HPA-AN

TOWNSHIP ENVIRONMENTAL ASSESSMENT

2017

MYANMAR ENVIRONMENT INSTITUTE

BRACED Building Resilience and Adaptation to Climate Extremes and Disasters

MEI

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

Abbreviation and Acronyms

BRACED	Building Resilience and Adaptation to Climate Extremes and Disasters
CBO	Community Based Organization
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRA	Community Risk Assessment
CRSA	Climate Resilient Sustainable Agriculture
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
Cu.Ton	Cubic Ton
ECD	Environmental Conservation Department
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
GHG	Green House Gas
IEE	Initial Environmental Examination
Inh/km2	Inhabitant per Kilometer Square
KBA	Key Biodiversity Area
Km	Kilo Meter
LC	Least Concern
m	Meter
m^3	Cubic Meter
MEI	Myanmar Environment Institute
MIMU	Myanmar Information Management Unit
MOECAF	Ministry of Environmental Conservation and Forestry
MONREC	Ministry of Natural Resource and Environmental Conservation
MSW	Municipal Solid Waste
NCEA	National Commission for Environmental Affair
NGO	Non-Governmental Organization

NTFP	Non -Timber Forest Product
NW	North West
PAH	Polycyclic aromatic hydrocarbon
PM	Particulate Matter
PVC	Poly Vinyl Chloride
RIMES	Regional Integrated Multi -Hazard Early Warning System
SE	South East
SEA	Strategic Environmental Assessment
SO_2	Sulfur Dioxide
TDMP	Township Disaster Management Plan
TEA	Township environmental assessment
TEMP	Temperature
UN	United Nation
UNEP	United Nation Environmental Program
WCS	Wildlife Conservation Society
WSHG	Women Self Help Group
WtE	Waste to Energy

Table of Contents

List of Figure

List of Table

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 and is 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 section does not provide details on application of SEA's in decision making process or explicitly stress where an SEA is required. An SEA is undertaken by a government department on a specific development plan or strategy.

According to existing EIA procedure, there is not a strong mandatory requirement for conducting SEA.

This study is not intended to replace or substitute any SEA's required under the EIA procedure on ongoing development plans or activities in Myanmar. The data presented should support the development of any further environmental studies undertaken by government or private sector actors in Hpa-an township by giving a contextual overview of the situation in the township.

Environmental Scoping

A preliminary scoping study was conducted through stakeholder consultation meetings in Hpa-an Township and a desktop review. Environmental components studied were terrestrial flora and fauna, physical environment, geological features social sector, air pollution, religious and cultural heritage, public health & safety.

The active projects identified in the TEA process as having impacts on environmental and social receptors of Hpa -An township are listed in following table.

Active Projects of Interest	Key Issues
Mining & Quarries	Open cutting, blasting and aesthetics, dust pollution
Increasing cement plants	Emission , Discharge, Land Acquisition , Waste
Enhancement of tourism and construction of accommodation and restaurant	Land acquisition, new infrastructure , waste ,public health , impacts on culture and indigenous people
Waste Management facility /landfill	Waste Generation, land fill, open dumping, incineration, , handling and transporting, water pollution, draining
Planning on commercial& perennial plantation such	Flora and fauna , bush fire
Special Economic Zone / Manufacturing Factories	Waste management, emission , discharge , public health and safety
Instream Mining	River ecosystem

Environmental Baseline

A great deal of the forest cover in Hpa-an Township has been lost within recent decades due to the uncontrolled and illegal logging activities, commercial plantation and expansion of agricultural land. This loss of forest coverage has mostly occurred in northern and north eastern parts of the study area. Rapid decline of forest coverage in the regions has been contributing to increase of vulnerability to climate change extremes through the loss of basic ecosystem services.

In term of biodiversity concerns, a total of 115 Km^2, Hpa-an is categorized as medium risk. However, more information on covering area is required to judge the biodiversity status of the entire region.

Socio economic, Culture, Religion and Ethnicity

Majority of the residents of Hpa-an are Kayin (Karen) ethnic people who speak their own language. Major language is Kayin .Kayin ethnic people are subdivided into two major ethnic groups namely Sakaw Kayin and Po Karen. Another sub group is called Bwe Kayin and majority of these Bwe Kayin reside in Taungoo District which is bordered with northern Kayin State.

According to 2014 census, population in Hpa-an Township is (421,575) with population density of 145.4 inh/km2. Buddhism is main religion in the region with 94% adherents among the total population.

Farming is the mainstay of Hpa-an has a reasonably productive agricultural sector with fertile soil in lowland areas and upland hills. The majority of fish and prawns are obtained from fresh water such as lakes, wetland, rivers and streams. In some lowland area, small Inns (Lake) form naturally during the flooded season. Aqua farming is practiced in those Inns adding some aqua species in the rainy season.

Environmental Impact Analysis, Environmental Threats and Vulnerability in Hpa -An

Both rural and urban communities of Hpa-an township experience a wide ranges of natural disasters including seasonal floods, intense heat, storm, bush fire, land slide, riverbank erosion and high winds. These natural disasters are exacerbated by environmental impacts driven by development projects, business practices and other human activities.

A number of active development activities identified above were assessed to understand probable interaction between economic activities and environmental elements in the scoping section.

Some adverse environmental impacts triggered by development activities are identified. Environmental degradation from air and water pollution, riverbank erosion and deforestation are considered to be significant impact on vulnerability in communities of the regions.

Environmental Management Framework

This study provides recommendations for measures that should be integrated into existing or future township policy, plan, programs and regional development plans to improve environmental and social protection of existing activities.

Recommendations are targeted at business, government, community and CSOs.

Recommendations for Government

1. Existing environmental and related regulations and laws highlighted in chapter 3 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 district level government structures to agree and adopt and implement an environmental management plan, 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. Formulation and implementation of township waste management strategy and action plan in line with national waste management strategy
5. Increase capacity building of staff for environmental conservation department and other relevant departments including members of state environmental management committee for enforcement and implementation of environmental legislations and guidance
6. 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
7. Consideration to be made in the decision making process for permitting future cement plants in the regions since the area has been already suffering the adverse effects on environmental and social systems in the region.
8. Improve capacity of staff for inspection and monitoring of environmental performance of business activities
9. Township departments 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 Hpa-an. 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.
10. The Township Disaster Management Plan (TDMP) for Hpa-an should draw on data and information and risk identified in this report and ensure that the TDMP is synergized with this report.

Recommendations for Industry and Business

Consultation sessions should be organized with private sector and business leaders to present the findings of this TEA report. Efforts should be made to highlight existing environmental, social and cultural regulations and guidelines and work with industry and business to come up with compliance mechanisms. Suggestions for initial steps include:

11. Improvement in public participation and consultation in project development phase of new projects and activities
12. Initiate transparency and openness about project and business operations with publication of environmental, health and safety standards and policies.
13. 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
14. 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).
15. Development community health and safety initiatives along with occupation health and safety program
16. Prioritize environmental conservation and pollution prevention mechanisms in business operations
17. Develop project specific environmental management framework with local government departments and implementation in accordance with existing EIA guidance and laws
18. 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
19. Develop Corporate Social Responsibility initiatives which focuses on improvement of community resilience , community development, maintenance of ecosystem service and environmental management

20. Actively participate in stakeholder consultation and business meetings
21. Share local knowledge and experience in the consultation meeting and express concerns and challenges
22. Actively participate in environmental campaigns to be initiated by government organization and other organizations
23. Develop a private sector oversight mechanism that tracks adherence to environmental laws and procedures of all new development activities and

projects

24. Oversee the development and implementation of environmental management framework and encourage accountability and transparency in business and development practice

အကျဉ်းချုပ် အစီရင်ခံချက်

မြန်မာ့ပတ်ဝန်းကျင်သိပ္ပံသည် အစွန်းရောက် ရာသီဥတုများ၏ ဘေးဒဏ်ခံနိုင်စွမ်း တည်ဆောက်ခြင်း နှင့် လိုက်လျောညီထွေ စွာနေထိုင်ခြင်း (BRACED) စီမံကိန်း၏ အစိတ်အပိုင်းတရပ်အဖြစ် မြန်မာနိုင်ငံအတွင်း ရွေးချယ်ထားသော မြို့နယ် ရှစ်မြို့နယ်တွင် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း ပြုလုပ်ရန် တာဝန်ယူခဲ့ပါသည်။ BRACED စီမံကိန်းသည် ရွေးချယ်ထားသော မြို့နယ်ရှစ်မြို့နယ်အတွင်း လူဦးရေ သုံးသိန်းငါးသောင်းကျော် တို့၏ အစွန်းရောက် ရာသီဥတုများကြောင့်ဖြစ်ပေါ်သော သဘာဝဘေးဒဏ်ခံနိုင်စွမ်း တည်ဆောက် ရန် ရည်မှန်းထားပါသည်။

BRACED(၂၀၁၅-၂၀၁၇) စီမံကိန်းကာလအတွင်း ရွေးချယ်ထားသော တောင်ကုတ်၊ ဘားအံ၊ မော်လမြိုင်၊ကျောက်ဖြူ၊ လပွတ္တာ၊မိတ္ထီလာ၊ကျိုင်းတုံနှင့် ဒဂုံဆိပ်ကမ်းမြို့နယ် များအတွက် မြန်မာ့ပတ်ဝန်းကျင်သိပ္ပံမှာ အဆိုပါ လေ့လာမှုများ ပြုလုပ်လျက် ရှိပါသည်။ အားလုံးသော ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းအစီရင်ခံစာများသည် မြို့နယ်အတွင်းလုပ်ဆောင်နေသော ဖွံ့ဖြိုးရေးစီမံကိန်းများနှင့် အခြားသော လုပ်ငန်းစဉ်များကြောင့် ဖြစ်ပေါ်လျက်ရှိသော ပတ်ဝန်းကျင်နှင့် လူမှုရေး ဆိုးကျိုးသက်ရောက်မှုများကို အဓိကထားလေ့လာပါသည်။ အစီရင်ခံစာမှ ထွက်ရှိလာသော အကြံပြုချက်များကို လက်ရှိနှင့် အနာဂတ် တွင် ဖြစ်ပေါ်လာနိုင်သော စီမံကိန်းများ၊ စီမံချက်များ တွင် ထည့်သွင်းစဉ်းစား နိုင်ရန် တင်ပြထားပါသည်။ဤသို့ဖြင့် အနာဂတ် စီမံကိန်း၊စီမံချက်များ ရေးဆွဲရာတွင်လည်း ပတ်ဝန်းကျင်ဆိုင်ရာ အသိအမြင်များ ပေါင်းစပ် ၍ ထည့်သွင်း အသုံးပြုနိုင်မည် ဖြစ်ပါသည်။

ဤအစီအရင်ခံစာပါ အချက်အလက်များသည် ဒေသခံပြည်သူလူထု အစုအဖွဲများ၏ ဒဏ်ခံနိုင်စွမ်းကို ထိပါးသွားနိုင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ ဆိုးကျိုးသက်ရောက်မှုများကို ဖော်ထုတ်သွားမည်ဖြစ်ပြီး မြို့နယ်ဆိုင်ရာ ဖွံ့ဖြိုးရေးနှင့်အခြား စီမံချက်များအတွက် လိုအပ်နေသော ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံ လမ်းညွှန်ချက်တခု ဖြစ်လာစေရန် ရည်မှန်းထားပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေ မူဘောင်

၂၀၁၅ ခုနှစ်တွင် ပြဋ္ဌာန်းထားသော ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်း အခန်း (၁၂) အပိုဒ် {၁၀} တွင် ဗျူဟာမြောက် ပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာဆန်းစစ်ခြင်းနှင့် ပတ်သတ်၍ ထည့်သွင်းဖေါ်ပြထားပါသည်။ သယံဇာတနှင့်ပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ကြီးဌာနသည် လိုအပ်ပါက အခြားဝန်ကြီးဌာနများ တိုင်းနှင့်ပြည်နယ် ဒေသကြီးများ ၊ခရိုင်နှင့်မြို့နယ်များ၊ ကိုယ်ပိုင်အုပ်ချုပ်ခွင့်ရ တိုင်းနှင့်ဒေသများနှင့် အခြား ပုဂ္ဂလိက အဖွဲ့အစည်းများမှ ရေးဆွဲသော မူဝါဒများ၊ ဗျူဟာများ၊ဖွံ့ စီမံချက်များ အတွက် ဗျူဟာမြောက်ပတ်ဝန်းကျင်ဆိုင်ရာ အစီရင်ခံစာပြုစုရန် သက်ဆိုင်ရာ တာဝန်ရှိသူများကို တောင်းဆိုမည် ဖြစ်ပါသည်။

အကယ်၍ ထို မူဝါဒများ ဗျူဟာများ ဖွံ့ဖြိုးရေးစီမံကိန်းနှင့် မူဘောင်များ စီမံချက်များမှ ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများရှိနိုင်သည်ဟု ယူဆပါက သက်ရောက်မှုများ ဖော်ထုတ်နိုင်ရန်၊သင့်တော်သော လေ့လာဆန်းစစ်မှုများ ပြုလုပ်နိုင်ရန်၊ မဟာဗျူဟာမြောက် ပတ်ဝန်းကျင်အစီရင်ခံစာတွင် လေ့လာစောင့်ကြည့်ရေး မူဘောင်များ ထည့်သွင်းရေးဆွဲရန် တောင်းဆိုနိုင်ကြောင်း ဖော်ပြထားပါသည်။

ဤ လုပ်ထုံးလုပ်နည်းကို ပြန်လည်သုံးသပ်ကြည့်ပါက မဟာဗျူဟာမြောက်ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း အစီရင်ခံစာ နှင့်ပတ်သတ်၍ ယေဘုယျသာ ဖော်ပြထားသည်ကို တွေ့ရှိရပါသည်။ မည်သို့လိုအပ်သည် မည်သို့လုပ်ဆောင်ရမည်ဟု အသေးစိတ် ဖော်ပြထားနိုင်ခြင်းမရှိသလို မည်သို့ ဆက်လက် ဆောင်ရွက်မည်ဟုလည်း ဖော်ပြနိုင်ခြင်းမရှိပါ။ ထို့ကြောင့် လိုအပ်ချက်များ နည်းပါးနေကြောင်း တွေ့ရှိရပါသည်။

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

နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း

ကနဦး နယ်ပယ်အတိုင်းတာသတ်မှတ်ခြင်းကို သက်ဆိုင်ရာ ပတ်သတ်ဆက်စပ်သူများ (Stakeholder) အစည်းအဝေး နှင့် ရှိရင်းစွဲအချက် အလက်များကို လေ့လာခြင်းများကို သုံး၍ ပြုလုပ်ခဲ့ပါသည်။ သက်ဆိုင်သူများ၏ ဆွေးနွေးချက်များ အယူအဆများ သည် ဤ နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်းတွင် ထင်ဟပ်နေပါသည်။

ရွေးချယ်ထားသော လေ့လာစရာ ပတ်ဝန်းကျင်အစိတ်အပိုင်းများမှာ ကုန်းနေသတ္တဝါများနှင့် အပင်များ ၊ရုပ်ပိုင်းဆိုင်ရာ ပတ်ဝန်းကျင်၊ပထဝီအနေအထား၊လူမှုစီးပွား၊ လေထုညစ်ညမ်းမှု၊ဘာသာရေးနှင့် ယဉ်ကျေးမှုဆိုင်ရာ နေရာများနှင့် လူထုကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး တို့ဖြစ်ပါသည်။ ပတ်ဝန်းကျင် ထိခိုက်နိုင်ခြေရှိသည်ဟု ယူဆရသော အောက်ပါ စီမံကိန်းများ၊စီမံချက်များ လုပ်ငန်း များကို ရွေးချယ်ထားပါသည်။

၁. ကျောက်ထုတ်လုပ်ငန်းများ

၂. ဘိလပ်မြေစက်ရုံများ

၃. ခရီးသွားလုပ်ငန်း

၄. အမိုက်သိမ်းဆည်းမှုနှင့် စွန့်ပစ်မှုစနစ်

၅. နှစ်ရှည် စက်မှုကုန်ကြမ်းစိုက်ခင်းများနှင့် လယ်ယာမြေချဲ့ထွင်ခြင်း

၆. အထူစီးပွားရေးဇုန်

၇. မြစ်အတွင်း သဲတူးဖော်ခြင်း

ပတ်ဂန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက်များ

လွန်ခဲ့သော ဆယ်စုနှစ်များအတွင်း ဒေသတွင်း သစ်တော ပြုန်းတီးမှုများ အရှိန်အဟုန်မြင့်မား ခဲ့ပါသည်။ ထိန်းချုပ်ရန် ခက်ခဲသော တရားမဝင်သစ်ခုတ်ခြင်း လုပ်ငန်းများ၊ ရွှေပြောင်းတောင်ယာစနစ်များ၊ နှစ်ရှည်ပင် စီမံကိန်းများသည် သစ်တော ပြုန်းတီးရခြင်းများ၏ အဓိက အကြောင်းတရား များဖြစ်ပါသည်။ သစ်တောပြုန်းတီးရာ နေရာများမှာ မြို့နယ်၏ မြောက်ပိုင်းနှင့် အနောက်မြောက်ပိုင်းများတွင်ဖြစ်ပါသည်။ ဤသို့ သစ်တောဖုံးလွှမ်းများ လျင်မြန်စွာ ပြောင်းလဲခြင်းများသည် အစွန်းရောက် ရာသီဥတုများကြောင့် ဒေသအတွင်း ဂေဟစနစ်မှ ပေးအပ်သော ဂန်ဆောင်မှုများ လျော့ကျကာ ဒုက္ခခံစားနိုင်ရမှုများကို ပိုမိုမြင့်တက်လာစေနိုင်ပါသည်။

ဇီဂမျိုးစုံမျိုးကွဲများတန်ဖိုးနှင့်ပတ်သတ်၍ ၂၀၁၂ ခုနှစ်တွင် ဘားအံမြို့ ပတ်လည် အကျယ်အဂန်း ၁၁၅ ကီလိုမီတာ ပတ်လည်ဒေသအား အလယ်အလတ် အဆင့်ဖြင့် သတ်မှတ် ထားခဲ့ပါသည်။ ဒေသကြီတခုလုံးအတွက်မူ အချက်အလက်များ ပိုမိုစုံလင်အောင် ကောက်ယူနိုင်မှသာ ဆုံးဖြတ်ချက်ချနိုင်မည်ဖြစ်ပါသည်။

လူမှုစီးပွားယဉ်ကျေးမှု ၊ဘာသာရေးနှင့် လူမျိုးစု

ဘားအံမြို့နယ်တွင် အဓိကအားဖြင့် ကရင်လူမျိုးများနေထိုင်ကြပါသည်။ ကရင်လူမျိုးများသည် မိမိတို့ ကိုယ်ပိုင် ဘာသာစကားနှင့် စာပေ ပိုင်ဆိုင်ထားသူများဖြစ်ပါသည်။ ကရင်တိုင်းရင်းသားလူမျိုးစုတွင် ပိုးကရင်နှင့် စကောကရင် ဟူ၍ ထပ်မံ ကွဲပြားပါသည်။ စကောကရင်များသည် လူဦးရေအများဆုံးဖြစ်ပြီး မြန်မာနိုင်ငံအနှံ့နေထိုင်ကြပါသည်။ အခြားသော ကရင်လူမျိုးစုမှာ ဘွဲ့ကရင် လူမျိုးစုဖြစ်ပြီး ကရင်ပြည်နယ် အနောက်ပိုင်းနှင့် နယ်နမိတ် ထိစပ် လျက်ရှိသော တောင်ငူဒေသတွင် နေထိုင်ကြပါသည်။ လူမျိုးစုများအလိုက် ဘာသာစကားကွဲပြားမှုလည်း အနည်းငယ် ရှိပါသည်။

၂၀၁၄ ခုနှစ် သန်းခေါင်စာရင်းအရ မြို့နယ်အတွင်း လူဦးရေ မှာ (၄၂၁,၅၇၅) ယောက်ဖြစ်ပါသည်။ သိပ်သည်းဆအားဖြင့် စတုန်းရန်း တစ်ကီလိုမီတာအတွင်း ၁၄၅.၄ ယောက် နေထိုင်ပါသည်။ ဗုဒ္ဓဘာသာကိုးကွယ်သူ အများစုဖြစ်ပြီး လူဦးရေ စုစုပေါင်း၏ ၉၄ ရာခိုင်နှုန်းရှိပါသည်။

ဖွဲ့ကပင်တောင်ခြေနှင့် အခြားတောင်များ တွင် ထုံးကျောက်ဂူများ တည်ရှိပါသည်။ ဘာသာရေး ယုံကြည်မှုများ ၊ယဉ်ကျေးမှုများ၊ရိုးရာဓလေ့ထုံးတမ်းစဉ်များနှင့် ပေါင်းစပ်လိုက်သောအခါ ထို ထုံးကျောက်ဂူများသည် ဘာသာရေးနှင့် ယဉ်ကျေးမှုဆိုင်ရာအဓိက နေရာများဖြစ်လာပါသည်။

မြေဆီမြေနှစ်ပြည့်ဂသော လယ်နှင့် တောင်ယာမြေများ ပေါများခြင်းကြောင့် စိုက်ပျိုးရေး လုပ်ငန်းသည် ဒေသအတွင်း အဓိက သက်မွေးဂမ်းကြောင်း လုပ်ငန်းအဖြစ် တည်ရှိပါသည်။ ငါးပုဖွန်များကိုလည်း ဒေသအတွင်းရှိ အင်းများ၊ ကန်များ၊ရေဂပ်ဒေသများနှင့် မြစ်ချောင်းများမှ ဖမ်းယူ ရရှိနိုင်ပါသည်။ အချို့နေရာများတွင် မိုးရာသီတွင် ရေများပြည့်လာကာ အင်းငယ်များ သဘာဂအလျောက် ပေါ်ပေါက်တတ်ပါသည်။ ထိုသို့သော အင်းများကို အခြေပြု၍ ငါး မွေးမြူရေးနှင့် ပုဖွန်လုပ်ငန်းများလည်း လုပ်ကိုင်ကြပါသည်။

ပတ်ဂန်းကျင်ဆိုင်ရာ သက်ရောက်များ ဆန်းစစ်ခြင်း၊ ပတ်ဂန်းကျင်ဆိုင်ရာ ခြိမ်းခြောက်မှုများနှင့် အင်အားအနည်းပါးဆုံး အစုအဖွဲ့များ

ဘားအံမြို့ပေါ်ရပ်ကွက်များနှင့် ကျေးလက်ဒေသများပါ အမျိုးမျိုးသော သဘာဝ ဘေးအန္တရာယ်များကို ခံစားခဲ့ကြရပါသည်။ ရေကြီးခြင်း၊ အပူရှိန်ပြင်းထန်ခြင်း၊ မုန်တိုင်း၊ တောမီးလောင်ခြင်း၊မြေပြိုခြင်း ၊မြစ်ကမ်းပါးပြိုခြင်းနှင့် လေတိုက်နှုန်းမြင့်မားခြင်းများသည် ယေဘုယျအားဖြင့် ကြုံတွေ့နေရသော သဘာဝ ဘေးအန္တရာယ်များ ဖြစ်ပါသည်။

နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း အခန်းတွင် ရှိရင်းစွဲလုပ်ငန်းများနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ အစီတ်အပိုင်းများ ထိတွေ့ဆက်စပ်နိုင်မှု ဇယားကို အသုံးချကာ ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင် သက်ရောက်မှုများကို ခန့်မှန်းခဲ့ပါသည်။

ဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းများနှင့်အခြား လုပ်ငန်းများကြောင့် ဖြစ်ပေါ်လာသော ပတ်ဝန်းကျင်သက်ရောက်မှုများကို ဤ အခန်းငယ်တွင် ဖော်ပြထားပါသည်။ လေထုနှင့်ရေထု ညစ်ညမ်းမှုများ၊ မြစ်ကမ်းပါးပြိုခြင်းများနှင့် သစ်တောပြုန်းတီးမှုများသည် အဓိကကျသော ပတ်ဝန်းကျင်ဆိုင်ရာ ဆိုးကျိုးသက်ရောက်မှုများ အဖြစ်တွေ့ရပါသည်။ ထိုဆိုးကျိုးများသည် ဒေသ၏ အင်အားအနည်းပါးဆုံး အစုအဖွဲ့များကိုတိုက်ရိုက် သက်ရောက်နိုင်သော အကြောင်းအရာများဖြစ်ပါသည်။

အခြေခံ အကြံပြုချက်များနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု

ဤအခန်းတွင် ဖွံ့ဖြိုးရေးစီမံကိန်းများ စီမံချက်လုပ်ငန်းများ ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကာကွယ်မှုများ တိုးမြှင့်လုပ်ဆောင် လာနိုင်စေရန် လမ်းညွှန်ထားပါသည်။

ဤအကြံပြုချက်များကို လက်ရှိနှင့်အနာဂတ် တွင် ပေါ်ပေါက်လာနိုင်မည့် မြို့နယ်အတွင်း စီမံကိန်းများ စီမံချက်များနှင့် လုပ်ငန်းများ ဆောက်ရွက်ရာတွင် ထည့်သွင်းစဉ်းစား သင့်ပါသည်။

မြို့နယ်နှင့်ပတ်သတ်သော အဓိက အဆုံးအဖြတ်ပေးသူနိုင်များ၊ အကောင်အထည်ဖော်သူများ ၊အကြံပြုထောက်ပြသူ အစိုးရအဖွဲ့အစည်းများ၊ စီးပွားရေးလုပ်ငန်းစုများနှင့် အရပ်ဘက်အဖွဲ့အစည်းများအတွက် လုပ်သင့်လုပ်ထိုက်သော ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေးချက်များကို အောက်ပါ အတိုင်း ဖော်ပြထားပါသည်။

အစိုးရ ဌာနဆိုင်ရာ အဖွဲ့အစည်းများ

1. ဤအစီရင်ခံစာ အခန်း(၃) တွင်ဖော်ပြထားသော ပတ်ဝန်းကျင်နှင့် အခြား ဆက်စပ်ဥပဒေများကို အစိုးရဌာန ဆိုင်ရာ များအနေနှင့် လေ့လာသုံးသပ်ပြီး ဥပဒေစိုးမိုးရေး အတွက် တာဝန်ရှိသည့် အဖွဲ့အစည်းများ ဌာနများကို တာဝန်ပေးခြင်းများ ပြုလုပ်ရန်
2. ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု ကို နားလည်သဘောပေါက်ရန် ၊ ဥပဒေစိုးမိုးမှုများကို လေ့လာစောင့်ကြည့် ရန်နှင့် ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကိစ္စများကို လေ့လာစောင့်ကြပ်ရေး နည်းလမ်းများကို တည်ဆောက် နိုင်ရန်အတွက် မြို့နယ်နှင့် ခရိုင်ဒေသ အတွင်း ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု ကော်မီတီဖွဲ့စည်းရန်
3. ဂေဟစနစ်မှ ပေးသော ဝန်ဆောင်မှုများနှင့် ဒဏ်ခံနိုင်စွမ်းဆက်စပ်ပုံများကို အခြေခံသော ပတ်ဝန်းကျင်ဆိုင်ရာ အသိပညာပေး လုပ်ငန်းများကို ဒေသခံလူထုအတွင်း ဆောင်ရွက်သွားရန်
4. အမျိုးသား: စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှု မဟာဗျူဟာနှင့် လိုက်လျောညီထွေရှိသော မြို့နယ်ဆိုင်ရာ စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှု မဟာဗျူဟာနှင့် စီမံချက်များ ရေးဆွဲအကောင်အထည် ဖော်ဆောင်နိုင်ရန်

5. ပတ်ဂန်းကျင်ထိန်းသိမ်းရေးဌာနနှင့်အခြားဆက်စပ်ဌာနများမှ ဂန်ထမ်းများ နှင့် ပြည်နယ် ပတ်ဂန်းကျင် စီမံခန့်ခွဲရေးကော်မတီ အဖွဲ့ဂင်များကို ကို ပတ်ဂန်းကျင်ဆိုင်ရာ ပြဌာန်းချက်၊ ဥပဒေများ လက်တွေ့အကောင်အထည်ဖော်ရေးဆိုင်ရာ အရည်အသွေးမြှင့်တင်မှုများ ပြုလုပ်ခြင်း
6. ဖွံ့ဖြိုးရေးလုပ်ငန်းများကြောင့် ပတ်ဂန်းကျင်နှင့် ဒေသခံလူထုတို့၏ ရာသီဥတုဆိုးဂါးမှ ဒဏ်ခံနိုင်စွမ်းကို မည်သို့မည်ပုံ သက်ရောက်မှုရှိနိုင်ကြောင်း ကုမ္ပဏီများ ၊အဖွဲ့အစည်းများမှ ပွင့်လင်းစွာ တင်ပြနိုင်ရေးအတွက် တွန်းအားပေးရန်
7. ဘိလပ်မြေစက်ရုံများကြောင့် လေထုညစ်ညမ်းမှုများနှင့် အခြားပတ်ဂန်းကျင်ညစ်ညမ်းမှုများ ရှိနေနိုင်ပြီး ဖြစ်သောကြောင့် နေရာဒေသတစ်ခုအတွင်း ဘိလပ်မြေ စက်ရုံအသစ်များ ထပ်မံဆောက်လုပ်ခြင်းအတွက် အဖက်ဖက်မှ စဉ်းစားပြီးမှသာ ဆုံးဖြတ်နိုင်ရန်
8. ပတ်ဂန်းကျင်ထိန်းသိမ်းရေးဌာနမှ ဂန်ထမ်းများကို စီးပွားရေးလုပ်ငန်းများ၏ ပတ်ဂန်းကျင်ဆိုင်ရာ အကောင်အထည်ဖော် ဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြပ်မှုနှင့် ပတ်သတ်သော အရည်အသွေး ဆိုင်ရာ ဥသင်တန်းများ ပို့ချပေးခြင်းများ ပြုလုပ်နိုင်ရန်
9. မြို့နယ်အတွင်းရှိ ဌာနဆိုင်ရာများအနေနှင့် ရာသီဥတုပြောင်းလဲမှုများ၊ ရာသီဥတု ပြောင်းလဲမှုများကြောင့် ဖြစ်ပေါ်လာသော ဘေးနှင့်ဖိစီးမှုများ၊ လက်ရှိစီမံကိန်းများမှ နောင်တွင်ဖြစ်ပေါ်လာနိုင်သော ပတ်ဂန်းကျင် ဆိုးကျိုးသက်ရောက်မှုများကို ဖော်ထုတ်နိုင်ရန်အတွက် BRACED စီမံကိန်းမှ ပြုစုခဲ့သော မြို့နယ်ပတ်ဂန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း အစီရင်ခံစာ နှင့် ကျေးရွာလူထု၏ ဘေးအန္တရာယ်ခံနိုင်စွမ်း စစ်တမ်းများကို လေ့လာသုံးသပ်ရန်(ဘားအံဒေသအတွင်းရှိ အင်အားအနည်းပါးဆုံး ဒေသခံတို့၏ ဘေးဒဏ်ခံနိုင်စွမ်း မြင့်မား လာစေရေးအတွက် ဒေသခံတို့မှာ ရှာဖွေ ဖော်ထုတ်ထားသော လုပ်ဆောင်ရမည့် လုပ်ငန်းများ အားလုံးကို အတူတကွ ပေါင်းစည်း၍ ပိုမိုကျယ်ပြန့်သော စီမံချက်များ ရေးဆွဲသင့်ပါသည်။ ထိုသို့ပြုလုပ်ရာ တွင် အစိုးရနှင့် ပြည်သူတို့ အတူတကွ လုပ်ကိုင်နိုင်မည့် ပတ်ဂန်းကျင်နှင့် ဂေဟစနစ်ဆိုင်ရာ စီမံကိန်းများအတွက် အသေးစားရံပုံငွေများ ရရှိအောင်ဆောင်ရွက်ခြင်းဖြင့် ဇီဂမျိုးစုံမျိုးကွဲ၏ ဂေဟစနစ်ဆိုင်ရာ ဂန်ဆောင်မှုများ မြင့်တက်လာနိုင်သည် ဆိုသော အချက်ကိုလည်း ထည့်သွင်းနိုင်ပါသည်)
10. မြို့နယ်ဆိုင်ရာ ဘေးအန္တရာယ် စီမံခန့်ခွဲရေး ရေးဆွဲရာတွင် ဤအစီရင်ခံစာပါ အချက်အလက်များ၊ အန္တရာယ်စစ်တမ်းများ ကို ကိုးကားနိုင်ရန် နှင့် အဆိုပါ စီမံချက်သည် ဤအစီရင်ခံစာ နှင့်အတူ အပြန်အလှန် ပေါင်းစည်းနိုင်ရန်

