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#2

ASEAN Disaster Risk Sustainable Resilience:

Incorporating Sustainable Development Goals into ASEAN Riskscape

Authors:
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#2

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Abstract:

Indonesia presented concepts of sustainable resilience to increase resilience in the face of disaster risks at the 7th Global Platform for Disaster Risk Reduction 2023. This presentation was followed by the Association of Southeast Asian Nations (ASEAN) Leaders Declaration on Sustainable Resilience (ASEAN, 2023), which aims to promote sustainable resilience as an enabling framework to enhance collaboration in strengthening climate and disaster resilience for sustainable development. This article assesses the latest disaster risk of the ASEAN region and incorporates the Sustainable Development Goals (SDGs) as components to build resilience. This assessment seeks to understand the impact of sustainable development efforts on the ASEAN riskscape. This year, the ASEAN Risk Index for Situational Knowledge (ASEAN RISK) shows that Myanmar, the Philippines, and Indonesia are the ASEAN Member States (AMS) most at risk of disasters. Compared to the 1st edition of the ASEAN Risk Monitor and Disaster Management Review (ARMOR), there is generally decreased resilience in the ASEAN region. However, compared to the 3rd edition of ARMOR, there is a general improvement in the resilience of the ASEAN region. By incorporating SDGs into the ASEAN risk assessment, there is an average reduction in risk scores of 9% across all AMS. By taking a closer look at each resilience component, each AMS highlighted its strong points on the SDGs for their resilience components. This article recommends that ASEAN explore how sustainable resilience can be shared amongst AMS to enhance regional resilience further.

Keywords: ASEAN RISK, disaster, resilience, sustainable development

Introduction

Background

In light of the escalating impact of natural hazards, the Association of Southeast Asian Nations (ASEAN) region remains particularly vulnerable to disasters. According to the ASEAN Disasters Information Network (ADINet), 2023 witnessed an average of three daily disasters within the ASEAN region. These events affected approximately 61,000 individuals, displacing 5,000 people on a daily basis ("ADINet," 2024). Tragically, there were an average of two deaths, one missing person, and three injuries each day during the same period. Comparing these figures to the disaster averages from 2012[1] to 2022, it becomes evident that disaster occurrences surged significantly in 2023, reaching 2.4 times the 2012–2022 average rate. This heightened frequency underscores the urgent need for proactive measures within the ASEAN community to enhance disaster resilience.

During the inauguration of the 7th Global Platform for Disaster Risk Reduction 2023, Indonesia delivered concepts of sustainable resilience in facing disaster risks to increase resilience (Office of Assistant to Deputy Cabinet Secretary for State Documents & Translation, 2022). This includes emphasizing the importance of strengthening culture and institutions, investment in science, technology, and innovation, ensuring access to funding and technology transfer, building disaster-resilient and climate-resilient infrastructure, and shared commitment to implement local, national, and global agreements. ASEAN leaders also adopted this concept on 5 September 2023 with the ASEAN Leaders Declaration on Sustainable Resilience (ASEAN, 2023). Through these declarations, ASEAN promotes sustainable resilience as an enabling framework to enhance collaboration in strengthening climate and disaster resilience for sustainable development by aligning critical initiatives related to the implementation of the Sendai Framework for Disaster Risk Reduction, the Sustainable Development Goals (SDGs), and the Paris Agreement at national and local levels.

Understanding the current ASEAN risk scope will highlight several components of resilience within the context of sustainability, which is essential for ASEAN. This understanding may also highlight how much ASEAN has increased its resiliency within the context of sustainability. This article explores and assesses the current ASEAN disaster riskscape and seeks to understand the impact of resilience components with sustainable development efforts on the ASEAN riskscape. Further, this article also examines the sustainable resilience component of ASEAN Member States (AMS) to reduce disaster risk in ASEAN.

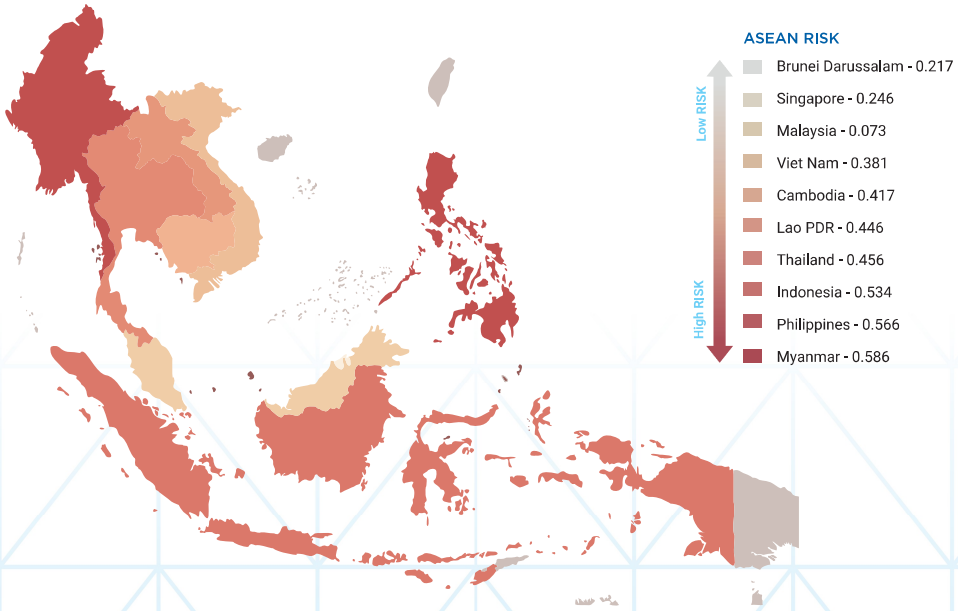


Figure 2.1 An ASEAN Risk Index for Situational Knowledge (ASEAN RISK) heat map showing the degrees of risk throughout the region.

[1] ADINet started record disasters from July 2012.

ASEAN Risk

ASEAN RISK builds on two of the leading disaster risk assessments: the Joint Research Centre's 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." Both INFORM and PDC approach indicator aggregation, scaling, and ranking similarly — the differences are primarily based on indicator selection.

To provide a simplified, single measure for situational awareness and use by decision-makers within the ASEAN region, the "vulnerability" and "capacity" components were averaged into a single measure. The INFORM vulnerability index is averaged with the PDC vulnerability index to produce a composite ASEAN Risk Monitor and Disaster Management Review (ARMOR) vulnerability index. INFORM's "lack of a coping capacity" index is first subtracted from one to re-orient the scores to a "coping capacity" measure and then averaged with RVA's coping capacity index to produce a composite ARMOR managing capacity index.

A resilience index is calculated using the geometric mean (representing "1-vulnerability" multiplied by "coping capacity"). This provides an aggregate measure of AMS' resilience to shocks and systemic stressors. "Resilience" considers the socioeconomic and population-based measures associated with "vulnerability" and the systemic tools and shortcomings available to AMS to prepare for, respond to, and recover from shocks. This aggregate measure provides a relative ranking of the AMS' abilities to cope with hazards and exposures.

Hazards and exposures are assessed using PDC's All-Hazards Impact Model (AIM) 3.0 model. AIM's base population and infrastructure data are at a 30-metre resolution. Hazard zones (for earthquakes, wildfires, landslides, tropical cyclone winds, flood tsunamis, and volcanos) are input into the model. The base population and infrastructure data intersecting the hazard zones are aggregated and min-max scaled. Next, hazard raw (total) and relative (% of the total) indicators are generated for population, replacement building cost, vulnerable population, schools, and hospitals within the hazard zones. The values are min-max scaled to generate values from 0 to 1, where 0 is the lowest exposure, and 1 is the highest. Each class's raw and relative exposure values (population, etc.) are averaged to produce composite hazard-specific exposure values. These values are then averaged to produce an overall "hazard exposure" value.

