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ONE RESPONSE

ASEAN Risk Monitor and Disaster Management Review

Issue June 2022

3rd edition

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When Disasters and Pandemic Collide:
**What does it mean to ASEAN, now
and into the future?**



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ARMOR 3rd Edition

Introduction

With the publication of the third edition of the ASEAN Risk Monitor and Disaster Management Review (ARMOR) - titled *When Disasters and Pandemic Collide: What does it mean to ASEAN, now and into the future?* - the AHA Centre continues to provide well-researched and in-depth analysis of issues relating to disaster management in the ASEAN region. ARMOR has now established itself as a regular source of knowledge, seeking to share information on innovations and best practices on disaster management and crisis management in what is one of the most disaster-prone regions in the world.

In the study of disaster management, it is not sufficient to produce research for research sake, simply adding to the many journals of interest only to academics. It is essential that such research is made available, as a comprehensive and readily available source of reference to support development and implementation of disaster management policy.

With this in mind, and with the active contributions from academia and disaster management professionals, ARMOR aimed to provide critical data and intelligence in an accessible format to policymakers and officials, as well as to practitioners in the field. By doing so, ARMOR plays its part in fulfilling its role of supporting the implementation of the ASEAN Vision 2025 on Disaster Management.

Given the nature of the health crisis endured globally and in the ASEAN region as a result of COVID-19 in the past years, the contributors in this edition bring highlights to how the current pandemic affected disaster management policymaking. This edition not solely focuses on the COVID-19 pandemic, but also deals with innovative methods, including the latest information and communication and satellite technology, that can be used to speed up the analysis of real-time data and the cross-border provision of aid during disasters, in anticipation of future pandemics.

Disaster and Pandemic: The Exacerbating Effects of COVID-19 on ASEAN's Disaster Riskscape examines the effects of the COVID-19 pandemic and its impact on disaster risk and disaster management and emergency response in the ASEAN region, in particular how the pandemic worsened the disaster riskscape of the ASEAN region, and how the region adapted its disaster management practices to cope with the pandemic.

Leveraging Artificial Intelligence for Enhanced Flood Emergency Response, Amidst COVID-19 Pandemic illustrates how the UN Satellite Centre's (UNOSAT) FloodAI programme can provide up-to-date imagery of flood-prone areas. The imagery is processed by a deep-learning model to generate flooding maps and update operational dashboards. This allows decision makers to optimise the response to flooding in a much shorter timeframe than through human-based analysis, thus reducing the loss of life and mitigating damage.

ASEAN Single Window: Towards More Efficient & Faster Facilitation of Customs Clearance explains how the ASEAN Single Window, a regional initiative that combines the direct exchange of data between ASEAN Member States can be used to synchronise the data exchange across borders in order to expedite and streamline cargo clearance and shipment release throughout the region in times of disaster, especially during pandemic-induced mobility restrictions.

As Local as Possible - COVID-19 impacts on localisation efforts and humanitarian response: Opportunities for the AHA Centre discusses the leveraging of localisation in disaster management. Taking as its theme "as local as possible, as international as necessary" the study determines how localisation has evolved, particularly amid the COVID-19 pandemic; defines the role of the AHA Centre in operationalising local efforts and analysing sustainable methodologies; and reflects on adaptations of the broader ASEAN humanitarian system.

Finally, this edition also includes a special feature article on **Emergency Response in a Pandemic: the Singapore COVID-19 Experience**, which provides a synopsis of how the Singapore Civil Defence Force coped with the impact of the COVID-19 pandemic on its operations at home and in the wider region through its Operation Lionheart, outlining the many practical measures taken and adaptations made to ensure continuity of operations.

The AHA Centre is grateful to the individuals and organisations that have supported and contributed to the third edition of ARMOR.

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ACRONYMS AND ABBREVIATIONS

A	AADMER	ASEAN Agreement on Disaster Management and Emergency Response
	ACDD	ASEAN Customs Declaration Document
	ACDM	ASEAN Committee on Disaster Management
	ACE Programme	AHA Centre Executive Programme
	ADB	Asian Development Bank
	ADINet	ASEAN Disaster Information Network
	AHA Centre	ASEAN Coordinating Centre for Humanitarian Assistance on disaster management
	AI	Artificial Intelligence
	AIM	All-hazard Impact Model
	AMS	ASEAN Member States
	APDR	Asia-Pacific Disaster Report
	APG	AADMER Partnership Group
	ARI	Acute Respiratory Illness
	ARMOR	ASEAN Risk Monitor and Disaster Management Review
	ART	Antigen Rapid Test
	ASEAN	Association of Southeast Asian Nations
	ASEAN-ERAT	ASEAN Emergency Response and Assessment Team
	ASEAN RISK	ASEAN Risk Index for Situational Knowledge
	ASW	ASEAN Single Window
	ASWSC	ASEAN Single Window Steering Committee
	ATIGA	ASEAN Trade in Goods Agreement
B	BCP	Business Continuity Plan
	BNPB	Indonesia’s Badan Nasional Penanggulangan Bencana or National Disaster Management Agency
	BoO	Base of Operations
	BRT	Basic Rescue Training

C	CDA	Civil Defence Academy
	CET	Continuing Education and Training
	CFE-DM	The Center for Excellence in Disaster Management and Humanitarian Assistance
	CIQ	Customs, Immigration, and Quarantine
	COVID-19	Coronavirus Disease 2019
	CPR	Cardiopulmonary Resuscitation
	CSIS	Center for Strategic & International Studies
	CSO(s)	Civil Society Organisation(s)
CTs	Certification Tests	
D	DDPM	Thailand's Department of Disaster Prevention and Mitigation
	DELSA	Disaster Emergency Logistics System for ASEAN
	DORSCON	Disease Outbreak Response System Condition
	DRR	Disaster Risk Reduction
	DRRM	Disaster Risk Reduction and Management
	DSS	Decision Support Systems
E	EM-DAT	Emergency Events Database
	EMS	Emergency Medical Services
	ESCAP	Economic and Social Commission for Asia and the Pacific
G	GMI	Global Mentoring Initiative
H	HBL	Home-based Learning
	HELIX	The Humanitarian and Emergency Logistics Innovation Expo
	HITL	Human-in-the-loop
I	ICT	Information and Communications Technology
	IFRC	The International Federation of Red Cross and Red Crescent Societies
	IMF	International Monetary Fund
	INFORM	Index for Risk Management
	INGO(s)	International Non-Governmental Organisation(s)
	INSARAG	International Search And Rescue Advisory Group
J	JRC	Joint Research Centre

L	LOA	Leave of Absence
	LWG (for ASW)	The Working Group on Legal and Regulatory Matters for The ASW
M	MOH	Ministry of Health
N	NDMC	Brunei Darussalam's National Disaster Management Centre
	NDMO	National Disaster Management Organisation
	NDPBA	National Disaster Preparedness Baseline Assessment
	NDRRMA	National Disaster Risk Reduction and Management Authority
	NDRRMC	the Philippines' National Disaster Risk Reduction and Management Council
	NFP	National Focal Point
	NGO(s)	Non-Governmental Organisation(s)
	NSW(s)	National Single Window(s)
O	OECD	Organisation for Economic Co-operation and Development
	Ops	Operation
	ORNSmen	Operationally Ready Servicemen
	OWID	Our World in Data
P	PDC	Pacific Disaster Center
	PDF	Portable Document Format
	PLF	Protocol on the Legal Framework
	PMO	Project Management Office
	PPE	Personal Protective Equipment
R	RCC	Rota Commander Course
	RMC	Risk Management Centre
	RS Portal	Regional Service Portal
	RVA	Risk and Vulnerability Assessment
S	SAR	Synthetic Aperture Radar
	SARS	Severe Acute Respiratory Syndrome
	SASOP	Standard Operating Procedure for Regional Standby Arrangements and Coordination of Joint Disaster Relief and Emergency Response Operations
	SCC	Section Commander Course
	SCDF	Singapore Civil Defense Force
	SIPA	School of International and Public Affairs
SMM	Safe Management Measures	

Disaster and Pandemic:

The Exacerbating Effects of COVID-19 on ASEAN's Disaster Riskscape

T	TFA	Trade Facilitation Agreement
	TWG (for ASW)	The Working Group on Technical Matters for The ASW
U	UN	United Nations
	UN-ASIGN	United Nations-Adaptive System for Image Communication over Global Networks
	UN ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
	UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
	UNOSAT	The United Nations Satellite Centre
	UNRCO	United Nations Resident Coordinator Office
	USAR	Urban Search And Rescue
V	USD	United States Dollar
	USINDOPACOM	United States Indo-Pacific Command
	VNDMA	Viet Nam Disaster Management Authority
W	WCO	World Customs Organization
	WFH	Work From Home
	WHO	World Health Organization
	WTO	World Trade Organisation



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Abstract

The ASEAN region's disaster risk remains among the highest in the world—and has been further exacerbated by the COVID-19 pandemic. Between 11 March 2020 and 30 November 2021, the region struggled to manage the public health emergency. During this same time, record-high numbers of disasters occurred across the region. This article assesses the latest disaster risk of the ASEAN region and explores how COVID-19 impacted its disaster riskscape and disaster management and emergency response. Myanmar, the Philippines, and Indonesia remained the most-at-risk ASEAN Member States (AMS) to disasters. Moreover, the region's disaster risk has increased since the first edition of the ASEAN Risk Monitor and Disaster Management Review (ARMOR) in 2019. The main drivers of the higher disaster risk were increased vulnerability and reduced coping capacities. The COVID-19 pandemic exacerbated the region's disaster risk by an average of 33% —a significant negative impact. This required adjustments on the part of National Disaster Management Organisations (NDMOs) and the AHA Centre in carrying out their respective disaster response activities. Their experiences in disaster response during the pandemic were full of challenges and lessons learned, however since COVID-19 will not be the last pandemic, a more institutionalised and effective approach to disaster risk reduction is therefore needed. Towards this end, this article makes three recommendations—a more targeted method of addressing disaster risk by focusing on its drivers, monitoring of risk through the periodic conducting of risk assessments, and exploring how surplus resilience in some AMS can be shared across the region.

**Keywords:**

ASEAN RISK, COVID-19, disaster riskscape, pandemic, resilience



1.1

Introduction

On 11 March 2021, the World Health Organization (WHO) declared COVID-19 a pandemic. The ASEAN region, one of the most at-risk to disasters, was significantly affected by the public health emergency. Between 11 March 2020 and 30 November 2021, the region tallied 5% of the global cumulative cases and 6% of the global cumulative deaths (WHO, 2021). During the same period, 16% of the globally recorded disasters due to natural hazards occurred in the region (EM-DAT, 2021). This illustrates the combination of natural hazards and the pandemic.

From July 2012 to November 2021, the ASEAN Disaster Information Network (ADINet) recorded a total of 3,503 disasters—48% (1,690) of which were recorded during¹ the COVID-19 pandemic (Figure 1.1). Several factors influenced this high number, including improved monitoring and reporting capacities of ASEAN Member States' (AMS) National Disaster Management Organisations (NDMOs) and the aggravating effects of the pandemic on the already threatening disaster riskscape of the region.

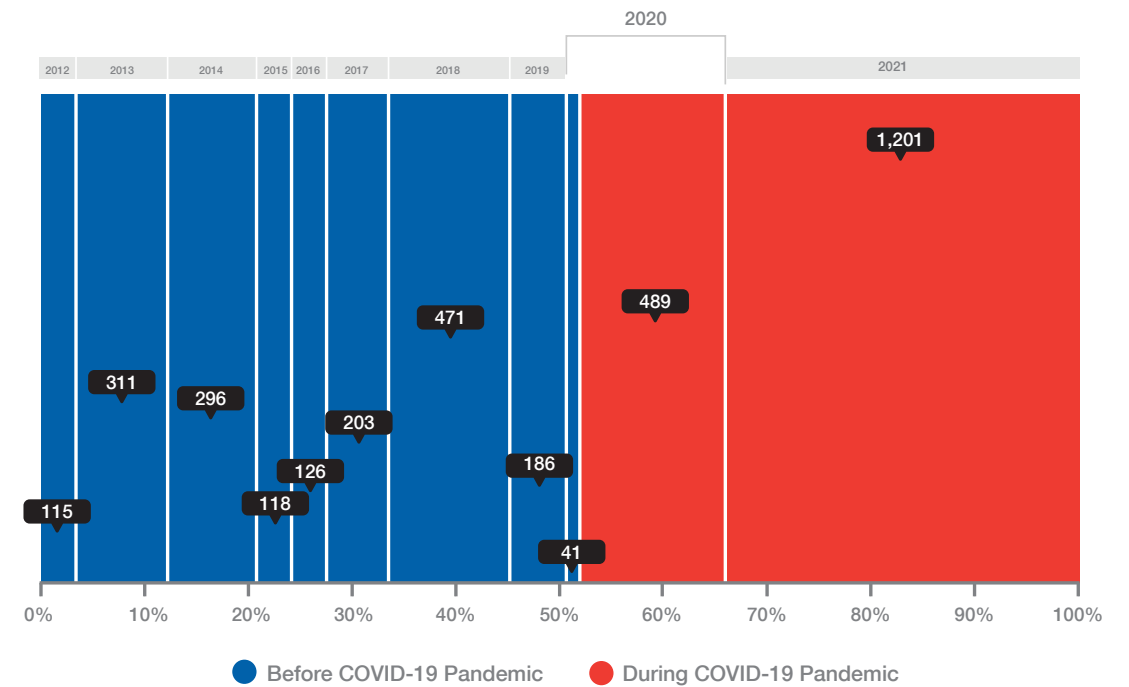


Figure 1.1: The breakdown of disaster occurrences in the ASEAN region by year shows that 48% of occurrences between 2012 and 2021 were recorded during the COVID-19 pandemic (Source: ADINet, 2021).

This article explores the impact of COVID-19 on the ASEAN region's disaster riskscape and disaster response management. Further, this article introduces the ASEAN Risk Index for Situational Knowledge (ASEAN RISK)—a model-of-models approach to assessing the region's disaster risk and resilience. ASEAN RISK is used to quantitatively assess the latest regional disaster risk and the effects of COVID-19 on it. Lastly, results of a questionnaire responded to by NDMOs and the AHA Centre are used to qualitatively present perspectives on the impact of COVID-19 on disaster response.

¹ This article temporally defines the coverage of COVID-19 pandemic as between its declaration (11 March 2020) to a set cut-off for data inclusion (30 November 2021) to maintain uniformity in its analyses.

1.1.1 ASEAN RISK

ASEAN RISK (Figure 1.2) builds on two of the leading disaster risk indices currently in use—the Joint Research Centre’s (JRC) Index for Risk Management (INFORM) and the Pacific Disaster Center’s (PDC) ASEAN Risk and Vulnerability Assessment (RVA). These indices are leveraged to create a composite measure of Multi-Hazard Exposure, Vulnerability, Coping Capacity, and Resilience. Composite indices are highly useful for summarising complex information for decision makers; as such, the authors believe that ASEAN RISK provides the most comprehensive method of disaster risk assessment for the ASEAN region.

INFORM and ASEAN RVA take similar approaches to indicator selection, scaling, aggregation, and ranking. The differences are largely due to the scale of INFORM (global) versus the ASEAN RVA (regional) and minor differences in indicators are included in the analysis. The results from each index are similar but not entirely the same.

The ASEAN region is situated in one of the most disaster-prone areas in the world. To better capture the natural hazard exposure of AMS, Multi-Hazard Exposure is assessed using the PDC’s All-hazard Impact Model (AIM) 3.0, which uses base population and infrastructure data, which are at the highest spatial resolution currently available (30 m by 30 m resolution). Hazard zones (earthquakes, wildfires, landslides, tropical cyclones, floods, tsunamis, and volcanoes) serve as input into the model. Hazard exposure considers raw values (total size of population and/or infrastructure exposed within a hazard zone) and relative values (percentage of total population and/or infrastructure exposed within a hazard zone). This provides a more balanced assessment of both the magnitude and importance of hazard exposure within each AMS. The base population and infrastructure data that intersect the hazard zones are aggregated to produce a composite, hazard-specific exposure. These are then averaged to produce an overall Multi-Hazard Exposure value.

The Vulnerability and Coping Capacity components of INFORM and ASEAN RVA are aggregated to produce a single score and ranking for each AMS. Following ASEAN RISK’s model-of-models approach, results from both risk models are applied to produce a single measure index score for each component. Further, index scores for Vulnerability and Coping Capacity are additionally aggregated to produce a measure of Resilience to consider both the population-based measures and systemic tools that assess AMS’ ability to prepare for, respond to, and recover from a variety of shocks.

Risk is envisioned as the composite of Multi-Hazard Exposure, Vulnerability, and lack of Coping Capacity. This is in keeping with the currently accepted model of disaster risk where the driving forces are exposure to hazards and sensitivity to impact. ASEAN RISK generates a final risk score for each AMS, and a ranking based on the scores. The final score is on a 0-1 scale, with 1 being the highest risk and 0 being the lowest.

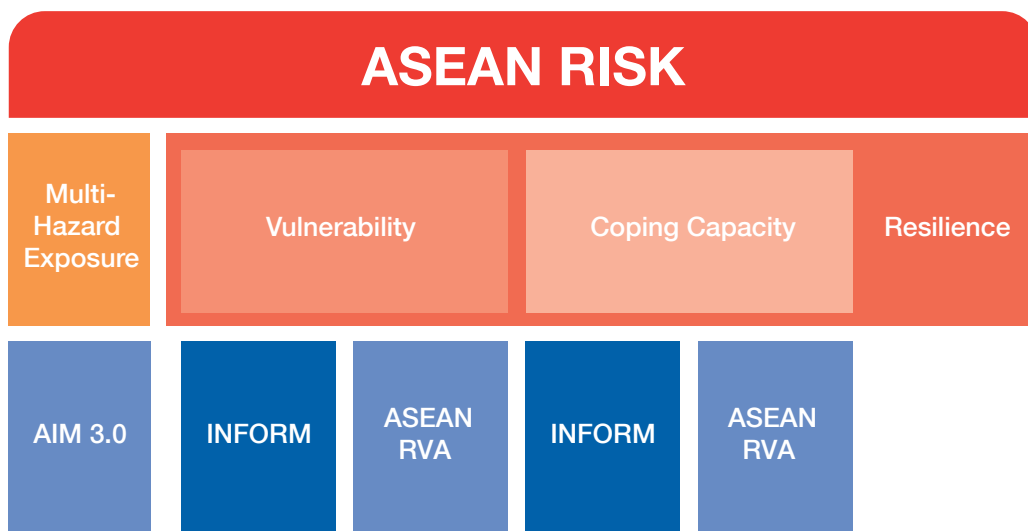


Figure 1.2: ASEAN RISK follows a model-of-models approach, whereby disaster risk components in INFORM and ASEAN RVA are applied to produce a composite risk index for each AMS.

1.1.2 COVID-19 Exposure

Previous editions of the ASEAN Risk Monitor and Disaster Management Review (ARMOR) disaster riskscape analyses quantitatively assessed natural hazard risk only. For this article, COVID-19 exposure (total cases, total deaths, average daily cases, average daily deaths, and unvaccinated population) was considered as well. Each exposure category for both raw (total count) and relative (percentage of the population) was captured. Raw and relative exposure categories were aggregated to produce a final COVID-19 exposure value.

To determine the additive burden of COVID-19 exposure on each AMS' disaster risk profile, the COVID-19 exposure was combined with the natural hazard risk (Figure 1.3). This provides a final value that demonstrates the risk of each AMS due to the combination of natural hazards and COVID-19.

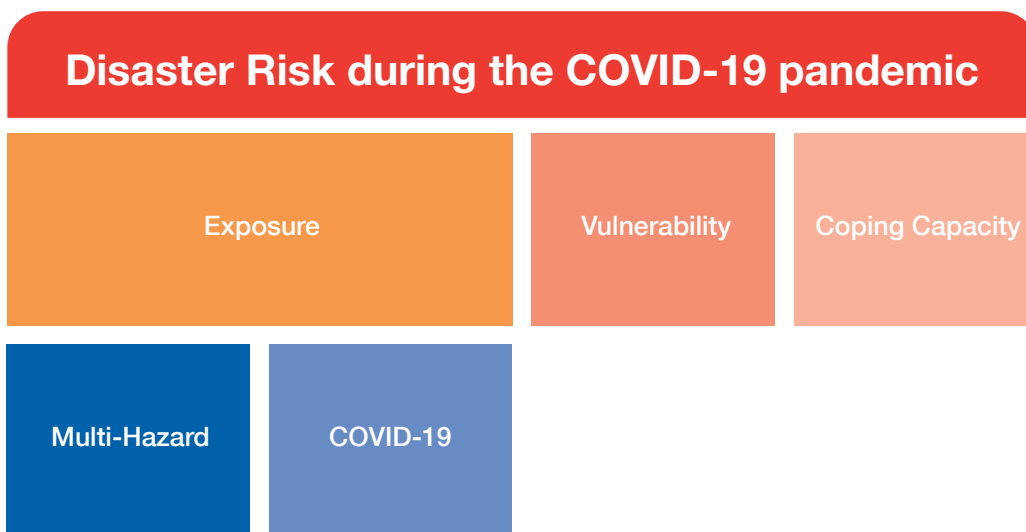


Figure 1.3: COVID-19 exposure is aggregated with the Multi-Hazard Exposure and then re-calculated with the other components of ASEAN RISK (Vulnerability and Coping Capacity) to arrive at a measure of the additive burden of COVID-19 on the natural hazard risk of each AMS.

1.1.3 Disaster Response During COVID-19

Even during the pandemic, disasters of varying magnitudes continued to take place. While most of these disaster events were within local disaster response capacities, a few required at least a national level of response. In the last quarter of 2020, two disaster events prompted regional coordination in their disaster responses—the Central Viet Nam flooding (October) and Typhoon Goni in the Philippines (November).

To illustrate the effects of COVID-19 on the disaster response activities of ASEAN and the AMS, the experiences of NDMOs and the AHA Centre were gathered through a short questionnaire.

Rooted in the reality that COVID-19 required adherence to health safety protocols (e.g., social distancing, use of personal protective equipment, etc.) in the conduct of disaster response operations (e.g., evacuation, search and rescue, delivery of relief assistance, etc.), the survey explored adjustments or changes to respective operations/procedures/protocols prompted by the pandemic. Respondents were also asked about their experiences during the implementation of such adjustments.

The questionnaire also inquired as to the added complexity of COVID-19 in several components of disaster response management (i.e., logistics, management of internally displaced people, human resources, information and communications technology, coordination, and disaster monitoring, data collection, recording, and reporting) and on significant milestones/successes in the conduct of disaster response operations during COVID-19.

Six NDMOs answered the survey in time for the analysis—Brunei Darussalam's National Disaster Management Centre (NDMC), Indonesia's Badan Nasional Penanggulangan Bencana (BNPB), Lao PDR's National Disaster Management Office (NDMO), the Philippines' National Disaster Risk Reduction and Management Council (NDRRMC), Thailand's Department of Disaster Prevention and Mitigation (DDPM), Viet Nam Disaster Management Authority (VNDMA). In addition, an official regional perspective is provided by the AHA Centre.



1.2

Results & Discussions

1.2.1 ASEAN RISK 2021

Exposure to natural hazards remains to be the main driver of disaster risk in the ASEAN region. Of the natural hazards assessed, earthquakes and tropical cyclones pose the most considerable threat to the region’s population—359 million (57% of the population) and 310 million (49% of the population) people are exposed, respectively. During the COVID-19 pandemic, 1% of recorded disaster events were due to earthquakes in Indonesia and the Philippines (ADINet, 2021). Meanwhile, 13% of recorded disaster events were due to tropical cyclones and other wind-related incidents that occurred in most AMS (Table 1.1) (ADINet, 2021).

ASEAN Member States	Drought	Landslide	Storm	Wind	Flood	Tsunami	Volcano	Earth Quake	Total
Brunei Darussalam	-	-	-	-	-	-	-	-	-
Cambodia	1	-	8	11	11	-	-	-	31
Indonesia	12	135	6	134	888	-	4	11	1,190
Lao PDR	-	3	3	1	4	-	-	-	11
Malaysia	-	2	0	-	36	-	-	-	38
Myanmar	-	4	5	2	4	-	-	-	15
Philippines	-	18	30	25	88	-	2	6	179
Singapore	-	-	0	-	-	-	-	-	-
Thailand	-	12	39	36	56	-	-	-	143
Viet Nam	-	12	18	14	29	-	-	-	83
Total	13	206	109	223	1,116	-	6	17	1,690

Table 1.1: The distribution of disaster events (by AMS and hazard) in the ASEAN region during the COVID-19 pandemic shows that Indonesia had the highest number of occurrences for all types of hazards except storms, for which Thailand ranked first (Source: ADINet, 2021).

On the other hand, floods pose the largest economic exposure, amounting to USD 7.6 trillion (Figure 1.4). Moreover, flooding is the most frequently occurring disaster in the region. In fact, during the COVID-19 pandemic, 66% of recorded disaster events were due to flooding that occurred in all AMS except Brunei Darussalam and Singapore (ADINet, 2021).

