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**CLIMATE CHANGE VULNERABILITY
ASSESSMENT OF LABUTTA TOWNSHIP,
AYEYAWADY REGION, 2016-2050:
SCENARIOS FOR RESILIENCE BUILDING**

SUMMARY FOR POLICY MAKERS

STUDY CONDUCTED BY



IN COLLABORATION WITH



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CLIMATE CHANGE VULNERABILITY ASSESSMENT OF LABUTTA TOWNSHIP, AYEYAWADY REGION, 2016-2050: SCENARIOS FOR RESILIENCE BUILDING

SUMMARY FOR POLICY MAKERS

CONTENTS



06 Highlights

09 Purpose, Principles and Methods of the Assessment

1

12	Township Profile
	Climatic Features, Natural Hazards and Observed Impacts
	Ecosystem Conditions
	Infrastructure Conditions
	Socio-economic Conditions
	Spatial Structure of Labutta
	Current Vulnerability Index

2

26	Climate Change Projections and Future Risks and Vulnerabilities
	Climate Change Projections
	Future Impacts
	Future Risks Profile and Vulnerabilities

3

46	Scenarios for Labutta 2050
----	----------------------------

54	Findings & Recommendations: Planning for Adaptation in Labutta
----	--

59	Local Adaptation and Resilience Planning: Pursuing the Best Scenario
----	--

HIGHLIGHTS

In 2016 the Myanmar Climate Change Alliance (MCCA), implemented by UN-Habitat and UN-Environment, on behalf of the Ministry of Natural Resources and Environmental Conservation, conducted a detailed climate change vulnerability assessment of Labutta Township, in collaboration with WWF and Columbia University.

Labutta is located at the southern tip of the Ayeyawady Delta Area region in Myanmar and is home to approximately 315,000 people. Characterized by a deltaic environment, it has a predominantly flat topography, and suffered greatly in terms of damage and lives lost from Cyclone Nargis in 2008. Labutta is still struggling to recover from its effects, especially in rice production.

The study analyses current vulnerabilities, and by projecting changes in climate, anticipates further vulnerabilities in the future up to 2050. Three scenarios for the future of Labutta are envisaged, taking into account the potential impact of climate change and the required adaptation and mitigation action. Recommendations are issued to avoid the worst case future scenario A, which is currently the most likely.

The study projects changes in climate for the township and concludes that temperatures may increase by as much as 2.3°C in 2050, with up to 17 more hot days per year. Rainfall patterns are also projected to change, with a possible increase in rainfall during a shorter rainy season, meaning more frequent heavy rainfall events, over shorter periods of time. Strong winds and cyclones are also expected to increase, because of higher air and ocean temperatures, more evaporation and a greater moisture level in the atmosphere. Salinity already is and will continue to be a critical challenge. Labutta has two salt lines: A permanent salt line, below which the land and groundwater is saline, and a seasonal salt line, in which land and groundwater is saline in the dry season. These salt lines are moving north and east, affecting a greater number of people as the sea-level rises. The assessment projects up to 41 centimetres of sea-level rise by 2050, which will increase the area of salt infiltration, and cause more frequent and more intense inundations and floods.

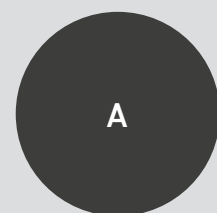


The assessment concludes that decision-makers in Labutta Township will need to plan for increased coastal flooding, warmer temperatures, more frequent extreme heat days, more intense cyclones, greater amounts of rain within a shorter monsoon season, and unknown rainfall changes during other seasons.

The study demonstrates that, in the current conditions Labutta Township is insufficiently resilient to the present climate conditions, and its vulnerability will increase greatly because of the projected future changes in climate if no adaptation actions are taken. This is due to the current socio-economic; infrastructure and ecological system conditions, and the expected impact of climate change on these systems.

The interplay of these underlying vulnerabilities with on-going and future changes in the climate will, if not urgently addressed, leave the people of Labutta more vulnerable to disasters. The effects will be seen through more frequent loss of lives and assets, lower incomes that will drive poverty, increased migration, poorer outcomes for women and a challenging public health situation. Housing and basic service conditions will also worsen, driven by changes in the climate and degraded ecosystems.

