေးသော ဝန်ဆောင်မှုများကို ထိန်းသိမ်းရန် နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံချက်များ ပါဝင်သော လူမှုတာဝန်သိမှု အစီအစဉ်များရေးဆွဲ အကောင်အထည်ဖော်ရန်

အရပ်ဖက်အဖွဲ့အစည်းနှင့်ဒေသခံလူထု

- 17. သက်ဆိုင်ဆက်စပ်သူများ အစည်းအဝေးများတွင် ပါဝင်ဆွေးနွေးကြရန်။ မိမိတို့အစဉ်အဆက်တွေ့ကြုံခဲ့ရသော အဖြစ်အပျက်များ ဗဟုသုတများကို ထိုသို့သော ဆွေးနွေးပွဲများတွင် အတွေ့အကြုံများ၊ စိုးရိမ်စရာ အကြောင်းများနှင့် ဖြစ်ပေါ်နိုင်သော စိန်ခေါ်မှုများကို ပွင့်ပွင့် လင်းလင်း တင်ပြနိုင်ရန်
- 18. အစိုးရနှင့်အခြားအဖွဲ့အစည်းများမှ ဦးဆောင်ကျင်းပသည့် အပြုသဘောဆောင်သည့် ပတ်ဝန်းကျင် ဆိုင်ရာ ထိန်းသိမ်းရေး ပညာပေးရေး လုပ်ငန်းများတွင် ပါဝင်ရန်
- 19. စီမံကိန်းအသစ်များ၏ ဥပဒေ ၊ လုပ်ထုံးလုပ်နည်းများ နှင့်အညီ ဆောင်ရွက်ခြင်း ရှိမရှိ သိရှိ ရန်အတွက် ပုဂ္ဂလိက လုပ်ငန်းများ စောင့်ကြည့်ရေးလုပ်ငန်းစဉ် ထူထောင်ရန်
- 20. စီးပွားရေးနှင့် အခြားဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းများ၏ တာဝန်ယူမှုနှင့် တာဝန်ခံမှုများ တိုးတက်လာစေရန် လုပ်ငန်းများ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြည့်ရန်

Chaper 1 . Introduction and Background

1. 1 Background

Myanmar Environmental Institute (MEI) has been commissioned under the Building Resilience and Adaptation against Climate Extremes and Disasters (BRACED) project to conduct Township Environmental Assessments (TEA) for selected townships which are identified as vulnerable to natural disaster and climate change. This study is undertaken as a part of BRACED Alliance Project which has aimed to build resilience of 350,000 people in the selected 8 townships from climate extremes and disasters.

Environmental management and sustainability is one of the fundamental elements of sustainable development. There are many different mechanisms and approaches to achieving environmental sustainability. However, a thorough understanding of the status and condition of the natural environment and plans for developing the built environment is required to be able to analyze environmental impacts and development strategies to maintain and manage our natural environments.

Accordingly, MEI under the BRACED project has classified this study as a Township Environmental Assessment (TEA) . The TEA study however follows similar steps and methodologies as set out in SEA (Strategic Environmental Assessment).

As a part of full BRACED project (2015-2017), MEI has committed to publish 8 TEA reports in Hpa -An, Dagon Myothit (Seikkan), Meiktila, Kyaukpyu, Kengtung, Taungup and Labutta. All reports focus on township level and study the particulars of township plans and economic developments. This document provides recommendations for decision makers to apply in the planning process that incorporate environmental impacts and issues. It furthermore allows for improved awareness of the environment in future planning and policies.

It is anticipated that the information and recommendations provided in this report will be utilized in local level development planning. This data will further help to identify potential environmental changes and impacts on communities that might impact on capacities or vulnerabilities within communities. It will also be utilized to identify how ecosystem and environmental management can support communities to strengthen resilience to a variety disaster and, climate shocks and stresses. This will indirectly benefit to women and children by supporting resilience building mechanism through its recommendations.

In addition, in line with BRACED's objectives, this document provides general guidance notes and frameworks on how to integrate climate change risk considerations into strategic planning and inclusion of climate adaption and resilience strategy into decision making process as far as possible in the region. Servicing beyond the BRACED project (2015-2017) the contents of this TEA can be

regarded as basic environmental reference for future sustainable development activities and would feed into any full SEA undertaken by government departments.

1.2 Introduction of BRACED

The Building Resilience and Adaptation to Climate Extremes and Disaster (BRACED) Myanmar Alliance is a program aiming at strengthening resilience of communities across the country implemented by six consortium partners (Action Aid, Plan International, UN Habitat, Myanmar Environmental Institute, World Vision, BBC media Action) with the financial support from Department of International Development (DFID). The three year project 2015 to 2017 is coordinated by Alliance Coordination Unit based in Yangon.

The principal goal of the project is to build the resilience of 350,000 people across Myanmar to climate extremes through saving lives, protecting livelihoods, improving institutional coordination, and influencing national policy. BRACED alliance is building community resilience to climate extreme events so that vulnerable communities driven women and children are more resilient to identified climate shocks and stresses.

In Labutta Township, Action Aid, the implementing partner and three technical partners including BBC Media Action, UN Habitat and Myanmar Environment Institute are coordinating activities to strengthen resilience.

UN Habitat is improving access to climate and weather and risk information through preparation of climate profile of the region and building capacities and skills of township stakeholders to use risk information in planning processes through the development of Township Disaster Management Plan (TDMP). They have additionally conducted township level and national level carpenter trainings to strengthen skills in safer construction.

BBC Media Action undertook research on climate change communication and information access and then produced public service announcements (educational and awareness videos related to disaster preparedness and resilience) broadcast through televisions and radio channels.

Action Aid has undertaken community resilience action planning in selected villages. Based on the assessment, activities are implemented to strengthen resilience including capacity building trainings, resilience actions plans.

Myanmar Environment Institute (MEI) is working to complement community resilience and institutional support activities by carrying out township environmental assessment in all eight townships. Study looks at the environmental threats posed by existing development projects, sectoral plans, and services to public and business activities and then predict future trends. Based on the finding, MEI prepares generic entry point and recommendations for township environmental management framework and provides trainings to government officials to lead on implementation of TEA recommendations.

Introduction to SEA

Myanmar has recently entered into a transition period from military dictatorship to a democratic governance system with a newly elected government which has been putting many efforts in reforming both political and economic structures and policies. Similar to other developing countries, Myanmar has been suffering severe environmental deteriorations for decades as a result of poor governance and weak knowledge of environmental issues among the governing bodies, private and public sectors as a result of the previous regime.

Major environmental threats in Myanmar today include widespread deforestation occurring across the country along with water and soil degradation, loss of habitat and destruction of coastal mangrove forest. Many of these ecosystems and resources provide livelihoods and ecosystem services (flood/soil protection, drinking and utility) water to Myanmar's populations in both rural and urban area.

In addition to anthropogenic impacts on these ecosystems and natural resources, the quality, availability and accessibility to these resources and ecosystems may also be significantly affected by changing climate and occurrence of climate extreme events.

To address these concerns in Myanmar, there is an urgent need for government, private and civil society sectors to work together to develop and implement legislative frame work and guidelines which support authorities to prevent further environmental degradation and damages from inappropriate development actions, plan and projects and to identify key proactive measures for development of resilience of natural resources and ecosystems and the people that rely on them for livelihoods and ecosystem services.

In Myanmar, EIA (Environmental Impact Assessment) was introduced in the last few years. Being project specific, EIA has some limitations as it does not contribute to higher level decision making. Thus SEA has emerged globally to bridge this gap. While EIA focus on individual projects, SEA aims to provide overall guidance toward integrating environmental sustainability into higher level planning process and policy choices. In general EIA approach is fairly reactive whilst SEA aims to be more proactive to mainstream environmental consideration into development proposals.

Under the 2015 EIA procedure, SEA is a recognized tool to be carried out by government department on specific projects or development activities and plans.

This Labutta TEA report follows the concept and process of general SEA methodology.

1.3 TEA Goal and Objective

The principal goal of the regional TEA is to provide a regional overview of environmental status of Labutta that leads to formulation of generic environmental management framework of selected sector complementing resilience building activities. In addition, TEA report is intended to provide guidance to the relevant decision makers to adopt sustainable development strategies in existing and potential plans and programs within the township boundary.

This study is a starting point to advocate for better policy adaptation and to strengthen the capacity of governmental officials and community leaders to understand the correlation between development projects and environmental sustainability.

This document has been designed to meet a number of objectives:

- To analyze the existing environmental and social legislative frameworks relevant to environmental governance,
- To collect environmental baseline information representing physical, ecological and social characteristics of study area,
- To assess and identify significant environmental threats
- To provide legal and technical guidance for sustainable development and entry to environmental management in study township ,

It is anticipated that recommendation and generic environmental management provided in this document shall be practically considered when implementing ongoing development plan and future potential. The recommendations of the reports will continue to serve beyond BRACED project period.

1.4 SEA Methodology

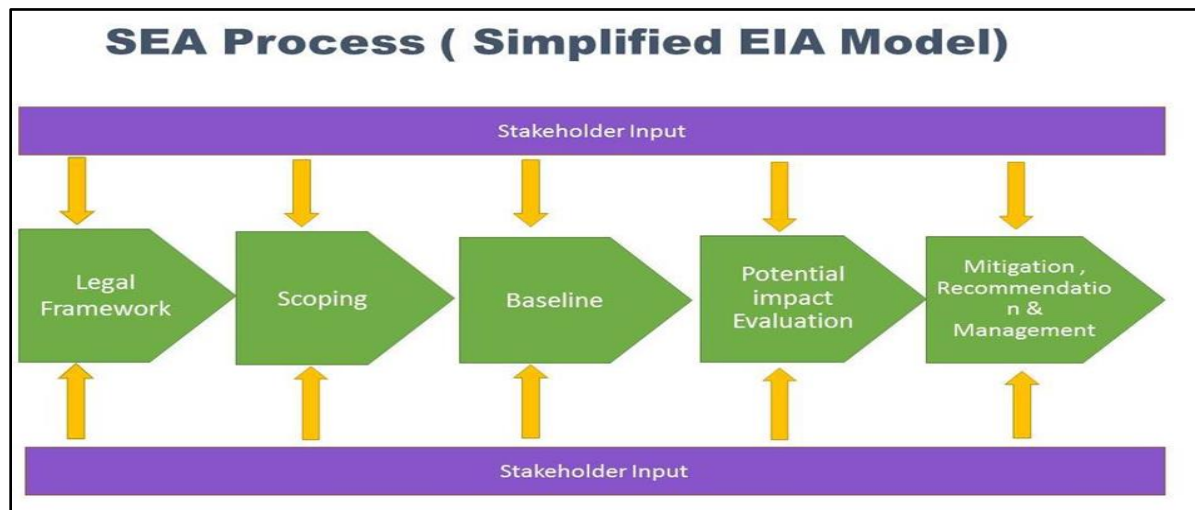
This TEA study follows a broad SEA methodology to undertake analysis of Labutta Township. Accordingly, MEI has used well-established EIA principle or simplified EIA process in the study whilst adapting it to incorporate climate change and disaster risk issues.

The adopted SEA process is shown as following figure and key elements are described from starting point to the completion of process.

In this simplified SEA process, stakeholder participation and consultation shall be considered and included in every step as a continuous participatory approach. All feedback, suggestion and input from stakeholder consultations are taken into account in scoping and assessment and analysis.

In this study, the environmental assessment shall be carried out at township level emphasizing the sensitivity of ecosystems and environments in study area with reflection of regional development plans. TEA will take a broader view of the potential impacts of sectorial plans e.g. waste management , industrial sector and other services.

Figure 1 SEA Process



Analysis and evaluation of the probable impact builds on expert judgment technique from the core MEI team validated by a wider variety of opinions and expertise of individuals who have considerable knowledge.

Data Collection Methodologies

The TEA requires a considerable amount of data and information including secondary and primary data. To make certain to be a reliable and realistic document, following methods were employed.

Literature Review and Desk Study

The research team firstly reviewed all existing and available technical and scientific documents relevant to the area and other unpublished data from other governmental departments , academic institutions and documents from online search.

Field Data Collection

Field observations were conducted to gather primary data and information. During the visits, experts from MEI met with local governmental officials, some NGOs and local inhabitants. The meetings included focus group discussions and investigated their perceptions and opinions over social and environmental issues and concerns currently encountered in the region.

Stakeholder Consultation and Interview

Stakeholder meeting and focus group meeting were undertaken with various government departments. Participants and respondents actively discussed and disclosed information about existing activities and concerns about the environmental degradation.

First consultation meeting was conducted in April 2016 which was followed by second consultation meeting in January 2017 . Based on the findings from drafted TEA report, training for implementation was carried out in March 2017. All events were taken place in Labutta Town.

1.5 Limitations

Major challenges during the study include a lack of secondary resources and information. During baseline observation, the study team was unable manage to visit some significant areas in the township especially coastal mangrove areas and southern part of township. Thus, the study centered on Labutta Town and easily accessible surrounding areas. In the absence the information, or insufficient data, experiences of stakeholders shall be mainly taken into account. The development projects found in the study area are small scale enterprises having some low level effect on the receiving environment. Thus, study focuses on the existing drivers leading to the degradation of environment.