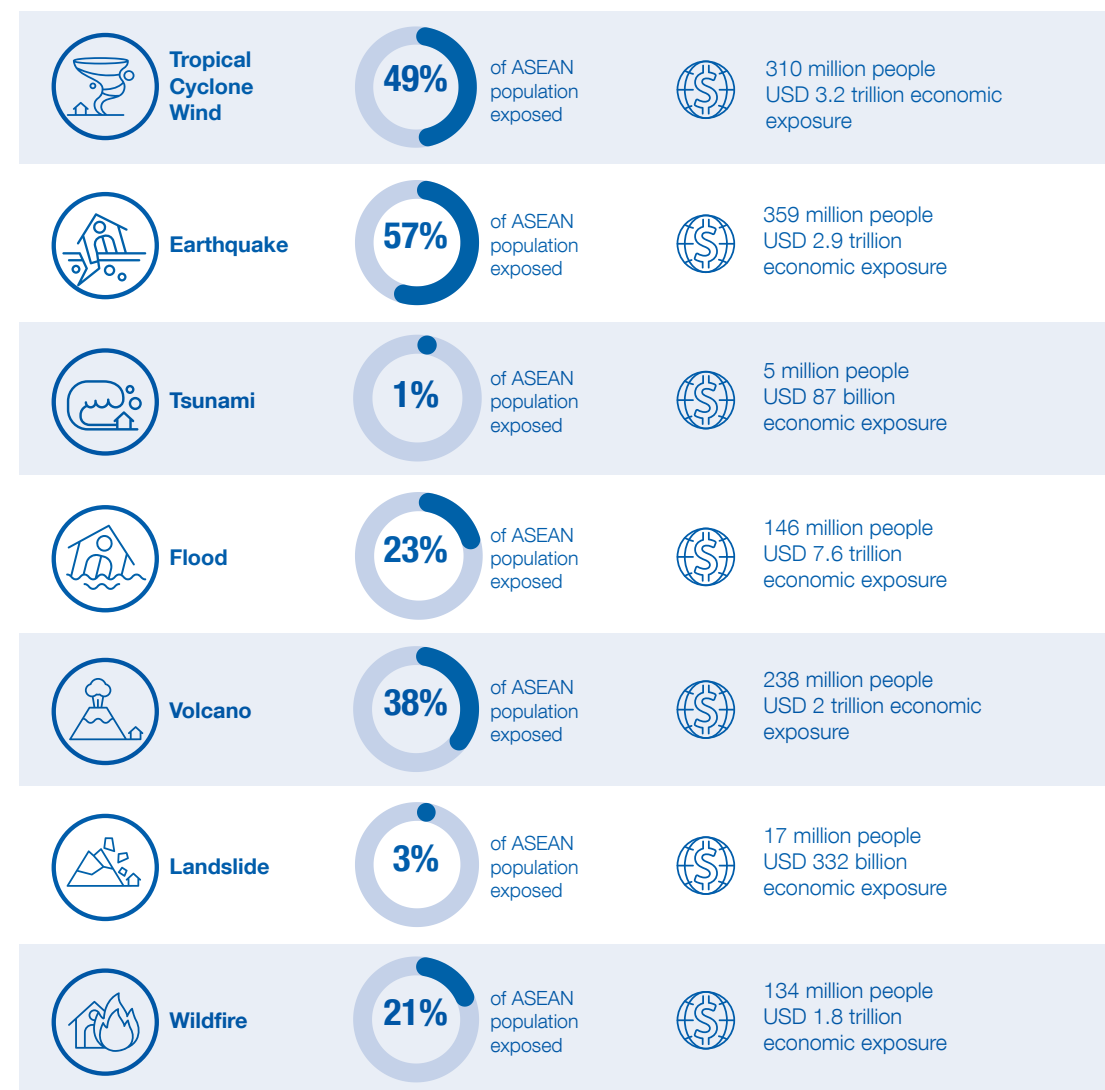


Figure 1.4: A summary of the ASEAN region’s population and economic exposure to natural hazards shows that earthquakes, tropical cyclones, and volcanoes pose the highest threat to its population. Meanwhile, floods—the most frequent disaster in the region, pose the highest threat to the economy.

In total, the ASEAN region’s economic exposure to multi-hazards amounts to USD 17.9 trillion—almost six times the region’s total economy in 2020 (estimated at USD 3.1 trillion [IMF, 2021]). This is a significant increase from the ARMOR second edition which estimated the region’s capital stock exposure to be four times its economy in 2019 (Dimailig, Landicho, Green, & Morath, 2020). The significantly increasing gap between the region’s economic exposure to natural hazards and its combined economy is a developmental problem—it exposes the region to the danger of a catastrophic transboundary disaster pushing back years of development.

Indonesia, Myanmar, and the Philippines are the three most exposed AMS to multiple natural hazards; and ultimately, the three most-at-risk AMS to disasters. On the other hand, Brunei Darussalam, Malaysia, and Singapore are the least-at-risk AMS, primarily due to their high levels of resilience (Table 1.2). These findings have been consistent with the past two editions of ARMOR (Pang & Dimailig, 2019; Dimailig, Landicho, Green, & Morath, 2020).

Member States	Risk	Risk Rank	Resilience	Resilience Rank	Coping Capacity	Coping Capacity Rank	Vulnerability	Vulnerability Rank	Exposure	Exposure Rank
Brunei Darussalam	0.240	9	0.743	2	0.654	2	0.169	9	0.236	10
Cambodia	0.455	5	0.415	9	0.337	9	0.506	3	0.339	9
Indonesia	0.530	3	0.545	6	0.480	6	0.390	5	0.694	2
Lao PDR	0.489	4	0.455	8	0.345	8	0.437	4	0.409	6
Malaysia	0.374	8	0.452	3	0.622	3	0.318	6	0.434	5
Myanmar	0.640	1	0.321	10	0.254	10	0.612	1	0.575	3
Philippines	0.580	2	0.471	7	0.472	7	0.531	2	0.720	1
Singapore	0.178	10	0.871	1	0.837	1	0.095	10	0.365	8
Thailand	0.448	4	0.590	5	0.507	5	0.312	7	0.575	4
Viet Nam	0.342	7	0.609	4	0.513	4	0.296	8	0.387	7

Table 1.2: ASEAN RISK scores and rankings for 2021 show Indonesia, Myanmar, and the Philippines as the three most-at-risk AMS to disasters, consistent with the findings of the past two editions of ARMOR. Likewise, Brunei Darussalam, Malaysia, and Singapore remain the least-at-risk.

Myanmar is the AMS with the highest disaster risk. In addition to having the third-highest Multi-Hazard Exposure, the primary drivers of risk in the country are its high Vulnerability and low Coping Capacity. The country’s main contributors to its high vulnerability are high displacement of people due to conflicts and high multi-dimensional poverty. Meanwhile, improvements in its governance could improve its Coping Capacity.

Disaster risk in the Philippines (second-highest) and Indonesia (third-highest) are driven primarily by high exposure to multiple natural hazards—ranked first and second respectively. During the COVID-19 pandemic, close to 81% of reported disasters occurred in these two AMS (Figure 1.5) (ADINet, 2021). Both AMS are exposed to hydrometeorological and geophysical hazards, but the Philippines has a significantly higher exposure to tropical cyclones. In addition, high vulnerability is also a main driver of disaster risk in the Philippines. High displacement and the compounding effects of successive and recurring disasters on its population are the primary contributors to its high vulnerability.

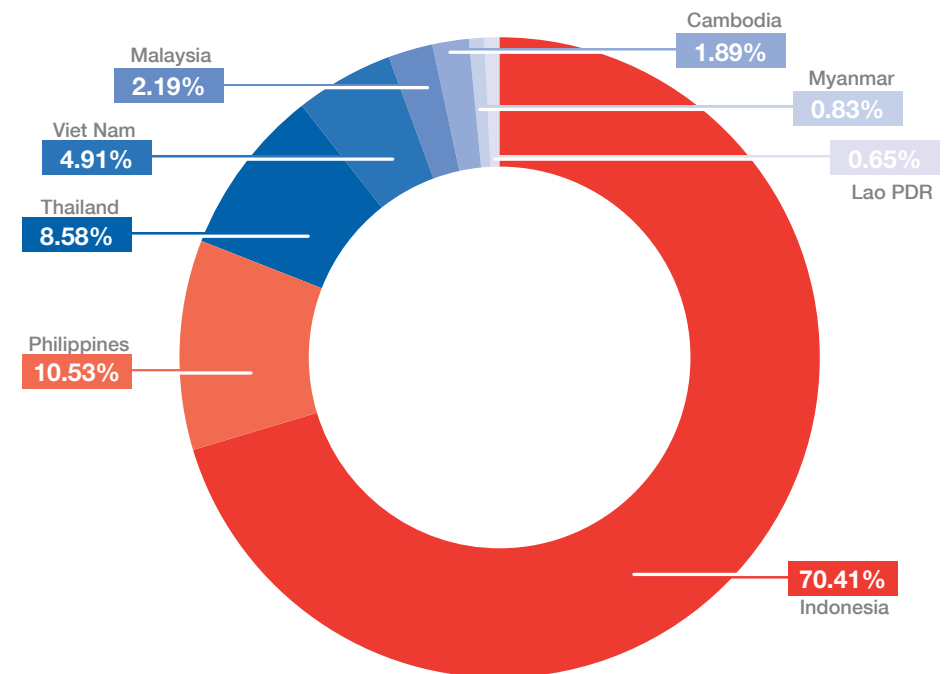


Figure 1.5: The distribution of disaster occurrences in the region during the COVID-19 pandemic shows that the majority occurred in Indonesia and the Philippines. Meanwhile, there were no reported events in Brunei Darussalam or Singapore (Source: ADINet, 2021).

On the other hand, Singapore and Brunei Darussalam have the lowest disaster risk of all AMS. These two AMS have the lowest Multi-Hazard Exposure in the region—Singapore is only exposed to two of the seven natural hazards assessed (landslides and wildfires) while Brunei Darussalam is exposed to four (flooding, landslides, tsunamis, and wildfires). Moreover, based on ADINet records, the frequency of disaster occurrences in either of these AMS is very low—approximately one in every 25 years. In addition, Singapore and Brunei Darussalam also have the highest Coping Capacity and lowest Vulnerability scores in the region. Effective governance is among the primary contributors to their high Coping Capacity (Figure 1.6), while very high human development is among the major factors in their low Vulnerability (Figure 1.7).

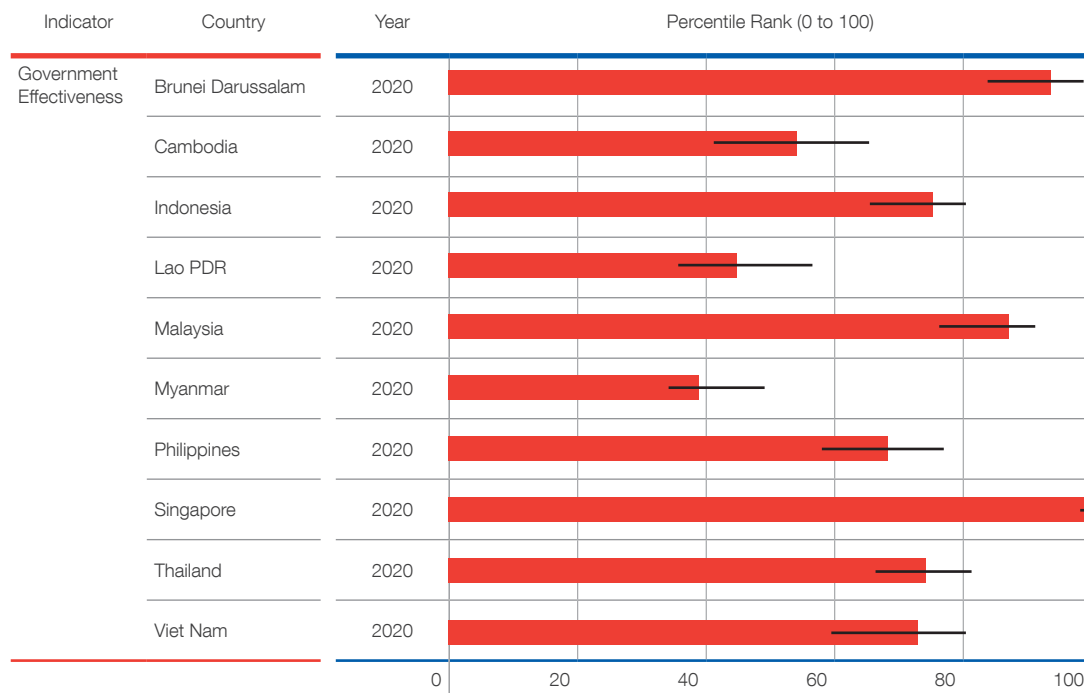


Figure 1.6: The percentile ranking of AMS in the Government Effectiveness component of the Worldwide Governance Indicators (WGI) show that Brunei Darussalam and Singapore rank among the most effective governments globally (90th percentile) (Source: WGI DataBank, 2021).

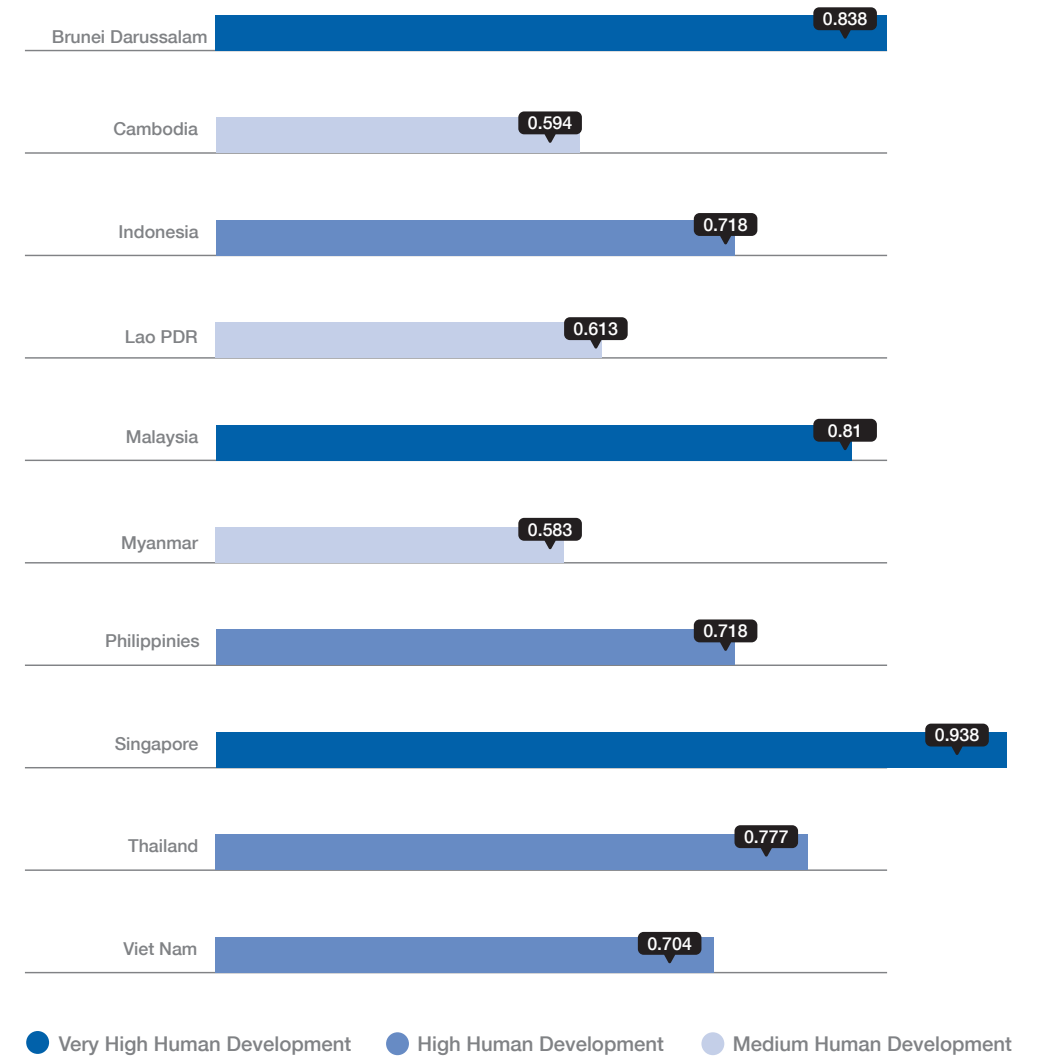


Figure 1.7: The Human Development Report 2020 identifies Brunei Darussalam, Malaysia, and Singapore as among the countries with very high human development globally. The Human Development Index is a composite measurement of countries' achievements in three basic dimensions of human development—a long and healthy life, knowledge, and decent standard of living (Source: UNDP, 2020).

1.2.2 Change in ASEAN Riskscape

The PDC's AIM 3.0 is a recent update, with improved spatial resolutions. This results in a more accurate assessment of exposure. Hazard zones do not appreciably change over the short term; therefore, this article's ASEAN RISK assessment is aggregated with the Vulnerability and Coping Capacity scores of previous editions of ARMOR to allow for comparison across time.

There has been a small average increase in the Vulnerability scores from the first edition of ARMOR in 2019, indicating most AMS have experienced worsening Vulnerability in the past two years. The largest increases were observed in Myanmar and Cambodia. Both countries have been observed to have declining performances in the Human Development Index and increasing economic dependency on official development assistance. In addition, ongoing conflicts in Myanmar are increasing the number and exposure of vulnerable groups. Myanmar, Cambodia, and the Philippines, which have the highest Vulnerability scores, continued to experience increasing Vulnerability in the past two years.

Conversely, Thailand and Singapore saw small decreases in Vulnerability. Continuous improvements in human development and health were noted in Singapore, whereas, improving socio-economic status of the population and increased community resilience to shocks from recurring disasters have been observed in Thailand.

A small decrease in Coping Capacity scores since the ARMOR first edition has been observed in the ASEAN region. All AMS have shown decreases, with Myanmar showing the largest difference, followed by Lao PDR. Issues relating to immunisation coverage and government effectiveness are the main bottlenecks to Myanmar's positive development in Coping Capacity. Meanwhile, improving infrastructure in Lao PDR has been noted; however, government effectiveness has been shown to progress towards the opposite direction.

On the other hand, the AMS with the highest Coping Capacity scores—Singapore and Brunei Darussalam, had the smallest decreases. Infrastructure remains a strong asset in these AMS; however, very small decreases in institutional capacity have been observed since the ARMOR first edition.

Overall, these observations translate to a general decrease in the disaster resilience of the ASEAN region. All AMS, with the exception of Singapore and Thailand, have recorded decreased resilience since the ARMOR first edition in 2019 (Figure 1.8). In general, aggravating socio-economic status and the situation of vulnerable groups have influenced the increased vulnerability of the region. On the other hand, deterioration in government effectiveness has been observed to be the primary contributor to the decreased Coping Capacity of the region. The World Bank's Worldwide Governance Indicators (n.d.) define government effectiveness as perceptions of the quality of public services, the quality of the civil service and the degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

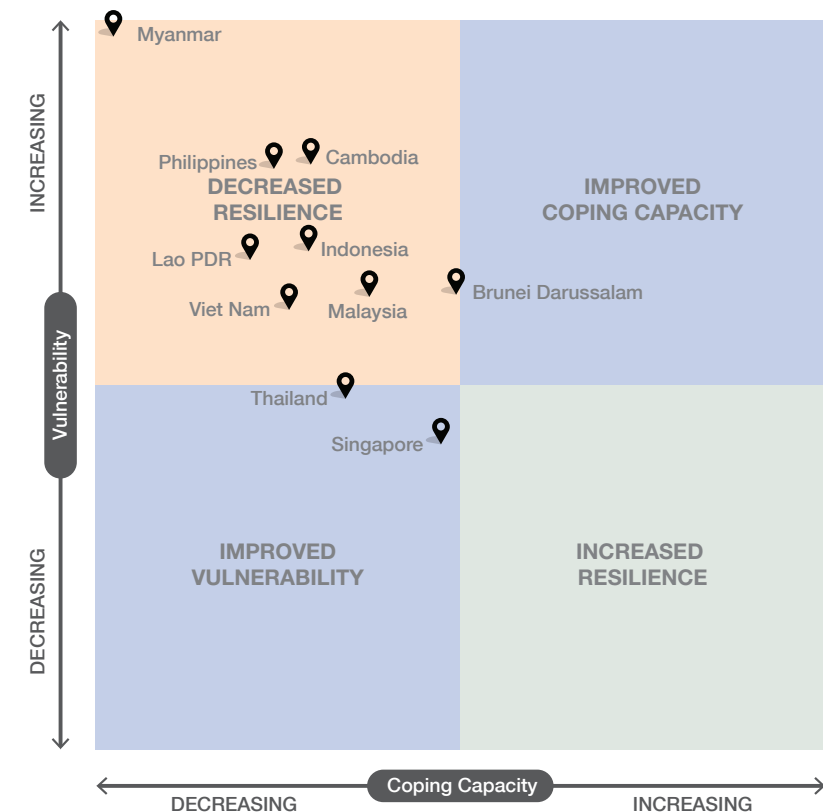


Figure 1.8: A comparison of ASEAN RISK assessments using data in this article and the ARMOR first edition shows a general decrease in resilience in the ASEAN region. Myanmar had the largest difference in the two years since 2019, followed by the Philippines. Only Singapore and Thailand have shown positive development over time, specifically in improving their respective vulnerabilities.

All AMS, except Singapore, have been observed to show increased Risk scores since the ARMOR first edition in 2019 (Figure 1.9). Myanmar and the Philippines had the largest increase in Risk scores, while Thailand experienced the smallest increase. Myanmar and the Philippines have consistently had the highest Risk scores across all years. This pattern tracks with the findings for the Vulnerability and Coping Capacity scores whereby those with the least favourable scores across all thematic areas trend in the negative direction year over year.

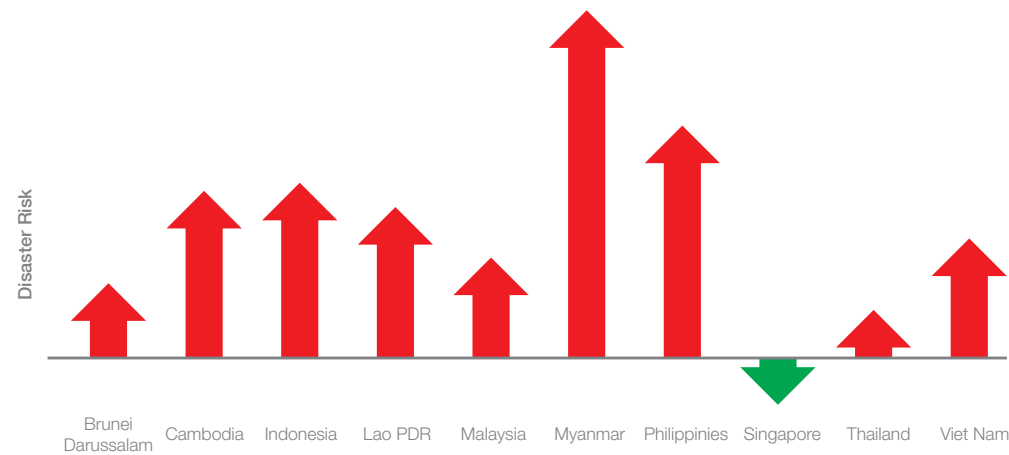


Figure 1.9: A comparison of ASEAN RISK assessments using data in this article and the ARMOR first edition shows that all AMS, except Singapore, experienced increased disaster risk from 2019.

1.2.3 COVID-19 Impact to ASEAN Riskscape

Aggregating COVID-19 exposure with the latest ASEAN RISK assessment produced the Disaster Risk + COVID-19 Index, where existing natural hazard risks and the COVID-19 risk are combined. This resulted in a 33% average increase in Risk scores—suggesting that the COVID-19 pandemic had a significant negative impact on the disaster riskscape of the ASEAN region.

Indonesia, Malaysia, and the Philippines had the highest percent increase in Risk due to the COVID-19 pandemic. Indonesia saw a 69% increase, Malaysia saw a 59% increase, and the Philippines saw a 51% increase in their respective Risk scores. Meanwhile, Cambodia saw the smallest increases in Risk score, recording an approximately 6% increase after the addition of COVID-19 exposure (Figure 1.10).

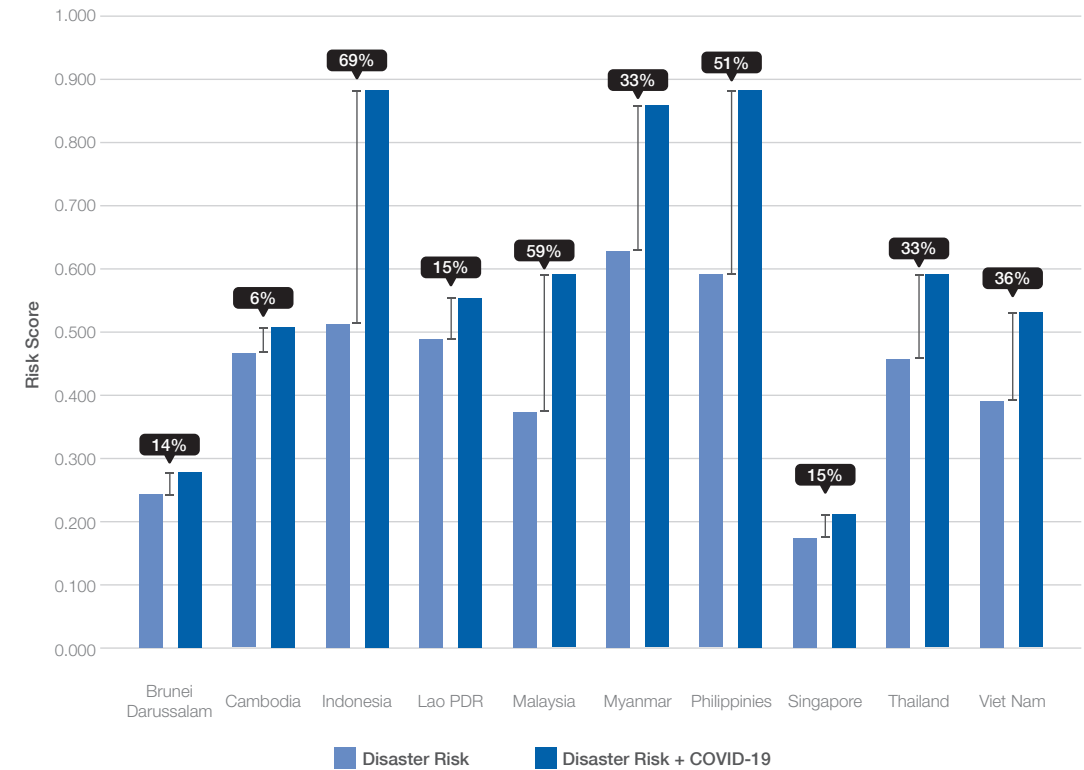
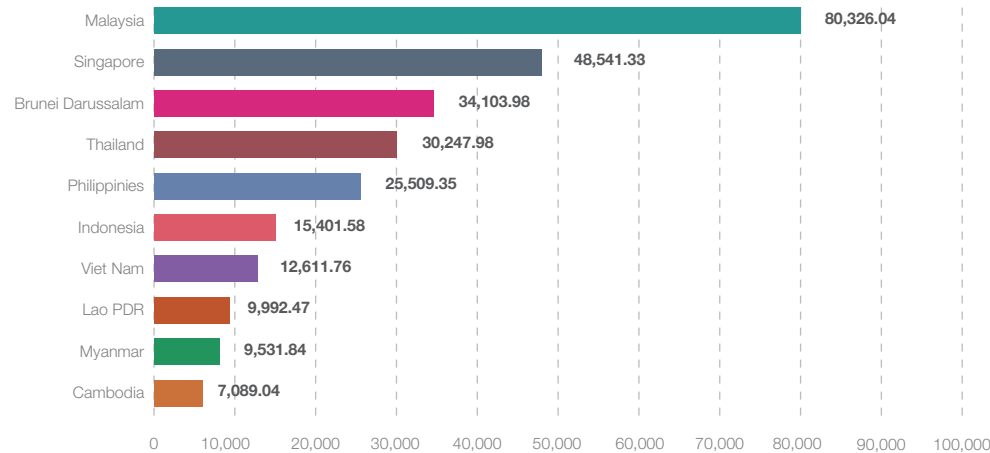


Figure 1.10: Incorporating COVID-19 exposure with ASEAN RISK shows an increased risk in all AMS, with the highest percentage change in Malaysia, the Philippines, and Indonesia—the AMS with the highest numbers of COVID-19 cases.

