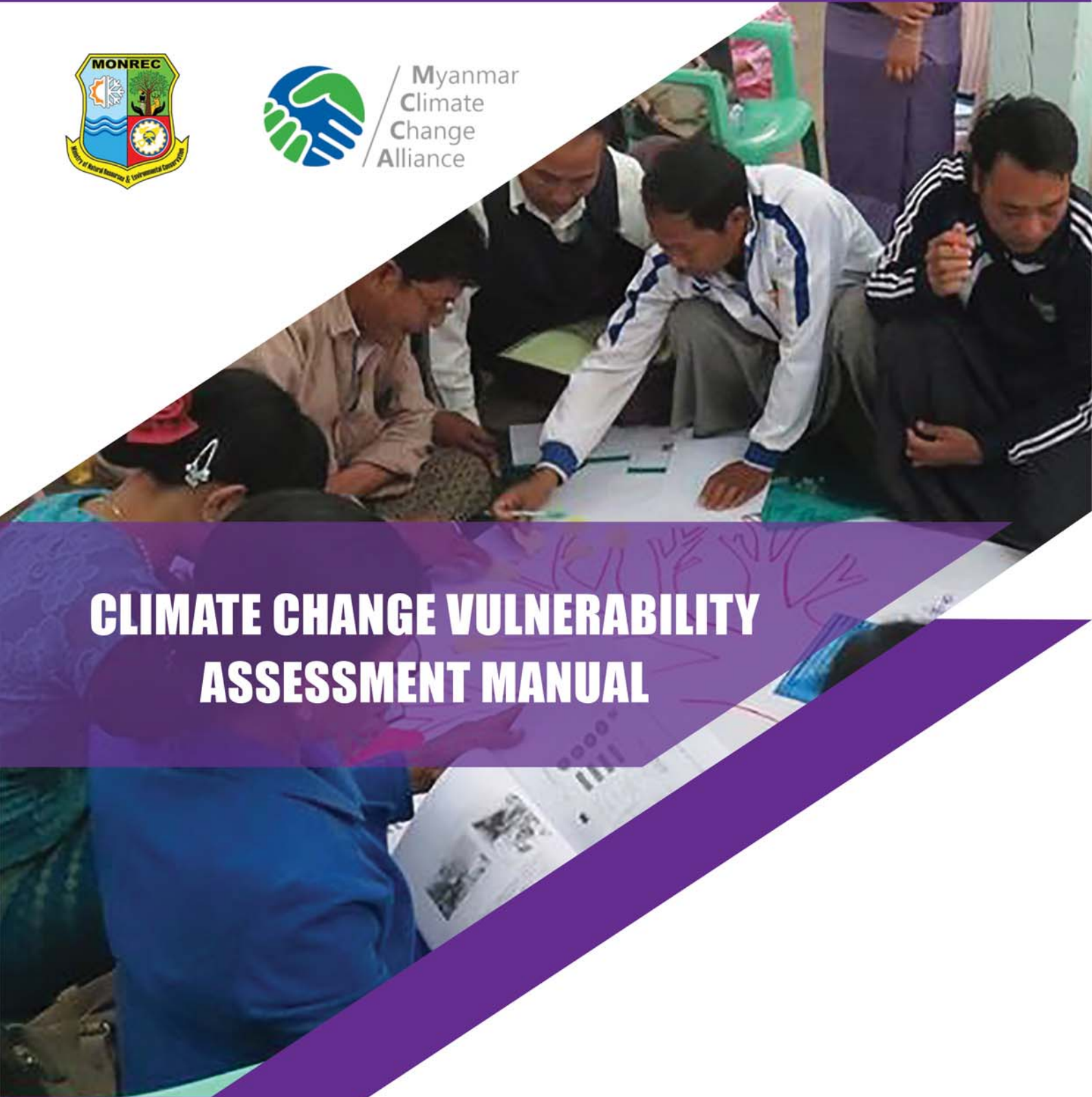




Myanmar
Climate
Change
Alliance



CLIMATE CHANGE VULNERABILITY ASSESSMENT MANUAL

UN HABITAT
FOR A BETTER URBAN FUTURE

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THE GLOBAL CLIMATE CHANGE ALLIANCE PLUS INITIATIVE



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List of Acronyms

CCA	climate change adaptation
GIS	geographic information system
GAD	General Administration Department
MIMU	Myanmar Information Management Unit
MoF	Matrix of Functions
RCPs	Representative Concentration Pathways

I. About this manual

What is the purpose of this manual?

This manual is intended to serve as a guide for national and local government officials on how to assess vulnerability of townships of Myanmar to climate change and hazards. The assessment framework presented herein captures a wide array of issues related to climate change and its impacts on townships and communities. Those are grouped into environmental, socio-economic and infrastructure components. Furthermore, the analytical approach allows for exploring current and future vulnerability, and carrying out a complex spatial analysis. Importantly, the proposed methodological framework is designed for the Myanmar national context since the suggested process and methods have been used in the case studies of Labutta (Delta Zone) and Pakokku (Central Dry Zone) Townships.