More importantly, this study, given its mainly environmental focus, could not study all the issues in detail.

1.6 Environmental Scoping

The scoping study was conducted in the earlier phase of project .During the field observation in Labutta Township, the study team met a numbers of stakeholders in consultation meeting and focus group meetings. Opinions and suggestion expressed by stakeholders in identifying environmental issues, major drivers, development projects and probable impacts. The identified common environmental and climate change issues are described as below.

- Intense heat, water scarcity and pollution
- Flood and storm
- River bank erosion
- Saline intrusion
- Mangrove forest degradation

Active and potential development plan and activities identified as having negative environmental consequences are described in the following table with linked issues.

Development and Activities	Key Environmental Issues
Waste Management	Air pollution, health and hygiene , water pollution, flood
Fuel wood consumption and logging	Pressure on mangrove communities , riverbank erosion
Extension of Agricultural Land and Land use Change	Pressure on coastal mangrove communities

Chaper 2 Environmental Legislative Framework & Enabling Environment, Environmental Assessments

2.1 General

Myanmar has already developed legislations and regulations relating to natural environment since before its independence. The Forest Act and the Burma Wildlife Protection Act, for example, have been enacted respectively in 1902 and 1936 for the sustainable use of forest products.

2.2 National Environment Policy

National Environment Policy was issued in 1994 by NCEA with intention of formulating sound environmental policies, legislative frameworks, effective utilization of resources and water so as to conserve environment and prevent from degradation. The major theme of policy is consideration of environmental and social aspect into development process. By doing so, it is believed to enhance the quality of life of citizen.

2.3 Myanmar Agenda 21

The commission also formulated a blue print, the Myanmar Agenda 21, in 1997 as a follow up of national environmental policy in response to the call of the Earth Summit to develop national strategies to implement the Global Agenda 21. Myanmar Agenda 21 serves as a framework for integrating environmental considerations in future national development plans as well as sectorial and regional development plans in Myanmar and recognizes the need of environmental impact assessment, integrated economic development and sustainable social development respectively.

2.4 National Sustainable Development Strategy

National Sustainable Development Strategy was formulated to implement the National Environmental Policy in 2009 by Ministry of Forestry with the vision of wellbeing and happiness of Myanmar people. Three overarching goals identified are sustainable management of natural resources; integrated economic development and sustainable social development. In order to achieve these goals, a series of objectives are set along with activities. In addition, leading institution and collaboration institutions are identified to perform the activities.

2.5 Relevant Environmental Legislation

Besides the above-stated documents, there are several laws and regulations relating to the environmental matters administered by various relevant ministries in Myanmar. Some major laws and regulations are also tabulated with their main purposes in following table.

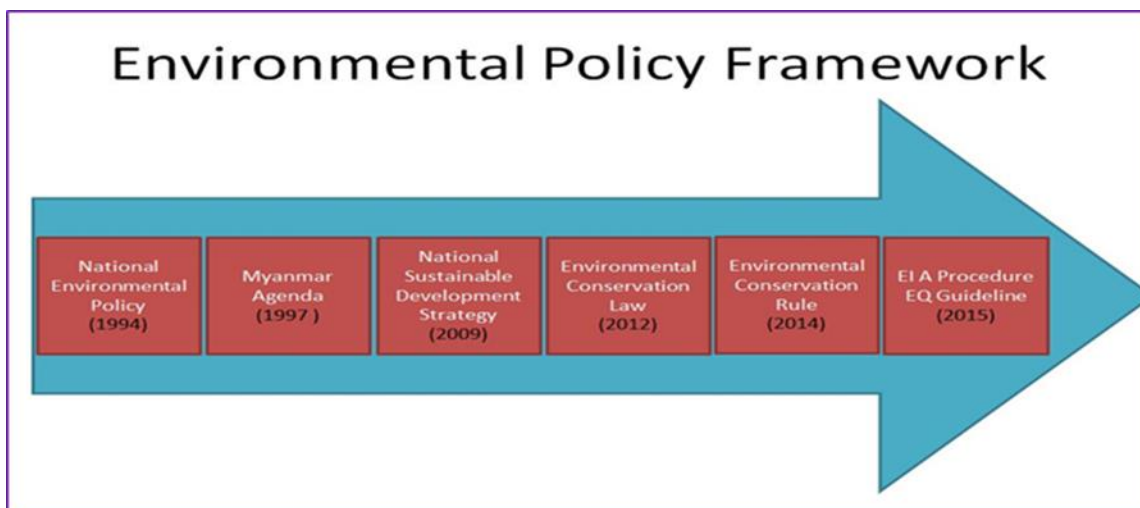
Table 1 Existing Environmental Legislation

Law and regulation	Year	Purpose
Factory Act	1951	To make effective arrangements in every factory for disposal of waste and effluence, and for matters of health, cleanliness and safety.
Public Health Law	1972	To promote and safeguard public health and to take necessary measures in respect of environmental health.
Territorial Sea and Maritime Zone Law	1977	To define and determine the Maritime Zone, Contiguous Zone, Exclusive Economic Zone and Continental Shelf and the right of the Union of Myanmar to exercise general and exclusive jurisdiction over these zones and the Continental Shelf in respect of preservation and protection of the marine environment, its resources and prevention of marine pollution.
Fishing Rights of Foreign Vessels Law	1989	To conserve fisheries and to enable systematic operation in fisheries with participation of foreign investors.
Marine Fisheries Law	1990	To conserve marine fisheries and to enable systematic operation in marine fisheries.
Forestry Law	1992	To implement forest policy and environmental conservation policy, to promote the sector of public cooperation in implementing these policies, to develop the economy of the State, to prevent destruction of forest and biodiversity, to carry out simultaneously conservation of natural forests and establishment of forest plantations and to contribute to the fuel requirements of the country.
National Environmental Policy	1994	To establish sound environment policies in the utilization of water, land, forest, mineral resources and other natural resources in order to conserve the environment and prevent its degradation.
Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law	1994	To protect wildlife, wild plants and conserve natural areas, to contribute towards works of natural scientific research, and to establish zoological gardens and botanical gardens.

Myanmar Mines Law	1996	To implement mineral resources policy.
Conservation of Water Resources and river law	2006	Protection and maintenance of river bank and river water quality by defining area of river bank and forbidding substance which are harmful.
Conservation of Water Resources and River Rule	2006	Specification on role and responsibility for maintaining river, permission process for activities which could damage river resources.
Fertilizer Law	2002	To boost development of the agricultural sector, control fertilizer businesses, and to facilitate conservation of soil and the environment.
Environmental Conservation Law	2012	The law lays down the path forward to focus government efforts to accomplish sustainable development and provide basic principle for systematic integration of environmental issues in development mechanism
Environmental Conservation Rule	2014	The rules provide duty and power of Ministry and department, finance for sustainability, development of EIA procedure, guidance for development of environmental standard, urban environment ,waste management , protection of natural resource and natural heritage. .
EIA Procedure	2015	To provide a clear guidance how to perform environmental impact assessment and initial environmental examination for the development projects.
National Environmental Quality Guideline(Emission)	2015	To inform the specific requirement and standard for discharge and emission.

Source: Resource and Environment Myanmar

Figure 2 Generic Environmental Legislative Framework



2. 6 Institutional Management and Arrangement for Environmental Policy and Strategies

Central Committee for National Environment Conservation and Climate Change (NECCC)

Chaired by Vice President of Union of Myanmar, this committee plays a high level coordinating role among the sectorial ministries. Responsibilities of the central committee include laying down policies and mediating the tasks between the Ministries of the Union and Cabinets of the Regions and states. For effective implementation, it has established following committees.

- Policy, Law and Standards Working Committee
- Climate Change Mitigation and Adaptation Working Committee
- Land use and Culture /Heritage Working Committee
- Urban and Industries Working Committee
- Environmental Education Working Committee
- Green Economy Development working Committee

National Coordination Framework

Natural Resource and Environmental Conservation Committees of Pyithu Hluttaw (*Lower house*) and Amyotha Hluttaw(*Upper House*) were formed as part of check and balance mechanism of Phuhtaungsu Hluttaw. These committees will serve as advisory board to Hluttaw. Responsibilities held by these bodies include gathering information about the widespread environmental issues and complaints from communities and affected people, serving as an advising administrative bodies for more transparent and effective implementation of environmental policy and regulations, reviewing existing legislation and promulgating new natural resource and environmental related legislation.

Ministry of Natural Resources and Environmental Conservation

Since Myanmar has initiated its move towards democracy, the Ministry of Forestry was reformed as Ministry of Environmental Conservation and Forestry (MOECAF) in 2011 as a national level agency to coordinate and handle environmental related issues and matters including the implementation of international environmental agreements signed by government, law enforcements and information dissemination. MOECAF was reformed again by merging with Ministry of Mining as Ministry of Natural Resource and Environmental Conservation (MONREC) effecting from 1st April 2016.

Currently MONREC has been acting as focal coordinating body for country's environmental performance and implementation of environmental management.

MONREC has supported preparation of environmental regulations such as EIA rules, environmental quality standards through collaboration with international financial institutions and United Nations organizations. MONREC has been extending its organizational structure by forming sub -divisions under Environmental Conservation Department) into State and Division offices and recruiting new staff with the aim of effectively implementing and managing environmental regulations and resources.

Environmental Conservation Department (ECD)

The Environmental Conservation Department (ECD) under MONREC was established in October 11, 2012 to take responsibility for the effective implementation of environmental conservation and management in Myanmar.

Environmental Conservation Department is responsible for implementing National Environmental Policy, strategy, framework, and action plan for the integration of environmental consideration into in the national sustainable development process. Additionally ECD has to manage natural resources conservation and sustainable utilization, the pollution control on water, air and land and to cooperate with other government organizations, civil society, private sectors and international organizations concerning with environmental management.

Being a national coordination body related to environmental matters, ECD has been hosting various environmental and sustainable related workshops and meetings in an effort to develop human resource, knowledge and technical expertise in environmental sector, transferring and encouraging knowledge sharing from international counterparts and experts.

ECD is also responsible for managing the national climate Change strategy development and implementation under the Myanmar Climate Change Alliance.

Regions/States Environment and Climate Change Supervision Committee

With notification, Union Government office gives order to form regional, state and Naypyidaw level, Regional Environmental Conservation and Supervising

Committee. The Committee will be chaired by a Council member nominated by the Regional and State Government and the members are nominated by sector ministries and some representatives from CSO. The regional ECD head will act as secretary of committee. The tasks given are¹

- Implementation of Environmental Impact Assessment and establishment of comprehensive monitoring for environmental conservation
- Supervision on climate change mitigation and adaptation activities and coordination between relevant government department and organizations
- Formulations of plans for conservation of natural resources and cultural heritages
- Issuing directives and supervising activities towards prevention of loss of natural resources and sustainable effective use of them
- Formulation and implementation of plans and directives for sustainability and efficiency of energy use
- Supervision of environmental statistics and database
- Supervision of environmental management of urban, rural, industrial zone and special economic zones
- Supervision of systematic control of waste
- Coordination between relevant government bodies and organizations on environmental disputes
- Inspection and taking action on environmental complaints and if necessary reporting to the Environmental Conservation Committee

2.7 SEA Requirement in EIA Procedure

Newly emerged EIA procedure approved by Union Government in November 2015 and officially launched in December 2015 is regarded as significant mile stone for environmental sector of Myanmar .This procedure focuses on the identification of business types needing EIA and IEE and conducting stakeholder involvement in the project in transparent way.

Under the Article 123 of section 10², SEA requirement is generally stated that MONREC may ask relevant authorities to conduct SEA for policy strategy development plan and program prepared by government organizations of state, regional and township administration, self-administered zone and division or private sector .Where significant environmental and social impact is likely to occur by those policy, strategy, plan and program. MONREC may ask responsible agency for undertaking scoping study to identify and access environmental and social impact, provision of monitoring frame work for those of policy, plan and program.

¹ Need assessment for effective implementation of the environmental conservation law in Myanmar (MOECA, SYKE, Ministry of Foreign Affair of Finland, UNDP)

²2015 EIA Procedure , Government of Union of Myanmar

However, this section does not provide enough details on application of strategic environmental assessment in decision making process. In addition, it is found to be quite general and does not explicitly stress the requirement of SEA such as TOR, reviewing process, implementation, sense of ownership and follow-up.

Thus it can be concluded that there is not a strong mandatory requirement for conducting SEA according to existing environmental regulations.

2.8 Institutional Framework related to Resettlement and Land Acquisition

Principle legislations concerning land acquisition are:

- (1) Constitution
- (2) Land Acquisition Act (1894)
- (3) Farmland Law (2012)
- (4) Special Economic Zone Law
- (5) Vacant, Fallow and Virgin Law

Following table presents the existing legislations which govern the land use and land acquisition in Myanmar.