Three possible future scenarios by 2050 are envisaged:



Most likely /
least desirable

The business as usual scenario, in which authorities and communities do not recognize the urgent need to address different aspects of vulnerability. Changes in climate have exponential effects on the three systems analysed in this report; socio-economic, infrastructure, ecological and ultimately affect people's life, livelihoods, health, and safety before and by 2050. In this scenario, insufficient planning capacities and governance affect the required mid to long-term planning. Decisions are taken to respond to short-term needs; such as allowing cutting mangroves without replanting; constructing infrastructure where inundation may occur; or failing to construct houses with storm-resistant techniques, but with long-term negative consequences. Under this scenario, livelihoods, infrastructure and environmental conditions will not allow people to improve living conditions in the township. In addition, projected changes in the climate will interact with and exacerbate the existing vulnerabilities and as they do, new, unforeseen vulnerabilities may also emerge.



Currently unlikely /
desirable

The resilience is built to maintain current living standards scenario, in which the township and communities recognize the urgent need to take action, but also recognize investment, time, economic, technical and skill constraints. In this scenario, an adaptation plan is adopted, and activities that can be implemented without large investment are consistently undertaken, such as the protection of the environment; the strengthening of economic associations to create a more resilient livelihood and income; the integration of measures for strong winds in housing and schools; the improvement of water-harvesting, among others. Under this scenario, decisions on land-use and town-planning would need to take into account current and projected climate risks, to prevent hazardous situations, such as infrastructure being constructed near flood-prone areas and the need to clean drainage infrastructure inter alia. In this scenario, the township and communities are able to plan their adaptation needs considering climate constraints, and communicate them to the districts, states and regions, NGOs and development partners. This scenario is the minimum required to prevent increased vulnerability, and to continue present development trends.



Currently very unlikely /
very desirable

Resilience is built that enables economic and social development despite changes in climate by 2050, considering the different vulnerabilities of both men and women, in which effective, strategic planning, resources, coordination, and time is assigned not only to maintain basic safety conditions, but to achieve development goals. Based on this assessment, the first of its kind in Labutta, planning work that follows is strategic, and guides the township planning, the budget request to the district and other authorities. It requests investment from national authorities and international partners, to achieve three main results: 1) A healthy ecosystem is maintained and enhanced, to protect and provide for people; 2) A diversified, inclusive and resilient economy, to enhance the economic conditions of the township; 3) A resilient infrastructure and connectivity, that protects people and enables. In this scenario, efforts are sustained in an inclusive manner over a long period of time, and by a number of actors, but particularly the local and national government.

PURPOSE, PRINCIPLES AND METHODS OF THE ASSESSMENT

The purpose of this assessment is to inform the Labutta Township, district, regional and national authorities, as well as the development partners, of the expected consequences of climate change and, on this basis, to help them to plan and act to adapt to climate change.

FIVE PRINCIPLES WERE APPLIED TO CONDUCT THE ASSESSMENT:

- **Simplicity**, to ensure ease of replication in other townships
- **Measurability** and availability of data, to ensure ease of update and replication
- **Inclusiveness**, to ensure participation of communities
- **Comprehensiveness**, to ensure relevance of the findings
- **Spatial relevance**, to guide actual adaptation interventions





TO RESPECT THESE PRINCIPLES, THE ASSESSMENT USES THE FOLLOWING:

- Open-source or widely available software, such as Q-GIS.
- Data available at either national or local level, which can be easily obtained upon written request. The assessment does not use high resolution satellite imagery, other than that free on-line. Although this creates limitations in developing flood modelling, for example, it enhances the replication potential of this work.
- Data from the Census 2014, disaggregated at village-tract and urban ward level, as a key source of information. In addition to being a vast source of information and insight, future census' will provide actual monitoring of changes in the structure of the townships, which can be reanalysed in the future. Census data can also be easily accessed for each township;
- Participatory approach, involving communities throughout the whole township through simple questionnaires, community focus groups and participatory mapping;
- Studying the three main systems that define the township; ecological, socio-economic, and infrastructure. Climate change causes impacts on all three of these systems in Labutta. A simple analysis of extreme natural hazards does not help to understand the extent to which the township will need to adapt. Hence, the assessment is designed to analyse system-wide issues and the interaction between systems.