This methodology envisions risk as a composite of "hazard exposure," "vulnerability," and 1-"coping capacity" (or coping-capacity deficit). This methodology is roughly equivalent to 1-"resilience," as calculated above. Thus, the equation can be normalised as:

$$\text{Risk} = \text{Hazard Exposure}^{1/2} \times (1\text{-Resilience})^{1/2}$$

Equation 2.1 *Risk is calculated as the square root of "hazard exposure" times square root of 1 minus "resilience"*

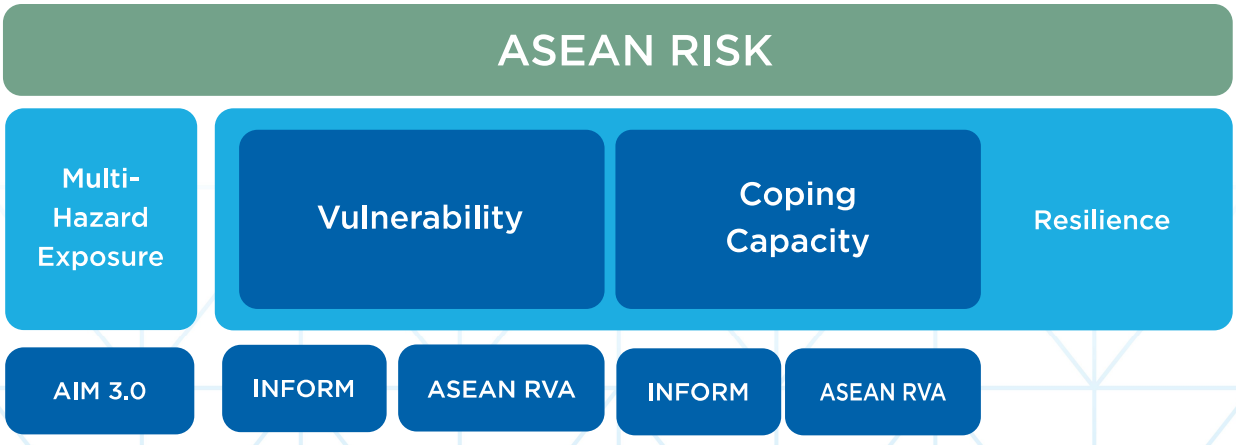


Figure 2.2. ASEAN RISK follows a model-of-models approach, whereby disaster risk components in INFORM and ASEAN RVA are applied to produce a composite risk index for each AMS (Source: Dimailig et al., 2022).

ASEAN RISK, Resilience, and Sustainability

ASEAN RISK (Dimailig et al., 2020; Pang & Dimailig, 2019) considers natural hazard risk, and last year's analysis (Dimailig et al., 2022) considered the additive burden of COVID-19 to each AMS risk profile. The focus of this year's analysis was assessing sustainable resilience. This assessment seeks to understand the impact of sustainable development efforts on the ASEAN riskscape. The resilience indicators used in each of the previous years significantly overlap with the 17 SDGs. Because there is significant overlap between the 17 SDGs and disaster resilience outcomes, using the SDG Progress score provides a metric that accounts for SDG progress and current indicators of resilience, demonstrating the sustainability of efforts that overlap both the SDG and Disaster Risk Reduction.

The progress of each AMS towards achieving all 17 SDGs was considered during the SDG Progress. The SDG Progress score was normalised for the ASEAN region, and the SDG normalised score was combined with the "resilience" measure from the ASEAN assessment (done by multiplying the "resilience" index score by 1 + the normalised SDG score). This calculation provides an assessment of "resilience" while additionally giving credit to the AMS for their relative progress in achieving the 17 SDGs. The SDG-adjusted "resilience" score can then be combined with "hazard exposure" to show the impact of SDG Progress on disaster risk scores. The outcome measure provides a current understanding of the ASEAN riskscape as well as a measure of sustainability in reducing disaster risk.

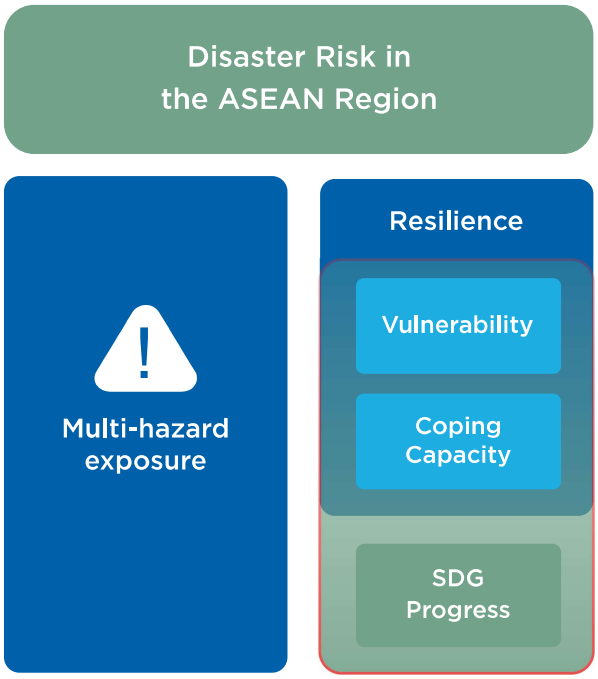


Figure 2.3. SDG Progress is aggregated with the *"Resilience"* component, which consists of *"Vulnerability"* and *"Coping Capacity"*, and then re-calculated with the other components of ASEAN RISK (*"Multi-hazard exposure"*) to arrive at a measure of adjusted Disaster Risk of each AMS with SDG Progress.

Figure 2.4. Detail of *"resilience"* component assessed (*"Vulnerability"* and *"Coping Capacity"*) in this article compared to 17 SDGs.

The authors conducted interviews and discussions with representatives from AMS to incorporate the perspectives of actors from national disaster management organisations (NDMOs). These interviews aimed to gather insights into their understanding of sustainable resilience and provide information to help them assess progress towards SDGs. Specifically, the focus was on efforts to reduce "vulnerability" and enhance "coping capacity." Six NDMOs contributed valuable information to this article, including Cambodia's National Committee on Disaster Management, Indonesia's Badan Nasional Penanggulangan Bencana, Lao PDR's NDMO, Thailand's Department of Disaster Prevention and Mitigation, and the Viet Nam Disaster and Dyke Management Authority.