Table 2 Existing Land Management Legislation

Legislative Framework	Year	Major Provision
Constitution	2008	The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union.
Land Acquisition Act	1894	This is basic legal framework for land acquisition providing government to acquire the land from landowner. Major elements include demarcation of boundary, declaration of action and role and responsibility of collectors.
SEZ Law	2014	This law provides framework for forming of working committee, management committee and supporting body with various government department and responsible authority for land acquisition.
Farmland Law	2012	This law focuses on land use right of farmers and details the process of permission to potential farmers who are eligible. Under this law. Land can be sold, leased and transferred freely by legitimate land owner. Role and responsibility of farmland administrative bodies of various levels are defined in detail.
Vacant, Fallow and	2012	This law aims at providing framework for effective use of land. Investor can apply land right to the government for

Virgin Land Law		basic structure or other investment which would benefit for the sake of state.
National Land Use Policy	2016	This policy was released recently to ensure the systematic land use management and administration of present and future so as to improve food security, water resource development, transportation, business development and to protect environment and cultural heritage.

In connection with land confiscation, little information and guidance is available about streamlining the process of acquiring land in Myanmar. In review of land acquisition act (1894), detailed requirements are not described and followed regulation does not stress the process for the resettlement work. Absence of adequate resettlement and livelihood restoration standards has led to the alleged land grabbing for development project in the past. In recent years, a numbers of protests against the investment projects took place on account of improper grabbing of land without or little compensation. Government has received piles of complaints over the land grabbing related cases.

Newly promulgated EIA procedure also does not provide the clear guidance and process in dealing with land grabbing, resettlement and compensation. Instead, it merely mentions resettlement is to be carried out in coordination with relevant authorities. Authorized government bodies to be involved in engaging and mediating land issues are not explicitly mentioned. Requirement of Involuntary resettlement is not mentioned in the procedure.

2.9 Institutional Analysis on Environmental Governance

In review of institutional and organizational management in environmental governance, the responsibly and accountability are still unclear among state and regional department, line ministries, Hluttaw and MONREC. ECD has been currently increasing staffing to strengthen its capacity to enhance the environmental governance of Myanmar. However, it is observed that there is room for improvement in department such as capacity for monitoring, environmental audit, technical knowledge, skill and experience of staff assigned for the specific duty. In order to fill this gap, international organizations such as ADB and IFC has been continuously delivering capacity building programs including monitoring of water and air pollution, reviewing technique of EIA, IEE and sustainable hydropower to staff of environmental sections of Ministry .ECD has opened its branches in 14 States and Regions.

In connection with individual performance and activity, majority of the staff within department are newly recruited with need of skill, knowledge, experience and technical expertise to be developed.

Viewing implementation of legislative framework, environmental policy is not very effective on account of aforementioned factors. Meanwhile ECD has been putting its

efforts to improve the department's capacity and capability to address the environmental conflicts and disputes in development projects at both national and regional level.

Township Level Environmental Management

There is no organized structure for environmental governance and management in Labutta Township. Sectoral department separately takes responsible for managing environment pertaining to their activity. Whilst forest department monitors the status of deforestation and losses of wildlife, township development committee handles solid waste management. ECD was formed in Patheingyi, capital city of Ayeyawady Region, as regional focal unit to oversee the environmental management of region and to promote environmental awareness among public.

Township GAD (General Administrative Department) has responsibility for overall township management.

Chaper 3 . Environmental Baseline, Key Environmental Issues and Vulnerabilities

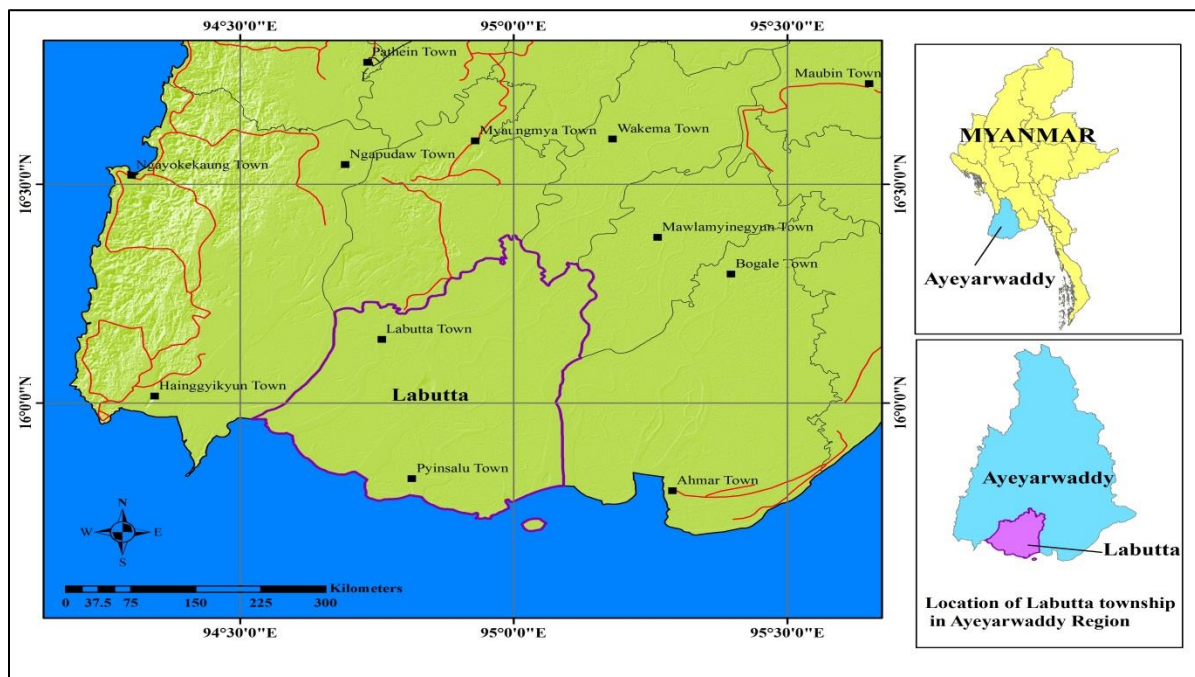
3.1 Environmental Baseline

Fundamental objective of establishing environmental and social baseline data of study area is to understand the current status of environmental and social features , their trends and to realize the sensitivity of flora and fauna of particular region and to serve as a basic environmental reference .

Location of Labutta Township

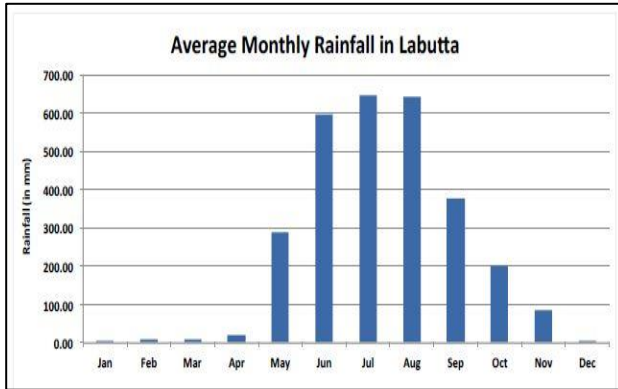
Labutta Township is one of the townships in Ayeyawady Region . It is located between North Latitude $15^{\circ}40'30''$ and $16^{\circ} 23'$ and between East Longitude $94^{\circ} 33'$ and $95^{\circ} 9'$ and elongated 23.2 miles from East to West and 36.063 miles from South to North. The land area of the township is 1160 square miles. It is surrounded on the east by Bogale township, on the south by the Andaman Sea , on the west by Nga putaw Township and on the north by Myaungmya, Wakema and Mawlamyinegyun township. As it is in the delta region, there are many river and streams flowing in the township . The north part of the township has some hills of under 50 feet and the remaining parts are flat region. It is located over 5 feet above the sea level.

Figure 3 Location of Labutta Township



Climatology ³

Climate information in this section is referred from Climate Profile of Myanmar prepared by Regional Integrated Multi Hazard Early Warning System(RIMES) as a technical partner to United Nation Human Settlement Programme (UN-Habitat) , as part of BRACED Programme.



Rainfall in Labutta exhibits a unimodal behavior with the wet season starting in May, peaking in July and August, and starts receding from September; November-April records minuscule amounts of rainfall. This rainfall pattern suggests high influence of Southwest monsoon over the rainfall in the township.

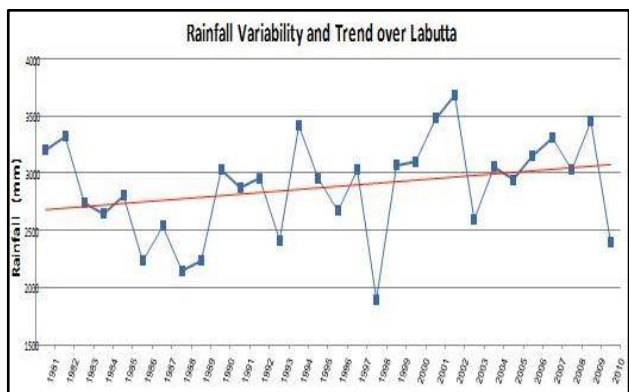
According to the average monthly rainfall figure, highest rainfall receives in July and August which usually more than 600 mm per month. Owing to the geographical location, the region receives the longer South West monsoon period than other parts of country

Labutta is typically warmest in April (maximum temperature averaged at 36.09°C; and average minimum temperature at 24.40°C) and March (with average maximum temperature at 35.62°C; average minimum temperature at 21.77°C). January records the lowest average minimum temperature, at 17.53°C; followed by December (18.84°C); and February (19.26°C)

Diurnal variation (i.e. difference between day time and night time temperature) is notable in Labutta, especially from December to February; the wet months of June, July, August and September have the least diurnal variation.

Rainfall Variabilities, Trends and Extremes

Labutta has average annual rainfall of about 2,900mm. The lowest annual rainfall recorded in 1998 was 1888mm; highest observed rainfall was recorded at 3677mm in 2002. In 30 years, about 626 events exceeded 40mm; of these, 73 events exceeded 100mm in 24 hours. Two events exceeded 200mm (240mm in 20 May 2002; 216mm in 18 June 1987).



Further analysis suggests the

³ Climate Profile, RIMES, UN-Habitat, BRACED Program

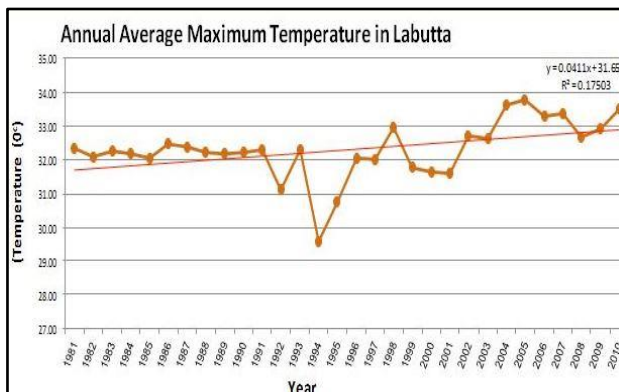
increasing trend in annual rainfall and the increasing occurrence of extreme rainfall events.

On the average, the wet season in Labutta contributes about 95% to annual rainfall. The number of wet days, is averaged at around 118 over the study period of 1981-2010. The variability is high, ranging from having the least number of rainy days 1987 (94), and the most number of rainy days in 1999 (141); The trend in the number of rainfall days is increasing. The increasing trend in both amount of rainfall and number of days of rainfall is indicative that the wet season, in the Township, is becoming wetter.

Analysis of extremes further suggests increasing occurrences of high intensity rainfall events, in the township.

Temperature Variabilities, Extremes and Trends

In 30 years, the maximum temperature in Labutta is averaged at 32.30°C. 2005 is overall the warmest year with average maximum temperature of 33.8°C. The warmest maximum temperature in Labutta was recorded in 2 May 2002 and 1 May 2004 at 41.5°C; the coolest maximum temperature was in 31 December 2010.



The analyses of average maximum temperature shows increasingly warmer days and extreme temperature events have been experienced over the 30 years period.

Average minimum temperature in Labutta, from 1981–2010, is 22.27°C. Highest average minimum temperature is in 1998, at 23.36°C. Warmest night time temperature in

Labutta is at 28°C.

The data 30-year minimum temperature data from Labutta shows that despite a slightly increasing trend in average minimum temperature, the occurrences of very warm nights are decreasing.

Biological Environment

As Labutta township is flat plain region and shallow part of the sea, network of rivers and streams are commonly found in this township. The condition of forest coverage in Labutta Township is 12.56%. Limited information is available to understand the detail status of flora and fauna of township.

Natural Habitat

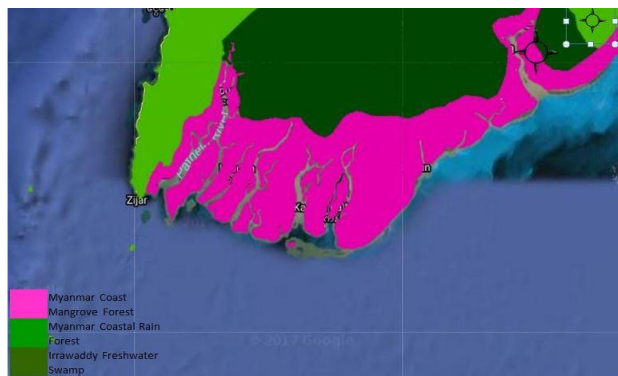
Ecosystem in the region comprises of mangrove forest, agricultural land, scrub land, build up area and stream. Mangrove forest occupies the large portion of township. However, most of mangrove forest is degraded due to long history of

logging, extension of agricultural land, firewood collection and charcoal making activities. Vast area of shrub land are observed in west and northwest of Labutta town along the eastern bank of Thakethoung River which borders with Bogale Township . A large patch of coastal mangrove forests is identified on Islands between Pyinsalu River and Ayeyawady River. Another area with significant mangrove forest coverage is on island between Pyanmalok and Ywe River. It is clearly understood the existing coastal mangrove forest are located in western part of township.

