



Ministry of Natural Resources and  
Environmental Conservation



Myanmar  
Climate  
Change  
Alliance

# Climate Change and Private Sector Resilience in Myanmar

Policy Brief | December 2017





This Policy Brief is one of a series produced by the Myanmar Climate Change Alliance (MCCA) to help develop understanding on key challenges, strategic objectives and specific actions to effectively address climate change in Myanmar. The series aims at providing high-level policy guidance designed for use by the Members of the six sectoral Working Groups on MCCSAP. In addition, the briefs seek to raise awareness of various stakeholders on the national priorities of action in the field of climate change.

The analysis provided in this brief was developed based upon: (i) desk research; (ii) interviews with key informants

focusing on state institutions and limited number of private sector actors; (iii) a research-oriented workshop organized by MCCA (held on 8 November 2017 in Nay Pyi Taw) to validate preliminary findings and consult with a wide range of national government organizations engaged in the implementation of the Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2017-2030; and (iv) a workshop organized by Business for Social Responsibility (BSR) (held on 10 November 2017 in Yangon), which gathered representatives from the private sector with the objective to explore what practical tools are needed to enhance the resilience of businesses.

## Key Points

- **This policy brief looks into climate risks to three selected industries (agribusinesses, garment industries, building businesses) in order to illustrate potential impacts on and key vulnerabilities of businesses in Myanmar, dominated by small and medium enterprises.**
- **Businesses and industries in Myanmar are already facing enormous losses and damages associated with climate change. In future, climate change will likely cause huge production losses and physical damages to farmers, agro-processing firms, retailers and other agribusinesses. The garment industry will face unreliable electricity supply, disruptions in all transport modes, physical damages to assets, and declining health and well-being of migrant workers. Building industries and businesses will be challenged by more frequent disruption of operations, as well as losses associated with long-term consequences of climate change on supply of materials, health of workers, quality of construction works and market demand.**
- **To enhance the resilience of businesses and industries, Myanmar should: enforce environmental laws, regulations and safety standards legislation; mainstream climate change considerations into sectoral policies, labour health and safety standards, and social protection programmes; and develop tailored information services, stimulate research, raise awareness, support capacity-building of businesses, and improve early warning systems.**
- **Public institutions should work with the private sector to safeguard a resilient future of the nation and communities, including by engaging private sector actors in adaptation planning and implementation, and promoting public-private partnerships.**

## Why is the private sector of strategic importance for the climate-resilient development of Myanmar?

The physical effects of climate change are already evident across Myanmar – sea level rise, changes in the monsoon season and rainfall patterns, and more frequent and intense hazards such as heat extremes, droughts, floods and tropical storms.

In future, the average annual and daily maximum temperatures in Myanmar are projected to rise. Regions will face more often extreme hot days and heat waves, as well as more intense rainfall particularly during the wet season. This in turn could exacerbate wet season flooding in some areas. Furthermore, seasonal rainfall patterns will shift and become more erratic, causing floods and droughts. The country's low-lying coastal areas, such as the Ayeyawady Delta, are at risk of frequent and severe coastal flooding and storm surges due to sea level rise. In addition, global climate change projections indicate that tropical cyclones will become stronger than they are today.

*The impacts of climate change on businesses and industries can hinder Myanmar's development in the absence of effective policy response.*

Various industries in Myanmar like manufacturing, construction and agro-industries have a significant contribution to the national gross domestic product, export revenues, food security, employment and rural/urban development. Meanwhile, productive sectors including agriculture, fisheries and livestock, industry and commerce have been the most affected sectors by recent disasters. Cyclone Nargis (2008) affected more than three

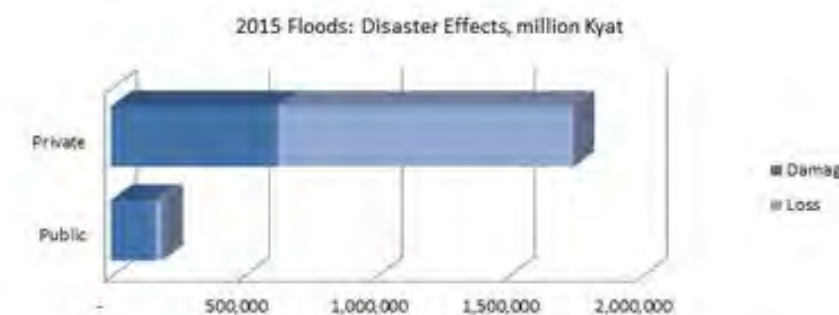
million people and caused significant losses and damages to infrastructure and assets. The estimated economic cost of Nargis is equivalent to 21 per cent of the country's gross domestic product in the previous fiscal year, and 74 and 57 per cent of the annual output of Ayeyawady and Yangon Divisions, respectively (GoM, 2008). Impacts on productive sectors accounted for about 70 per cent of the total value of losses and damages. The industry sector was largely affected by damages to buildings, machinery and equipment, and suffered significant losses due to suspension of operations for several months. Nargis had also long-lasting consequences for local businesses including labour out-migration, health deterioration, high costs of reconstruction, loss of agricultural productivity and coastal ecosystems degradation.

