

# PERSPECTIVE

RESEARCHERS AT ISEAS – YUSOF ISHAK INSTITUTE ANALYSE CURRENT EVENTS

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## Malaysia's Floods of December 2021: Can Future Disasters be Avoided?

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*Rescue officials evacuate people in a boat in Shah Alam, Selangor, on 20 December 2021, as Malaysia faced some of its worst floods for years. Photo: Arif KARTONO, AFP.*

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## **EXECUTIVE SUMMARY**

- The floods of December 2021 in Malaysia left almost 50 dead, required the evacuation of about 400,000 people, and resulted in an overall estimate of RM6.1 billion in financial losses. Unprecedented volumes of rainfall left areas on the west coast of Peninsular Malaysia under almost four meters of water and turned roads into rivers.
- A study by the Institute of Geology, Malaysia, placed the source of disaster in thousands of landslides that occurred in the Titiwangsa Range as a result of heavy rains. This then led to debris flows chockfull with rock and forest fragments and wreckage surging downstream, wiping out riverine villages in its path.
- While government disaster response systems were overwhelmed by calls for help, citizens and civil society organisations mobilised aid. The army also moved to rescue stranded flood victims in the absence of an official directive from the National Disaster Management Agency (NADMA). Politicians were panned for their delayed response to the calamity and for ‘showboating’.
- As disasters like these are likely to recur, it is imperative that Malaysia acts to ensure the enforcement of town and city planning requirements, use modelling data to predict flood severity, and implement effective disaster mitigation and resilience plans.
- Aside from dealing with post-flood financial recovery, there is also a need to treat flood-induced trauma. The nation must build back better and incorporate river restoration, flood plain planning, sponge city approaches and community capacity-building to reduce the severity of future flooding disasters.

## INTRODUCTION

On 16 December 2021, MetMalaysia (Jabatan Meteorologi Malaysia) issued an orange alert for inclement weather in Kelantan and Terengganu. Most believed that this was the usual annual end-of-year monsoon event which often severely affects the east coast states. True to form, by 17 December, some parts of Kelantan and Terengganu began to flood. The states were well-prepared, however. This annual occurrence means that evacuation centres are ready as soon as MetMalaysia warnings are released and residents, as well as local agencies, know exactly what to do when waters begin to rise.

However, this year, Tropical Depression 29W<sup>1</sup> took an unexpected turn, and also dumped unprecedented volumes of rainfall onto the west coast of Peninsular Malaysia.

On 17 December 2021, MetMalaysia issued an amber alert, which then swiftly rose to a red alert (the highest level) for the Klang Valley, Selangor and neighbouring states. It rained continuously for four days, a deluge equivalent to a month's worth of rainfall in the area. Four rivers around Kuala Lumpur breached their banks, and by 18 December floods in Taman Sri Muda, Shah Alam had reached hip-level.

At the same time, a debris flow that gushed down rivers from the Titiwangsa Range wiped out homes in Kampung Sungai Lui, Hulu Langat, leaving barren patches of land, collapsed roads and destroyed bridges in its wake. Residents likened it to a tsunami.<sup>2</sup>

By 20 December, several highways across central Peninsular Malaysia had been inundated, leaving roads impassable. Many single-storey homes in Taman Sri Muda were flooded to their rooftops. Floodwaters reached a height of four meters in some places,<sup>3</sup> a deluge that left 95 percent of the area underwater.<sup>4</sup>

The state of Pahang was also flooded during this time, but received far less media coverage than areas in Selangor. Posts on social media often begged viewers to focus on Pahang too, regretting that much of the media presence was in the Klang Valley.<sup>5</sup>