While Malaysia had a very good COVID-19 vaccination coverage—79% of its population as of 30 November 2021 (OWID, 2021), the huge percentage increase in its Risk score due to COVID-19 has largely been driven by its very high number of cases and deaths among its population—the highest in the ASEAN region (Figure 1.11). Likewise, the aggravating impact of COVID-19 on the Philippines and Indonesia has largely been driven by the high number of COVID-19 cases and deaths. In addition, reported vaccination coverage in the Philippines remained low.

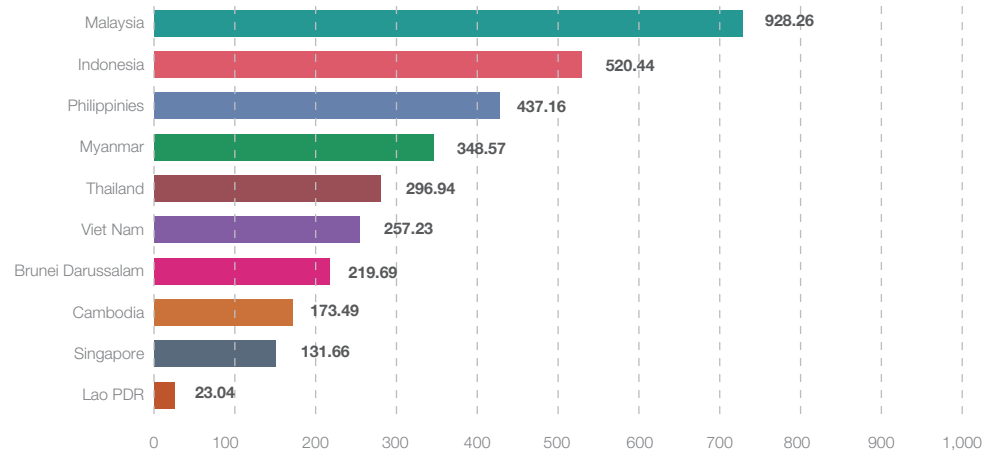
Cumulative confirmed COVID-19 cases per million people

Due to limited testing, the number of confirmed cases is lower than the true number of infections



Cumulative confirmed COVID-19 deaths per million people

Due to limited testing and challenges in the attribution of the cause of death, confirmed deaths can be lower than the true number of deaths



Sources: Johns Hopkins University CSSE COVID-19 Data



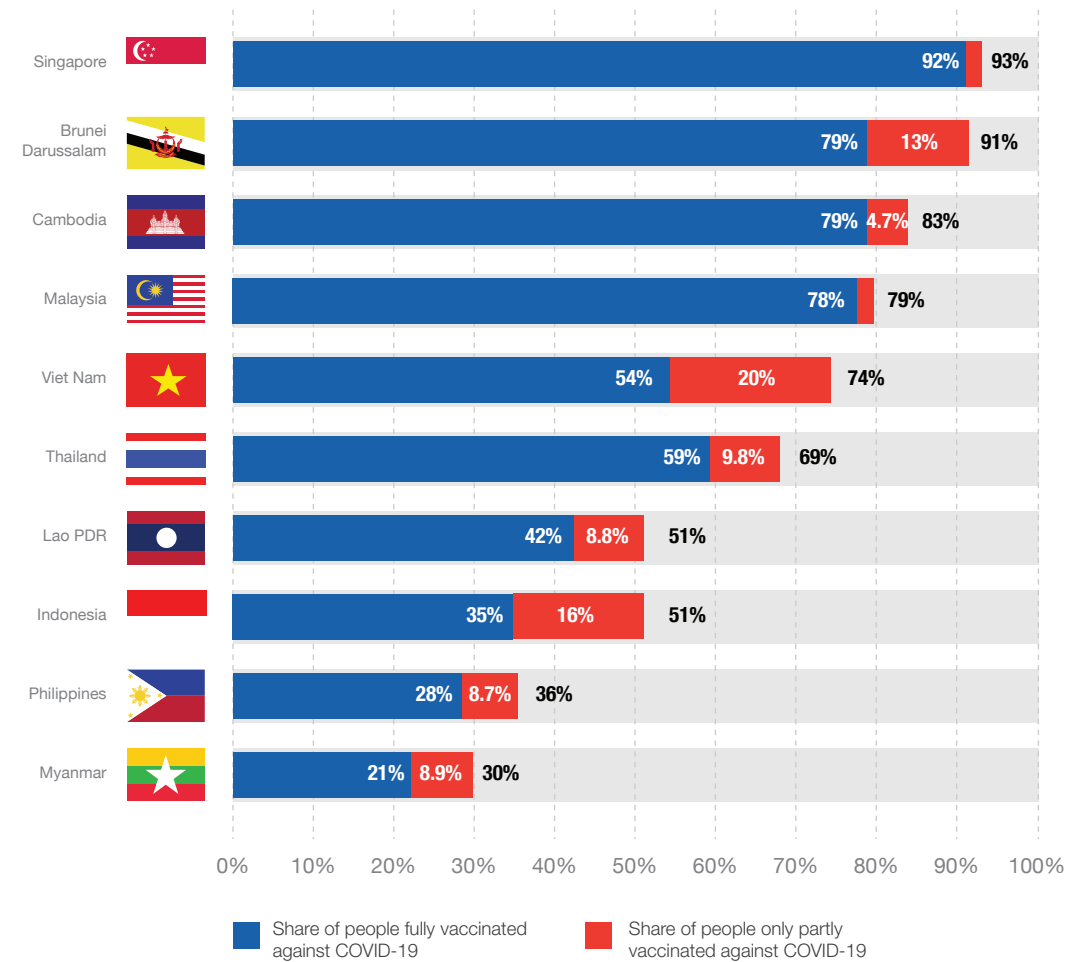
Figure 1.11:

Malaysia is way ahead of the other AMS in terms of cumulative cases and deaths per million population. This shows that a significant portion of its population directly suffered from the COVID-19 pandemic (Source: Our World in Data, 2021).

Cambodia's minimal percentage increase in its Risk score after the addition of COVID-19 exposure has been largely influenced by its very good COVID-19 vaccination coverage of 83% (as of 30 November 2021)—third highest in the ASEAN region after Singapore's 93% and Brunei Darussalam's 91% (Figure 1.12) (OWID, 2021), and low number of cases and deaths.

Share of people vaccinated against COVID-19, Nov 30, 2021

Alternative definitions of a full vaccination, e.g. having been infected with SRS-CoV-2 and having 1 dose of a 2-dose protocol, are ignored to maximise comparability between countries.



Source: Official data collated by Our World in Data. This data is only available for countries which report the breakdown of doses administered by first and second doses in absolute numbers. CC BY



Figure 1.12:

The COVID-19 vaccination coverage in the ASEAN region as of 30 November 2021 shows Singapore and Brunei Darussalam topping the list—very close to vaccinating their entire populations, both with at least 90% coverage. All AMS, except the Philippines and Myanmar, have vaccinated the majority of their respective populations (Source: Our World in Data, 2021)



Figure 1.13: The Risk Score Ranking of AMS changed with the addition of COVID-19 Exposure. The Philippines, Indonesia, Thailand, and Malaysia became higher in the ranking; while Myanmar, Lao PDR, and Cambodia ranked lower. However, the Philippines, Indonesia, and Myanmar still comprise the three most-at-risk AMS, both in disaster risk and in the added impact of COVID-19.

This demonstrates that all AMS have been adversely affected by the COVID-19 pandemic. However, when factoring in existing Multi-Hazard Exposure, Vulnerability, and Coping Capacity scores, not all have been impacted in the same way.

The overall Risk score ranking of AMS was altered by adding COVID-19 exposure. The Philippines became the most-at-risk to the combination of disasters caused by natural hazards and the COVID-19 pandemic (Figure 1.13). But the three most-at-risk AMS remain to be the Philippines, Myanmar, and Indonesia.

1.2.4 COVID-19 Impact to AMS' and ASEAN's Disaster Response

In general, adjustments have been made, to varying degrees, in the disaster response operations, procedures, and/or protocols of the NDMOs and the AHA Centre, in response to the complexities brought about by the COVID-19 pandemic. Malaysia and the Philippines, two of the AMS with the highest numbers of COVID-19 cases and deaths, reported significant changes. An example of this change, in the case of the Philippines, is the issuance and implementation of a COVID-19 Operational Guidance for Camp Coordination and Camp Management and Protection during the Typhoon Goni disaster response (NDRRMC, 2020). According to the NDRRMC (2020), this was aimed at strengthening infection prevention and control measures inside evacuation centres.

Meanwhile, on the part of the AHA Centre, procedures prior to the COVID-19 pandemic dictated that the Centre must send an In-Country Liaison Team to the disaster-affected AMS. However, due to difficulties attached to travel limitations imposed by AMS and the risk of infection, the Centre employed a mixed approach. For the case of the Central Viet Nam flooding in October 2020, a fully virtual coordination of regional assistance was implemented—all levels of coordination with the VNDMA were done online. In the case of Typhoon Goni in the Philippines in November 2020, the National Logistics Officer, who was already stationed in-country, was tasked with the operational coordination with the NDRRMC. Moreover, the deployment of the ASEAN Emergency Response and Assessment Team (ERAT) was not offered in either case. This was to avoid contributing to the spread of infection across the region.

In terms of implementing adjustments, NDMOs and the AHA Centre reported experiencing challenges. Logistics is identified as the top-most challenge. Movement restrictions, both domestically and internationally, had a significant influence on the flow of people and goods. Additional layers of necessary arrangements for the deployment of damage assessment teams slowed down data collection and reporting. The combination of delayed field information to support disaster response decision-making and logistical limitations resulted in a slowing down of the delivery of relief assistance. This was experienced, in varying degrees, during disaster response operations in Indonesia, Lao PDR, Malaysia, the Philippines, Thailand, and Viet Nam.

NDMOs played different roles in their respective national responses to the COVID-19 pandemic. The occurrence of large-scale disasters during the COVID-19 pandemic significantly resulted in the straining of NDMO's human resources, and to some extent, challenges to their financial resources. In the case of Indonesia, Lao PDR, Malaysia, the Philippines, and Thailand, significant challenges related to human resources were experienced. In some cases, NDMO staffs in charge of managing disaster response, also played roles in the COVID-19 response; thereby, extending their workload and skills requirements. In addition, most organisations implemented skeletal workforces and work-from-home arrangements. Related to this, challenges regarding coordination were reportedly experienced significantly during disaster response operations in Indonesia, the Philippines, Thailand, and Viet Nam.

Surprisingly, not many NDMOs reported significant challenges to the management of internally displaced people. During the first few months of the COVID-19 pandemic, there was hesitation among affected people in seeking refuge in designated evacuation centres due to fears of infection, as reported in some cases in Indonesia and the Philippines. But strict implementation of health safety protocols, provision of necessary personal protective equipment (PPE) to both disaster responders and displaced populations, and the strong operational coordination between the humanitarian and health sectors, eventually curbed this fear among the population. This good practice, unsurprisingly, resulted in minimal reports of infection in evacuation centres.

And lastly, availability and use of information and communications technology (ICT) to support the digitisation and virtualisation of disaster response is identified as the least challenging by all respondents. This reflects the positive observation in the ASEAN RISK, where infrastructural Coping Capacity is not identified as a relatively major gap in the region. NDMOs and the AHA Centre were quick to leverage the use of available ICT tools and platforms, and with minimal need to procure new ICT services.

While NDMOs and the AHA Centre experienced significant challenges especially during the first few disaster response operations at the time of the COVID-19 pandemic, the ASEAN region was not short of good practices. The pandemic provided opportunities for NDMOs and the AHA Centre to digitise and virtualise their key disaster response operations, for example coordination—physical meetings were held only when necessary and it was

ensured that health and safety protocols were followed. And even though coordination meetings at all levels were held virtually as much as possible, the effectiveness of disaster response was not significantly affected.

Moreover, movement restrictions provided a push for organisations to implement localisation—local emergency management authorities were given more opportunity and capacity to manage the disaster response in their respective areas. National (and regional) organisations provided technical support remotely. Lastly, front liners were provided with the necessary support, such as prioritised vaccination, regular testing, and provision of PPE.

1.3



Conclusion & Recommendations

Risk assessment is a core element of Disaster Risk Reduction (DRR). To enable disaster management practitioners and decision-makers to approach DRR effectively, it is necessary that the level of risk is known, and its drivers are understood.

Disaster risk in the ASEAN region remains among the highest in the world. Due to its geographical location, exposure to multiple natural hazards remains the region's main driver of disaster risk. While not much can be done to minimise the region's exposure to natural hazards, it is still possible to reduce risk—specifically by increasing the region's resilience. Resilience is a function of a community's vulnerability to the impact of hazards and its capacity to cope.

Since the ARMOR first edition in 2019, an increase in disaster risk has been observed in the ASEAN region. This increase is due to the decreasing resilience of the AMS—Vulnerability has risen, while Coping Capacity has declined. In addition, the COVID-19 pandemic further exacerbated the region's riskscape.

While the region struggled to manage the public health emergency, a record-high number of disasters occurred. This combination of disasters due to natural hazards and the COVID-19

pandemic brought challenges and provided lessons. The COVID-19 pandemic gave the ASEAN region a taste of the disaster-health nexus.

The level of disaster risk of the ASEAN region to natural hazards is already overwhelming. Further, the drastic effects of climate change are already being felt. And COVID-19 will not be the last pandemic that could further exacerbate the region's disaster riskscape. It is therefore imperative that DRR be addressed more effectively.

Towards this end, this article recommends three steps that the ASEAN region undertake: 1) Be more targeted in addressing disaster risk by focusing on its drivers, 2) Strengthen the periodic conduct of risk assessment, and 3) Explore how resilience can be shared across the region.

To be methodical in reducing risk, AMS should look at their respective drivers of risk. In general, the objective is to lessen Vulnerability and enhance Coping Capacity. Based on ASEAN RISK, it is recommended that the region focus on improving the socio-economic status of its population and shock-proofing its vulnerable groups. Moreover, the region should aim to improve governance. These are the indicators that have huge influence on the increased disaster risk of the region. As such, policies and actions targeted at improving these elements should help AMS and the region to progress towards resiliency.

Further, it is necessary to assess whether policies and actions taken are effective in reducing disaster risk. In relation to this, it is important to ensure and strengthen regular assessment of disaster risk and its elements at all levels (regional, national, and sub-national). The assessments will provide a sound basis for gauging the effectiveness of policies and actions, identify strengths, and propose specific elements of disaster risk that must be better targeted.

Lastly, regional coordination is an ASEAN strength, and this must be leveraged further. Based on ASEAN RISK, some AMS have higher resilience than their respective disaster risk (Figure 1.14)—a resilience surplus. This is another opportunity for the ASEAN region to coordinate resilience-sharing and building in the region. It is recommended that ASEAN explores this concept and determine how resilience surplus can be shared across the region.

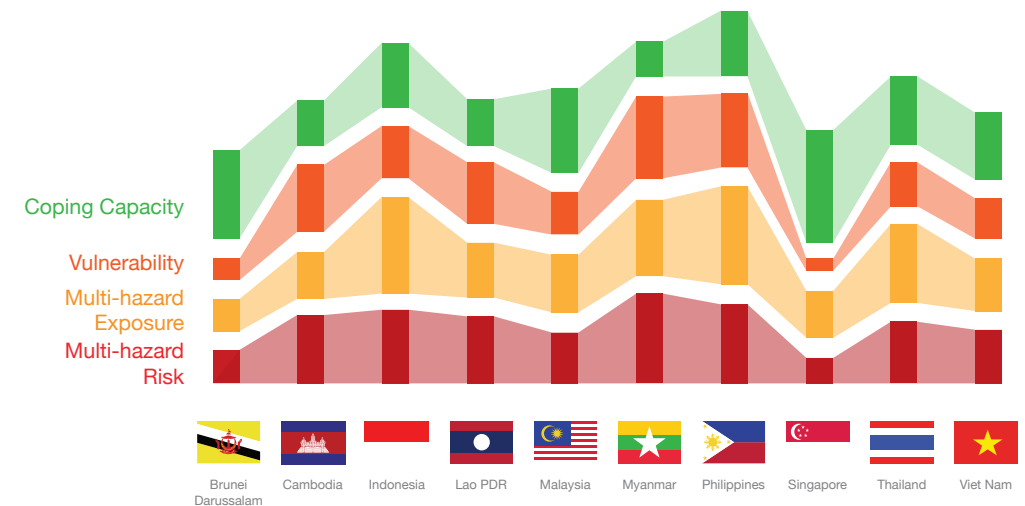
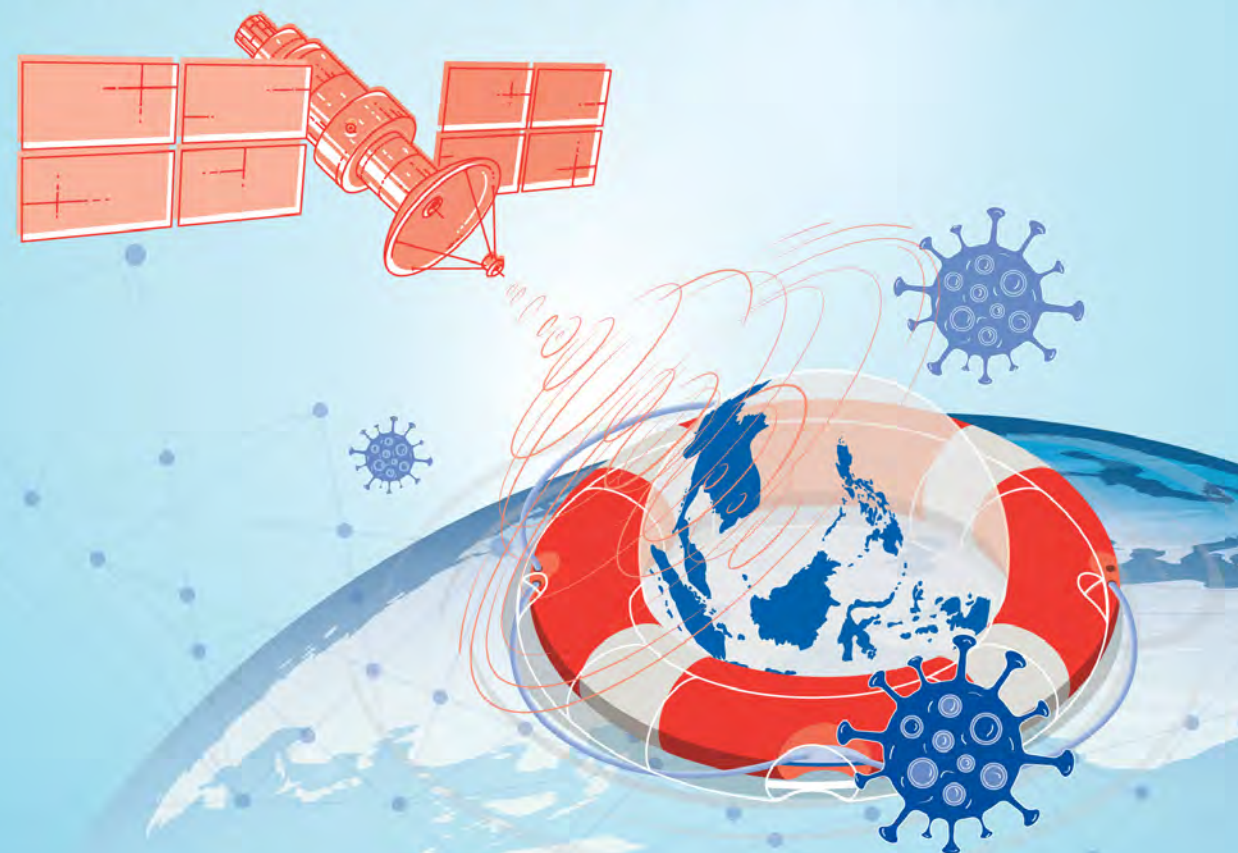


Figure 1.14: ASEAN RISK shows that Singapore and Brunei Darussalam have higher Coping Capacity scores than their Vulnerability and Multi-Hazard Exposure scores. This presents an opportunity for the ASEAN region to explore how this resilience surplus can be shared with other AMS.

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Leveraging Artificial Intelligence for Enhanced Flood Emergency Response, Amidst the COVID-19 Pandemic



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Abstract

The ongoing COVID-19 pandemic has inflicted an unprecedented amount of stress on the health and economic sectors, which has reduced the capacity of communities and societies to cope with recurring natural hazards. The mobility restrictions resulting from COVID-19 have also impeded the ability of central governments to reliably assess the magnitude of crises and to provide emergency support to people in need with already overstretched resources. Several countries in South and Southeast Asia experienced severe monsoon floods amidst the second or third waves of the pandemic outbreak. The United Nations Satellite Centre (UNOSAT) recently launched UNOSAT FloodAI: an end-to-end pipeline where Copernicus Sentinel-1 Synthetic Aperture Radar (SAR) imagery of flood-prone areas is automatically downloaded and processed by a deep-learning model to generate flood-extent maps and update operational dashboards. The model is based on a fully convolutional neural network that takes SAR imagery as input and returns a semantic segmentation flood mask. These efforts were successfully documented and published in a peer-reviewed academic paper (Nemni, Bullock, Belabbes, & Bromley, 2020).

Combining a deep-learning model embedded within an automation pipeline allows for the processing of a large amount of satellite data in near-real-time. UNOSAT FloodAI is also able to process the dynamic flood updates and generate automatic statistics in regard to the exposed population. The latter intersected with the population affected by COVID-19 could act as a proxy indicator for an emergency needs assessment revealing the population under stress. This not only informs the decision-making process to help optimise the disaster response, but it also has the potential to significantly reduce the loss of life and mitigate damage, particularly in the context of humanitarian operations, thus supporting both national authorities and international emergency management organisations for the benefit of local populations.



2.1

Introduction

While several countries in the ASEAN region struggled hard to manage the effect of the third wave of the COVID-19 pandemic, the recurrent monsoon rains caused widespread flooding during the second half of 2021. This coupled biological-natural hazard wreaked an unprecedented amount of stress on the health and economic sectors. This in turn reduced the capacity of communities and societies to cope with ever-recurring natural hazards. Also, the mobility restrictions resulting from COVID-19 impeded the ability of central governments to reliably assess the magnitude of crises and provide emergency support to the people in need, with already overstretched resources. Access to accurate information is crucial in these emergency operations to optimise resource allocation, personnel deployment, and rescue operations. Despite the critical need, collecting reliable information during a pandemic can be extremely challenging, and remote-sensing methods of data collection using satellite images are viable alternatives in such cases.

As COVID-19 continues to ravage the sustainable development gains in the different parts of the world, it is clear the management and response activities related to natural and biological hazards need to be unified going forward. Reducing the risks related to natural hazards will not guarantee automatic resilience to biological hazards or vice-versa. Therefore, there is an immediate need to use frontier technologies to generate insights that are valuable for decision-making related to this multi-hazard complex challenge. However, ingesting new sources of data and using data-driven insights for decision-making is unfortunately not a plug-and-play process. It requires extensive investment in data infrastructure and a cultural shift towards accepting new ways of solving problems. And most importantly, knowledge and capacity are needed to custom tailor the outputs for end-users who are pressed to make critical calls during an emergency.

Since its inception in 2001, the United Nations Satellite Centre (UNOSAT) has been working together with member states and UN sister agencies to utilise satellite imagery and geospatial data to support humanitarian operations. Banking on the 20 years experience and extensive research investment in different frontier technologies such as artificial intelligence (AI) and big data analytics, UNOSAT has been able to operationalise “UNOSAT FloodAI”. FloodAI is an end-to-end operational pipeline that downloads Sentinel-1 Synthetic Aperture Radar (SAR) imagery and generates key statistics related to flood exposure using a deep-learning model. This service has already been deployed to support emergencies in two ASEAN countries to date – Myanmar and Thailand during the 2021 monsoons and it has demonstrated cost and time savings at various stages of the analytical pipeline and operations. The adoption of new operational technologies like this can assist in the following ways:

- Filling the data gaps for flood response amidst COVID-19 mobility restrictions by providing timely and reliable information.
- Revealing the stress at the subnational level originating from both flood and COVID-19 occurring at the same time, hence delivering a full operational picture to the concerned government ministries.

In this chapter, the authors bring their experiences of the recent application of UNOSAT FloodAI in an operational context, amidst the COVID-19 pandemic with recommendations for the future uptake of frontier technologies for informed decision making.