Result and Discussions

ASEAN RISK

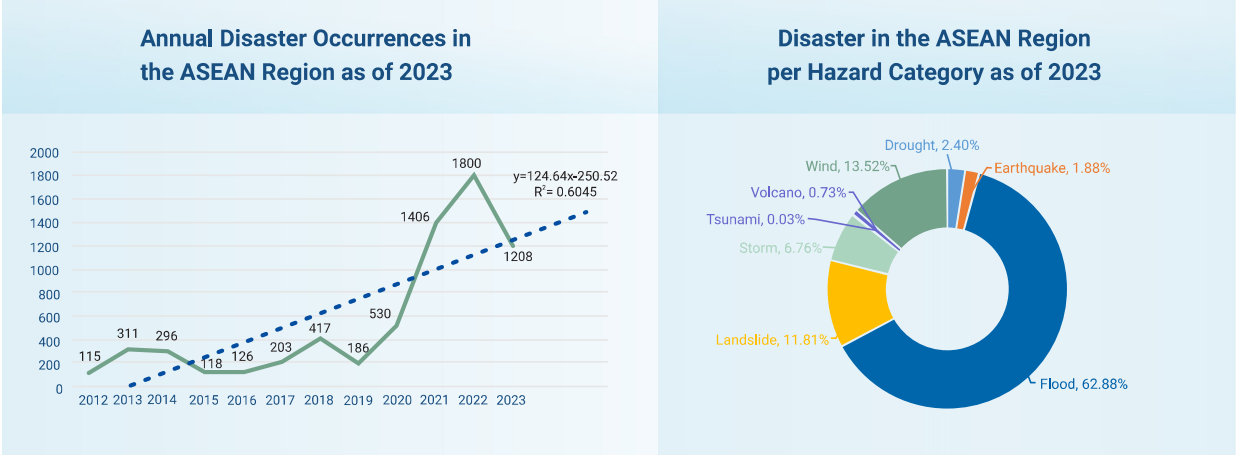


Figure 2.5. Annual disaster occurrences (left) and distribution of disaster events per hazard category (right) in the ASEAN Region until December 2023 shows that there is a general increasing trend from 2012 until 2023, and hydrometeorological disasters are the most disasters that occurred in the ASEAN Region (Source: "ADINet,"2024).

Between 2012 and 2023, the ASEAN Disaster Information Network documented over 6.7K disaster events across the ten AMS. These events have significantly impacted more than 235 million individuals, displacing over 26 million people and resulting in 118K casualties (including fatalities, missing persons, and injuries). The economic toll stands at over USD 19 billion in damages. Figure 2.5 illustrates a general upward trend in disaster occurrences within the ASEAN region. However, there was a temporary decline in 2023 due to the onset of El Niño. Notably, hydrometeorological disasters (floods, storms, landslides, winds, and drought) dominate the region's disaster landscape, emphasising the critical role of weather and climate conditions in shaping ASEAN's risk to disasters.

Hazard	Percent of the ASEAN Population Exposed	Percent of Exposed that are considered Vulnerable	Population Exposed	Built Environment Exposure Replacement Cost (USD)
Flood	23	13	146,245,744	7,631,504,208,000
Landslide	3	12	16,504,715	331,833,423,800
Tsunami	1	16	5,184,092	86,681,397,400
Earthquake	57	17	359,126,250	2,907,266,094,100
Tropical Cyclone Wind	49	16	310,300,381	3,189,321,060,100
Volcano	38	14	237,734,911	2,000,466,041,400
Wildfire	21	14	134,478,967	1,759,751,570,900

Table 2.1. Summary of the ASEAN region's population and economic exposure to natural hazards shows that earthquakes, tropical cyclones, winds, and volcanoes pose the highest threat to the ASEAN population. Meanwhile, floods are the region's most frequent disaster with the highest threat to capital exposure (built environment exposure).(Source: PDC, 2023).

Exposure to natural hazards continues to be the predominant factor driving disaster risk within the ASEAN region. Amongst the natural hazards assessed, identical to the previous ARMOR edition (Dimailig et al., 2020; Dimailig et al., 2022; Pang & Dimailig, 2019), earthquakes (affecting 57% of the population, approximately 359 million people) and tropical cyclones (affecting 49% of the population, around 310 million people) pose the most significant threats. From 2012 to 2023, tropical cyclone–related disasters affected over 100 million individuals, while earthquakes impacted nearly 20 million. Regarding casualties, tropical cyclones (along with associated disasters) and earthquakes stand out as the top two events resulting in the highest loss of life in ASEAN. On the other hand, when considering built environment exposure, floods incur the highest costs, exceeding USD 7 billion. Tropical cyclones follow closely, accounting for over USD 3 billion, while earthquakes contribute approximately USD 2.9 billion to the overall economic impact.

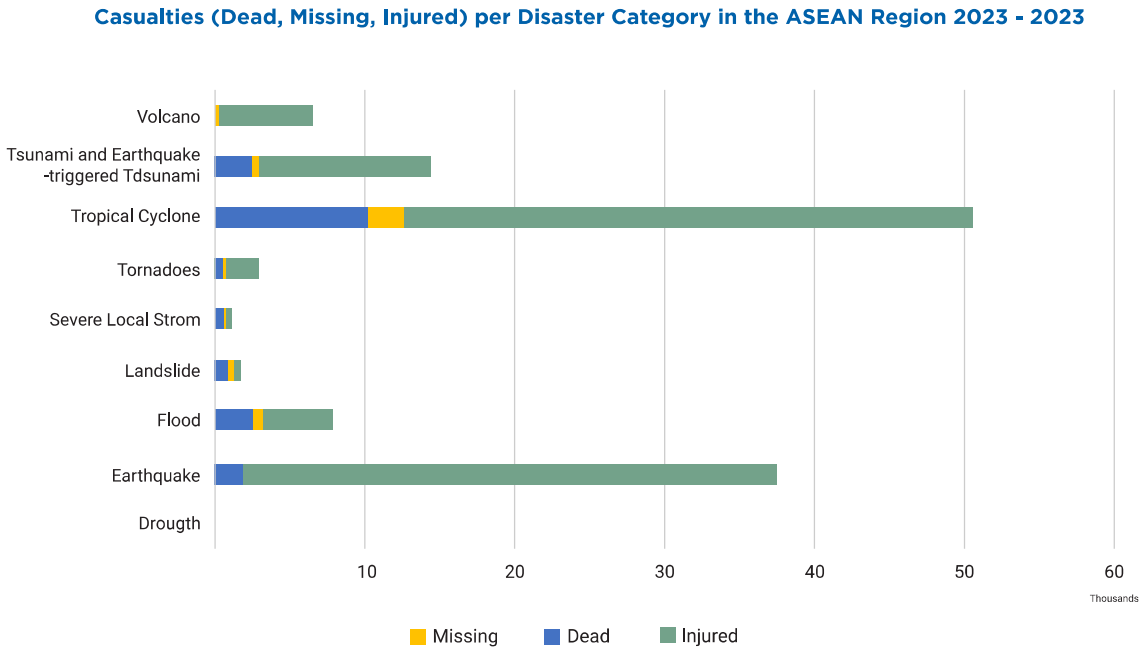


Figure 2.6. Casualties (dead, missing, injured) per disaster category in the ASEAN region (Source: "ADINet," 2024).

Figure 2.6 presents data on casualties (including fatalities, missing individuals, and injured people) in the ASEAN region from 2012 to 2023. The figure highlights the impact of various disaster types during this period. Earthquakes and tsunamis account for the highest number of casualties, contributing 50.6% of the total. Tropical cyclones and associated disasters represent 41.4% of casualties; tropical cyclones and their related disasters have affected the region during the same period. In terms of the affected populations, Figure 2.7 reveals that hydrometeorological disasters have the most significant impact. Tropical cyclones remain the primary cause of affected populations, representing 45.2% of all disasters in the ASEAN region from 2012 to 2023. Additionally, other hydrometeorological events — such as flooding, landslides, storms, and wind-related disasters — contribute 39.6% of the total disaster occurrences.