Ecoregion, Key Biodiversity Area and Protected Area

As defined by WWF (World Wildlife Fund) , an ecoregion is a "large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions".⁴

Figure 4 Ecoregion



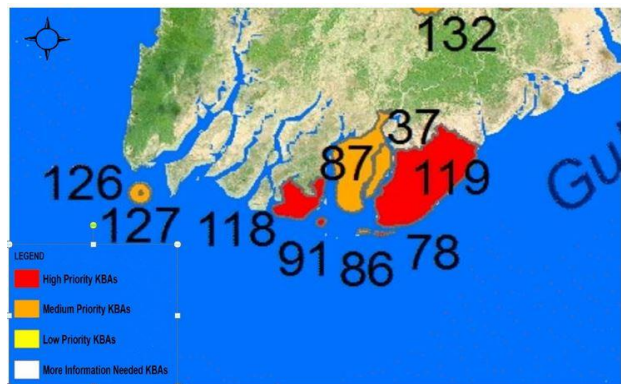
Source: <https://ecoregions2017.appspot.com/>

Figure 4 shows the distribution of three ecoregions in Myanmar. The Myanmar Coastal Mangrove Forest (pink) is located along the coast, Myanmar Coastal Rain Forest (green) is in the inland, and Irrawaddy Freshwater Swamp (dark green) is in the northern part of the country.

Ecoregion in Myanmar is divided into 14 regions depending of the assemblage of plants, animal, climate and geo-morphology characteristics of the area . Located in delta region, Labutta area falls within Myanmar coastal mangrove ecoregion. The Ayeyawady River flows into the Bay of Bengal, and its delta is made up of

mangroves and freshwater swamp forests.

Figure 5 KBA of Delta Area



Source: <https://myanmarbiodiversity.org/key-biodiversity-areas/>

This ecoregion is an extremely fertile area because of the river borne silt deposited in the delta. The southern portion of the ecoregion transitions into the Myanmar Coastal Mangroves [IM1404] and is made up of fanlike marshes with oxbow lakes, islands, and meandering rivulets and streams.⁵

Some key biodiversity area (KBA) are identified along coastal area in the very north west of township close to Adman sea.

⁵ <https://www.worldwildlife.org/ecoregions/im0116>

Pyinalan reserved forest and Kaingthaung Island are included in the key biodiversity area .⁶ These areas are considered high priority KBAs.

However, there is no protected area in Labutta Township. Nearest designated protected areas are Mainmahla Kyun wildlife sanctuary which is located in Bogale Township. It is an island of low flat land delta area . Mangrove is major natural resource with 40 recorded species, 51 medicine plant species, 11 orchid species, 18 mammal species including Ayeyawady Dolphin . Mainmahla Kyun is one of Myanmar’s ASEAN heritage site. ⁷Mainmahla Kyun Wildlife Sanctuary is the premier place in Myanmar to see saltwater crocodiles. Additionally, during certain months of the year, it is also possible to see the rare Irrawaddy Dolphin large population of migratory water birds.

The study area has seen a general decline on biodiversity status due to continuing expansion of agricultural land. Coastal mangrove forest coverage has been on a steady decline due to agricultural expansion and deforestation. A 2014 satellite study indicates the significant losses of mangrove coverage between 2000 and 2013 in Ayeyawady Delta area.

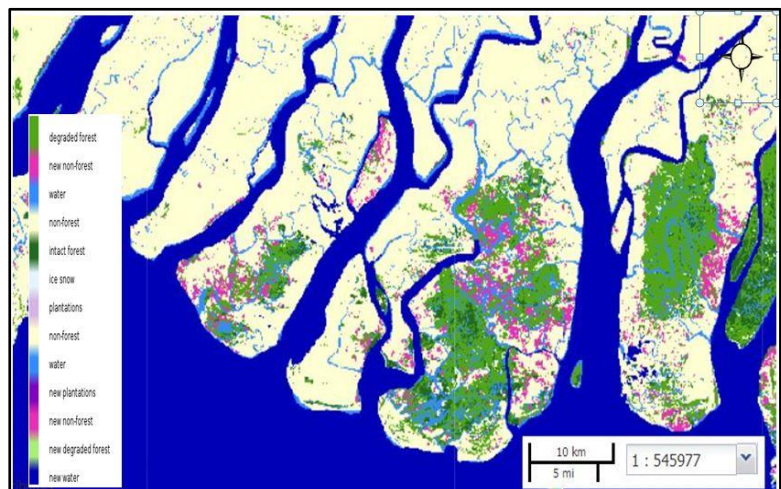
Mangrove Forest of Delta Area

Coastal mangrove ecoregion of Myanmar is found in Ayeyawady Delta, Rakhine Coastal an and Taninthayi

Figure 6 Forest Cover Change

Coastal Area.

Ayeyawaddy mangroves consist of *Rhizophora mucronata*, *R. conjugata*, *Bruguiera parviflora*, *B. gymnorhiza*, *B. cylindrica*, *Heritiera formosensis*, *Sonneratia apetala*, *S. griffithii*, *S. caseolaris*, *Xylocarpus granatum*, *X. molluccensis*, *Ceiosporox burghiana*, *C. mimosoides*, *Avicennia officinalis*, *Kandelia rheedii*, and *Excoecaria agallocha*.⁸



Source: Myanmar Forest Land Cover Change (2002-2014) Alarm,EcoDev, EU, MERN,IUCN,Smithsonian, gmap,

However, mangrove of American Museum of Natural History Delta Area including Labutta has been seriously degraded due to various reasons including human encroachment, expansion of agricultural land, firewood harvesting and charcoal production and shrimp farming.

⁶ <https://myanmarbiodiversity.org/portfolio-items/myanmar-key-biodiversity-areas/>

⁷ Myanmar Protected Area, Context , Current Status and Challenges

⁸ <https://www.worldwildlife.org/ecoregions/im1404>

From 1980 to 2013, about 83% of mangrove forest in Ayeyawady Delta area has been lost. The remaining 17% of mangrove are not good quality to produce seed for replantation.⁹ Within 1980 to 2013 a total of 567701 acres of mangrove cover was completely wiped out and converted into agriculture land, shrimp farming and other activities.

Table 3 Mangrove Coverage

Region	Total Mangrove (1980)	Other Land Use (Ac)			Mangrove Coverage
		Agriculture	Shrimp Farm	Other	
Ayeyarwaddy	679019	265917	301784	567701	111318

Source: Adapted from Vulnerability and Resilience Assessment of Ayeyawady Delta in Myanmar

The discharge in Ayeyawady delta is in low in February and March and high in April and May due to the melting snow in upper catchment area.

In Labutta Township, mainstream Ayeyawady River, Pyinsalu River, Pyamalok River, Ywe River and Tetketaung River flow from North to South and empty into Adman Sea. The waters of these rivers are very turbid

Figure 7 Rivers in the Study Area

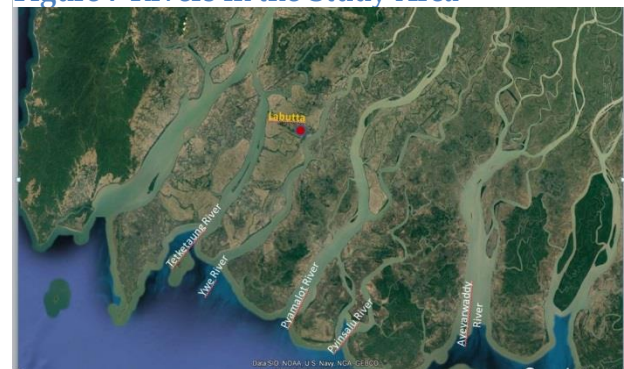


Figure 8 Representative Photo of Ywe River



due to the silt load they carry. The sea along the coastal line is very shallow due to the large volume of sediment deposition from upper and middle catchment area. Sagyin Chaung which connects between Ywe River and Tetketaung River is small river flowing across main island. All these rivers are distributaries of mainstream Ayeyawady River.

As a result of constant accretion into the sea, the delta is advancing at a rate of 5-6 km per 100 years, equivalent to about 1,000 hectares per year.¹⁰

⁹ Vulnerability and Resilience Assessment of Ayeyarwaddy Delta in Myanmar

¹⁰ <http://enfo.agt.bme.hu/drupal/node/12903>

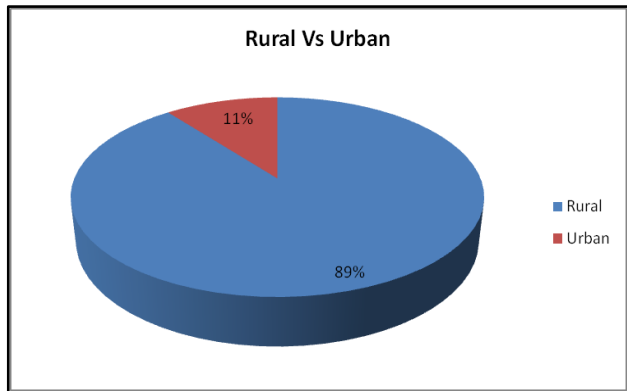
Geology

The Geological Map of Myanmar shows that the entire area is overlain by a thick layer of recent alluvium brought down by Ayeyawady and Thanlwin Rivers. Three main types of soil have been developed. Those are meadow grey clay soils, meadow swampy soils and saline gley soils.¹¹

3.2 Social Economic

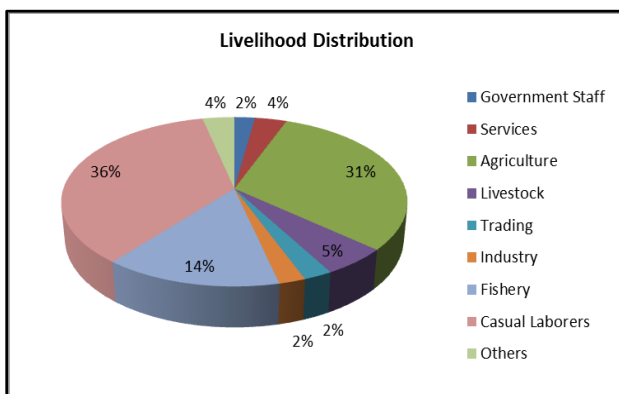
Population, Ethnicity and Language

In 2014, total population in Labutta Township(including Pyinsaly Sub-Tsp) was 315,218 people. 89% of total population (281,815 people) lived in rural area and the rest of population (11%) lives in urban area. There is a big gap between urban and rural population ratio. The population density is 126.5 inh./km². In comparison with population density of Ayeyawady Region which has 176.5 persons per square kilometer, the township population density is low.



The largest ethnic group in the study area is Bamar which makes up more than half of total population (82%). Myanmar Language is common and major language in Labutta. Kayin ethnic group is second largest group with total population of 56361 people. (17%). Some Kayin people speak their own language.

Livelihood



Source: Township Planning Dept

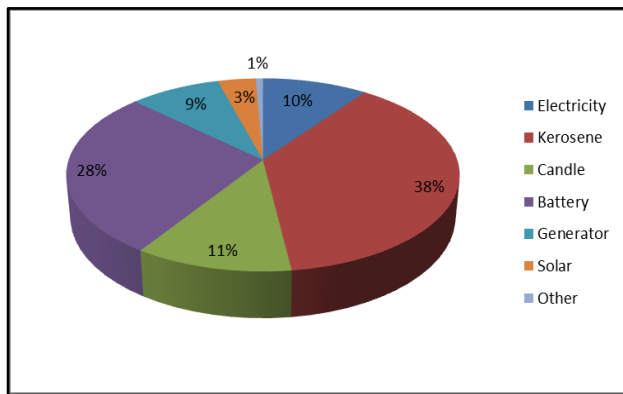
Ayeyawady Region has been known as Myanmar's largest rice producer for decades. Over 3.6 million acres out of 4 million acres are paddy fields. In addition to paddy fields, other crops such as banana, coconut, Nipa Palm, betel nut, cashew nut, chili and onion are grown.

Agriculture and fisheries are prime economy for local residents of Labutta Township. Depending on location, livelihood profile is different. In

¹¹ Fee, L; Gibert, M; Bartlett R; Capizzi, P; Horton, R; Lesk, C; Climate Change Vulnerability Assessment of Labutta Township, Ayeyarwaddy Region, Myanmar, 2016-2050, UN-Habitat Myanmar, 2017

southern part of township where is close to river and sea , fisheries and crab hunting are predominant livelihood . However, residents residing in northern section of the township practice both , agriculture and fisheries due to the vast flat land . Another prominent business are rice mill, livestock, trading , salt production and some construction. . Livelihood distribution in Labutta are described is described in the figure provided .