2.2



The Intersection of COVID-19, Floods, and Biological Hazards in Southeast Asia

Southeast Asia is one of the most hazard-prone subregions in the Asia-Pacific region. According to the Asian Development Bank, the subregion suffered USD 91 billion in financial losses in 2004–2014 (Asian Development Bank, 2021) from the impacts of typhoons, storm surges, floods, drought, and earthquakes. According to the Asia-Pacific Disaster Report (APDR) 2021 (Economic and Social Commission for Asia and the Pacific (ESCAP), 2021) of the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) more than 15 million people in Southeast Asia were affected by natural hazards in 2020. According to UN ESCAP risk and resilience portal (UN ESCAP, 2021), flooding is the most common among all other natural hazards in Southeast Asia. As shown in figure 2.1, population exposure (medium-high, high, and very high exposure) to flood and biological hazards in the current climate-change scenario is estimated to be around 40% of the population in Viet Nam and Cambodia, 28% in Laos, 22% in Myanmar, and 13% in the Philippines. The average annual losses from flood and biological hazards is estimated to be USD 2.28 billion in Thailand, USD 2.2 billion for Viet Nam, and USD 2 billion for Indonesia.

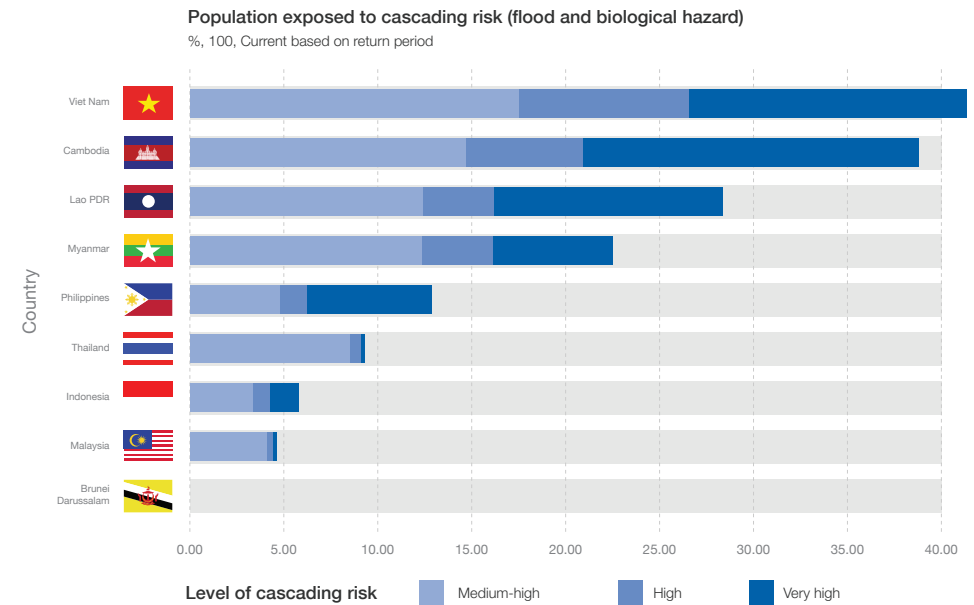


Figure 2.1: Population exposed to cascading risk (flood and biological hazards) in Southeast Asia (Source: UN ESCAP, 2021).

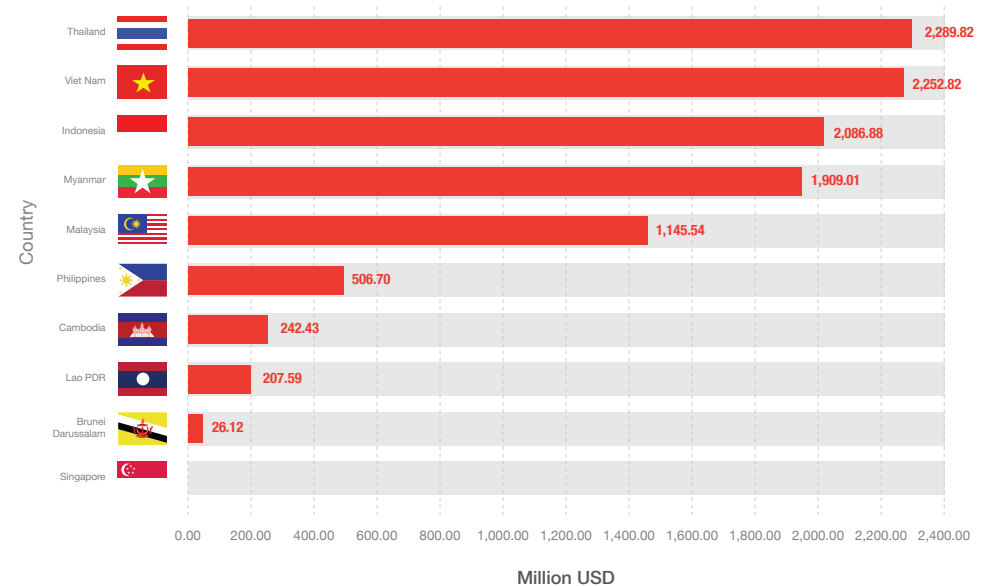


Figure 2.2: Average annual losses from cascading risk (flood and biological hazards) in Southeast Asia (Source: UN ESCAP, 2021).

In addition to the impact of natural hazards, COVID-19 has substantially affected the subregion, by further exacerbating the existing socio-economic vulnerabilities and inequalities. As of 25 October 2021, Southeast Asia had almost 13 million COVID-19 cases (Center for Strategic & International Studies, 2021). According to the International Monetary Fund (IMF), Thailand, for instance, lost 6% of its GDP in 2020 due to COVID-19 (International Monetary Fund (IMF), 2021). The economic impact increased unemployment and social disparities around ASEAN. In a survey (Morgan, 2021) conducted by the Asia Development Bank (March 2021), on average, 44.4% of employees had either lost their jobs (temporarily or permanently) or had experienced a workload cut in ASEAN countries. Additionally, on average 27% of children could not attend school during the pandemic, due to poverty or lack of access to the internet or digital devices.

In its flagship publication APDR 2021, UNESCAP concluded that while countries are striving towards risk reduction from individual hazards, many countries are still ill-prepared for complex overlapping crises where biological and natural hazards intersect. Figure 2.4 presents an overview of the total number of flood disaster occurrences from 2011 to 2021 and total COVID-19 cases in ASEAN countries. For instance, Indonesia had on average 10 major flood events per year in the last decade and is the ASEAN country with the highest number of COVID-19 cases (4.24 million), followed by the Philippines (2.76 million), Malaysia (2.43 million), and Thailand (1.86 million). A multi-hazard approach is fundamental for effective disaster risk management, recognising the overlapping vulnerabilities to mitigate risks.

ASEAN Occurrences from Flood Disaster, 2011 to 2021

(Source: The international disaster database: EM-DAT)

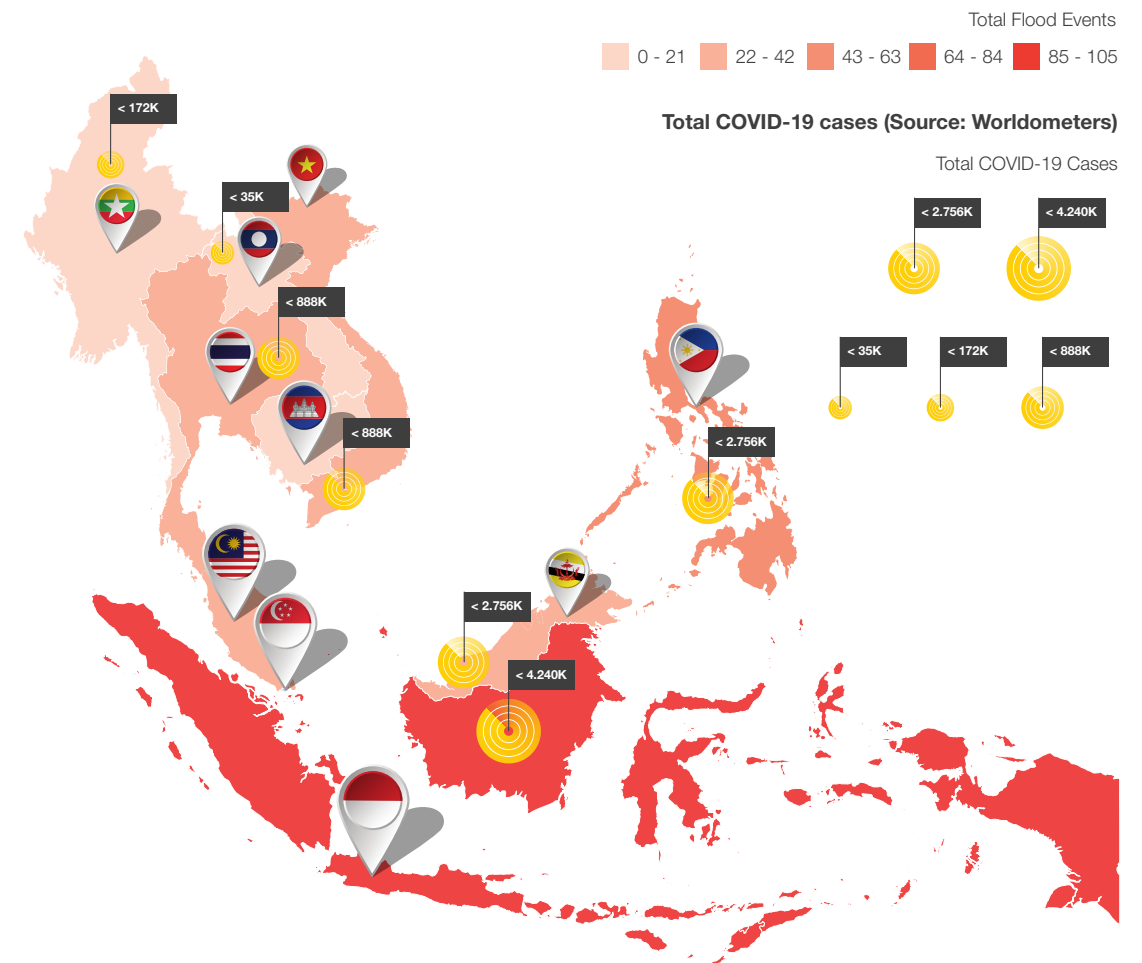


Figure 2.3: Flood disaster occurrences (2011 to 2021) and total COVID-19 cases in ASEAN countries.

The increasing complexity of multi-hazard risks, overlapping both natural and biological hazards, requires technical experts and decision-makers in the field of disaster risk management to be adequately equipped with frontier technologies such as AI, big data analytics, etc. The latter is already used by several countries for early detection and rapid diagnosis of the situation related to COVID-19. However, the use of frontier technologies for generating fast and reliable assessments of the magnitude of natural hazards remains limited. The next sections introduce remote sensing and machine learning for flood monitoring, and the use of UNOSAT FloodAI to increase efficiency and efficacy in public administration for integrated disaster risk management.

2.3

Remote Sensing & Machine Learning for Flood Monitoring

Flood inundation can be detected easily through pre- and post-disaster satellite imagery using remote sensing techniques and has long been used as a vital source of observation in the emergency context. Floodwater can be identified using images from multi-spectral or SAR satellite images. The detection of flood signatures is easier when using multi-spectral or colour images compared with SAR imagery. But, multispectral imagery can only be captured during the daytime and is useful only when there are no clouds. During the monsoon season in the ASEAN region, clouds are predominant, so for continuous monitoring of flood evolution, multi-spectral images are not ideal. In these conditions, SAR images prove to be useful as these sensors can observe through the clouds, even though the processing is much more difficult and resource-consuming. For example, from pre-processing to the analysis of a single Sentinel-1 SAR scene may take four to five hours through traditional desktop-based analysis. This is a limitation because, during emergencies, information needs to be generated rapidly. With a bigger coverage area, the number of scenes increases, as well as the processing time.

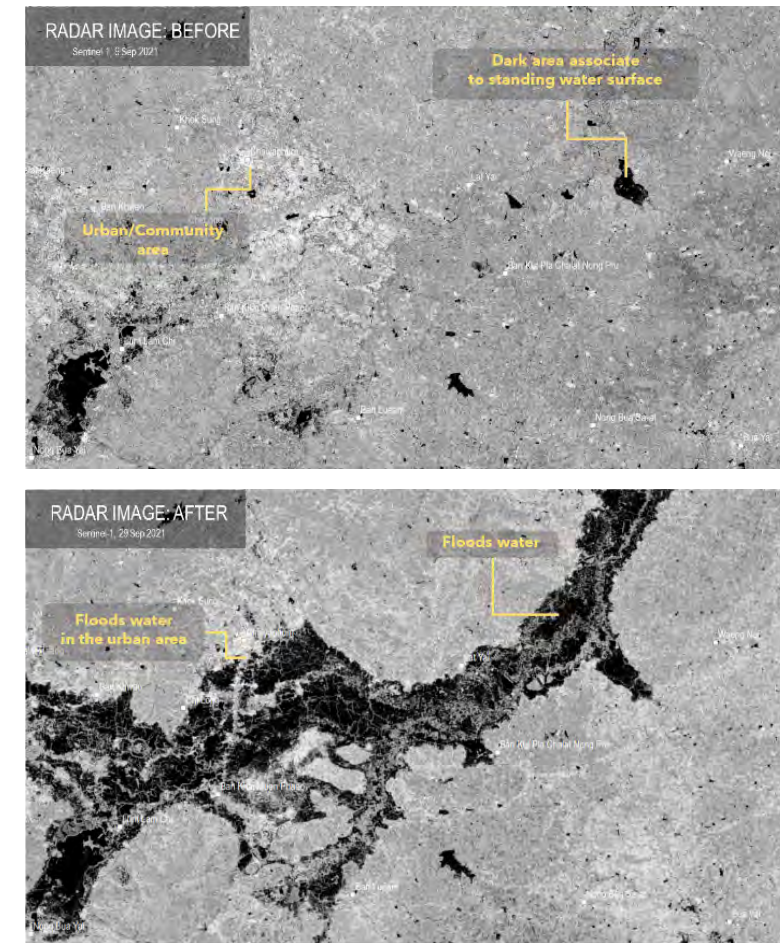


Figure 2.4:

Demonstration of flood detection using pre- (left) and post- (right) SAR satellite images.

Machine learning, a subset of AI, is an ideal choice to deal with big data generated by the increase of commercial and open-source satellite imagery, due to its scalability. Recently machine-learning models proved to perform well in tasks such as flood analysis, shelter mapping, object detection, damage assessment, and more (Logar, et al., 2020). Flood analysis is currently carried out by experts from national and international organisations following a manual or semi-automated methodology. For timely monitoring and mapping of potentially flood-affected areas across several countries, UNOSAT has implemented an AI-based flood-detection tool called UNOSAT FloodAI, which is now fully operational and embedded within the UNOSAT emergency mapping service.



2.4

UNOSAT FloodAI: What is it and how does it work?

UNOSAT FloodAI is an end-to-end pipeline where Copernicus Sentinel-1 SAR imagery of flood-prone areas is automatically downloaded and processed by a machine-learning model to output flood vector data and update operational dashboards. The model is based on a fully convolutional neural network that takes SAR imagery as input and returns the flood extent. These efforts were successfully documented and published in a peer-reviewed academic paper (Nemni, Bullock, Belabbes, & Bromley, 2020). The machine-learning model published in this paper outperformed the histogram-based method which is currently used to perform flood extraction from SAR imagery, and it does not rely on any threshold value, which is optimal in operational settings. A recent review of existing deep-learning methods for flood mapping (Bentivoglio, Isufi, Jonkman, & Taormina, 2021) shows that Nemni et al. improved noticeably with respect to traditional models achieving the highest accuracy among the reviewed approaches. It is worth mentioning that the comparison considered model performances in different case studies and therefore the corresponding model metrics cannot be considered comparable in absolute terms.

During a flood near-real-time activation, all the available Sentinel-1 imagery overlapping an area of interest is downloaded and processed by the machine-learning model. The FloodAI end-to-end pipeline is fully operational in Viet Nam, Cambodia, Myanmar, and Thailand following a human-in-the-loop (HITL) framework. A HITL framework refers to a partial degree of automation during the deployment of an AI model where human verification and corrections are performed before the data release. The domain expert's validation consists of identifying the area where the model output is under- or overpredicting the flood extent. This framework allows UNOSAT to deploy a machine-

learning model in an operational setting while keeping a high level of quality and mitigating the risk of an incorrect prediction. The domain expert's feedback and corrections are not only used to edit the machine-learning output but are also saved to improve the model performance known as model adaptation. Therefore, FloodAI is adaptative in the sense that the expert's feedback allows the model to improve its performance.

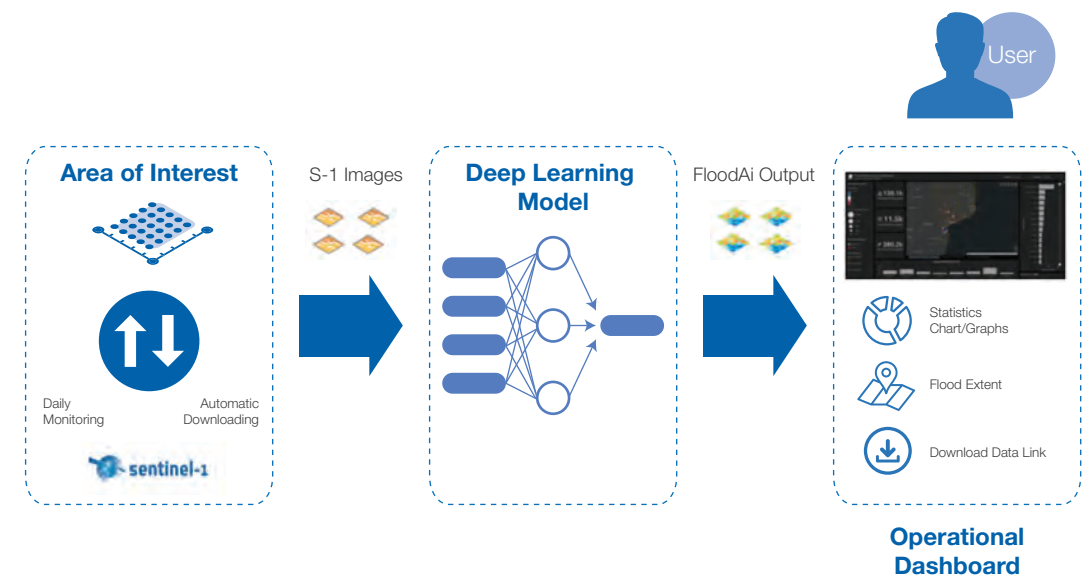


Figure 2.5: FloodAI workflow.



2.5

Comparative Analysis of Machine Learning for Flood Monitoring

The authors performed a comparative analysis between the traditional histogram-based manual flood detection method most used by the remote sensing community and UNOSAT FloodAI. Comparing the two workflows, FloodAI turned out to be a faster methodology saving a minimum of two hours per image and the cost savings multiply when more images must be analysed. In the traditional technique one remote-sensing analyst downloads the image, perform analysis on the image, then the output goes through map production and quality-control stages. In an ideal scenario, the whole process could take a minimum of four hours, and therefore one analyst could tackle a maximum of two images in one day. For continuous flood monitoring at a country scale, it may be required to analyse up to 200 images, which means that one single analyst would require up to 100 days to complete the task without considering analyst fatigue. On the other hand, FloodAI can process daily acquired images without any backlogs and keep repeating the analysis for the full duration of the monitoring project. Regardless of the size of the team, FloodAI can process seven times more images per week including both day and night, which was enough to cover the area of interest that our partners requested. If more countries or a bigger area need to be monitored, FloodAI can be easily scaled simply by adding a process in parallel.

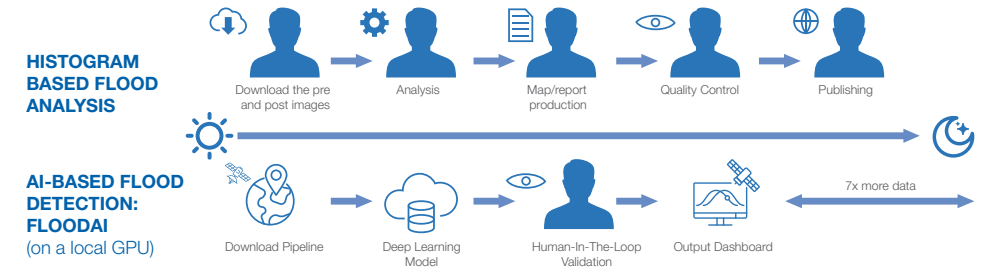


Figure 2.6: Histogram-based flood analysis versus AI-based flood detection.

The efficiency of FloodAI is demonstrated through a substantial reduction in costs and time. Without taking into account administrative and computational, etc., costs the authors can estimate a reduction of 68% in personnel costs - from 59 workdays (or 472 hours) to 19 workdays (150 hours). Table 1 shows the example of a scenario of flooding in Thailand in 2021, where 70 images were processed. While the quality control was operated by the analyst in both methods, FloodAI reduced the time required for download, pre-processing, flood detection, and cleaning from 420 person-hours (17.5 person-days) to 115 hours (4.8 days). Additionally, quality control of images processed through UNOSAT FloodAI required less time than needed in the histogram-based method.

Scenario: Flood Event 70 images processed	Traditional Human Analyst (Histogram Based Method)	UNOSAT FloodAI (Machine Learning)
Download	420 hours	15 hours
Pre-processing	420 hours	24 hours
Flood Detection	420 hours	76 hours
Cleaning	420 hours	-
Quality Control	52 hours	35 hours
Total Time	472 hours (or 59 workdays Analyst)	150 hours

Table 2.1: Time comparisons.

In another example, the authors can compare the two methods and the necessary resources used in the case of Myanmar. The flood activation started on 30 July 2020, UNOSAT produced four maps processing six images using the histogram-based workflow during 15 days of monitoring. On the other hand, for the 2021 floods in Myanmar, FloodAI automatically processed 40 images during 14 days of monitoring. Given the similar monitoring period, the authors could confirm that FloodAI was able to monitor seven times more images compared with the previous year. Therefore, FloodAI allowed UNOSAT to process a larger amount of data in a shorter time augmenting the human analysts' capabilities while maintaining the necessary level of quality control. It also enabled UNOSAT to automatically perform analysis at scale covering a greater geographical coverage in a shorter time.

2.6



AI Data Augmentation with Remote Field Observation

Even though the UNOSAT FloodAI prediction does go through expert validation before results are published, still some flooded areas could be misclassified due to the limitation of satellite sensors, topography, and underlying landcover. To complement observations from the satellites, UNOSAT has also developed extensive toolsets to collect field data with ease – through smartphone apps and browser-based tools.

The free-to-access smartphone app UN-ASIGN co-developed by UNOSAT can be used by local authorities and concerned citizens in the locality of flooding to collect photos. The results of data collection are automatically ingested to the UNOSAT FloodAI dashboard giving much-needed complimentary eyes on the ground. In some cases, due to national lockdowns, collecting field photos is also challenging and ground information can only be collected over phone calls. For those specific cases, UNOSAT has developed a browser-based flood-reporting application that can be used to geotag and record different flood observations on a map.



Figure 2.7: Collecting field data remotely.

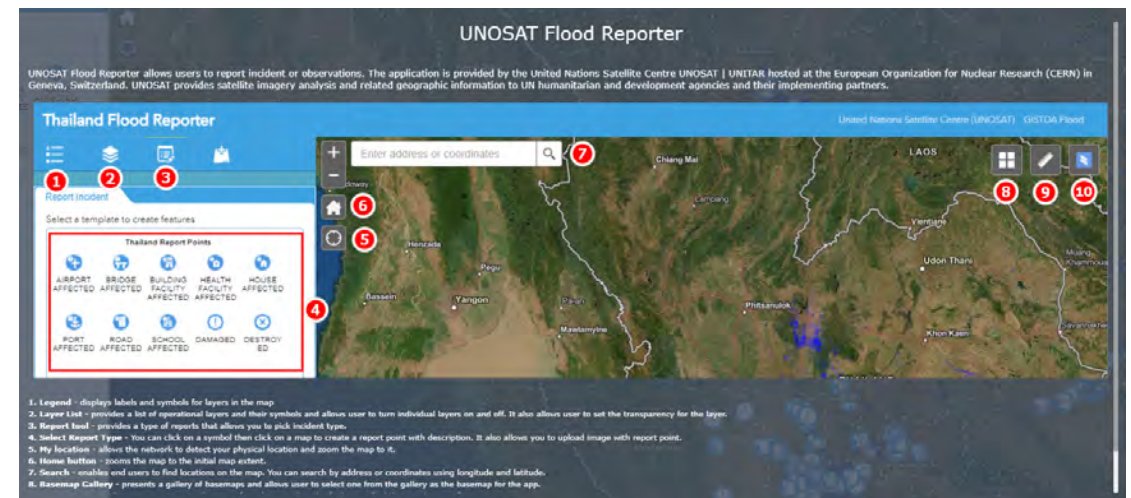
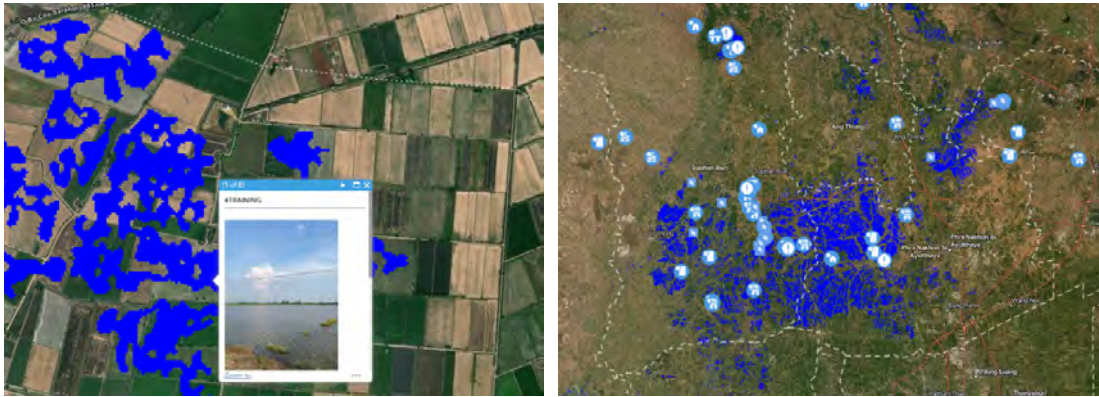


Figure 2.8: Reporting flood locations on a map.