- Identification of the current and future spatial structure of the township, which is essential to support planning and interventions for adaptation spatially
- Equal participation of men and women and, where possible, using gender disaggregated data
- Representative engagement of young and old people, and consideration poverty drivers such as a lack of access to educational opportunities
- Engagement of the national government and the township throughout the process, to ensure ownership of the results and replication

THE METHODOLOGY WORKS AS FOLLOWS:

- It first describes the context and key socio-economic, ecological and infrastructure features and the spatial structure of the township, as basis for the analysis. This generates insights on the current situation and sources of vulnerability. A vulnerability index is presented, which gives an account of the most vulnerable locations in the township;
- It analyses, through both data analysis and community risk mapping, the exposure of people and assets to recurrent natural hazards and the potential for rapid and slow on-set disaster;
- It then overlays downscaled projections of climate change up to 2050 on the current conditions analysed in the assessment and studies how these new climatic conditions will affect people and assets in the township;
- It produces future scenarios that may materialize if adaptive action is not taken and contrast them with potential adaptive pathways, which inform adaptation planning
- On this basis, it informs a long-term local adaptation and resilience building plan, with detailed adaptive measures for the infrastructure, environmental and socio-economic systems

1

TOWNSHIP PROFILE



Labutta Township is in the heart of Ayeyawady delta. The township is characterized by a flat, low-lying topography typical of a river basin outlet, except for some low hills in the north of the township. The mangrove forests and the surrounding ecosystem are in an increasingly fragile state due to direct impacts of economic development and land use change, including decades of deforestation.

Labutta's demographic and socio-economic characteristics make the township vulnerable to shocks, even more so because of climate change. In particular, migration trends, low economic outputs, non diversified livelihoods sources and lack of vocational training education, make Labutta insufficiently resilient and dependent on climate-sensitive sources of income. In addition, social trends show an unequal access to economic opportunities for women.

Labutta town hosts both the Labutta Township administration and the Labutta District, which is one of the six districts that form the Ayeyawady Region. The Ayeyawady Region regional government is located in Patheingyi. The ability of the Township administration to integrate climate change into planning, and invest resources to mitigate its impact, will determine the future scenarios and the development of the township and its inhabitants.



CLIMATIC FEATURES, NATURAL HAZARDS AND OBSERVED IMPACTS

In the last decades, meteorological and observational data confirm that

- Stronger storms, winds and unusually heavy rainfall affect people's mobility and access to basic services, destroy houses and lives, and destroy agriculture crops. The cyclone Nargis was extremely destructive and killed thousands of people. Its intensity was unprecedented in this region.
- Exposure to storm surges and erosion is higher in deforested areas along the coast and water canals
- A shorter monsoon season and higher temperatures gives less time to collect rain water and faster evaporation resulting in water shortages for agriculture and drinking water
- Sea water infiltration increases salinization impacting nutrient cycling in soil and lowers rice yields

ECOSYSTEM CONDITIONS

- Labutta Township is characterised by a deltaic environment, with a flat topography, except for some low hills in the northern part of the township. Due to its location, the Ayeyawady Delta collects sediments and nutrients that support a highly productive surrounding ecosystem. These in turn provide critical ecosystem services – benefits that nature provides to people – that support livelihoods and the larger economy of the entire township.
- The Delta is a naturally highly productive and resilient ecosystem, but decades of deforestation and degradation have severely diminished. Mangrove forests are especially critical to maintaining ecosystem services, but without major intervention, will be entirely lost in the coming decade .
- Due to its geography and the naturally variable seasonal hydrology, the township is also highly exposed to climate hazards like coastal and upstream floods and droughts.
- Low lying geography at the coastal outlet of the Ayeyawady River makes the township similarly vulnerable to saline intrusion, especially in combination with decreasing dry season flows and upstream uses. The township can be divided in three main areas, depending on the level of salinity intrusion: (i) the coastal areas (coastal front), permanently under influence of salt water intrusion; (ii) the central areas (estuarine zone), under seasonal influence of salt water intrusion; and northern areas (flood plain zone), beyond the reach of salt water intrusion.

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