How was this manual developed?

This manual was developed based upon the following documents:

- Climate Change Vulnerability Assessment of Pakokku Township, the Central Dry Zone, Myanmar, 2016-2050 (Authors: Fee, L.; Gibert, M.; Bartlett R.; Capizzi, P. (forthcoming, 2017))
- Climate Change Vulnerability Assessment of Labutta Township, Ayeyawady Region, Myanmar, 2016-2050 (Authors: Fee, L.; Gibert, M.; Bartlett R.; Capizzi, P., Horton, R., Lesk, C. (forthcoming, 2017))
- Review of additional literature (see References).

How to use this book?

Section 2 of the book introduces key terms, highlights the purpose, objectives and overarching principles of the analysis, and offers recommendations for planning an assessment. Section 3 provides a step-by-step guidance on how to assess vulnerability such as guiding questions, suggested methods/tools, data sources and explanatory notes. Section 4 discusses the implications of assessment results for climate change adaptation (CCA) at a local level. A series of annexes provide additional information and technical details on the proposed methodology.

II. Framework for climate change vulnerability assessment

1. Key terms and concepts

1.1. Basic terms

Adaptation	Undertaking actions to adjust to already observed or expected climate and its effects with the objectives to: <ul style="list-style-type: none"> ▪ protect natural and human systems against the actual and anticipated harmful effects of climate change; ▪ exploit any opportunities they may generate; ▪ ensure the sustainability of investment and development interventions despite of current climate risks and potentially increasingly difficult climatic conditions.¹
Climate	The average characteristics of meteorological conditions, calculated over a long period (typically 30 years or more).
Climate change	A shift in average climate parameters and/or in the magnitude of climate variability observed and persisting over long periods (typically decades or longer) ² . To simplify, climate change suggests long-term continuous change of: (i) the average (typical) climate, e.g. average (typical) seasonal temperatures in the coastal zone of Myanmar are getting higher; (ii) variability of temperatures, precipitation, and other climate parameters, e.g. more frequent and severe rainfall and stronger winds are observed in some regions of Myanmar.
Climate change impacts	The effects of climate change (e.g. increasing temperatures and change in seasonal patterns) and extremes (e.g. heat waves, heavy rainfall, severe storms) on human systems and environment. The impacts of climate change include: <ul style="list-style-type: none"> ▪ Physical impacts – floods, droughts and sea level rise; ▪ Environmental – impacts on ecosystems such as loss of biodiversity, water scarcity, and land degradation; ▪ Impacts on human systems – socio-economic effects (e.g. loss of life and livelihood, food insecurity), and infrastructural consequences.

¹ MCCA Dictionary (<http://myanmarcalliance.org/en/dictionary/>)

² UN-Habitat, Standardization of DRR Terminology, 2013, Norwegian Ministry of Foreign Affairs, Department of Rural Development

Climate hazard	Any climate-related physical event (e.g. cyclone), trend (e.g. increasing temperatures in dry season) or impact (e.g. flood, sea level rise), which has the potential to cause loss of, and damage to, people, physical assets, provision of services, and ecosystems. Hazards (as well as climate change impacts) can be divided into slow onset (like drought and insect infestations), and rapid onset (like floods) events.
Climate projections	Simulations of possible future state of Earth's climate (e.g. in 2050 and 2100) using climate models. The latest global and regional climate change projections are based upon scenarios for Representative Concentration Pathways (RCPs) under assumptions concerning socio-economic and technological developments that may or may not be realised. The Intergovernmental Panel on Climate Change has defined four RCPs scenarios, which capture selected possible states of the composition of the atmosphere (i.e. concentration of greenhouse gases and aerosols) and land cover up to 2100. These four RCPs are: two in which there is little to no coordinated action on reducing global emissions (worst case – RCP8.5 and best case – RCP6), and two in which there is a serious global action on climate change (worst case – RCP4.5 and best case – RCP 2.6).
Climate variability	The variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate, attributed either to natural internal processes within the climate system, or to variations in natural or anthropogenic variables. In other words, climate variability refers to the annual fluctuation of the climate, above or below the long-term average.
Ecosystem	A system of living organisms, their environment (e.g. land, water) and the interactions within and between them.
Ecosystem services	Ecosystems provide people with numerous benefits called ecosystem services, which could be categorized as follows: <ul style="list-style-type: none"> ▪ Provisioning services are all products obtained from ecosystems such as food, fresh water and raw materials. For instance, people depend on lakes and rivers for water and fish, while forests are vital source of wood and food for many communities. Nature also provides people with traditional and commercial medicinal plants/raw materials (e.g. 'Thanaka' in Myanmar). ▪ Regulating services are related to the ability of ecosystems to regulate natural processes such as water, air and soil quality control, erosion prevention and moderation of extreme events. For example, trees in urban areas provide shade in hot days and improve the air quality, while mangroves can protect communities from hazards by reducing wind speed, flooding and coastal erosion. Forests remove carbon dioxide, prevent soil erosion and landslides, and reduce the flow of water during floods. Wetlands can filter waste water (e.g. human and animal waste) and absorb floodwaters. ▪ Cultural services refer to non-material benefits such as using the nature