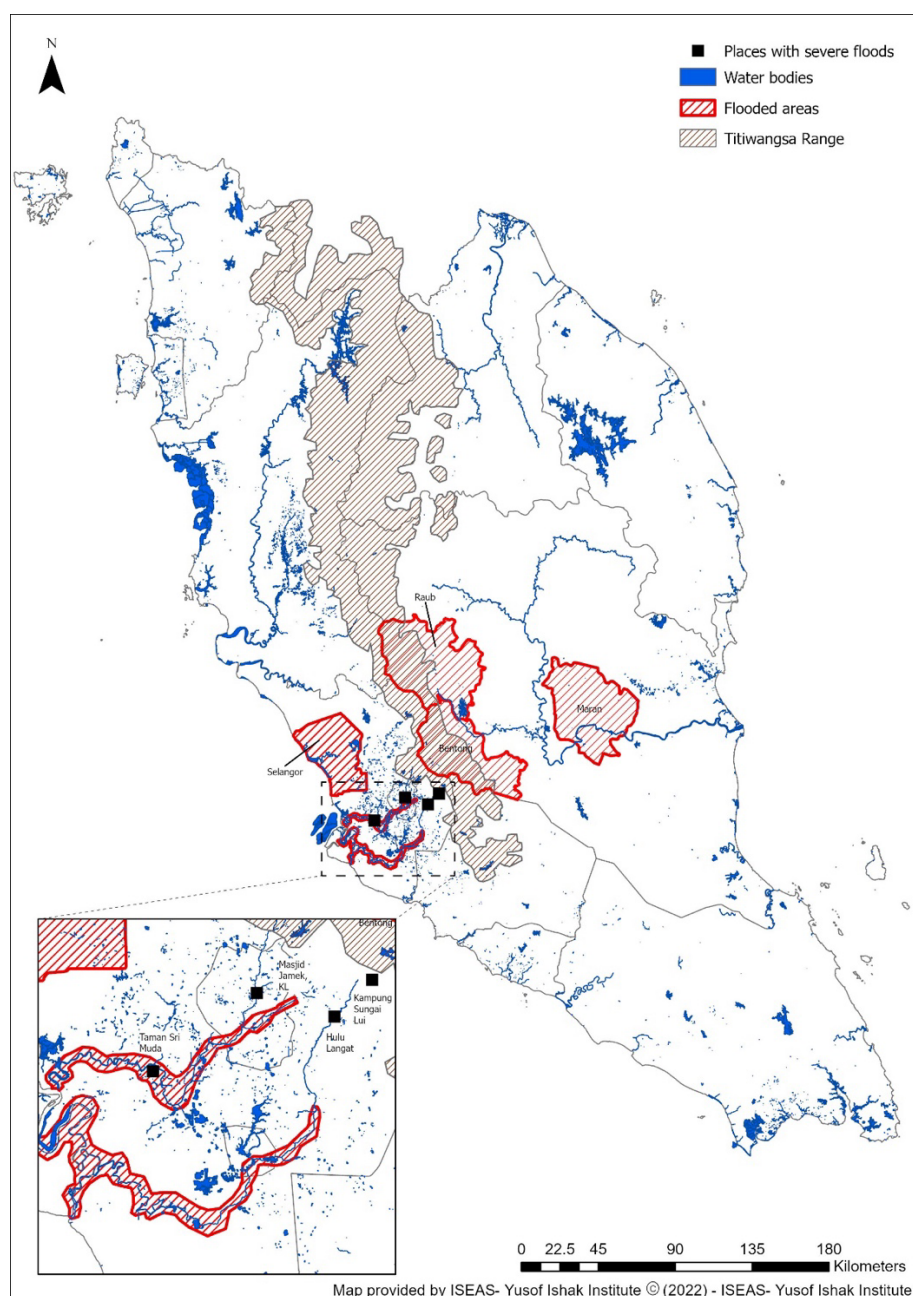
However, on 18 December, just as waters in Taman Sri Muda were rising, Pahang registered the highest number of evacuees. Mudslides in Bentong on the same day dragged down a number of holiday chalets and three holiday-makers with it. After 48 hours of rain, Maran and Raub were the first districts to have people evacuated, and by 19 December, 19 rivers were at danger levels.

Figure 1 below illustrates the areas in Pahang and Selangor that were severely affected by the December 2021 floods.

While some of the floodwaters receded in Pahang and Selangor by Christmas day, and residents were able to return to their homes to begin clearing up the mess and count their losses, the storms moved eastwards to Sabah, flooding Kota Marudu. As rivers in Selangor

overflowed, the floods spread downstream to Melaka, Johor and Negeri Sembilan over the new year. Kelantan and Terengganu's floods also returned as the rainclouds moved east. The weather-related problems did not end there. Sporadic cloudbursts continued until the end of January 2022 and included an unusual hailstorm and strong winds in Kuala Lumpur (24 January), and tornado-like winds that tore off roofs and felled trees in Ipoh (30 January).

