Flood Management for Selangor

Identifying Key Issues

1. Urban Flooding & Flood Hotspots

Urban flooding is unforeseen and has broad impacts, from the disturbance of everyday life to the spread of waterborne diseases. As it is commonly associated with climate change, the poor are hurt the most by urban flooding, for their capacity to prepare and rebound from damages is significantly weaker than other classes.

- Areas affected by the flood were mainly located adjacent to Sungai Klang which made them more prone to flash flood due to the unexpected heavy rainfall.
- Unsustainable development around flood risks areas
- Residential houses in low lying areas that should have been gazetted
- Clogged drainage system which makes it unreliable in redirecting rainfall

The likelihood of flash floods can be induced by silt, garbage and other obstructions which reduces the carrying capacity of the drainage system up to 50% only. The width of the drains also plays the part in making it challenging for rainwater to flow.

- Poor irrigation and maintenance

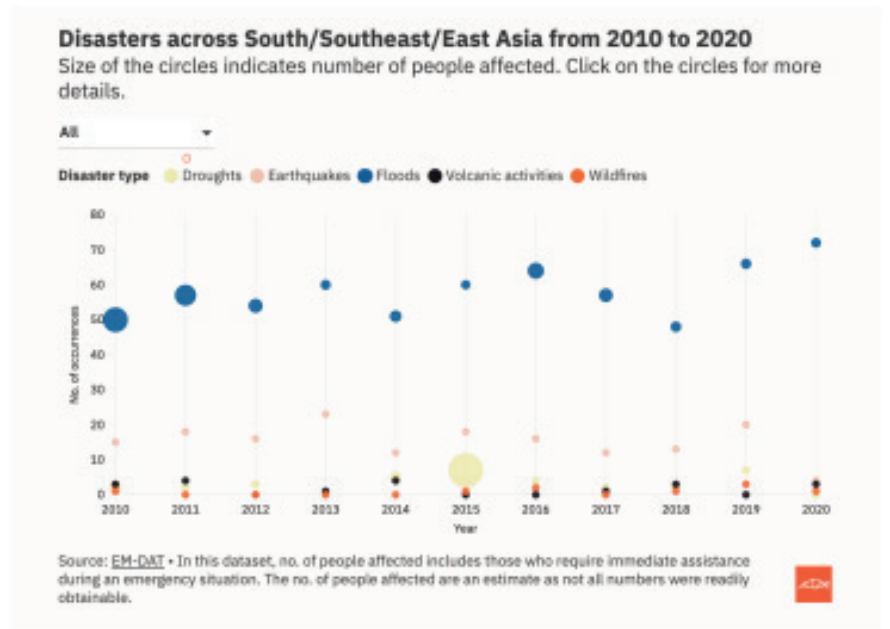
2. Understanding Climate Change

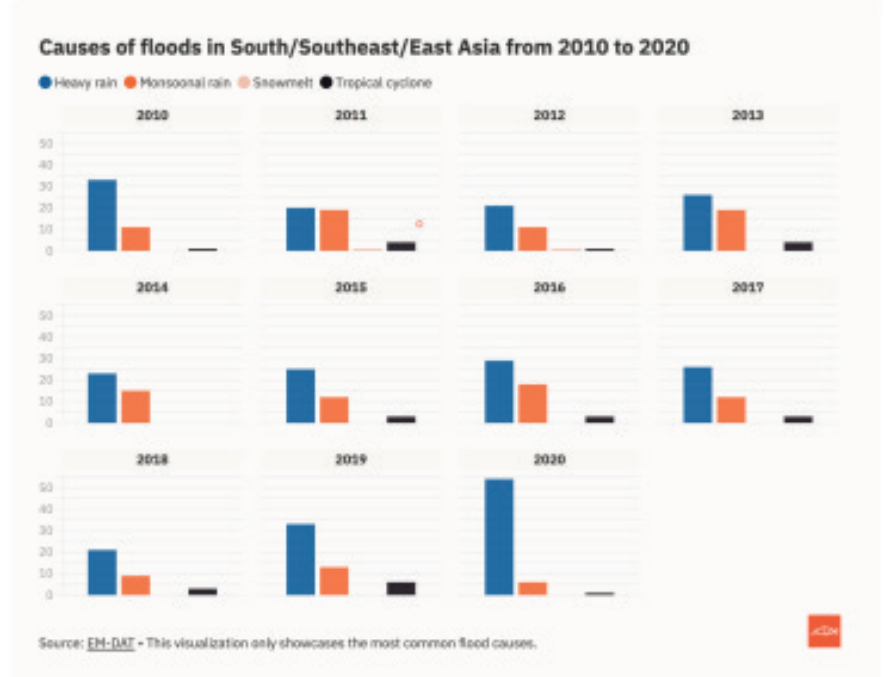
- **Risk for Malaysia**

  Slow-onset: increased rainfall, sea-level rise
  Rapid-onset: flooding, land subsidence

- **Trends affecting flash flood across S.E.A**

Malaysia is not the only country affected by heavy rainfall as most countries in South East Asia were heavily impacted as well. The trends can be seen via the figures below where flooding is the most prominent disaster. The summer monsoon has been coming increasingly late over the years, with rainfall amounts remaining the same. This means torrential rains hit us all at once, over a shorter period of time. As time passes, we'll experience more intense rainfall and, consequently, more intense floods. [based on Kontinentalist figures]





- The 6th Assessment Report released by the IPCC has also warned the general public on the effects of climate change which includes vulnerabilities of many regions.