 **Figure 2.9:** *Crowd-sourced field observation in Thailand.*

The data augmentation serves two main purposes, i) to improve the model where flood detection was erroneous and ii) to boost the confidence of the users in the output of new technologies.

Together with the FloodAI dashboard, these field-reporting tools were extensively used by United Nations Resident Coordinator Office (UNRCO) Nepal together with counterparts from the National Disaster Risk Reduction and Management Authority (NDRRMA) during July-August 2021 to realise the scale of an event and assess the resources available and the possible response while the country was in lockdown.



2.7

Flood AI Dashboard: Supporting Decisions Through User-Friendly Web Application

In addition to the use of machine learning and remote field observation to increase efficiency and efficacy in operations, it is necessary to ensure data is communicated and visualised through decision support systems (DSS). DSS are information systems, containing data, models, and knowledge management, presented through a user interface that allows technical and non-technical audiences, such as managers and directors, to quickly extract evidence to support decision-making processes. Having high-quality data products from frontier technologies is not enough if users cannot extract the needed insights within the decision-making timeframe. Therefore user-friendly interactive web applications – such as the FloodAI Dashboard – are a key component in closing the loop between technical or scientific knowledge and decision-making. Figure 2.10 shows the example of the FloodAI Dashboard that integrates the results from machine learning and remote field observation in one place through a user-friendly interface.

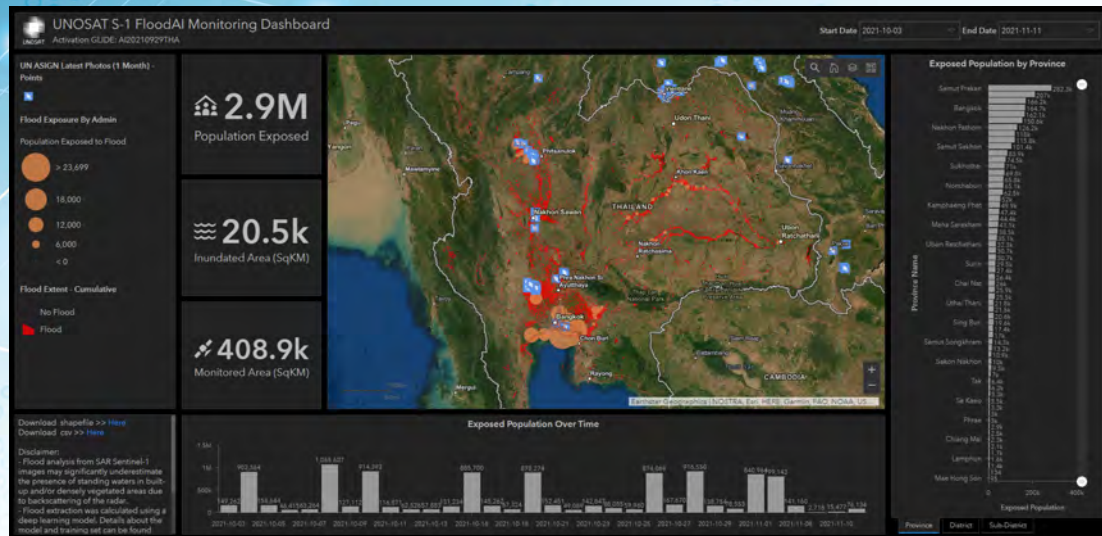


Figure 2.10:
FloodAI dashboard.

Under a time-pressure environment, humans are proven to be subject to decision shortcuts, which are used to select alternatives believed to bring about the optimal result. In short, these mental shortcuts, also called heuristics, can provide quick answers which, however, can be subject to bias and lead to opposite results from those which are expected. There are multiple forms of heuristics, such as the tendency to make judgments about the probabilities of events based on how easy they come to mind (availability heuristics), the tendency to decide based on the first information accessed (anchoring heuristics), and the tendency to choose based on emotions towards the event (affect heuristics). These and other mental shortcuts are evolutionary strategies that are experienced regardless of the hierarchical position or technical expertise.

DSS can enable users of data under time pressure to make decisions to move from subjective shortcuts to more objective shortcuts. By being exposed to geospatial information through user-friendly interfaces in a timely manner, evidence-based decision-making processes can be possible, building bridges between frontier technologies and decision-making. A people-oriented approach in technology development can be implemented by integrating user experience and user interface design. Since the primary audience for data products in the field of disaster risk management are neither the scientific nor academic communities, but public administration staff and officials, sophisticated analysis needs to be followed by front-end solutions that adequately communicate information with the user context in mind.

Finally, decision-making processes within disaster risk management need to move from paper-based to web-based solutions. Paper-based data products – such as printed reports and PDF files – are static materials, regardless of how extensive and comprehensive they might be. Interactive web applications that allow real-time access by multiple users, and through different devices, contribute to an enabling environment for effective collaboration, communication, and knowledge exchange. When government departments across national, regional, and local levels are able to visualise relevant information both in real-time and historical repositories, it can further improve the quality and efficiency of decisions. DSS as interactive web applications, therefore, can contribute to making organisations smarter, not only by applying frontier technologies in analysis, but also by modernising the way of data sharing and visualisation. The next section shows an example of the FloodAI dashboard used in Thailand.

2.8

Overlapping Hazards: Flooding & COVID-19 in Thailand

During the COVID-19 outbreak, people across Thailand were affected economically, socially, and emotionally. Amidst raging pandemic, the 2021 monsoon (September-November) brought heavy rainfall causing flash floods in the northern region and subsequently the overflow of water also created widespread flooding and water stagnation downstream in central and northeastern regions of Thailand. Citizens from the low-income bracket and especially the farmers experienced widespread losses from reduced mobility, crop and infrastructure damage.

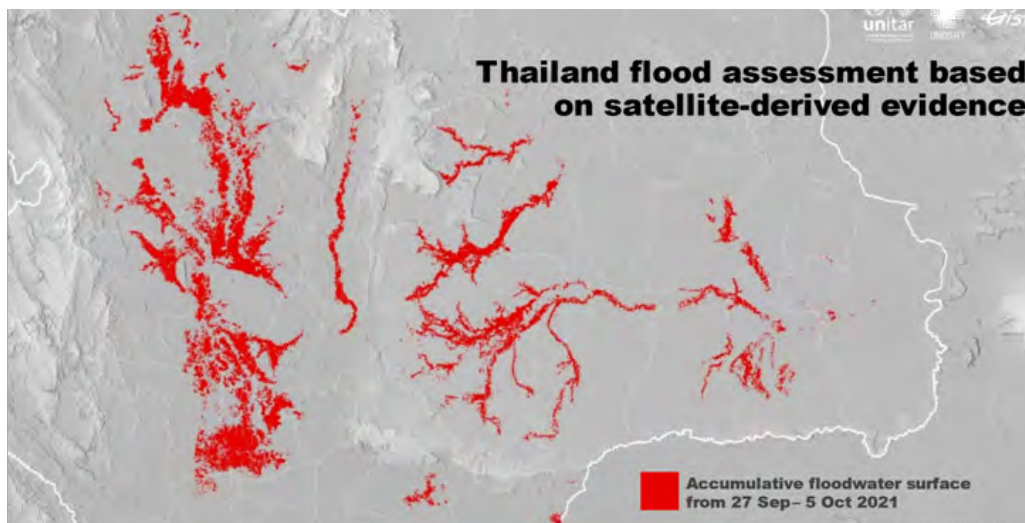
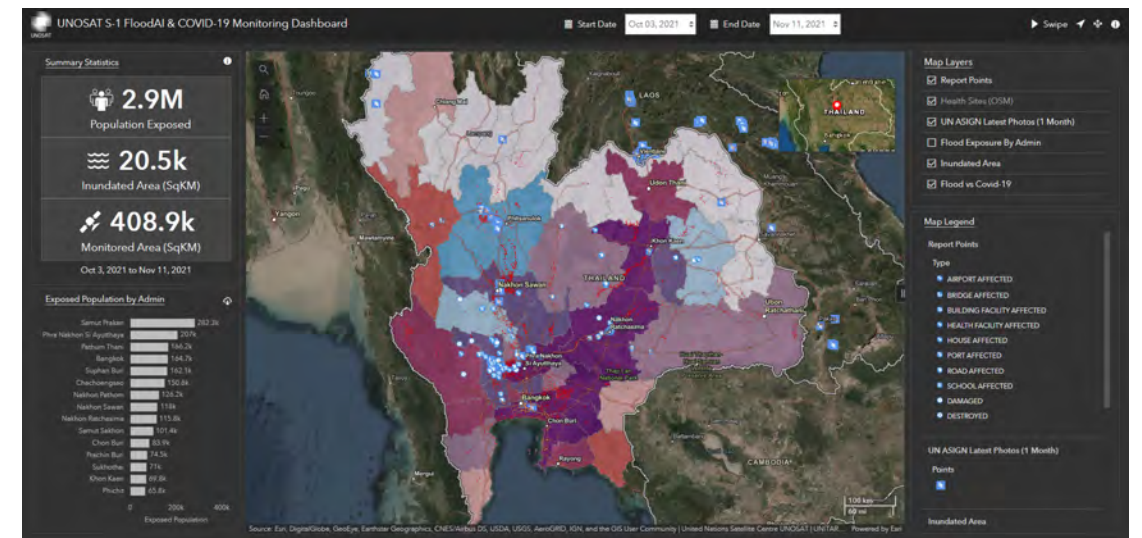


Figure 2.11: Thailand flood assessment based on satellite-derived evidence.

The health ministries of most of the ASEAN countries are regularly updating COVID-19 related numbers at the provincial or district level. The rapidly available flood exposure information from UNOSAT FloodAI is also presented at different admin-aggregated levels. Using simple geospatial techniques these two sources of data can be juxtaposed to assist integrated decision making. In the map below, the authors present the COVID-19 cases and population exposed to flood using a bivariate map.



High Flood Exposure Low Covid-19 Cases	High Flood Exposure Medium Covid-19 Cases	High Flood Exposure High Covid-19 Cases
Medium Flood Exposure Low Covid-19 Cases	Medium Flood Exposure Medium Covid-19 Cases	Medium Flood Exposure High Covid-19 Cases
Low Flood Exposure Low Covid-19 Cases	Low Flood Exposure Medium Covid-19 Cases	Low Flood Exposure High Covid-19 Cases

Figure 2.12: The UNOSAT FloodAI dashboard showing population exposure to flood versus COVID-19 cases since September (Source: UNOSAT, 2021).

The light grey colour represents low flood exposure and COVID-19 cases, while the purple colour represents where both exposures are very high. A decision-maker from the mandated government agency could use this information to prioritise the issuance of response packages to the provinces experiencing double hazards. This kind of information is only useful when refreshed at frequent intervals and delivered to end-users without delay, so it feeds into existing decision-making processes. But processing a large amount of satellite imagery that covers the whole country or a region may take weeks or months if analysed using traditional “image-by-image” human interpretation, most likely to be rendered ineffective in highly dynamic situations. As demonstrated in the previous section UNOSAT FloodAI can process large amounts of images up to daily intervals and can easily be combined with other sources of COVID-19 impact-related information in an operational context.



2.9

Conclusion and Recommendations

The frontier technologies AI, machine learning, big data analytics, and predictive analytics are not buzzwords anymore, most of the modern business analytics nowadays are driven by these technologies together with location intelligence. The UNOSAT FloodAI case study presented in this chapter reinforces the idea that a combination of AI and big data analytics can be used in real-life emergency response scenarios. The UNOSAT FloodAI is now fully trained and operations ready for Mozambique, Bangladesh, Nepal, Viet Nam, Cambodia, Myanmar, and Thailand. Through collaboration with national stakeholders, the model could be further improved to be deployed in other ASEAN countries as required. By using geospatial data of COVID-19 cases, health vulnerabilities and capacity modules could be included in the analytical dashboards giving a more holistic picture. To tackle the complex and cascading risk from natural-biological hazards

in the new normal there is a great opportunity to take advantage of frontier technologies, location intelligence to shape our understanding of forward-looking, multi-hazard scenarios on a scale that was not possible before.

However, there is a fundamental gap between scientific knowledge and decision-making that needs to be addressed. Although substantive progress has been made in the development of new technologies, most are not yet user-friendly nor mainstreamed for non-technical audiences. Decision-makers should not need expertise in AI, remote sensing, or data analytics to be able to use and extract relevant information for effective disaster risk management – they should be able to use it through the click of a button. So, expert scientific agencies need to design and deliver operational solutions keeping the decision-makers in mind by developing user-friendly decision support systems (DSS) that allow timely evidence-based decision-making processes. Without this approach, the application of frontier technologies will remain with subject matter experts, within pilot testing bubbles and decision-makers will need to keep guessing as to the best way to spend their limited resources for disaster risk management. User-friendly DSS based on machine learning, that are integrated into existing disaster-response protocols, can catalyse the national and local capacities to identify and monitor disaster risk, and enhance regional cooperation to achieve the ASEAN Vision 2025 to become “a global leader given its vast experience, knowledge, and expertise in disaster management and emergency response.”

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ASEAN Single Window: Toward More Efficient and Faster Facilitation of Customs Clearance



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Abstract

One of the main challenges for getting relief assistance to affected communities quickly is the processing time for customs clearance of humanitarian relief items and equipment, as well as immigration clearance for specialists. The different ASEAN Member States (AMS) have a variety of structures, processes, requirements, and forms for customs, immigration, and quarantine (CIQ). Additionally, as the influence from the COVID-19 outbreak expands across territories and industries, so do the measures affecting the cross-border movements of cargo and personnel. In response to the COVID-19 pandemic and to limit the spread of the virus, countries imposed temporary restrictions on exports and imports of some items, implemented new documentary requirements and mandatory quarantines that disrupted the smooth operations of humanitarian logistics and supply chains. The ASEAN Single Window (ASW) is a regional initiative that combines the direct exchange of data between AMS that allows national single windows (NSWs) to synchronise the data exchange across borders and which aims to expedite and streamline cargo clearance and shipment release throughout the region. This paper analyses the challenges of customs clearance and trade facilitation during disasters and amidst the COVID-19 pandemic, as well as the initiatives of the ASW and its implementation, particularly in trade facilitation and customs clearance for possible preparedness measures on humanitarian logistics. An interview with a senior official of the ASW from the ASEAN Secretariat was also conducted to review the ASW, key milestones and the status of the ASW for AMS, as well as to get insights on the potential benefits and challenges for the facilitation for humanitarian logistics through the ASW in this current outbreak situation.

**Keywords:**

humanitarian logistics, customs clearance, trade facilitation, ASEAN Single Window



3.1

Introduction

The COVID-19 pandemic has hit globally with an unprecedented scale and had severe impacts on multiple sectors including global and regional supply chains. Additionally, COVID-19 has created both supply and demand uncertainties and capacity fluctuations, causing gaps and disruptions in global supply chains (Ivanov, 2020; Queiroz et al., 2020). As the new variants of the virus emerge, it has exposed the vulnerabilities for essential goods such as vaccines, medical supplies and equipment, as well as food.

In response to the COVID-19 pandemic and to limit the spread of the virus, countries have applied controls that serve various public policy aims including managing the movement of goods across borders, restrictions on the export and import of some items, strict border controls for customs clearance and public health measures such as new documentary requirements or mandatory quarantines, among other factors, causing disruption to the smooth operation of humanitarian logistics and supply chains.

Concurrently, disasters might occur at anytime and anywhere. When a disaster strikes amidst a pandemic and a request for international assistance is required, facilitation and mobilisation of relief assistance will be necessary. One of the key aspects of the facilitation and mobilisation of relief assistance is the customs clearance process. With the additional context of a pandemic and disruptions in the logistics supply chain, very few customs clearances are adequately prepared for the possibility of facilitating relief assistance in huge volume and in a short period of time. Furthermore, the different ASEAN Member States (AMS) have a variety of structures, processes, requirements, and forms for customs, immigration, and quarantine (CIQ) processes. Multiple stakeholders involved within the affected state also lead to unnecessary bureaucratic bottlenecks, which also slow the entry and clearance of the relief assistance and cause unnecessary delays and possibly higher costs.

Guidelines to Specific Annex J, Chapter 5, Relief Consignments, of the Revised Kyoto Convention state that the effectiveness of humanitarian assistance is dependent to a large extent on the

speed with which it can be furnished. It is therefore imperative that customs administrations be as facilitative as possible and be prepared to rapidly clear goods that, as a result of catastrophic events, are being forwarded as aid (World Customs Organization 2000, p. 3). Accordingly, if there are any delays with customs clearance during disasters or emergencies, the humanitarian response may not be as effective and efficient as it should be.

To overcome bottlenecks in customs and trade facilitation during a disaster or amidst the pandemic, as well as to harmonise the regional mechanism for preparedness measures of humanitarian logistics, several approaches might be needed. First, reinforcement of national trade facilitation to include all supply chain activities and actors with adequate and sufficient response and capacity during disasters and amidst a pandemic. Second, implementation of paperless and digital trade and customs facilitation for easy, safe, and fast access and connectivity. Third, a permanent mechanism for cross-border exchange information, data, and documentation with streamlined procedures among the relevant stakeholders. Fourth, acceleration of clearance based on risk management to minimise trade disruption and reduce costs. The pandemic revealed that the requirement for digital, paperless trade procedures and facilitation more efficiently facilitated and managed the cross-border movement of critical goods during global health emergencies or disasters while maintaining open trade and equitable access to essential goods such as medical supplies and equipment.

The ASEAN Single Window (ASW) is a regional initiative that combines the direct exchange of data among AMS that allows National Single Windows (NSWs) to synchronise data exchange across borders and which aims to expedite and streamline cargo clearance and shipment release throughout the region. In line with the trade-facilitation principle, this paper seeks to examine the possibility and applicability of improving and harmonising trade and customs facilitation through the ASW in line with humanitarian requirements in times of emergency and amidst the COVID-19 pandemic.

This paper reviews the literature to analyse the challenges of customs clearance during disasters amidst the COVID-19 pandemic, as well as the initiatives of the ASW and its implementation, particularly in trade facilitation and customs clearance for possible preparedness measures in humanitarian logistics. An interview with a senior official of the ASW from the ASEAN Secretariat was also conducted to review the ASW, key milestones and status of the ASW for AMS, as well as to get insights on the potential benefits and challenges for the facilitation of humanitarian logistics through the ASW in this current outbreak situation. After analysing the key potential benefits and challenges discovered, recommendations for the way forward are made.

3.2



Understanding Trade Facilitation and Customs

According to the Organisation for Economic Co-operation and Development (OECD), trade facilitation covers all the steps that can be taken to smooth and facilitate the flow of trade, including the simplification, modernisation, and harmonisation of formalities in export and import processes and the related exchange of information and documents among the various parties in the supply chain. The primary goals of trade facilitation are to streamline and simplify the international trade procedures across borders such as export-import, to allow the easier and more predictable flow of trade across borders, whilst ensuring its safety and security and to be efficient in terms of cost.

Trade facilitation is often associated with the activities of a national customs administration. The role of customs is recognised in the Trade Facilitation Agreement (TFA) which entered into force in February 2017. It applies only to the World Trade Organisation (WTO) members that have accepted it. The TFA aims to speed up customs procedures, by making processes and fees more transparent and taking advantage of new technologies. Through the TFA, governments have agreed to publish a wide range of customs-specific information, including to have it available online where possible, outlining measures to expedite the processing and clearance of goods, options for electronic payment of import or export duties and encouraging countries to use relevant international standards for import, export and transit formalities and helping to minimise the number of different procedures to move goods among countries.

As a part of the continuous efforts to enhance international trade amidst the pandemic, it became imperative for the governments engaging in trade both at regional and global levels to adopt, enhance, or shift to the practice of digital trade facilitation. The application of modern information and communication technologies (ICT) to simplify and automate trade through the electronic exchange of data, single windows, and digital custom processes, has enabled quick paperless

tracking and contactless trade facilitation ensuring sustainability and optimisation. Implementation of automated customs not only influences trade competitiveness but also addresses surrounding issues of logistics and supply chain management. Paperless trade fosters significant economic savings including lower inventory costs or direct savings for traders through lower compliance requirements. An increase in savings, enhanced port efficiency, less port congestion, reduction of errors, flexible custom management, and initial direct clearance, contribute to ensuring sustainability and make trade facilitation efficient.

3.3



Customs Facilitation During Emergencies

Customs facilitation during emergencies is usually part of bilateral coordination between the assisting entity to the affected state and/or through the facilitation of the AHA Centre as a regional coordinating centre of humanitarian assistance in disaster management by the offer of or request for assistance. Referring to the Standard Operating Procedure for Regional Standby Arrangements and Coordination of Joint Disaster Relief and Emergency Response Operations (SASOP) Version 2 – 2018, Article 32, it is stated that the assisting entity arriving in the territory of the requesting or receiving party via air, land, or sea entry checkpoints shall immediately proceed to the CIQ facility for the necessary immigration procedures, customs clearance, and quarantine checks. The arrangements agreed by the parties in the Contractual Arrangement form shall be used as the primary document to facilitate the CIQ procedures for entry or exit of assets and capabilities from the territory of the assisting entity into the territory of the requesting or receiving party. The signed copies of the Contractual Arrangement form shall be used by the assisting entity or requesting or receiving party for verification of the movement of assets and capabilities. In this regard, the national focal point (NFP) or his/her authorised representative of the requesting or receiving party

shall provide the entry checkpoints with the signed copies of the Contractual Arrangement form and alert them to incoming assistance. The NFP of the assisting entity shall also provide the signed copies of the Contractual Arrangement form to its team leader.

The current practice of the facilitation of CIQ processes during emergencies involve many stakeholders, not only the National Disaster Management Organisation (NDMO) of the affected state but also relevant ministries/agencies such as the ministry of foreign affairs and CIQ department and others. The different AMS have a variety of structures and mechanisms on the arrangement of the involved stakeholders. However, as mentioned above, the NDMO of the affected state will internally coordinate and be the point of contact for any information.

3.4



Challenges in Facilitation of Customs Clearance Processes During Disasters

The challenges or delays in customs facilitation are caused by various problems in the wider international system. The cause of delay is mainly the improper documentation or paperwork of the humanitarian assistance. However, Turner (2015) identifies some critical variables in customs delays including time used to track lost goods and respond to shippers, customs clearance, backlogs, approval time, overwhelmed recordkeeping and confusion, political willingness or motivation, unwritten procedures in practice, poor quality IT systems and infrastructure, non-binding disaster law model agreements, lack of knowledge of policies in place, and the volume of external and internal goods coming in from international organisations, among other factors.

One of the critical variables highlighted above that delays the customs approval process is the backlog in incoming relief consignments and the effects that backlog have on local customs officials. A backlog is defined as the amount of relief consignments coming into the point of entry that are waiting to begin the customs-approval process. When the backlog grows large and consignments keep on coming, customs officials will work overtime to process the backlog. This overtime might cause data errors in trying to implement this corrective action, whose effects then reinforce the initial action that it was trying to correct. As the absolute number of goods cleared in 24 hours after the disaster is likely to increase from the non-disaster or peacetime rate, the approval process per consignment will take more time. This means that fewer goods are cleared per week during the disaster. One example is the backlog and congestion at Mumbai Airport, which was reported in 2020 with huge stockpiles of consignments due to the pandemic in 2020.

In addition to the point above, another critical variable of customs delay is the time to verify the paperwork and obtain ministerial approvals. The approvals and verifications need to be streamlined and communicated with all ministries involved. The approval time might be quite substantial given the number of stakeholders involved and the requirements of paperwork, which is still done conventionally, such as conducting a review of necessary documents to streamline fields within those documents where the stamps and signatures required will create multiple inquiries and ineffective recordkeeping, which increases the time needed to track the responses.



3.5

ASEAN Single Window

The ASW is a secured regional environment where the NSWs of AMS exchange trade, transport, and commercial data. While an NSW offers a service limited to the nationwide authorities and the exchange of data takes place within the national internet domain, the ASW can refer to an exchange of data between NSWs. ASEAN was the first regional economic community to conceptualise a regional single window. It was established under a legal framework known as the Protocol on the Legal Framework (PLF) to implement the ASW.

The main objective of the ASW is to have a single, synchronised system of submission and processing of data, as well as a single point of approval for customs clearance of cargo in ASEAN. ASW implementation ensures the compatibility of AMS with international open communication standards, while also ensuring that each of the AMS can then exchange data securely and reliably with any trading partners that use international open standards. Eventually, because it uses international operability standards, the ASW can support the exchange of certificates of origin and advance cargo information with non-ASEAN trading partners.