**Figure 1** – Map of flooded areas and townships in Pahang and Selangor states (December 2021)

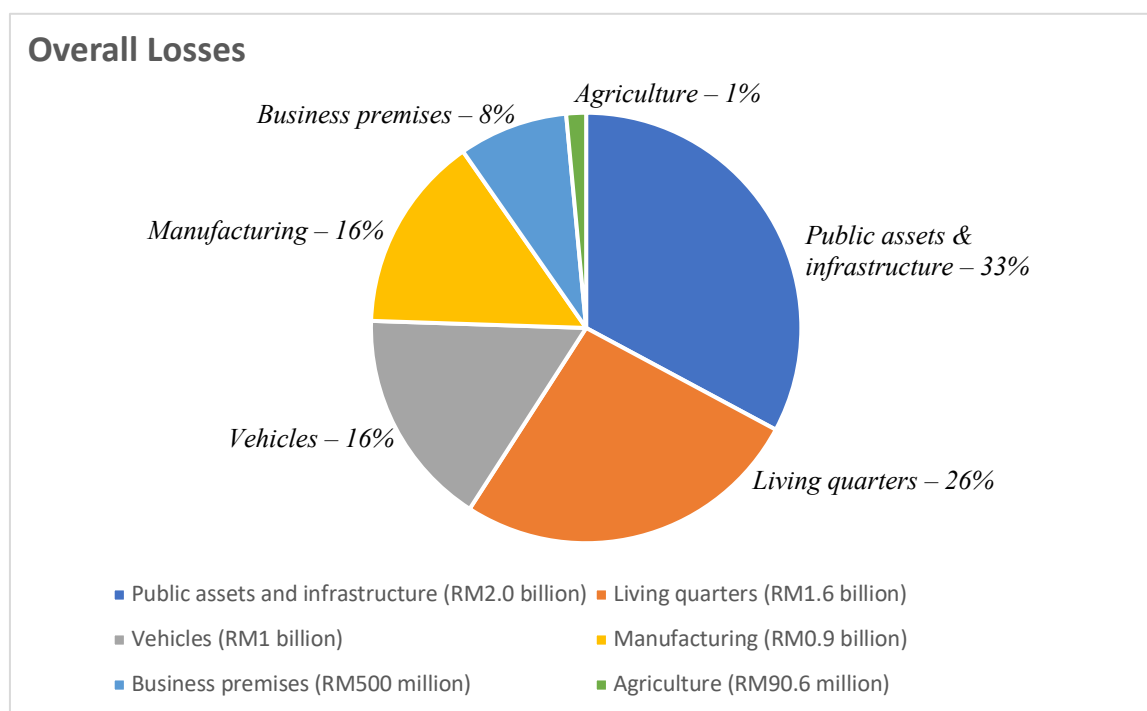


The devastation as a result of these calamities came as a surprise to many. This paper attempts to summarise the possible issues behind the floods of December 2021, which have broadly been attributed to natural geological processes, unusually extreme rainfall, climate change, logging and over-development. The responses to the catastrophe are also examined, before the paper concludes with a number of possible mitigation and adaptation measures for these increasingly frequent ‘natural’ disasters.

## FLOOD IMPACTS

The flooding and landslides across eight states in December 2021 left almost 50 people dead,<sup>6</sup> and displaced more than 40,000 people.<sup>7</sup> The Department of Statistics, Malaysia calculated that overall losses from the floods came to about RM6.1billion (USD1.46 billion).<sup>8</sup> This figure was based on assessments of public assets and infrastructure, living quarters, vehicles, manufacturing, business premises (mostly services) and agriculture. The breakdown is shown in Figure 2 below.

**Figure 2** – Breakdown of overall losses as a result of the December 2021 floods (RM6.1 billion)



Source: Data taken from the Department of Statistics, Malaysia (Facebook infographic:

<https://www.facebook.com/photo/?fbid=302766295228528&set=pcb.302766691895155> (posted on 28 Jan 2022).