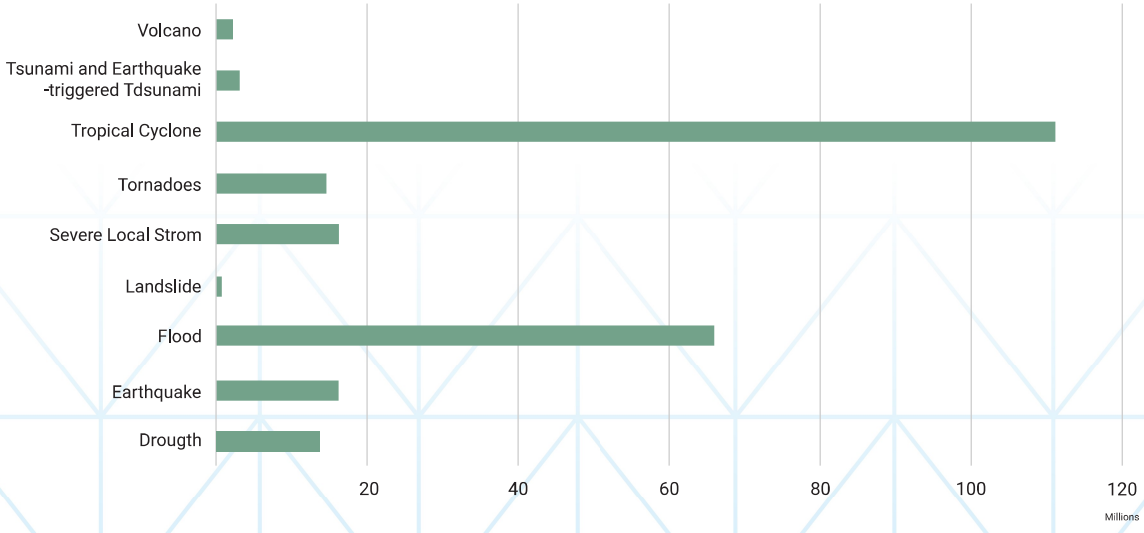


Figure 2.7. Affected persons per disaster category in the ASEAN region (Source: "ADINet," 2024)

Table 2.2 presents the most recent analysis results, which remain consistent with last year's assessment. Notably, Myanmar, the Philippines, and Indonesia continue to be the AMS facing the highest risk. Myanmar stands out as the most vulnerable AMS, driven by a combination of factors, including having the third-highest "natural hazard exposure," the highest "vulnerability," and the lowest "coping capacity." Ongoing multi-dimensional challenges, including a significant displaced population due to conflict situations, contribute significantly to this vulnerability score. The Philippines and Indonesia follow closely as the second and third highest-risk countries, respectively. Their exposure to natural hazards remains a critical factor. Together, they account for over 80% of the disasters in the ASEAN region ("ADINet," 2024), with Indonesia at 70.5% and the Philippines at 11.5%. Additionally, the Philippines faces the second-highest "vulnerability" and the fifth-lowest "coping capacity."

ASEAN Riskscape

Member State	Risk	Risk Rank	Resilience	Resilience Rank	Coping Capacity	Coping Capacity Rank	Vulnerability	Vulnerability Rank	Exposure	Exposure Rank
Brunei Darussalam	0.246	9	0.754	2	0.660	2	0.160	9	0.236	10
Cambodia	0.418	6	0.484	9	0.390	9	0.399	3	0.339	9
Indonesia	0.533	3	0.590	6	0.520	6	0.330	5	0.694	2
Lao PDR	0.447	5	0.512	8	0.410	8	0.361	4	0.409	6
Malaysia	0.373	8	0.861	3	0.640	3	0.276	6	0.434	5
Myanmar	0.585	1	0.405	10	0.320	10	0.487	1	0.575	3
Philippines	0.566	2	0.555	7	0.530	5	0.419	2	0.720	1
Singapore	0.218	10	0.869	1	0.820	1	0.079	10	0.365	8
Thailand	0.457	4	0.637	4	0.560	4	0.275	7	0.575	4
Viet Nam	0.380	7	0.627	5	0.520	6	0.243	8	0.387	7

Table 2.2. ASEAN RISK Scores and Rankings for ARMOR 4th Edition show Indonesia, Myanmar, and the Philippines remain the three most at-risk AMS to disasters, consistent with the findings of the past three editions of ARMOR. Likewise, Brunei Darussalam, Malaysia, and Singapore remain to be the least at risk.

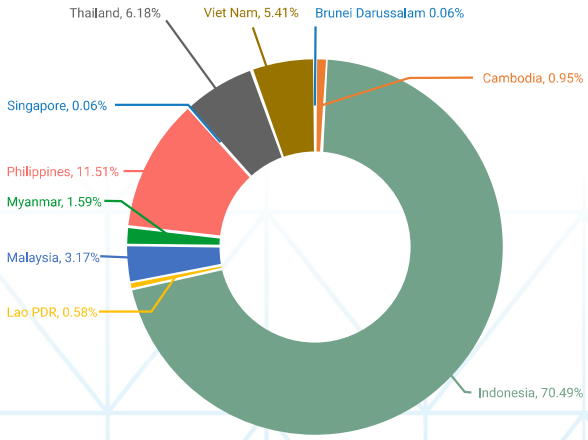


Figure 2.8. The distribution of disaster occurrences in the ASEAN region from July 2012 to December 2023 shows that most of the disasters occurred in Indonesia and the Philippines.

Singapore and Brunei Darussalam stand out as the AMS with the lowest risk. Their "natural hazard exposure" is notably minimal within the region. Singapore is exposed to only two of the assessed natural hazards (landslides and wildfires). At the same time, Brunei Darussalam faces exposure to four out of the seven hazards assessed (flood, landslide, tsunami, and wildfire). In addition to their low "hazard exposure," these AMS exhibit remarkable "resilience" as they both have the highest "coping capacity" score and the lowest "vulnerability" scores amongst all ASEAN states, ranking first and second in "resilience." Regarding disaster occurrences resulting from natural hazards, both Singapore and Brunei Darussalam represent less than 0.1% of the total disasters in the ASEAN region ("ADINet," 2024).

Change in the ASEAN Riskcape

PDC's AIM 3.0 is a recent update with improved spatial resolutions, resulting in a more accurate assessment of exposures. 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.

A slight average increase in "vulnerability" scores from the 1st edition indicates that most AMS have seen increased "vulnerability" scores. The change in "vulnerability" has decreased when including this year's assessment. This is due to an overall decrease in these scores for this year's assessment. The most significant decreases in "vulnerability" scores were in Cambodia, Myanmar, and the Philippines.

Figure 2.9. Comparison of the ASEAN RISK assessments using data in the 4th edition, 3rd edition, and 1st edition. The figure shows that, since the 1st edition, there has been a general decrease in "resilience" in the ASEAN region. However, Lao PDR, Singapore, Thailand, and Viet Nam show an improvement in "vulnerability," and Brunei Darussalam shows an improvement in "coping capacity." Between the 3rd and 4th editions, there has been a general improvement in the "resilience" of the ASEAN region.

In line with the decreases in "vulnerability," all AMS (except Singapore) saw slight increases in "coping capacity" scores. A small average decrease in "coping capacity" has persisted since the 1st edition. All AMS have seen a decrease in "coping capacity."

Myanmar saw the largest decrease in "coping capacity" since the 1st edition, followed by Viet Nam and Lao PDR. Those AMS with the highest "coping capacity" scores have the smallest decrease in "coping capacity" since the 1st edition.

Exposures are based on PDC's updated AIM. Hazard zones do not appreciably change over the short term; therefore, the current exposure assessment used for this edition was aggregated with past edition "vulnerability" scores and "coping capacity" scores to allow for comparability across editions for exposure and risk.