Referring to the figure, majority of residents are making livelihood by agriculture and fisheries where casual laborers are factored in.

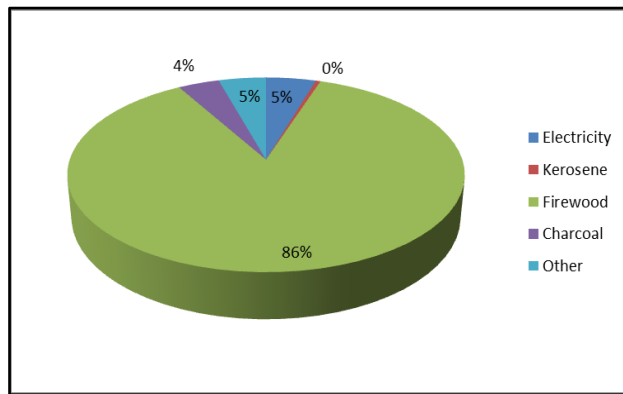


Source of Energy ¹²

Most significant source of energy for lighting is kerosene as shown figure to the left which accounts for 38 % of total household use. Lighting produced by battery comprised of 28 % of total household use. Battery is second largest source of energy for lighting. Only 10 % of total household is accessible to national grid for

lighting.

Source of Cooking ¹³



The chart to the left illustrates the proportion of source of cooking in Labutta Township. Most inhabitants of the township primarily rely on firewood as source of cooking. It is observed that 86% of total household uses firewood. Only 5% of total household afford to cook with electricity. Even the area was once famous for production of good quality charcoal from mangrove; the

actual use of charcoal by local people is considerably low in comparison with use of firewood.

Source of Drinking Water ¹⁴

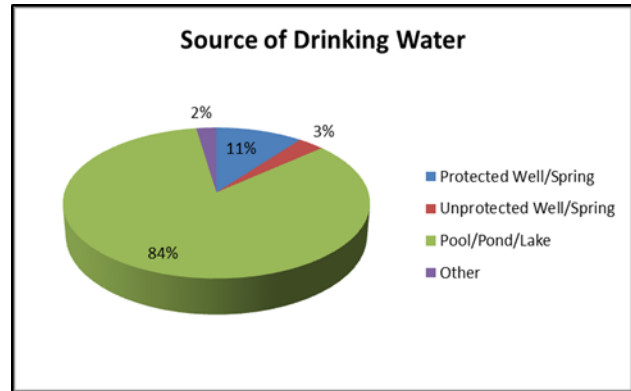
The census report indicates the source of drinking water and non-drinking water of Labutta Township in housing amenities section. As illustrated by pie chart to the

¹² Census Report , 2014 Myanmar Population and Housing Census Union of Myanmar

¹³ Census Report , 2014 Myanmar Population and Housing Census Union of Myanmar

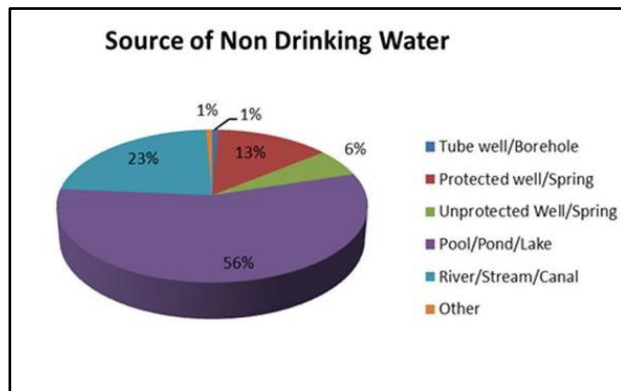
¹⁴ Census Report , 2014 Myanmar Population and Housing Census Union of Myanmar

left, 84% of total household rely on rain water collection pond for drinking water purpose. Household who sources drinking water from protected well and unprotected well accounts for 11% of total household. The rest of total households depends on tube well/river /bottled water are very much minimum. The water quality from the rain water collection ponds is not available during the study period. Therefor most significant source of drinking water is rain water collection pond.



Source of Non Drinking Water ¹⁵

Similar to source of drinking water, community of the study area sources majorly from artificial pond and lake for non-drinking water with 56%. If is followed by tube well and borehole with 23%.



Land Use

The predominant land use in Labutta is agriculture which covers 45% of total land. It is followed by mangrove forest with 28%. A greater number of this mangrove forests locates in southern part of township. Scrub land (15%) and forest (12%) locate in northern section of township.

3. 3 Environmental Issue and Analysis

During the scoping process, the significant environmental issues of township are prioritized. Some activities and drivers behind these issues which lead to environmental deterioration are also identified.

In this section, probable impacts were examined and assessment was made through desktop review and expert judgment.

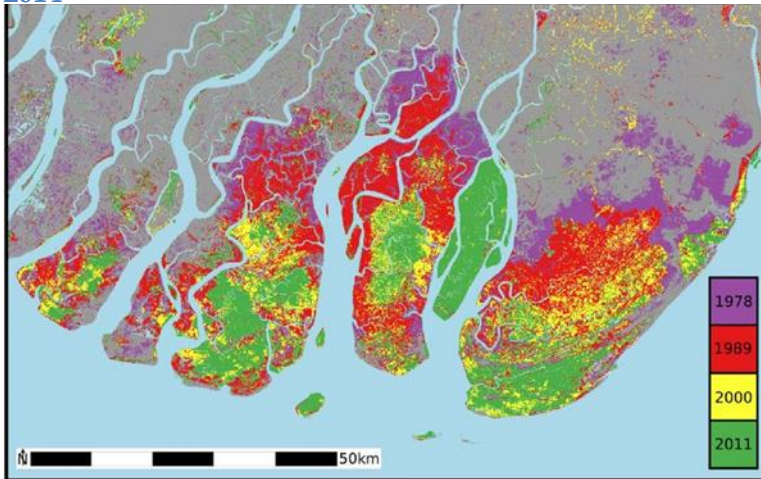
The relationship between environmental aspect and climate change is also highlighted in each section.

¹⁵ Census Report , 2014 Myanmar Population and Housing Census ,Union of Myanmar

Environmental Impact by Human Encroachment, Expansion of Agricultural Land and Mangrove Forest

As mentioned in baseline section, mangrove of delta area including Labutta has been seriously degraded due to various reasons including human encroachment, expansion of agricultural land, firewood harvesting, salt farming, charcoal production and shrimp farming.

Figure 9 Mangrove Forest Cover Change from 1978 to 2014



Source: Webb. et al(2015) Deforestation in the Ayeyarwaddy Delta and the conservation implications of an internationally engaged Myanmar

According to some studies, Ayeyawady Region has low forest coverage. Moreover, intact forest coverage has decreased from 8% (2002) to 6% (2014).¹⁶ Following figures shows the mangrove land cover change in Ayeyawady Delta in 1978, 1989, 2000 and 2011. In 2002, mangrove forest coverage was in abundance and covered extensively in Delta area. However, these mangrove forests have been eventually wiped out by

human activities.

Environmental impact and recommendation by human encroachment, expansion of agricultural land and mangrove forest are basically described in the following table.

Table 4 Environmental Impact by Extension of Agricultural Land

Element	Description
Current & Future Trend	Due to continuous agricultural land expansion, firewood collection, charcoal making and logging, mangrove forest cover has been significantly reducing. It is estimated that average annual loss of intact forest is 1.88% and average annual loss of all forest is 0.33%. ¹⁷ With average deforestation rate of 51

¹⁶ Myanmar Forest Land Cover Change (2002-2014) Alarm, EcoDev, EU, MERN, IUCN, Smithsonian, gmap, American Museum of Natural History

¹⁷ Myanmar Forest Land Cover Change (2002-2014) Alarm, EcoDev, EU, MERN, IUCN, Smithsonian, gmap, American Museum of Natural History

Element	Description
	kilometer per year, total mangrove forest would be lost by as early as 2019 in the worst case scenario. ¹⁸
Environmental Impact	<p>A number of environmental impacts by the removal of mangrove community are identified as follows.</p> <p><i>Deforestation</i> Deforestation causes loss of ecosystems, loss of flora and fauna species and habitats.</p> <p><i>Loss of Spawning Ground and impact to aquatic species</i> Mangrove forest serves as best spawning place, food and shelter for aquatic species and birds. Loss of these forests means significant impact for those aquatic species. With degradation of forest, fish population could be decreased and livelihood of residents who rely on fishery would be significantly affected.</p> <p><i>Riverbank and coastal line erosion</i> One of the ecosystem services provided by mangrove community is retaining water flow and sediment. Mangrove vegetation growing along the riverbank and coastal habitats could protect the erosion through retaining flash flood, slope stability and consolidating sediment. Clearing vegetation could lead to decrease the stability of slope and to increase the frequency of riverbank and coastal erosion.</p>
Climate Change and Linkage Impact	<p>Deforestation and land use change are also the major factors of climate change. Forest is a natural carbon sink which absorbs carbon in the form of carbon dioxide and emit oxygen which is vital for living of human being and animals. Mangrove forest has higher capacity of carbon sequestration than that of other forest types.</p> <p>Since it has been serving as natural barrier for storm and flood, the intensive removal of mangrove vegetation has caused the decrease in resilience and increase the intensity of natural disaster such as storm surge, Tsunami and flood .</p>
Recommendation	<p>In addition, allowing concession rights for perennial plantation should be considered.</p> <ul style="list-style-type: none"> • Implementation of government's policy/ forest law and regulation should be continuously applied. These measures could be achieved through cooperation of local community involvement.

¹⁸ Webb. et al(2015) Deforestation in the Ayeyarwaddy Delta and the conservation implications of an internationally engaged Myanmar

Element	Description
	<ul style="list-style-type: none"> • Monitoring illegal logging and tree cutting should be programmed. • Environmentally sound technologies should be promoted in agriculture, aqua farming and household cooking. • Practice on unsustainable use of resource should be reduced and it is required to explore and adopt the utilization of renewable energy resource. • Restoration and preserving natural mangrove vegetation should be programmed and maintained.

Environmental Impact by Solid Waste Management

Similar to other towns in Myanmar, Labutta has been a growing issue which could deteriorate environmental and public health quality of receiving environment.

In fact, there is not designated waste dumping facility in town. Conventionally, solid waste are collected, transported and dumped to the low lying area. The worst thing

is that most of the collected garbage are directly dumped on to the ground between motor road and river bank of Ywe River , about 3 Km to the north of Town as per figure. Thus, Ywe River has become a main receiver of various types of municipal and industrial waste.

According to world bank estimation, annual waste generation per capita in Myanmar is 0.44 kg/capita/day. Based on given waste generation rate and population of Labutta town, it is averagely estimated that the urban area has been generating about 14.6 metric ton on a daily basis . The entire township (both urban and rural) could generate the municipal solid waste up to 140 metric ton per day due to the higher population . All waste generated from town is cannot be transported to the dumping sites. It is estimated that Township Development Committee (Municipality) which is responsible government agency for handling municipal solid waste is apparently able to collect less than 50% of total generated waste of urban. Besides, the remaining uncollected waste typically ended up on the street, in the water bodies and in the low lying area.

Figure 10 Existing Waste Disposal Site



In rural area, there is no waste collection and disposal service provided by municipality such as transportation. Instead, villagers have to management the waste disposal on their own which means discarding nearby water course and beside the streets. Unhygienic opening waste dumps could be spotted on the roadside in the vicinity of villages.

In brief, due to the various factors such as lack of facility, poor capacity, equipment , human resource, limited public awareness , institutions and governance solid waste management in Labutta in weak and hardly exist.

Basic information, current and future trend, environmental and climate change impact and recommendations for waste management are generally summarized in following table.

Table 5 Environmental Impact by Solid Waste

Element	Description
Current and Future Trend	Since population is gradually increasing and development and business are likely to increase in the area, more waste is expected to be generating in the future.
Environmental Impact	<p>Improper solid waste management systems is resulting in a number of detrimental effects on the environment in Labutta which are described as follows.</p> <ul style="list-style-type: none"> • Blockage to the drain and sewer causing much flood area and spreading of vectors and forming stagnant water with fouling smell. • Employees responsible for waste collection and disposal are exposed to harmful substance • Due to the absence of landfill, the dumping site attracts domestic livestock which eats the rotten vegetable and kitchen refuse • Increase breeding ground for rat and other vermin. • Presence of fire hazard by flammable and combustible material • Soil and water contamination due to the lack of leaches control • Burning of solid water emits toxic chemical compounds which could impair the health of human living in the vicinity of waste dumping site • Surface water pollution through direct disposal of and storm run-off
Climate Change and Linkage Impact	Burning of solid waste does significantly contribute in deteriorating of local air quality, public health and finally global warming. Improper burning practices will be worsening the accumulation of global warming gases.