While 11 states suffered financial losses as a result of the floods, Klang, Petaling and Hulu Langat districts (all in Selangor state) suffered the most. This is probably due to its more dense, urbanised environment, as well as its lack of familiarity with severe flooding situations. This meant that residents were unaware and unprepared for the floods, let alone the extent of the severity of this particular season's extreme precipitation and flooding event. However, these are merely financial calculations. The intangible aftereffects in those who suffered cannot be quantitatively assessed. Losses such as areas or items of historic, cultural or sentimental value are irreplaceable, and with some of these, there is a subsequent diminishing or loss of identity. While agricultural impacts have been estimated, this may not include the value of arable land; most often damaged by debris, mud and landslides or from being water-logged in the floods.

Poorer communities suffer more than wealthier neighbourhoods, especially as work is disrupted while they try to repair and salvage what remains of their homes. Neighbourhood shops and related stock or equipment may be destroyed, leaving them with even more difficulty in rebuilding their lives when expenses are incurred at rebuilding homes and in the restoring of livelihood sources.<sup>9</sup>

There is also the possibility of water-borne diseases or other illnesses arising post-floods.<sup>10</sup> While many disagree with claims by NADMA that people were reluctant to evacuate,<sup>11</sup> it is undeniable that many feared exposure to Covid-19 at evacuation centres.<sup>12</sup> The figures shown above are short-term material losses that do not take into account debilitating post-event manifestations such as trauma and a decline in mental health and general well-being. As the rains continued in January 2022, a survey of social media posts revealed that many in Selangor were afraid of being trapped in floods again.<sup>13</sup> Myriad posts reflected panic and worry about a rerun of the December 2021 disaster.

## **WHAT CAUSED THE FLOODS**

### *Natural Geological Processes*

A study by the Institute of Geology Malaysia, led by Professors Ibrahim Komoo and Che Aziz Ali, revealed that one of the direct causes of the destruction of a number of villages and holiday chalets along Selangor's rivers were sudden mega debris flows (*banjir puing*).<sup>14</sup> The unprecedented volume of rainfall was far more than the ground and soil could absorb. This resulted in more than a thousand landslides along the Titiwangsa range, which like an avalanche in temperate climes, tumbled downstream in more than a hundred debris flows. These immensely swift and powerful surges of water swept trees, rocks and other debris with it as rivers overflowed their banks. Anything in its path was slammed by this combination of fast-flowing water and its contents, and was hurled along with it.

The study breaks down the components of the December 2021 calamity into four parts: upstream landslides and debris flows in the Titiwangsa range reserve forests, debris floods in highland agricultural areas, mud floods in the lowlands (affecting riverine villages such

as those in Hulu Langat), and monsoonal floods at the estuaries (which affected urban areas such as Taman Sri Muda, Shah Alam and Kuala Lumpur).<sup>15</sup>

Their assessment deemed this a natural geological phenomenon, albeit exacerbated by human impacts in the highlands. While many on social media insisted that rampant logging in the Pahang and other highlands led to this catastrophe, the geologists report that the logs strewn across damaged homes and towns after the waters subsided were those that were ripped out of the ground by surging water rushing down the hillsides.

### *Anthropogenic Impacts*

Deforestation is often cited as the direct cause of floods, but there are often many contributing factors to a disaster. A tropical rainforest is able to intercept and trap about 30 percent of rainfall in its canopy. Of the remaining percentage, much is usually absorbed by the soil and taken up by tree roots.<sup>16</sup> Thus when vast hillsides are clear-felled for agriculture, mining or development, or even when there is selective logging for timber, there is undoubtedly an impact on areas downstream as rainfall cannot be caught and absorbed as much as can be done by a fully intact primary forest.

There are undoubtedly myriad issues related to Malaysian land and forest management, regulation and enforcement, not least because of overlaps in jurisdiction between state and federal authorities.<sup>17</sup> The Rimba Disclosure Project, for example, alleges that vast tracts of forest lands are available for sale online.<sup>18</sup> These lands for sale could be private or state-owned forested land; not all forests are reserves under the jurisdiction of the Forestry Department. However, any forest clearing, even on state land, technically requires approval by the Forestry Department.