	<p>for tourism, ecotourism and sports, and cultural and spiritual activities.</p> <ul style="list-style-type: none"> Supporting services are those benefits related to natural processes that support and maintain all other services (e.g. soil formation, providing nutrition and habitat for species).
Gender	<p>Socially ascribed roles, responsibilities, rights and opportunities associated with being a man or a woman, and the social relations between women and men. These are dynamic, change over time and are context-specific. Gender roles in society shape the gender division of labour, which is the allocation of the tasks and responsibilities of women and men at home, at work and in society. For example, often a division is made between: (a) productive tasks (e.g. agriculture, fisheries/aquaculture, self-employment, workers in enterprises); (b) reproductive tasks such as child care and household tasks; and (c) community tasks (UN-Women, 2014).</p>
Weather	<p>A condition of the atmosphere at a certain time and location described by meteorological variables such as temperature, precipitation, wind, humidity, atmospheric pressure, cloudiness.</p>

1.2. Framing risk of, and vulnerability to, climate change and hazards

Why does the change in the climate affect Myanmar? The reason lies in the fact that the country is exposed and vulnerable to the impacts of climate change and climate-related hazards. The probability of experiencing negative impacts of climate change is called **climate risk**. Risk results from the interaction of climate change and hazards, exposure and vulnerability. Adaptation and mitigation actions can reduce the risk (Figure 1).

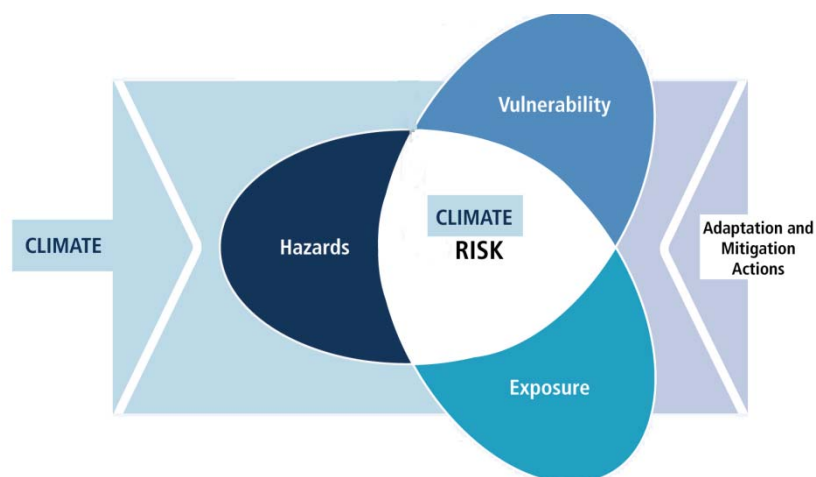


Figure 1 The concept of climate change risk (Source: adapted from IPCC, 2014)

Exposure relates to the presence of human and environmental systems (including people, livelihoods, assets and infrastructure, ecosystems, etc.) in places that could be adversely affected by climate change and hazards. For example, exposed to climate change and hazards could be: the lives and health of people; natural resources that people use such as water, land, trees; houses and

community assets; livestock and crops; public infrastructure and services such as electricity and water supply, schools and hospitals.

Vulnerability is the degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes. This notion is used to describe socio-economic, physical and environmental factors, which determine the sensitivity/susceptibility of a country, town, community or individual to the impact of climate change (e.g. change in seasonal patterns) and/or hazard (e.g. flood).

For example, socio-economic factors of vulnerability are poverty, low level of awareness on climate change, and dependence on climate-sensitive agricultural production. Land degradation and unsustainable natural resources management are environmental factors of vulnerability. For instance, cutting mangroves in populated coastal areas increases the vulnerability of communities because mangroves help in reducing wind speed, flooding and coastal erosion. Physical vulnerability relates to the state of infrastructure and human settlements.

Countries and communities are more vulnerable when they have low **adaptive capacity**. The latter specifies their ability to adjust to climate change (including to climate variability and extremes) and moderate or cope with its potential negative impacts. Adaptive capacity also relates to the ability of people to take advantage of opportunities and benefits from climate change. For example, a longer growing season due to changing climate offers opportunity to farmers to increase their income. However, their adaptive capacity is often constrained by the limited access to knowledge and technology on how to increase their production under longer growing season conditions.

Adaptation to climate change aims at reducing vulnerability and building **climate resilience**. Climate resilience is the ability of a system to (i) absorb stress and cope with climate change and hazards, including maintaining its basic structure, functions and adaptive capacity, and (ii) recover, adapt and transform in ways that improve its sustainability, leaving it better prepared for future climate change impacts. In this context, **climate-resilient development** of townships of Myanmar suggests development that ensures townships' ability to cope with current climate and its impact and to adapt to future climate change, by preserving development gains and minimising damages.

Example: Climate risk and vulnerability profile of Myanmar

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