



ASEAN REGIONAL PLAN OF ACTION FOR ADAPTATION TO DROUGHT 2021-2025



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one identity
one community

ASEAN REGIONAL PLAN OF ACTION FOR ADAPTATION TO DROUGHT 2021-2025

The Association of Southeast Asian Nations (ASEAN) was established on 8 August 1967. The Member States of the Association are Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.

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ASEAN Regional Plan of Action for Adaptation to Drought 2021-2025

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CONTENTS

FOREWORDS	6
LIST OF FIGURES	8
LIST OF TABLES	8
ABBREVIATIONS AND ACRONYMS	8
EXECUTIVE SUMMARY	10
1. INTRODUCTION	12
1.1. Background and rationale	13
1.2. ASEAN Declaration on the Strengthening of Adaptation to Drought	15
1.3. Goal and objectives of the Regional Plan of Action for Adaptation to Drought	16
2. RATIONALE FOR ACTIONS ON DROUGHT IN ASEAN	17
2.1. Current status and challenge	18
2.2. Emerging issues	18
2.3. Guiding principles for development and implementation of the Regional Plan of Action for Adaptation to Drought	20
2.4. Other ASEAN initiatives on drought adaptation	21
2.5. Stakeholder consultation on the ASEAN Regional Plan of Action for Adaptation to Drought	21
3. ASEAN REGIONAL PLAN OF ACTION FOR ADAPTATION TO DROUGHT, 2021-2025	23
3.1. Action 1: Risk, impact and vulnerability assessment	26
3.2. Action 2: Early warning system, preparedness and planning	26
3.3. Action 3: Adaptation actions	27
3.4. Action 4: Response and recovery	27

3.5. Action 5: Strengthening coordination between ASEAN sectoral bodies	28
3.6. Action 6: Partnership and collaboration with non-ASEAN partners	28
3.7. Action 7: Capacity-building/enhancement	29
3.8. Action 8: Data sharing and dissemination	29
3.9. Action 9: Monitoring and evaluation	30
4. IMPLEMENTATION PLAN AND CONCLUSION	34
4.1. Proposed implementation arrangements	35
4.1.1. Planning phase	36
4.1.2. Implementation phase	37
4.1.3. Monitoring, reporting and evaluation phase	39
5. CONCLUSION	41
ANNEXES	43
ANNEX 1. Implemented, existing and planned national strategies in the ASEAN Member States related to drought	43
ANNEX 2. ASEAN Declaration on the Strengthening of Adaptation to Drought	45
ANNEX 3. Drought indicator indices	48



FOREWORDS



In Southeast Asia, we have witnessed the devastating impacts of droughts on the region's livelihoods, ecosystems and food security. The prospect of more frequent and severe droughts precipitated by climate change underscores the importance of a strategic and concerted response by ASEAN. The ASEAN Leaders recognised the urgency of the issue when they commended the adoption of the *ASEAN Declaration on the Strengthening of Adaptation to Drought* at the 37th ASEAN Summit in November 2020. The Declaration inter alia resolved to promote a regional framework to strengthening adaptation and mitigation to drought, and supported the development of an ASEAN Regional Plan of Action for adaptation to drought.

Less than a year later, ASEAN Member States have adopted the *ASEAN Regional Plan of Action on Adaptation to Drought (ARPA-AD) 2021-2025* which aims to develop drought policies towards managing drought risk, strengthening adaptive capacity, as well as minimising drought vulnerability of impacted groups and sectors. The Plan of Action outlines 9 key actions, complemented by 26 sub-actions, which covers the areas of risk assessment, early warning systems, adaptation actions, response and recovery, coordination between ASEAN Sectoral bodies, collaboration with external partners, capacity building, data sharing, and monitoring and evaluation.

I therefore would like to commend the ASEAN Committee on Disaster Management (ACDM) for working closely with relevant sectoral bodies and stakeholders in finalising the Plan of Action, as well as for their continued leadership in advancing regional disaster resilience. I also appreciate the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) for their strong support and collaboration in realising this landmark document, which has incorporated the assessments on the drought situations of each ASEAN Member State found in the publications on *Ready for the Dry Years: Building Resilience to Drought in Southeast Asia*.

As we commit to addressing the impacts of drought in a holistic manner, I am hopeful that this Plan of Action will advance engagement among our member countries and partners in the area of disaster management, as well as in realising a sustainable and resilient ASEAN Community in the spirit of 'One ASEAN, One Response'.