In 2015, Myanmar was severely affected by floods and landslides. The disaster caused losses and damages equivalent to 3.1 per cent of Myanmar's gross domestic product in 2014/2015 (GoM, 2015). The private domain, particularly productive sectors and housing have been the most affected sectors accounting for about 90 per cent of the total value of losses and damages.

*Engaging the private sector in building resilience of the nation and communities stands at the core of effective response to climate change and hazards.*

Therefore, the Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2017-2030 (to be adopted) seeks to enhance the adaptive capacities of businesses and promote public-private partnerships.

## What are the development challenges under climate change in Myanmar with implications for businesses?



Source: GoM, 2015.

Climate change will likely exacerbate the physical vulnerability of businesses and industries.

Energy, water and telecommunications infrastructure and facilities are facing increasing risks of physical damage from storms, floods and other rapid-onset hazards that are growing more frequent and intense. For instance, power networks located in low-lying coastal areas are exposed to sea level rise, storm surges and inundation. Heat waves and increasing number of hot days may lead to high energy demand for air conditioning, while prolonged droughts and change in river flows due to erratic rainfall will likely affect the hydropower energy supply, which currently represents 75 per cent of country's electricity consumption. Intense rains and increasing number of flood events may trigger large-scale erosion processes, leading to siltation and sedimentation of waterways and dams. Road, rail and water modes of transport will also be negatively affected by climate-related hazards in future, e.g. road and rail infrastructure could be damaged from cyclones, severe storms, floods and landslides; sea level rise will likely affect connectivity in coastal areas and the Delta Zone; and river transportation may be challenged by more frequent and severe river floods and droughts. Furthermore, climate change is expected to have significant impact on urban areas including disruption of water and energy supply, transportation and logistics, as well as flooding of industrial and commercial buildings.

In future, climate change will have significant impact on ecosystems, which may limit the availability of and access to raw materials and natural resources, and consequently affect key productive sectors.

Soil erosion, impact on crops and loss of agricultural land (e.g. due to sea level rise in coastal areas and landslides in mountain regions) have already been observed throughout the country. Droughts, sea level rise and other climate factors, coupled with growing human pressure on water resources (such as expansion of irrigation infrastructure; pollution from agriculture, urban developments and industrial production; unsustainable use of water resources) have already resulted in a decline in water quality and availability. Myanmar may also experience a loss in marine biodiversity caused by oceanic warming and acidification (as a result of increasing sea water temperatures), and deterioration of mangrove ecosystems. Furthermore, rapid-onset events may trigger secondary disasters such as toxic spillages in industrial zones and have long-lasting environmental consequences. In addition, land use change for establishment of new and expansion of existing industrial zones reduces the resilience capacity in these areas and increases the risk of disasters such as floods and cyclones (e.g. due to deforestation) or heat extremes (e.g. heat urban island effect).

Climate change will deepen existing socio-

economic vulnerabilities of communities, which will have significant implications for businesses and industries.

**Increasing socio-economic vulnerability in rural and urban areas:** A large share of Myanmar's population, particularly in rural areas where 70 per cent of the population resides, is highly vulnerable to climatic stress. Main vulnerabilities are rooted in the high dependence on agriculture for food and income, low climate change coping and adaptive capacities, persistent poverty, poor health status and low economic diversification in rural areas. In addition, climate change and recent disasters are new drivers of migration to cities. Agricultural producers are already challenged by a loss of rural labour force particularly in the Central Dry Zone and the Delta Region. Furthermore, climate change and migration of men are already forcing rural women to take central roles in agriculture and household food security. In cities, high migration flows often lead to the establishment of informal settlements located in the most at-risk zones. Cities like Yangon and Mandalay attract young men and women seeking jobs but fail to provide basic living conditions for the rapidly growing population. With climate change, migrant workers are exposed to an increasing risk of disasters, diseases, poverty and food insecurity.

**Skilled labour shortages:** Climate change will limit the access to education particularly in rural areas due to the inability of households to cover school costs, health impacts of climate change on children and effects of disasters on physical access to schools. Even today, poverty-driven migration of young people leaves many girls and boys without completed secondary education. In addition, most skills and vocational training opportunities are located in urban areas and not accessible by rural poor. All these factors will result in deficiency of skilled labour in the job market.

**High risk to public health and health of workers:** Climate change and hazards pose significant risks to human health including increase of waterborne and vector-borne diseases, heat-related illnesses, injuries and malnutrition, among others (MoNREC, 2012). The population living in large urban centres will likely be exposed to high heat stress (urban heat island effect) and increasing pollution levels. Urban poor will have decreased access to water and nutrition. Accessibility to health care services in remote regions will be further limited due to an increase in the occurrence of hazards like floods, landslides and inundation of low-lying coastal regions. In future, particularly vulnerable groups such as marginalized and poor people, migrants living in informal settlements, women, children and the elderly will face increasing risk to health, life and food security.