စက်ရုံအလုပ်ရုံများ နှင့် စီးပွားရေးလုပ်ငန်းများ

ဤအစီရင်ခံစာမှတွေ့ရှိချက်များနှင့်ပတ်သတ်ပြီး ပုဂ္ဂလိကလုပ်ငန်းများ၊စီးပွားရေးလုပ်ငန်းများ၊ နှင့် ဆွေးနွေးပွဲများ ပြုလုပ်သင့်ပါသည်။ ပတ်ဂန်းကျင်၊လူမှုရေးနှင့် ယဉ်ကျေးမှု ဆိုင်ရာ ဥပဒေများနှင့် လမ်းညွှန်ချက်များကို အဓိက ဦးစားပေးဖော်ပြကာ စက်ရုံအလုပ်ရုံများနှင့် စီးပွားရေးလုပ်ငန်းများ အနေနှင့် ဥပဒေများလိုက်နာရန် နည်းလမ်းများ ပေါ်ပေါက်လာနိုင်စေရေးကို ဦးတည်သင့်ပါသည်။ ပါဂင်သင့်သည်များကို အောက်ပါအတိုင်း အကြံပြုပါသည်။

11. စီမံကိန်းအသစ်များနှင့်လုပ်ငန်း အသစ်များ၏ ကနဦးအဆင့်တွင် လူထုတွေ့ဆုံရေးနှင့် အကြံဉာဏ် တောင်းခံရေး လုပ်ငန်းစဉ်များ ပိုမိုဆောင်ရွက်လာနိုင်စေရန်
12. စီမံကိန်းနှင့် စီးပွားရေးလုပ်ငန်းများ၏ ပတ်ဂန်းကျင် ၊ကျန်းမာရေးနှင့် လုပ်ငန်းခွင်ဆိုင်ရာ

ဘေးအန္တရာယ် ကင်းရှင်ရေး ဆိုင်ရာ စံနှုန်းများ၊ မူဝါဒများကို တရားဝင်ထုတ်ပြန်ခြင်းဖြင့် ပွင်းလင်းမြင်သာမှုများကို ဖော်ဆောင်ရန်

13. ဖွံ့ဖြိုးရေးလုပ်ငန်းများသည် မည်သည့်မည်ပုံ ရပ်ရွာလူထု ဝန်ဆောင်မှုလုပ်ငန်းများ နှင့် စနစ်များ (ရိက္ခာဖူလုံရေး၊ရေစွမ်းအင်နှင့် ကျန်းမာရေး)၏ ရာသီဥတုဆိုးဝါးမှုပေါ် ဒဏ်ခံနိုင်စွမ်းနှင့် ပတ်ဝန်းကျင်ကို ထိပါးနိုင်ကြောင်း နှင့် ပြန်လည်ကုစားရေးအစီမံများကို ပွင့်လင်းစွာ ရှင်းပြနိုင်ရန်နှင့် အချက်အလက်များကို ပေးမျှရန်
14. ဖွံ့ဖြိုးရေးစီမံကိန်းများနှင့် စီးပွားရေးလုပ်ငန်းများသည် စီးပွားရေး တိုးတက်မှုနှင့် အကျိုးအမြတ် ရနိုင်မှုကို ဦးတည်သော ဘေးဒဏ်ခံနိုင်စွမ်း ဆိုင်ရာ လုပ်ငန်းများ ပါဝင်သည့် စီးပွားရေး ဆောင်ရွက်မှုများ ပိုမိုများပြားလာစေရန် အတွက် တွန်းအားပေးရန် (ဥပမာ- စိုက်ပျိုးရေးနှင့်သက်ဆိုင်သော လုပ်ငန်းများ၊ ရပ်ရွာလူထုအတွက် အခြေခံ အဆောက်အဦများ၊စွမ်းအင်နှင့် ရေ ဖြန့်ဖြူးရေး ဝန်ဆောင်မှ လုပ်ငန်းများ)
15. လုပ်ငန်းခွင်ဆိုင်ရာ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးများနည်းတူ စီမံကိန်းအနီးတဝိုက်မှ ဒေသခံပြည်သူတို့၏ ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက်လည်း ဆောင်ရွက်ရန်
16. အခြား စီးပွားရေးဆိုင်ရာ လုပ်ငန်းများနှင့်အတူ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် ပတ်ဝန်းကျင်ညစ်ညမ်းမှုများ ကာကွယ်ရေး တို့သည်လည်း အရေးကြီးကြောင်း သတ်မှတ်ထားနိုင် ရန်
17. တည်ဆဲ EIA လုပ်ထုံးလုပ်နည်း နှင့်အညီ စီမံကိန်းနှင့်ဆိုင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံချက်များကို ရေးဆွဲအကောင်အထည်ဖော်ရန်
18. စီးပွားရေးနှင့် ဖွံ့ဖြိုးရေးလုပ်ငန်း များကြောင့် ပတ်ဝန်းကျင်ဆိုးကျိုးနှင့် ဒေသခံတို့၏ အသွန်းရောက် ရာသီဥတုဒဏ်ခံစွမ်းရည်များကို မထိခိုက်စေရန်အတွက် မိမိတို့၏ လုပ်သားထုများကို ပတ်ဝန်းကျင်ဆိုင်ရာ သင်တန်းများပေးရန်အတွက် အစီအစဉ်များ ရေးဆွဲရန်
19. ဒေသခံတို့၏ ရာသီဥတုဒဏ်ခံနိုင်စွမ်းရည် မြင့်တက်လာစေရန် ၊ ဂေဟစနစ်မှပေးသော ဝန်ဆောင်မှုများကို ထိန်းသိမ်းရန် နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံချက်များ ပါဝင်သော လူမှုတာဝန်သိမှု အစီအစဉ်များရေးဆွဲ အကောင်အထည်ဖော်ရန်

အရပ်ဖက်အဖွဲ့အစည်းနှင့်ဒေသခံလူထု

20. သက်ဆိုင်ဆက်စပ်သူများ အစည်းအဝေးများတွင် ပါဝင်ဆွေးနွေးနိုင်ခြင်း
21. မိမိတို့အစဉ်အဆက်တွေ့ကြုံခဲ့ရသော အဖြစ်အပျက်များ ဗဟုသုတများကို ထိုသို့သော ဆွေးနွေးပွဲများတွင် အတွေ့အကြုံဖလှယ်ခြင်း၊ စိတ်ပူပန်သောအကြောင်းများနှင့် ဖြစ်ပေါ်နိုင်သော စိမ်ခေါ်မှုများကို တင်ပြနိုင်ခြင်း
22. အစိုးရနှင့်အခြားအဖွဲ့အစည်းများမှ ဦးဆောင်ကျင်းပသော အပြုသဘောဆောင်သည့် ပတ်ဝန်းကျင် ဆိုင်ရာ ထိန်းသိမ်းရေး ပညာပေးရေး လုပ်ရှားမှုများတွင်တက်ကြွစွာပါဝင်ရန်
23. စီးပွားရေးနှင့် အခြားဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းများ၏ ဥပဒေနှင့်အညီ ဆောင်ရွက်မှု ရှိမရှိ သိရှိနိုင်ရန်အတွက် လေ့လာစောင့်ကြည့်ရေး ယန္တယားတစ်ခုထူထောင်ရန်
24. လုပ်ငန်းများ၏ တာဝန်ယူမှုနှင့် တာဝန်ခံမှုများ တိုးတက်လာစေရန် နှင့် လုပ်ငန်းများ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြည့်ရန်

Chapter 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 350,000people 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 environment.

Amongst the tools to achieve this are strategic environmental assessments (SEA) which is a proactive measure to avoid or minimize the environmental consequences of development and other programs.

MEI has identified SEA as an important tool informing decision making processes and MEI members are striving to establish SEA in Myanmar as an approach recognized and accepted amongst environmental experts and decision makers. MEI recognizes that under Myanmar policy and procedures. SEA should be undertaken by government departments and agencies.

Accordingly, MEI under the BRACED project has classified this study as a Township Environmental Assessment.. The TEA studies are focused in eight townships which are considered most vulnerable regions to climate extremes and disasters in Myanmar. The study however follows similar steps and methodologies as set out in Strategic Environmental Assessment (SEA).

Strategic environmental assessment is an analytical tool which seeks to identify environmental aspects of policy, strategy, plan, and program and integrate them into planning process. It is principally based on the concepts of sustainable development by giving equal weight in economic, social and environmental consideration into decision making process of plan and programs. Under the BRACED, MEI has adapted the SEA tools to link between environmental managment issues and climate change and resilence processes.

MEI conducted its first TEA study during the pilot phase of the BRACED programme in 2014 for Taungup Township. As a part of full BRACED project (2015-2017), MEI has committed to publish 7 more TEA in Hpa -an, Mawlamyine, Dagon Myothit (Seikkan) , Meiktila, Kyaukpyu, Kengtung and Labutta.

All TEA reports focus on township level as a geographic boundry 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.

The TEA methodology includes data collection and analysis based on secondary data sources and then collects primary environmental, social, economic and development data through field observations and stakeholder consultation meetings.

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 utlised 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 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 finical support from Department for 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 resilience to identified climate shocks and stresses.

In Hpa-an Township, Action Aid, the implementing partner and three technical partners including BBC Media Action, UN-Habitat and the 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 television and radio channels.

Action Aid has undertaken community resilience action planning in ten villages. Based on community risk assessment reports, activities are implemented to strengthen resilience including capacity building trainings, Climate Resilient Sustainable Agriculture (CRSA) initiatives. Women, Self Help Groups (WSHG) was formed to build financial safety nets and to promote women empowerment and Child Centered Resilience activities to encourage leadership and engagement of youth, children, women and girls in resilience strengthening activities.

Myanmar Environment Institute (MEI) is working to complement community resilience and institutional support activities by carrying out township environmental assessment in all eight townships including Hpa-an. The study looks at the environmental threats posed by existing development projects and sectoral plans to predict future trends. Based on the finding MEI prepares township environmental management framework and provide trainings to government officials, academic institution and CSO to lead on implementation of environmental management plan.

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.

1.3 TEA Goal and Objective

The principal goal of the regional TEA is to provide a regional overview of environmental status of Hpa-an 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 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 Hpa-an Township. Accordingly, MEI has used the well-established EIA principle or simplified EIA process in the study whilst adapting it to incorporate climate change and disaster risk issues.

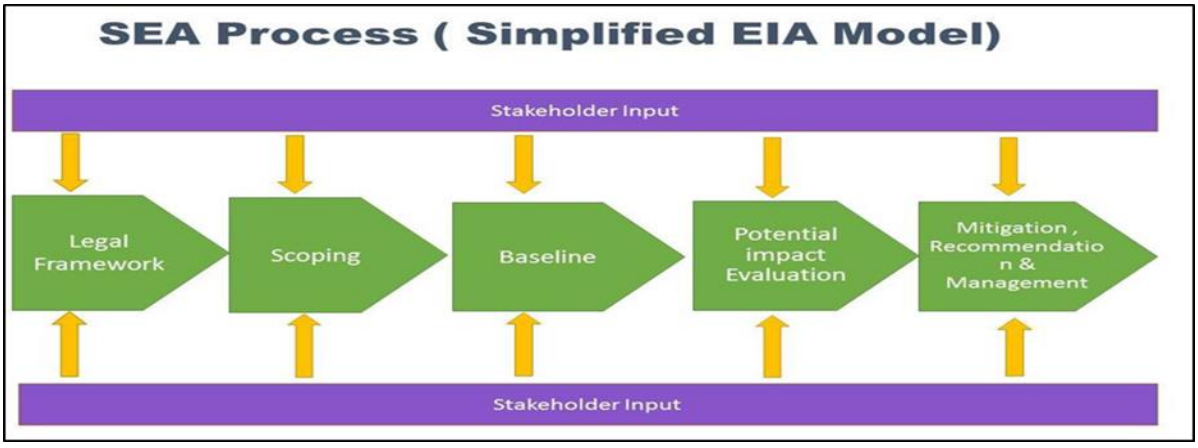
The adopted SEA process is shown as following figure and key elements are described from staring point to the completion of process.

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. Watershed management, waste management, industrial sector and other services.

Analysis and evaluation of the probable impact builds on expert judgment

Figure 1 Generic SEA Process



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 SEA 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 including the township year book of the General Administration Department, unpublished data of Forest Department, Immigration and National Registration Department, Settlement and Land Record Department, Land Transportation Department, Inland Water Transportation Department, Meteorological and Hydrological Department and other academic institutions .

Field Data Collection

Field observations were conducted twice in June and December 2015 to collect primary data and information. During the visits, experts from MEI met with local departmental officials, some NGOs, village heads and community leaders. The meetings included focus group discussions and investigated their perceptions and opinions over social and environmental issues and concerns currently encountered in the region. Documents related to regional plans were collected during the site visits and reviewed. Ecological and physical environmental team observed the areas of interest in terms of ecology and topography while social team collected information about the livelihood, economic and other social status.

Stakeholder Consultation and Interview

Stakeholder meeting and focus group meeting were undertaken with various government departments. Participants and respondents discussed and disclosed

information about existing activities and concerns about the environmental degradation.

First stakeholder consultation meeting was held in June 2015 followed by second meeting in December 2015. Based on the findings from drafted TEA report, training for implementation was carried out in April 2017. All events were taken place in Hpa-an.

1.5 Limitations

Major challenge during the study included a lack of secondary resources and information. It is observed that limited technical and scientific research or study relevant to the Hpa-an region were previously conducted at the time of writing this report. No official environmental study has been previously performed in the region by the government and few studies about human interventions and consequences on the natural environment were conducted. Hence, it is presumed that this study shall act as the first and foremost environmental study providing overviews of the existing environmental and social status of region, the threats and opportunity generally covering the region.

While exploring the status of township level plans and programs currently being implemented, it was quite challenging to identify concrete development plans in documented form. However, the team has identified some active programs with government official in stakeholder meeting during the scoping phase.

During baseline observation, the study team was unable manage to visit some significant areas in the township including northern section due to the remoteness. Thus, the study has centered on Hpa-an Town and easily accessible surrounding areas. In the absence the information, or insufficient data, experiences of stakeholders shall be mainly taken into account for predicting future trends of the particular issue.

In this report, Kayin State Government's plan to build coal fired power plant and supply jetty in Thanlwin River are not included as information about those development projects were received after the completion of drafted TEA report.

The study team recognizes the limitations of this study and encourages the government to undertake full SEA of all development plans in the township. Further EIA should be undertaken on all new development activities in the township. More importantly, this study, given its mainly environmental focus, could not study all the issues in detail.

Chapter 2 Environmental Scoping

The preliminary scoping study was conducted through stakeholder consultation meetings in Hpa-an Township and a desktop review. Opinions and suggestions from key stakeholders involved in consultation meetings were reflected in the scoping study along with finding from a literature review. Moreover, some information was explored through a reconnaissance trip, secondary data collection and informal/formal stakeholder consultation with governmental officers, villagers and town dwellers.

In Hpa-an TEA study, scoping focuses primarily on identifying areas of ecological interest, sources of contaminants, development activities, their interactions with and consequences on immediate environment.

First step of TEA scoping is to identify sensitive environmental areas of region in terms of terrestrial ecosystem, river system and other landscapes and other physical environmental features.

Next step is to understand the existing development plans and to forecast upcoming development in future so as to identify potential sources of pollutants.

2.1 Key Environmental Components

Key environmental components are identified and highlighted in following table as most important matters to consider in the study.

Table 1 Key Environmental Component

Environmental Component	Area of Interest
Terrestrial flora and fauna	Zwekabin Mountain range ,General Ecology and Biodiversity of the region Wildlife Sanctuary in Hpa-an Township
Physical Environment	Thanlwin River and its tributaries within Hpa-an Township, River water quality, ground water quality
Geological Features	Mineral and sand mining ,open cut mining method , quarry sites of cement plants
Social Sector	Flooded areas in Hpa-an Town, land acquisition
Air pollution and climate change	Air pollutant sources
Religious and Cultural Heritage	Zawkabin Mountain range ,Kawgun Cave, Bayin Nyi Cave, Kyauk Kalop Pagoda and surrounding lake , Sadan Cave, Kawtkak Thaung Cave, Bat Cave, Yathapyan Cave, Shwe Yin Hmaw Pagoda

Environmental Component	Area of Interest
Public Health & Safety	Waste Management Infectious disease, respiratory issues

Source: Stakeholder Consultation Meeting

2.2 Selected Key Township Development Plan, Actions and Activities

During the stakeholder meetings, MEI team met and discussed with the planning department of Hpa-an to understand the plans and programs of present and future. However, on account of mandate given to township and district authorities, the vast majority of the programs under the management of township and district authorities observed are very small scale such as upgrading existing road, building new accommodation of staff, construction of school buildings and so on.

From environmental and social perspective, those activities are perceived as less harm to existing environment and social elements. Only the river water irrigation plan is noted with some potential detrimental environmental impact to river ecosystem. In viewing this plan, much information about the location, design, and river water consumption is not available. Hence, instead of township programs, MEI team has looked at the particulars of existing projects which could produce serious environmental and social deteriorations and explore the linkage between climate change extremes, mitigation, adaption and resilience accordingly and the consequence of project activities with anticipation of future trends.

Following active projects are selected for TEA process as they have been considered as having environmental impacts on environmental and social receptors of region.

- Mining & quarry
- Increasing cement plants
- Enhancement of tourism
- Waste management facility /landfill/ open burning
- Commercial & perennial plantation and expansion of agriculture land
- Special economic zone
- Instream mining work

Table 2 Key Development and Services Activities

Development and Other Activities	Key Interest
Mining & quarry	Open cutting, blasting and aesthetics
Increasing cement plants	Emission , discharge, land acquisition , Waste
Enhancement of tourism and construction of accommodation and restaurant	Land acquisition , waste ,public health , indigenous people

Provision of waste management facility /landfill	Waste generation, land fill, open dumping, incineration, , handling and transporting
Planning on commercial& perennial plantation such as rubber ,	Flora and fauna , bush fire
Special economic zone / manufacturing factories	Waste management, emission , discharge , public health and safety
Instream mining	River ecosystem

Source : Stakeholder Meeting

2.3 Interaction Matrix

In scoping phase, likely interaction between key environmental components and township's existing plans have been identified through the matrix system. Environmental components are subdivided into various elements.

Generic environmental components of physical, ecological, social and pollution are listed down in vertical column. Existing township development plans have been listed across the horizontal axis of the matrix.

Each square highlighted in amber indicates the potential impact between environmental receptors of regions and development plans. The significance of this impact will be taken into account in impact evaluation process and detailed examination will be undertaken.

Table 3 Interaction Matrix

Environmental Receptor	Sr.		Existing Mining & Quarry	Increasing cement plants in the area	Instream Sand Mining	Enhancement of tourism sector	Industrial Zone Manufacturing plant	Waste Management	Planning on commercial& perennial plantation Agricultural land
Social Environment		Involuntary Resettlement							
		Local economy							
		Existing social infrastructures							
		Ethnicity							

Environmental Receptor	Sr.		Existing Mining & Quarry	Increasing cement plants in the area	Instream Sand Mining	Enhancement of tourism sector	Industrial Zone Manufacturing plant	Waste Management	Planning on commercial& perennial plantation Agricultural land
		Cultural & religious heritage							
		Public Health and Safety							
Physical & Ecological Enviorment		Soil Erosion							
		Groundwater							
		River Eco System							
		Flora, Fauna and Biodiversity							
		Landscape							
Pollution		Air Pollution							
		Water Pollution							
		Soil Contaminati on							

Existing sources that significantly contribute environmental pollution and resource depletion in the focus area include quarry, cement manufacturing plant and waste management.

- Quarrying in particular has significant impacts on the natural landscape, biodiversity, forest and plantation. A substantial number of quarries from which construct aggregate, rock ,sand, gravel are extracted has been reported in the study areas . In addition, quarry for extracting minerals for cement manufacturing plants has worsened the issues severely.
- Dumping and open burning of waste widely practiced in the area is considered serious as they lead to deterioration in water and soil quality, stimulating fire hazard and degradation of aesthetic beauty of area. Lack of solid waste disposal facilities at several key locations, short of waste collection trucks and man power to handle waste are the major constraints in regard to waste management system.
- Deforestation is a growing issue which has been accelerating across the township areas. Similar to other regions of the country, Hpa-an has been apparently suffering a high deforestation rate and widespread illegal logging in recent

years. As vast area of Hpa-an Township has been build up for long time, most deforestation occurs in the northern tips of the township. Converting reserved forest area into rubber plantation has become a threat to forest coverage and its biodiversity. This issue is happening widespread of study region especially in the north which is endowed with diverse ecosystem.

- The presence of cement plants are observed within three kilometers distance from Hpa A town at the west bank of Thanlwin River. Air and water pollution are likely to have impacted by these plants. Quarry sites associated with these plants also have the history of damaging agriculture land closed to the sites.
- An industrial estate was established in 2011. It consists of small scale manufacturing facilities. The Industrial zone has not installed a centralized and systematic waste collection system to control and dispose of effluent and network of proper drainage system. In addition, environmental and social considerations were not integrated in establishment of the industrial zone.
- Uncontrolled and inappropriate practice of sand mining coupled with excessive production could have adverse impact to the river ecosystem and surrounding environment.

These background environmental concerns will be elaborated into detail study in impact analysis section.

Chapter 3 . Environmental Legislative Framework & Enabling Environment for Environmental Assessment

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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.

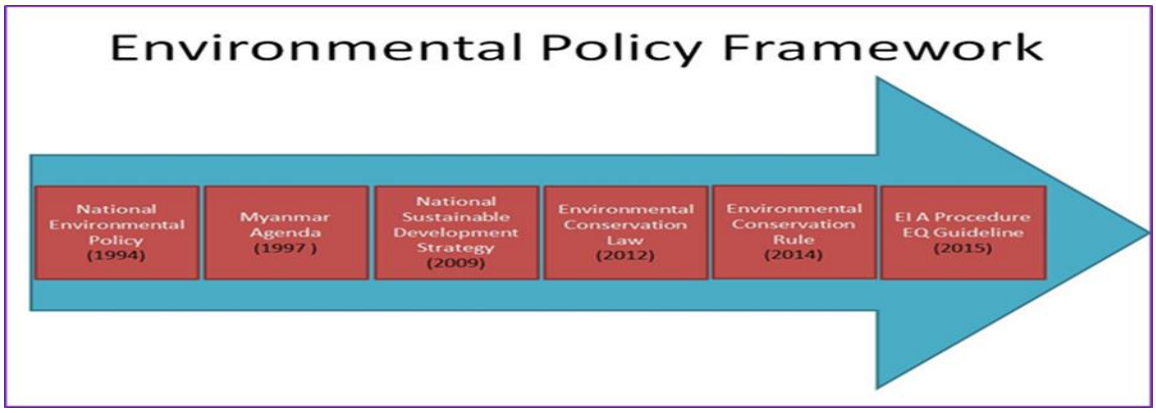
Table 4 Existing Environmental Legislation

Law and regulation	Year	Major Provision
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	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.

Natural Areas Law		
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



3.6 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 it 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 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 are[1]

- 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

3.7 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 10[2], 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.

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

[1] Need assessment for effective implementation of the environmental conservation law in Myanmar (MOECAF, SYKE, Ministry of Foreign Affair of Finland, UNDP)
[2] 2015 EIA Procedure , Government of Union of Myanmar

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.

3.8 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 5 Existing Land Management Legislation

Law and Regulation	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 Virgin Land Law	2012	This law aims at providing framework for effective use of land. Investor can apply land right to the government for 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.

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 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 (Hpa-an)

There is no organized structure for environmental governance and management in township level during the study period. 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 Hpa-an as regional focal unit to oversee the environmental management, resource conservation of region and to promote environmental awareness among public.

Chapter 4 Environmental Baseline, Key Environmental Issues and Vulnerabilies

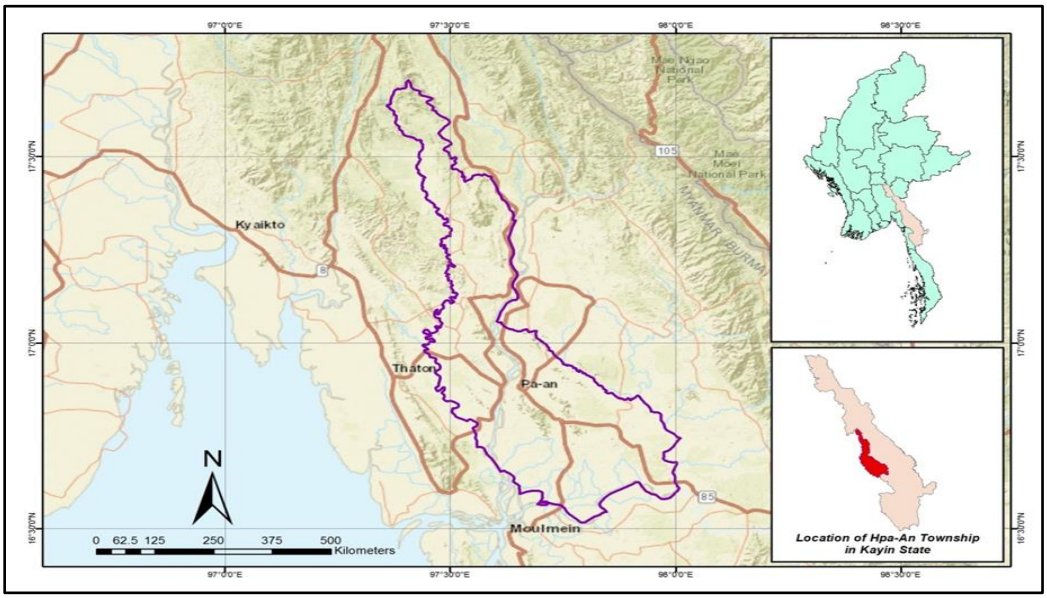
4.1 Environmental Baseline

The fundamental objective of establishing environmental baseline information is to understand the current status of environmental and social elements of region and their trends, to realize environmental sensitivity of flora and fauna and to serve as basic environmental reference of region.

Location of Hpa-an Township

Hpa-an township is the capital of Kayin State .It occupies an area of 1120.089 square miles. The location of the township is between north latitude 16°30′ and 17°44′ and between east longitude 97° 21' and 98° 1'. It is surrounded on the north by Hpa-pun Township, on the east by Hlaing-bwe and Kawkareik Township, on the south by Mawlamyine Township and on the west by Belin and Thaton Township. The area in the north of Hpa-an township is mostly occupied by hilly terrain with narrow flatland separated by steep mountains which are continuation of the Shan plateaus. The narrow flat land can be found along the Thanlwin River and its tributaries.

Figure 3 Location Map of Hpa-an Township



Zwekabin Mountain

Mountains in this area are not very high but have steep slopes separating narrow and fertile land suitable for dry farming practices. The most prominent and significant attraction is Zwekabin mountain or Mt. Zwekabin which is 772m above sea level.[3]

[3] http://www.myanmarburma.com/attraction/75/mt-zwekabin

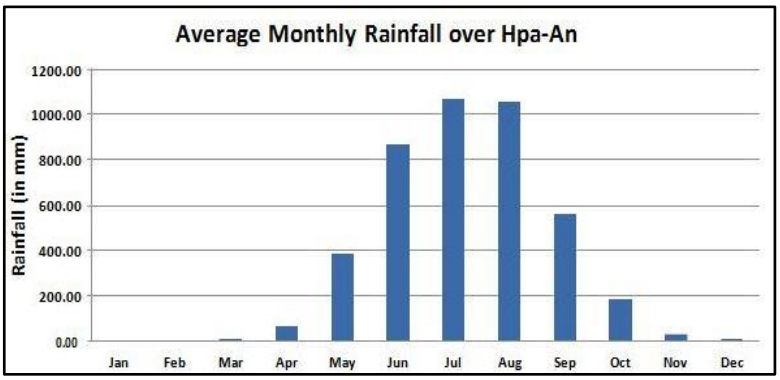
Belonging to unique landscape and dramatic karst mountain scenery, this sheering limestone mountain has been a symbol of Kayin ethnic people and a landmark of Hpa-an Township for many years.

Figure 4 Zwekagin Mountain

The foothill of the mountain is surrounded with interesting places such as lime stone caves, hundreds of Buddha statues and water falls which attract the tourists, picnickers and local pilgrims all year round. A striking sunset can be experienced from the top of mountain.

Climatology of Hpa-an Area[4]

Hpa-an area is predominately influenced by tropical monsoon Climate. In general, two types of monsoon pattern occur in the study area which is known as South East and North West monsoon and short transitional periods between them. The south west monsoon is normally symbolized by widespread coverage of rain cloud and heavy rain fall, bestrewed by thunder storm. The North West monsoon carries less cloud, slight rainfall and mild temperature to the region.



Northwest Monsoon represents summer wet season which occurs between May and October whereas Southwest Monsoon, dry season from November to April.

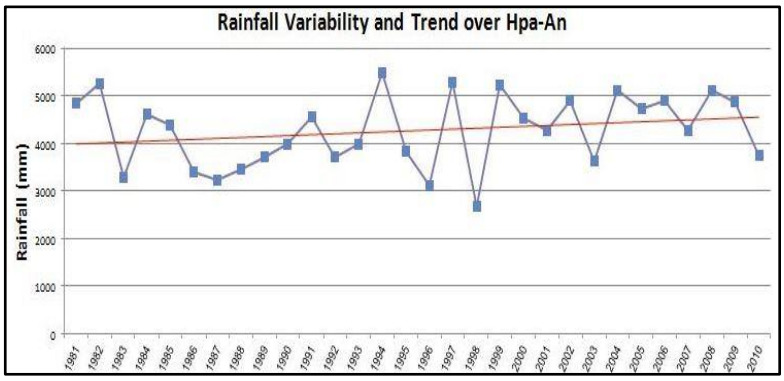
Climate information about Hpa-an in the following box is extracted from Climate Profile of Myanmar prepared by Regional Integrated Multi-Hazard Early Warning System (RIMES), as a technical partner to United Nations Human Settlements Programme (UN-Habitat), as part of BRACED Programme.

According to study , July receives the highest rainfall over 1000 mm which is followed by August .

Rainfall Variabilities, Extremes and Trends

[4] Climate Profile Report, RIMES,UN-Habitat, BRACED Program

Averaging at 4267mm annually, the highest observed rainfall was recorded in 1994 at 5472mm. Four (4) other years (1987, 1982, 1999 and 2008) recorded observed rainfall of more than 5000mm between 1989 and 2010.



In the inclusive period of study, significant heavy rainfall events were recorded during the dry season. Specifically, 14 events exceeded 40mm in the dry season

The annual rainfall shows an increasing trend, the increasing trend is also evident in the percentile analysis for maximum rainfall events, within the baseline period, corroborating the increased occurrences of extreme rainfall events during the period.