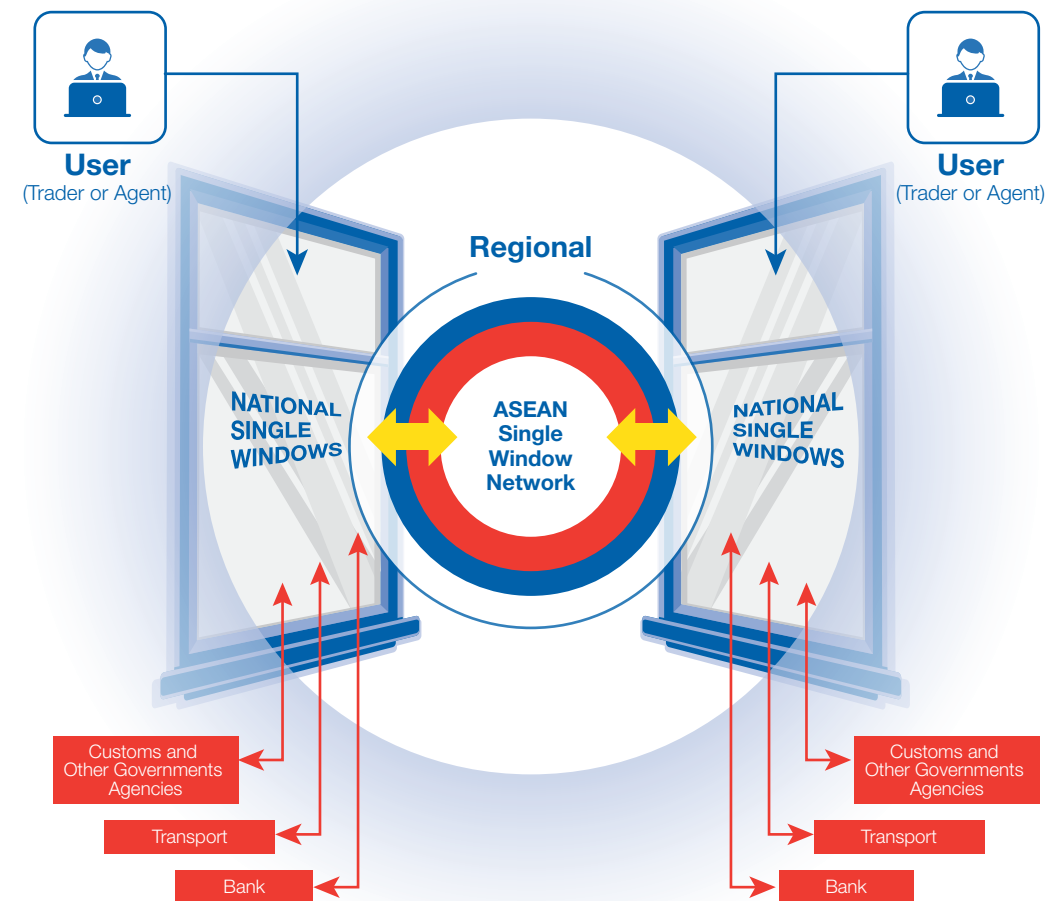


Figure 3.1:

Workflow between National Single Window and ASEAN Single Window
(Source: ASW - ASEAN Secretariat).

The architecture of the ASW consists of the ASW Gateway, a system linking the NSW of each AMS together to allow the exchange of e-documents in the agreed data format, under the agreed process flow and using the agreed protocol. It further consists of a Regional Service Portal (RS Portal), which is a centralised reporting system collecting statistics information (e.g. the number of ASEAN Trade in Goods Agreement (ATIGA) e-Form D exchanges, customs response) from all AMS' ASW gateways for policy development purposes. It will not retain the actual content of trade data and information exchanged, as was agreed by the AMS.

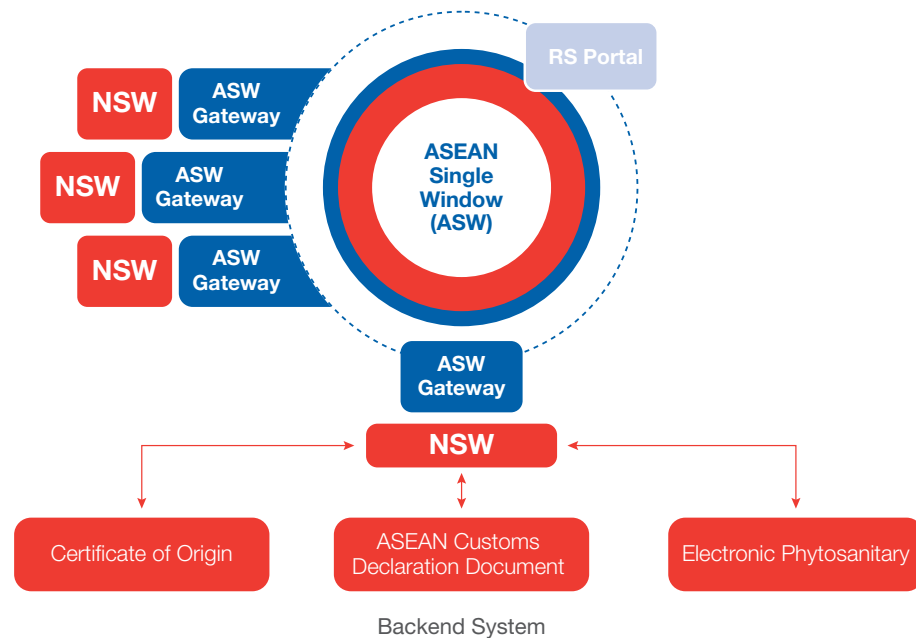


Figure 3.2: Architecture of ASEAN Single Window (Source: ASEAN Secretariat).

3.5.1 ASW Key Milestones

a. Inception of the ASW (2003-2005)

Discussion of the ASW started, an Inter-agency Task Force was created, and the agreement to establish and implement the ASW (ASW Agreement) was signed in 2005.

b. Protocol of the legal framework (2006-2015)

Following the signing of the protocol to establish and implement the ASW (ASW Protocol) in 2006, the ASW Steering Committee (ASWSC) was established with two working groups, which are the Working Group on Technical Matters (TWG) and the Working Group on Legal and Regulatory Matters (LWG). On 4 September 2015, the PLF was signed by all AMS.

c. Complete ratification and the creation of the Project Management Office (2017)

In 2017, the PLF was ratified by all 10 AMS and the ASW Project Management Office (PMO) was established in ASEC to supervise and manage the implementation of the ASW.

d. Live operation of ATIGA e-Form D (2018)

Starting 1 January 2018, live operation of the ATIGA e-Form D through the ASW began among Indonesia, Malaysia, Singapore, Thailand, and Viet Nam.

e. Live operation of ATIGA e-Form D among all AMS (2019)

Brunei Darussalam joined on 1 April, Cambodia on 1 July, Myanmar on 9 December, Lao PDR on 23 December and The Philippines on 30 December

f. Live operation of the ASEAN Customs Declaration Document (ACDD) (2020)

Starting 31 December 2020, live operation of the ACDD began among Cambodia, Myanmar, and Singapore.

g. Live operation of the ACDD among all AMS (2021)

Starting 31 March 2021, Malaysia and Thailand joined the live operation and other AMS were expected to join in 2021.

3.5.2 Key Potential Benefits

Based on the interview with the senior official of the ASW to review the potential benefits of ASW implementation and application in facilitation of trade and customs procedures in line with humanitarian requirements during emergency or amidst the pandemic, several key potential benefits were revealed:

a. The submission of documents electronically can reduce contact between the involved parties, such as government officials, traders, assisting entities, donors, etc., during emergencies. These approaches can minimise the risk of the spread of COVID-19.

b. The online approach not only allows the presentation of documents remotely but also provides a faster procedure that allows border officials and relevant agencies to verify the validity, identify next steps, and expedite clearance in a more transparent manner. Below is an illustration of the time saving where validation and issuance takes only a few minutes.

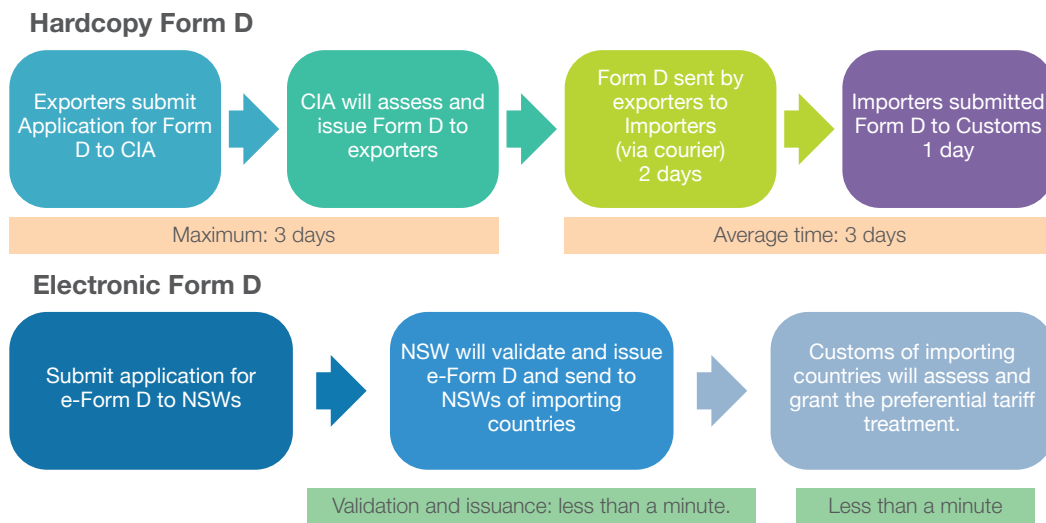


Figure 3.3: Processing time between hardcopy and electronic Form D.

- c. The electronic exchange of cross-border data/information ensures operational transparency and better compliance with guidelines, specifications, and conditions, which may be imposed by the donor or assisting entity or country in facilitating the assistance.
- d. Better and efficient recordkeeping.
- e. Easier access to relevant parties and the public in relation to the information as part of the transparency and compliance.
- f. Pre-arrival information received through the ASW will enable border control officials to begin risk management on electronically processed information before goods arrive and without seeing the physical goods.
- g. To enforce regulations and manage risk effectively, border control agencies need documents to be submitted in a timely manner. Pre-arrival information received through the ASW will enable border control officials to begin risk management on electronically processed information before goods arrive and without seeing the physical goods.

- h. The ASW will help NSWs provide improved track-and-trace capability, progress, and status of documents during the submission of entry declaration.
- i. The regional services component of the ASW architecture ensures synchronised control, standardised reference tables, and operational efficiency among participating governments in a distributed working environment.
- j. The ASW helps harmonise regional procedures and encourages AMS to carry out business processes and streamline procedures at the national level.



3.6

Challenges for Further Governance in Paperless Trade and Customs Facilitation

With the pandemic causing disruption in global supply chains, it became crucial to enhance the preparedness of humanitarian logistics at regional and multilateral levels through paperless, contactless, and fast-track clearance of cross border goods to more efficiently facilitate assistance. However, as countries possess different capacities and systems, it is often difficult to harmonise with a single policy instrument. There are several potential challenges that might arise in the further promotion of paperless trade and customs facilitation:

- a. The most essential challenge is whether the AMS will be willing to accept a treaty. To date, not all AMS are in live operations.
- b. Disparities among AMS on the availability of infrastructure including system automation and personnel capacity.
- c. Technical issues that might slow down or stop the process.
- d. Requirements of national coordination to reinforce the regional efforts. These include coordination among the NDMOs and other relevant stakeholders such as CIQ agencies, ministries of foreign affairs, ministries of trade and other agencies to help harmonise and streamline the process.
- e. Not all entry points can accept the ATIGA form.
- f. Lack of public outreach, as many relevant stakeholders are not aware about this initiative.



3.7

Conclusion

The application of the ASW to simplify and automate trade and customs processes has enabled the rapid tracking of paperless and contactless trade and customs facilitation, which is urgently needed amidst the pandemic and during emergencies. Given the benefits and potential challenges of the ASW, it has become imperative for governments particularly the respective NDMOs to study these existing initiatives on trade and customs facilitation and their potential application for humanitarian assistance.

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As Local As Possible:

COVID-19 Impacts on Localisation Efforts and Humanitarian Response



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Abstract¹

The Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM) requested the team from the School of International and Public Affairs (SIPA), Columbia University, to advance the mission of the Association of Southeast Asian Nations (ASEAN) Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre) by leveraging localisation. This required stakeholder analysis to (i) determine how localisation evolved, particularly since the beginning of the COVID-19 pandemic, (ii) define the role of the AHA Centre in operationalising local efforts and analysing sustainable methodologies, and (iii) reflect on adaptations of the broader Southeast Asian humanitarian system.

Localisation is a process of recognising, respecting, and strengthening the independence of leadership and decision making of local actors in humanitarian and disaster response. Local actors include national actors, sub-national actors, local authorities, local communities, and local civil society organisations. The seven dimensions of practice include strong quality of funding, equitable partnerships, institutional capacity, participation of all members of society, increased influence in coordination, visibility of efforts, and direct influence on policy.

The study illustrates the complexities as well as the opportunities that exist within the network of partners. Local partners need to be empowered to make relevant decisions about disaster prevention and mitigation. National actors can support local responses and coordinate state-wide responses. ASEAN builds regional capacity for nations to share resources. International organisations, along with partner nations, and donors, can work with the AHA Centre to directly meet the needs of local organisations.

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Keywords:

Localisation, AHA Centre, adaptation



4.1.

Landscape of Localisation

4.1.1 Humanitarian Aid

Humanitarian aid requires a strong preparedness plan to save time, reduce costs, determine critical stakeholders and processes, and maintain the necessary infrastructure. Investing in preparedness builds staff capacity, streamlines working processes, implements knowledge sharing and information-sharing systems. Assessment planning mitigates needs and protects infrastructure during a disaster. When disaster strikes, information is slow, and access is limited in affected areas, and actors must immediately respond through planned logistical coordination.

The sudden changes brought on by the COVID-19 pandemic showed the reality of upholding local capacities. Where larger international organisations cannot assist on the ground, their logistical roles change from in-person assistance to building local actors' capacity and sharing information and best practices. The supply chain needs to be flexible and agile to meet the needs of affected communities.

The pandemic reduced direct contact between affected groups and international humanitarian actors (ACAPS, 2020). In some locations, local actors and national governments deliver aid (Adeso Africa, 2020). One of the leading organisations, the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), has partnered with ASEAN to assist with humanitarian response plans during COVID-19 (UNOCHA, 2020). Regional typhoons, torrential rains, and storm surges affect densely populated cities, especially economically marginalised people, a key target audience for the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) 2021-2025 Work Plan.

4.1.1.1 Trends in Localisation with Civil Society Organisations

Localisation is an international process to empower local actors in humanitarian assistance. At the 2016 World Humanitarian Summit, leaders declared that humanitarian action be “as local as possible, as international as necessary” (United Nations, 2016). This definition highlighted the disparities among international humanitarian actors, UN agencies, international non-governmental organisations (NGOs), and local humanitarian actors in disaster management. Since there is no universal definition, stakeholders debate the different interpretations of localisation (Barbelet, 2018). Most funding for humanitarian response goes to international non-governmental organisations (INGOs) and is limited at local levels. For the monitoring and evaluating of the progress of locally-led responses, Global Mentoring Initiative (GMI) proposed seven dimensions of localisation, see Figure 4.1 (Van Brabant & Patel, 2018). These seven dimensions will be used for analysis later.

Seven dimensions of localisation

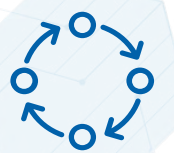
		FUNDING 25%, As directly as possible, Better quality
PARTNERSHIPS Less sub contracting More equitable		
		CAPACITY Institutional development Stop undermining
PARTICIPATION REVOLUTION Of crisis affected communities Gender, age, disabilities...		
		COORDINATION MECHANISMS National actors greater presence and influence
VISIBILITY Roles, results and innovations by national actors		
		POLICY INFLUENCE National actors greater presence and influence in international policy debates



Figure 4.1: Seven dimensions of localisation (Source: Van Brabant & Patel, 2018).

4.1.1.2 The Role of Civil Society Organisations

Civil Society Organisations (CSOs) include NGOs, community groups, faith-based organisations, and professional associations (WHO | Civil Society, n.d.). CSOs are on the ground, enabling them to have strong connections with local communities and gain access to most affected areas (Van Brabant & Patel, 2018). In the ASEAN region, the AADMER Partnership Group (APG), one of the CSO networks, is recognised by ASEAN as a partner in disaster management. The APG contributed to the enhancement of localisation through the CSO Consultation Process for the Drafting of the AADMER Work Programme 2021-2025. The APG proposed to strengthen localisation through multiple approaches, including renewing the ASEAN Committee on Disaster Management (ACDM)-CSO Partnership Framework, building national and sub-national capacity, and enhancing local partnerships, as well as offering to take a lead on drafting a regional strategy for localisation in the next AADMER Work Programme (Summary Note, n.d.).



4.2

Methodology

Participants shared their organisations' work around the three themes of how localisation had shifted since the pandemic, how the AHA Centre can leverage local actors to create meaningful capacity, and how the broader humanitarian system continues to adapt. In this report, the following terms were defined as the following:

1. National organisations include all non-governmental organisations, civil society organisations, and local community actors; and
2. INGOs include all external, international organisations operating and providing in-country assistance.

The study involved a cross-sectional examination of a variety of expert opinions across humanitarian actors. Semi-structured interviews elicited responses that addressed the critical research questions while still providing interviewees flexibility to share their insight on issues and

explore innovative solutions to disaster management efforts. ASEAN Member States (AMS), the ACDM, and donor countries provided national perspectives. International actors included the UN and non-UN affiliated organisations, regional organisations, partners of the AHA Centre, and local organisations.

To complement the interviews, a quantitative survey was dispersed to the interviewees' organisations, and distributed to the AHA Centre Executive (ACE) and ASEAN-Emergency Response and Assessment Team (ERAT) personnel across the 10 AMS. Ten responses from national organisations (including NGOs, CSOs, and local organisations) and 13 responses from members of international organisations were received to gain insight from a wider audience from members who worked within these organisations. The survey provided generalised opinions that enabled quantitative tools such as factor analysis to aggregate themes in survey responses.

Qualitative analysis was conducted to elicit long-term trends shared by interviewees. The themes emerged out of coded analysis of these conversations. Each of the 20 interviews conducted were transcribed for accuracy, consisted of the same questions and were separated into three sections: Localisation, Adaptation of Humanitarian System due to COVID-19, or relevant to the AHA Centre. The information extracted from each interview was categorised by the type of organisation (national vs. international), and was then further analysed and allocated into one or two of the most fitting seven dimensions to inform and derive the forthcoming recommendations. Quantitative data provides a present-day snapshot of themes, metrics, and values that established near-term ideas. Table 1 shows the number of informants for each category of international or national organisations. These two forms of analysis established the findings and recommendations in the following sections.

Category of Informants	Interviews	Surveys	Total
National ²	11	10	21
International ³	9	13	22



Table 4.1: Category of survey and interview informants.

² Includes governments, local NGOs, and nationally appointed leaders of societies of Red Cross/Crescent.

³ Includes national chapters of INGOs.

During the design and implementation stage, constraints influenced the quality of the results of the interviews and surveys, potentially obscuring the analysis based on these results. The discussions and surveys were all conducted in English rather than the local languages. AMS have their official and regional languages. The results of the study did not have an even geographical distribution across the AMS of interest; the survey results were based on those who were willing to participate, and the interviews were conducted based on availability within a short timeframe. Therefore, this study was unable to include national and international organisations operating in every AMS. The ongoing COVID-19 pandemic caused travel restrictions and impeded the field research and the face-to-face interviews with specific organisations or government staff from focus nations (Indonesia, Philippines, Cambodia, Laos, Myanmar, Viet Nam). Furthermore, it was difficult to contact a wide range of key informants and survey respondents in local and national organisations and governments. The survey was distributed by the interviewees to members within their organisations and through the ACE and ERAT teams, not directly distributed by the SIPA team. Interviews were held over Zoom, limiting the access to certain organisations; local organisations may not have had the proper internet connection and the language barrier did not allow for direct interview opportunities.

4.3 Findings

The findings illustrated (i) how localisation evolved, particularly since the beginning of the COVID-19 pandemic, (ii) the role of the AHA Centre in operationalising local efforts and analysing sustainable methodologies, (iii) reflections on adaptations of the broader Southeast Asian humanitarian system, and (iv) recommendations.

4.3.1 Localisation

4.3.1.1 Concept of Localisation

The 2016 World Humanitarian Summit was a major development in localisation efforts (Localisation of Humanitarian Action, 2020). As shown in Figure 4.2, 96% of survey respondents agreed with the call of the summit for humanitarian action to be “as local as possible, as international as necessary.” However, since then, there has been no agreed-upon definition of localisation in the international community (IFRC, 2018). The diverging

interpretations of localisation speak to the diversity of understandings and perspectives on this key issue across the world.

Q1 Do you agree with this definition of localisation that humanitarian action is ‘as local as possible, as international as necessary’?

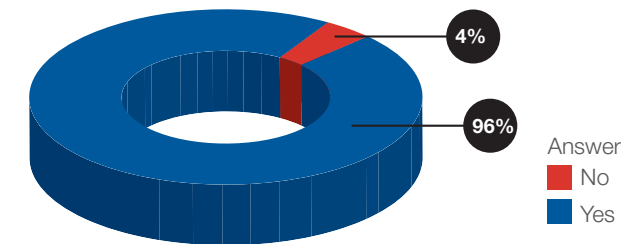


Figure 4.2: Definition of localisation.

Q2 What organisational level do you consider local?

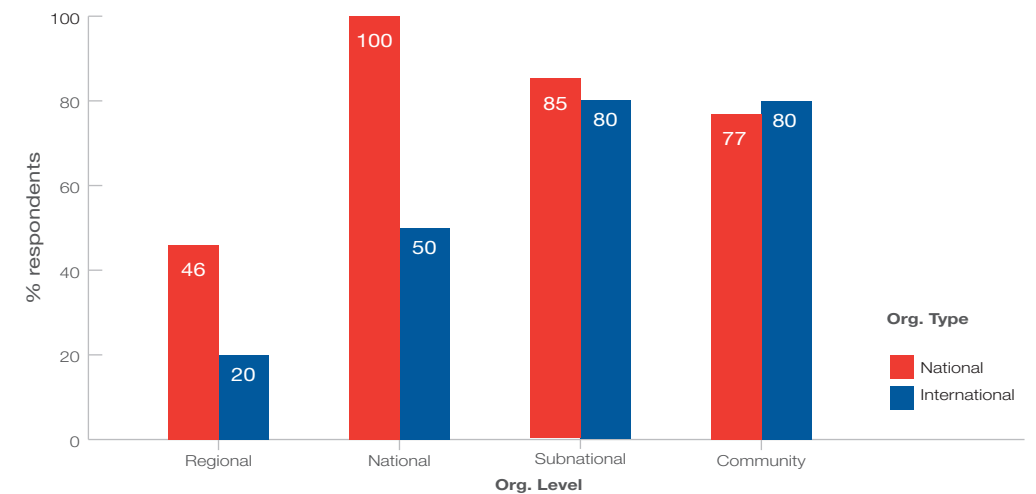


Figure 4.3: What is considered “local”?

The definition of localisation depends significantly on each organisation's scope and scale of engagement. International organisations deem national organisations as local, while local actors are at the sub-national and community levels from national actors' perspective. As illustrated in Figure 4.3, 100% of survey respondents from international organisations consider national actors as local, while 50% of national organisations regard national actors as local. Instead, 80% of respondents from national organisations view sub-national and community levels as local.

Moreover, local, national, and international organisations recognise localisation according to the GMI's seven dimensions of localisation (Figure 4.4) differently, except for the capacity dimension, which they all agree is an essential element of the definition of localisation. International organisations deem capacity (100%), coordination (92%), partnership (85%), visibility (85%), and funding (77%), as significant elements that define localisation. Local and national organisations consider capacity (100%), participation (90%), partnership (90%), funding (80%), and coordination (70%), as significant components of localisation.

Based on key informants' interpretations of localisation, the study developed a working definition of localisation in the ASEAN region.

Localisation is a process of recognising, respecting, and strengthening the independence of leadership and decision making of local actors in humanitarian and disaster response. Local actors include national actors, sub-national actors, local authorities, local communities, and local civil society organisations.

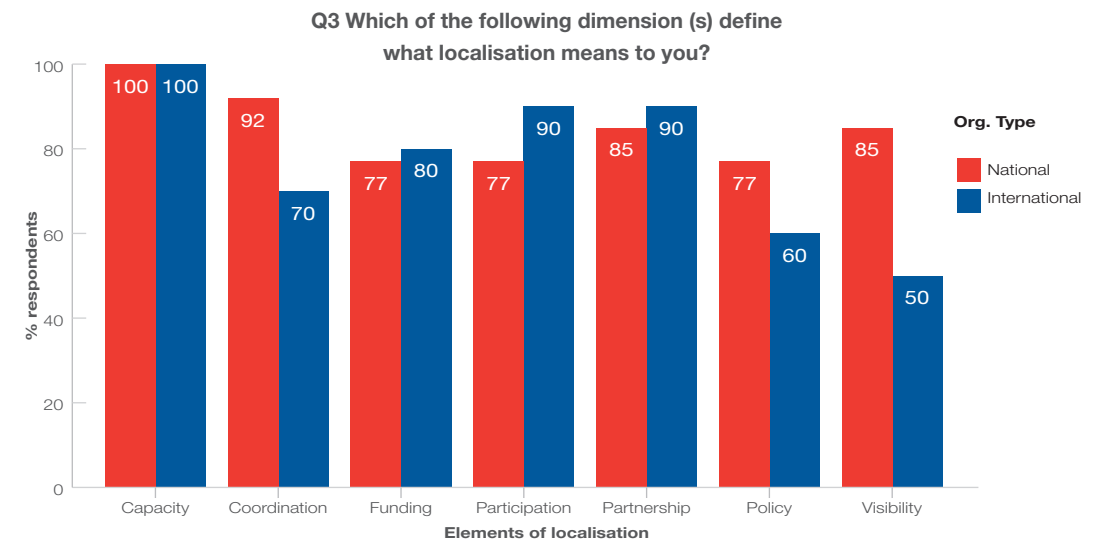
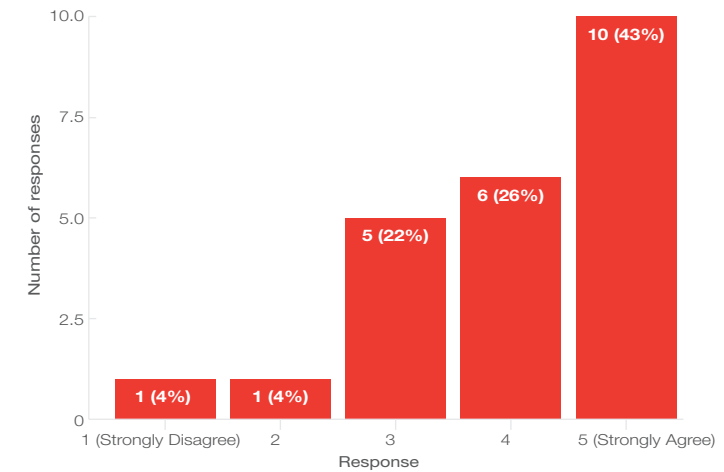


Figure 4.4: Dimensions which define localisation.