**Underdeveloped financial and insurance sectors to support resilience action:** Myanmar's banking and insurance sector is at an early stage of development and has limited presence outside cities (GoM, 2015). Small

and medium enterprises with limited assets and financial capacity have difficult access to bank financing because of high application costs and interest rates, and unfavourable regulatory requirements imposed on banks (e.g. 200 per cent loan coverage through land titles) (SWITCH-Asia, 2016). Main sources of financing with coverage in rural areas are cooperatives, microfinance institutions and hire purchase companies (GoM, 2015). The prime insurance provider is Myanma Insurance, which however does not offer agricultural or rural insurance. Private homeowners are usually severely affected by disasters like floods, cyclones or landslides but they rarely have insurance for their properties.

Potential primary and secondary impacts of climate change on businesses and industries (selected examples)

	Potential primary impacts (short-term effects)	Potential secondary impacts (long-term consequences)
Physical factors	<p>Direct impact on physical assets due to rapid-onset disasters and consequent disruption of operations</p> <p>Production losses due to disruption of logistics and operations caused by damages of rapid-onset disasters to transport infrastructure and services, e.g. workers cannot go to work, input materials cannot be delivered, final products cannot be distributed</p>	<p>Disruption of operations and consequent production losses due to insecure access to energy and water in the long term caused by impacts of climate change on utility infrastructure, services and their prices (e.g. water scarcity will likely result in reduced hydropower energy and water supplies, and higher prices)</p> <p>Operational costs will likely rise as a result of increasing expenses for maintenance of facilities, and need for investments in disaster-resilient infrastructure</p> <p>Production losses due to disruption of logistics and operations caused by long-term effects of climate change on the transport sector</p>
Environmental factors	<p>Direct losses for industries and businesses dependent on natural resources, e.g. destroyed beaches after cyclone affect the tourism sector, while floods bring direct loss of crops and livestock</p>	<p>Loss of ecosystems productivity (e.g. land, marine, forest)</p> <p>Conflicts over use and allocation of natural resources (e.g. land, water)</p> <p>Impact on entire supply chains such as higher prices of raw and input materials, and reduced access to and availability of raw materials for production</p>
Socio-economic factors	<p>Impact on local economies after major disaster, e.g. lower demands for certain goods and services, loss of sources of income, unemployment</p> <p>Unavailability of workers because of impact of rapid-onset disaster on worker's health/family/community/</p> <p>Significant financial losses form disasters due to lack of insurance</p>	<p>Impact on local economies, increasing poverty and out-migration exacerbated by climate change</p> <p>Reduced labour productivity due to health impacts of climate change on workers (higher sick leave and turnover rates and large liabilities in case of death)</p> <p>Shortages of skilled labour due to impact of climate change on the education sector</p> <p>Significant financial losses form disasters due to lack of tailored financial and insurance services to help businesses invest in and prepare for future climate change and hazards</p>

Learn more:

MCCA produced a series of policy briefs to help develop understanding on key challenges, strategic objectives and specific actions to effectively address climate change in Myanmar, focusing on six development sectors as defined in MCCSAP: (i) agriculture, fisheries and livestock; (ii) environment and natural resources; (iii) energy, transport and industry; (iv) urban development; (v) health and disaster risk reduction; and (iv) education, public awareness and technology. Available at: [www.myanmarccalliance.org](http://www.myanmarccalliance.org).

"Socio-economic Atlas of Myanmar" (Kraas F. et al.(2017)) is an up-to-date source of information (including maps) on administrative boundaries, natural resources, population, infrastructure, social and economic development. Available at: <https://elibRARY.steiner-verlag.de/book/99.105010/9783515116251>.



# What are the climate risks to businesses and industries in Myanmar?

## Agribusinesses

### What are the key climate risks to agribusinesses?

Crops production in Myanmar is exposed to a wide range of hazards such as temperature increase and heat extremes, erratic rainfall, floods, droughts and tropical storms, which can bring enormous damages and financial losses to farmers. For instance, rapid-onset disasters can damage irrigation infrastructure, limit access to markets and destroy crops, while slow-onset hazards can reduce overall farm productivity and quality of production. Agro-processing firms, retailers and distribution businesses are also exposed to climate hazards. Warehouses and markets can be flooded by heavy rainfall or damaged by cyclones, while agro-processing businesses might suffer losses from floods due to the inability of workers to reach their workplace. For instance, the 2015 floods caused damages to buildings and facilities of processing industries and retailers, as well as production losses due to disruption in operations (GoM, 2015).