Wet and Dry Season Rainfall

In Hpa-an, almost 97% of the annual rainfall is contributed by the wet season. The highest excursion in terms of quantity was in 2008 where the dry season recorded 547mm. The driest dry season was in 2004, contributing only 4mm to an annual rainfall of 5101mm.

The increasing trend in the wet season rainfall is mirrored in the increasing trend of the annual rainfall. Wet season rainfall observed in 17 years exceeded the average wet season rainfall of 4267mm.

The number of wet days similarly indicates an increasing trend. Averaged at 132 annually, 15 years recorded wet days that exceeded the average.

Temperature Variabilities, Extremes and Trend

Maximum temperature in Hpa-an is averaged at 33.05°C. The highest average maximum temperature was in 1998 (35.03°C); the lowest average day time temperature, on the other hand, was in 1982 (31.69°C). The maximum temperature, from 1981-2010, indicates an increasing trend, suggesting that warmer days, in general, had been experienced during the period.

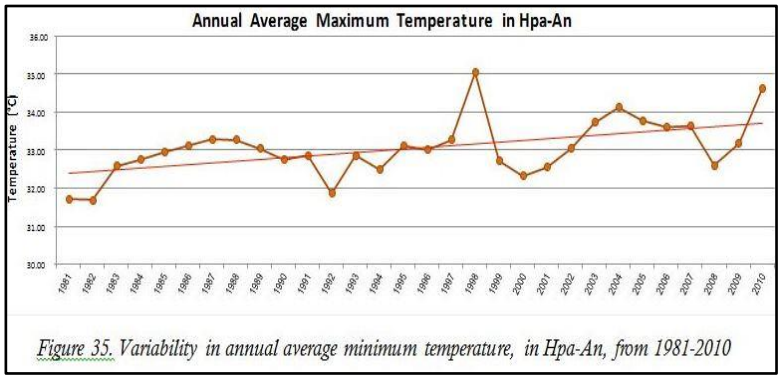
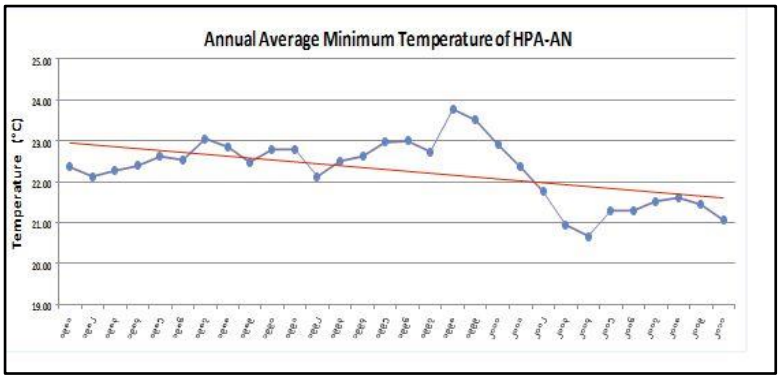


Figure 35. Variability in annual average minimum temperature, in Hpa-An, from 1981-2010

The average minimum temperature is 22.28°C. The lowest average night time temperature in Hpa-an was in 2004 (20.68°C).



In 30 years, the warmest nights, in Hpa-an were in 19 April 1991 and 4 May 1995, both at 28.6°C. Analysis of the occurrence of very warm nights indicates a decreasing trend, opposing the increasing tendency of very warm day time temperature. Over the 30-year period, warmer days and cooler nights have been experienced in Hpa-an.

General Geology

Kayin State is a NW-SE liner region in the southeastern part of eastern highland. It is bounded by Thailand and Kayah state on the northeast, Mandalay and Bago Regions and Mon State on the southwest. Kayin State is located in the middle-segment of the Eastern Highlands. Its occupies the region between the Shan Plateau and the Tanintharyi Ranges hence its stratigraphic succession is composed of a mixture of rock units which are typically exposed in the Shan State and in the Tanintharyi Region.

Like other mountainous areas, Kayin State is one of the poorly accessible regions of the union of Myanmar. It forms a narrow region trending NW to SE, from Thandaung area, east of Taunggoo, to the Three-pagodas pass, east of Ye in upper Tainintharyi Region. The northern part which is in the north of Papun and the eastern part which is in the east of Papun and Kawkareik are mountains and the rest of the state is formed either of lowlands or of low hills. Limited geological investigations have been carried out in Kayin State.

Soil Type[5]

Five major soil types can be observed in Hpa-an Township. Hilly regions have mountain soil, primitive soil, forest soil and lateritic soil. Meadow swampy soil develops in the plain area. Following table describes the soil types in Hpa -an region.

Table 6 Soil Type

Soil Type	Description
Mountain Soils	The red brown mountain soils and yellow brown mountain soils are found with shallow primitive soil on the mountain. These soils are found in northernmost part of the area where evergreen and

[5] Resource Appraisal of Hpa-an Township, Hpa-an University , 2011

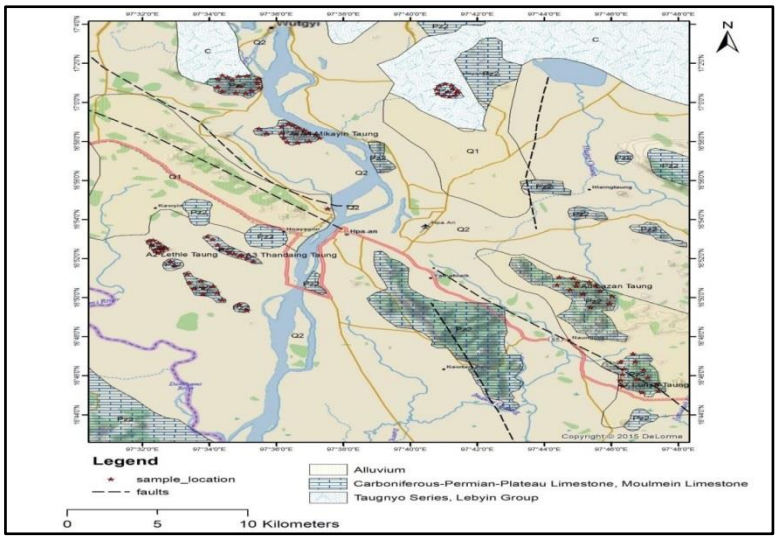
	mixed deciduous species commonly grow. The color of the soil is reddish brown. The pH value of the surface is 4 to 5.5.
Primitive soils	Primitive soils are found in Kyone-sein and Donthami Reserved forests. The pH value of the soil is 4.9 to 6.3. The texture is porphyritic with silt and stones. The limestone outcrops are found on the hill such as Paw-htaw, Kha-lauk-htaung, La-san taung, Taw-Ponee, Hlaing taung, Naung-toe-de, Moe-Kaye, Ya-thae-pyan, East Kaw-gun, Hpa-pu taung and Pan-Kone
Forest Soils	Red Brown forest soils are found under Forest of Mi-zaing Mountain along the northern part of Hpa-an Township, in the east of the Donthami River from Kaw-pyin village to the northern border of Kyone-sein reserved forest. The soil is fragile and has a high capacity of holding water with good aeration. The structure of the soil is crumby and has good drainage. The color of soil varies in different profiles and are poor in humus and slightly acid with pH value about 5.5 to 6.5. In accordance with this pH value, the soil is quite suitable for gardens and plantations. Yellow Brown Forest Soils (Ferrasol-Xanthic) are found in the central and southern part of the township and common on low foothills at the elevation of 300 to 1000 feet above sea level. Its color can be categorized by yellowish brown to dark brown. The top soil are light loamy in texture. Those are slightly acidic with pH value from 5 to 6.5.
Lateritic soils	Lateritic red brown soils are found on the hills such as Bayint-Nyi Cave and Hpa-pu Mountain with pH value of 4.9 to 6.2. Rubber and other garden crops are able to grow in these soils
Meadow Soil (Gleysol)	These are found in the eastern and the western part of the Hpa-an Township. It contains a high content of clay and silt but no content of gravel. It is mildly acidic with the pH value 5 to 7. They have low content of phosphate, high content of potassium and moderate content of nitrogen. So, these soils are productive in spite of a small addition of fertilizer containing phosphate and nitrogen. In dry period, these soils tend to crack. This soil is very suitable for paddy cultivation
Meadow Swampy Soil	These soils cover about 8 percent of the Hpa-an Township. It occupies lower places, except ponds and lakes. Terrain is the water logged for about 6 to 8 months in a year. It is mainly composed of delta clay alluvium. The soil color shows grayish in humus horizon and grayish brown mottled with rusty and grey spot in the lower horizon. There is no accumulation of salt. Soil reaction is strongly

	to slightly acid in the humus horizon and become neutral downwards

Mineral Resource

Hpa-an area is endowed with a variety of mineral resources. Basic mineral resources are sand, mud and gravel which are used as construction materials. Other useful and workable materials like granite, limestone, mica, white clay and antimony can be found in the northern part of township, at the foothill of Zwekabin and some foothills of the mountains. Decorative stone can be extracted from these areas. Although antimony belt is identified, it sporadically distributes in the northern part of township.

Figure 5 Sampling Site of Limestone



Source: Limestone Potential , REM

According to Resource and Environment Myanmar, a total of 5 limestone deposits were investigated and sampled in the western part of Hpa-an area, especially western part of Thanlwin River at Yathebyan Taung, Lethle Taung, Thandaing Taung, Mikayin Taung and Kawpyin Taung.[6]

In the area, east of Hpa -An Township, where a series of relatively large, high, steep-sided, karstic massive ranges occupies on the extensive and undulating land. Investigation team conducted lime stone potential at three areas in eastern Hpa -An region. Those include Pawtaw Taung, Lunya Taung, and Lazan Taung . [7]

At the foot hills of some ranges the clastic sedimentary rocks of the Taungnyo Group underlie the Moulmein Limestone equivalent with Plateau limestone Group Shan State (south). The Moulmein Limestone occupying these ranges is composed of a variety of such limestone as light grey limestone, dark grey or black limestone, white crystalline limestone, and light yellowish colored limestone. Most of this limestone is medium to thick bedded and very thick bedded or massive types.

Finding of the study suggests the high potential of limestone resources in the Hpa-an region with industrial grade. The location of limestone where potential for commercial production is expected is identified in Pawtaw Taung Lunya Taung,

[6] Lime Stone Potential(Resource and Environment Myanmar) 2016
[7] Limestone Potential (Resource and Envirornment Myanmar) 2016

Lazan Taung, Yethebyan Taung, Lethle Taung, Thandaing Taung, Kawpyin Taung and Mikayin Taung.

Zwekabin mountain range was omitted in survey due to its cultural and religious significance in the investigation.

Air Quality

There is no air quality data available for either Hpa-an Township or Kayin State. In addition, implementing agencies such as environmental conservation department and township development committee are not adequately equipped with monitoring devices and mechanism to measure and record the air quality of region.

Figure 6 Emission from Cement Plant

Vehicles are known as heavy emitters of particulate matters and other pollutant gases such as SO_2 and CO_2. Nowadays, the use of vehicles has been growing in Hpa-an with an increase in diesel powered truck and trawlergies (tractor). Air pollutants from these mobile sources are not seen as a visible issue. During consultation meeting, participants stated that movement of trucks and mobile sources of air pollution within the Hpa-an area are not considered significant. Nevertheless, cumulative impacts from these sources must be taken into account for assessing air quality of an area.

Poor enforcement of recently adopted emission guideline and existing vehicles import policy could further contribute towards further reduction in quality of air in the area through rapidly growing vehicles use.

Serious concerns were raised during consultation about the emission from the cement plants located on the northern bank of Thanlwin (Salween) River, three kilometer away from Hpa-an town. It is reported that two cement plants have been operating for years with conventional technology. These plants are venting significant volume of pollutants on a daily basis. During the field visit, study team observed the large quantity of black plume being emitted into the air from the cement plant.

Cement plants are a major source of environmental degradation, contributing to air, water and land pollution and biodiversity losses .It contributes to environmental impact at all stages of the process from construction to operation. Airborne particulates which constitutes of Sulfur dioxide, Nitrogen Oxides, Dust, Dioxin

compound and other pollutants are known to be the primary pollutants of emission from cement plants.

River System

The frominent river in the study area is Thanlwin River and other rivers useful for agriculture and navigation are Gyaing River and Donthami River. Apart from these drainage, there are many small stream flowing in the region .

Thanlwin (Salween) River

The most prominent river which flows through Hpa-an Township is the 2815 Km long Thanlwin River(Internationally known as Salween River) which originates at Tibetan Highland of China and enters into Gulf of Martaban in Adman Sea. The most famous tributaries are the Gyaing and Donthami Rivers. Thanlwin River (internationally known as Salween River) is commercially useful for navigation, fishery and sand extraction. Upper reaches of the river passes through undulating terrains with steep cliffs. It has little commercial value for navigation there. However when the river enters into Hpa-an area which is the lower reach of the river ,it gets broader with moderate current and reasonable water depth favorable for navigation .This river passes through about 54 mile in the Hpa-an Township territory.

Thanlwin River is among the ten most polluted rivers in the world (The Millennium Project, 2010) as a result of natural resource depletion in upstream riparian and catchment area. Degradation of river water quality is expected to be accelerated with future damming on the river and deforestation and resource extraction in catchment area.

Figure 7 Thanlwin River

Thanlwin River is vital for sustaining livelihood, beliefs and culture for ethnic people residing in the river basin and riparian community. Hence, it is regarded as lifeblood of the Kayin State as well. Moreover, the lower reach area including Hpa-an is enriched with fertile floodplain area. Accordingly, it also provides the productive agricultural land for the farmers residing villages along the bank of the river. Varieties of freshwater fishes are available for local consumption.

Gyaing River

Gyaing River borders Hpa-an Township in Kayin State and Kyeimayaw Township in Mon state. It has two major tributaries in Kayin State, known as Hlaingbwe River and Haungtharaw River .These two rivers merge to form Gyaing River, the second largest river of Hpa-an State. Gyaing River enters the Thanlwin River near

Mawlamyine Town, Mon State. Gyaing River provides navigational service in local scale.

Donthami River

Donthami River is located in the western part of Hpa-an Township. With a length of 56.07 kilometers, Donthami River originates from northern part of Kayin State, passes through diverse terrain and enter into Thanlwin River about two mile downstream of Htone Aying Village. Donthami River is demarcated as western boundary of Hpa-an Township.

Other tributaries of Thanlwin and Gyaing Rivers are Hlaing Chaung, Hlaing Bwe River, Mizaing Chaung,Hpa On Chaung ,Khayar Chaung and Zarthabyin Chaung.

Biological Environment

The secondary information on the biological environment of Hpa-an Township is very limited and very few researches and studies were conducted in the past by academic institutes and researchers. Existing studies focus on the specific areas and do not cover the entire region. As such, baseline data on biological environment has collected based on sparse information. An effort was made during the two stakeholders meetings, once during baseline study and once in consultation process to gather biological information. Some biological data are supported by forest department of Hpa-an. A field survey was, therefore, conducted to collect the data on flora and fauna for evaluation of the biodiversity value. Natural vegetation types of Hpa-an was briefed as follows

Figure 8 Typical Forest

Due to high temperature and heavy rain fall in the area, Hpa-an Township is rich in flora with diverse habitats. Mixed deciduous forests and Indaing forests are the most important and valuable natural resources for the area. The swamp species of trees can be seen along the lower river courses and the southern part of the township. The limestone hills have less vegetation because of the rocky nature and thin top soil. Xerophytic plants can grow due to the dryness of this top soil. Tall trees with thick canopies of leaves are found in ravines where underground water table near the surface of the mountain slopes and plain area.[8]

The natural vegetation of Hpa-an Township can be classified as

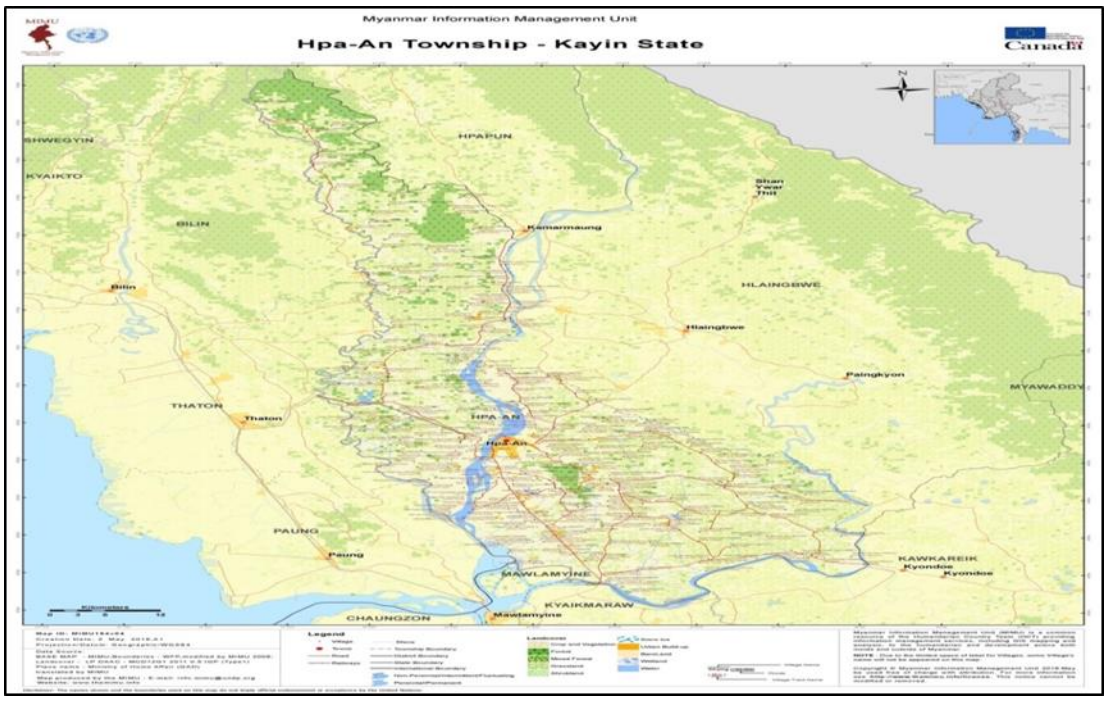
- Mixed deciduous forest
- Indaing forest and

[8] Resource Appraisal

- Swamp forest

The moist upper mixed deciduous forests are found between the Donthami River and the Mizaing River, where the surface drainage conditions are good. In this forest, the commercial plant species like teak can be found mostly in Kahelu reserved forest. Teak(Tectona grandis) , Pyinkado(Xyliaxylocarpa) , Yon (Anogeissus acuminate Wall.),Taukkyant(Terminalia tomentosa) , Binga(Mitragyna rotundifolia) , Yamanae(Gmelina arborea) , Leza(Lagerstroemia tomentosa) , Padauk (Pterocarpus macrocarpus) , Gwe(Spondias pinnata) , and Kanyin(Dipterocarpus spp.) are are commercially important species of the forest . The dry forest is found on the upper slopes of the mountain where the underground water is insufficient. Plant species of the dry forest such as Padauk (Pterocarpus macrocarpus) , Pyinma(PalaquimPolianthum) , Hnaw(Adinacordifolia), Phankar(Terminalia chebula) and Taw-Gwe (Spondias pinnata)etc are found in Kyonesein , Myingalay and Mitheyaund reserved forest .

Figure 9 Habitat Map of Hpa-an



Source: MIMU

Indaing forest is grown below 2500 feet above sea level on lateritic soils with sand and pebbles. In (Dipterocarpus tuberculatus), Ingyin (Pentacme siamensis), Teak (Tectona grandis) and Bamboo are the common plant species. The indaing forest is found in Mizan Village Tract which is adjacent to Hlaingbwe Township and also found in the eastern part of Hpa-an Township. The lowland of Hpa-an, is covered with In (Dipterocarpus tuberculatus) plant species. The swamp species of plant can be seen along the lower Donthami, Thanlwin and Gyaing Rivers where the tide

reaches. Eihai, Kawgun, Naungkone, Kawpayan village and the east of Hpa-an township are the areas of swamp forest. The big trees can be seen near the banks of the river and there are tall tropic grasses along the banks of the rivers.

Terrestrial Flora

Some forest areas have been extensively converted to agricultural and plantation lands such as rubber, Kun (*Piper betel*) and Taung-Htan. Common planted tree species are *Acacia auriculiformis*, *Lagerstroemia speciosa*, *Sandoricum koetjape*, and *Delonix regia*, which are found along the roadside and some paddy fields were also found in large patches. Other wild species such as *Alpinia officinarum*, *Costus speciosus*, *Curcuma roscoeana*, *Globba schomburgkii*, and *Kaempferiae legans*, belonging to Zingiberaceae family were recorded as representative species in Kayin State. Plant Species Recorded in Hpa-an in 2015 are listed in the attachment section.

Terrestrial Fauna

According to the information obtained from the villagers and forest department, the general fauna of Hpa-an township includes deer, birds, monkey, turtle and elephants[9]. Due to the urbanization and industrialization, wild animals migrated to the deeper forest land in northern sectors region. Hpa-an Township is covered with some highland and deep forest where people are not frequently reachable., Major factors of deforestation are encroachment of forest land and illegal felling of trees for Taungya (slash and burn farming) and rubber plantation. Fauna species identified in the regions are put in the following table.

Table 7 Fauna Species

Butterfly
Butterflies are considered as an important indicator of the status biodiversity of a specific location.. Butter fly serves as an effective pollinator for plant species. The interrelationship between butterfly and flora species is important in maintaining and harmonizing the ecosystem of habitat. Pollination process of the flora is largely influenced by activities of butterflies transferring pollen from male part to female part of plant for reproductive process of plant species. According to the observation, 27 species of butterflies were recorded with different population sizes in Hpa-an Township in 2015. All the recorded butterfly species were considered as common species in term of abundance status. Summary of butterfly species recorded in Hpa-an Township in 2015 can be found in appendix section.
Reptilian Species

[9] Township Fact, Hpa –An ,2014

Various reptilian species are reported in Hpa-an area. Species such as viper, water snake, rat snakes, and lizards were recorded. According to the information from the villagers, snakes were frequently spotted in this area especially paddy fields, secondary woodland, and swampy habitat.

Summary table of reptilian species recorded in Hpa-an Township are attached in appendix section.

Amphibian Species

Summary of amphibian species recorded in Hpa-an Township are described in Appendix section.

Mammals

During the field survey, four mammal species were recorded, and all recorded species were known to be common species. Summary of mammal species recorded in Hpa-an Township can be seen in appendix section.

Major decline in large population of fauna species has been experienced in the region with some species becoming classed as very rare and some on the verge of extinction.

A number of endanger species such as Sumatran rhinoceros which were once spotted in northern section are considered to be extinct .Myanmar law prohibits all hunting and trading of endangered species. However, wildlife trade has been widespread in the targeted area. Lack of resource to handle, prolonged civil war in the region and some political factors are major barriers to stop illicit trading and hunting. Even designated Kahilu wildlife Sanctuary is under the threat of deforestation.

Avian Species

The most commonly observed bird species were insectivorous species. They were Plain Prinia (Prinia inornata), Asia Palm Swift (Cypsiurus balasinensis), Common lora (Aegithina tiphia), Common Tailorbird (Orthtomus sutorius), and Grey-breasted Prinia (Prinia hodgsonii). The species such as white-throated Fantail (Rhipiddura albicollis), Jerdon`sBushchat (Saxicola jerdoni),Zitting Cisticola (Cisticola juncidis) and Green Bee-Eater (Merops orientalis) are also identified as insectivorous group in this survey.
House sparrow (Passer domesticus), Eurasian Tree Sparrow (Passer montanus), Common Myna (Acridotheres tristis), Jungle Myna (Acridotheres fuscus), Black Bulbul (Hypsipetes mcclellandii), Red Vented Bulbul (Pycnonotus cafer), Spotted Dove (Sterptopelia chinensis),Streak-eared Bulbul (Pycnonotus blanfordi), Red-Whiskered Bulbul (Pycnonotus jocosus) and Rock Pigen (Columba livia) are also recorded as omnivores and common resident birds. Scaly-Breasted Munia (Lonchura punctulata), Black-headed Munia (Lonchura malacca) and Pied Bushchat (Saxicola caprata) are also inoted as omnivores species,They were found

at cultivated land and shrubland. House Sparrow (Passer domesticus). Eurasian Tree Sparrow (Passer montantis) Common Myna (Acridotheres tristis) were found abundantly at the cultivation areas and human habitation.

The Carnivorous species observed during the survey are White-throated Kingfisher (Halcyon smyrnensis). Greater Coucal (Centropus sinensis), Greater Cormorant (Phalacrocorax carbo), Cinnamon Bittern (lxobrychus cinnamoneus), Great Egret (Arddea albus), Little Egret (Egretta gazetta), Black Kite (Milvus migrans) and Brown Shrike (Lanius cristatus).

Majority of bird species identified in the area are of least concerns. However, more detailed survey is required to understand the avian species covering the whole region. Summary of birds species recorded in Hpa-an Township can be found in annex section .

Aqua Fauna

A total of 33 fish species were listed from Hpa-an segment of Thanlwin River during the survey period. Largest species number was found under family Cyprinidae and followed by those of family Bagridae and Schilbeidae. Among the recorded fish species, Notopterus notopterus, Cirrhinus mrigala, Wallago attu, Anguilla bicolor bicolor, Tenualosa ilisha, Cyprinus carpio, Cyprinus carpio, Labeo stoliczkae, Mystus gulio and Eutropiichthys vacha were highly popular and preferred by the people for consumption. The flora and fauna species recorded are centered Hpa-an town and immediate surrounding areas .These records do not reflect all areas of Hpa-an Township. Species from very northern area of Hpa-an Township cannot be included due to the remoteness and accessibility. A summary of fish species recorded in Hpa-an Township are listed in Annex section.

Forest Coverage and Trend

A great deal of the forest cover in Hpa-an Township has been lost within recent decades due to the uncontrolled and illegal logging activities, commercial plantation and shifting cultivation. This loss of forest coverage has occurred in northern and north eastern parts of the study area. Rapid decline of forest coverage in the regions has been contributing to increase of vulnerability to climate change extremes through the loss of basic ecosystem services.

Forest Product of Hpa-an Township

The most valuable forest product of the area is hard wood such as teak, pyinkado, paduak, thingan, ingyin, inn, kanyin. According to the figures provided by planning department, 5601 Cu. Ton of hardwood was extracted in 2008-2009.

Other forest products apart from hardwood are fire wood, charcoal, bamboo, cane, herbal medicine, In leave, honey, bat's guano and resins.

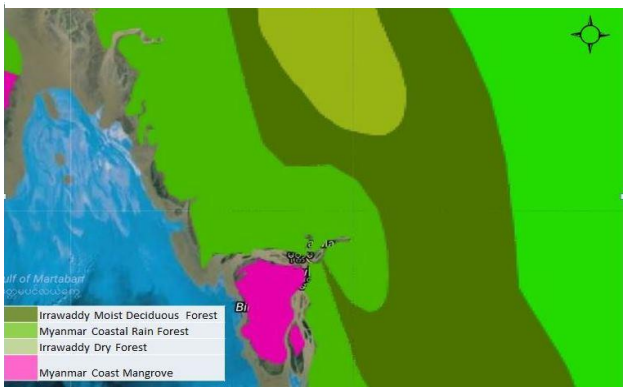
Bamboo is available from both reserve and non-reserved forest. Fire wood and charcoal are also produced for domestic use.

Ecoregion, Protected Area and KBA

The study area falls within ecoregions of Irrawddy dry froest and Irrawaddy moist deciduous forest.

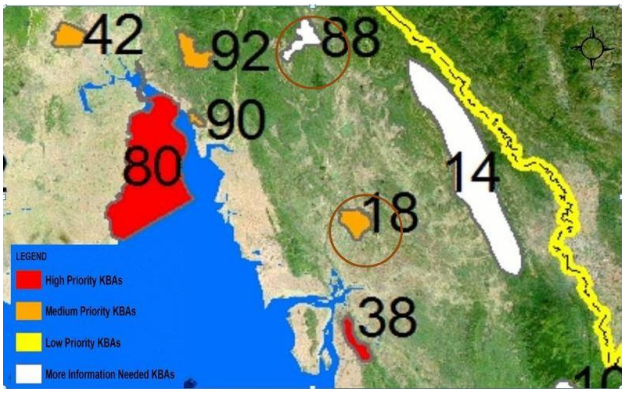
Myanmar Biodiversity.org , a joint initiative from a network of Myanmar local and international NGOs and CSOs working on nature conservation in Myanmar identified a total of 132 Key Biodiversity Areas(KBA) in Myanmar in 2012 . However, Kahilu Protected Area was classified as a data deficient Protected Area .In term of biodiversity concerns, a total of 115 Km2 ,Hpa-an is categorized as medium range KBA [10]However, more information covering entire area is required to judge the biodiversity status of the entire region.

Figure 10 Ecoregion



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

Figure 11 Key Biodiversity Area



Source: WCS Myanmar

The Karen State and Hpa An township belongs to various ecoregions such as Irrawaddy Dry Forest , Irrawaddy Moist Deciduous forest, Kayah –Karen Montane forest and Myanmar Coastal Rain forest . Hpa An area has been listed as one of the KBA with medium priority.

Major fauna of ecological interest in this KBA is Big-headed Turtle (Endangered) and Asiatic Softshell Turtle(Vulnerable).

Protected Area(Kahilu Wildlife Sanctuary)

Kahilu is listed as Protected Area of Myanmar . This wildlife sanctuary is located in Hpa -Pu and Hpa-an Township of Kayin State. The topography of the Kahilu is mostly flat with some mountains lowering from northwest to southeast. Two streams namely Yepu Chaung and Kayindone Chaung are flowing across the area. This area was established as protected area in 1928 with conservation purpose. Total area of sanctuary is about 161 km2 with altitude between 20 to 260 m. The sanctuary is located west side of the road which connects between Kamamaung and Hpa Pun.

Moist upper mixed deciduous forest is primary type of forest which dominates the area of Kahilu. As avian species, jungle fowl, parrot, myna, hornbill, woodpecker,

[10] Myanmar Biodiversity.org

dove, partridge, lapwing, drongos, kite and owl were recorded in the sanctuary .Monkey and barking deer were also identified in the area. Occurrence of Sumatran rhinoceros was reported about 70 years ago. Tracks of two rhinoceros were identified in 1947-48. No information about this specie later than 1948 is available.

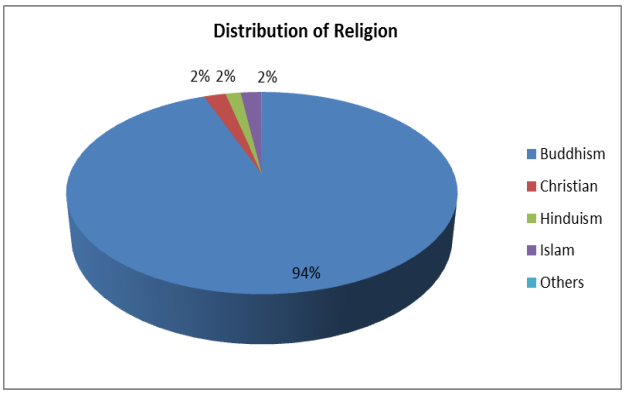
According to Myanmarbiodiversity.org, a joint initiative from network of local and international NGOs and CSO, there is not sufficient data about Kahilu protected area. Therefore, even though the area is recognized as protected area, according to the data deficiency, current status is unknown.

Major threat in the area is extension of shifting cultivation and illegal wood extraction. Hunting is traditional practice in the area for food supply .Ecological and wildlife status of this designated area is considered decreasing due to various threats. Google map of 2014 indicates that majority of flat area has been degraded with increased shifting cultivation.