Development, urbanisation and related improprieties also add to the woes. While both federal and state regulations stipulate that riverbanks and coastal mangrove forests must have a minimum in untouched buffer zone, and there are myriad constraints listed under the National Land Code, villages invariably pop up too close to the water and some developers are able to find ways around minimum requirements.

Some of these buffer areas along rivers and coasts are not gazetted for protection, while others are within private land. This then makes it hard for the Drainage and Irrigation Department (JPS) and local council to enforce regulations. Some land owners do not take the necessary action to ensure that these buffer zones remain intact.

Urban areas that are expanded over time tend to channel drains and water overflow systems into shared retention ponds. This is a developer's quick fix when an urban space is too crowded (or expensive) for them to build new drainage systems and runs counter to city and town plans, as well as the National Land Code.

In the case of Taman Sri Muda,<sup>19</sup> the sudden and rapid water level rise was due to the unusually high volumes of water flowing downstream, and the whole neighbourhood essentially became a water catchment basin. The situation was made worse as the king tide

at the time impeded overflow channels. Dams could not be opened and sluice gates could not work fast enough to release rising waters.

Added to that were alleged irregularities in the conversion of retention ponds (in Kuala Lumpur) into development projects.<sup>20</sup> Taman Sri Muda is one such area initially marked out on the local plan as a flood plain meant to be used only as a retention pond.<sup>21</sup> Accusations have also arisen over poor maintenance of sluice gates and drainage systems, which have already periodically led to minor flash floods during heavy rainfall long before the December disaster.<sup>22</sup>

### *Climate change*

Some quarters have blamed climate change as the key reason behind the floods and other recent weather-related events. Geologists note that many extreme weather phenomena attributed to climate change have always occurred periodically over millennia.<sup>23</sup> The difference between that and climate change is that the latter has human-related causes whereas geological processes occur naturally over a longer period of time. Human-induced climate change speeds up these processes, leading to increasingly frequent extreme weather phenomena that may or may not be the result of global warming and increasing temperatures.

Hence in December 2021, climate change may have exacerbated the situation through the intensity of 29W (essentially a mild typhoon) and the direction in which it traveled (to the west coast instead of settling on the east coast of Peninsular Malaysia as had always been the recent norm). However, it has yet to be ascertained whether climate change (more specifically global warming due to increasing temperatures or greenhouse gases) was a main or direct cause of the floods.

## **RESPONSES ON THE GROUND**

### *The government response*

When waters began to rise, most politicians were involved in the UMNO and Bersatu general meetings,<sup>24</sup> or away on year-end holidays.<sup>25</sup> Flood-affected residents bemoaned the lack of organised aid and rescue by the government and other agencies, which left some of them stranded on rooftops for up to four days.<sup>26</sup>

The Malaysian Armed Forces (ATM) moved to begin relief efforts even without a directive from the National Disaster Management Agency (NADMA) as is the required protocol, after witnessing victims stranded on rooftops for hours. News reports indicated that the ATM had grown impatient with the lack of direction and decided to mobilise on its own.<sup>27</sup> The Fire and Rescue Department were overwhelmed by calls for help, especially in Selangor where staff themselves were suffering from floods yet rushed to help others, and the severity of the deluge was ‘unexpected’.<sup>28</sup> Indeed, instead of acting in unison to help flood victims,



the government seemed to be more intent on pushing blame between federal and state governments and agencies, and politicking between incumbent parties.<sup>29</sup>

While a few opposition politicians were shown to be on the ground and helping flood-stranded victims by 18 December,<sup>30</sup> many other political leaders and ministers only appeared after the water subsided.<sup>31</sup> Accusations of ‘showboating’ arose as politicians were seen posing on ‘rescue’ boats packed full of media personnel and their personal entourage,<sup>32</sup> as well as holding grand hotel ‘launch’ ceremonies to announce their aid distribution to the media.<sup>33</sup>

Others were panned for posing with water jets and shovels in places that were clearly already cleaned, and doing that in inappropriate footwear.<sup>34</sup> Prime Minister Ibrahim Sabri acknowledged there were shortfalls in the government response, and announced the immediate replacement of NADMA with the National Security Council (MKN) to deal with the disaster response.<sup>35</sup>