### What makes agribusinesses vulnerable to climate change?

#### Physical factors:

- Poor flood control infrastructure (along river banks and coastal areas).
- Undeveloped water infrastructure and limited access to irrigation technology.
- Limited rural access to roads and electrification; some producers are located in remote areas and are physically isolated during part of the year.
- Lack of wholesale markets and access to storage facilities/warehouses in many rural areas. Seed traders and local producers lack facilities to properly store seeds and output that could be damaged by changing climate conditions and disaster events (e.g. pests and diseases, high humidity, heat extremes, floods). For instance, the consequent risk for coffee is a huge reduction in quality, which means selling at a low price at local markets instead of exporting the production.
- Most buildings and facilities of agribusinesses are not resilient to hazards.

#### Environmental factors

- Decreasing soil fertility in some regions due to unsustainable management of land and water resources. Increasing water pollution from chemicals used in agriculture.
- Unsustainable agro-practices (e.g. improper application of fertilizers and pesticides) and low level of awareness on environmental conservation.
- Loss of productivity due to climate variability (e.g. droughts, winds, coastal inundation).

#### Socio-economic factors

- In some regions, such as the Central Dry Zone and the Delta Area, rural out-migration poses major limitations to the sector given the low level of mechanization of the

Climate change is a growing threat to the expanding tea and coffee production in Myanmar. Heavy rainfall can cause floods and landslides in mountain regions like Shan and Chin – where highland Arabica coffee varieties as well as tea are mostly grown – which can damage crops and affect post-harvest processing and logistics (e.g. due to damaged roads). For instance, tea plantations in Chin and Shan States were affected by landslides triggered by the 2015 floods (GoM, 2015). Producers from Chin State could also be affected by frost and extreme low temperatures. Low-land coffee producing regions like Mandalay are exposed to droughts, high temperatures and wildfires. Projections for Myanmar indicate that the Eastern and Northern Hilly Regions like Shan and Kachin States are likely to experience the highest increase in temperatures in the country, which may have impact on tea and coffee production. While research on this topic has not been conducted so far for Myanmar, global assessments indicate that coffee and tea production worldwide is negatively affected by increasing temperatures and rainfall variability, which also increase the risk of plant pests and diseases. Furthermore, changing rainfall patterns can affect post-harvest processing activities, e.g. prolonged rainy season this year (2017) negatively affected the drying process of pulped coffee in Pyin Oo Lwin, Mandalay.

production (investment in farm machinery is affordable only for larger producers).

- Large share of farmers/producers are small and have low coping and adaptive capacities. Most often, field-level climate change adaptation measures are undertaken by farmers such as improved soil management, rainwater harvesting and micro-irrigation, or creating a defensible space around fields against wildfires.
- High dependence on agriculture and low economic diversification in rural areas.
- Limited access to financing and lack of agricultural insurance market.

#### Institutions/governance

- The current land tenure system limits the capacity of producers/farmers to respond to climate risks, e.g. insecure land tenure is a disincentive for infrastructural investments and land-use categorization restricts

economic activities.

- Limited government support to producers of fruits, vegetables and other crops than rice (e.g. supply of quality and stress-tolerant seed varieties, and capacity-building of farmers). To be effective, agricultural extension services need to be extended from agronomic to post-harvest management, considering also climate change risk management.
- Poor enforcement of existing environmental laws and regulations concerning unsustainable agro-practices (e.g. use of chemicals, deforestation).
- Poor early warning mechanisms and low level of climate risk awareness of actors (other than farmers) within agricultural value chains (wholesale distributors, retailers, exporters, financial institutions, other businesses such as seed and fertilizer companies).
- Limited research on the impact of climate change on agricultural value chains.

### Potential primary and secondary impacts of climate change on agribusinesses (selected examples)

Selected private sector actors	Potential primary impacts (short-term effects)	Potential secondary impacts (long-term consequences)
Farmers	<p><i>Agro-ecosystems:</i> Impact on quality and quantity of crops Direct loss of crops due to rapid-onset disaster</p> <p><i>Labour:</i> Impacts on health of agricultural workers, e.g. exposure of workforce to increased heat</p> <p><i>Physical assets and infrastructure:</i> Damages to assets Damages to roads and consequent loss due to inability to reach markets</p>	<p><i>Agro-ecosystems:</i> Decreased yield and quality of crop production Loss of productive land, e.g. due to soil erosion/decreased soil fertility, effects of sea level rise, landslides Higher demand for water for irrigation Water shortages for irrigation/watering Increased incidences of plant pests and diseases Ability to grow in areas previously not suitable for agriculture due to changing climate conditions</p> <p><i>Labour:</i> Impacts on health of agricultural workers Out-migration and labour shortages</p> <p><i>Physical assets and infrastructure:</i> Increasing expenses for maintenance of infrastructure (e.g. irrigation systems) Reduced access to markets, i.e. physical isolation due to impacts of climate change on the transport sector</p>
Agribusiness firms (e.g. seed companies, agro-processing businesses, retailers)	<p>Damages to infrastructure/facilities caused by rapid-onset disaster Production losses due to:</p> <ul style="list-style-type: none"><li>- disruption in operations caused by insufficient input supplies and/or damaged facilities</li><li>- disruption in output distribution</li></ul>	<p>Decreased productivity due to:</p> <ul style="list-style-type: none"><li>- unreliable hydropower energy supply and shortages of water for operations caused by water scarcity</li><li>- health impacts on workers</li></ul> <p>Higher operational costs:</p> <ul style="list-style-type: none"><li>- increasing expenses for maintenance of facilities, and need of investments in disaster-resilient infrastructure</li><li>- higher insurance costs</li></ul> <p>Changes in market positioning resulting from changing demand and prices</p>