4.2 Socio economic and Ethnicity

Ethnicity

Majority of the residents of Hpa-an is Kayin (Karen) ethnic people who speak their own language. Kayin ethnic people are subdivided into two major ethnic groups namely Sakaw Kayin and Po Karen. Sakaw Kayin is the largest Kayan ethnic group living all areas of Myanmar. Another sub group is called Bwe Kayin and majority of these Bwe Kayin reside in Taungoo District which is bordered with northern Kayin State.



In spite of capital city of Kayin ethnic group, Hpa-an Township host mixtures of all national race including Kayan, Mon, Shan and Bamar.

Language

Major language is Kayin and language among these sub-groups is slightly different but they easily communicate each other. Similar to the sub -ethnic group, language is divided in accordance with their ethnicity. Skaw Karen speaks Skaw Karen language whereas Po Karen and Bwe Karen do the same.

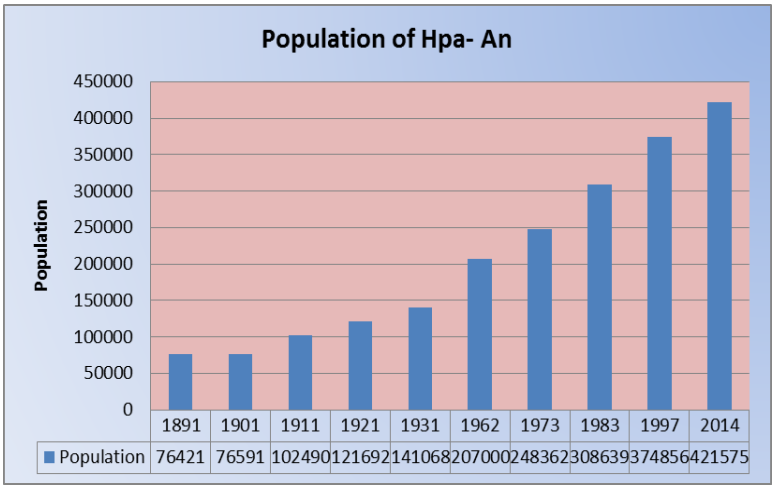
As a city of the region, most of the Kayin people in Hpa-an also speak and understand Myanmar language as symbol of immersing themselves into mainstream culture. However ethnic group living in rural area speak their own language in their daily life.

Religion

Buddhism is main religion in urban and rural areas. 94 %of total population are Buddhists. Other religions represent 2% each of total population. The Distribution of religions of Hpa-an township is expressed in the figure.

Population [11]

Referring to the figure described population in Hpa-an Township has been steadily increasing. In 1891, only over 76421 inhabitants resided in the area. However in 2014, population has reached to 421,575 with density of 145.4 inh./km².Total household constitutes 89,197 in township. Avergely 145.4 people reside in one kilometer square.



Religious and Cultural Sites

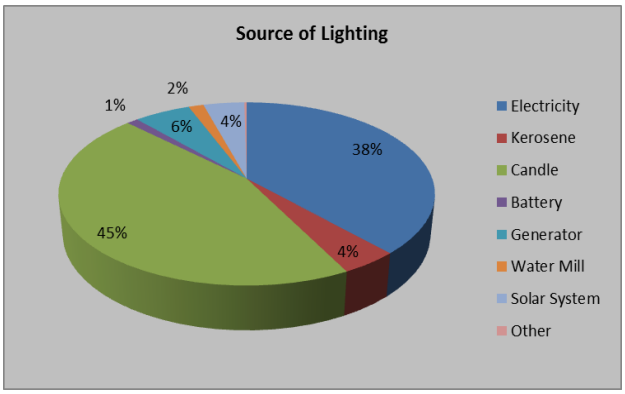
Much of the area of Kayin State including Hpa-an comprise numerous hills of Paleozoic limestone. These lime stones have endured the process of chemical weathering for thousands of years and finally the features have evolved into various shapes of overhanging cliffs, caves and sinkholes. Hence, a numbers of limestone caves are in Hpa-an Township especially at the foothill of Zwekabin Mountain. With mixtures of religious belief, traditional custom and culture, together, these lime stone caves have been the centers of cultural heritage as well as religious sites. The famous limestone caves are Kawgun cave, Bayinnyi cave, Sadan cave, KautKathaung cave, Bat Cave and Yathaypyan Cave. Other places known for cultural and religiously importance, are Mt. Zwekabin, Lonbani bridge and Kyaukkalat pagoda. Representative photos of religious and cultural sites are descried in Annex section .

Livelihoods and Land Use

Farming is the mainstay of Hpa-an and the region has a reasonably productive agricultural sector with fertile soil in lowland areas and upland hills. Local people principally depend on selling agricultural product for their livelihoods. Consequently, agriculture is mean contributor of local economy. Various types of agricultural lands such as wet farm land, dry farmland and upland are identified. Alternative income source of the local people is livestock breeding. Greater number

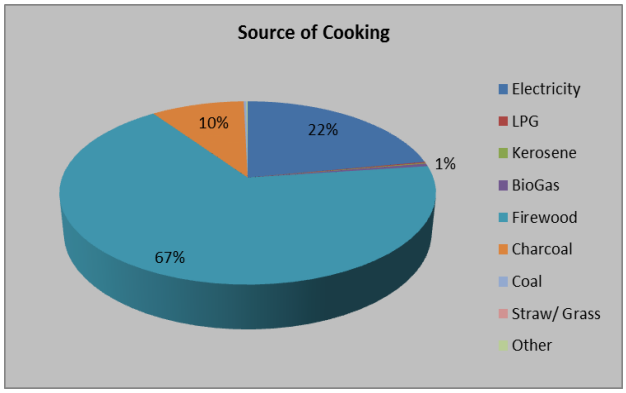
[11] From 1891 to 1997 Immigration and Man Power Dept, For 2014 Myanmar Population and Housing Census - The Union Report.

of livestock is cattle which are kept for farming and other domestication are pigs, sheep and poultry. The imported revenue from those of residents who migrate to and work in Thailand has also become a significant contribution of individual household.



Electricity

There is no electricity generation facility in Hpa-an township. Only in urban areas and some villages are accessible to power grid. Major parts of region are still suffering deficiency of electrical power supply due to remoteness of villages and absence of distribution grid network. Only 38% of household have acces to the grid electricity.

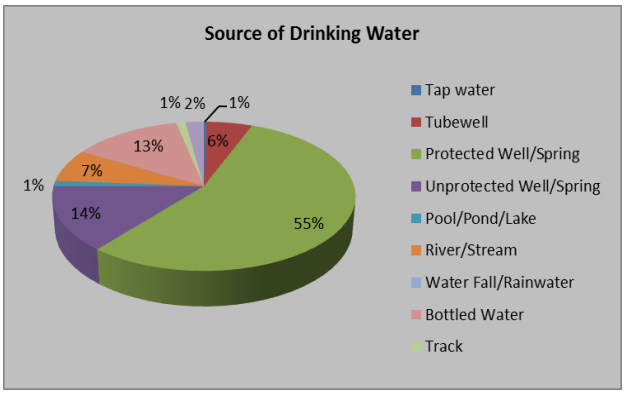


Thus, candle light has been major lighting source in the region. 45% of household rely on it for lighting. Other source of lighging are kerosene(4%) , generator(6%), battery (1%) and solar system(4%).

common in region.

Source of Cooking [13]

Fire wood accounts for major source of cooking fuel as 67% of total household primary rely on it . It is followed be 22% of household with electricity use for cooking. Other sources of cooking are charcoal, LPG, BioGas and kerosene.



Source of Drinking Water [14]

Over 55% of township's household use protected well and spring as primary source for drinking purpose which is followed by 14% of unprotected well and spring. 13% of household rely on bottled drining water. It is learnt thatonly 1% of household are accessable to piped water.

[13], [12, 13] Census Report Volume 3-C, Kayin State, The 2014 Myanmar Population and Housing Census, The Republic of the Union of Myanmar

Source of Non Drinking Water [15]

Similar to drinking wate source, primary place of non drinking water purpose in the township is protected well/spring which 56 % of total household account for.

Fishery and Livestock

The majority of fish and prawns are obtained from fresh water such as lakes, wetland, rivers and streams. In some lowland area, small Inns (Lake) form naturally during the flooded season. Aqua farming has initiated in those inns adding some aqua species in the rainy season. It is estimated that 19 inns in southern part of Hpa-an are active with aquaculture. In 2013 -2014 figures, there was a total of 377 acres of fish ponds and 7 acres of shrimp ponds in the township.[16]

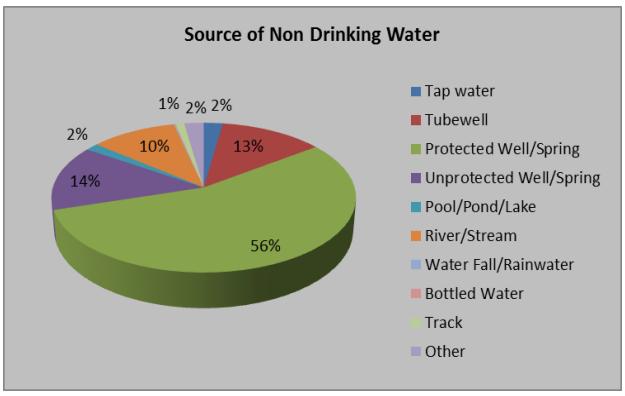


Figure 12 Typical Fish Trap

Fresh water fish production is one of the items that produce additional income of local people. Small scale farming is extended to integrated farming to gain more benefits. Thanlwin River is a major source of fishing activities. Fishery in this township is not commercial scale and people engaged in fishing said that catching fish is for local consumption.

Livestock is major income for people living in rural areas. Common livestock such cow, buffalo, sheep pig and poultry has been raised within their limited control.

4.3 Environmental Issue and Analysis

During the scoping process, active development activities were identified and a matrix indicating the probable interaction between economic activities and environmental elements .Seven activities are regarded as the most active and would have considerable impacts on social and environmental resources of study area.

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

[16] Township Fact Hpa An 2014.

The relationship between such activities and climate change consequences are also highlighted in each section.

Environmetnal Impact by Quarrying for crushed stone

It was observed that a numbers of quarry sites have been active and extraction of aggregate has continued around Zwekabin mountain ranges. Falling within Zwekabin mountain area which is considered holy place for local residents, careful attention must be paid to this area.

These aggregate are quarried to use in motor road construction and maintenance work. Aggregates in the form of crushed stone are primary raw material for such activities. Manual and mechanical practices are widely used for extraction of stones from mountain rock. Extracted rocks are transported to nearby crushing sites where rocks are crushed into various sizes by machine.

However, in the selection of quarry and crushing sites, environmental, social, cultural and religious features were not carefully considered. No particular guidance was given to adhere to. Quarrying operation basically involves removal of vegetation, rock and mineral of particular area. Consequently, a numbers of environmental and social concerns are encountered from such activities.

One aspect to consider when identifying quarry sites is value and sensibility of location. Zwekabin mountain range which is locally considered center for religious belief consisting of numerous lime stone caves with Buddhist images, existence of a number of pagodas in the area, surrounding land scape features, biodiversity and scenic views. In addition, the kurst mountain range is considered Key Biodiversity Area of Myanmar with some rare species and their habitats .

Current and prediction of future trends of activities, consequence, probable impact and linkage to climate change and recommendations about quarrying activities are summarized in following table.

Table 8 Quarrying and Environmental Impact

Element	Description
Current and Future Trend	With potential economic boom and urbanization in Myanmar, extension of road network will likely demand more production of crushed stone or annular rock. With availability of suitable rock deposits in the study area, the area will be primary source for annular rock extraction. Limestone is also essential raw material for cement industry. Hence quarrying of rock is likely to accelerate since the study area has amble opportunity with limestone resources.
Environmental Impact	Continuous quarrying results in loss of habitat, flora and fauna, scenic change, noise, surface water quality and sedimentation issues. Major environmental disturbance caused by quarrying is

Element	Description
	landform change. Other environmental and social impacts by stone extraction and crushing site are summarized as follows. Uncontrolled noise and dust emission from grinding machine could create nuisance to nearby residents Partial loss of wildlife habitats Increased aggregate extraction could alter the landscape of area and its beautiful scene. Lifelong visual impact shall be occurred.
Climate Change and Linkage Impact	Removal of flora could have loss of carbon sink .Sediment load of spoil earth would block the natural water courses causing localized flooding.
Recommendation	Considering alternative option for selection of quarry site, there are some considerable locations where required raw material for road construction and maintenance. • Current locations should be avoided to preserve the natural environment, landscape and habitants of wildlife • Conducting feasible study for alternative location of quarries • Issuing guidance note to the existing mining site to follow the basic principles of avoiding and minimizing detrimental effects • Restriction of night work operation • Installation of noise barriers are suggested • Site specific waste management practice to be introduced and implemented • Rehabilitation of extracted area by afforestation growing tree which is of native plant species

Environmetnal Impact by Cement Plant in Myingalay Area

Currently there are two cement plants operating in Hpa-an Township. Myingalay cement plant 1 with production capacity of 900 ton per day and Myingalay cement plant 2 with 4000 ton per day.

Myingalay cement plants were constructed at Myingalay village on the west bank of Thanlwin

Figure 13 Active Quarry Site in Cement Plant

Source: Adapted from Google Earth

River named after Myingalay village. These plants are strategically located near the area where raw materials such as limestone are abundantly available around and in Myingalay only few meters away from cement plants.

A conventional quarrying method is used to acquire raw materials. The whole hill is opened, tapped, removed and then unwanted excavated material is dumped and contaminated water is left behind. On account of access restriction, the study team did not visit the old and new quarry sites of Myingalay cement plants. Thus, Google Earth Mapping and personal interviews are the sources to identify the outstanding environmental issues triggered by ongoing cement plant operation.

Figure 14 Emission from Cement Plant

Evidence from Goggle Earth study indicates that all old quarry sites are abandoned after operation without proper decontamination and rehabilitation. Thus, it can conclude that mine closure plan and rehabilitation program for old quarry are absent.

Current and prediction of future trends of activities, consequence, probable impact and linkage to climate change and recommendations about cement plants are summarized in following table.

Table 9 Cement Plants and Environmental Impact

Element	Description
Current and Future Trend	Endowed with limestone resources, Hpa-an Township has the potential of increasing cement manufacturing plants in the future with the boom of economic development. Environmental impacts associated with cement factories are quite can be significantly detrimental and preventive measures have to be in place once permission is allowed by the Government.
Environmental Impact	Cement plants could create various environmental impacts at all phases of the manufacturing process. *Water Pollution* A number of areas close to abandoned quarry sites have been observed to be contaminated. Absence of an environmental

Element	Description
	management plan for quarry sites and unethical business practices are considered underlying causes which has led to contamination in surrounding areas. Consequently, water contamination could have resulted in ground water contamination. *Air Pollution* The most significant impact of typical cement factory is degradation of air quality up to a considerable distance from the plant around and distant location as well. Cement plant emits air pollutants such as particulate matters (suspended and respiratory) nitrogen oxides, sulfur oxides, carbon monoxide, VOC and greenhouse gases .It also send the heavy metals such as mercury, lead and cadmium. Air pollutants released by cement plant deteriorate occupational health and community health for people residing around the area .Dust emission in various particulate forms has been connected to respiratory problem. Myingalay village is the nearest sensitive receiver which has been suffering the impact of contaminated air as it is located immediate vicinity and downward of prevailing wind direction. Residents from Hpa-an which is just 3 km away from factories might have suffered as well. During the field survey, it was observed that existing cement plant was emitting large volume of emission and sending dust into the immediate atmosphere. Residents have claimed that cement factories release pollutants very frequently .Assuming the absence of filtration and control system, it is believed that Myingalay cement plants are contributing significant air pollutants into the local atmosphere. Impact of cement plants on local air quality is not just of a simple matter of occupational health of employees in the premise of plant. Change in air quality does not stop at boundary of Hpa-an Township. Considering prevailing wind direction of that area, rough prediction is made that air pollutants would move towards north and north east during April and October and towards south west and south during November to March. In view of air pollution in Hpa-an, it is perceived by local people that daily emission of air pollutants comes from cement factory. No air pollution monitoring system is established so far in and around Myingalay area and Hpa-an Township. Hence, the air

Element	Description
	quality baseline data is not available during the study visit. *Health impact* Air pollutions from cement plants significantly contribute to the increase of instances of respiratory health issues. The most vulnerable affected by cement plants are people working for and living in the vicinity of the factories. Health effects of particulate matter in the form of dust are strongly connected to its particle size. The small particle size is considered most dangerous as it could easily enter into the body through respiratory system. Various internal functions of organs of a body could be affected by pollutants of cement factories including respiratory system, gastro intestinal system, stomach and central nervous system. Since these cement plants have been operating for decades, it is believed that local residents may have suffered health degradation. However, no health studies have focused on people living around cement plants in the area.
Climate Change and Linkage Impact	Emission of pollutants consisting of global warming gases such as carbon dioxide and some amount of methane contribute to global warming and climate change.
Recommendation	Recommendation for polluted water decontamination is to drain out stagnant water trapped to after passing through physical treatment or reuse for plantation and dust control work. • Health assessment on local community and workers is recommended to carry out fundamentally focusing respiratory related health issues. In addition, following recommendations are suggested. • Stakeholder consultation and engagement of community should be made in the decision making process for permitting future cement plants in the regions since the area has been already suffering the adverse effects on environmental and social atmospheres • Strategic environmental assessment or similar study for cement plants in Hpa-an is suggested prior to allowing more cement plants in region. • Semi opening pit mining should be prioritized to maintain natural landscape • Sufficient dust collectors, filtration method such as bag house,

Element	Description
	electrostatic precipitators and other dust capturing methods should be recommended to install sufficient enough to control pollutants • Avoid building factories near populated areas • EIA and follow up EMP system to be established and implemented through the life of project • Communities should be provided Information about the frequency of blasting prior to the activity • Green Belt approach with planting trees around the factory • Control system for discharge water and decontamination program for existing contaminated land and old quarry sites • Introduction of rehabilitation program for the abandoned quarry to be filled back with trees

Environmental Impact by Instream Sand Mining

Traditional instream sand mining has existed for decades in the region for road construction and building works. Sand mining and gravel extraction has become one of the major businesses for local economy. It has been reported that sand mining activities in Thanlwin Rivers has been increasing to supply aggregate material for construction. Methods used in sand are mining works in Thanlwin River include manual and mechanical extraction with high pressure jet pumps. However there is not sufficient information and data available over the sand extraction of Thanlwin River.

Figure 15 Spacial Extent of Saline Intrusion in Summer

Source: Adapted from Google Earth

General information, current and future trend, environmental and climate change impact and recommendations for instream sand mining are summarized in following table.

Table 10 Instream Sand Mining and Environmental Impact

Element	Description

Element	Description
Current and Future Trend	The demand for sand and gravel in the construction of infrastructure and buildings in Hpa-an has continued to increase and demand is expected to be high in the future as political reform has moves toward free economy and increased investment in infrastructure. It should be acknowledged that this could contribute to significant local economic opportunities.
Environmental Impact	Extensive extraction of sand and gravel directly leads to serious degradation of rivers and its eco system. Excess instream mining makes the stream bed lower to some extent and in turn, its produces river bank erosion and sudden collapse. Sand mining also contributes to saline intrusion if river is close to estuaries and seas. Sea level rise and intensive sand mining works might be compounded to bring faster sea level intrusion in the future. Other environmental impacts triggered by excessive sand mining include influence on changes in river channel and river morphology, loss of aquatic habitat that alter pattern of sediment deposit. Major impact to river morphology results in degradation of riparian habitat. Riparian zone is highly important for river ecosystems as it serves as buffer zone to prevent pollutants entering from urban runoff, controlling soil erosion and providing nutrient to riparian habitats. Damaging riparian zone during sand and gravel extraction can lead to reduction of stream bank stabilization and increasing bank erosion frequency. The stability of stream beds depends on harmonized balance of stream flow, sediment load and channel formation. With destruction of stream beds, there might be other detrimental effects on availability of aquatic food, impacting on other systems. Instream mining could adversely cause the increase of turbidity in short term near the mine site which could temporary degrade the river water quality. According to local sources, sand and gravel mining activities in Thanlwin river along Hpa-an and immediate areas are taking place in an uncontrolled and unethical way. Protection of river ecosystems, riparian zone and other factors has never been prioritized when it comes to instream sand and gravel mining. Specific site, tool, volume, timing used in sand extraction are not taken into account for such activities. Briefly, excessive instream sand and gravel mining could lead to

Element	Description
	following impact on Thanlwin River morphology and river ecosystem in negative and destructive way. • Deepening river bed and river bed degradation • Damage to aquatic food chain and aquatic habitat • Loss of riparian zone and Lowering water table which protect river ecosystem which might impact to riparian habitat • Rapid bed degradation, river bank instability and river bank collapse • River water quality degradation and increase turbidity • Seawater intrusion which directly threaten the river ecosystem
Climate Change and Linkage Impact	One of river ecosystem impacts occurring and likely to increase is saline water in the Thanlwin River .This river is experiencing saline water intrusion from the Andaman Sea during dry season. This occurs normally in the dry season when river flow is limited and river water level is low. According to local people and river morphologists, saline intrusion in Thanlwin River reaches to Htone Aing Village which about 15 miles downward of Hpa-an in summer. However, no documented study relevant to assessment of salinity intrusion is publically available. Combined effects in form of cumulative impacts such as riverbed lowering by excessive instream mining, water level decreasing due to less rain, and potential future damming in upstream of Thanlwin River could worsen and extend the saline intrusion into the river. Along with sea level rise; the saline intrusion is expected to continue to the upper stream by excessive sand mining.
Recommendation	Suggestions are made to ensure enough environmental protection efforts are established to preserve river morphology, ecosystem and riparian environment and prevent potential collapse of riverbank. For better river management, the township management committee is suggested to initiate close monitoring program ensuring sand mining is carried out in environmentally and socially accepted way and in accordance with existing rules and regulations. One of the factors to be considered is supportive work for the future river trainings work, systematic data collection of volume of permissible sand and actual production to be initiated. • Environmental effects and sensitivity of river ecosystem should be assessed by river ecologist and hydrologist prior to approval of mining, value of resources, the importance of social, culture

Element	Description
	and religious terms are also to be considered. • An estimation of permissible volume of sand and gravel within defined areas would ensure the sustainability of ecosystem in Thanlwin River and other streams. Permission of sand mining should be granted based on annual replenishment capacity. • Extent of areas and intensity of activities are to be considered in permissions. • Establishment of continuous monitoring mechanism should be carried out by authorized persons from relevant government organization. • Assessment of salinity intrusion in Thanlwin River should be conducted in collaboration with international organization taking into consideration climate change impacts on sea level raise. *Alternatives* In order to avoid adverse environmental affects, it is proposed to maintain river ecosystem and to meet the huge demand for sand and aggregate material in future, some suggestions are generally made in consideration of alternative location for sand mining including abandoned stream channels and inactive flood plains should be prioritized for sand mining than in the active channel and extraction from small stream should be avoided.

Environmental Impact by Enhancement of Tourism Sector

Hpa-an is endowed with many religious places, enchanting landscapes, unique natural environment and is the center of Kayin ethnic minority lifestyle and culture and the picturesque water ways of Thanlwin river. This has led to the raise of tourism in Hpa-an as an emerging business. General information, current and future trend, environmental and climate change impact and recommendations for tourism development are summarized in following table.

Major receptors that are affected by enhancement of tourism are divided into physical, religious and cultural environment and social environment.

Key activities involved in tourism sectors are construction of accommodation and road, establishment of entertainment venues, expansion of facilities, heath care service, sightseeing, hiking and cycling etc. A growth of the tourist sector in Hpa-an will bring the following benefit to Hpa-an region.

- Employment opportunity and alternative income for local people
- Increased revenue for local and union government
- Improve the social status of community.

Table 11 Tourism Sector and Environmental Impact

Element	Description
Current and Future Trend	As such, both local and international tourists come and visit Hpa-an and surrounding areas to enjoy nature, to explore ethnic lifestyle and to observe the historical building environment. It is perceived that tourism sector of Hpa An would be developed further. Along with the influx of tourists and local pilgrims, construction works for the basic infrastructures will be intensive.
Environmental Impact	Probable environmental impacts to be caused by development of tourism are predicted as follows. *Physical Environment* Loss of biodiversity and disturbance to natural habitats due to greater access to remote location Disruption to landscape scenery and by construction of hotels and restaurants Air, water and soil quality degradation due to the increased waste volume generated by tourism sector such as hotels, restaurants , transportation service Water pollution owing to inadequate waste treatment facilities with increase tourist population Increased access into ecologically sensitive area especially to remote location Increase pressure to weaken waste management service and impact to water quality by the accumulation of waste generated by tourists. Increase pressure to the social service such as hospital, road and water supply *Social and cultural environment* Major positive economic benefit is expected as a result of increased tourism business. Local business such as gift shops, restaurants, accommodation and transportation sectors are expected to increase along with tourism development. Extension of road network to provide the smooth and convenient transportation could also have negative impact to local community through land grabbing, noise, dust generation and increase of road accident rate.
Climate Change and	With the growth of tourism sector, the local business is expected to be thriving including the income of local community. Increased income and income diversification can support the enhancement of

Element	Description
Linkage Impact	vulnerable local community's resilience to climate extremes through building well-structured accommodation, ensuring food security and knowledge about the climate change.
Recommendation	In order to ease environmental, social and cultural concerns by tourism development, following recommendations are made. • All hotels , inns, restaurants and other accommodations should be equipped with basic waste treatment facilities • Enforcement should be made by authorities concerned with existing environmental legislation • Adequate waste collection points should be allocated in the tourist hotspots and waste collection systems including transportation to depot • Manage motorized vehicle movement through promotion of trekking and bicycling services • Careful selection of location for new infrastructure such as accommodation and restaurant reasonable distance from sensitive areas • Prioritize expansion and upgrading of existing road instead of planning new access roads • Issuing guidance note and leaflet in hotel and inn for visitors to avoid any detrimental impact to flora and fauna

Environmental Impact by Industrial Zone

Hpa-an industrial zone was already developed and some of the factories have commenced operation. This industrial park was developed with multiple objectives including creating job opportunities for local people, bringing economic development to region, and facilitating domestic and foreign direct investment.

The industrial zone is located about 7 miles (11.2km) north west of Hpa-an town. It is a collection of different manufacturing industries including

- Textile /garment manufacturing
- Cigarette factory
- Bicycle assembling workshop
- Beverages factory
- Wood furnishing Industry
- Concrete and brick industry

Figure 16 Location of Industrial Zone

Source: Adapted from Google Earth

The industrial zone is located on large flat areas surrounded by agricultural land to the north and patches of degraded forest to the south. No significant areas of ecological and social features are observed.

During site visit in the area, study team has identified that some of the infrastructures and building are still under construction .The zone started it construction work in 2011, however, currently only a few factories such as garments are operating. The park has not developed as much expected due to constraints such as low foreign investment, transitioning political environments, and geographical location. Covering about 1000 acres, industrial area is divided into four zones

- Zone one is mainly intended for foreign investment with coverage of 177 acres.
- Zone two is designated for Myanmar business entrepreneurs, spreading out over 585 acres.
- Zone three is reserved for Kayin State business men covering 112 areas.
- Zone four is specially aimed for those of people from Mying Gyi Ngu area with area of nearly 100 acres.

Waste Management

Figure 17 Enterprise in Industrial Zone

Hpa-an Township development committee does not have sufficient capacity to handle waste management. With increased manufacturing operations in the zone in the near future recycling and reuse of industrial waste is not anticipated which would further impact on the waste management service of the township.

In the absence of centralized waste water treatment plant and individual waste water treatment facility, there

have been potential of contamination on ground and surface water through uncontrolled effluent discharge. Sewage collection is not practiced in industrial zone and surrounding residential areas.

Different types of industrial include packing materials, scrap metals, wood chips, used oil , plastic material ,tires and other debris .Most of these rubbish can be resold in local market and reused for other purpose in safe way .However, some non-recyclable waste such as plastic debris, empty bottles and containers , papers, wood chips, kitchen refuse are to be disposed in environmental friendly manner.

Basic information, current and future trend, environmental and climate change impact and recommendations for special economic zone are summarized in following table.

Table 12 Industrial Zone and Environmental Impact

Element	Description
Current and Future Trend	Only small scale and labor intensive industries are currently running and it it unlikely to develop quickly in the future.
Environmental Impact	Physical environment Industries currently running in this industrial zone are small and medium manufacturing facilities. The study has found that the industrial zone does not have a large impact on the surface and ground water contamination and has not significant degraded air quality or contributed significant emission leading to climate change. However with the existing design and layout of the zone, there have been some issues such as absence of centralized waste treatment facility, waste collection depot, runoff water collection facility, drainage network, fire break and fire management. With increased production and manufacturing facility infrastructures in the future, the lack of regulation and management procedure could result in increasing ground and surface water quality degradation. *Impact of Industrial Zone on Community Health and Safety* Little assessment has been undertaken on community health and safety issues on the residents of Hpa-an town owing to the considerable distance from the town. However, the industrial zone is divided by highway road which connects the Hpa-an Township and other townships in Kayin State. Vehicle movement from transportation of raw and finished material from the zone could compound the existing traffic and there might be an increase in road accidents. In order to mitigate the potential threats, suggestion is

Element	Description
	generally made to designate the speed limit for the road sector within industrial park by erecting speed limit signage and ensuring police enforcement. The current zoning system centers on the types of owners instead of types of industry which is not appropriate from a public health and safety perspective as it could create the cluster of different classes of industries within single zone. Compatibility between industries is a must in the establishment of industrial estate. For example, surrounding environment of food process plant should not contaminate the food products. Hpa-an industrial zone seems to be weak in defining zone section.
Climate Change and Linkage Impact	Using Google Earth maps tool, altitude of the area is measured to be about 20 m above sea level. As mentioned, some quarters of Hpa-an town and surrounding lowland areas have been frequently suffering severe flooding from swollen Thanlwin River during rainy season. In order to avoid the seasonal flood, the location of industrial zone was carefully selected on the higher ground. Hence, consequence of the climate change extremes, mainly flooding triggered by torrential rain and swollen Thanlwin River may not affect the area and infrastructures under current flood conditions. However a more thorough analysis of rainfall and flood scenarios would be required to rule out potential impacts on industrial estate under furture climate conditions. Based on the type of factories operating and likely operating in the future, the emission of global warming gases such as CO2 and CH4 releasing into atmosphere is minimal. Thus, it is anticipated that operation of the zone will not much contribute to global climate change itself. With respect to contribution to surrounding residents and communities, the type of industries in the zone are labor-intensive employing a number of local people. Generating regular income for those of employees working for factories enhances the livelihood security of communities.

Element	Description
Recommendation	It was noticed that industrial zone does not prepare emergency management plan and response. To avoid or minimize any harm to nearest residents and workers, emergency management plan should be set up which should cover all industrial types in the event of fire and explosion. In order to minimize the environmental impact caused by enterprises, following recommendations are proposed. • Development of a comprehensive waste collection and management system including industrial solid waste management regulation of the industrial zone paying attention to safe and proper disposal and storage of hazardous and toxic materials.Component of the system should include: ➢ Designation of waste collection points with waste bin provided ➢ Segregation of waste in accordance with category ➢ Encourage reuse and recyclable practice ➢ Establishment of own sanitary landfill site within the zone with greater capacity with controls for storm water diversion and prevention of leaching through lining of landfill In addition, following suggestions are made to ensure probable impacts are integrated into existing and future planning process. • Separation of zone should be based on the compatibility of industries • Establish of industry zone emergency management plan which should include a comprehensive risk assessment consisting of climate change, disaster, fire, explosions and release of toxic materials. All industries and employees need to be introduced and sensitised to the plan as part of health and safety training. • Although industrial zone does not store large quantity of explosive substance and hazardous chemical, storage of fuel and other flammable materials should be carefully designed and constructed setting safety distance from nearest combustible material storage and residential area.