Element	Description
	<p>Uncollected debris could remain in the drain and make blockage to the water flow. This blockage could worsen the intensity of flood in rainy season.</p>
<p>Recommendation</p>	<p>Increased volume of waste can be considered potential resources for human consumption and utilization.</p> <p>One feasible option for the study area is establishment of small scale composting plant. Composting of waste is anaerobic method of decomposing solid wastes. The process involves decomposition of organic waste known as compost which is a good fertilizer for plants.¹⁹</p> <p>Other Recommendation</p> <ul style="list-style-type: none"> • Study area needs a solid waste management plan to address issues generated by waste collection and disposal. Setting up such plan should be prepared together with departmental organizations led by township development committee with assistance of waste management specialists. • Improvement of waste collection systems including provision of sufficient waste collection bin and frequency of so as to avoid throwing debris into nearby water bodies • Uncontrolled waste disposal in public should be stopped through improvement of reduce reuse and recycling principle. It should be promoted through public environmental campaigns and with incentives • Burning practices should be reduced by increasing landfill and compositing sites • Delivering water management trainings including safe handling of waste, disposal method • Promoting effective waste management and disposal practice among public through initiating public and school campaign

¹⁹ Wikipedia

3. 4 Key vulnerabilities of communities in Labutta and Ecosystem Services

Major Environmental Threats and Vulnerabilities

Labutta Township has been experiencing a wide range of natural disasters and environmental issues such as storm, tsunami, intense heat, river bank erosion, saline intrusion and flood.

Water Pollution

A numbers of environmental issues triggered by human activities are identified in previous section. Amongst, environmental degradation such as water pollution by improper waste dumping, riverbank erosion and deforestation are considered to have much affected on vulnerable communities of the region.

River Bank Erosion

River bank erosion is one of the major threats for the villages locating alongside river bank of Ywe and other rivers of region. Intense rain fall event and increased sediment load are considered to be



the primary source of river bank erosion along with removal of riparian vegetation. Village community of those areas has been suffering transportation cut-off, loss of agricultural land and other assets in the event of river bank erosion. Other streams in the region have also been facing up the threats of riverbank erosion. Thus, some villages like

Aung Hlaing Village in Thitpoke Village Tract situated along river bank are much vulnerable to the disaster.²⁰

Saline Intrusion

According to the villagers and community risk assessment reports prepared by Action Aid under BRACED project, villagers have expressed their concerns on increase in saline intrusion. Combination of sea level rise and removal of mangrove forest is considered key factor leading to this salinity issue.

Very southern part of township where is close to coastal line of Andaman Sea have been experiencing year around saline intrusion. Consequently, agriculture is not possible in some area where salinity happens year around. Saline instruction brings another issue to the local community, drinking water problem. Central region of the township encounters seasonal saline in summer where water flow from rivers is lower. In general, very northern part of township is free from salinity. However, in

²⁰ CRA Report, Labutta, Action Aid

the recent years, the salt line has been moving north eastward, affecting larger land area and greater number of people .²¹ It is considered the most vulnerable community by saline intrusion is farmers. Even though there is not systematic salinity monitoring system in the region, farmers realizes the increased salinity and decline the soil quality of agricultural land after Nargis Cyclone .

General occurrence of salt water intrusion is maximized in the March and minimized in November.

Regarding spatial extent of salinity intrusion and considering the level of salinity intrusion the township can be divided into three main areas. Those are (1)the coastal area permanently under influence of salt water intrusion (2)the central area, under seasonal influence of salt water intrusion(3)the northern area beyond the reach of salt water intrusion Among these three zones , central areas are the most vulnerable to the saline water encroachment as they are least adapted to high salinity conditions .²²

Drinking water Scarcity

Almost all villages where BRACED project has been operating have been encountering drinking water problem during the summer. Water from most of the stream and river are considered to be unfit for drinking due to high content of turbidity, salinity and other chemical compounds from agricultural industry. Improper waste disposal practices of the area compound the surface and underground water contamination.

Seasonal Flood and Storm

Referring to the community resilience reports prepared by Action Aid for targeted villages and stakeholder consultation meetings, the common and frequent natural disasters are seasonal flooding and storm . Loss of coastal forest and mangrove vegetation along with lack of flood protection infrastructure, village communities in the Labutta Township are vulnerable to the storm and tidal surge.

Cyclone Nargis which ripped through the region in 2008 in lower Myanmar is an example of climate change. Brief information about the Cyclone Nargis is described in the following box.

²¹ Fee, L;Gibert ,M;Bartlett R; Capizzi,P; Horton, R; Lesk, C; Climate Change Vulnerability Assessment of Labutta Township, Ayeyarwaddy Region, Myanmar , 2016-2050 , UN-Habitat Myanmar, 2017

²² Fee, L;Gibert ,M;Bartlett R; Capizzi,P; Horton, R; Lesk, C; Climate Change Vulnerability Assessment of Labutta Township, Ayeyarwaddy Region, Myanmar , 2016-2050 , UN-Habitat Myanmar, 2017

Cyclone Nargis

This category 4 cyclone (some reports mentions as category 3) made landfall in Labutta on the 2nd of May 2008 . With wind intensity of at least 200 kilometers per hour , a heavy rain and 3.6 m storm surge , Cyclone Nargis caused unprecedented devastation in Ayeyawady Delta area .

According to official figures, almost 140000 people were killed. A total of 37 townships were significantly affected by the cyclone. ²³ Some entire families were totally wiped out and some villages were entirely vanished .

The UN estimates that as many as 2.4 million people were affected.²⁴ In Labutta Township alone, as many as 80000 facilities were reported.

Cyclone Nargis became one of Asia's deadliest storms by hitting land at one of the lowest points in Myanmar and setting off a storm surge that reached over 40 kilometers (25 miles) inland.²⁵

After Cyclone Nargis , people in Myanmar have become much aware climate change and consequence of unprecedented natural disaster.

Health

A significant health issues could be triggered due to the improper disposal of communal waste into water bodies and nearby low land area on the outskirts of the town. Domestic, agricultural runoff and street runoff will be brought down to the water bodies of nearby streams and leads to surface water contamination. Unhygienic dumps will also contribute to the contamination of underground water resulting in the water pollution of artificial water pond and dug well which are major drinking water source of the township dwellers. Stagnant water blocked by solid water in the natural water course and artificial drains could be breeding ground for mosquitoes and other vectors.

Ecosystem Service

Ecosystem service is various services provided by natural ecosystem to human being. Ecosystem service is generally divided into four categories namely provisioning service, regulating service, supporting service and cultural service. ²⁶

²³ Fee, L;Gibert ,M;Bartlett R; Capizzi,P; Horton, R; Lesk, C; Climate Change Vulnerability Assessment of Labutta Township, Ayeyarwaddy Region, Myanmar , 2016-2050 , UN-Habitat Myanmar, 2017

²⁴ <http://www.ifrc.org/en/news-and-media/news-stories/asia-pacific/myanmar/myanmar-cyclone-nargis-2008-facts-and-figures/>

²⁵ http://webcache.googleusercontent.com/search?q=cache:http://factsanddetails.com/southeast-asia/Myanmar/sub5_5h/entry-3139.html

²⁶ https://en.wikipedia.org/wiki/Ecosystem_services

Ecosystem in Labutta is generally divided into different categories such as mangrove ecosystem, estuarine habitat, mud flat, river, agricultural land and built up area. Existence of diverse ecosystems within particular region is greatly important in term of climate vulnerability. A more diverse ecosystem could be greater benefits to the people. The dominant ecosystem of the region is mangrove forest. The notable functions provided by mangrove vegetation in Labutta include fishing ground and shelter, storm surge buffering and firewood. It is reported about the evidence that mangrove communities of the region play key role in the protection of people from Nargis Cyclone in 2008. Fewer people were killed in the area with intact forest. More people were killed in the deforested areas.

However these mangrove forests of coastal area have been now under high pressure and in significantly deforested state due to wood harvesting and coastal development such as shrimp farming and agricultural land expansion.

Without effective intervention, the entire mangrove forest will be vanished in near future. As a result, numerous basic ecosystem services such as defending against natural disaster, supporting climate resilience, fish spawning ground will be lost. Consequently fish population would be decreased and livelihood of local community would be hardly hit.

Food Security

Ayeyawady Delta is known as rice bowl of Myanmar due to the endless paddy fields and high yield of rice. The production of rice from this region is not only sufficient to its people but also export to other regions of the country. Farmer in the southern part of township, which is influenced by salt water all year around, can grow the paddy in the monsoon season. Farmers in northern part of township where is dominated by freshwater in most seasons have two paddy growing seasons (summer and monsoon). Integrated farming system is found in the fresh water zones particularly to support the summer production season.²⁷

Fishing is second most important livelihood in the delta area after rice cultivation. However, it is reported fish availability has been notably decreasing along after Nargis Cyclone. In this regards, overfishing and degradation of mangrove forest for land use and logging activities are considered major factors for decline of fish population in the region.

Small scale livestock such as raising pigs, chicken and duck within household control are very common in the study area. Raising these livestock supports alternative income and food for local consumption.

²⁷ Eric Vaughan, A Strategic Resilience Assessment of the Ayeyarwaddy Delta, Mercy Corps, Welthungerhilfe, GERT, 2016

Water Availability and Quality

Artificial rain water collection pond are the major facility for drinking, livestock use and utility purpose .84 % of total households in township relies on the water pond for drinking However, availability of water from these ponds depends on the functional services of pond. Evaporation, shorter rain harvesting period in some years and intense heat are the major threats to the water availability.

Absence of waste water treatment and improper solid waste disposal practice would further affect the water quality of the area.

A number of environmental issues caused by human activities and some development and service program are identified and recommendations are adopted in the environmental analysis section. Some environmental impacts from those activities could have potential threats to the vulnerable communities of particular area. Following table illustrates the possible linkage between environmental aspect of human activities and vulnerable communities.

Table 6 Environmental Impact and Vulnerabilities

Activity	Impact	Affect on Human Being	Vulnerable Community
Discharge of solid waste and garbage into water bodies and low lying area	Degradation of surface and ground water quality Disruption of aquatic food chain Blockage to drain network, hygienic issue	Water scarcity Water use ,Health Aquatic good change Drinking water contamination ,Accelerate flood	Village community , fishermen, low income family Both village and urban community
Deforestation , remove of mangrove and land use change	Loss of ecosystem service Resilience to extreme climate become weak in community Riverbank erosion and Increase salinity intrusion	Livelihood Change Loss of agricultural land Accelerate magnitudes of flood	Farmers , rural community
Riverbank Erosion	Transportation Loss of assets, river channel change	Loss of infrastructure and agricultural land	Riparian community

Chaper 4 Generic Environmental Management and Recommendation

This chapter sets out to consolidate all if the data in this report by presenting a series of recommended actions and deliver mechanism for relevant authorities to undertake to manage the environment and to reduce environmental risk. This implementation of these recommendations will contribute to protection of environment and sustaining livelihood as well as building resilience of local communities.

The study team stresses the requirement for all actions to be carried out in a manner which will lead to harmonization of environment, economy and social values of Labutta Township. Recommendations are focused around the exiting activities that are deemed to have significant environmental impacts in the township. The recommendations are further linked to activities and highlight responsibilities and institutional requirements to implement the activities. It is acknowledged that no all actions can be implemented immediately. It is intended that the detailed implementation plan will be developed as part of the township implementation consultation process.

It is the responsibility of regional government agencies to take into consideration and integrate of these management measures into the existing activities and prior to any new activities in consultation with local government and stakeholders as a key factor in the implementation of sustainable development. In this regard, stake holder consultation is proposed to be performed for all project level activities or plans with full information disclosure.

As this document is an advisory document to government agencies to consider environmental and social aspects into the existing and future programs and projects, allocation of the responsibility and accountability is excluded.

4.1 Institutional Arrangement

General Administration Department, township development committee, forest department and other relevant agencies hold responsibility as implementing agencies for ensuring that all development and sectorial programs are operating with environmentally, socially and ethically responsible principles and adherence to the stipulated legislation and guidance.

Strengthening of institutional capacity

Environmental management and governance is new area for the government employees working in environmental related sectors. Existing capacity of departments of various administrative levels of government such as township, district, region and state and central bodies is currently weak. Accordingly, much more efforts are needed to enhance the capacity of individual, organization and institutional as a whole.

4.2 General Recommendation for Major Actors

A series of recommendations is summarized for government organization, Industry and business, community and civil society. Although there is not much development in industrial sector in Labutta , some recommendations made in the box are for business activities, considering future potential .

Recommendations for Government:

1. Existing environmental and related regulations and laws highlighted in chapter 2 of this report should be reviewed by local government departments and enforcement measures established including identification of responsible agencies and departments
2. Establish and convene a joint environmental working committee within township and regional level government structures to agree and adopt and implement an environmental management framework , oversee enforcement of laws and regulations and develop monitoring mechanism to monitor progress in tackling environmental and social issues
3. Promote community environmental awareness campaign highlighting the importance of ecosystem services and its relation to community resilience
4. Township waste management plan should be developed including a sustainable waste management campaign, design and development of waste collection and storage facilities and disposal plans in line with national waste management strategy
5. Increase capacity building of staff from relevant departments for enforcement and implementation of environmental legislations and guidance
6. Improve capacity of staff for inspection and monitoring of environmental performance of business activities
7. Encourage industry and business to initiate transparency and information disclosure about their activities and service which are likely to impact on environment and community resilience
8. Township departments and regional department should review both TEA impacts section and Community Resilience Assessment Reports produced under BRACED to identify climate change and disaster shocks and stresses and further impacts caused by ongoing development activities. Activities identified by communities should be consolidated and plans drawn up for broader processes to enhance the resilience of most vulnerable communities of Labutta. These can include maintenance and improvement of ecosystem service of natural biodiversity by channeling small grants and funds to joint community and government environment and ecosystem management projects.