Some countries have experienced increased localisation during the pandemic due to personnel movement restrictions, such as Malaysia, while other countries, such as Indonesia, stated a minimal change under COVID-19. These perspectives were stated during two separate interviews. One regional organisation member working in Malaysia stated many NGOs expanded after March 2020 and had greater accessibility within their geographic boundaries due to lockdowns. Whereas in Indonesia, local responses to disasters were initiated after the tsunami in 2004; localised efforts were already in place before COVID-19 hit and strong civil society organisations were already present. During COVID-19, it has been incumbent on local organisations to respond since the pandemic has restricted other organisations' staff who previously came from abroad to present on site. Localisation has become a critical solution to disaster response and pandemic support. The increase in localised responses during COVID-19 is reflected in the survey data in Figure 4.5.

Localisation is a process of **recognising, respecting, and strengthening** the independence of leadership and decision making of local actors in humanitarian and disaster response. Local actors include national actors, sub-national actors, local authorities, local communities, and local civil society organisations.

Q11 Local/national organisations have an increased responsibility in humanitarian response during COVID-19 in Southeast Asia.



Q16 Overall, the changes due to COVID-19 have increased the importance of localisation in humanitarian response in Southeast Asia.

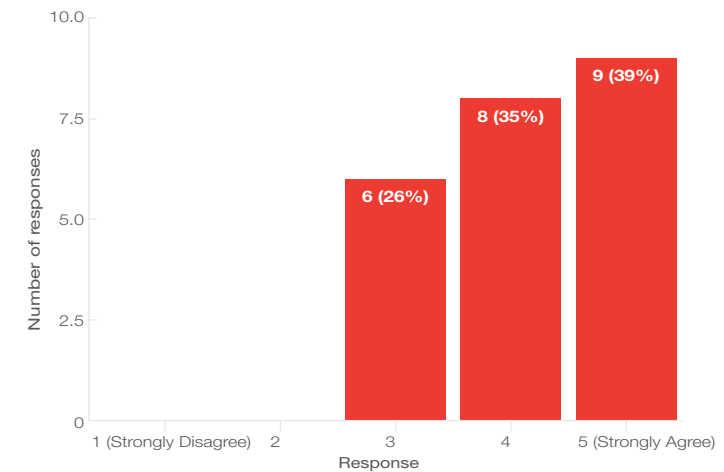


Figure 4.5: How COVID-19 affected humanitarian and local responses.

4.3.1.2 Capacity

Capacity building is vital for improving localisation and disaster management abilities. Among the seven dimensions of localisation, survey respondents rated capacity as the most integral to localisation. INGOs recognise their role in empowering communities to be more responsible and accountable during a crisis. Intentionally focused and curated efforts include building resilience, establishing a hub of resources, planning for contingencies, and nationalising and identifying staff as currently promoting localisation.

4.3.1.3 Coordination

Coordination at sub-national levels is essential. Coordination differs in each AMS. Knowledge sharing is integral to exchange the ways that people deal with disasters. Local governments are significant in leading and coordinating with various stakeholders. Identifying the qualified local organisations and building a coordination mechanism (system) for them are beneficial in responding to disasters as quickly as possible, and then supporting localisation in the region to coordinate resource mobilisation.

4.3.1.4 Funding

Donors have a crucial role in promoting localisation. They hold power in the humanitarian sector as they determine whom to fund. Since some organisations, particularly local NGOs and CSOs, have limited resources and capacity, they may not have enough capacity to do the groundwork to request funding, including preparing applications, establishing monitoring and evaluation systems, and reporting on the use of funds. Resultantly, they might not be able to access funding from donors. Almost 40% of survey respondents disagree with the notion that local and national organisations received sufficient funding during the COVID-19 pandemic. Additionally, approximately 40% of survey respondents discern that local and national organisations received grants disproportionately compared with international organisations. Concerning funding, most interviewees thought that funding has not changed or has decreased, especially to local/national organisations.

4.3.1.5 Participation

The framework of the GMI's seven dimensions define participation as the involvement of crisis-affected populations in the decision-making, review, and evaluation processes. From interviewees' perspective, participation differs from the GMI's definition. It is an engagement of all stakeholders, especially local actors, ranging from local communities and local NGOs, to the provincial and national governments, in emergency responses. Over 60% of survey respondents deem their organisations encourage localisation in Southeast Asia.

4.3.1.6 Partnerships

Opportunities for collaboration exist among national actors, humanitarian actors, and local actors in humanitarian relief work. All stakeholders cooperate to design the best way to respond to disasters. Local organisations have varying capabilities in skill level, capacity, funding, and experience. In accordance with the notion of "as local as possible, as international as necessary," international organisations can complement the local actors, providing support and help in bridging the gap between the local actors' abilities and realities. As seen in Figure 4.6, COVID-19 was seen to strengthen partnerships between international and local actors in Southeast Asia.

Q7 Changes due to COVID-19 strengthened the partnerships between international actors and local/national actors in Southeast Asia.

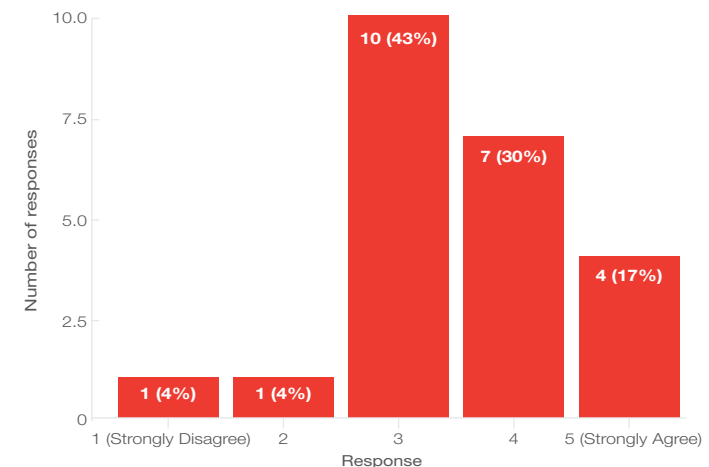


Figure 4.6: How COVID-19 strengthened partnerships between international and local/national actors.

4.3.1.7 Policy

Governments and INGOs have begun altering their policies around localisation. Some countries have established new laws to strengthen local governments and decentralise responses to disasters. Through studies, interviews, and review of policies organisations are responding to localisation. While policies focused on localisation are essential, local involvement in national or regional decision-making and planning are also important for broader participation. As shown in Figure 4.7, only 43% of survey respondents agree that locals are involved in developing policies in Southeast Asia and 57% either disagree or remain neutral. Policy decisions affect all levels of the humanitarian sector, whether that is an INGO operating and providing external aid, regional organisations such as government-affiliated organisations, or small CSOs and NGOs.

Q14 Local/national organisations are involved in the development of humanitarian policies and planning processes in Southeast Asia.

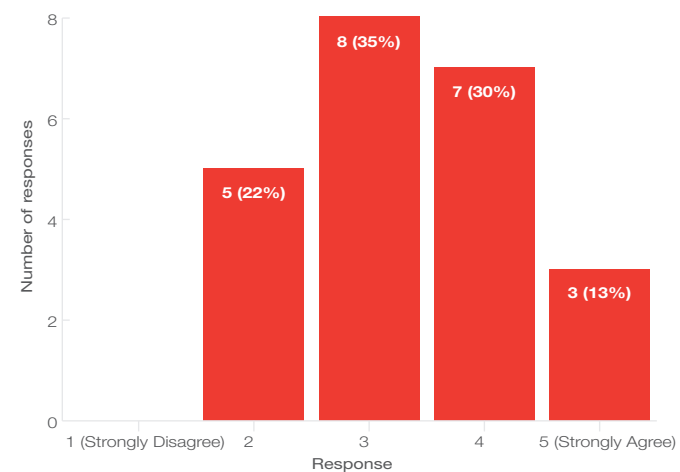


Figure 4.7: *Involvement local/national organisations have in humanitarian policies.*

4.3.1.8 Visibility

A vital part of localisation includes acknowledging and publicising the work that local and national actors do so the broader international community is also aware of their work. Local and national organisations feel mixed about being acknowledged for their efforts in humanitarian responses with 61% of respondents either feeling neutral or disagreeing on being recognised. Only 39% feel they received credit for their role in humanitarian

responses. While governments have made great progress, participation and visibility must expand to include a variety of local and national actors.

4.3.2 ASEAN and the AHA Centre

Survey respondents attributed the AHA Centre as having an essential role in coordination and providing visibility to regional and national actors. Interviewees and respondents expressed that the AHA Centre was helpful in capacity building, coordination, and partnership and can further support these localisation dimensions. Meanwhile, 74% of survey respondents agree that regional organisations, including the AHA Centre, are essential in furthering local-led responses. Furthermore, 92% of national and international organisations respondents emphasised that the AHA Centre could primarily contribute towards capacity building and partnership out of the seven aspects of localisation.

4.3.2.1 Capacity Building

Survey respondents shared their insights on the beneficial resources they gain from the AHA Centre in capacity building including training programmes from the AHA Centre through ACE, ERAT and other platforms. Most respondents from local and national organisations conveyed the importance of knowledge, outreach, and training resources from the AHA Centre. The AHA Centre has initiated the Disaster Emergency Logistics System for ASEAN (DELSA) to mobilise and distribute relief items to disaster-affected AMS. This programme has established regional warehouses for supplies, which can further strengthen local disaster response capabilities. Both national and international organisations ranked logistics as the lowest element of partnership with the AHA Centre. The Humanitarian and Emergency Logistics Innovation Expo (HELIX), was the AHA Centre's latest effort to leverage on logistical expertise in the ASEAN region to improve logistical capacities (AHA Centre, 2021).

4.3.2.2 Partnership

The AHA Centre can partner with governments to represent their perspectives to UN agencies and other international organisations working in the regional disaster response. The AHA Centre can also facilitate the efficient maximisation of resources among AMS to fill gaps in national capacity. Indeed, a rapid response in a disaster is effective when

all actors, the governments, international organisations, small and large NGOs, and civil society utilise their strengths to assist disaster relief efforts. This is an area where the AHA Centre can play a greater role, by establishing a network of organisations. Interviewees also expressed the importance of sector coordination. No organisation will have the resources to rapidly respond to disasters alone. This underscores the importance of establishing strong multi-sectoral partnerships for the AHA Centre to improve regional efforts to respond to disasters.

4.3.2.3 Coordination

The AHA Centre is a central point of collaboration among the AMS and external organisations. Various agencies provide opportunities for the Centre to leverage their nation-states' strengths and resources and coordinate access to nations in need. The AHA Centre can leverage its relationships with international organisations to develop policies in which nations with varying resources can transfer, loan, or gift these resources to countries that require them when disaster strikes. This creates the strength of the ASEAN region and relationships between AHA Centre and their international partners. The varying capabilities of nations can be leveraged to create a regional support network.

4.3.3 Humanitarian Response and Adaptations

Informants shared how they foresee the humanitarian architecture changing in the short and long term due to COVID-19. Respondents elaborated on the humanitarian challenges they have faced and the challenges they anticipate in the long run, the pandemic's effect on regional contributions to local responses, and the changing influence of international humanitarian assistance.

4.3.3.1 International and Local Response

Currently, the actors responding to disasters include a wide array of international organisations. While local actors' empowerment is ideal, local organisations acknowledge that international humanitarian actors still impact disaster response. Two years after the World Humanitarian Summit, the Central Sulawesi 2018 earthquake and tsunami occurred in Indonesia. Interviewees cited it as a spark in Southeast Asia's localisation

efforts. The government of Indonesia restricted direct intervention by international humanitarian organisations (Robillard et al., 2020). The Indonesian government limited the type and quantity of aid international organisations could provide. Instead, national, and local partners assisted in coordination with the Indonesian government (*Charting the New Norm?*, 2019). This one event remains critical in revealing the ability of government agencies to take the lead. On the other side of the humanitarian sector, interviewees from INGOs acknowledge local partners' importance as first responders.

4.3.3.1.1 Capacity Building Efforts and Policy Reform

Capacity building is underway as INGOs move to support governments, national responses, and national organisations. Along with this shift, a few INGOs have become "national NGOs." Although these organisations are not entirely local, as they are headquartered elsewhere, they strive to be as local as possible in their hiring practices. This ensures that their staff are knowledgeable, experienced, and aware of local dynamics. The humanitarian system can empower and supplement national actors specifically in terms of capacity and resources. An example of this is by specifically assisting CSOs in the COVID-19 response – providing means, accurate information, and policies is a top-down approach to international aid filling the gap.

4.3.3.1.2 Challenges for the Humanitarian Sector

Respondents felt that funding availability would be the most significant humanitarian challenge in the next 10 years. Responses alluded to the fact that funds from donor countries decreased due to COVID-19 and that competition for the remaining funds continued to be strong. Considering COVID-19 circumstances, interviewees are questioning the existence and relevance of international humanitarian organisations post-COVID-19 (*Interview 4*, personal communication, March 3, 2021). Due to the COVID-19 pandemic AMS and governments rely less on international organisations to access local communities. Interviewees referred to the changing role of international organisations in response to humanitarian and disaster relief, noting a shift towards locally-led responses. Some informants felt the shift to be temporary; while others regard these changes as long-term shifts.

4.3.3.2 Communication and Multimedia Resources

Communication is a central aspect of humanitarian response and government efforts, and illustrates room for improvement across INGOs, governments, regional organisations, and national organisations. Due to personnel movement restrictions, COVID-19 necessitated the use of virtual platforms for communication, coordination, and capacity building (*Interview 16*, personal communication, March 22, 2021, p. 16) (*Interview 19*, personal communication, March 30, 2021). Interviewees suggested networks or databases across these sectors for a more integrated approach. The importance of local partnership in terms of data and information sharing was highlighted multiple times.

4.3.3.3 COVID-19 Adaptations

Local, national, and international organisations alike were unprepared for the sudden circumstances that COVID-19 entailed (*Interview 18*, personal communication, March 24, 2021). In the short run, organisations had to scramble to adapt. One respondent mentioned that organisations did not learn from past disease outbreaks such as Ebola and African Swine Fever and take necessary preparations (*Interview 5*, personal communication, March 2, 2021). One international organisation mentioned that due to their lack of expertise in health emergencies, they transitioned to supporting health agencies and facilities in the COVID-19 response (*Interview 6*, personal communication, March 9, 2021). One key exception was the Red Cross, which had expertise in providing medical assistance to affected communities.

4.3.3.3.1 Health Protocols & Logistics

COVID-19 necessitated humanitarian actors to heed the nuances required in a health emergency – the epidemiological risks, the protocols required to keep both the first responders and affected safe, and the logistics required to do so (*Interview 6*, personal communication, March 9, 2021) (*Interview 12*, personal communication, March 16, 2021) (*Interview 18*, personal communication, March 24, 2021). These protocols also interfered with normal operations. Respondents mentioned that the speed of response to disaster relief had been impeded (*Interview 6*, personal communication, March 9, 2021) (*Interview 18*, personal communication, March 24, 2021). Due to the necessary personal protective equipment (PPE) and health protocols, response times to move personnel to and within the areas were impacted.

Future humanitarian response protocols may also involve bringing infectious disease protocols to the forefront of disaster response (*Interview 12*, personal communication, March 16, 2021). Respondents alluded to disaster risk necessitating a localised response, amid the larger risks presented for the movement of humanitarian workers in a global pandemic.

Medical supplies and logistics must supplement traditional disaster logistics. In disaster preparedness, humanitarian organisations are now asking for funding for PPE as a core component in every project's funding requirements (*Interview 9*, personal communication, March 15, 2021).

4.3.3.3.2 Effect of COVID-19 on Localisation

COVID-19 has highlighted and brought greater awareness of epidemiological risk to communities globally. The pandemic has shown how disease can compound the effects of existing humanitarian crises by adding the possibility of infection (*Interview 1*, personal communication, February 22, 2021). In response to this, governments of AMS enacted movement restriction orders and border closures. This severely impacted personnel movement within countries and between countries. People were not only unable to reach affected communities, but were also scared of contracting COVID-19 (*Interview 1*, personal communication, February 22, 2021). COVID-19 changed the form of how these organisations viewed capacity building and their operations. Adaptation plans were drawn up to address the nuances required during COVID-19, including the operational modality and geographical areas of implementation amidst the personnel and logistical restrictions (*Interview 5*, personal communication, March 2, 2021).

Beyond personnel movement, COVID-19 disrupted global logistical networks, limiting the capacity of supply chains and transport logistics (*Interview 2*, personal communication, February 23, 2021). In Indonesia, cross-island resource mobilisation was hindered by COVID-19, necessitating the mobilisation of resources from neighbouring provinces within the same island to prevent epidemiological spread (*Interview 12*, personal communication, March 16, 2021). A respondent from an international organisation mentioned how COVID-19 had put their capacity-building efforts for local actors on hold (*Interview 9*, personal communication, March 15, 2021).

Training that would usually be conducted in the absence of the disease was impeded by the lack of internet connectivity in local communities. Furthermore, this respondent mentioned that COVID-19 also affected the quantity and physical-mental capacity of their staff, thereby affecting their ability to strengthen local capacities.

Considering the pandemic, governments had to rely on local organisations, instead of external support. In Central Java, the local government could not distinguish who among the humanitarian workers who resided outside the disaster-stricken areas were COVID-19 positive during the floods that occurred in 2021 (*Interview 13*, personal communication, March 17, 2021). Leaders resorted to activating the local organisations instead of inviting help externally from the affected region to prevent the spread of disease.

However, while COVID-19 could have accelerated localisation, local actors may not have had the capacity, nor the resources required to address the health emergency. Local organisations had no choice but to assist despite knowing the risk of COVID-19 (*Interview 20*, personal communication, March 30, 2021). Local organisations also worked together to support one another's needs. Local organisations often became the main responders in humanitarian crises during COVID-19.

4.3.4 Recommendations

The following recommendations provide a way forward to address the three preceding sections to strengthen localisation in Southeast Asia.

4.3.4.1. Amplify Youth Participation

Humanitarian efforts can amplify the voices of youth to incorporate societal change and empowerment at the local level. The AHA Centre has worked to highlight ongoing projects by young ASEAN citizens. Another aspect of preparedness at the local level is integrating youth participation within disaster management through formalised programmes. Young people make up the next generation of local activists. Local organisations can develop volunteer and mentorship programmes and pathways to work in their local communities to develop meaningful and valuable policies and programmes. In Viet Nam, the local disaster management council at the commune level also includes the youth unions

(*Interview 10*, personal communication, March 16, 2021). Another interviewee mentioned the importance of humanitarian stakeholders engaging young people to foster them as campaigners for humanitarian causes (*Interview 6*, personal communication, March 9, 2021). The youth can offer progressive and innovative solutions towards disaster management and humanitarian crises.

4.3.4.2 Identify Areas Where the Government Can Localise Assistance and Support National Organisations

Interviewees underscored the importance of enhancing the localisation capacity building of local governments and the coordination across local, provincial, and national levels. A recurring theme was to enhance the localisation of capacity building of local governments and to embed coordination at local, provincial, and national levels. The Philippines has established Disaster Risk Reduction Councils at different government levels, including the barangay, city/municipal, provincial, regional, and national levels (Assessment of Disaster Risk Reduction and Management (DRRM) at the Local Level, 2014). Whenever two or more geographical entities of a specific level are affected, the higher geographical council is activated. For example, if two or more barangays are affected, the city/municipal council is activated. In view of limited resources, governments and other organisations working on improving the capacity of local actors can also train local actors to become trainers, who in turn can train others. In Viet Nam, provincial governments are encouraged to have their own programmes to train the teams from the communes in their provinces (*Interview 10*, personal communication, March 16, 2021). This allows the training to be tailored to the geographically specific needs and disasters of that region and strengthens the provincial governments in their expertise and ownership of disaster management.

4.3.4.3 Centralise Platforms for Information Sharing

While some local actors can develop skills to respond to disasters through experience, other groups rely on scenarios and information exchanges. Knowledge sharing through networks (e.g., a cluster system) or other information-sharing platforms is critical to organise, aggregate, and share the diverse resources of the humanitarian actors. Interviewees mentioned how there was a need for knowledge-sharing platforms for local NGOs from different AMS to share valuable experiences and skills (*Interview 7*, personal communication, March 8, 2021) (*Interview 19*, personal communication, March 30,

2021). Local NGOs have experience in handling and responding to disasters in their local contexts - many of their innovations and best practices can be invaluable lessons for not only other local CSOs, but also other organisations and governments. Furthermore, improving partnerships between national and local actors, as well as humanitarian organisations and national actors can help to grow a regional support network.

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Special Feature :

Emergency Response in a Pandemic: the Singapore COVID-19 Experience

Interview 7 (SIPA Capstone Team, Interviewer). (2021, March 8). [Personal communication].

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Abstract

Singapore confirmed its first imported case of the coronavirus COVID-19 on 23 January 2020. On 7 February 2020, the Disease Outbreak Response System Condition (DORSCON) alert level was raised from Yellow to Orange following evidence of disease transmission within the community, and measures were immediately introduced to mitigate the outbreak.

The Singapore Civil Defence Force (SCDF), as the national agency for firefighting, rescue and emergency medical services (EMS), had to adapt protocols to maintain operational readiness and support the nation's fight against the COVID-19 pandemic. The SCDF's EMS was at the forefront, coming in direct contact with suspected and confirmed COVID-19 cases. The fire and rescue responders were also at risk of exposure as they interacted with the community while attending to everyday emergencies such as fires, road traffic accidents and medical calls. Personnel safety was ensured by personal protective equipment (PPE) protocols, implementation of strict decontamination procedures and modifications to operational practices without compromising service delivery. New measures were also introduced for overseas missions to safeguard the health and safety of both the SCDF teams and the affected people in need of humanitarian aid.

Being at the frontline in the battle against the pandemic, it was crucial for SCDF to maintain business continuity and develop contingency plans in the event of an outbreak spreading within the organisation. The SCDF's Business Continuity Plan (BCP) ensured that vital emergency services to the public were never compromised through the introduction of team segregation, rigorous health monitoring, an organisation-wide vaccination drive and safe-distancing measures. These required the collective effort of all levels within the organisation such as the fire stations, training institutions and supporting departments. Over and above its core duties, the SCDF also supported the national effort to contain the pandemic by assisting in COVID-19 swab-test operations, the operation of quarantine and community isolation facilities, and training other government agencies in PPE donning and doffing procedures.

While the COVID-19 pandemic still poses a challenge for emergency services agencies, the various measures implemented by SCDF thus far have proven to be effective in maintaining operational readiness whilst keeping personnel safe and minimising transmission risk.



5.1

Introduction

The spread of the coronavirus COVID-19 has affected the world in an unprecedented manner. To protect ourselves from this pandemic, organisations, institutions and people around the world have had to adapt existing protocols and embrace new concepts of operations in ways that we might not have imagined possible before.

The Singapore Civil Defence Force (SCDF) is Singapore's national agency for firefighting, rescue and emergency medical services (EMS). In addition, the SCDF also undertakes overseas humanitarian missions to render assistance to disaster-stricken countries. Adaptations to existing protocols and the development of new ones had to be implemented to allow the SCDF to continue operating effectively while safeguarding the health and safety of the frontline responders.

The measures described in this article were accurate at the time of writing. However, due to the dynamic nature of pandemic response and the ever-evolving national guidelines in combating COVID-19, readers should note that some of these measures may have changed by the time of publishing.



5.2

Overview

To maintain operational readiness and ensure business continuity, the SCDF undertook measures to prevent and curb the spread of COVID-19 within the organisation. As the pandemic evolved over time, the measures undertaken were also adjusted to ensure adherence to the national guidelines issued by the Singapore Ministry of Health (MOH). Being an essential service provider on the frontline in the battle against COVID-19, the measures the SCDF undertook were often stricter than the national guidelines. The slew of measures included workplace segregation, mask-wearing, temperature screening and regular rapid COVID-19 antigen testing, and vaccination. Non-frontline staff would work-from-home (WFH) while meetings and briefings were convened on virtual platforms. This article outlines the details of the specific measures implemented for fire stations, the provision of EMS, and overseas humanitarian missions under the codename of Operation Lionheart (Ops Lionheart). On top of that, the article also discusses how the Civil Defence Academy (CDA) maintained training operations, and how the SCDF supported other agencies as part of the nation's fight against the pandemic.



Image 5.1:

The vaccination drive for SCDF personnel commenced as early as January 2021.



5.3 Fire Stations

The SCDF's frontline responders are constantly at risk of COVID-19 exposure as they interact with the community when attending to emergencies such as fires, rescue operations, and medical calls. To prevent the spread of COVID-19 within the fire stations, temperature screening took place before entering the workplace given that the responders are in constant close contact for long periods during their duty-shifts at the fire station. As Singapore transitioned towards a COVID-19 endemic state, temperature screening was lifted and replaced with routine testing using the Antigen Rapid Test (ART) prior to each duty.

5.3.1 Control Points as a Line of Defense

Control points are a necessary feature of an operation's set-up during a major emergency. Similarly, in safeguarding the fire stations against COVID-19 transmission, control points were set up in the fire stations, each with a specific function that had to be strictly abided by.

TraceTogether¹ and Temperature Screening

Upon reporting for duty at a fire station, all personnel had to register their entry via TraceTogether. In addition, supervised temperature screening was carried out prior to entry into the fire station. In-coming personnel were permitted entry only if their temperature was within the healthy range. They would proceed to their locker rooms via a designated route that minimised contact with the out-going personnel. Routine temperature taking was also conducted twice daily, at 0800 hrs (UTC+8) and 2000 hrs (UTC+8).

¹ This is a digital system implemented nationwide by the Singapore government to facilitate contact tracing in response to the COVID-19 pandemic. The main purpose of this system is to allow for quick identification of persons who may have come into close contact with anyone who has tested positive for COVID-19.