Environmental Impact by Waste Management

Like other cities and towns in Myanmar, waste management including collection and disposal in Hpa-an remain a major chanllenge. Potential growth of industrial development and other sectors and expansion of urban settlement would compound the existing situation worsen if appropriate management and measures are not provided.

Township Development Committee which holds the responsibility pertaining to waste management has been struggling to deal with handling the issue.

Dumping facility

The designated waste dumping facility in Hpa-an is located near the Zwekabin mountain range next to the township graveyard occupying two to three acres. The Township development committee administers the site and takes responsibility and holds accountability for managing and operating waste disposal site. Waste collected from the township is transported to the landfill and some recyclable materials are segregated manually by contractors at site. Reusable and recyclable waste such as plastic bottle, aluminum can, metal scrap and cardboard are segregated as it is possible to resell in local market.

Figure 18 Final Disposal Site

Despite the fact that site is for open dumping, due to the limited land availability, all mixed solid waste is burned at the site and ashes are buried.

Through careful examination around the place, this dumping site is totally unacceptable in term of social environmental and health aspects. There are no proper structures and facilities to prevent leaching of contaminants into the soil. The existing site is operating in a way that causes sanitary issues. No membrane layer is placed underneath to control leachate. No parameter boundary or fenced is installed to prevent unauthorized person and animal entering into the dumping site. Most importantly, plastic, rubber, battery, old tires and other harmful waste are not effectively segregated and all are burnt out on site.

Figure 19 Smoke from Open Burning

In spite of holding a number of campaigns about waste reduction including 3 Rs (Reduce, Re-use, and Recycle), no household waste reuse and recycling program are set up and implemented.

Estimated waste volume

It is estimated by the township development committee that average waste collected Hpa-an Town is 20 tons per day [17]. Household waste production accounts for more than 50 % of the total volume. At present, the township development committee can only manage to collect and dump a portion of daily waste generated, which is transported to the dumping site using conventional trucks on a daily basis.

Following challenges are discovered during the study period.

- Low waste collection coverage
- Limited area for landfilling and waste burning
- Lack of government's attention to the waste management
- Poor public awareness and participation in the proper waste management
- Poor data and information about the type of waste
- Poor enforcement of existing legislation and instruction
- Insufficient institutional cooperation
- Insufficient capacity and resource to handle waste issue
- No monitoring mechanism

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

Table 13 Waste Management and Environmental Impact

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	Open burning of mixed household waste and other communal waste which consists of plastic debris is seriously harmful to the human health and air quality. Overall problems from existing waste management practices of Hpa-an town is expected to include: Toxic gases, particulate emission, CO2 and other global warming gases emissions into the atmosphere. Foul odor from burning and landfill Surface water and ground water and Soil contamination Spreading infectious disease by vectors emanating from the landfill

[17] Township Development Committee

Element	Description
	resulting in community health issues Various types of air pollutants giving rise from burning of mixed solid and hazardous waste can have a direct impact on the health of people living nearby the landfill and people working at dumping site and visitor coming to graveyard to attend funeral ceremonies. Health impacts can occur as a result of toxic pollutants such as dioxin, polystyrene, benzopyrene, particulate and carbon monoxide. Inappropriate waste dumping in public area post a fire hazard for the communities.
Climate Change and Linkage Impact	Burning of solid waste does significantly contribute in deteriorating of local air quality, public health and finally global warming.CO2 is primary global warming gas emitted by open burning and methane emission is from landfill site. Improper burning practices will be worsening the accumulation of global warming gases. Considering climate change impact on infrastructure, the opening burning site is located at the foothill of Zwekabin Mountain range, in rather high elevation. Thus flooding of Thanlwin River will not reach to the infrastructure of the site.
Recommendation	According to UNEP (2001), one of the basic principles for sustainable waste management practice is to review the waste as a resource and manage it properly. That means increased volume of waste can be considered potential resources for human consumption and utilization. In general, waste for potential resource could be utilized following options. • One of the options is to consider municipal waste to heat (MSW) as sources of renewable energy .An MSW power plant which is also called Waste to Energy (WtE) could reduce the significant volume of waste. Actually a numbers of great benefits can result from building such facility such as reduction of waste volume, reduction of land use for landfill, electricity supply and minimize negative environmental impacts caused by open dumping and open burning. Despite that fact that waste to energy is an attractive technical option, there have been numerous debates among the environmental scientists over the WtE recovery project and its consequences on environmental including impacts such as air pollution, land and water contamination and health impact not to mention the financial barriers to establishment of such facilities. • Another option is establishment of composting plant. Composting of waste is anaerobic method of decomposing solid wastes. The

Element	Description
	process involves decomposition of organic waste known as compost which is a good fertilizer for plants. [18] ***Recommendation*** • 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 along the Thanlwin river so as to avoid throwing debris into river. • Uncontrolled waste disposal in public and reuse and recycling should be promoted through public environmental campaigns and with incentives • Formulation and implementation of township waste management strategy and action plan in line with national waste management strategy • Open dumping and burning into controlled operation provided with proper barriers /fence Conduct awareness level raising campaign on source separation of organic waste and hazardous waste • Burning practices should be reduced by increasing landfill and compositing sites • Township waste management plan should be developed and documented for effective management and monitoring.

Environmetnal Impact by Commercial and Perennial Plantation and Extension of Agricultural Land

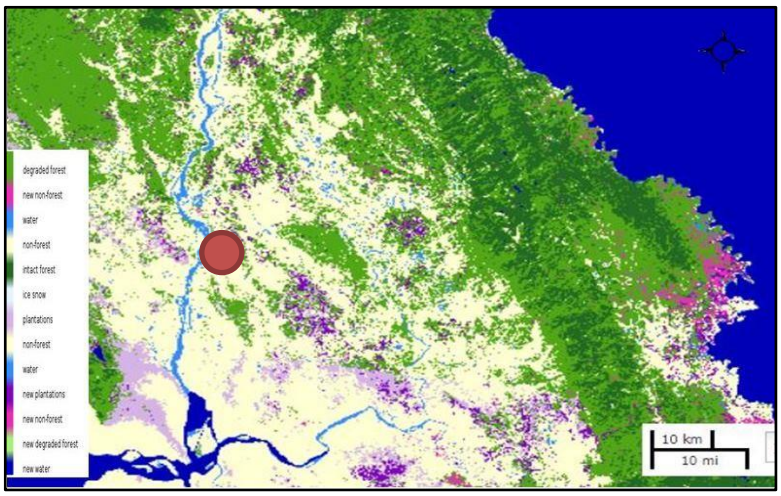
The existing landscape of study region is found to be seriously degraded in view of ecosystem and forestation due to the encroachment of human settlement and traditional agricultural practice. The land form of this area is predominantly occupied by mixture of high and medium hill range covering forest and woodland.

Significant landcoverchange was detected between 2002 and 2014 as per figure. Most of the changes occurs very sourthern and northern parts of Hpa-an.

[18] Wikipedia

One of the major contributing factors that caused adverse environmental consequences is clearance of vegetation for perennial plantation and agricultural land.Slash and burn of forest and woodland is widely practiced in the area for reclamation of new dry farm land.

Figure 20 Land Cover Change in Hpa An Township



Source: Adapted from Forest Cover Change(2002-2014) Alarm,EcoDev, EU, MERN,IUCN, Smithsonian, gmap, American Museum of Natural History.

Through Google map, the vegetation clearance activities have been mostly observed in the northern section of Hpa-an Township.

Government does not have sufficient information about the extent of vegetation clearance for upland farming.

No specific program for data collection about this activity is established yet. It was central government who allow concession right to local businessmen to grow rubber, cashew nut, palm oil and other perennial crops in the area. Kayin State is one of the regions that grows rubber for industrial use.

Figure 21 S Extension of Cultivated Land

Basic information, current and future trend, environmental and climate change impact and recommendations for forestation, plantation and slash and burn activities are summarized in following table.

Table 14 Forestry: Commercial Plantation and Extension of Agricultural Land and Environmetnal Impact

Element	Description
Current and Future Trend	Little is known about the spatial extent of plantation and expansion of agricultural land and its trends.
Environmental Impact	*Deforestation* Deforestation causes loss of ecosystems, loss of flora and fauna species and habitats. Deforestation has been accelerating due to the excess extraction of timber and increasing upland farming and perennial plantation. Northern part of area has been experiencing these issues nowadays. *Soil Erosion* Deforestation is directly linked to the soil erosion, In the absence of trees in area, the valuable top soil layers are washed away with torrential rain flow and increase the sediment load of the receiving river. *Water Pollution* The use of fertilizers and pesticides in agriculture in Hpa-an continues to rise without proper handling. Increased plantation and active dry farm can damage water quality through run off of agro chemicals into water bodies. *Air Pollution* Air pollution is caused by open burning biomass disposed from land clearance. Conventionally, remaining foliage such as cleared undergrowth, fallen trees, twigs and other debris are piled up and burned it out to make layer of ash which helps the nutrient enriched fertile soil and yield of crop. *Bush Fire* Slash and burn farming is one of the major causes of forest fire. Most of the bush fires originate from burning of vegetation debris. Unattended and uncontrolled burning practice, intense heat and strong wind can lead fires to get out of control and spread. *Social Environment* Most of perennial plantation are located in the upland area where is largely used by local farmers. Converting the upland into rubber and other crop development causing impact to livelihood of local villager .In this event, there is no practice of creating alternative livelihood which is able to sustain their income. Forest whether pristine or degraded in nature, serves the local

Element	Description
	community providing fruit, vegetable, fish, herbal medicine, honey and other NTFP(Non Timber Forest Product) on a daily basis . Loss of forest coverage poses a serious threat to food security of farming communities since forest provides basic food and income to locals.
Climate Change and Linkage Impact	One of the driving factors of climate change is deforestation and land use change. Forest is a natural carbon sink which absorbs carbon and emit oxygen which is vital for living of human being and animals. Open burning directly brings about the climate change by sending carbon dioxide and methane which are regarded as most harmful global warming gases into the atmosphere. On the other hand, deforestation induced by vegetation clearance is responsible of degrading the resilience of nature and biodiversity. Forest also plays an important role in watershed management and can prevent landslides and floods through maintaining soil stability and ground water flow. Forests are essential in flood protection and climate change adaptation through ecosystem services.
Recommendation	Suggestion is made to initiate a program for data collection.In addition, allowing concession rights for perennial plantation should be considered the status of existing plantation, regional ecology, and social dimension potential land conflict and community involvement. Principle of compensation for chopping down tree should be introduced regionally. The principle is grounded on the fact that number of chopped down trees shall be replanted in the similar habitant. Implementation of government's policy on logging activities should be continuously followed. These measures could be achieved through cooperation of local community involvement. Monitoring illegal logging and tree cutting should be programmed. Slash and burning practices should be stopped through legal enforcement, awareness campaign and capacity building which will make local community understand the consequence of slash and burn practices.

4.4 Key vulnerabilities of communities in Hpa-an and Ecosystem Services

Major Environmental Threats and Vulnerability in Hpa -An

Both rural and urban communities of Hpa-an township experience a wide range of natural disasters including seasonal flood, intense heat, storm, bush fire, land slide, riverbank erosion and high wind. These natural disasters are worsening by the environmental impact of development, business and other human activities.

A numbers of adverse environmental impacts triggered by development activities are identified in the previous section. Amongst, environmental degradation such as air and water pollution, riverbank erosion and deforestation are considered to have much affected on vulnerable communities of the regions.

Figure 22 Probable Communities affected by Air Pollution

The major sources of air pollution in the region are identified as opening burning and emission from cement factories. Particulate matters and other chemical compounds of air pollutant could have resulted in significant health issues to nearby residents. The most vulnerable communities to be affected by air pollution are roughly considered those living 3 kilometer away from cement factories and 0.5 km away from opening burning site of municipal waste as shown in following figure.

River water pollution which degrades river water quality is caused by inappropriate rubbish dumping, deforestation, industrial effluent discharge from restaurants and hotel, household sewerage and storm water runoff. Water from Thanlwin River and other streams have become unfit for drinking purpose. As a result, community dwelling along river bank and on islands in Thanlwin River channel cannot use river water for drinking purpose all year around.

River bank erosion is one of the major threats for the villages locating alongside river bank and on fluvial island of Thanlwin River. Excessive instream sand mining, intense rain fall event and increased sediment load are considered to be the primary source of river bank erosion. Village community of those areas has been suffering losses of houses, agricultural land and other assets due to river bank erosion.

Drinking water scarcity is the consequence of intense heat, deforestation and river water pollution. Village communities residing on the fluvial island and hilly regions

are most vulnerable communities when it comes to drinking water scarcity. Water shortage does occur in summer especially April and May, the hottest months of the year.

One of the major disasters frequently occurs in Hpa-an township is seasonal flooding. Flood event becomes quite common in monsoon season. Some villages located in the fluvial island and on the bank of Thanlwin River and lowland area also encounter frequent flood during the rainy season especially June, July and August. According to community resilience assessment reports prepared by Action Aid, an implementing partner of BRACED Consortium, some village communities have been experiencing frequent flood occurrence since 1980. Heavy rain caused by monsoon swells Thanlwin and other rivers of region and resulted in flooding. Deforestation in upstream and Hpa-an region, shallow river channels and excessive level of precipitation by extreme weather event are supposed to be some factors of flooding.

A series of development and business plan, program and other human activities have been identified, assessed the potential impacts and the mitigation measures are adapted in the environmental assessment section. Some environmental impact from those activities could have potential threats to the vulnerable communities of particular areas. Key vulnerable communities whose livelihood and resilience are likely to be affected by increased business activities, development plan and climate change are generally identified .Following table summarizes the linkage between environmental aspect and most vulnerable community.

Table 15 Environmental Impact and Vulnerable Community

Activity	Impact	Effect on HumanBeing	Vulnerable Community
Discharge of pollutant into water	Degradation of water quality Disruption of aquatic food chain	Water scarcity Less availability of fish Water use Health issues	Fishermen, single led family, low income family, women and children, old people
Emission of air pollution	Decreased air quality , production of particulate matters and toxic pollutants	Serious health issues to people living near by the source of pollutant	Children, women and old people
Deforestation and land use change	Loss of forest ecosystem service, Reduction the retention of water	Change livelihood of people Water scarcity Food scarcity	Mountainous community People living downstream and

Activity	Impact	Effect on HumanBeing	Vulnerable Community
	flow , Soil erosion and loss of fertile soil Riverbed increasing Increased sedimentation in water body , Loss of productive land and reduction the availability of food	Accelerate the frequency and magnitude of flood	low land
Riverbank erosion	Loss of vegetation coverage, loss of assets, river channel change	Loss of agriculture land ,loss of house and other assets	Riparian community
Waste dumping	Drainage block, hygienic issue	Accelerate flood, spread of disease	Children, women and old people

Health

A significant number of health related issues could be triggered due to contaminant air pollutants by cement industries and inadequate waste burning practices from municipal waste burning site and other activities.

Cement plant emits air pollutants such as particulate matters (suspended and respiratory, described as $PM_{2.5}$ and PM_{10}), nitrogen oxides, sulfur oxides, carbon oxides, VOC and greenhouse gases. It could also constitute heavy metals such as mercury, nickel, cobalt, lead and cadmium.

Studies have shown adverse respiratory health effects in the people exposed to cement dust, exemplified in increased frequency of respiratory problems (Al-Neaimi et al.,2001).It also suggests that people exposed to cement dust are badly affected by respiratory problems and gastro intestinal diseases (Adak et al., 2007). Several studies have also demonstrated linkages between cement dust exposure, chronic impairment of lung function and respiratory symptoms in human population. Cement dust also irritates the skin (Ikli et al., 2003). Its deposition in the respiratory tract causes increased pH values that irritate the exposed mucous membranes (Zeleke et al., 2010). Cement dust contains heavy metals like chromium, nickel, cobalt, lead and mercury pollutants hazardous to the biotic environment with

impact for vegetation, human health, animal health and ecosystem (Baby et al. 2008) . Air pollution has a great impact on human health, climate change, agriculture and natural ecosystem (Molina et al., 2004). Long- term exposure to air pollution could have an increased risk of chronic respiratory illness (Schwartz, 1994; Pope et al., 1995; Dockery and Pope, 1994) and of developing various types of cancers (Hemminki and Pershagen, 1994; Knox and Gilman, 1997; Nyberg et al. 2000).[19]

Communities living within three kilometer away from cement plants are roughly considered to be the most affected people by air pollutants as shown in figure. However, it is important to understand the air pollutants do not stop within this boundary limit. People living further distances from the source could also suffer health issues trigged by air contaminants depending on prevailing wind direction and intensity.

Open burning of household waste, waste from business activities and other communal waste which contains plastic debris and other material could result in serious health problems to human health .Number health issues in local residents can be developed from toxic gases and particulate emission.

Carbon oxide from incomplete combustion could cause dizziness, head ache, affect mental function, visual acuity and alertness. Dioxins and Furans are very toxic and it may cause cancer, affects immune and reproductive systems.[20] Dioxin is emitted by burning plastic such as organochlor based compound such as PVC (Poly Vinyl Chloride). Particulate Matter can lead to irritation of respiratory tract, aggravated asthma. It also contributes to chronic obstructive pulmonary diseases.[21] Burning polystyrene releases Carbon Monoxide and styrene monomers into the environment, which can be extremely hazardous to health.[22]

Residual ash from burning site can be washed away by storm water and then brought into nearby water bodies. Ash containing toxic compounds could impair the water quality of both surface and ground water. Contaminant water can contribute to health problems such as typhoid in local community who rely on stream and tube well as water source .Open dumping site could be the place spreading infection disease through vectors. Most vulnerable communities who could be suffered health problems by open burning and dumping water is predicted to be residents living about 500 m distance from the site. However, this is just estimation and people living outside of this boundary could also be affected by these

Throwing rubbish and discharging domestic, industrial and agricultural runoff and waste water into nearby river channels could contaminate water. Contaminated

[19] Syed S.M and Dr. G A Bhat, Cement Factories, Air Pollution and Consequence, Dept of Env Science and Center for Research, University of Kashmir and Jammu, India, 190006

[20] ,[19]Health effect of burning municipal solid waste, Saskatchewan Ministry of Environment, www.environment.sk.ca

[22] http://businessbarbados.com/trending/green-business/the-dangers-of-polystyrene/

water can cause many water borne diseases such as typhoid, hepatitis A and cholera.

Ecosystem Service

Ecosystem service is service provided by ecosystem to human being. Ecosystem service is generally divided into four categories such as provisioning service, regulating service, supporting service and cultural service.[23]

Ecosystem in Hpa-an generally divided into different categories such as forest, grass land, river, flood plain, wetland, cultivated land, urban high land and low land. Each ecosystem has unique characteristics in regulation on natural hazard and service to human being. For example forest ecosystem plays role in flood protection and soil loss prevention[24]. River ecosystem provides food, water, agricultural land and transportation for human being.

Food

Rice is staple food of the people of Hpa -An Township. Paddy rice field can be observed in rainy season. Apart from paddy field, some seasonal and cash crop such as varieties of beans, ground nut, lady finger, water melon, papaya, onion cucumber ,gourd, banana and other vegetables are grown on either on farmland, fluvial land, flood plain orchard or home garden. Livestock such as cattle, water buffalo, goat, chicken and pig are raised within household control. Principally, cattle and water buffalo are for agricultural purpose .Other livestock are for food and alternative income.

Fish is another source of food for the region. Fish from natural river, stream, wetland and water pond (Inn) are caught using traditional fishing techniques such as hook and line, cast net, trap to for household consumption and income generation.

Community of mountainous region relies on forest as their alternative food source collecting bamboo shoot, mushroom, vegetable and other foods.

However, flooding, water pollution and sand mining activity could disrupt food security of the region. Contaminated water might poison aquatic fauna. According to CRA prepared by Action Aid, seasonal flooding in the region has frequently caused damage to paddy field loss of crops and livestock crops. Concerns were raised about water pollution and sand mining and their disruption on aquatic food chain of fresh water of Thanlwin River, Gyaing River, Donthami River, Hlaine Bwe River and other streams ends up to less availability of fresh water fish production. Sometime, aqua farms are flooded by the terrestrial rain. Land conversion, deforestation and forest fire are considered factors which would reduce the food availability from forest and productive land.

[23] https://en.wikipedia.org/wiki/Ecosystem_services

[24] Environment and Vulnerability, Emerging Perspective, UNEP, ISDR

Some degraded forest and shrub land have converted into commercial plantations. These activities increase the attenuation of food availability from forest ecosystem to local residents.

Thus, food security of the rural communities has been threatened by climate extremes and environmental pollution, development activities and commercial plantation.

Water Availability and Quality

Conventional dug water wells have been used for decades for drinking, cooking and watering domestic animals. Hpa-an municipality has provided some households utility use through river water pumping and water supply network. However, treatment system is poor and it is considered unfit for drinking purpose. The river water quality of Thanlwin and other rivers in the area have not been thoroughly analyzed. In the meantime, authorities of Hpa-an township have planned to extract more water from Thanlwin River into town water distribution network through upgraded filtration system.

River ecosystem services of Hpa-an contains Thanlwin River, Gyaing River, Donthami River and other streams. Most of ecosystem services provided by river ecosystem in Hpa -An have been well utilized by people of Hpa-an. However, water availability from the Thanlwin is not commonly utilized due to possible water pollution and increased turbidity. Hence, it is not usable for drinking purpose. Unlike other rivers, water in Thanlwin is available all year around for other purposed such as industrial use, household utility and irrigation.

During the hot season, most of the villages suffer drinking water shortage and sanitation issues. Water aquifer lowers and conventional dug becomes dried up in some places. Water availability from small streams cannot supply much water in the summer due to low water level .This water scarcity leads to spread of infectious diseases on local resident and animals.

Chapter 5 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 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 action to be carried out in a manner which will lead to harmonization of environment, economy and social values of Hpa-an Township. Recommendations are focused around the exiting industries and development 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.

This study provides guidance to development programmes and sectors to avoid or mitigate environmental and social impacts of existing and future activities.

These recommended measures should be integrated into the existing or future township policy, plan and programs and regional development plans.

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 encouraged.

Legislative framework on environment and land issue describes in pervious chapters are the principles to govern each and every projects and development plans of the township both for urban and rural areas.

Influence of NGO and CSOs in environmental sectors has been rapidly evolving. Engagement with local NGO and CSO for investments is becoming vital for transparency and openness of future project investments in Myanmar. Local NGOs and CSOs, technically supported by environmental experts have spoken out against the unethical and unsustainable development projects and need to continue to ensure accountability of investors and businesses.

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.

Recommendations in the report should be considered as dynamic and revision will be taken placed as required based on implementation results on the ground.

5.1 Institutional Arrangement

Environmental Conservation Department, General Administration Department and other relevant agencies of Government hold responsibility as implementing agencies for ensuring that all development and sectorial programs and development projects of regions are operating with environmentally, socially and ethically responsible principles and adherence to the stipulated legislation and guidance.

The vast majority of environmental, social and economic concerns associated with industries, mining works, plantation and other activities happening in the regions are not systematically addressed and limited coordination between various levels of government, private companies is observed.Further there is limited monitoring and management framework of these issues. In order to effectively address the environmental concerns and to monitor the performance of development activities, it is necessary that departments are adequately staffed and equipped with environmental monitoring mechanisms.

Township institutional cooperation

Establishment of multi stake holder meeting for any project and activities related development is the key to the success of development plan and to harmonize the balance of three pillars, environment, economy and society. This type of meeting would host the open discussing of community over the environmental and social concerns and facilities speedy coordination between these agencies.

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.

General Recommendation for Major Actors

A series of recommendations is summarized for government organization, Industry and business, community and civil society.

Recommendations for Government

1. Existing environmental and related regulations and laws highlighted in chapter 3 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 district level government structures to agree and adopt and implement an environmental management plan, 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. Formulation and implementation of township waste management strategy and action plan in line with national waste management strategy
5. Increase capacity building of staff for environmental conservation department and other relevant departments including members of state environmental management committee for enforcement and implementation of environmental legislations and guidance
6. 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
7. Consideration to be made in the decision making process for permitting future cement plants in the regions since the area has been already suffering the adverse effects on environmental and social systems in the region.
8. Improve capacity of staff for inspection and monitoring of environmental performance of business activities
9. Township departments 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 Hpa-an. 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.
10. The Township Disaster Management Plan (TDMP) for Hpa-an should draw on data and information and risk identified in this report and ensure that the TDMP is synergized with this report.

Recommendations for Industry and Business

Consultation sessions should be organized with private sector and business leaders to present the findings of this TEA report. Efforts should be made to highlight existing environmental, social and cultural regulations and guidelines and work with industry and business to come up with compliance mechanisms. Suggestions for initial steps include:

11. Improvement in public participation and consultation in project development phase of new projects and activities
12. Initiate transparency and openness about project and business operations with publication of environmental, health and safety standards and policies.
13. 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
14. 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).
15. Development community health and safety initiatives along with occupation health and safety program
16. Prioritize environmental conservation and pollution prevention mechanisms in business operations
17. Develop project specific environmental management framework with local government departments and implementation in accordance with existing EIA guidance and laws
18. 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
19. Develop Corporate Social Responsibility initiatives which focuses on improvement of community resilience , community development, maintenance of ecosystem service and environmental management

20. Actively participate in stakeholder consultation and business meetings
21. Share local knowledge and experience in the consultation meeting and express concerns and challenges
22. Actively participate in environmental campaigns to be initiated by government organization and other organizations
23. Develop a private sector oversight mechanism that tracks adherence to environmental laws and procedures of all new development activities and

projects

24. Oversee the development and implementation of environmental management framework and encourage accountability and transparency in business and development practice

Table 16 Recommendation Table

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
1. Quarrying for Crushed stone			
1A	**General**	➢ A number of locations for quarries should be explored for raw material for road construction and maintenance with less environmental and health impacts ➢ Current locations (Zwekabin) should be avoided or minimized to preserve the natural environment, landscape and habitants of wildlife. ➢ Conduct feasible study for alternative locations ➢ Issue guidance note to the existing mining site owners to follow exiting laws and procedures and encourage to avoid detrimental effects quarrying activities	Protection of environmental and social sensitive area. Strengthening regulatory framework
1B	**Biological environment**	➢ Allocate quarry sites in safe and considerable distance away from residential and environmentally sensitive area	Improve public health and safety Prevent ecosystem degradation ,Enhance the good waste management scheme
1C	**Landscape and aesthetic value**	➢ There are numerous locations where required raw material in Hpa-an region can be found. There for existing locations should be avoided. ➢ Area for extraction of aggregate and annular rock should be designated based on the pre-defined criteria.	Preserving unique landscape feature Restoration of ecosystem and

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		➢ Rehabilitation of extracted area by reintroduction with native plant species	landscape
1D	**Water quality**	➢ Proper mine closure plan and rehabilitation program for old quarry including guidance and regulations and decontamination plan for old quarry sites ➢ Control system for discharge water and decontamination program for existing contaminated land	Improve water quality and enhancement of management systems
1E	**Public Health and safety**	➢ Restriction of night work operation ➢ Noise barrier are suggested to install ➢ Information about the frequency of blasting	Protection of health and safety of local residents
2. Enhancement of tourism sector			
2A	**General**	➢ Tourism development should be regulated and overseen by local and national government departments and enforcement should be made by authorities concerned with existing environmental legislation	Strengthening institutional framework
2B	**Biological environment**	➢ Expansion and upgrading of existing road and infrastructure facilities should be prioritized over planning new access roads and infrastructure ➢ Guidance materials including pamphlets/ signboards and posters should be produced for visitors to avoid any detrimental impact to flora and fauna	Avoidance of destructive land acquisition and development activities Enhancement of reputation of Hpa-an tourism industry
2C	**Landscape**	➢ Careful selection of location for new infrastructure such	Maintaining ecosystem and

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
	and aesthetic value	as accommodation and restaurant responsible distance from sensitive area	aesthetic features
2D	**Air quality**	➢ Control of vehicle movement through promotion of trekking and bicycling services	Minimizing air pollution and noise
2E	**Water quality**	➢ Hotel , inn and restaurants and other normal accommodation should be equipped with basic waste treatment facility such as septic tank ➢ Sufficient waste collection bins should be allocated in tourist hotspots and transport to the nearest waste collection depot provided	Controlling surface and ground water quality
2F	**Public Health and Safety**	➢ Speed limit restriction and enforcement in busy areas	Reducing the number of road accident and extent of injuries
2G	**Ethnicity and cultural Heritage**	➢ Convening public consultation meetings with local community frequently to lay down the strategy aiming at protecting natural environment, preserving traditional customs and maintaining security of the region ➢ Developing & implementation restoration guidelines for preservation of heritage sites ➢ Developing code of conduct and potential legislation for tourism development at heritage sites that would emphasis the preservation of culture in coordination with ethnic community	Improve the cooperation of local community and other sectors in decision making process Strengthening institutional framework in tourism sector. Improvement in preservation of tangible and intangible cultural heritages

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
2H	**Livelihood**	➢ Training to local people for employment in tourism sector such as area tourist guide, staff in hotel and restaurant business and environmental protection in the sector	Job Creation, more income generation and improvement of resilience
3. Industrial Zone			
3A	**General**	➢ Improve the waste collection system of the zone ➢ Establish overall industrial management framework and monitoring scheme for environmental management, occupational safety and fire safety ➢ Improve industrial solid waste management guidance and waste collection systems ➢ Designate waste collection points with waste bin provided ➢ Encourage reuse and recycling within industry and business processes ➢ Establishment of sanitary landfill site within zone ➢ Consideration of building small scale landfill within the Industrial zone with greater capacity	Strengthening institutional framework Adequate waste management practice Protection of water and soil degradation
3B	**Water Quality**	➢ Lining the landfill to control leaching and storm water diversion are suggested to protect from water contamination from waste products	Controlling the surface and ground water quality degradation
3C	**Public Health and Safety**	➢ Zonation of industries should be based on compatibility, health and safety priorities ➢ Establish of industry zone emergency management plan	Reduce harm to residents Avoidance of contamination,

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		➢ Fire management and frequent inspection (internal and external)	leakage and pollution
4. Waste Management			
4A	**General**	➢ Formulation and implementation of waste management strategy and action plan in line with national waste management strategy ➢ Township waste management plan should be reviewed and improved where deemed to be insufficient and an effective management and monitoring mechanism established ➢ Promote sustainable waste management awareness campaign to public and reduce waste disposal in drainage network, to reduce seasonal and flash flooding through good drainage and to alleviate the health risk to community ➢ Conduct awareness level raising campaign on source separation of organic waste and hazardous waste ➢ Education and awareness programme on the negative impact of inappropriate waste disposal ➢ Behavior change through well designed environmental program ➢ 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	Improve waste management infrastructure Improve environmental awareness Reduce flooding Reduce health risk Improve waste management practice Minimize health impact Strengthening the cooperation of public in waste handling

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		people ➢ .Encourage for widespread use of household level composting plant , composting pit for organic waste	
4B	**Ecological environment**	➢ Township and City Development Committee can evaluate the technical feasibility of composting plant	Improving infrastructure and protection of soil and water pollution Improve use of organic fertile residue from compositing plants
4D	**Air quality**	➢ Waste burning practices should be restricted	Minimizing the emission of air pollutants
4E	**River ecosystem and water quality**	➢ Throwing all types of waste into Thanlwin river should be strictly controlled ➢ Provide sufficient waste collection bin along the Thanlwin River so as to avoid throwing debris into river.	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