DATO LIM JOCK HOI
Secretary-General of ASEAN



South-East Asia remains vulnerable to intense droughts that occur frequently. The slow-onset nature of drought provides a significant opportunity to prepare for and mitigate the effects of these events. As reported in our Asia-Pacific Disaster Report 2021, half of the member States of ASEAN have more than 30 per cent of their employed population working in the agricultural sector; that represents 110 million people exposed to drought and the biological hazards related to it. In these circumstances, droughts can have severe impacts on people, the economy and the environment, thus highlighting the need to boost the capacity of ASEAN members to build resilience to drought.

As part of the effort to mobilize region-wide action, the ASEAN and ESCAP secretariats have been jointly producing the Ready for the Dry Years publication series, which builds a case for a paradigm shift towards more proactive drought management across South-East Asia while leveraging the innovative measures within Member States. The series reveals how the region is likely to see a geographical shift in droughts and their severities and provides policy recommendations for strengthening drought adaptation through regional cooperation. Supported by these policy recommendations, the ASEAN Declaration on the Strengthening of Adaptation to Drought, adopted at the 37th ASEAN Summit on 13 November 2020, called for the development of the ASEAN Regional Plan of Action for Adaptation to Drought (ARPA-AD).

The ARPA-AD presented in this document is a needs-driven blueprint to enhance coordinated responses. It provides nine actions advocating for policies along three tracks: reduce and prevent; prepare and respond; and restore and recover. Concrete areas of work identified in this document offer opportunities to translate strategic contributions into solutions for collective action.

I hope this document will guide national and regional strategic actions towards achieving sustainable management of drought through multi-sectoral cooperation. I also hope that this document will support this year's COP 26, which features adaptation and the need to support vulnerable communities as a dedicated goal, as well as the United Nations High-level Political Forum on Sustainable Development in 2022, which will hold in-depth reviews of Sustainable Development Goal 15 on life on land.

ARMIDA SALSIAH ALISJAHBANA

Under-Secretary-General of the United Nations and Executive Secretary of ESCAP

LIST OF FIGURES

Figure 1	Relative frequency of severe drought in South-East Asia, 1951-2013 (top) and 1981-2020 (bottom) (Ready for the Dry Years, 2021)	14
Figure 2	Timeline and key milestones	15
Figure 3	Population exposure to drought and related diseases under the current worst-case scenario in South-East Asia	19
Figure 4	Three parallel tracks for drought adaptation	24
Figure 5	Relevant ASEAN sectoral bodies	35
Figure 6	Proposed implementation arrangement	36

LIST OF TABLES

Table 1	Linkages between ARPA-AD and the Three-Parallel Tracks	25
Table 2	Strategic actions and Indicator Framework	30
Table 3	Indicative work plan and timeline of the actions and sub-actions	37

ABBREVIATIONS AND ACRONYMS

AADMER	ASEAN Agreement on Disaster Management and Emergency Response
ACDM	ASEAN Committee on Disaster Management
ACW	ASEAN Committee on Women
ACWC	ASEAN Commission on the Rights of Women and Children
AHA Centre	ASEAN Coordinating Centre for Humanitarian Assistance on disaster management
AMME	ASEAN Ministerial Meeting on Environment
AMS	ASEAN Member States
APAN	Asia Pacific Adaptation Network
ARPA-AD	ASEAN Regional Plan of Action for Adaptation to Drought
ASEAN	Association of Southeast Asian Nations
ASM	Average Soil Moisture
ASMC	ASEAN Specialised Meteorological Centre
ASOEN	ASEAN Senior Officials Meeting on Environment
AWGCC	ASEAN Sectoral Working Group on Climate Change
AWGWRM	ASEAN Working Group on Water Resources Management
AWP	AADMER Work Programme
CDI	Combined Drought Indicator/Index
CMI	Crop Moisture Index
COSTI	Committee on Science, Technology and Innovation
DFRI	Disaster Risk Finance Insurance
DRR	Disaster Risk Reduction
EDO	Copernicus European Drought Observatory