Garment industry

What are the key climate risks to the garment industry?

In 2014, there were about 275 garment factories in Myanmar while estimations suggest that the number of factories reached 416 in 2016 (IMPACT, 2016). The garment factories are concentrated in and around Yangon, with small numbers located in Pathein, Mandalay, Bago and Kayin. This makes them exposed to various hazards including increasing temperature and heat extremes, heavy rain, high humidity, floods, strong wind/cyclones, drought/water scarcity, and fire.

What makes the garment industry vulnerable to climate change?

Physical factors:

- Lack of reliable energy supply and underdeveloped telecommunications and transport infrastructure. Given the strong reliance of factories on import of input materials for production as well as export of output, impact of climate change on the transport sector will have significant implications for the garment industry.
- Buildings and facilities of some factories are not resilient to climate hazards (floods, cyclones, heat extremes, water scarcity). Particularly older small (less than 500 workers) and medium (500 – 1000 workers) size factories have inadequate infrastructure, e.g. structural vulnerability of buildings to floods, poor infrastructure for waste water or lack of air conditioning and ventilation. These factors increase the risks to operations posed by climate change such as heat-related illnesses of workers due to lack of cooling system, or significant damages to buildings and facilities due to structural vulnerability.

Environmental factors

- Garment factories could be affected by shortages of water for hydropower supply, operations and sanitation in future. A recent report indicates that access to electricity is a key barrier to the development of the industry (IMPACT, 2016). At the same time, the heavy reliance on electricity from diesel generators means that greenhouse gas emissions will increase with the expansion of the sector unless these are adapted.
- Poor waste management in some factories, e.g. unsafe disposal of solid waste (textiles, plastic, packaging) pollutes the surrounding environment.

Socio-economic factors

- Lack of incentives of foreign players to support factory improvements and underdeveloped financial sector to foster industry growth (BIF, 2016).
- Poor health and safety standards in factories.
- High vulnerability of migrant workers, particularly women and girls.

The garment industry employs 260,000-300,000 workers (2016 estimates), most of which are young girls with a migrant background (IMPACT, 2016; WaterAid, 2016). Many of them live in Hlaing Thar Yar Township, Yangon (WaterAid), which is located in a flood-prone area. Dormitory, worker rooms and standalone houses are the main types of accommodation for garment workers (WaterAid, 2016). Standalone houses are built from rudimentary materials (e.g. bamboo and wood) and highly vulnerable to hazards like floods and strong winds. Workers have also inadequate access to water for drinking and domestic use and could be further affected by water shortages due to climate change in future. Female employees face critical health issues including diseases like diarrhea and undernourishment. Climate change and disasters pose additional risks to the health of garment workers. Consequent impacts on the industry include reduced labour productivity, as well as higher sick leave and turnover rates.

Institutions/governance

- Limited knowledge and awareness of public and private actors on climate risks to the garment industry.
- Poor enforcement of existing environmental laws and regulations, safety standards legislation (e.g. disaster risk management plans, building code standards) and need to mainstream climate change considerations into labour safety standards and social protection policies especially for migrant workers.



Credit: Public domain

Potential primary and secondary impacts of climate change on garment factories (selected examples)

Channels through which climate change can affect garment factories	Potential primary impacts (short-term effects)	Potential secondary impacts (long-term consequences)
Input resources and materials	Disruption of supply (transportation) of input materials due to impacts of rapid-onset disasters on the transport sector	Increasing costs of supply (transportation) of input materials due to impacts of climate change on the transport sector
Production process/Business operations	Damages to buildings and facilities, and high recovery/reconstruction costs Inability of workers to go to work due to disruptions of transportation Decreased productivity due to disruptions of water and energy supply caused by rapid-onset disasters	Decreased productivity due to: - unreliable hydropower energy supply and shortages of water for operations and sanitation caused by water scarcity - health impacts on factory workers, including due to elevated pollution levels Higher operational costs: - increasing expenses for maintenance of facilities, and need of investments in disaster-resilient infrastructure - higher insurance costs
Output distribution and market positioning	Production losses due to disruption of product distribution	Production losses due to disruption of logistics and operations caused by long-term effects of climate change on the transport sector Loss of competitive advantages due to a decline in productivity and rise in prices
Macro-environment	Impact on workers' livelihood and loss of jobs in case of major disaster	Increasing risks to well-being of migrant workers Shortages of skilled labour