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
4F	**Public Health and Safety**	➢ Separation distance of landfill site to be defined minimum distance from residential area for major landfill depot ➢ Open dumping and burning into controlled operation provided with proper barricade/fence ➢ Uncontrolled waste disposal in public and other areas should be reduced through public campaign	Minimizing the contact between waste dumping site and public area to ensure the public health of community is secure
5.	**Perennial plantation and extension of Agricultural Land, Deforestation**		
5A	General	➢ Concession and permits for perennial plantation should be considered based on land coverage of existing plantation, regional ecology and social dimension, potential land conflict and community reliance on ecosystem	Protection vegetation clearance , increasing food security of local community , and increase the resilience of local community to climate extremes
5B	**Ecological environment**	➢ Principle of compensation for chopping down tree should be developed and implemented. The principle is grounded on the fact that number of chopped down trees shall be replanted in the similar habitant. ➢ Numbers of cultivation acres of existing upland areas should be recorded and education campaign should be staged to minimize the loss of ecological biodiversity	Strengthening institutional framework. Maintain the ecosystem of specific area Improvement of data inventory process of township. Raising environmental awareness
5C	**Air Quality**	➢ Open burning of debris of felled tree and undergrowth should be restricted	Minimizing the emission of air pollutants

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
			Legal compliance
5D	**Water Quality**	➢ Technical experts should emphasize alternative use of natural fertilizers as a substitute of chemical fertilizers in plantations	Minimizing the surface water pollution caused by chemical compound
5E	**Livelihood**	➢ Conventional shifting cultivation should be moved forward to modernized agricultural practices focusing minimum amount of land requirement and maximum yield production ➢ More efficient sustainable agricultural practices with less chemical should be adopted which will also be adapted to climate shock and stress.	Securing food security, sustaining livelihood. Improvement in agricultural practices. Avoidance of land acquisition and land conflict issues Resilience agricultural Practice
6. Existing and Future Cement Plant			
6A	**General (also relevant to quarrying)**	➢ Permits for future cement plants should consider adverse environmental and social impacts ➢ Undertake strategic environmental assessment or cumulative impact assessment for cement plants in the regions together with development of cement production plan of region ➢ Mine closure and quarry rehabilitation program ➢ EIA and follow up EMP system established for ongoing cement factory activities ➢ Green Belt approach with planting trees around the	Avoidance of additional cumulative impacts Consideration of environmental impact to project activity. Improvement in ecosystem

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		factory ➢ Introduction of rehabilitation program for the abandoned factories with will be filled back with trees	
6B	**Landscape and aesthetic value**	➢ Instead of applying open mine, semi opening pit mine design is suggested for alternative design for future cement raw material quarrying.	Preserving aesthetic beauty and avoiding visual impact
6C	**Air Quality**	➢ Sufficient dust collectors, filtration methods such as bag house, electrostatic precipitators and other dust capturing methods should be recommended to control pollutants from cement production ➢ Since there is no framework for monitoring and management of air quality arising from both point sources and non-point sources such as cement plants on west bank and vehicle movements in and around Hpa-an Township, it is highly recommended to set up air quality monitoring of the area and its trend ➢ Air emission of existing cement plants should be managed through an environmental management plan, and monitoring mechanism by Myanmar Economic Corporation which is the sole operator, The EMP should be prepared based on the result of environmental due diligence audit and assessment.The following factors should be taken into account in establishment of proposed mechanisms:	Minimizing the emission of air pollutants ,

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		➢ Define parameters to be monitored ➢ Select numbers of monitoring locations and frequency of sampling ➢ Management action against the exiting environmental quality guideline is stipulated by MONREC ➢ Publish the record air quality data to interesting stakeholder ➢ Encourage third parties or organizations to conduct research on the air quality and health issues of the area	
6E	**Water Quality**	➢ Proper mine closure plan and rehabilitation program for old quarry. ➢ Control system for discharge water and decontamination program for existing contaminated land ➢ Decontamination plan for old quarry sites.	Improve water quality and enhancement of management system
6F	**Community Health and Safety**	➢ Initiate community health and safety practice along with project's occupational health and safety system ➢ Conduct health surveillance on potential affected people	Improve health status of community
6G	**Community Development**	➢ Initiate CSR program focusing on development of affected community	Improve community development
7. Instream sand mining			
7A	**River ecosystems**	➢ Abandoned stream channels and inactive flood plains should be prioritized for sand mining over active channel ➢ Extraction from small stream should be avoided	Preservation of Thanlwin river ecosystem and river

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		➢ River ecosystem sensitivity should be determined with help of river ecologist and hydrologist ➢ Calculate the allowable volume of sand and gravel that would ensure the sustainability of the Thanlwin River and other stream ecosystems ➢ Permission for and mining should be based on annual replenishment levels, extent of proposed areas and intensity of activities, value of resources, the importance of social, culture and religious sites within proposed extraction areas ➢ Recommend sand and gravel extraction methods that would have least impacts on river morphology ➢ Establishment of continuous monitoring mechanism and monitoring should be carried out by authorized persons appointed relevant bodies. ➢ Implementation the guidance for sand mining in Karin and Mon State to avoid detrimental environmental impact and damage to river ecosystem and morphology ➢ Assessment of salinity intrusion in Thanlwin River should be conducted in collaboration with international organizations	morphology Improve the methodology and data collection practice of relevant department Improvement in implementation of administrative procedures Improve Institutional framework Better information management and data inventory Avoidance of reaching sand deficient river
8. **Climate Change and Ecosystem Management**			
8A	**General**	➢ Promote environmental awareness campaign in community highlighting the importance of ecosystem services and its relation to community resilience and	Improve ecosystem service Improve community resilience

Sr.	Environmental Category	Recommendation	Benefit to Environment, Ecosystem Management , Climate Change Mitigation , Adaptation and Resilience
		climate change ➢ Review both Community Resilience Assessment Reports produced under BRACED to identify climate change and disaster shocks and stresses and further impacts caused by ongoing development activities. Enhance the resilience of most vulnerable communities of Hpa-an. through maintenance and improvement of the good ecosystem service of natural biodiversity by channeling small grants and funds to joint community and government environment and ecosystem management projects	

အခြေခံ အကြံပြုချက်များနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု

ဤကဏ္ဍတွင် ဘားအံမြို့နယ်၏ အစိုးရအာဏာပိုင်များအနေဖြင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု စနစ်တကျပြုလုပ်ခြင်းအားဖြင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဘေးအန္တရာယ်များကို လျော့ချနိုင်ရန်အတွက် အကြံပြုမှုများ နှင့် အစီအမံများကို ဆွေးနွေး တင်ပြထားပါသည်။

အစီအစဉ်များကို ပတ်ဝန်းကျင်အား ကာကွယ်ခြင်း၊ အသက်မွေးမှုလုပ်ငန်းများကို ထိန်းသိမ်းခြင်းအပြင် ဒေသခံလူထု၏ ဘေးဒဏ်ခံနိုင်ရည် စွမ်းကို တည်ဆောက်ပေးခြင်း တို့တွင် ထည့်သွင်း စဉ်းစားနိုင်ပါသည်။

ဤပတ်ဂန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာ ပြုစုရာတွင် လေ့လာရေးအဖွဲ့သည် ဘားအံဒေသ၏ သဘာဝ ပတ်ဝန်းကျင်ဆိုင်ရာ၊ စီးပွားရေး နှင့် လူမှုရေး ဆိုင်ရာ တန်ဖိုးများကို ညီညွတ်မျှတစွာ စဉ်းစားနိုင်စေရေး အတွက် လိုအပ်သော လုပ်ဆောင်ချက်များကို အထူး အလေးထား စဉ်းစားထားပါသည်။ ဒေသအတွင်းရှိ ရှိရင်းစွဲစက်ရုံများနှင့် စီးပွားရေးစီမံကိန်းများသည် ပတ်ဂန်းကျင်ထိခိုက်မှုများ ဖြစ်နိုင်ခြေရှိသည်ဟု ယူဆကာ ထို စီမံကိန်းများနှင့် အခြားစီမံချက်များကို ဗဟိုပြု၍ ဤအကြံပေးချက်များ တင်ပြထားပါသည်။ လုပ်ငန်းများ အကောင်အထည်ဖော်ရာတွင် တာဂန်ရှိသည့် အဖွဲ့အစည်းများနှင့် တာဂန်ယူမှုနိုင်မှုများကို လည်း ချိတ်ဆက်တင်ပြထားပါသည်။ သို့သော်လည်း အကြံပြုချက် အားလုံးသည် ချက်ခြင်း အကောင်အထည်ဖော်ရန် မဖြစ်နိုင်ပါ။ ထို့ကြောင့် အသေးစိတ် အကောင်အထည် ဖော်ဆောင်ရွက်မည့် အစီအစဉ်ကို မြို့နယ်၏ ဆွေးနွေးတိုင်ပင်ရေး လုပ်ငန်းစဉ်အတွင်း ထည့်သွင်းစဉ်းစားရန် ရည်ရွယ် ထားပါသည်။

လုပ်ငန်းများ၏ ဆိုးကျိုးသက်ရောက်မှုများကို ရှောင်ရှားရန် (သို့) အတတ်နိုင်ဆုံးလျော့ချရန် ရည်သန်ကာ ဤ အကြံပြုချက်များပေးထားပါသည်။ ဤ အကြံပြုထားသော အစီအမံများကို မြို့နယ်၏ လက်ရှိ (သို့) အနာဂတ်မူဝါဒ၊ စီမံကိန်းများ၊ စီမံချက်များ တွင် ထည့်သွင်းအသုံးပြုသင့် ပါသည်။

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

ပြီးခဲ့သော အခန်းများတွင် ဖော်ပြထားသည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေမူဘောင် နှင့် မြေယာဆိုင်ရာကိစ္စများသည် မြို့ပြ နှင့် ကျေးလက် နှစ်ခုလုံးအတွက် ဖွံ့ဖြိုးမှု စီမံကိန်းများ နှင့် စီမံချက်တိုင်းကို ထိန်းချုပ်ရန်အတွက် မူဝါဒများ ဖြစ်ပါသည်။

အရပ်ဖက်အဖွဲ့အစည်းများနှင့် အစိုးရမဟုတ်သော အဖွဲ့အစည်းများ အားကောင်းမောင်းသန်လာနေမှုနှင့်အတူ အနာဂတ်ဖွံ့ဖြိုးရေးစီမံကိန်းများနှင့် စီးပွားရေး လုပ်ငန်းများ ပွင့်လင်းမြင်သာမှုကို အခြေခံ၍ လုပ်ဆောင် လည်ပတ်နိုင်ရန် အတွက်လည်း အဆိုပါအဖွဲ့အစည်းများနှင့် တိုင်ပင်ညှိနှိုင်းမှုများ ပြုလုပ်ရန်သည်လည်း အရေးကြီးသော အချက်ဖြစ်ပါသည်။ ပညာရှင်များ၏ ပံ့ပိုးမှုနှင့်အတူ အရပ်ဖက်အဖွဲ့အစည်းများ ၊ အစိုးရမဟုတ်သော အဖွဲ့အစည်းများသည် ဖွံ့ဖြိုးရေးလုပ်ငန်းများနှင့် စီးပွားရေးလုပ်ငန်းများ၏ ကျင့်ဂတ်အားနည်းခြင်း နှင့် ရေရှည်တည်တံ့မှုကို ဦးစားပေးခြင်း မပြုလုပ်မှုများကို ပွင့်ပွင့်လင်းလင်း ထုတ်ဖော်ပြောကြားနေကြပြီ ဖြစ်ပါသည်။ ထို့ကြောင့် ဖွံ့ဖြိုးရေးစီမံကိန်း နှင့်အခြား လုပ်ငန်းများ၏ တာဂန်ခံမှုတာဂန်ယူမှု အပိုင်းများ ပိုမိုတိုးတက်လာရန် လိုအပ်ပါသည်။

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

အဖွဲ့အစည်းများ၏ အစီအစဉ်

ဒေသအတွင်းရှိ ကဏ္ဍအလိုက်လုပ်ငန်းများ၊ ဖွံ့ဖြိုးရေးစီမံကိန်းများ ပတ်ဝန်းကျင်နှင့်လူမှုရေး စံနှုန်းများ၊ ကျင့်ဝတ်များ၊ ပြဋ္ဌာန်းထားသော ဥပဒေများနှင့်အညီ လုပ်ကိုင်ဆောင်ရွက်ရန်အတွက် အထွေထွေ အုပ်ချုပ်ရေးဦးစီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန နှင့် အခြားသက်ဆိုင်ရာ ဌာနများတွင်တာဝန်ရှိပါသည်။ ဒေသအတွင်းရှိ မိုင်းလုပ်ငန်းများ၊ စက်မှုဇုံများ၊ နှစ်ရှည်ပင်များနှင့် အခြားလုပ်ငန်းများ ကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ဆိုးကျိုးသက်ရောက်မှုများကို ယခင်က စဉ်းစားထားခြင်း၊ စနစ်တကျ ပြုလုပ်ထားခဲ့ခြင်း မရှိပါ။ ဌာနဆိုင်ရာများအတွင်းနှင့် ပုဂ္ဂလိကများအတွင်း ပတ်ဝန်းကျင် ကိစ္စများနှင့်ပတ်သတ်၍ ပူးပေါင်းဆောင်ရွက်မှု အတန်ငယ် အားနည်း နေဆဲဖြစ်ပါသည်။ ထို့အပြင် ဤကိစ္စများကို စောင့်ကြပ်ရန် မူဘောင်မှာလည်း အားနည်းနေပါသည်။ လုပ်ငန်းများ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ ဆောင်ရွက် လုပ်ကိုင်မှုများကို စောင့်ကြပ်ရန်နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စိုးရိမ်ပူပန်မှုများ ဖော်ထုတ်နိုင်ရန်အတွက် သက်ဆိုင်ရာ ဌာနများမှ ဝန်ထမ်းများကို ဆက်စပ် သင်တန်းများနှင့် အခြားအရင်းအမြစ်များ ထောက်ပံ့ရန်လိုအပ်လျက်ရှိပါသည်။

မြို့နယ်အဆင့် အဖွဲ့အစည်းများ ပူးပေါင်းဆောင်ရွက်ခြင်း

ဖွံ့ဖြိုးမှုနှင့် သက်ဆိုင်သော မည်သည့် စီမံချက် နှင့် လုပ်ငန်းများကိုမဆို လုပ်ကိုင်ရာတွင် သက်ဆိုင်သူအမျိုးမျိုးပါဝင်သော အစည်းအဝေးများ ကျင်းပပေးခြင်းသည် ဖွံ့ဖြိုးမှုအစီအစဉ်များ အောင်မြင်မှု၏ အဓိကသော့ချက်ဖြစ်ပြီး ပတ်ဝန်းကျင်၊ လူမှုရေး နှင့် စီးပွားရေး စသည့် မဏ္ဍိုင် ၃ ခု၏ ဟန်ချက်ကို လိုက်လျောညီထွေဖြစ်စေပါသည်။ ထိုကဲ့သို့ အစည်းအဝေးများသည် လူထု၏ ပတ်ဝန်းကျင် နှင့် လူမှုရေးဆိုင်ရာကိစ္စရပ်များဆွေးနွေးရာတွင် ပွင့်လင်းမှုကို ရှိစေမည်ဖြစ်ပြီး ထိုအဖွဲ့အစည်းများ အကြားတွင် မြန်ဆန်သော ပူးပေါင်းဆောင်ရွက်မှုကို ဖြစ်ပေါ်စေမည်ဖြစ်ပါသည်။

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။ အခြေခံအားဖြင့် ဒေသတွင်းအဆင့်တွင် အောက်ပါအကြံပြုချက်များ အကြံပြုထားပါသည်။

အဖွဲ့အစည်း အသီးသီးမှ ဆောင်ရွက်သင့်သော အကြံပေးချက်များ

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

အစိုးရ ဌာနဆိုင်ရာ အဖွဲ့အစည်းများ

1. ဤအစီရင်ခံစာ အခန်း(၃) တွင်ဖော်ပြထားသော ပတ်ဝန်းကျင်နှင့် အခြား ဆက်စပ်ဥပဒေများကို အစိုးရဌာန ဆိုင်ရာ များအနေနှင့် လေ့လာသုံးသပ်ပြီး ဥပဒေစိုးမိုးရေး အတွက် တာဝန်ရှိသည့် အဖွဲ့အစည်းများ ဌာနများကို တာဝန်ပေးခြင်းများ ပြုလုပ်ရန်

2. ပတ်ဂန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု ကို နားလည်သဘောပေါက်ရန် ၊ ဥပဒေစိုးမိုးမှုများကို လေ့လာစောင့်ကြည့် ရန်နှင့် ပတ်ဂန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကိစ္စများကို လေ့လာစောင့်ကြပ်ရေး နည်းလမ်းများကို တည်ဆောက် နိုင်ရန်အတွက် မြို့နယ်နှင့် ခရိုင်ဒေသ အတွင်း ပတ်ဂန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု ကော်မီတီဖွဲ့စည်းရန်
3. ဂေဟစနစ်မှ ပေးသော ဂန်ဆောင်မှုများနှင့် ဒဏ်ခံနိုင်စွမ်းဆက်စပ်ပုံများကို အခြေခံသော ပတ်ဂန်းကျင်ဆိုင်ရာ အသိပညာပေး လုပ်ငန်းများကို ဒေသခံလူထုအတွင်း ဆောင်ရွက်သွားရန်
4. အမျိုးသား: စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှ မဟာဗျူဟာနှင့် လိုက်လျောညီထွေရှိသော မြို့နယ်ဆိုင်ရာ စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှု မဟာဗျူဟာနှင့် စီမံချက်များ ရေးဆွဲအကောင်အထည် ဖော်ဆောင်နိုင်ရန်
5. ပတ်ဂန်းကျင်ထိန်းသိမ်းရေးဌာနနှင့်အခြားဆက်စပ်ဌာနများမှ ဂန်ထမ်းများ နှင့် ပြည်နယ် ပတ်ဂန်းကျင် စီမံခန့်ခွဲရေးကော်မီတီ အဖွဲ့ဂင်များကို ကို ပတ်ဂန်းကျင်ဆိုင်ရာ ပြဌာန်းချက်၊ ဥပဒေများ လက်တွေ့အကောင်အထည်ဖော်ရေးဆိုင်ရာ အရည်အသွေးမြှင့်တင်မှုများ ပြုလုပ်ခြင်း
6. ဖွံ့ဖြိုးရေးလုပ်ငန်းများကြောင့် ပတ်ဂန်းကျင်နှင့် ဒေသခံလူထုတို့၏ ရာသီဥတုဆိုးဂါးမှ ဒဏ်ခံနိုင်စွမ်းကို မည်သို့မည်ပုံ သက်ရောက်မှုရှိနိုင်ကြောင်း ကုမ္ပဏီများ ၊အဖွဲ့အစည်းများမှ ပွင့်လင်းစွာ တင်ပြနိုင်ရေးအတွက် တွန်းအားပေးရန်
7. ဘိလပ်မြေစက်ရုံများကြောင့် လေထုညစ်ညမ်းမှုများနှင့် အခြားပတ်ဂန်းကျင်ညစ်ညမ်းမှုများ ရှိနေနိုင်ပြီး ဖြစ်သောကြောင့် နေရာဒေသတစ်ခုအတွင်း ဘိလပ်မြေ စက်ရုံအသစ်များ ထပ်မံဆောက်လုပ်ခြင်းအတွက် အဖက်ဖက်မှ စဉ်းစားပြီးမှသာ ဆုံးဖြတ်နိုင်ရန်
8. ပတ်ဂန်းကျင်ထိန်းသိမ်းရေးဌာနမှ ဂန်ထမ်းများကို စီးပွားရေးလုပ်ငန်းများ၏ ပတ်ဂန်းကျင်ဆိုင်ရာ အကောင်အထည်ဖော် ဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြပ်မှုနှင့် ပတ်သတ်သော အရည်အသွေး ဆိုင်ရာသင်တန်းများ ပို့ချပေးခြင်းများ ပြုလုပ်နိုင်ရန်
9. မြို့နယ်အတွင်းရှိ ဌာနဆိုင်ရာများအနေနှင့် ရာသီဥတုပြောင်းလဲမှုများ၊ ရာသီဥတု ပြောင်းလဲမှုများကြောင့် ဖြစ်ပေါ်လာသော ဘေးနှင့်ဖိစီးမှုများ၊ လက်ရှိစီမံကိန်းများမှ နောင်တွင်ဖြစ်ပေါ်လာနိုင်သော ပတ်ဂန်းကျင်ဆိုးကျိုးသက်ရောက်မှုများကို ဖော်ထုတ်နိုင်ရန်အတွက် BRACED စီမံကိန်းမှ ပြုစုခဲ့သော မြို့နယ် ပတ်ဂန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် ကျေးရွာလူထု၏ ဘေးအန္တရာယ်ခံနိုင်စွမ်း စစ်တမ်းများကို လေ့လာသုံးသပ်ရန်(ဘားအံဒေသအတွင်းရှိ အင်အားအနည်းပါးဆုံး ဒေသခံတို့၏ ဘေးဒဏ်ခံနိုင်စွမ်း မြင့်မားလာစေရေးအတွက် ဒေသခံတို့မှာ ရှာဖွေ ဖော်ထုတ်ထားသော လုပ်ဆောင်ရမည့် လုပ်ငန်းများ အားလုံးကို အတူတကွ ပေါင်းစည်း၍ ပိုမိုကျယ်ပြန့်သော စီမံချက်များ ရေးဆွဲသင့်ပါသည်။ ထိုသို့ပြုလုပ်ရာ တွင် အစိုးရနှင့် ပြည်သူတို့ အတူတကွ လုပ်ကိုင်နိုင်မည့် ပတ်ဂန်းကျင်နှင့် ဂေဟစနစ်ဆိုင်ရာ စီမံကိန်းများအတွက် အသေးစားရံပုံငွေများ ရရှိအောင်ဆောင်ရွက်ခြင်းဖြင့် ဇီဂမျိုးစုံမျိုးကွဲ၏ ဂေဟစနစ်ဆိုင်ရာ ဂန်ဆောင်မှုများ မြင့်တက်လာနိုင်သည်" ဆိုသော အချက်ကိုလည်း ထည့်သွင်းနိုင်ပါသည်)
10. မြို့နယ်ဆိုင်ရာ ဘေးအန္တရာယ် စီမံခန့်ခွဲရေး ရေးဆွဲရာတွင် ဤအစီရင်ခံစာပါ အချက်အလက်များ၊ အန္တရာယ်စစ်တမ်းများ ကို ကိုးကားနိုင်ရန် နှင့် အဆိုပါ စီမံချက်သည် ဤအစီရင်ခံစာ နှင့်အတူ အပြန်အလှန် ပေါင်းစည်းနိုင်ရန်

စက်ရုံအလုပ်ရုံများ နှင့် စီးပွားရေးလုပ်ငန်းများ

ဤအစီရင်ခံစာမှတွေ့ရှိချက်များနှင့်ပတ်သတ်ပြီး ပုဂ္ဂလိကလုပ်ငန်းများ၊စီးပွားရေးလုပ်ငန်းများ၊ နှင့် ဆွေးနွေးပွဲများ ပြုလုပ်သင့်ပါသည်။ ပတ်ဂန်းကျင်၊လူမှုရေးနှင့် ယဉ်ကျေးမှု ဆိုင်ရာ ဥပဒေများနှင့် လမ်းညွှန်ချက်များကို အဓိက ဦးစားပေးဖော်ပြကာ စက်ရုံအလုပ်ရုံများနှင့် စီးပွားရေးလုပ်ငန်းများ အနေနှင့် ဥပဒေများလိုက်နာရန် နည်းလမ်းများ ပေါ်ပေါက်လာနိုင်စေရေးကို ဦးတည်သင့်ပါသည်။ ပါဂင်သင့်သည်များကို အောက်ပါအတိုင်း အကြံပြုပါသည်။

11. စီမံကိန်းအသစ်များနှင့်လုပ်ငန်း အသစ်များ၏ ကနဦးအဆင့်တွင် လူထုတွေ့ဆုံရေးနှင့် အကြံဉာဏ် တောင်းခံရေး လုပ်ငန်းစဉ်များ ပိုမိုဆောင်ရွက်လာနိုင်စေရန်
12. စီမံကိန်းနှင့် စီးပွားရေးလုပ်ငန်းများ၏ ပတ်ဂန်းကျင် ၊ကျန်းမာရေးနှင့် လုပ်ငန်းခွင်ဆိုင်ရာ ဘေးအန္တရာယ် ကင်းရှင်ရေး ဆိုင်ရာ စံနှုန်းများ၊ မူဂါဒများကို တရားဂင်ထုတ်ပြန်ခြင်းဖြင့် ပွင်းလင်းမြင်သာမှုများကို ဖော်ဆောင်ရန်
13. ဖွံ့ဖြိုးရေးလုပ်ငန်းများသည် မည်သည့်မည်ပုံ ရပ်ရွာလူထု ဂန်ဆောင်မှုလုပ်ငန်းများ နှင့် စနစ်များ (ရိက္ခာဖူလုံရေး၊ရေစွမ်းအင်နှင့် ကျန်းမာရေး)၏ ရာသီဥတုဆိုးဂါးမှုပေါ် ဒဏ်ခံနိုင်စွမ်းနှင့် ပတ်ဂန်းကျင်ကို ထိပါးနိုင်ကြောင်း နှင့် ပြန်လည်ကုစားရေးအစီမံများကို ပွင့်လင်းစွာ ရှင်းပြနိုင်ရန်နှင့် အချက်အလက်များကို ဂေမျှရန်
14. ဖွံ့ဖြိုးရေးစီမံကိန်းများနှင့် စီးပွားရေးလုပ်ငန်းများသည် စီးပွားရေး တိုးတက်မှုနှင့် အကျိုးအမြတ် ရနိုင်မှုကို ဦးတည်သော ဘေးဒဏ်ခံနိုင်စွမ်း ဆိုင်ရာ လုပ်ငန်းများ ပါဂင်သည့် စီးပွားရေး ဆောင်ရွက်မှုများ ပိုမိုများပြားလာစေရန် အတွက် တွန်းအားပေးရန် (ဥပမာ- စိုက်ပျိုးရေးနှင့်သက်ဆိုင်သော လုပ်ငန်းများ၊ ရပ်ရွာလူထုအတွက် အခြေခံ အဆောက်အဦများ၊စွမ်းအင်နှင့် ရေ ဖြန့်ဖြူးရေး ဂန်ဆောင်မှ လုပ်ငန်းများ)
15. လုပ်ငန်းခွင်ဆိုင်ရာ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးများနည်းတူ စီမံကိန်းအနီးတဝိုက်မှ ဒေသခံပြည်သူတို့၏ ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက်လည်း ဆောင်ရွက်ရန်
16. အခြား စီးပွားရေးဆိုင်ရာ လုပ်ငန်းများနှင့်အတူ ပတ်ဂန်းကျင်ထိန်းသိမ်းရေးနှင့် ပတ်ဂန်းကျင်ညစ်ညမ်းမှုများ ကာကွယ်ရေး တို့သည်လည်း အရေးကြီးကြောင်း သတ်မှတ်ထားနိုင် ရန်
17. တည်ဆဲ EIA လုပ်ထုံးလုပ်နည်း နှင့်အညီ စီမံကိန်းနှင့်ဆိုင်သော ပတ်ဂန်းကျင်ဆိုင်ရာ စီမံချက်များကို ရေးဆွဲအကောင်အထည်ဖော်ရန်
18. စီးပွားရေးနှင့် ဖွံ့ဖြိုးရေးလုပ်ငန်း များကြောင့် ပတ်ဂန်းကျင်ဆိုးကျိုးနှင့် ဒေသခံတို့၏ အစွန်းရောက် ရာသီဥတုဒဏ်ခံစွမ်းရည်များကို မထိခိုက်စေရန်အတွက် မိမိတို့၏ လုပ်သားထုများကို ပတ်ဂန်းကျင်ဆိုင်ရာ သင်တန်းများပေးရန်အတွက် အစီအစဉ်များ ရေးဆွဲရန်
19. ဒေသခံတို့၏ ရာသီဥတုဒဏ်ခံနိုင်စွမ်းရည် မြင့်တက်လာစေရန် ၊ ဂေဟစနစ်မှပေးသော ဂန်ဆောင်မှုများကို ထိန်းသိမ်းရန် နှင့် ပတ်ဂန်းကျင်ဆိုင်ရာစီမံချက်များ ပါဂင်သော လူမှုတာဂန်သိမှု အစီအစဉ်များရေးဆွဲ အကောင်အထည်ဖော်ရန်

အရပ်ဖက်အဖွဲ့အစည်းနှင့်ဒေသခံလူထု

20. သက်ဆိုင်ဆက်စပ်သူများ အစည်းအဂေးများတွင် ပါဂင်ဆွေးနွေးနိုင်ခြင်း
21. မိမိတို့အစဉ်အဆက်တွေ့ကြုံခဲ့ရသော အဖြစ်အပျက်များ ဗဟုသုတများကို ထိုသို့သော ဆွေးနွေးပွဲများတွင်

အတွေ့အကြုံဖလှယ်ခြင်း၊ စိတ်ပူပန်သောအကြောင်းများနှင့် ဖြစ်ပေါ်နိုင်သော စိမ်ခေါ်မှုများကို တင်ပြနိုင်ခြင်း

22. အစိုးရနှင့်အခြားအဖွဲ့အစည်းများမှ ဦးဆောင်ကျင်းပသော အပြုသဘောဆောင်သည့် ပတ်ဂန်းကျင် ဆိုင်ရာ ထိန်းသိမ်းရေး ပညာပေးရေး လှုပ်ရှားမှုများတွင်တက်ကြွစွာပါဝင်ရန်

23. စီးပွားရေးနှင့် အခြားဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းများ၏ ဥပဒေနှင့်အညီ ဆောင်ရွက်မှု ရှိမရှိ သိရှိနိုင်ရန်အတွက် လေ့လာစောင့်ကြည့်ရေး ယန္တယားတစ်ခုထူထောင်ရန်

24. လုပ်ငန်းများ၏ တာဂန်ယူမှုနှင့် တာဂန်ခံမှုများ တိုးတက်လာစေရန် နှင့် လုပ်ငန်းများ၏ ပတ်ဂန်းကျင်ဆိုင်ရာ စီမံဆောင်ရွက်မှုများကို လေ့လာစောင့်ကြည့်ရန်