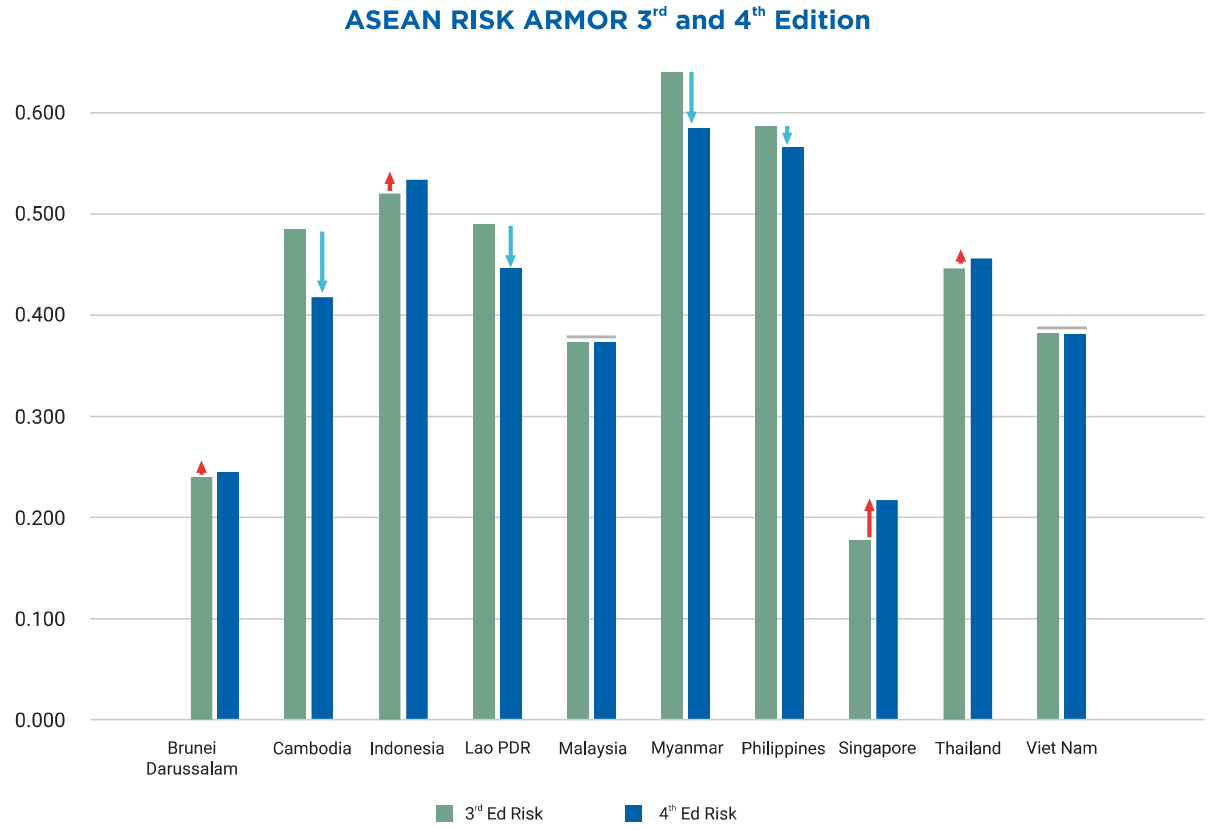


Figure 2.10. The ASEAN RISK from the ARMOR 3rd edition and 4th edition with the ASEAN RISK score show a decrease for Cambodia, Lao PDR, Myanmar, and the Philippines, while Brunei Darussalam, Indonesia, Malaysia, Singapore, Thailand, and Viet Nam show a slight increase to no change in ASEAN RISK score.

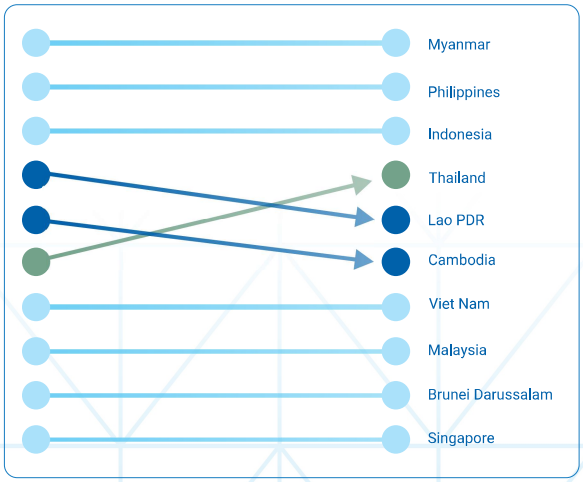


Figure 2.11. The ASEAN RISK score of AMS change from the ARMOR 3rd edition (left) to the ARMOR 4th edition (right) shows that there was a change for Thailand, Lao PDR, and Cambodia.

Myanmar and the Philippines have the largest increase in risk scores since the 1st edition. This remains unchanged from last year's assessment. Thailand and Singapore saw the smallest increase in risk scores since the 1st edition. Myanmar and the Philippines have consistently had the highest risk scores across all years. This pattern is consistent with what was found 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.

Compared to last year's assessment, all AMS have demonstrated enhanced "resilience." Notably, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, and the Philippines have improved their "vulnerability" and "coping capacities." Singapore and Viet Nam have also made strides in addressing "vulnerability," while Brunei Darussalam has strengthened its "coping capacity." These collective efforts have led to adjustments in the ASEAN region's disaster riskscape. Specifically, Cambodia, Lao PDR, Myanmar, and the Philippines now exhibit a reduced risk score. Conversely, Brunei Darussalam, Indonesia, Malaysia, Singapore, Thailand, and Viet Nam have seen a slight increase or no change in their risk scores compared to the previous ASEAN RISK (Dimailig et al., 2022).

Sustainability and Risk

Incorporating SDG Progress scores into the ASEAN RISK assessment provides insight into the efforts to meet the SDGs and how they may intersect with the disaster risk reduction efforts. Overall, there are minor changes in risk when considering SDG Progress. There is an average reduction in risk scores of 9% across all AMS. Singapore and Brunei Darussalam saw the largest reductions in risk scores, followed by Thailand. From this information, we see that AMS with the lowest risk scores benefitted from the consideration of SDG Progress. Amongst the AMS with the highest risk scores (Myanmar, the Philippines, and Indonesia), Indonesia saw the most significant reduction in risk score (approximately 6%), followed by the Philippines (5%) and Myanmar (2%). When compared relatively, only Lao PDR and Thailand changed ranks. This is due to the closeness in SDG Progress scores for all AMS.