In Pakokku, many families rely on micro-scale (family-run) production of slippers and clothing for living. Annual wet-season floods affect many of these businesses. Key impacts include flooding of production facilities, lack of electricity and access to clean water, and health impacts on family members, all of which lead to termination of operations for weeks and consequent loss of income. In response, MCCA constructed a drainage system in the most flood-affected ward in Pakokku, which transformed the community's lives during the monsoon in 2017. Slipper and clothing production was not interrupted, livelihoods were secured.



Building industries and businesses

What are the key climate risks to the building industry?

At present, most building developments are concentrated in Yangon and larger urban centres like Mandalay, and hence related industries and businesses are exposed to hazards typical for these regions such as floods, tropical storms and heat extremes. The country imports construction materials from neighbouring countries, which makes the industry highly vulnerable to the impacts of climate change on the transport sector. There is also a local supply of cement, bricks and wood that could be disturbed by climate-related disasters. Most local cement factories are located in the Central Dry Zone, especially around Mandalay and could be affected by hydrological hazards and heat extremes.

Climate factors that affect the building industry are floods, intense rainfall, landslides/mudslide in hilly areas, water scarcity in drought-prone regions, strong wind/cyclones in coastal areas, heat extremes, and low temperatures in high mountain areas.

What makes the building industry and related businesses vulnerable to climate change?

Physical factors:

- The housing sector of Myanmar is highly vulnerable to rapid onset disasters like floods and cyclones. About 90 per cent of all houses in rural areas, and 63 per cent in urban zones are wooden/bamboo houses or huts, while building practices are based upon traditional knowledge and skills (GoM, 2015). Furthermore, urban residents are exposed to building overheating and high humidity. The most commonly-used building materials in modern construction work for cities are corrugated steel and aluminium zinc roofing panels, as well as cement (bricks) and mortar for walling. These factors condition the high structural vulnerability of the existing building stock, but also indicate the high potential for private sector engagement in promoting climate-resilient design, construction techniques and materials.
- Climate-induced stress on buildings like high temperatures, high moisture, strong winds, as well as exposure to chemical agents (e.g. salt) and solar radiation can have a major impact on the degradation of some construction materials, e.g. corrosion of metals and degradation of wood, paint and other materials (Camilleri M., 2000).
- Producers of construction materials (e.g. brick and cement factories) could be affected by hazards if their buildings and facilities are not climate-proofed. This requires e.g. retrofitting of vulnerable structures (e.g. to resist floods, cyclones or earthquakes), securing access

to energy by investing in renewable energy system, or improving water and energy use efficiency of factories.

Environmental factors

- The expected construction boom could have serious environmental consequences (raw materials extraction, processing, transportation, energy use, waste).
- There are significant implications for climate change mitigation in the sector, but private sector actors (particularly local businesses) have limited capacities and knowledge to take action to reduce emissions from the industry and develop green products and services.

Socio-economic factors

- The country is facing a growing demand for residential buildings, office space and commercial projects, particularly in large cities, which means increasing demand for urban housing and access to infrastructure and basic services. Yangon is already facing an urgent need of substantial investments in expanding and upgrading energy grid, drinking water supply and drainage systems, considering also future climate risks (e.g. more intense rains).
- The building sector remains labour-intensive, highly dependent on import of construction materials, and dominated by small construction companies with low human, technical and financial capacities.

In 2011, the Department of Urban and Housing Development (DUHD) under the Ministry of Construction, initiated a long-term program - "One Million Housing Units Plan" – aimed at increasing the current housing stock with one million units by 2030, of which 20 per cent shall be provided through the delivery system of DUHD, and 80 per cent by private sector actors (DUHD, 2017). The housing delivery system of DUHD engages local construction companies and could serve as entry point for promoting climate-resilient practices in the building sector.

- The underdeveloped financing and insurance sectors limit the capacity of actors to address climate risks. Individual homeowners typically do not have insurance for their properties and were severely affected by the floods in 2015 (GoM, 2015). Main sources of financing for housing in rural areas are informal financing and microfinance, whereas loan size is limited and sufficient to contribute mainly to home improvements (DUHD, 2017). The Construction and Housing Development Bank, a joint-venture between DUHD and private sector construction firms, provides large-scale loans to construction companies and serves as a financing mechanism for the housing delivery system of DUHD (DHUD, 2017). Future goals of the Bank include provision of housing loans for individual households.
- The private sector has limited technical capacities for implementing resilient construction practices. For example, there is a lack of locally produced climate-resilient materials and the cost of quality imported materials is high. Furthermore, there is a shortage of skilled labour and lack of specialists (engineers/architects) in the field of climate- and disaster-resilient building design/techniques.