Segregation of Teams

Segregated work areas were assigned to the outgoing and incoming personnel to prevent intermingling between different teams. The Handing Over and Taking Over (HOTO) process for vehicles, equipment and facilities was conducted without physical interaction between the two groups of personnel. Outgoing personnel would conduct a wipe-down of vehicles and common areas upon completing their duty, before proceeding to their locker rooms via a designated route. Outgoing personnel were encouraged to leave the fire station as early as possible to avoid prolonged contact time within the fire station.

Isolation Room

Personnel with a temperature of higher than 37.5°C or displaying COVID-19-related symptoms would be sent to an isolation room with no further face-to-face contact with the fire station personnel apart from the on-duty EMS Officer who would conduct further examination. The EMS Officer monitored the isolated personnel and determined if conveyance to hospital was necessary. This measure was in force through the pandemic and was lifted in late 2021.

5.3.2 Response Plan for COVID-19 Infection

Notwithstanding the precautions taken, the SCDF's frontliners could still be infected with COVID-19 from interactions both within or outside of the workplace. A response plan that minimised the chances of further transmission amongst SCDF personnel was prepared which contained the following key elements:

Notification Procedure

When an SCDF officer tested COVID-19 positive, the Unit Commander or Department Head would be informed, and updates would be relayed to the SCDF's Risk Management Centre (RMC) for tracking and monitoring. This officer would need to abide by the prevailing protocol for positive cases set by the MOH and only return to the workplace after recovery. The RMC also coordinated the activation of the appropriate departments when further action was required. Officers from the same workplace would be notified on the follow-up steps that must be carried out.

Contact Tracing

If the COVID-19 positive officer had been in the workplace within the previous five days, contact tracing would be conducted to identify close and transient contacts in the workplace. Identified close contacts would be required to return home. These officers would be placed under leave of absence (LOA) and had to remain at home to monitor their health and self-administer an ART every day for a period of seven days. A final exit ART swab on the last day, with a negative result, was necessary before they were allowed to return to work. Any officers testing positive for COVID-19 during this period had their LOA extended, and the daily ART would continue until the officer tested negative. These measures have since been removed.

Disinfection

A disinfection team would be activated to disinfect the affected work sites and any other areas that had been assessed by the Unit Commander or Department Head to be a possible threat of viral transmission. While disinfection operations were in progress, personnel who were determined to not be a close contact would be held at a temporary holding area or allowed to leave the fire station. Disinfection of vehicles and premises generally took three hours and eight hours, respectively, from the time the positive swab test result was received.

Operational Coverage

After the disinfection operations, the Unit Commander and Divisional Headquarters would deploy an interim team to the fire station to resume operational duties as coverage for the officers placed on LOA. This ensured that the operational readiness of the SCDF's emergency services remained at an optimal level despite the manpower challenges caused by the pandemic.

Timeline of Key Activities

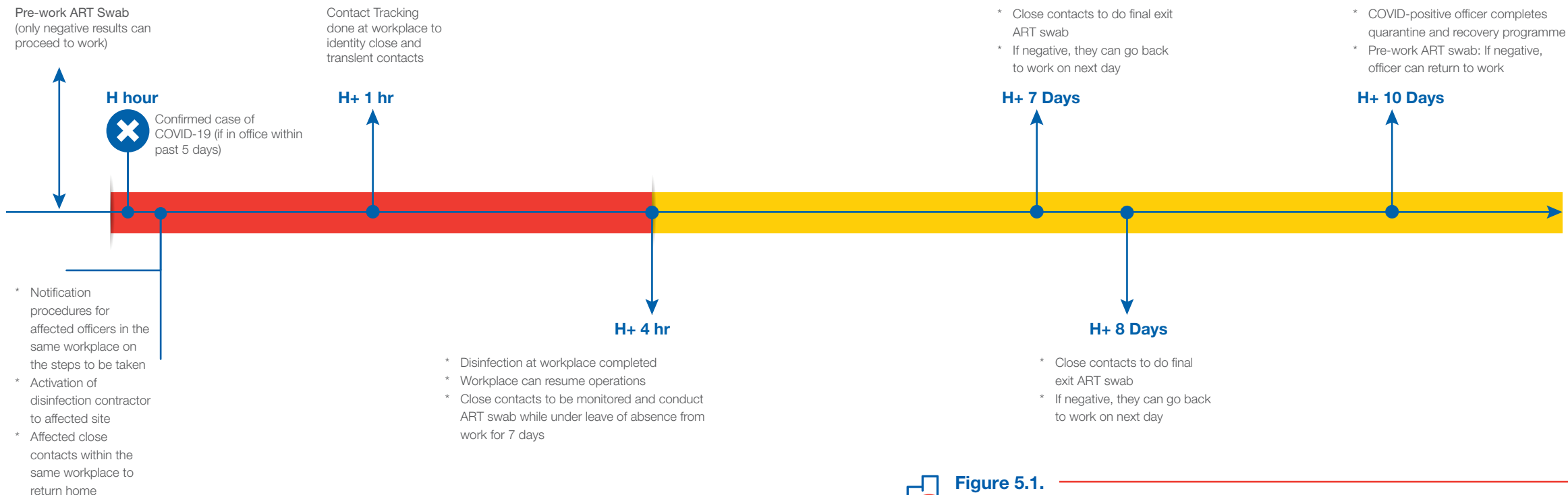


Figure 5.1. Timeline of key activities in SCDF's response plan for COVID-19 Infection.

5.3.3 Safe Management Measures during Deployment and Major Standbys

During the pandemic, SCDF officers continued to perform duties such as on-site operational standby for major events. Extensive Safe Management Measures (SMM) were put in place to ensure that these operational activities could be carried out in a safe manner in terms of the avoidance and prevention of COVID-19 transmission. All officers involved in these duties had to be fully vaccinated and undergo regular testing using the ART. They would only commence duties after confirmation of a negative result from the test.

Added attention was given to such operational deployments due to the risk of cross-unit infection because of the scale of the events and the coming together of personnel from different work units. As such, officers were required to maintain a 1-metre distance from each other with minimal interactions, and they were required to remain in small functional groups when moving from one point to another. Surgical masks or reusable masks had to be worn at all times unless performing strenuous operational tasks. These tasks were to be carried out with predetermined teammates in a four-person section concept, preventing intermingling with other teams. Disinfection of vehicles, equipment and common touchpoints were conducted after each pre-deployment training exercise and after the actual deployment.

5.3.4 Maintaining Operational Readiness of National Servicemen²

In addition to regular full-time staff, fire station duties are also performed by personnel serving their National Service obligations. The same SMM applied to these personnel. Operationally Ready Servicemen (ORNSmen) who returned to the fire station to perform their annual In-Camp-Training (ICT) as reservists were subjected to a health and travel declaration. Any disruption to the enlistment of National Service personnel and the call-up of ORNSmen was kept to the minimum to maintain the availability of reservists in the event of a large-scale emergency.

5.3.5 Psychological Support

As the pandemic situation was highly dynamic, SCDF's procedures and protocols at the fire stations and during emergency operations were similarly ever-evolving. This uncertainty and the effort to keep themselves safe from infection could lead to frontliners enduring additional stress and anxiety. For more than a year, SCDF officers adhered to these additional protocols on top of the nationwide rules and restrictions put in place to combat COVID-19. Not only did the protocols lead to physical discomfort and additional workload, they also contributed to mental stress.

The SCDF ramped up its efforts in preventive and early mental health intervention. When signs of stress, burnout or social withdrawal was identified in an officer, psychologists would be deployed to provide assistance and alleviate anxiety. Prior to the pandemic, a 24-hour helpline was already made available to help frontliners cope with both personal and work-related crisis. From February 2020, this helpline was expanded to deal with COVID-19-related stressors as well. In addition, the SCDF organised regular morale sensing as well as online seminars on psychological resilience, covering aspects such as maintaining a positive mindset and adopting effective relaxation techniques. As a show of appreciation for the responders, the SCDF also regularly distributed welfare items to uplift spirits and morale in these trying times.

² Male Singapore citizens are conscripted to serve two years of National Service (NS) as full-time National Servicemen (NSF) in the Army, Police or the SCDF. Upon completion, they are deemed Operationally Ready National Servicemen (ORNSmen) and are required to return to their camp annually for a period of in-camp-training as reservists until they reach the statutory age cap.



5.4

Emergency Medical Services (EMS)

The SCDF operates the national EMS with a fleet of ambulances manned by paramedics and emergency medical technicians (EMT) trained to administer pre-hospital emergency care. The EMS was at the forefront of Singapore's response to the COVID-19 pandemic, attending to both suspected and confirmed cases of COVID-19 patients who needed medical attention. In 2020, the SCDF EMS attended to 8,300 suspected and 2,000 confirmed COVID-19 cases. The SCDF worked closely with the MOH and the Restructured Hospitals in Singapore to streamline processes to ensure safety for patients as well as the ambulance crews.

5.4.1 Operational Adaptations

The SCDF adhered to the case definition released by the MOH to triage patients into suspected or confirmed cases. The case definition included physiological criteria such as fever and symptoms of Acute Respiratory Illness (ARI), and other criteria such as travel history and close contact with other COVID-19 patients. Triage was done both by the SCDF Operations Centre over the phone, as well as in-person by the paramedics. If a patient was classified as a suspected or confirmed case, a series of actions and adaptations was required. As the pandemic evolved, the case definition was adjusted accordingly.

Learning from the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003, the EMS ramped up its preparedness and activated the pandemic personal protective equipment (PPE) supplies from its stores³ immediately upon the declaration of DORSCON Yellow in Singapore in January 2020. Logistics and supply chain processes were set up to ensure that all frontline crew at the fire stations had sufficient supplies for operations.

³ The stock of PPE was set up during peacetime as part of the pandemic preparedness strategy.

The PPE provided respiratory exposure protection (fitted N95 masks and respirators), splash protection (splash-proof gowns, hair and shoe covers) and contact protection (surgical gloves). The level of protection was tiered to the level of risk exposure, which was determined by the known status of the patient as well as the disease prevalence in the community. When the risk of community transmission was deemed high, full PPE was required for all emergency medical calls, regardless of the nature of the call. It was a fine balance to strike between ensuring the safety of the ambulance crew while ensuring sustainable consumption of the PPE supplies. When the risk of community transmission was deemed low, full PPE was only required for suspected cases upon triage. Regardless of community transmission risk, the baseline PPE consisting of the respiratory and conjunctivae splash protection was required for any medical scenario with aerosolising procedures. Table 1 below shows the tiering of PPE levels to be donned in the various scenarios.

Scenario	PPE
On standby for emergency calls in the fire station	Reusable mask with high filtration grade or surgical mask
On emergency medical calls, non-suspected COVID-19 case without aerosolising procedures	N95 respirator and surgical gloves
On emergency medical calls, non-suspected COVID-19 case, with aerosolising procedures e.g. oxygen administration, Cardiopulmonary Resuscitation (CPR)	N95 respirator, surgical gloves and eye goggles
On emergency medicals, suspected or confirmed COVID-19 case	Full PPE: N95 respirator, surgical gloves, eye goggles, splash-proof gown, and hair and shoe covers



Table 5.1:

SCDF EMS applies PPE requirements in a tiered manner depending on the risk level. When community transmission is deemed high, full PPE was applied to all the above scenarios.



Image 5.2:

EMS personnel in full PPE.

Environmental protection within the ambulances was ensured by the implementation of decontamination procedures following the conveyance of suspected or confirmed COVID-19 cases to the hospital. Ambulance decontamination was achieved with atomising devices using hydrogen peroxide as the primary active ingredient. For non-COVID-19-related cases, the ambulances were decontaminated by way of sodium hypochlorite wipe-down by the crew, as an added precaution.

Several medical procedures were modified to further ensure the safety of responders. For example, bronchodilator treatment for asthma patients was delivered via a metered-dose inhaler and spacer instead of nebuliser masks to minimise aerosolisation of respiratory droplets. In addition, the next-of-kin of suspected or confirmed COVID-19 patients were

prevented from accompanying the patients on the ambulance to the hospital to keep the number of people in the ambulance to a minimum.

The MOH supplemented SCDF emergency ambulances with a non-emergency ambulance fleet dedicated for the pandemic, which was a system that had been in place since the SARS outbreak in 2003. This arrangement proved to be effective in managing the spike in demand for ambulances, especially during the pandemic surge. For example, for several months in mid-2020, Singapore recorded the highest daily number of reported COVID-19 cases within Southeast Asia due to outbreaks in migrant worker dormitories. A large majority of these cases were stable and did not require advanced medical care. The pandemic non-emergency ambulance arrangement ensured that the SCDF's emergency ambulances were available to respond to critical medical cases during the surge.

5.4.2 Challenges and Lessons Learnt

The safety protocols implemented enabled the SCDF EMS to operate effectively during the pandemic with minimal disruption to operational readiness. With strict adherence to safety protocols, the ambulance crews were not subjected to quarantine procedures following conveyance of COVID-19 patients.

The PPE requirements took a physical toll on the responders, especially in the warm and humid climate of Singapore. As such, the responders were allowed to wear official SCDF polo t-shirts during duties to improve comfort while maintaining their professional image when responding to medical calls.

The dynamic nature of the pandemic required frequent adaptation of strategies, and the communication of clear instructions to all frontline crew members was essential to ensure their safety. This was achieved through the network of EMS leaders at all levels of the organisation.

5.5



Operation Lionheart (Ops Lionheart)

The SCDF maintains a 79-man, round-the-clock, standby contingent, code-named Operation Lionheart (Ops Lionheart) that is deployed to provide humanitarian assistance or conduct Urban Search And Rescue (USAR) to regions afflicted by major disasters. Since its inception, the Ops Lionheart contingent has been deployed on 18 humanitarian assistance operations. Classified as a Heavy USAR Team by the International Search And Rescue Advisory Group (INSARAG), the SCDF is able to conduct search and rescue operations with the use of specialised equipment and search and rescue dogs, and sustain 24 hours of operation at two separate incident sites for up to 10 days.

To safeguard the health of the SCDF rescuers, international disaster assistance partners, as well as the inhabitants of the affected country, measures had to be put in place to minimise the risk of COVID-19 infection and transmission. On top of the existing COVID-19 measures administered by the host country, rescuers also had to adhere to additional measures before, during and after deployment:

5.5.1 Mitigation and Preparedness

To ensure the operational readiness of the contingent, routine training and logistics checks were conducted. During these activities, measures such as temperature-taking and self-administered ART were introduced. Officers in the standby contingent were required to update their respective unit supervisors if they were in contact with COVID-19 positive persons or were issued with quarantine orders. Personnel deemed to be at risk of possible COVID-19 infection would not be deployed for overseas operations and a replacement would be sought for the affected officer.

5.5.2 Response

Should a disaster occur and a request for assistance be made, or the affected country accepted Singapore's offer of assistance, the contingent would be mobilised with additional precautionary measures put in place. Upon mobilisation, members of the contingent would report in two groups at staggered timings with a one-hour gap between the two groups to minimise intermingling.

At the reporting location, personnel would proceed for temperature taking and an ART. Personnel whose body temperature was above 37.5°C or had a positive ART result would be isolated for medical attention.

During the mobilisation phase, personnel in the segregated groups had to avoid physical interaction with one another. The two groups were to travel on different vehicles and where possible, they were to board different flights to the destination country. If separate flights were not possible, personnel from two different groups would not be seated together within the airplane.

Management of the Base of Operations (BoO)

The BoO is a designated location at the affected country where the contingent carries out its daily routines, plan for operations and recuperates. In view of the pandemic, additional safety measures implemented at the BoO included assigning a single entry and exit point for personnel and equipment. Personnel and equipment had to be decontaminated⁴ before entry. Personnel returning from the work site would undergo an ART. The size of the BoO was increased to ensure SMM⁵, facemasks had to be worn within the BoO and rest areas, and sanitisers and soap dispensers were made available. Interaction across different groups was avoided and meetings between different groups (if needed) would be conducted via video conference to reduce contact.

⁴ Personnel entering the BoO were required to decontaminate themselves using a sodium hypochlorite solution premixed with an Aseptosyl solution.

⁵ Each person would have 16m² of spacing within the tent

Contingent Health Monitoring

Doctors, with the assistance of paramedics, conducted daily health screening for the contingent members. Temperature taking was done twice a day and reported to the contingent Operations Cell. In the event that an officer fell ill, he would be isolated, and an ART would be conducted. Contact tracing would be carried out and persons who were in close contact with the affected officer would also undergo testing. If there was a high risk of transmission within the contingent, the contingent commander could decide to execute a repatriation plan.

5.5.3 Recovery

Upon completion of the contingent's humanitarian assistance mission, the contingent needed to prepare for its return to Singapore and adhere to Singapore's entry requirements.

Demobilisation

Upon termination of operations, all logistical items were decontaminated before packing and delivery. The logistics cache would be subject to further decontamination by specialised contractors in Singapore. The search and rescue dogs were also subject to health checks by relevant authorities.

Throughout this phase, contingent members would continue to adhere to the segregation and transportation plans that were in place since mobilisation.

The tradition of family members receiving the contingent upon the contingent's arrival in Singapore was suspended. Contingent members were subject to movement restrictions and quarantine measures prescribed by the MOH depending on the country of embarkation and the prevailing COVID-19 situation. Should another disaster activation be required while the current contingent was still in quarantine, the preceding team in the quarterly rotation schedule would be activated.

5.6 Training Academy

The Civil Defence Academy (CDA) plays a crucial role in maintaining the SCDF's operational readiness. The academy accommodates the full spectrum of SCDF training needs, from recruits serving their National Service to foundational firefighting courses, EMS courses, specialist courses, as well as leadership courses. Upon completion of these courses, personnel are deployed to serve in the frontline units. In addition, CDA conducts certification tests (CTs) that frontline officers must pass annually, to keep their skills and knowledge current. A prolonged disruption to training would inevitably lead to a shortfall in trained officers available for deployment to the frontline units and might also result in a deterioration of specialist expertise. Hence, it was crucial that measures were put in place to minimise the impact of the pandemic on the SCDF's operational readiness. The main considerations were to ensure training continuity, the health and safety of staff and the morale of instructors.



Image 5.3:

SCDF personnel conduct training activities with facemasks worn.

5.6.1 Training Continuity

The COVID-19 pandemic triggered a new normal in teaching and learning methodologies across the world. While the concepts of eLearning and self-learning are not new, the requirements for isolation and social distancing drove an impetus for a greater adoption of eLearning. Over the years, the SCDF had developed interactive eLearning modules that allowed remote learning and enabled foundational course trainees who resided in the CDA dormitories to continue their learning journey after training hours. The pandemic severely disrupted the operations of the academy when Singapore went into a “Circuit Breaker”⁶ from 7 April 2020 to 1 June 2020, during which many courses were suspended or converted to home-based learning (HBL). Realising the need to be prepared for a recurrence, the CDA planned for all theory-based lessons to have an accompanying eLearning module. Lessons which required low levels of interaction were converted to eLearning modules in-house by CDA instructors with the use of simple animations, videos and a voiceover of the content. Mobile learning software developers were engaged for the creation of complex eLearning modules with detailed graphics and animations, storylines and decision-making scenarios. Upon completion, these eLearning modules allowed the CDA to conduct high-quality training, even when the course participants were not physically present at the academy.

A reduction of frontline training frequency at CDA facilities was supplemented by Continuing Education and Training – Refreshing Training (CET-Refresher Training). The CET-Refresher Training included lessons on new equipment or procedures, as well as refresher lessons on existing skills and knowledge. All theory components of the CET-Refresher Training were conducted online in the form of self-directed learning. Where applicable, practical components of the CET-Refresher Training were self-administered at the frontline units by supervising officers. With this implementation, frontline units were able to maintain their skills and knowledge without the need to attend in-person training at the CDA. Cross-unit contact was also avoided with the self-learning format of the CET-Refresher Training.

The CDA also conducts residential courses such as Basic Rescue Training (BRT) for new recruits, and foundational courses such as the Rota Commander Course (RCC) and Section Commander Course (SCC). In such residential courses, course participants reside in the academy from Sunday night to Friday afternoon each week during their course duration, housed in communal dormitories. To prevent the spread of COVID-19 from one group of participants to another, courses and platoons were ringfenced to minimise interaction. If there was a positive COVID-19 case in a particular course, only the immediate participants and instructors of that course needed to be quarantined, allowing the other courses at the academy to proceed without disruption.

5.6.2 Health and Safety of Staff

As per the COVID-19 SMM set by the Singapore Government, CDA staff that did not need to work physically on-site were placed on WFH. However, due to the conduct of practical lessons and exercises, and the need for ample numbers of Safety Officers to ensure training safety, a large proportion of instructors were required to be on-site at the academy. Hence, it was critical to implement measures that allowed the instructors to operate in a safe environment. All instructors were segregated into two groups, Group A and Group B, with each group having designated offices and training assignments, as well as staggered working hours. For instance, Group A instructors would only conduct training activities and CTs assigned to group A and likewise for Group B instructors. This minimised the intermingling among instructors and the various courses. In addition, keeping the two groups separate allowed partial continuity of training activities if one of the groups was affected by COVID-19.

CDA staff, course participants and CT takers also went through regular health monitoring. CDA staff and course participants were required to undergo twice daily temperature-taking. Persons reporting a temperature of more than 37.5°C or showing symptoms of ARI would be directed to report to the medical centre or to visit a doctor, and they were barred from entering the premises or participating in any training activity. Similarly, test takers reporting for a CT would be turned away if they had an elevated body temperature or displayed symptoms of ARI.

⁶ The Circuit Breaker contained enhanced measures taken to minimise physical contact and curb the spread of COVID-19.

5.6.3 Morale of Instructors

As the battle against COVID-19 continued, it was important to acknowledge that all staff were facing an immense amount of mental stress, both from the nationwide restrictions set by the government as well as the changes implemented at the workplace. With the segregation of instructors into two groups and the predetermined training activities, instructors might end up in a continuous routine of conducting the same series of lessons every week. Hence, segregation deployment was planned with the workload and the skillsets of each group in mind. This allowed the instructors within the segregated groups to rotate their responsibilities equitably to ward off fatigue and maintain training excellence.



5.7

Supporting Singapore's Fight against COVID-19

On top of its core duties, the SCDF also supported Singapore's whole-of-government effort at combating the spread of COVID-19. SCDF officers were heavily involved in the operation of quarantine facilities as well as managing incoming arrivals at the borders.

5.7.1 Management and Fire Safety Assessment of Government Quarantine Facilities

The spread of COVID-19 brought about a surge in the number of infected patients, and close contacts linked to these patients had to be isolated and quarantined promptly to curb further spread of the virus. In addition, Singapore's international borders were still open in the early stages of pandemic, before Singapore imposed the "Circuit Breaker", and individuals flying into Singapore from countries of high COVID-19 risk were placed under quarantine. There was a need to set up more quarantine facilities in Singapore to cope with this increase. In April 2020, the SCDF was activated as part of the whole-of-government effort to convert the CDA dormitories and an affiliated clubhouse into a temporary migrant workers dormitory and a government quarantine facility respectively.

The CDA dormitory provided temporary lodging for migrant workers from key industrial sectors who had to be re-housed when the government imposed stricter rules on their lodging conditions after COVID-19 affected many of the migrant workers dormitories. The affiliated clubhouse housed both Singaporeans and foreigners arriving in Singapore from high-risk countries and who had been put under quarantine.



Image 5.4:

In-processing of foreign workers into the CDA temporary foreign workers dormitory.

The SCDF also deployed officers to a multi-agency workgroup, set up to manage the sharp increase in COVID-19 cases in migrant workers dormitories. During this deployment period, SCDF officers ensured that the needs of the migrant workers were met. These included food, water, basic necessities and personal welfare. The team also ensured that SMM were strictly adhered to, and medical attention and care were given to the migrant workers when necessary.

SCDF resources were deployed to assist the MOH in conveying COVID-19 patients with mild symptoms from government quarantine facilities and hospitals to Community Care Facilities. SCDF also conducted mask fitting and PPE and safety training for taxi and

private-hire drivers who volunteered to transport suspected COVID-19 patients from the start of the pandemic.

To contain the spread of COVID-19 within the migrant workers dormitories, premises such as sports halls were identified as temporary housing. In May 2020, a COVID-19 Mega Facility was built, consisting of two tentages and seven accommodation vessels to house up to 15,000 migrant workers under quarantine. However, these premises were not built to be used as dormitories and therefore might not have had the necessary fire-safety requirements prescribed in the SCDF Fire Code. To address this gap, the SCDF expeditiously developed fire-safety guidelines, provided consultancy advice and conducted site inspections to facilitate the conversion of these temporary dormitories to ensure the safety of the occupants. For the COVID-19 Mega Facility, the SCDF also conducted extensive checks and drafted contingency plans to ensure readiness to respond to any fire, rescue or medical emergency in the facility.

SCDF officers provided customised training for in-situ personnel such as dormitory operators and security staff at the respective temporary foreign workers dormitories to ensure the prompt initial response in the event of a fire. As a result, they were able to assess the situation, conduct evacuation and mitigate incipient fires during fire emergencies and maintained a high level of fire-safety standards at these premises.

5.7.2 Deterrence of COVID-19 at Singapore's Borders

In January 2020, the Singapore government expanded the temperature-screening requirement at Changi Airport to screen passengers from all incoming flights. Over 100 SCDF officers were deployed to carry out temperature-screening operations at the airport, round-the-clock, for over 20 days.

In early February 2020, 174 Singapore residents were brought home from Wuhan, China, via an evacuation flight and the MOH needed immediate assistance to perform entry and exit nasopharyngeal swabs on these individuals while they were in quarantine. The SCDF supported the MOH with medical officers as well as regular frontline officers at the government quarantine facilities housing these Singapore residents to carry out swab tests at the start and end of their 14-day quarantine period.



5.8

Conclusion

The prolonged COVID-19 pandemic has been highly challenging for emergency services providers such as the SCDF. As the SCDF plays a key role in keeping Singapore safe and secure, the organisation must uphold its service delivery despite the challenges posed by the pandemic. Through the implementation of various measures at all levels of the SCDF to prevent the transmission of COVID-19, the SCDF has maintained operational readiness in frontline response and ensured training quality at its academy and remains ever ready to respond to major disasters beyond our shores with international humanitarian assistance efforts.



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