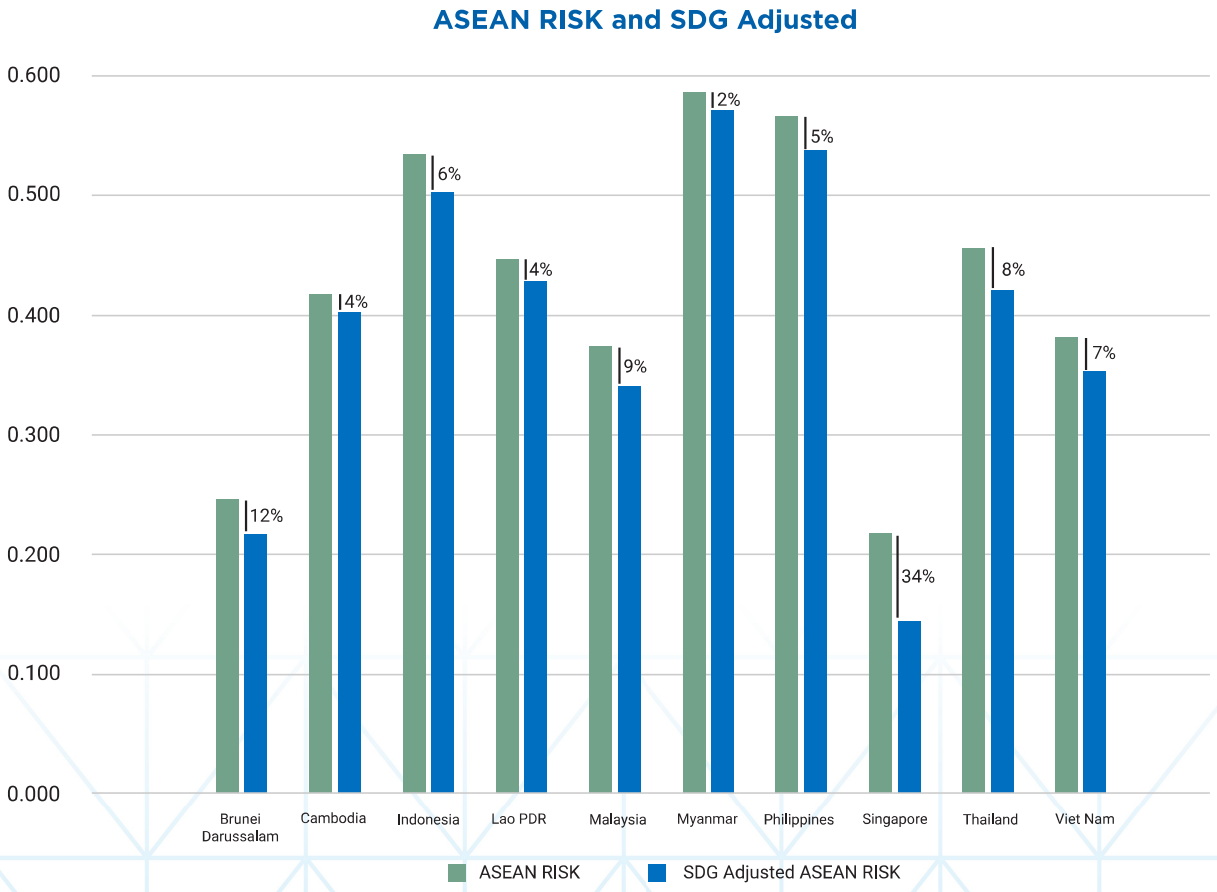


Figure 2.12. Incorporating SDG Progress to ASEAN RISK shows decreased risk in all AMS, with the highest percentage change in Singapore (34%) and Brunei Darussalam (12%).

[2]Sachs, J.D., Lafortune, G., Fuller, G., Drumm, E. (2023)
[3]https://dashboards.sdgindex.org/profiles/indonesia access on 31 January 2023

Singapore and Brunei Darussalam have experienced the most significant percentage changes in the ASEAN RISK assessment after incorporating progress related to the SDGs. Specifically, Singapore (Sachs et al., 2023) has made positive strides in achieving SDG goals related to Clean Water and Sanitation (goal #6), Responsible Consumption and Production (goal #12), and Climate Action (goal #13). These achievements indicate that Singapore is "on track or maintaining SDG achievement" in these areas. According to the SDG index dashboard (Sustainable Development Report, n.d.), Singapore's overall progress towards SDG targets stands at 60.7% of targets having been achieved or being on track, 18% showing limited progress, and 21.3% worsening. Despite the positive trends, Singapore faces significant challenges across various SDG goals, including Zero Hunger (goal #2), Clean Water and Sanitation (goal #6), Decent Work and Economic Growth (goal #8), Responsible Consumption and Production (goal #12), Climate Action (goal #13), Life Below Water (goal #14), Life on Land (goal #15), Peace, Justice, and Strong Institutions (goal #16), and Partnership for the Goals (goal #17).

As the second highest in decreased risk, Brunei Darussalam has made commendable progress towards several SDGs. Notably, SDG goals related to Clean Water and Sanitation (goal #6), Industry, Innovation, and Infrastructure (goal #9), and Sustainable Cities and Communities (goal #13) are showing positive trends, indicating that they are "on track or maintaining SDG achievement." According to the SDG index dashboard, Brunei Darussalam's overall progress towards SDG targets can be summarised as 39.6% of targets having been achieved or being on track, 33.3% showing limited progress, and 27.1% worsening. Despite these challenges, Brunei Darussalam remains committed to addressing critical issues across various SDG goals, including Zero Hunger (goal #2), Good Health and Well-Being (goal #3), Gender Equality (goal #5), Clean Water and Sanitation (goal #6), Affordable and Clean Energy (goal #7), Decent Work and Economic Growth (goal #8), Industry, Innovation, and Infrastructure (goal #9), Responsible Consumption and Production (goal #12), Climate Action (goal #13), Life Below Water (goal #14), Life on Land (goal #15), Peace, Justice, and Strong Institutions (goal #16), and Partnership for the Goals (goal #17).

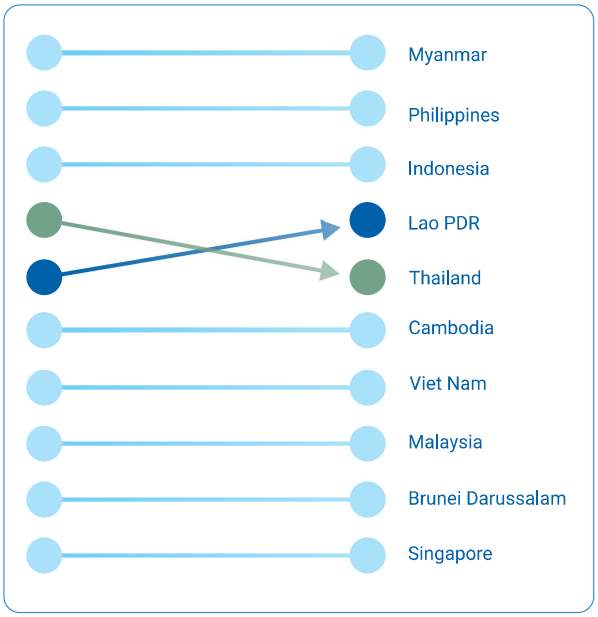
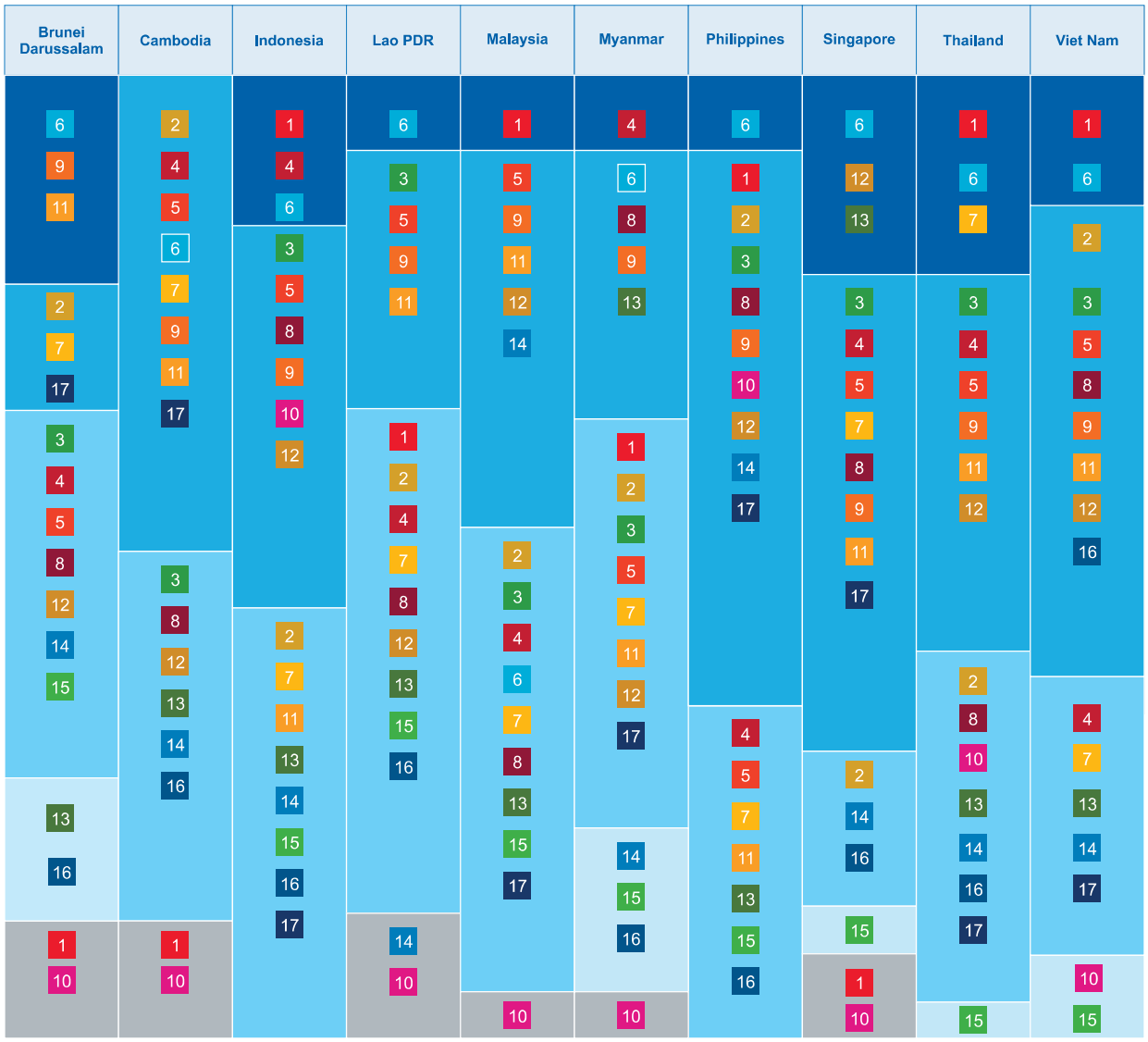