In the immediate aftermath of the floods, the government put out a call for donations to a flood relief fund, but netizens on Twitter responded with the hashtag #DoNotDonateToGovernment.<sup>36</sup> While there were then subsequent announcements of flood aid, the RM1000 (SGD322) per household disbursement<sup>37</sup> was roundly criticised by flood victims and opposition politicians as acutely insufficient given that the average estimated home repair cost was at least RM10,000. Others complained that there was too much bureaucracy to overcome in order to get the aid.<sup>38</sup>

The government subsequently announced a more comprehensive flood relief package worth a total of RM1.4 billion (SGD450 million), and a revision to previous restrictions.<sup>39</sup>

### *Civil society to the rescue*

While the floods of December 2021 were a terrible experience for its victims and left the rest of the nation reeling in shock at the severity of the debris flows and floodwater depths, there was a silver lining to the episode.

As with any other disaster that occurs in Malaysia, the people rose to help themselves and each other when there seemed to be a lag in effective action by the government and local authorities or agencies.<sup>40</sup>

Social and mainstream media reports highlighted the efforts and kindness of resident groups, neighbours and random strangers (including migrant workers) who did their best to help the aged, children and disabled.<sup>41</sup> As residents sat stranded on rooftops, several youth swam through the floods to retrieve and rescue food and other needs, clambering across houses to deliver them to starving and thirsty families,<sup>42</sup> or to look for help.

Not only did NGOs and religious groups like the Malaysian Red Crescent Society and the Gurdwara Sahib Petaling Jaya immediately mobilise, so did concerned citizens from other states.

Fishermen of Kelantan, Kedah, Terengganu and Johor traveled to Selangor with their boats in tow to provide aid as roads turned into lakes and rivers.<sup>43</sup> Awan Omar, better known as ‘Abang Viva’, became a viral sensation and ‘flood hero’ for taking emergency leave to haul his boat on top of his Perodua Viva from Melaka to Shah Alam to help those in need.<sup>44</sup> Some provided heavy vehicles and 4WDs to send food and other supplies.

Those interviewed said that they were merely returning the kindness shown them when they too endured floods in the past. Others simply said they could not sit back and watch fellow Malaysians suffer.<sup>45</sup>

Volunteer doctors set up impromptu clinics and others focused on rescuing pets and providing veterinary care.<sup>46</sup> When the floods subsided, youth and countless other volunteers helped to clean homes and places of worship, as well as salvage and repair damaged appliances.<sup>47</sup>

## **MOVING FORWARD**

Annual monsoonal floods in the east coast of Peninsular Malaysia, as well as in Sarawak and Sabah have become such a regular occurrence that action in response to inundation usually moves like clockwork. Ibrahim Komoo notes that it is important to prepare society to ‘live with disaster’. He emphasises the need for a better understanding of geological processes (earth sciences) and better public awareness on disaster response and SOPs.<sup>48</sup>

Ili Nadiah Dzulfakar, Founder of KLIMA Action Malaysia, notes that international efforts to combat climate change should not focus solely on over-ambitious and elitist aspects such as carbon credits and markets, but instead work on practical measures that will reach those who are on the frontlines of climate change-related disasters. She suggests that Malaysia take on an important role to strengthen Loss and Damage mechanisms for finance in the climate change Conference of Parties (COP), and also domestically refocus on actions that addresses Loss and Damage to ensure compensation, reparation and funds to rebuild lives.<sup>49</sup> Environmentalists across Malaysia have called for a complete logging moratorium,<sup>50</sup> but this will have to overcome myriad overlaps in jurisdiction and loopholes such as the ability to log on private land; will require a lot of institutional transparency and integrity; and the unwavering recognition of indigenous land rights. Since the devastating floods, the Pahang state government has announced that it has launched a programme to plant a tree for every child born in the state.<sup>51</sup>

Nature-based solutions to climate change call for river restoration in place of hard engineering approaches to canals and drainage systems.<sup>52</sup> Good town and city planning documents and regulations that take into account future climate change scenarios should be strictly enforced, and incorporate approaches such as flood plains planning.