Recommendations for Industry and Business

9. Improvement in public participation and consultation in project development phase of new projects and activities in accordance with EIA procedure
10. Initiate transparency and openness about project and business operations with

- publication of environmental, health and safety standards and policies.
- 11. Share information and findings of how businesses activities will affect community services and systems (food, water, energy, health etc.) and their resilience to climate extremes and environment and establish a mitigation plans
- 12. Encourage business investment in service provision and business practices that will improve the availability of resilience services to communities that will also contribute to economic development and profit margins (e.g agricultural services, community infrastructure, energy and water services etc.)
- 13. Prioritize environmental conservation and pollution prevention mechanisms in business operations
- 14. Develop project specific environmental management framework with local government departments and implementation in accordance with existing EIA procedure
- 15. Adopt environmental training program to operatives to ensure the service and activities undertaken by business do not adversely affect the resilience of local communities and the environment
- 16. Initiate Corporate Social Responsibility programs focusing on enhancement of community resilience, protection of ecosystem service and environmental management

- Recommendations for Community and Civil Society**
- 17. Actively participate in stakeholder consultation and business meetings. Share local knowledge and experience in the consultation meeting and express concerns and challenges
 - 18. Actively participate in environmental campaigns to be initiated by government organization and other organizations
 - 19. Develop a private sector oversight mechanism that tracks adherence to environmental laws and procedures of all new development activities and projects
 - 20. Oversee the implementation of generic EMP and encourage accountability and transparency in business and development practices

အခြေခံ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုနှင့် အကြံပေးချက်များ

ဤကဏ္ဍတွင်လပွတ္တာ မြို့နယ်၏ အစိုးရအာဏာပိုင်များအနေဖြင့် ပတ်ဝန်းကျင်အားစီမံခန့်ခွဲမှုပြုလုပ်ခြင်းအားဖြင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဘေးအန္တရာယ်များကို လျော့ချနိုင်ရန်အတွက် အကြံပြုမှုများ နှင့် အစီအမံများကို ဆွေးနွေး တင်ပြထားပါသည်။

အစီရင်ခံစာအတွင်း ဖော်ပြထားသော အကြံပေးချက်များကို ပတ်ဝန်းကျင် ကာကွယ်ရေးလုပ်ငန်း၊ အသက်မွေးဝမ်းကျောင်း လုပ်ငန်းများကို ထိန်းသိမ်းခြင်းအပြင် ဒေသခံလူထု၏ ဘေးဒဏ်ခံနိုင်စွမ်းကို တည်ဆောက်ပေးခြင်း တို့တွင် ထည့်သွင်း စဉ်းစားနိုင်ပါသည်။

ဤပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာ ပြုစုရာတွင် လေ့လာရေးအဖွဲ့သည် လပွတ္တာ ဒေသ၏ သဘာဝ ပတ်ဝန်းကျင်ဆိုင်ရာ၊ စီးပွားရေး နှင့် လူမှုရေး ဆိုင်ရာ တန်ဖိုးများကို ညီညွတ်မျှတစွာ စဉ်းစားနိုင်စေရေး အတွက် လိုအပ်သော လုပ်ဆောင်ချက်များကို အထူး အလေးထား စဉ်းစားထားပါသည်။ ဒေသအတွင်းရှိ ရှိရင်းစွဲ စီမံချက်များ၊ လူတို့၏ လုပ်ဆောင်ချက်များ သည် ပတ်ဝန်းကျင်ထိခိုက်မှုများ ဖြစ်နိုင်ခြေရှိသည်ဟု ယူဆကာ ထို စီမံချက်များကို ဗဟိုပြု၍ ဤအကြံပေးချက်များ တင်ပြထားပါသည်။ လုပ်ငန်းများ အကောင်အထည်ဖော်ရာတွင် တာဝန်ရှိသည့် အဖွဲ့အစည်းများနှင့် တာဝန်ရှိမှုများကို လည်း ချိတ်ဆက်တင်ပြထားပါသည်။ သို့သော်လည်း အကြံပြုချက် အားလုံးသည် ချက်ခြင်း အကောင်အထည်ဖော်ရန် မဖြစ်နိုင်ပါ။ ထို့ကြောင့် အသေးစိတ် အကောင်အထည် ဖော်ဆောင်ရွက်မည့် အစီအစဉ်ကို မြို့နယ်၏ ဆွေးနွေးတိုင်ပင်ရေး လုပ်ငန်းစဉ်အတွင်း ထည့်သွင်းစဉ်းစားရန် ရည်ရွယ် ထားပါသည်။

အဆိုပြုထားသော ဒေသဆိုင်ရာစီမံခန့်ခွဲမှုအစီအမံများကို လက်ရှိလုပ်ငန်းများ နှင့် ဖွံ့ဖြိုးရေးဆိုင်ရာ မူဝါဒများ နှင့် စီမံကိန်းများအစပြုရေးဆွဲရာ အဆင့်များတွင် ထည့်သွင်းစဉ်းစားရန်မှာ ဒေသဆိုင်ရာ အစိုးရ၏ တာဝန်ဖြစ်ပါသည်။ ထို့အပြင် မည်သည့်လုပ်ငန်းမဆို လုပ်ငန်းများမပြုလုပ်မီတွင် ဒေသခံအစိုးရ နှင့် လုပ်ငန်းနှင့်သက်ဆိုင်သူများ ဆွေးနွေးညှိနှိုင်းခြင်းသည် ရေရှည်ဖွံ့ဖြိုးတိုးတက်မှုအတွက် အဓိကကျသော အချက်တစ်ချက်ဖြစ်ပါသည်။ ထို့ကြောင့် ဆွေးနွေးညှိနှိုင်းခြင်းများကို စီမံချက် (သို့) စီမံကိန်းအဆင့်လုပ်ငန်းတိုင်းတွင် ပြုလုပ်ပေးရန် အကြံပြုပြီး သတင်းအချက်အလက်များ အပြည့်အစုံထုတ်ပြန်ကြေညာမှုအား ပြုလုပ်ရန်လည်း တိုက်တွန်းပါသည်။

ဤအစီရင်ခံစာသည် အစိုးရဌာနများ အနေဖြင့် လက်ရှိလုပ်ငန်းများအတွင်း ပတ်ဝန်းကျင်ဆိုင်ရာ စဉ်းစားရမည့် အချက်များကို ထည့်သွင်းနိုင်စေရန် အကြံပေး လမ်းညွှန်ချက်များသာဖြစ်ပြီး တာဝန်ခွဲဝေမှုနှင့် တာဝန်ယူမှု အပိုင်းများကို ထည့်သွင်းထားခြင်းမပြုထားပါ။

အဖွဲ့အစည်းများ၏ စီစဉ်ကွပ်ကဲမှု

ဒေသအတွင်းရှိ ကဏ္ဍအလိုက်လုပ်ငန်းများ၊ ဖွံ့ဖြိုးရေးစီမံကိန်းများ ပတ်ဝန်းကျင်နှင့်လူမှုရေး စံနှုန်းများ၊ ကျင့်ဝတ်များနှင့်အညီပြဌာန်းထားသော ဥပဒေများနှင့်အညီ လုပ်ကိုင်ဆောင်ရွက်ရန်အတွက် အထွေထွေ အုပ်ချုပ်ရေးဦးစီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန နှင့် အခြားသက်ဆိုင်ရာ ဌာနများတွင်တာဝန်ရှိပါသည်။

အဖွဲ့အစည်းများ၏ စွမ်းဆောင်ရည်များ မြှင့်တင်ပေးခြင်း

လက်ရှိစွမ်းရည်များကို အခြေခံ၍အကဲဖြတ်ရာတွင် မြို့နယ်၊ ခရိုင်၊ တိုင်းဒေသကြီး၊ ပြည်နယ် နှင့် အဓိက ဗဟို အစိုးရအဖွဲ့အစည်းများတွင် ပတ်ဝန်းကျင်နှင့် သက်ဆိုင်သော အခန်းကဏ္ဍသည် ၎င်းတို့၏အစိုးရဝန်ထမ်းများအတွက် နယ်ပယ်အသစ်တစ်ခုဖြစ်နေပါသည်။ ထို့ကြောင့် တစ်ဦးချင်း နှင့် အဖွဲ့အစည်းတစ်ခုလုံး၏ စွမ်းရည်မြှင့်တင်ရန် ပိုမိုအားကောင်းသော ကြိုးပမ်းအားထုတ်မှုများလိုအပ်ပါသည်။ လုပ်ငန်းများ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ ဆောင်ရွက် လုပ်ကိုင်မှုများကို စောင့်ကြပ်ရန်နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စိုးရိမ်ပူပန်မှုများ ဖော်ထုတ်နိုင်ရန်အတွက် သက်ဆိုင်ရာဌာနများမှ ဝန်ထမ်းများကို ပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာစောင့်ကြည့်ရေးနှင့် ပတ်သတ်သော အရည်အသွေးဆိုင်ရာ သင်တန်းများနှင့် အခြားအရင်းအမြစ်များ ထောက်ပံ့ရန်လိုအပ်လျက်ရှိပါသည်။

အဖွဲ့အစည်း အသီးသီးမှ ဆောင်ရွက်သင့်သော အကြံပေးချက်များ

မြို့နယ်နှင့်ပတ်သတ်သော အဓိက အဆုံးအဖြတ်ပေးသူများ အကောင်အထည်ဖော်သူများ ၊အကြံပြုထောက်ပြသူ အစိုးရအဖွဲ့အစည်းများ စီးပွားရေးလုပ်ငန်းစုများနှင့်အရပ်ဘက်အဖွဲ့အစည်းများအတွက် လုပ်သင့်လုပ်ထိုက်သော ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေးချက်များကို အောက်ပါ အတိုင်းဖော်ပြထားပါသည်။