Figure 2.13. There has been no significant change to the risk score ranking of AMS with the addition of SDG Progress. Lao PDR moved higher in the ranking, while Thailand ranked lower. Myanmar, the Philippines, and Indonesia still comprise the three most-at-risk AMS, both in disaster risk and in the adjusted SDG Progress.

As three AMS with elevated disaster risk, Myanmar, the Philippines, and Indonesia have made commendable progress towards several SDGs. Indonesia demonstrates positive strides in achieving No Poverty (goal #1) and Quality Education (goal #4). Indonesia and Myanmar are "on track or maintaining SDG achievement" for Clean Water and Sanitation (goal #6). According to the SDG index dashboard for the status of SDG targets in these AMS, Myanmar shows that 18.8% of SDG goals have been achieved or are on track. The Philippines shows that it has achieved 34.7% of SDG goals, representing positive progress. Indonesia shows that 36.2% of SDG goals are moving in the right direction. Despite these achievements, these AMS face significant challenges across various SDG goals, with the exception of Responsible Consumption and Production (goal #12) and Climate Action (goal #13).



SDGs Trend

	On track or maintaining chievement
	Moderately Increasing
	Stagnating
	Decreasing
	Insufficient data

Table 2.3. SDGs Trend for each ASEAN Member State, which shows that Brunei Darussalam (6 SDGs), Cambodia (8 SDGs), Indonesia (9 SDGs), Lao PDR (5 SDGs), Malaysia (7 SDGs), Myanmar (5SDGs), Philippines (10 SDGs), Singapore (11 SDGs), Thailand (9 SDGs), and Viet Nam (10 SDGs) has achieved trends on maintaining achievement and moderately increasing.achievement (Source: Sachs et all, 2023).

Lao PDR and Thailand have experienced changes in their rankings (Figure 2.12). Thailand demonstrates positive progress, indicating that it is either on track or maintaining achievements for SDGs #1 (No Poverty), #4 (Quality Education), and #7 (Affordable and Clean Energy). In contrast, Lao PDR exhibits similar progress for SDG #6 (Clean Water and Sanitation). According to the SDG index dashboard, the status of the SDGs reveals that 25.5% of Lao PDR's SDGs and 43.1% of Thailand's SDGs have been achieved or are on track. However, 38.2% of Lao PDR's SDGs and 26.4% of Thailand's SDGs face limited progress. Lao PDR encounters significant to major challenges across most SDGs, except for #12 (Responsible Consumption and Production) and #13 (Climate Action). Conversely, Thailand grapples with significant to major challenges in SDGs, except for goals #1 (No Poverty) and #4 (Quality Education).

Cambodia, Viet Nam, and Malaysia remain consistent in their rankings from previous years. Both Viet Nam and Malaysia exhibit positive progress, signifying that they are either on track or maintaining achievements for SDGs #1 (No Poverty, applicable to both countries) and #6 (Clean Water and Sanitation, specifically for Viet Nam). In contrast, Cambodia demonstrates, at most, moderate growth. According to the SDG index dashboard, the status of SDGs shows that 28.4% of Cambodia's SDGs, 36.6% of Malaysia's SDGs, and 35.7% of Viet Nam's SDGs are achieved or on track. Another 49.3% of Cambodia's SDGs, 32.4% of Malaysia's SDGs, and 41.4% of Viet Nam SDGs are considered to have limited progress. In terms of challenges, Cambodia faces significant to major challenges for all SDGs except #1 (No Poverty), #12 (Responsible Consumption and Production), and #13 (Climate Action). In contrast, Malaysia faces significant to major challenges for all SDGs except #1 (No Poverty), #4 (Quality Education), and #9 (Industry, Innovation, and Infrastructure). Lastly, Viet Nam faces significant to major challenges for all SDGs except for #1 (No Poverty), #4 (Quality Education), #5 (Gender Equality), #12 (Responsible Consumption), and #13 (Climate Action).
In general, the AMS have implemented or planned their activities to enhance resilience by reducing their vulnerability and improving their capacity to align with sustainability, in this case, to achieve SDGs. While challenges still remain, AMS have several activities with positive progress.

On a regional basis, ASEAN has assessed eight SDGs with 29 from 231 indicators ("ASEANstats," 2022; Economic and Social Commission for Asia and the Pacific, 2023). According to the reports, for SDG #1 (No Poverty), the number of people vulnerable to climate-related disasters has increased; around 2,500 individuals per 100,000 population in ASEAN died, were missing, or were otherwise directly affected by climate-related disasters in ASEAN. For SDG #2 (Zero Hunger), child malnutrition has lessened. In contrast, for #3 (Good Health and Well Being), some progress in maternal and child health in ASEAN continued, and goals #2 and #3 also contributed to improving "resilience" in ASEAN by decreasing the number of vulnerable people. The other SDGs that also had improved trends were #4 (Quality Education), #7 (Affordable and Clean Energy), #8 (Decent Work and Economic Growth), #9 (Industry, Innovation, and Infrastructure), and #17 (Partnership of the Goals). These improvements also strengthen the region's "coping capacity."