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်း နှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
၁. ကျောက်ထုတ်လုပ်ခြင်း			
၁(က)	အထွေထွေ	• လမ်းတည်ဆောက်ခြင်း နှင့် ထိန်းသိမ်းခြင်းအတွက် လိုအပ်သော တည်ဆောက်ရေး ကုန်ကြမ်း ပစ္စည်းများကို နေရာတော်တော်များများမှ ရရှိနိုင်ပါသည်။ ထို့ကြောင့်အခြား သင့်လျော်သော နေရာ လေ့လာဖော်ထုတ်ခြင်းကို ဆောင်ရွက်သင့်သည် • လက်ရှိ တူးဖော်ရာနေရာများကို လုပ်ငန်းဆောင်ရွက်မှုများကြောင့် ဆိုးရွားသောသက်ရောက်မှုများဖြစ်ပေါ် စေခြင်းမှ ရှောင်ကြဉ်ရန်အတွက် အခြေခံမူဝါဒများနှင့် သက်ဆိုင်ရာ ဥပဒေများကို လိုက်နာရန် လမ်းညွှန်ချက်များ ထုတ်ပြန်ခြင်းကို ဆောင်ရွက်သင့်သည်	ပတ်ဝန်းကျင် နှင့် လူမှု ဆိုင်ရာ ထိခိုက်လွယ် နေရာများအား ကာကွယ်ခြင်း ဥပဒေမူဘောင်အား ပိုမိုအားကောင်းစေခြင်း
၁(ခ)	ဂေဟနစ်ပတ်ဝန်းကျင်	• ကျောက်ထုတ်စခန်းများကို လူနေထိုင်ရာနေရာများ နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်လွယ်သောနေရာများမှ ဘေးကင်း လုံခြုံစိတ်ချရသော့ အကွာအဝေးတွင် ထားရှိသင့်ပါသည် • ကျောက်ထုတ်ရာနေရာအတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုစနစ်ကို ထားရှိ အကောင်ထည်ဖော်သင့်ပါသည် • သဘာဝပတ်ဝန်းကျင် ၊ ရှုခင်း နှင့် သားရဲတိရစ္ဆာန်များ၏ ကျက်စားရာနေရာများကို ကာကွယ်ရန်အတွက် လက်ရှိ ကျောက်ထုတ်စခန်းနေရာများကို ရှောင်ရှားခြင်း (သို့) အတတ်နိုင်ဆုံး လျော့ထုတ်ခြင်းတို့ ပြုလုပ်သင့်သည်	လူထု ကျန်းမာရေး နှင့် ဘေးကင်း လုံခြုံမှုကို တိုးတက်စေခြင်း ဂေဟစနစ် အရည်အသွေးလျော့ကျမှုမှ ကာကွယ်နိုင်ခြင်း ကောင်းမွန်သော စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှုကို တိုးတက်စေခြင်း
၁(ဂ)	မြေယာရှုခင်းသဘာဝအလှအပ	• ဘားအံဒေသတွင် ကျောက်ထုတ်လုပ်ရေးအတွက် ရရှိနိုင်သော နေရာအမြောက်အမြားရှိသည်။ လက်ရှိနေရာများကိုရှောင်ရှားသင့်ပါသည်	ထူးခြားမြေမျက်နှာသွင်ပြင်များကို ထိန်းသိမ်းခြင်း

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်း နှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
		• လမ်းခင်းကျောက်တူးဖော်ထုတ်လုပ်ရာနေရာများကို ကြိုတင်ချမှတ်ထားသော သတ်မှတ်ချက်များအပေါ် အခြေခံ၍ ကန့်သတ်ထားသင့်ပါသည် • တူးဖော်ထုတ်လုပ်သည့်နေရာများတွင် ဒေသ၏ မူလပေါက်ရောက်သောသစ်ပင်များကို ပြန်လည်စိုက်ပျိုးပေးခြင်းများ ပြုလုပ်သင့်ပါသည်	ဂေဟစနစ်နှင့် မြေမျက်နှာသွင်ပြင်များကို ပြန်လည်ပြုပြင်ထူထောင်ပေးခြင်း
၁(ဃ)	ရေထုအရည်အသွေး	• ညစ်ညမ်းမှုများ သန့်ရှင်ရေးအတွက် လမ်းညွှန်မှုများ အပါအဝင် မိုင်းဆိုဒ်ဟောင်းများတွင် မိုးပိတ်သိမ်းရေး စီမံချက်နှင့် ပြန်လည်ပြုစုပျိုးထောင်ပေးရေးစီမံချက်များကို ရေးဆွဲခြင်း • လက်ရှိညစ်ညမ်း နေရာများ နှင့် ရေဆိုးစွန့်ထုတ်မှများကို ထိန်းချုပ်နိုင်ရန် အစီအစဉ်များ ရေးဆွဲခြင်း	ရေထုအရည်အသွေးကောင်းမွန် လာခြင်းနှင့် စီမံခန့်ခွဲမှုစနစ်များ အားကောင်းလာခြင်း
၁(င)	လူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး	• ဆူညံသံ တားဆီး ကာကွယ်သည့် အရာများတပ်ဆင်ရန် အကြံပြုထားသည • ညဖက် လုပ်ငန်းလည်ပတ်ခြင်းကို တားမြစ်ခြင်း	ဒေသခံပြည်သူများ၏ ကျန်းမာရေးနှင့် လုံခြုံမှုကို ကာကွယ်ခြင်း
၂.ခရီးသွားလုပ်ငန်းမြှင့်မားလာခြင်း			
၂(က)	အထွေထွေ	• လက်ရှိ ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေများ အသက်ဝင်ရေး နှင့် လိုအပ်သော ဥပဒေများ ပိုမို ပေါ်ထွန်းလာရေးအတွက် သက်ဆိုင်သော အစိုးရအဖွဲ့အစည်းများမှ တွန်းအား ပေးမှုများ ပြုလုပ်ပေးခြင်း	အဖွဲ့အစည်းဆိုင်ရာ ပူးပေါင်းဆောင်ရွက်မှု မူဘောင်အား အားကောင်းစေခြင်း
၂(ခ)	ဂေဟစနစ်ပတ်ဝန်းကျင်	• လမ်းအသစ်များ ထပ်မံဖောက်လုပ်ခြင်းထက် ရှိပြီးသား လမ်းများအား ချဲ့ထွင်ခြင်း နှင့် အဆင့်မြှင့်တင်ခြင်းကို ဦးစားပေးဆောင်ရွက်ခြင်း • အပင် နှင့် တိရစ္ဆာန်များ အား ဆိုးရွားသော သက်ရောက်မှုများ မဖြစ်စေရေးအတွက် ခရီးသွားများအတွက် လမ်းညွှန်ချက်များထုတ်ဝေခြင်း	မလိုလားအပ်သော မြေယာသိမ်းဆည်းမှု များကို ရှောင်ရှားနိုင်ခြင်း

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်း နှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
			ဘားအံဒေသ၏ ခရီးသွားလုပ်ငန်း အား ဂုဏ်တက်စေခြင်း
၂(ဂ)	မြေယာရှုခင်းသဘာဝအလှအပ	• အဆောက်အဦအသစ်များတည်ဆောက်ခြင်းအတွက် တည်နေရာများကို ဂရုတစိုက်ရွေးချယ်ပေးခြင်း ဥပမာ- စားသောက်ဆိုင်များနှင့် လူနေအဆောက်အဦများကို ထိခိုက်လွယ်သော နေရာများမှ သင့်တော်သော အကွာအဝေး တွင်ထားရှိခြင်း	ဂေဟစနစ်နှင့် လှပသော သဘာဝပတ်ဝန်းကျင် သွင်ပြင်လက္ခဏာများကို ထိန်းသိမ်းခြင်း
၂(ဃ)	လေထုအရည်အသွေး	• တောင်တက်ခြင်း နှင့် စက်ဘီးစီးခြင်း ဂန်ဆောင်မှုများကိုတိုးမြှင့်ပေးခြင်းဖြင့် မော်တော်ယာဉ်များ သွားလာခြင်းကို ထိန်းချုပ်ခြင်း	လေထုအရည်အသွေးမြင့်တက်ခြင်း
၂(င)	ရေထုအရည်အသွေး	• ဟိုတယ်၊ တည်းခိုခန်းများနှင့် စားသောက်ဆိုင်များနှင့် မိလ္လာကန်ကဲ့သို့သော အခြေခံအဆောက်အကြေး စီမံခန့်ခွဲမှု စနစ်တပ်ဆင်ထားသော အခြား အခြေခံ လိုအပ်ချက်များ • ခရီးသွားများ သွားလာရာ နေရာများတွင် အမှိုက်ပုံးများ လုံလောက်စွာ ထားရှိပေးခြင်းနှင့် အမှိုက်သိမ်းသည့် နေရာသို့ သယ်ယူပို့ဆောင်ရေးစနစ်တို့ကို ဆောင်ရွက်ရခြင်း	မြေပေါ်ရေနှင့် မြေအောက်ရေ အရည်အသွေး ကျဆင်းလာမှုကို ထိန်းချုပ်နိုင်ခြင်း
၂(စ)	လူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး	• လူထူထပ်သော နေရာများတွင် အရှိန် နှန်း ကန့်သတ်ထားရှိခြင်း၊ ယာဉ်မတော်တဆမှု အရေအတွက် နှင့် ထိခိုက်မှုများ လျော့ကျအောင်ဆောင်ရွက်ခြင်း	လေထုညစ်ညမ်းမှုနှင့် ဆူညံမှု လျော့ချရန်။
၂(ဆ)	လူမျိုစုနှင့် ယဉ်ကျေးမှု	• ဒေသခံလူထုနှင့် လူထုအကြံပြုအစည်းအဝေးများကို ဖိတ်ခေါ်၍ သဘာဝပတ်ဝန်းကျင်ကို ကာကွယ်ရေး၊ ရိုးရာဓလေ့ထုံးတမ်းများကို ထိန်းသိမ်းရေး နှင့် ဒေသ၏ ဘေးကင်းလုံခြုံရေးတို့ကို ဦးတည်သော နည်းဗျူဟာများ ချမှတ်ခြင်း	ဒေသအတွက် ဆုံးဖြတ်ရေး ကဏ္ဍတွင် ဒေသခံလူထု၏ ပူးပေါင်းပါဝင်မှုကိုတိုးတက်စေခြင်း

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
	အမွေအနှစ်	• ရှေးဟောင်းအမွေအနှစ်ဒေသများ ထိန်းသိမ်းကာကွယ်ခြင်းအတွက် စံသတ်မှတ်ချက်များ ချမှတ်ခြင်းလိုက်နာခြင်း • တိုင်းရင်းသားလူထုအတွင်း အချင်းချင်း ပေါင်းသင်း ဆက်ဆံသော ယဉ်ကျေးမှုပုံစံ ကို အထူးအလေးထားသော မူဝါဒများ ချမှတ်အကောင်အထည်ဖော်ခြင်း နှင့် ခရီးသွားလုပ်ငန်း ကဏ္ဍများတွင် ၄င်းယဉ်ကျေးမှုပုံစံကို မထိခိုက်အောင် ထိန်းသိမ်းထားရန် ဖြစ်နိုင်သော အခြေအနေများကို စဉ်းစားထားခြင်း	ခရီးသွားလုပ်ငန်းကဏ္ဍတွင် အဖွဲ့အစည်းများ ပူးပေါင်း ဆောင်ရွက်မှုကို တိုးတက်စေခြင်း ယဉ်ကျေးမှုအမွေအနှစ်များ ထိန်းသိမ်းစောင့်ရှောက်မှုကို တိုးတက်စေခြင်း
၂(ဇ)	သက်မွေးဝမ်း ကြောင်း	• ဒေသခံများအလုပ်အကိုင် အခွင့်အရေးပိုမို ရရှိလာရေးအတွက် ဒေသခံ ဧည့်လမ်းညွှန်သင်တန်းများ၊ စားသောက်ဆိုင်နှင့် ဟိုတယ်ဝန်ဆောင်မှုသင်တန်းများ ဦးစားပေးရန် • ထိုသို့ပြုလုပ်ရာတွင် ပတ်ဝန်းကျင်နှင့်ဓလေ့ထုံးတမ်းစဉ်လာများ ကာကွယ်စောင့်ရှောက် ရေးကို ထည့်သွင်းစဉ်းစားရန်	ဒေသခံများ ဂင်ငွေ တိုးတက်မှုမှ တဆင့် ဘေးဒဏ်ခံနိုင်စွမ်းများ မြင့်တက်ခြင်း၊လုပ်အကိုင်အခွင့်အ ရေးများ များပြားလာခြင်း
၃.စက်မှုဇုံ			
၃(က)	အထွေထွေ	• အထူးစက်မှုဇုံ၏ စွန့်ပစ်ပစ္စည်း စုဆောင်းမှုစနစ် ယခုထက်ပို၍ တိုးတက်လာစေရန် • စက်မှုဇုံပတ်ဝန်းကျင်ဆိုင်ရာ၊ လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာနှင့် မီးဘေးအန္တရာယ်ဆိုင်ရာ စီမံခန့်ခွဲမှုဘောင် နှင့် စောင့်ကြည့်စစ်ဆေးခြင်းစနစ်များချမှတ်ခြင်း • စက်မှုလုပ်ငန်းဆိုင်ရာ စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု နည်းဥပဒေအပိုင်း ယခုထက်ပို၍ ပြည့်စုံသင့်ပါသည် • အမှိုက်များကို အမျိုးအစားအလိုက် ခွဲခြားပြီး စွန့်ပစ်သင့်ပါသည် • ပြန်လည်အသုံးပြုခြင်း နှင့် ပြန်လည်ဖန်တီး၍ အသုံးချခြင်း ကျင့်သုံးမှုကို အားပေးသင့်ပါသည်	အဖွဲ့အစည်းဆိုင်ရာ ပူးပေါင်းဆောင်ရွက်မှု အားကောင်းစေခြင်း လုံလောက်သော စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အလေ့အကျင့်ရှိစေခြင်း ရေ နှင့် မြေဆီလွှာ အရည်အသွေးလျော့ကျမှုမှ

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
		• အထူးစီးပွားရေးဇုန်အတွင်းမှာပင် သန့်ရှင်းသော ကိုယ်ပိုင်စွန့်ပစ်ရာနေရာ ထားရှိသင့်ပါသည် • သေးငယ်၍ စွမ်းဆောင်ရည်အားကောင်းသည့် စွန့်ပစ်ရာမြေကျင်းများကို ဇုန်အတွင်းမှာပင် တည်ဆောက်ထားရှိရန် စဉ်းစားသင့်ပါသည်	ကာကွယ်ခြင်း
၃(ခ)	ရေထုအရည်အသွေး	• စွန့်ပစ်အမှိုက်ပုံ များနှင့်အခြား အညစ်အကြေးများမှတဆင့် ရေထုညစ်ညမ်းမှုများ မဖြစ်ပေါ် စေရန်၊စွန့်ထုတ်ရေ ထိန်းချုပ်ခြင်း၊ အမှိုက်များကို စနစ်တကျ သိမ်းဆည်းကာရံထားခြင်းများ ပြုလုပ်သင့်ပါသည်	မြေပေါ် မြေအောက်ရေ အရည်အသွေးထိန်းချုပ်နိုင်ခြင်း
၃(ဂ)	လူထုကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး	• ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းမှု ကို အခြေခံကာ စက်ရုံများနေရာချမှုကို ပြုလုပ်သင့်ပါသည် • စက်မှုဇုံဆိုင်ရာ အရေးပေါ် အခြေအနေဘေးကင်းရေး စီမံချက် ရေးဆွဲထားသင့်ပါသည် • မီဘေးအန္တရာယ်နှင့်ပတ်သတ်၍ ပိုမိုတင်းကြပ်သော စည်းမျဉ်းစည်းကမ်းများ၊ စစ်ဆေးမှုများ ပြုလုပ်သင့်ပါသည်။(စက်ရုံတွင်းနှင့် အခြားအဖွဲ့အစည်း)	ဒေသခံများအပေါ် အန္တရာယ်ကျရောက်မှု လျော့ပါးခြင်း ညစ်ညမ်းစေသောအရာများနည်းပါးခြင်း
၄. စွန့်ပစ်အမှိုက်များစီမံခန့်ခွဲမှု			
၄(က)	အထွေထွေ	• အမျိုးသား: စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှု မဟာဗျူဟာနှင့် လိုက်လျောညီထွေရှိသော မြို့နယ်ဆိုင်ရာ စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှု မဟာဗျူဟာနှင့် စီမံချက်များ ရေးဆွဲအကောင်အထည်ဖော်ရန် • မြို့နယ်၏ စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှု အစီအစဉ်ကို ပြန်လည်သုံးသပ်ပြီး ပိုမိုကောင်းမွန်သော စီမံချက်များရေးဆွဲအကောင်အထည်ဖော် ရန် စာင့်ကြည့်ရေး အစီအစဉ်တရပ်ထူထောင်ရန် • ရေရှည်တည်တံ့မှု ဖွံ့ဖြိုးမှုတို့ကို ဦးတည်သောရည်ရွယ်ချက်ဖြင့် ပြည်သူတို့၏ အမှိုက်သိမ်းဆည်း ၊စွန့်ပစ်နေမှုများနှင့်ပတ်သတ်၍ အသိပညာမြင့်မားရေး လုံ့ဆော်မှုများ ပြုလုပ်ရန် • အော်ဂဲနစ်အမှိုက်များ နှင့် အန္တရာယ်ရှိသော အမှိုက်များကို မူလအမှိုက်စွန့်ပစ်စင်ကပင် ခွဲခြားနိုင်ရေးအတွက် အသိပညာပေးလုံ့ဆော်မှုများ ပြုလုပ်နိုင်	စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု ဆိုင်ရာ အဆောက်အဦများ တိုးတက်စေခြင်း ပတ်ဝန်းကျင်ဆိုင်ရာ အာရုံစိုက်မှုအား တိုးတက်စေခြင်း စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အလေ့အကျင့်အား

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
		• ပတ်ဝန်းကျင် အစီအစဉ်များမှတဆင့် လူထု၏ အပြုအမူများကို ပြောင်းလဲသွားနိုင်ရန် ကြိုးပမ်းခြင်း • ထိရောက်သော စီမံခန့်ခွဲမှု နှင့် စောင့်ကြည့်စစ်ဆေးမှုရှိစေရန်ထားရှိနိုင်ခြင်းမှ တဆင့် ဒေသပြည်သူတို့အတွက် ရောဂါဘယများလျော့နည်းအောင် အထောက်အကူအဖြစ် စေနိုင်ခြင်း • အော်ဂဲနစ်စွန့်ပစ်ပစ္စည်းများကို မိမိတို့ခြံများအတွင်း မြေဆွေးတွင်းများ ပြုလုပ်ကာ စွန့်ပစ်ခြင်းကို တွန်းအားပေးရန်	တိုးတက်စေခြင်း မြေဆွေးပြုလုပ်သော လုပ်ငန်း (Composition plants)များမှ သဘာဝ (အော်ဂဲနစ်) မြေဩဇာ ကောင်းသော ကြွင်းကျန်ပစ္စည်းကို အသုံးချခြင်းအား တိုးတက်စေခြင်း ကျန်းမာရေးထိခိုက်မှု လျော့ချခြင်း စွန့်ပစ်ပစ္စည်းဆိုင်ရာ ကိစ္စရပ်များကို ကိုင်တွယ်ရာတွင် လူထုပူးပေါင်းပါဝင်မှုအား ပိုမို အားကောင်းလာစေခြင်း
၄(ခ)	ဂေဟစနစ်ပတ်ဝန်းကျင်	• မြို့နယ် အတွက် မြေဆွေးစက်ရုံများ စွန့်ပစ်အမှိုက်မှ စွမ်းအင်ထုတ်မည့် စက်ရုံများ နှင့်အခြား ရွေးချယ်နိုင်စရာများအတွက် ဖြစ်နိုင်ခြေလေ့လာမှုကို ပြုလုပ်သင့်ခြင်း	ရေထုနှင့်လေထုအရည်အသွေးထိန်းသိမ်းခြင်း၊ မြေဆွေးများမှတဆင့် သဘာဝဓါတ်မြေဩဇာအသုံးပြုမှု မြင့်တက်လာနိုင်ခြင်း အခြေခံအဆောက်အဦးများရှိမှုကို ပိုမိုများပြားလာစေခြင်း
၄(ဃ)	လေထုအရည်အသွေး	• အမှိုက်ကိုတိုက်ရိုက် မီးရှို့သည့်စနစ်ကို အတတ်နိုင်ဆုံးလျော့ချခြင်း နှင့် နောက်ဆုံးအပြီးအပိုင်ရပ်စဲခြင်း	လေထုညစ်ညမ်းမှုကို လျော့ချနိုင်ခြင်း

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
၄(ဇ)	ရေထုအရည်အသွေးနှင့်မြစ်ဂေဟစနစ်	• သံလွင်မြစ်အတွင်းသို့ မည်သည့်အမှိုက်အမျိုးအစားမဆို စွန့်ပစ်ခြင်းကို ထိရောက်စွာ တားဆီးသင့်ပါသည် • မြစ်အတွင်းသို့ အမှိုက်များစွန့်ပစ်ခြင်းကို ကာကွယ်ရန် သံလွင်မြစ်တလျောက်တွင် အမှိုက်ပုံးများ လုံလောက်စွာ ထားရှိသင့်ပါသည်	မြစ်ရေ အရည်အသွေး ပိုမိုကောင်းမွန်လာပြီး၊ မြစ်အတွင်းရှိ ရေနေသတ္တဝါများ အပေါ် သက်ရောက်မှု လျော့ကျ လာမည် ဒေသခံ လူထု၏ အစားအစာ ရရှိနိုင်မှု တိုးမြင့်လာခြင်း
၄ (စ)	လူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး	• မြေမြုပ်အမှိုက်စွန့်ပစ်သည့်နေရာများကို လူနေအိမ်ခြေများမှ အနည်းဆုံး အကွာအဝေးသတ်မှတ်ဆောင်ရွက်ခြင်း • အမိုက်များနောက်ဆုံးစွန့်ပစ်ရာနှင် မီးရှို့ရာနေရာများကို စည်းရိုးများခတ်ထားခြ • လူထုပညာပေးလုပ်ရှားမှုများမှတဆင့် အများပြည်သူပိုင်နေရာများတွင် အမိုက်ပစ်မှုများနည်းပါးသွားအောင်လုပ်ခြင်း	လူများနေထိုင်ရာ နေရာ နှင့် စွန့်ပစ်ပစ္စည်း စွန့်ပစ်ရာနေရာများ ထိတွေ့မှုကို လျော့ချပြီး လူထု၏ ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှုကို သေချာစေခြင်း
၅. နှစ်ရှည်စိုက်ခင်းများနှင့် လယ်ယာမြေများချထွင်ခြင်း၊ တောပြုန်းခြင်း			
၅(က)	အထွေထွေ	• လက်ရှိ စိုက်ခင်းများပမာဏ၊မြေရရှိနိုင်မှုအနေအထား၊ ဂေဟစနစ်အခြေအနေ၊ ဒေသခံတို့၏ဂေဟစနစ်အပေါ် မှီခိုမှု၊မြေယာဆိုင်ရာကိစ္စ စသည့် အချက်များကို စဉ်းစား ထောက်ရှုပြီးမှာသာ စီးပွားဖြစ်စိုက်ခင်းများတိုးချဲ့မှု ခွင့်ပြုသင့်မသင့် စဉ်းစားသင့်ပါသည်	သဘာဝပေါက်ပင် ဆုံးရှုံးမှုအား ကာကွယ်ခြင်း၊ ဒေသခံ လူထု၏ စားနပ်ရိက္ခာဖူလုံမှုရှိစေခြင်း ရာသီဥတုအစွန်းရောက်မှုများကို ဘေးဒဏ်ခံနိုင်ရည်စွမ်း တိုးတက်စေခြင်း
၅(ခ)	ဂေဟစနစ်ပတ်	• သစ်ပင်ခုတ်လှဲခြင်းအတွက် ပြန်လည်အစားထိုးရန် စည်းကမ်းသတ်မှတ်ချက်များကို ရေးဆွဲခြင်း	အဖွဲ့အစည်းဆိုင်ရာ ပူးပေါင်း

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
	ဂန်းကျင်	နှင့် အကောင်အထည်ဖော်ခြင်းပြုလုပ်သင့်ပါသည် • ခုတ်လဲသစ်ပင်များနေရာတွင် အလားတူ သစ်ပင်များကို ပြန်လည်စိုက်ပျိုးပေးမည့် အချက်ပေါ်တွင် မူတည်ကာ စည်းမျဉ်းစည်းကမ်းများကို ချမှတ်ထားသင့် ပါသည် • ကုန်းမြင့်ပိုင်း ဒေသများရှိ စိုက်ပျိုးမြေဇကာများကို မှတ်သားထားပြီး အသုံးချနိုင်သော မြေနေရာများ ဆုံးရှုံးမှုလျော့နည်းစေရန်အတွက် ပညာပေး အစီအစဉ်များ ပြုလုပ်ပေးသင့်ပါသည်	ဆောင်ရွက်မှုကို အားကောင်းစေခြင်း၊ဂေဟစနစ်များကိုထိန်းသိမ်းခြင်း၊ မြို့နယ်၏ အချက်အလက် ကောက်ယူမှု လုပ်ငန်းစဉ်များကောင်းမွန်လာခြင်း
၅(ဂ)	လေထုအရည်အသွေး	• ခုတ်လဲပြီးသော သစ်ပင်များ၏ အကြွင်းအကျန်များနှင့် မကြီးထွားသေးသော အပင်များကို မီးရှို့ခြင်းကို တားဆီးသင့်သည်	လေထုညစ်ညမ်းစေသော အရာများ ထုတ်လွှတ်မှုကို လျော့ချနိုင်ခြင်း ဥပဒေကိုလိုက်နာခြင်း
၅(ဃ)	ရေထုအရည်အသွေး	• ပညာရှင်များအနေဖြင့် ဓာတုမြေဩဇာများ အစား သဘာဝမြေဩဇာများ အစားထိုးအသုံးပြုရန်အတွက် နည်းပညာ အထောက်အပံ့များကို ဆောင်ရွက်ပေးခြင်းများ ပြုလုပ်သင့်ပါသည်	ဓာတုပစ္စည်းများကြောင့် မြေပေါ် ရေညစ်ညမ်းမှုကို လျော့ချနိုင်ခြင်း
၅(ငြ)	သက်မွေးဂမ်းကြောင်း	• သမာရိုးကျလယ်ယာစိုက်ပျိုးမှုစနစ်မှ စက်မှုနည်းပညာကိုအသုံးပြုပြီး မြေအနည်းငယ်ဖြင့် အထွက်တိုးပိုလာစေနိုင်သော နည်းစနစ်များကို ပညာရှင်များ အကူအညီဖြင့် ဆောင်ရွက်သင့်သည် • ပိုမိုထိရောက်သော ရေရှည်ဖွံ့ဖြိုးတိုးတက်မှုကို ဦးတည်သော ၊ရာသီဥတုဖောက်ပြန်မှုများကို ခံနိုင်သော၊ ဓါတုဆေးဂါး အနည်းငယ်သာ အသုံးပြုသော စိုက်ပျိုးရေးစနစ်များကို တွန်းအားပေးသင့်ပါသည်	အစားအစာအတွက် မပူပန်ရခြင်း၊ရေရှည်တည်တံ့ဖွံ့ဖြိုးတိုးတက်သော လူနေမှုဘဝ ရရှိခြင်း၊စိုက်ပျိုးရေးစနစ်များ တိုးတက်လာခြင်း၊မြေယာသိမ်းဆည်းမှုပြဿနာများ နည်းပါးခြင်း
၆. လက်ရှိနှင့် အနာဂတ်ဘိလပ်မြေစက်ရုံများ			

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်း နှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
၆(က)	အထွေထွေ	• ဒေသသည် သဘာဝပတ်ဝန်းကျင် နှင့်လူမှုဆိုင်ရာ အခြေအနေများတွင် ထိခိုက်မှုများ ရှိနေပြီးဖြစ်သောကြောင့် အနာဂတ်တွင် ဘိလပ်မြေစက်ရုံများ ပြုလုပ်ခွင့်ပြုခြင်းအတွက် ဆုံးဖြတ်ရာတွင် အလေးအနက်ထား စဉ်းစားမှုများ ပြုလုပ်ခြင်း • ဖြစ်နိုင်ခြေများအပေါ် အခြေပြုကာ ဒေသအတွင်း ဘိလပ်မြေစက်ရုံများထပ်မံချထားနိုင်မှုနှင့် ပတ်သတ်၍ စီမံချက်များရေးဆွဲကာ Cumultive Impact Assessment (သို့မဟုတ်) SEA ဆောင်ရွက်ခြင်း • သတ္တုတူးဖော်မှုများ ပိတ်သိမ်းခြင်း နှင့် တူးဖော်ရာနေရာများကို အခြေအနေပြန်လည်ကောင်းအောင်ပြုလုပ်ခြင်း • စက်ရုံတစ်ရုံခြင်းစီအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း နှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်များ ချမှတ်ခြင်း • စက်ရုံ ပတ်ပတ်လည်တွင် သစ်ပင်များ ဝန်းရံ စိုက်ပျိုးခြင်းဖြစ်သည့် အစိမ်းရောင် ခါးပတ် နည်းလမ်း (Green Belt Approach) ကို အသုံးပြုခြင်း • စွန့်ပစ်ထားသော သတ္တုတူးဖော်ရာ နေရာဟောင်းများကို အခြေအနေပြန်လည်ကောင်းမွန်အောင် သစ်ပင်များ ပြန်လည်စိုက်ပျိုးခြင်း	ထပ်မံဖြစ်ပေါ်နိုင်သည့် စုပေါင်းအကျိုးသက်ရောက်မှုများကို ရှောင်ရှားနိုင်ခြင်း စီမံကိန်းလုပ်ဆောင်မှုများတွင် ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများကို ထည့်သွင်းစဉ်းစား နိုင်ခြင်း ဂေဟစနစ် ပြန်လည်တိုးတက် ကောင်းမွန်စေခြင်း
၆(ခ)	မြေယာရှုခင်းသဘာဝအလှအပ	• မြေပေါ်ဟင်းလင်းပြင်သတ္ထုတွင်းများ လုပ်ဆောင်မည့်အစားနောင်တည်ဆောက်မည့် ဘိလပ်မြေစက်ရုံနှင့် ကျောက်မိုင်းပုံစံသစ်များအတွက် တစ်ဖက်ပွင့်သတ္ထုတွင်းပုံစံများကို အကြံပြုပါသည်	အနုပညာမြောက် အလှတရားများကိုထိန်းသိမ်းကာကွယ်ခြင်း မျက်စိပသာဒဖြစ်စေသော ရှုခင်းများထိခိုက်စေမှုကိုရှောင်ရှားခြင်း

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
၆(ဂ)	လေထုအရည်အသွေး	• လေထုညစ်ညမ်းမှုထိန်းသိမ်းရေးအတွက် လုံလောက်တဲ့ သဲမှုန့်ဖုန်မှုန့် သိမ်းစက်များ၊ စစ်ထုတ်နည်းလမ်းများ ဥပမာ- bag house, electrostatic precipitators နှင့် တခြား ဖုန်မှုန့်စစ်ထုတ်ခြင်း စသည့်လုပ်ငန်းများဆောင်ရွက်နိုင်ရန် • ဘားအံမြို့အတွင်းသွားလာနေသော မော်တော်ယာဉ်များနှင့် သံလွင်မြစ် အနောက်ဖက်ကမ်းမှ ဘိလပ်မြေစက်ရုံများကြောင့် လေထုညစ်ညမ်းမှု ပမာဏ တိုင်းထွာစောင့်ကြည့်နိုင်ရင် အခြေခံမူဘောင် မရှိပါ။ ထို့ကြောင့် ဒေသလေထုအခြေအနေနှင့် အလားအလာကို သိရှိနိုင်ရန်အတွက် လေထုတိုင်းတာ စောင့်ကြပ်ရေး အခြေခံမူဘောင် ချမှတ်ထား သင့်ပါသည်။ ထိုသို့ချမှတ်ရာတွင်လည်း အောက်ဖော်ပြပါအချက်များကို ထည့်သွင်း စဉ်းစားသင့်ပါသည်၊ စက်ရုံလည်ပတ်သူဖြစ်သော အဖွဲ့အစည်းမှ လေထုညစ်ညမ်းမှု မဖြစ်ပေါ် စေရေးအတွက် စက်ရုံဆိုင်ရာ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုနှင့် ကြီးကြပ်မှု စီမံချက်ရေး ဆွဲသင့်ပါသည်။ ထိုသို့ရေးဆွဲရာတွင်လည်း အောက်ပါအချက်များကို ထည့်သွင်းစဉ်းစားသင့်ပါသည် ➢ တိုင်းတာသင့်သည့် parameter များကို ဖော်ထုတ်ခြင်း ➢ တိုင်းတာစခန်းများ နေရာ နှင့်အကြိမ်အရေအတွက်သတ်မှတ်ခြင်း ➢ ဝန်ကြီးဌာနမှ ထုတ်ပြန်ထားသော EIA Procedure နှင့်အညီ EMP(Environmental Management Plan) ရေးဆွဲခြင်း ➢ မှတ်တမ်းတင်ထားသော လေထုဆိုင်ရာ အရည်အသွေး အခြေအနေများ စိတ်ဝင်စားသူများအတွက် ထုတ်ပြန်ပေးခြင်း ➢ စိတ်ဝင်စားသော တတိယအဖွဲ့အစည်းများမှ လေထုညစ်ညမ်းမှုနှင့်ပတ်ဝန်းကျင်ဆိုင်ရာ အကြောင်းအရာများကို ပြုလုပ်ရန်အားပေးခြင်း	လေထုညစ်ညမ်းမှုများကို ထိန်းချုပ်ခြင်း
၆(ဃ)	ရေထုအရည်အသွေး	• ကျင်းဟောင်းများအတွက် သင့်တော်သော ပိတ်သိမ်းသည့် အစီအစဉ်နှင့် ပြန်လည်ထူထောင်သည့် အစီအစဉ်များ တွန်းအားပေး အကောင်အထည်ဖော်ခြင်း	ရေအရင်းအမြစ် အရည်အသွေးတိုးတက်လာပြီး၊စီမံ