အစိုးရ ဌာနဆိုင်ရာ အဖွဲ့အစည်းများ

1. ဤအစီရင်ခံစာ အခန်း(၂) တွင်ဖော်ပြထားသော ပတ်ဝန်းကျင်နှင့် အခြား ဆက်စပ်ဥပဒေများကို အစိုးရဌာနဆိုင်ရာ များအနေနှင့် လေ့လာသုံးသပ်ပြီး ဥပဒေစိုးမိုးရေး အတွက် တာဝန်ရှိသည့် အဖွဲ့အစည်းများ ဌာနများကို တာဝန်ပေးခြင်းများ ပြုလုပ်ရန်
2. ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အကောင်အထည်ဖော်မှုကို နားလည် လက်ခံရန် ၊ ဥပဒေစိုးမိုးမှုများကို လေ့လာစောင့်ကြည့်ရန် နှင့် ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကိစ္စများကို လေ့လာစောင့်ကြည့်ရေး နည်းလမ်းများကို တည်ဆောက်နိုင်ရန်အတွက် မြို့နယ်နှင့် ပြည်နယ်ဒေသ အတွင်း ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အဖွဲ့အစည်း၊ ကော်မတီဖွဲ့စည်းရန်
3. ဂေဟစနစ်မှ ပေးသော ဝန်ဆောင်မှုများနှင့် ဒဏ်ခံနိုင်စွမ်းဆက်စပ်ပုံများကို အခြေခံသော ပတ်ဝန်းကျင်ဆိုင်ရာ အသိပညာပေး လုပ်ငန်းများကို ဒေသခံလူထုအတွင်း ဆောင်ရွက်သွားရန်
4. အမှိုက်သိမ်းဆည်းနည်းများ၊ အမှိုက်ပစ်နည်းများ နှင့် ရေရှည်ဖွံ့ဖြိုးတိုးတက်မှုကို ဦးတည်သော အမှိုက်များစီမံခန့်ခွဲမှု များနှင့် ပတ်သတ်သော အသိပညာပေး လုပ်ငန်းများ ပါဝင်သည့် မြို့နယ်ဆိုင်ရာ အမှိုက်စီမံခန့်ခွဲမှု စီမံချက်များ တည်ဆောက်နိုင်ရန် (ထိုသို့ရေးဆွဲရာတွင် အမျိုးသား စွန့်ပစ်အမှိုက် စီမံခန့်ခွဲရေး မဟာဗျူဟာနှင့် လိုက်လျောညီထွေ ဆောင်ရွက်သင့်ပါသည်)
5. ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဌာနနှင့်အခြားဆက်စပ်ဌာနများမှ ဝန်ထမ်းများကို ပတ်ဝန်းကျင်ဆိုင်ရာ ပြဋ္ဌာန်းချက်ဥပဒေများ လက်တွေ့အကောင်အထည်ဖော်ရေးဆိုင်ရာ အရည်အသွေးမြှင့်တင်မှုများ ပြုလုပ်ရန်
6. ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဌာနမှ ဝန်ထမ်းများကို စီးပွားရေးလုပ်ငန်းများ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ အကောင်အထည်ဖော် ဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြည့်မှုနှင့်ပတ်သတ်သော အရည်အသွေး ဆိုင်ရာ ဘဏ္ဍတန်းများ ပို့ချပေးခြင်းများ ပြုလုပ်နိုင်ရန်
7. ဖွံ့ဖြိုးရေးလုပ်ငန်းများကြောင့် ပတ်ဝန်းကျင်နှင့် ဒေသခံလူထုတို့၏ ရာသီဥတုဆိုးဝါးမှု ဒဏ်ခံနိုင်စွမ်းကို မည်သို့မည်ပုံ သက်ရောက်မှုရှိနိုင်ကြောင်း ကုမ္ပဏီများ အဖွဲ့အစည်းများမှ ပွင့်လင်းစွာ တင်ပြနိုင်ရေးအတွက် တွန်းအားပေးရန်
8. မြို့နယ်အတွင်းရှိ ဌာနဆိုင်ရာများ အနေနှင့် ရာသီဥတုပြောင်းလဲမှုများ၊ ရာသီဥတု ပြောင်းလဲမှုများကြောင့် ဖြစ်ပေါ်လာသော ဘေးနှင့်ဖိစီးမှုများ၊ လက်ရှိစီမံကိန်းများမှ နောင်တွင် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင် ဆိုးကျိုးသက်ရောက်မှုများကို ဖော်ထုတ်နိုင်ရန်အတွက် BRACED စီမံကိန်းမှ ပြုစုခဲ့သော ဗျူဟာမြောက် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် ကျေးရွာလူထု၏ ဘေးအန္တရာယ်ဒဏ် ခံနိုင်စွမ်း စစ်တမ်းများကို လေ့လာ သုံးသပ်ရန်။(ဒေသအတွင်းရှိ အင်အားအနည်းပါးဆုံး ဒေသခံတို့၏ ဘေးဒဏ်ခံနိုင်စွမ်း မြှင့်မား လာစေရေးအတွက် ဒေသခံတို့မှာ ရှာဖွေ ဖော်ထုတ်ထားသော လုပ်ဆောင်ရမည့် လုပ်ငန်းများ အားလုံးကို အတူတကွ ပေါင်းစည်း၍ ပိုမိုကျယ်ပြန့်သော စီမံချက်များ ရေးဆွဲသင့်ပါသည်။ ထိုသို့ပြုလုပ်ရာ တွင် " အစိုးရနှင့် ပြည်သူတို့ အတူတကွ လုပ်ကိုင်နိုင်မည့် ပတ်ဝန်းကျင်နှင့် ဂေဟစနစ်ဆိုင်ရာ စီမံကိန်းများအတွက် အသေးစားရံပုံငွေများ ရရှိအောင်ဆောင်ရွက်ခြင်းဖြင့် ဇီဝမျိုးစုံမျိုးကွဲ၏ ဂေဟစနစ်ဆိုင်ရာ ဝန်ဆောင်မှုများ မြှင့်တက်လာနိုင်သည်" ဆိုသော အချက်ကိုလည်း ထည့်သွင်းနိုင်ပါသည်)

စက်ရုံအလုပ်ရုံများ နှင့် စီးပွားရေးလုပ်ငန်းများ

9. စီမံကိန်းအသစ်များ စတင်တည်ဆောက်ပါက တည်ဆဲEIA လုပ်ထုံးလုပ်နည်းနှင့်အညီ ဒေသခံပြည်သူများ ၊ပတ်သတ်ဆက်စပ်သူများနှင့်တွေ့ဆုံက အကြံဉာဏ်များ ရယူရန်
10. စီမံကိန်းနှင့် စီးပွားရေးလုပ်ငန်း၏ ပတ်ဝန်းကျင် ၊ကျန်းမာရေးနှင့် လုပ်ငန်းခွင်ဆိုင်ရာ ဘေးအန္တရာယ် ကင်းရှင်းရေး ဆိုင်ရာ မူဝါဒများ၊ စံနှုန်းများကို တရားဝင်ထုတ်ပြန်ခြင်းဖြင့် ပွင့်လင်းမြင်သာမှုများကို ဖော်ဆောင်ရန်

11. ရပ်ရွာလူထု ဝန်ဆောင်မှုလုပ်ငန်းများ နှင့် စနစ်များ(အစားအသောက်၊ ရေစွမ်းအင်နှင့်ကျန်းမာရေး)၊ ရပ်ရွာလူထု၏ အစွန်းရောက် ရာသီဥတုများ၊ ပတ်ဝန်းကျင် ဆိုးကျိုးများအပေါ် ဒဏ်ခံနိုင်ရည်စွမ်းကို မည်သို့ သက်ရောက်နိုင်သည် ဆိုသော တွေ့ရှိချက်များကို ဝေမျှဖြန့်ဖြူးရန်၊ ဆိုးကျိုးများကို လျော့ပါးစေသော အစီအမံများ ဆောင်ရွက်ရန်
12. ဖွံ့ဖြိုးရေးစီမံကိန်းများနှင့် စီးပွားရေးလုပ်ငန်းများသည် စီးပွားရေး တိုးတက်မှုနှင့် အကျိုးအမြတ် ရနိုင်မှုကို ဦးတည်သော ဘေးဒဏ်ခံနိုင်စွမ်း ဆိုင်ရာ လုပ်ငန်းများ ပါဝင်သည့် စီးပွားရေး ဆောင်ရွက်မှုများ ပိုမိုများပြားလာစေရန်အတွက် တွန်းအားပေးရန် (ဥပမာ- စိုက်ပျိုးရေးနှင့်သက်ဆိုင်သော လုပ်ငန်းများ၊ ရပ်ရွာလူထုအတွက် အခြေခံ အဆောက်အအုံများစွမ်းအင်နှင့် ရေ ဖြန့်ဖြူးရေး ဝန်ဆောင်မှု လုပ်ငန်းများ)
13. အခြား စီးပွားရေးဆိုင်ရာ လုပ်ငန်းများနှင့်အတူ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် ပတ်ဝန်းကျင်ညစ်ညမ်းမှုများ ကာကွယ်ရေး တို့သည်လည်း အရေးကြီးကြောင်း သတ်မှတ်ထားနိုင်ရန်
14. တည်ဆဲ EIA လုပ်ထုံးလုပ်နည်း နှင့်အညီ စီမံကိန်းနှင့်ဆိုင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံချက်များကို ရေးဆွဲအကောင်အထည်ဖော်ရန်
15. စီးပွားရေးနှင့် ဖွံ့ဖြိုးရေးလုပ်ငန်း များကြောင့် ပတ်ဝန်းကျင်ဆိုးကျိုးနှင့် ဒေသခံတို့၏ အစွန်းရောက် ရာသီဥတုဒဏ်ခံစွမ်းရည်များကို မထိခိုက်စေရန်အတွက် မိမိတို့၏ လုပ်သားထုများကို ပတ်ဝန်းကျင်ဆိုင်ရာ သင်တန်းများပေးရန်အတွက် အစီအစဉ်များ ရေးဆွဲရန်
16. ဒေသခံတို့၏ ရာသီဥတုဒဏ်ခံနိုင်စွမ်းရည် မြှင့်တက်လာစေရန် ၊ ဂေဟစနစ်မှပေးသော ဝန်ဆောင်မှုများကို ထိန်းသိမ်းရန် နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံချက်များ ပါဝင်သော လူမှုတာဝန်သိမှု အစီအစဉ်များရေးဆွဲ အကောင်အထည်ဖော်ရန်

အရပ်ဖက်အဖွဲ့အစည်းနှင့်ဒေသခံလူထု

17. သက်ဆိုင်ဆက်စပ်သူများ အစည်းအဝေးများတွင် ပါဝင်ဆွေးနွေးကြရန်။ မိမိတို့အစဉ်အဆက်တွေ့ကြုံခဲ့ရသော အဖြစ်အပျက်များ ဗဟုသုတများကို ထိုသို့သော ဆွေးနွေးပွဲများတွင် အတွေ့အကြုံဖလှယ်ခြင်း၊ စိုးရိမ်စရာ အကြောင်းများနှင့် ဖြစ်ပေါ်နိုင်သော စိန်ခေါ်မှုများကို တင်ပြနိုင်ရန်
18. အစိုးရနှင့် အခြားအဖွဲ့အစည်းများမှ ဦးဆောင်ကျင်းပသော အပြုသဘောဆောင်သည့် ပတ်ဝန်းကျင် ဆိုင်ရာ ထိန်းသိမ်းရေး ပညာပေးရေး လုပ်ငန်းများတွင် ပါဝင်ရန်
19. စီမံကိန်းအသစ်များ၏ ဥပဒေ ၊ လုပ်ထုံးလုပ်နည်းများ နှင့်အညီ ဆောင်ရွက်ခြင်း ရှိမရှိ သိရှိ ရန်အတွက် ပုဂ္ဂလိက လုပ်ငန်းများ စောင့်ကြည့်ရေးလုပ်ငန်းစဉ် ထူထောင်ရန်
20. စီးပွားရေးနှင့် အခြားဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းများ ၏ တာဝန်ယူမှုနှင့် တာဝန်ခံမှုများ တိုးတက်လာစေရန် လုပ်ငန်းများ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြည့်ရန်

Table 7 Generic Recommendation for Environmental Management

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
1. Human Settlement , Expansion of Agricultural Land and Mangrove Forest			
1A	Biological Environment	<ul style="list-style-type: none"> ➤ Identification of mangrove forest area and monitoring the trend ➤ Protection of environmentally sensitive mangrove forest through existing legislative framework and public awareness ➤ Encourage reforestation and restoration in the disturbed area ➤ Establish administrative capacity to oversee and manage the mangrove community ➤ Promote public awareness the importance of mangrove forest ecosystem and linkage to natural disaster. ➤ Considering establishment of buffer zone between mangrove forest and residential area ➤ Environmentally sound technologies should be promoted in agriculture, aqua farming and household cooking ➤ Practice on unsustainable use of resource should be reduced and it is required to explore and adopt the utilization of renewable energy resource. ➤ Restoration and preserving natural mangrove vegetation should be programmed and maintained 	<ul style="list-style-type: none"> • Conservation of mangrove ecosystem and improvement in natural barrier against disaster
2. Waste Management			

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management, Climate Change Mitigation, Adaptation and Resilience
2A	General	<ul style="list-style-type: none"> ➤ Promote sustainable waste management awareness campaign to public ➤ Improvement of waste collection system through establishment of formal waste management process ➤ Handling the waste issue in more systematic and organized way might ameliorate the health of local people. ➤ City waste management plan including rural area should be reviewed and improved where deemed to be insufficient and an effective management and monitoring mechanism established 	<ul style="list-style-type: none"> • Improving waste management infrastructure and environmental awareness • Reducing flooding and health risk • Improving waste management practice • Minimizing health impact • Strengthening the cooperation of public in waste handling
2B	Ecological environment	<ul style="list-style-type: none"> ➤ Establishment of mini composting plants should be considered collaboration with technology and financial support from international aid agencies 	<ul style="list-style-type: none"> • Improving infrastructure and protection of soil and water pollution • Improve use of organic fertile residue from composting plants
2C	Landscape and aesthetic value	<ul style="list-style-type: none"> ➤ Feasibility study of waste heat to energy and /or compost plants to minimize the area required for landfill 	<ul style="list-style-type: none"> • Reducing land use and maintaining landscape feature
2D	Air Quality	<ul style="list-style-type: none"> ➤ Waste burning practices should be restricted 	<ul style="list-style-type: none"> • Minimizing the emission of air pollutants

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
2E	River ecosystem and water quality	<ul style="list-style-type: none"> ➤ Throwing all types of waste into Ywe river should be strictly controlled ➤ Provide sufficient waste collection bin along the river bank so as to avoid throwing debris into river. ➤ Stick control to restaurants along the river bank to stop dumping waste into water body 	<ul style="list-style-type: none"> • Improvement in river water quality and minimize impact to aquatic life of river. Enhancement of food security of local community • Improve drainage function and reduce flooding from runoff
2F	Public Health and Safety	<ul style="list-style-type: none"> ➤ Uncontrolled waste disposal in public and other areas should be reduced through public awareness campaign 	<ul style="list-style-type: none"> • Minimizing the contact between waste dumping site and public area to ensure the public health of community is secure
3. Climate Change and Ecosystem Management			
3A	General	<ul style="list-style-type: none"> ➤ Promote environmental awareness campaign in community highlighting the importance of ecosystem services and its relation to community resilience and climate change ➤ Review all community resilience reports prepared for BRACED project to identify climate change , disaster shocks and ,stresses and further impacts caused by human activities and other development activities ➤ Enhance the resilience of most vulnerable 	<ul style="list-style-type: none"> • Improvement of community resilience and ecosystem service

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		<p>communities through maintenance and improvement of good ecosystem service of natural biodiversity by channeling small grant and fund to joint community and government in environmental and ecosystem management projects</p>	

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