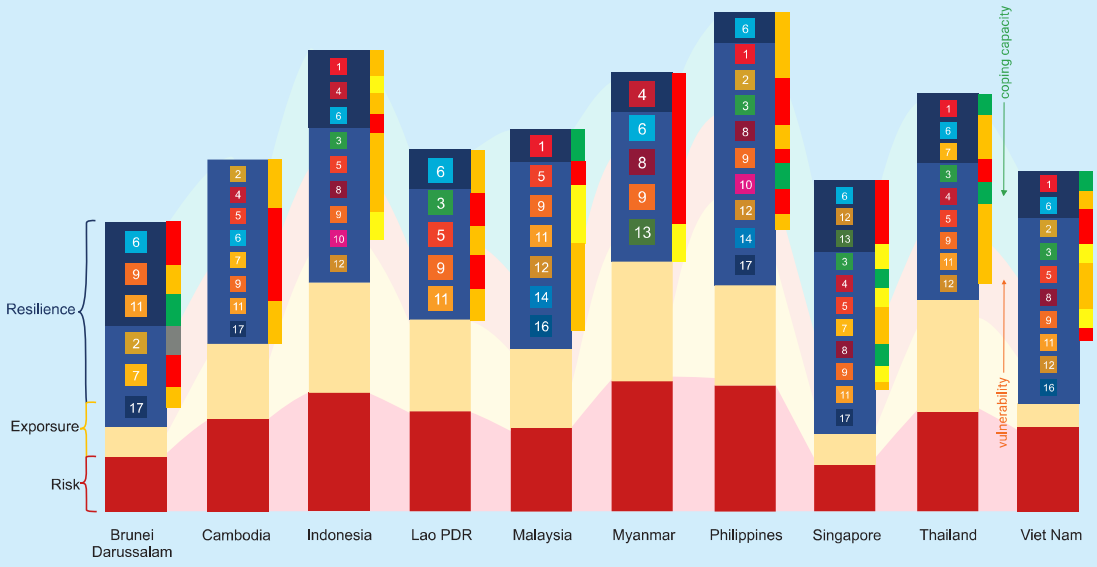
In the context of the AMS, although the concept of sustainable resilience is relatively new, several activities have been undertaken by the member states through their NDMOs. Even though not all officials in the NDMOs are familiar with the terms of sustainable resilience, they have managed to provide information on their activities to increase their resilience while also taking into account sustainability. The achievement of SDGs varies across the AMS, reflecting national activities based on the unique circumstances of each AMS. Despite facing distinct challenges, these AMS are actively working to improve disaster resilience while aligning with the SDGs. For instance, efforts to identify disaster risk zones within each AMS, such as mainstreaming risk-informed early action programmes and management, contribute significantly to achieving specific SDGs. These include SDGs #1 (No Poverty), #2 (Zero Hunger), #9 (Industry, Innovation, and Infrastructure), #11 (Sustainable Cities and Communities), and #13 (Climate Change). Additionally, integrating disaster risk awareness, training, and education into student curricula represents another impactful initiative. This effort directly supports SDG #4 (Quality Education) and reinforces the commitment of the AMS to build a more resilient and sustainable region.

Conclusion and Recommendations

Disaster risk assessment is one of the vital foundations for ASEAN to strengthen its disaster resilience. As it starts by understanding the current risk assessments, ASEAN can identify gaps and opportunities to enhance its disaster resilience for sustainable development. This process helps determine proper actions and interventions to minimise risk while increasing overall resilience.

The current ASEAN RISK assessment reveals that ASEAN remains highly vulnerable to disasters due to its geographical location and exposure to natural hazards. Over time, ASEAN has observed an increased disaster risk since the 1st edition of ARMOR; however, since the 3rd edition of ARMOR, there has been an improvement in "resilience" related to "vulnerability" and "coping capacity." Additionally, the AMS' sustainability efforts in achieving the SDGs play a crucial role in reducing disaster risk.

The overall increase in resilience indicates that ASEAN is starting to move in the right direction for sustainable resilience. Despite an annual rise in "multi-hazard exposure," the growing "resilience" component helps balance or even overcome this exposure, further reducing disaster risk in the ASEAN region. This article recommends that the ASEAN region explore how sustainable resilience can be shared amongst AMS, leveraging their strengths in achieving SDGs to enhance regional resilience.



Resilience			
SDGs Trend	SDGs Challenges		
On track or maintaining achievement	Goal Achievement	Significant challenges	Insufficient data
Moderately Increasing	Challenges remain	Major challenges	

Figure 2.13. ASEAN RISK shows that Myanmar, the Philippines, and Indonesia are still a top disaster risk in the ASEAN Region. Zooming into the "*resilience*" component, adjusting with SGDs, each member state also has achieved a moderate increase to on track/ maintaining achievement on the SDGs despite their challenges. SDG on No Poverty shows a better trend with solved challengesn ("Goal Achievement") in Malaysia, Thailand, and Viet Nam, while Brunei Darussalam is on the SDGs for Sustainable Cities and Communities. This can be an example of the ASEAN to explore its possibilities and how sustainable resilience can be shared to strengthen the regions.

References

ADINet. (2024). AHA Centre. Retrieved January 31, 2024, from https://adinet.ahacentre.org/

ASEAN. (2023, September 5). ASEAN Leaders' Declaration on Sustainable Resilience. https://asean.org/asean-leaders-declaration-on-sustainable-resilience/

ASEANstats. (2022). The 2022 ASEAN SDG Snapshot Report. https://www.aseanstats.org/publication/the-2022-asean-sdg-snapshot-report/

Dimailig, L. A., Landicho, K. P., Green, J., & Morath, D. (2020). The threat-multiplier: Climate change and disaster riskscape in ASEAN. In the AHA Centre, ASEAN risk monitor and disaster management review (ARMOR) 2nd edition (pp. 25–58). Jakarta: ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre). https://ahacentre.org/publication/armor/

Dimailig, L. A., Green, J., Keith, P. L., Sadhu, Z. J., Eric, H., Mohammad, F. & Adam. G. (2022). Disaster and pandemic: The exacerbating effects of COVID-19 on ASEAN's disaster riskscape, in the AHA Centre. ASEAN risk monitor and disaster management review (ARMOR) 3rd edition (pp. 1–28). Jakarta: ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre). https://ahacentre.org/publication/armor/

Economic and Social Commission for Asia and the Pacific. (2023, March 1). Asia and the pacific SDG progress report 2023: Championing sustainability despite adversities. United Nations. https://www.unescap.org/kp/2023/asia-and-pacific-sdg-progress-report-2023

Office of Assistant to Deputy Cabinet Secretary for State Documents & Translation. (2022, May 25). President Jokowi Offers Four Concepts of Sustainable Disaster Resilience. Cabinet Secretariat of the Republic of Indonesia. https://setkab.go.id/en/president-jokowi-offers-four-concepts-of-sustainable-disaster-resilience/

Pacific Disaster Center Global. (2023). AIM 3.0 All Hazard Impact Model. https://www.pdc.org/impact-modeling/

Pang, Q. & Dimailig, L. A. (2019). Trillion dollar multi-hazard risk landscape in Southeast Asia, in the AHA Centre, ASEAN risk monitor and disaster management review (ARMOR) 1st edition, (pp. 1–23). Jakarta: ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre). https://ahacentre.org/publication/armor/

Sachs, J.D., Lafortune, G., Fuller, G., & Drumm, E. (2023). Implementing the SDG Stimulus. Sustainable Development Report 2023. Dublin University Press. 10.25546/102924

Sustainable Development Report. (n.d.). Country Profiles. Retrieved January 31, 2024, from https://dashboards.sdgindex.org/profiles/