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်း နှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
	နှင့်မြစ်ဂေဟစနစ်	• စွန်ပစ်ရေ ထိန်းချုပ်မှုစနစ်နှင့် လက်ရှိ ပျက်စီးနေသော မြေနေရာများကို ပြန်လည်ကောင်းမွန်စေသော လုပ်ငန်းအစီအစဉ်များဆောင်ရွက်ခြင်း • ကျင်းဟောင်းနေရာများကို ပြန်လည်ကောင်းမွန်စေသော အစီအစဉ်	ခန့်ခွဲမှုစနစ် တိုးတက်လာခြင်း
၆(ဇ)	လူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး	• စက်ရုံများ၏ လုပ်ငန်းခွင်ဆိုင်ရာ ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေး နည်းတူ ဒေသခံပြည်သူတို့၏ ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးအတွက် ဆောင်ရွက်သင့်ပါသည် • လေထုညစ်ညမ်းမှုသက်ရောက်နိုင်သည့် နေရာများမှ ဒေသခံတို့၏ ကျန်းမာရေးအခြေအနေကို သိရှိနားလည်အောင် ကျန်းမာရေး လေ့လာမှုများ ပြုလုပ်သင့်ပါသည်	ဒေသခံတို့၏ ကျန်းမာရေး အခြေအနေ တိုးတက်လာခြင်း
၆(စ)	ဒေသခံပြည်သူများတိုးတက်ဖွံ့ဖြိုးမှု	• လက်ရှိနှင့်နောင်အနာဂတ်စီမံကိန်းများသည် ဒေသခံပြည်သူတို့အကျိုးစီးပွားကို ဖော်ဆောင်သော လူမှုတာဂန်သိအစီအစဉ်များ ချမှတ်လုပ်ဆောင်သင့်ပါသည်	ဒေသခံပြည်သူတို့၏ အကျိုးစီးပွား
ရ. မြစ်အတွင်း သဲတူးဖော်ရေးလုပ်ငန်းများ			
ရ(က)	မြစ်ကြောင်းဂေဟစနစ်	• အမြဲစီးဆင်းနေသော မြစ်ကြောင်း နှင့် သဲ သောင်များထက် စွန့်ပစ်ထားသော (သို့) ရေစီးဆင်းမှုနည်းသော မြစ်ကြောင်း နှင့် ရေလွှမ်းလွင်ပြင်များ ကို သဲတူးဖော်ရန်အတွက် ဦးစားပေးစဉ်းစားသင့်ခြင်း • မြစ်ချောင်းငယ်များမှ တူးဖော်ခြင်းကို ရှောင်ရှားသင့်ခြင်း • မြစ်ဂေဟစနစ်၏ ထိခိုက်လွယ်မှုကို သတ်မှတ်ခြင်းအားဖြင့် မြစ်ဆိုင်ရာ ဂေဟဗေဒပညာရှင် နှင့် ဇလဗေဒပညာရှင် များကို အထောက်အကူပြုခြင်း • သံလွင်မြစ် နှင့် အခြား မြစ်ချောင်းများ၏ ဂေဟစနစ်၏ ရေရှည်တည်တံ့မှုကို စဉ်းစားပြီး သတ်မှတ်ထားသော နေရာများအတွင်း ခွင့်ပြုနိုင်သော သဲ နှင့် ကျောက်စရစ် ပမာဏကို	သံလွင်မြစ် ဂေဟစနစ် နှင့် မြစ်၏ ရုပ်သွင်ကို ထိန်းသိမ်းကာကွယ်ခြင်း သက်ဆိုင်ရာဌာနများ၏ သုတေသနလုပ်ထုံးလုပ်နည်း နှင့် အချက်အလက်စုဆောင်းမှု အလေ့အကျင့်များကို

စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
		တွက်ချက်ခြင်း • နှစ်စဉ် ပြန်လည်ဖြည့်တင်းမှုကို အခြေခံသော တူးဖော်ခြင်းများကိုသာ ခွင့်ပြုပေးခြင်း။ • ဇရိယာများ တိုးချဲ့ခြင်း နှင့် လုပ်ငန်းလုပ်ကိုင်မှု အကြိမ်အရည်အတွက်အနည်းအများကို သေချာစဉ်းစားခြင်း • မြစ်၏ ရုပ်သွင်အပေါ်တွင် ထိခိုက်မှု အနည်းဆုံးဖြစ်သော သဲနှင့် ကျောက်စရစ် တူးဖော်ခြင်းနည်းလမ်းများကို အကြံပြုခြင်း • စဉ်ဆက်မပြတ် စောင့်ကြပ်လေ့လာခြင်း စနစ်တည်ဆောက်မှုနှင့် သင့်လျော်သော အဖွဲ့အစည်းများမှ အာဏာပိုင်များအနေဖြင့် စောင့်ကြည့်လေ့လာခြင်းကို ဆောင်ရွက်ခြင်း • အရင်းအမြစ်များ၏ တန်ဖိုး၊ လူမှုရေး၊ ယဉ်ကျေးမှုနှင့် ဘာသာရေးဆိုင်ရာ အချက်အလက်များကို ထည့်သွင်းစဉ်းစားရန် • ဆိုးဝါးသောပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုနှင့် မြစ်၏ ဂေဟစနစ်နှင့် ရုပ်သွင် ကို ထိခိုက်ပျက်စီးစေနိုင်ခြင်း တို့ကို ရှောင်ရှားနိုင်ရန် ကရင်နှင့် မွန်ပြည်နယ်တို့တွင် သဲတူးဖော်ခြင်းလုပ်ငန်းအတွက် လမ်းညွှန်ချက်များကို လက်တွေ့အကောင်အထည်ဖော် ဆောင်ရွက်ထားရန် • သံလွင်မြစ်အတွင်းသို့ ဆားငန်ရေဝင်ရောက်မှုကို နိုင်ငံတကာအဖွဲ့အစည်းနှင့် ပူးပေါင်းပြီး လေ့လာဆန်းစစ်ခြင်း	တိုးတက်စေခြင်း အဖွဲ့အစည်းဆိုင်ရာ ပူးပေါင်းဆောင်ရွက်မှုကို တိုးတက်စေခြင်း။ အချက်အလက်ဆိုင်ရာ စီမံခန့်ခွဲမှု နှင့် စာရင်းသတ်မှတ်ထားရှိမှုကို တိုးတက်စေခြင်း
၈.ရာသီဥတုပြောင်းလဲမှုနှင့် ဂေဟစနစ်စီမံခန့်ခွဲမှု			
၈(က)	အထွေထွေ	• ဂေဟစနစ်မှ ပေးသော ဝန်ဆောင်မှုများ ၏ အရေးပါပုံဂုဏ်တို့ နှင့် ဒေသခံပြည်သူတို့၏ ဘေးဒဏ်ခံနိုင်စွမ်း ၊ရာသီဥတုပြောင်းလဲမှုများ ဆက်စပ်ပုံ များအကြောင်းကို အသိပညာပေးလှုပ်ရှားမှုများ ပြုလုပ်ကာ ဒေသခံပြည်သူများနားလည် သဘောပေါက်အောင် ဆောင်ရွက်သင့်ပါသည်	ဂေဟစနစ် ဝန်ဆောင်မှုများ ကောင်းလာခြင်း ဒေသခံပြည်သူတို့၏

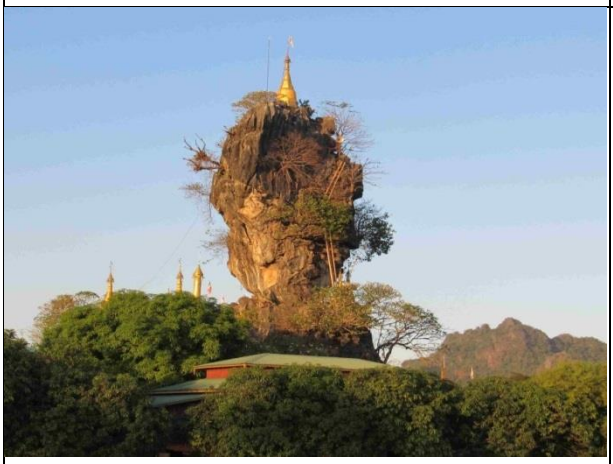
စဉ်	လုပ်ငန်း (သို့) စီမံကိန်းပုံစံ	အကြံပြုချက်	ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဆောင်ရွက်ခြင်းနှင့် ခံနိုင်ရည် မြှင့်တင်ခြင်း
		• လက်ရှိစီမံကိန်းများ၊ စီမံချက်များ ၊ဂန်ဆောင်မှုလုပ်ငန်း များကြောင့် အနာဂါတ်တွင်ဖြစ်ပေါ် လာနိုင်သော သက်ရောက်မှုများ နှင့် ဒေသခံပြည်သူတို့အပေါ် တွင် သက်ရောက်နေသော ရာသီဥတု ဘေးဒဏ်နှင့် ဖိစီးမှုများကို ခွဲခြားဖော်ထုတ်နိုင်ရန် BRACED စီမံကိန်းမှ ပြုစုသော Community Resilience Assessment (ရပ်ရွာလူထု ဘေးဒဏ်ခံနိုင်စွမ်း စစ်တမ်း)များကို ဖတ်ရှုကာ သုံးသပ်သင့်ပါသည် • ဒေသခံလူထုနှင့်အစိုးရ တို့ပေါင်းစပ်ပြီး ပတ်ဂန်းကျင်နှင့်ဂေဟစနစ် ဂန်ဆောင်မှုများ တိုးတက်လာရေး၊ ကာကွယ်ထိန်းသိမ်းရေးများကို အတူတကွ လုပ်ဆောင်သင့်ပါသည် အသေးစား ရံပုံငွေများ ထောက်ပံ့ပေးခြင်းအားဖြင့် သဘာဂဇီဂမျိုးစုံမျိုးကွဲ၏ ဂေဟစနစ်ဂန်ဆောင်မှ တိုးတက်လာခြင်းနှင့်အတူ အင်အားအနည်းပါးဆုံး အစုအဖွဲ့ဂင်ဒေသခံပြည်သူများ၏ ဘေးဒဏ်ခံနိုင်စွမ်းအားများ တိုးတက်လာနိုင်မည်ဖြစ်ပါသည်	ဒဏ်ခံနိုင်စွမ်းအားများ မြင့်တက်လာခြင်း

Reference & Appendix

1. Cement Factories, Air pollution and Consequence, Sayed, Sana Mehraj & Dr. GH Bhat , Dept of Environmental Science and Center of Research, University of Kashmir, Jammu and Kashmir, India 19006
2. Census Report Volume 3-C, Kayin State, The 2014 Myanmar Population and Housing Census, The Republic of the Union of Myanmar
3. Climate Profile (Climate Variabilities, Extremes and Trends in Central Dry, Coastal and Hilly Zones) Myanmar , RIMES, UN Habitat, BRACED Project
4. Commercial Agriculture Expansion In Myanmar, Kevin Wood, Forest Trend Report Series, March 2015.
5. Community Risk Assessments , Hpa-an Township, Action Aid,
6. Effect of Slash and Burn and Deforestation in Climate Change, Jhon, S.I .Ingram, University of Oxford
7. EIA Guideline for Oil Palm Development, State of Environmental Conservation Department, Sabah, Malaysia
8. ESIA Guideline April 2015, Cement Sustainability Initiative (CSI) , World Business Council For Sustainable Development
9. Forest Cover Change(2002-2014) Alarm,EcoDev, EU, MERN,IUCN, Smithsonian, gmap, American Museum of Natural History
10. Guideline for Design and Operation of Municipal Solid Waste Landfill in Tropical Climate
11. Guidance Notes on Land Acquisition in Myanmar, UNHABIT-UNHCR ,2010
12. Guidance on Integrating Climate Change and Biodiversity to Environmental Impact Assessment, European Commission
13. Habitat Map of Hpa-an Township, MIMU
14. Health effect of burning municipal solid waste, Saskatchewan Ministry of Environment, www.environment.sk.ca
15. Hpa-an Township Information General Administration Department,
16. Polulation Demography, Immigration and Man Power Dept, Hpa -An
17. Myanmar Protected Area (Context, Current Status and Challenges) , Istituto, Oikos and BANCA
18. Municipal Solid Waste Selection, Genermo Beris and Yohanis Birhanu, International Science and Research Publication , V5, Issue 4 April 2015
19. Myanmar Polulation and Housing Census, 2014, Union Report
20. Need assessment for effective implementation of the environmental conservation law in Myanmar (MOECAF, SYKE, Ministry of Foreign Affair of Finland, UNDP)
21. Renewable Energy Expert , Environmental Issue, Saman Zafar, , 15 April, 2014.
22. Open burning, UK Cooperative Extension Service University of Kentucky , College of Agriculture
23. Open Burning Of Residential Trash, Environmental Fact Sheet, Newhampshire Department Of Environmental Service (www.des.nh.gov)

24. Pilot Strategic Envrionmental Assessment for Development Plans in the Kangan Area, Islamic Republic of Iran, UNDP, 25 June 2007.
25. Potential Environmental Impact Of Quarrying Stone In Karst , A Literature Review, US Geological Survey,
26. River Sand Mining , a Detail Presentation, Shodhganga.inflibnet.ac.in
27. River Sand Mining Management Guideline, Dept Of Irrigation And Drainage Malaysia, Ministry Of Natural Resource And Environment
28. Rubber Plantation, Special Report on Environment, UN Mission in Liberia
29. Sand Mining Fact, The Ojos Negros Research Group
30. Site Selec Preliminary Guidance Document For Authorization And Licensing Of Sand Mining/ Gravel Extraction, In Terms Of Impact On Riparian Habitats . L.Hill And CJ. Kleynhans, IWQS, March 1999tion Of Municipal Solid Waste Using Analytical Hierarchy Process Method ,H Javaheri, T. Nasrabadi. MH, Jafarian, G.R. Rowshan, H.Khoshnam
31. Solid Waste Disposal, - A Burning Problem To Be Resolved To Save Environment (https://saferenvironment.wordpress.com)
32. Study on Limestone Potential at Hpa-an, Mudon and Kyaukse Area, Resource and Environment Myanmar Ltd , May 2016.
33. Sustainable Solution for Municipal Solid Waste Management in Thailand, Thaniya, Kaosol , International Journal V 3 No 12, 2009, World Academy of Science
34. The Millennium Project 2010.
35. The Resource Appraisal of Hpa-an Township, Hpa-an University, Department of Higher Education, Daw Htay, U Win Myint, Daw Myint Myint Tin 2011 August
36. The Effect of Slash Burning On Ecosystem Nutrient During Land Preparation Phase Of The Shifting Cultivation, Christian P. Giardia, Robert. L. Sanford and Others
37. https://myanmarbiodiversity.org/portfolio-items/myanmar-key-biodiversity-areas/

Appendix A. Cultural and Religious Site

Lubami Bridge	Bird Cave
	
Kyaikklap Pagoda	Religious Building at Bayin Nyi Cave
	
Saddan Cave	Buddha Images in Sadan Cave
	

Appendix B. List of Plant Species found in Hpa-an Region (2015)

Sr.	Common Name	Family Name	Scientific Name	Habitat
1	*Malaysia padauk*	*Mimosaceae*	*Acacia auriculiformis A. Cunn*	*Tree*
2	*Walking fern*	*Adiantaceae*	*AdiantumreniformeL.*	*Fern*
3	*Okshit*	*Rutaceae*	*Aeglemarmelos (L.) Correa*	*Tree*
4	*Anya-koko*	*Mimosaceae*	*Albizialebbek (L.) Benth.*	*Tree*
5	*Notknown*	*Poaceae*	*AlopecurusaequalisSobol.*	*Grass*
6	*Padegaw-gale*	*Zingiberaceae*	*Alpinia afficinarum Hance*	*Shrub*
7	*Notknown*	*Amaranthaceae*	*Alternantherabrasiliana (L.)Kuntze*	*Herb*
8	*Pazun-sar*	*Amaranthaceae*	*Alternantherasessils (L.) R. Br.*	*Tree*
9	*Yone*	*Mimosaceae*	*Anogeissus acuminate Wall.*	*Shrub*
10	*Ma-u*	*Rubiaceae*	*Anthocephalusmorindaefolius Korth.*	*Tree*
11	*Kyetma-ok*	*Myrsinaceae*	*ArdisiacolorataRoxb.*	*Bamboo*
12	*Kunthi-pin*	*Arecaceae*	*Areca catechu L.*	*Tree*
13	*Kyakat-wa*	*Poaceae*	*Bambusabambos (L.) Voss*	*Tree*
14	*Kyi-ni*	*Lecythidaceae*	*Barringtoniaacutangula (L.) Gaertn.*	*Aquatic*
15	*Kyi*	*Lecythidaceae*	*BarringtoniaangustaKurz.*	*Tree*
16	*Notknown*	*Hydrocharitaceae*	*Blyxa aubertii Rich.*	*Tree*
17	*Htan*	*Arecaceae*	*Borassusflabellifer L.*	*Tree*
18	*Mayan*	*Anacardiaceae*	*BoueaburmanicaGriff.*	*Climber*
19	*Pauk*	*Fabaceae*	*Buteamonospetma (Lam.) Kuntze*	*Herb*
20	*Sugauk-net*	*Caesalpiniaceae*	*Caesalpma crista L.*	*Herb*

Sr.	Common Name	Family Name	Scientific Name	Habitat
21	*Notknown*	*Marantaceae*	*Calatheaburle-marxu*	*Tree*
22	*Dangywe*	*Caesalpiniaceae*	*Cassia tora L.*	*Climber*
23	*Phalan-Taunghmwe*	*Costaceae*	*Costus speciosus Sm.*	*Tree*
24	*Marlarni; Taw-sa-nwin*	*Zingiberaceae*	*Curcuma roscoeana Wall.*	*Tree*
25	*Seinban*	*Caesalpiniaceae*	*Delonix regia (Bojerex Hook) Raf.*	*Tree*
26	*Kanyin*	*Dipterocarpaceae*	*Dipterocarpus alatus Roxb.*	*Tree*
27	*Kanyin*	*Dipterocarpaceae*	*Dipterocarpus costatus Gaertn. F.*	*Herb*
28	*Kanyin*	*Dipterocarpaceae*	*Dipterocarpus grandiflorus Blanco*	*Herb*
29	*Kanyin*	*Dipterocarpaceae*	*Dipterocarpus tuberculatus*	*Herb*
30	*Waso-pan*	*Zingiberaceae*	*Globba schomburgkii Hook f.*	*Climber*
31	*Yemana*	*Rubiaceae*	*Gmelina arborea L.*	*Herb*
32	*Rubber tree*	*Euphorbiaceae*	*Hevea brasiliensis (Wild.X A.Juss)Muell.Arg.*	*Tree*
33	*Kun-kado*	*Zingiberaceae*	*Kaempferia elegans (Wall) Baker*	*Tree*
34	*Pyinma*	*Lythraceae*	*Lagerstroemia speciosa (L.) Pers.*	*Tree*
35	*Leza*	*Lythraceae*	*Lagerstroemia tomentosa Wall X. Kurz*	*Tree*
36	*Taunghtan*	*Arecaceae*	*Livistona rotunddifolia (Lam.) Mart.*	*Tree*
37	*Binga*	*Rubiaceae*	*Mitragyna rotundifolia Korth*	*Tree*
38	*Ingyin*	*Dipterocarpaceae*	*Pentacme siamensis*	*Tree*
39	*Kun*	*Piperaceae*	*Piper betel L.*	*Tree*

Sr.	Common Name	Family Name	Scientific Name	Habitat
40	*Padauk*	*Sterculiaceae*	*Pterocarpus macrocarpus*	*Tree*
41	*Thitto*	*Mehaceae*	*Sadoricum koetjape (Burm. f.) Merr.*	*Tree*
42	*Taw Gwe*	*Anacardiaceae*	*Spondias pinnata L.*	*Tree*
43	*Kyun*	*Verbenaceae*	*Tectona grandis L.f.*	*Tree*
44	*Taukkyant*	*Combretaceae*	*Terminalia tomentosa Roxb.*	*Tree*
45	*Pyinkadoe*	*Mimosaceae*	*Xylia xylocarpa L.*	*Tree*

Appendix C. Butter Fly Species recorded in Hpa-an (2015)

Sr	Common Name	Family	Scientific Name
1	*Common Sergeant*	*Nymphalidae*	*Athyma perms*
2	*Karwar Swift*	*Hesperiidae*	*Caltoris canaraica*
3	*Blank Swift*	*Hesperiidae*	*Caltoris kumara*
4	*Common Pierrot*	*Pieridae*	*Castalius rosimon*
5	*Common Pierrot*	*Pieridae*	*Castulius rosimon*
6	*African Migrant*	*Pieridae*	*Catopsilia florelle*
7	*Common Emigrant*	*Pieridae*	*Catopsilia Pomona*
8	*Mottled Emigrant*	*Pieridae*	*Catopsilia pyranthe*
9	*Common Mime*	*Papilionidae*	*Chilasa clytia*
10	*Plain Tiger*	*Danaidae*	*Danaus chrysippus*
11	*Common Palmfly*	*Pieridae*	*Elymnias hypermneatra*
12	*SpotedPalmfly*	*Satyridae*	*Elymnias malelas*
13	*Brown King Crow*	*Pieridae*	*Euploe aklugii*
14	*Common Crow*	*Danaidae*	*Euploea core*
15	*Common grass yellow*	*Pieridae*	*Eurema hecabe*
16	*Great Orange Tip*	*Pieridae*	*Hebomoia glaucippe*

Sr	Common Name	Family	Scientific Name
17	*Great Eggfly*	*Nymphalidae*	*Hypolimnas bolina*
18	*Gray Pansy*	*Nymphalidae*	*Junonia atlite*
19	*Lemon Pansy*	*Nymphalidae*	*Junonia lemonias*
20	*Common Rose*	*Papilionidae*	*Pachilioptaaris tolochiae*
21	*Lime Butterfly*	*Papilionidae*	*Papilio demoleus demoleus*
22	*Great Mormon*	*Papilionidae*	*Papilio memnonagenor*
23	*Common Mormon*	*Papilionidae*	*Papilio polytes*
24	*Long banded Silverline*	*Lycaenidae*	*Spindasis lohita*
25	*King pansy*	*Nymphalidae*	*Tanaecia flora*
26	*Common fly*	*Nymphalidae*	*Tanaecia godarti*
27	*Common Five Ring*	*Nymphalidae*	*Ypthima baldus*

Appendix D; Summary of Reptilian Species Recorded in Hpa-an Township

Sr.	Common Name	Family Name	Species	Type of Evidence
1	*Water snake*	*Colubridae*	*Natrix natrix*	*Observed*
2	*Chequeredkeelback water snake*	*Colubridae*	*Xenochrophispiscator*	*Observed*
3	*Water snake*	*Colubridae*	*Xenochrophis flavipunctatus*	*Interview*
4	*Indochinese rat snake*	*Colubridae*	*Ptyas korros*	*Observed*
5	*Oriental Garden Lizard*	*Agamidae*	*Caltoes versicolor*	*Observed*
6	*Green Crested Lizard*	*Agamidae*	*Bronchocela cristatella*	*Observed*
7	*Blue Crested Lizard*	*Agamidae*	*Calotes mystaceus*	*Observed*

Sr.	Common Name	Family Name	Species	Type of Evidence
8	East Indian Brown Mabuya	Scincidae	Mabuya multifasciata	Observed
9	Monocellate cobra	Elapidae	Naja kaouthia	Interview
10	Lizard	Gekkonidae	Gekko gecko	Observed

Appendix E: Amphibian Species

Sr.	Common Name	Family Name	Species	Type of Evidence
1	True Toad	Bufonidae	Dutlaphrynus melanostictus	Observed
2	Painted common bull frog	Microhylidae	Kaloula pulchra	Observed
3	Ornated sand frog	Microhylidae	Microhyla oranata	Observed
4	Common Tree Frog	Rhacophordiae	Polypedates leucomystax	Observed
5	Common Floating Frog	Rhacophordiae	Occidoayga lima	Observed
6	Paddy Frog	Dicroglossidae	Fejervaryal imnocharis	Observed
7	Long toed frog	Dicroglossidae	Fejervaryal macrodactyla	Observed
8	Grey tree frog	Rhacophoridae	Hyla chrysoscelis	Interview

Appendix F:Mammal Speices

Sr.	Common Name	Family Name	Scientific Name	Type of Evidence
1	Grey Squirrel	Rodentia	Callosciurus pygerythrus	Observed
2	Himalayan striped squirrel	Rodentia	Tamiops mclellandii	Observed
3	Ricefield rat	Chiroptera	Rattus argentiventer	Observed

Sr.	Common Name	Family Name	Scientific Name	Type of Evidence
4	*Mole rat*	*Chiroptera*	*Bandicota bengalensis varius*	*Observed*

Appendix G : Bird Species

Sr.	Common Name	Family Name	Scientific Name	IUCN Red List status
1	*Jungle Myna*	*Stumidae*	*Acridotheres fuscus*	LC
2	*Common Myna*	*Stumidae*	*Acridotheres tristis*	LC
3	*Common iora*	*Aegithindae*	*Aegithina aphia*	LC
4	*Common lora*	*Aegithinidae*	*Aegithina tiphia*	LC
5	*Greater Coucal*	*Centropodidate*	*Centropus sineniss*	LC
6	*ZittingCisticola*	*Cisticolidae*	*Cisticola juncidis*	LC
7	*Rock Pigeon*	*Columbidae*	*Columba livia*	LC
8	*Asian Palm Swift*	*Apodidae*	*Cypsiurus batasiensis*	LC
9	*Plain Flowerpecker*	*Nectariniidae*	*Dicaeum concolor*	LC
10	*Scarlet-Backed Flowerpecker*	*Nectariniidae*	*Dicaeum cruentatum*	LC
11	*Black drongo*	*Corvidae*	*Dicrorus macroocercus*	LC
12	*Little Egret*	*Ardeidae*	*Egretta garzetta*	LC
13	*White-throated kingfisher*	*Halcyonidae*	*Halcyon smyrnensis*	LC
14	*Brown shrike*	*Laniidae*	*Lanus cristatus*	LC
15	*Black-Headed Munia*	*Ploceidae*	*Lonchura malacca*	LC
16	*Green Bee-Eater*	*Meropidae*	*Merops orientalis*	LC

Sr.	Common Name	Family Name	Scientific Name	IUCN Red List status
17	*Black kite*	*Accipitidae*	*Milvus migrans*	LC
18	*Common tailor bird*	*Cistieolidae*	*Orthotomus sutorius*	LC
19	*House Sparrow*	*Passeridae*	*Passer domesticus*	LC
20	*Eurasian tree Sparrow*	*Passeridae*	*Passer montanus*	LC
21	*Great Cormorant*	*Phalacrocoracidae*	*Phalacrocorax carbo*	LC
22	*Bayan Weaver*	*Ploceidae*	*Ploceus philippinus*	LC
23	*Grey-breasted Prinia*	*Sylvidae*	*Prinia hodgsonii*	LC
24	*Mountain prinia*	*Sylvidae*	*Prinia monata*	LC
25	*Streak Eared Bulbul*	*Pycnonotidae*	*Pycnonotus blanfordi*	LC
26	*Red Vented Bulbul*	*Pycnonotidae*	*Pycnonotus cafer*	LC
27	*Red Vented Bulbul*	*Pycnonotidae*	*Pycnononus jocosus*	LC
28	*White-throated Fantail*	*Corvidae*	*Rhipidura albicollis*	LC
29	*Jerdon`sBushchat*	*Muscicapidae*	*Saxicola jerdom*	LC
30	*Pied Bushchat*	*Muscicapidae*	*Saxicola caprata*	LC

Appendix H: Aqua Fauna

Local Name	Family Name	Scientific Name
Nga hpe	*Notopteridae*	*Notopterus notopterus*
Nga pyaw myit	*Megalopidae*	*Megalops cyprinoides*
Nga lin pan	*Anguillidae*	*Anguilla bicolar*

Local Name	Family Name	Scientific Name
Nga pya	*Anguillidae*	*Gonialosa modestus*
Nga-pya	*Engraulididae*	*Setipinna wheeleri*
Nga gyin lone	*Cyprinidae*	*Cirrhinus mrigala*
Shwe war nga gyin	*Cyprinidae*	*Cyprinus carpio*
Nga net pya	*Cyprinidae*	*Labeo calbasu*
Nga lu	*Cyprinidae*	*Labeo stoliczkae*
Nga phan ma	*Cyprinidae*	*Osteobrama belangeri*
Nga phe oung	*Cyprinidae*	*Osteobrama feae*
Nga khone ma mee ni	*Cyprinidae*	*Puntinus sarana*
Nga daung zay	*Cyprinidae*	*Salmostoma sardinella*
Nga maw taw	*Cyprinidae*	*Esomus altus*
Nga daung zin	*Cyprinidae*	*Rasbora rasbora*
Ka pa lwey	*Balitoridae*	*Nemacheilus savona*
Nga kya ma	*Balitoridae*	*Botia berdmorei*
Nga gyoung	*Bagridae*	*Aorichthys seenghala*
Nga zin yine kwe	*Bagridae*	*Mystus bleekeri*
Nga zin yine phyu	*Bagridae*	*Mystus cavasius*
Nga yway	*Bagridae*	*Mystus gulio*
Nga zin yine kyet chee	*Bagridae*	*Mystus pulcher*
Nga pet let	*Bagridae*	*Mystus leucophasis*
Nga zin yine	*Bagridae*	*Mystus malabaricus*
Nga nu than	*Siluridae*	*Ompok bimaculatus*
Nga butt	*Siluridae*	*Wallago attu*
Ka ka loung	*Schilbeidae*	*Clupisoma prateri*
Nga myin kunsar	*Schilbeidae*	*Eutropiichthys vacha*
Nga than gyaik	*Schilbeidae*	*Pseudeutropius therinoides*
Nga sue goat	*Sisoridae*	*Gagata gagata*

Local Name	Family Name	Scientific Name
Nga khoo	*Clariidae*	*Clarias batrachus*
Nga gyee	*Heteropneustidae*	*Heteropneustes fossilis*
Nga phaung yoe	*Belonidae*	*Xenentodon cancila*