Southeast Asia (SEA)

- Future warming will be slightly less than the global average (high confidence).
- Observed mean rainfall trends are not spatially coherent or consistent across datasets and seasons (high confidence). Rainfall will increase in northern parts and decrease in the Maritime Continent (medium confidence).
- Compound impacts of climate change, land subsidence, and local human activities will lead to higher flood levels and prolonged inundation in the Mekong Delta (high confidence).
- Although there has been no significant long-term trend in the overall number of tropical cyclones, fewer but more extreme tropical cyclones have affected the region.

Understanding Loss & Damage

1. Evaluating how climate change exceeds any adaptation measures that are or can be implemented

Loss & Damage is headed by the elaborate multidimensional aspects that determine how vulnerable individuals, households, communities and regions are to climate effects. These factors include – physical exposure to climate hazards over time; the rate and type of economic development; ecosystem health and biodiversity; poverty levels; social and economic inequalities; the state of institutions and governance arrangements; quality of infrastructure; access to essential services and others. (IIED, 2021)

2. Calculating the loss and damage in Selangor hotspots areas

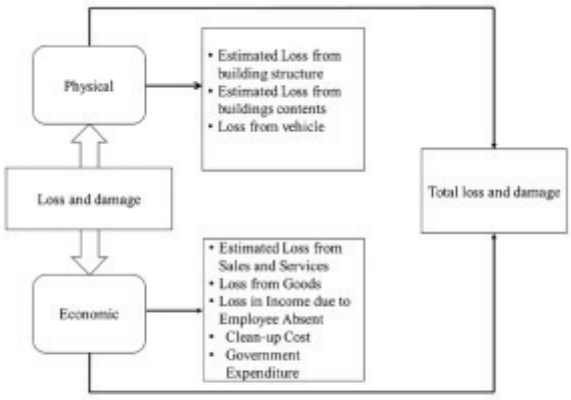


Figure by Bari et al (2021)

It is important to identify the flooding hotspots and calculate the L&D for each area in order to implement successful adaptation and mitigation plans.

Adaptation

1. Flood Risk Assessment

Flood risk assessments can be detected through GIS which can analyse:

- determination of flood probability
- simulation of flood characteristics
- assessment of flood consequences – measuring flood risk as a combination of hazard, exposure, and vulnerability
- using hydrological modelling for flood prevention

> **While such assessments might already be in place, it is important for the government to review any infrastructure capabilities to reach their full potential**

2. Considering nature-based solutions

- consulting indigenous knowledge on Orang Asli locations or other indigenous zoning areas in flood prevention
- cultivating trees and barriers to improving water absorption, capturing rainfall and delaying surface water run-off
- improve soil cover with plants to reduce water pollution and run-off
- redirect high water flows and create areas to store water
- construct leaky barriers to delay water flow in streams and ditches
- restore wetlands, mudflats and peat bogs

3. State Law

- release an updated flood zoning system and gazetting low lying flood plains to ensure that any kind of development is completely forbidden
- strict enforcement on deforestation and increasing forests reserve in the state
- Improved access to disaster risk finance – funding should be well communicated through federal and private entities eg. receiving high compensation from factories/manufacturers that contribute greatly to human induced climate change
- developing state climate policy to prevent natural disasters from occuring

Mitigation

1. Irrigation and Drainage

- Controlling where the river flows:

> It is essential that a river has adequate space for sudden floods – to perform its different functions and contribute various ecosystem benefits. It is becoming even more critical to recognise that floodplains are an integral part of a river's space and a river with a complete floodplain is not just a river in equilibrium, but also a river in good health.

- Sustainable Urban Drainage System (SUDS)

A study by Ghani et al (2008) shows that SUDS are currently the recommended techniques towards solving three major problems in Malaysia which are flash floods, water scarcity and water pollution. Previously, most of the stormwater runoff especially in urban areas is catered by conventional drainage systems that carry runoff downstream by the rapid disposal concept. In order to manage these three major problems, SUDS provide long term solutions to urban drainage management.

Mitigation

2. Retention Ponds

- acts as one of flooding mitigation structures to manage high runoff volume
- upgrade and construct better retention ponds and flood control pumping stations to contain flooding

3. Introduce flood managements practices to local communities

- providing awareness and knowledge for preparedness
- conceptualising and understanding local knowledge lets flood management officials adequately communicate with affected communities - the significance of strong social networks and credible local authorities to achieve effective flood disaster management