- Climate change poses health risks to construction workers such as heat-related illnesses, and consequent impact on construction businesses such as higher sick leave and turnover rates and large liabilities in case of death.

Institutions/governance

- Limited knowledge and awareness of public and private actors on climate risks to the building industry.
- Need of developing local climate change vulnerability assessments and integrating climate risks into local development planning.
- Poor enforcement of existing environmental laws and regulations, safety standards legislation (e.g. building code standards) and need to mainstream climate change considerations into labour safety standards and social protection policies.



Potential primary and secondary impacts of climate change on building industries and businesses (selected examples)

Selected private sector actors	Potential primary impacts (short-term effects)	Potential secondary impacts (long-term consequences)
Property owners (residential and commercial buildings)	Loss/damage to buildings and impact on access to basic services (e.g. electricity, water) High costs for reconstruction after disasters but opportunity to build back better	Degradation of building materials – thus reducing the durability lifespan of buildings High insurance costs because of increasing risks Reduced access to electricity and water caused by water shortages
Producers of building materials	Rapid-onset event can cause production losses due to: - disruption of supply of input materials - disruption of operations caused by damages to physical assets and infrastructure, and impact on employees - difficulties to transport output, e.g. intense rainfall causes difficulties to transport cement	Decreased productivity due to: - unreliable hydropower energy supply and shortages of water for operations caused by water scarcity - reduced access to/availability of raw materials (e.g. for production of bricks) - health impacts on workers Higher operational costs: - increasing expenses for maintenance of facilities, and need of investments in disaster-resilient infrastructure - higher insurance costs Increased demand for quality construction materials
Construction companies	Disruption of construction process due to rapid onset disasters, including: - damages to equipment - prolonged construction time - disruptions of supply of construction materials e.g. cement and bricks - health impact on workers	Disruption of logistics caused by long-term effects of climate change on the transport sector Health impacts on workers (e.g. heat-related illnesses, water-borne diseases), and consequent impact on construction businesses such as higher sick leave and turnover rates and large liabilities in case of death Negative impact on quality of construction works and dissatisfaction of clients
Real-estate businesses	Lower demand for properties due to impact of rapid-onset disaster on the financial capacity of affected people and businesses	Changes in market conditions



# What is needed to enhance the resilience of businesses and industries?

## Policies and legislation

Over recent years, Myanmar has developed a number of strategic documents for building climate resilience including the National Adaptation Programme of Action (2012), Myanmar Climate Change Strategy and Action Plan 2017–2030 and Myanmar Climate Change Policy (to be adopted). In addition, several sectoral policy frameworks address climate-induced disaster risks such as the National Strategy on Rural Development and Poverty Alleviation (2011), Climate-Smart Agriculture Strategy (2016–2030), National Social Protection Strategic Plan (2014) and Myanmar Action Plan on Disaster Risk Reduction (2017). While these policies can enhance the resilience of local businesses their implementation is still in its infancy and challenged by limited capacities of state institutions at the national and local levels.

The country has also made steps to advance regulatory frameworks, which have implications for climate resilience of businesses and industries. Since 2015, Myanmar has in place an Environmental Impact Assessment (EIA) Procedure, according to which an EIA Report shall contain identification of potential hazards and impacts of climate change. However, there is a need of integrating climate risk considerations into the instruments for managing environmental impacts of businesses such as Environmental Management Plans, Social Impact Assessments and Health Impact Assessments. As well, the National Building Code (updated recently) provisions for improved resilience of buildings to climate-related disasters, but its enforcement remains a challenge. Current

labour health and safety regulations (Factories Act (1951) and Shops and Establishments Act (1951)) do not address climate change risks, e.g. there are no official standards for maximum temperatures or ventilation at factories. Importantly, the new Occupational Safety and Health Law (under development) is expected to set improved health and safety standards including building safety, air and heat conditions, access to proper sanitation and drinking water, among others.

## Information, knowledge, awareness and capacity-building

A large share of small and medium enterprises in Myanmar have limited financial, human and technical capacities to plan for future risks, low level of awareness on climate change impacts and also lack knowledge on how to integrate resilience into their business planning. Furthermore, the weak early warning capacities of the country at the national and local levels, and unavailability of tailored climate risk information for businesses remain a critical constraint to businesses to effectively respond to climate change and hazards.