Zaki Zainudin, water quality and modelling specialist, notes that there is abundant data from climatology and hydraulic conveyance modelling tools that can be used to predict, plan for and mitigate flood severity.<sup>53</sup> New developments can consider the approach of China's 'sponge city' projects in Gui'an New District.<sup>54</sup>

However, in an already urbanised, overly-dense older suburb such as Taman Sri Muda, this would call for a complete overhaul of existing drainage systems and may result in the loss of already limited fringing open spaces, require costly land acquisition and highly complicated construction.

It is clear that society must pay heed to these consistent warnings of increasingly regular disasters to come if nothing is done to prepare for them. Christine Fletcher stresses the need for Malaysia to not just mitigate for natural disasters and climate change impacts, but to adapt lives and livelihoods for better resilience. Only when communities and local districts are empowered to take immediate or early action in light of weather warnings or other directives, can they properly "build back better," encompassing infrastructure, policies, planning and community capabilities.<sup>55</sup>

## ENDNOTES

<sup>1</sup> A low-pressure area that generates unusually high volumes of rainfall, with the possibility of becoming a cyclone or typhoon.

<sup>2</sup> Aiman, A. 23 December 2021. "Total loss: Hulu Langat residents tell of 'devastating' floods," Free Malaysia Today. <https://www.freemalaysiatoday.com/category/nation/2021/12/23/total-loss-hulu-langat-residents-tell-of-devastating-floods/>

<sup>3</sup> Ariff, I and Ramachandran, J. 1 January 2022. "How Taman Sri Muda 'drowned' in other people's water," Free Malaysia Today. <https://www.freemalaysiatoday.com/category/nation/2022/01/01/how-taman-sri-muda-drowned-in-other-peoples-water/>

<sup>4</sup> Chan, J. 24 December 2021. "Receding waters bring relief to Taman Sri Muda residents," Star Online. <https://www.thestar.com.my/metro/metro-news/2021/12/24/receding-waters-bring-relief-to-taman-sri-muda-residents>

<sup>5</sup> For example, on Twitter: [https://twitter.com/min\\_dy0/status/1472868053310328834](https://twitter.com/min_dy0/status/1472868053310328834)

<sup>6</sup> Relief Web. 3 January 2022. Malaysia – Floods and landslides, update (NADMA, Met Malaysia, media) (ECHO Daily Flash of 3 January 2022). <https://reliefweb.int/report/malaysia/malaysia-floods-and-landslides-update-nadma-met-malaysia-media-echo-daily-flash-3>

<sup>7</sup> Davies, R. 20 December 2021. "Malaysia – Floods displace over 40,000," Floodlist. <https://floodlist.com/asia/malaysia-floods-december-2021>

<sup>8</sup> Department of Statistics, Malaysia. 28 January 2022. Special Report on Impact of Floods in Malaysia 2021. [https://www.dosm.gov.my/v1/index.php?r=column%2FcthemByCat&cat=496&bul\\_id=ZlkxS0JnNThiRHk0ZllZajdyVm44UT09&menu\\_id=WjJGK0Z5bTk1ZE1VT09yUW1tRG41Zz09&fbclid=IwAR16\\_ZcY6DlefMigXSq-IyJUJT4a\\_EbiUz\\_IBl\\_T76xYWXX7eeTd3gdomGY](https://www.dosm.gov.my/v1/index.php?r=column%2FcthemByCat&cat=496&bul_id=ZlkxS0JnNThiRHk0ZllZajdyVm44UT09&menu_id=WjJGK0Z5bTk1ZE1VT09yUW1tRG41Zz09&fbclid=IwAR16_ZcY6DlefMigXSq-IyJUJT4a_EbiUz_IBl_T76xYWXX7eeTd3gdomGY)

<sup>9</sup> Gengathurai, V.D. 30 December 2021. "The far-reaching impact of floods," New Straits Times. <https://www.nst.com.my/opinion/letters/2021/12/758852/far-reaching-impact-floods>

<sup>10</sup> Hilmy, I. 23 December 2021. "Diseases loom after floods," Star Online. <https://www.thestar.com.my/news/nation/2021/12/23/diseases-loom-after-floods>

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