Therefore, to support the resilience of the private sector, government interventions need to address the vulnerability of businesses, through:

- Developing tailored information services about the risks to businesses associated with climate change, as well as tools and good practices on how to deal with those risks. This includes the need to consider establishing effective channels for dissemination of information to reach a wide-range of private sector actors. Since climate risks and responses differ for each business area, those responses could be implemented by sectoral ministries and departments in collaboration with the Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI).
- Promote research to advance the understanding on the impact of climate change on businesses and assess options for adaptation.
- Raising awareness of businesses on climate risks, adaptation (and mitigation) through various channels such as the media (television, radio, newspapers, electronic and social media channels), business forums and online business platforms.
- Integrate climate risk management into existing and prospective capacity-building programmes for small and medium enterprises.
- Strengthen the capacities of state and private sector organizations engaged in EIA for assessing the impact of climate change on a project.
- Establish partnerships with national and local organizations to support local level capacity-building and awareness-raising initiatives.
- Improve early warning systems considering the needs of businesses, as well as opportunities for engaging private sector actors such as telecommunication

companies.

## Working with the private sector

The government should seek close collaboration with the private sector. This can be achieved by:

- Engaging the private sector in policy and development planning, e.g. ensuring that consultations with the private sector are an integral part of developing climate change policies is an effective way to identify adaptation needs and opportunities for businesses. Furthermore, private sector actors should be engaged in the process of developing and implementation of local adaptation and disaster risk reduction/management plans.
- Promoting public-private partnerships in order to exploit opportunities for businesses to effectively adapt to climate change while also safeguarding public sector resilience. Areas where the Government of Myanmar can work with the private sector are for example investments in infrastructure and commercial/residential buildings; research, knowledge and capacity-building activities; awareness raising initiatives; and disaster relief.

## What role can the private sector play in climate action in Myanmar?

Businesses can support climate resilience of economic sectors and communities in which they operate through innovation, products and services (BSR, 2015). According to a “Climate Resilience Wedges” model developed by BSR, companies can invest in development, maintenance or restoration of physical, natural, governance, technological, knowledge, social, or financial assets to enhance climate resilience. Some examples:

- Physical assets: investing in infrastructure (e.g. roads, energy grid) and productive assets (e.g. factory facilities, farm equipment).
- Natural assets: taking actions to sustain the use of natural resources and health of ecosystems.
- Governance assets: implementing activities that support the access to decision-making and information.
- Technological assets: investing in improved access to information and telecommunication technologies to support local adaptation, e.g. by enhancing the access of farmers to climate risk information.
- Knowledge assets: provision of research, information and training services.
- Social assets: build resilience of vulnerable groups through e.g. skills development, awareness raising and women empowerment activities.
- Financial assets: developing financial products to enable investments in resilience to climate risks.

## What are the implications for climate change mitigation?

Economic development and industrialization processes will lead to an increase in greenhouse gas emissions in the future. Therefore, policies and programmes that target climate resilience of businesses and industries should be integrated with climate change mitigation objectives. For example, promote sustainable use of natural resources, and culture of saving, recycling and re-use of production materials. Strengthen environmental and waste management laws and regulations, and their enforcement. Create incentives for companies to invest in energy saving and efficient technologies, and also in the use of renewables. Set low-carbon and energy efficient standards, and fuel economy and emission standards for vehicles to reduce emissions from transportation.

## Where to find information on good practices of private sector engagement in climate resilience?

### Lessons from public-private collaborations around the world

“Private sector engagement in disaster risk management and climate resilience” project aimed at identifying success factors for private sector resilience initiatives and public-private partnerships, and deriving recommendations for public and private actors, by analysing over 100 examples of innovative public-private partnership and private sector initiatives from around the world. Project findings are presented in a report and case studies publication, which demonstrate how innovative public-private collaborations are making individuals, communities, businesses and economies more resilient to climate risks. The sectors and industries covered in the publications include agriculture and fisheries, housing, water, transportation, health and energy, among others.

[Learn more: www.cdkn.org/project/private-sector-engagement-in-disaster-risk-management-and-climate-resilience/?loclang=en\\_gb](http://www.cdkn.org/project/private-sector-engagement-in-disaster-risk-management-and-climate-resilience/?loclang=en_gb)

### ENHANCE Project: Partnership for Risk Reduction in Europe

The ENHANCE project addresses the need to enhance society’s resilience to catastrophic natural disasters. It aims at developing new models of multi-sector partnerships between public and private sectors, with an important role for the financial sector (e.g. insurers). The project results are built upon the experience from 10 selected participatory case studies on risk reduction of a number of catastrophic events in Europe (heat waves, forest fires, flood, drought, storm surge, and volcanic eruptions).

[Learn more: www.enhanceproject.eu](http://www.enhanceproject.eu)



The Myanmar Climate Change Alliance (MCCA) was launched in 2013 to support the Government of the Union of the Republic of Myanmar in addressing the challenges posed by climate change. MCCA is an initiative of the Environmental Conservation Department (ECD) of the Ministry of Natural Resources and Environmental Conservation (MoNREC). It is funded by the European Union as part of the Global Climate Change Alliance (GCCA), and implemented by the United Nations Human Settlements Programme (UN-Habitat) in partnership with the United Nations Environment Programme (UN Environment). For more information: [www.myanmarccalliance.org](http://www.myanmarccalliance.org); Facebook: @myanmarccalliance.



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