ESCAP	Economic and Social Commission for Asia and the Pacific
ISWF	Index of Soil Water Fraction
KBDI	Keetch-Byram Drought Index
LST	Land Surface Temperature
MOU	Memorandum of Understanding
MSME	Micro, Small and Medium Enterprises
NDVI	Normalised Difference Vegetative Index
NDWI	Normalized Different Water Index
PDSI	Palmer Drought Severity Index
PHDI	Palmer Hydrological Drought Severity Index
SDG	Sustainable Development Goals
SDI	Streamflow Drought Index
SAC-SMA	Sacramento Soil Moisture Accounting Model
SADDD	Sex, age and disability disaggregated data
SEA RCC	Southeast Asia Regional Climate Centre Network
SMA	Soil Moisture Anomaly
SMDI	Soil Moisture Different Index
SOM-AMAF	Senior Officials of ASEAN Ministers on Agriculture and Forestry
SOMSWD	Senior Officials Meeting for Social Welfare and Development
SPI	Standardised Precipitation Index
SVI	Standardized Vegetation Index
TCI	Temperature Condition Index
VCI	Vegetation Condition Index
VHI	Vegetation Health Index
VTCI	Vegetation Temperature Condition Index
WMO	World Meteorological Organization



EXECUTIVE SUMMARY

Drought frequency, severity, and magnitude have increased in South-East Asia, particularly over the past two decades. Prolonged and severe drought adversely impact agricultural productivity, threatening food security and livelihood of rural households and poor communities. The impact of drought is not limited to water consumption for agricultural purposes but also affects domestic and industrial water consumption, with critical long-term implications on the people and the environment of the region in the social, economic, and environmental aspects such as poverty, agriculture, food security, human development outcomes, ecological integrity (e.g., environmental quality and natural resources, energy, and other economic sectors such as tourism).

ASEAN is facing a double burden of disasters namely the stress of climate change and extreme weather events, as well as the impact of successive droughts compounded by the unprecedented socio-economic impact of the COVID-19 pandemic exacerbating the vulnerabilities of specific groups in the population, such as low-income, smallholder farmers and households dependent on agriculture livelihoods, food insecurity, workers in the informal economy and micro, small and medium enterprise (MSMEs). ASEAN's population is projected to increase from 661.5 million in 2020 to about 700 million people in 10 years' time with a corresponding increase in water consumption for agricultural, industrial and domestic purposes.

Cognisant of the impact of drought, the ASEAN leaders, through the ASEAN Declaration on the Strengthening of Adaptation to Drought, supported the strengthening of collaboration between the ASEAN Committee on Disaster Management (ACDM), relevant sectoral bodies and stakeholders, to: i) develop an ASEAN Regional Plan of Action for Adaptation to Drought; ii) establish networks and a community of practices for adaptive learning and continuous improvement of drought risk management in different parts of the region, building on the traditional knowledge and local solutions of communities; and iii) mainstream drought risks and disasters into the AADMER Work Programme and other relevant guidelines.

The ASEAN Regional Plan of Action for Adaptation to Drought (ARPA-AD) aims to **enhance coordination at the regional and national (international) level for achieving sustainable management of drought by considering the impact of drought on the livelihood of people, natural resources and ecosystem, agriculture, energy, and sustainable socio-economic development**. This document was developed following two consultative workshops with active participation by all relevant ASEAN sectoral bodies, ASEAN Centres, and ASEAN Member States.

It was developed in line with the guiding principles of the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) Work Programme 2021-2025, which foresees the development of outputs or strategic tangible products through institutionalization; localisation and communication; finance and resource mobilisation; gender and social inclusion; multi-hazards approach; innovation; partnership; and synergy. The future success of ARPA-AD implementation will be complemented by the ongoing work of relevant ASEAN sectoral bodies that address drought adaptation and mitigation.



The ASEAN Regional Plan of Action for Adaptation to Drought consists of nine groups of action covering a full set of drought management cycle, partnership, and coordination on the regional and national levels. The drought management cycle is in line with the three parallel tracks of drought intervention identified in the joint ASEAN-ESCAP study *Ready for the Dry Years*: (i) reduce and prevent, (ii) prepare and respond, and (iii) restore and recover. The actions that reflect the drought management cycle are composed of (1) risk, impact and vulnerability assessment, (2) early warning system, preparedness and planning, (3) adaptation actions, and (4) response and recovery; while partnership and coordination actions are (5) strengthening coordination between ASEAN sectoral bodies, (6) partnership and collaboration with non-ASEAN partners, (7) capacity-building/enhancement, (8) data sharing and dissemination, and (9) monitoring and evaluation.

The actions are complemented by 26 sub-actions and an implementation plan covering 2021-2025. Nine relevant sectoral bodies are identified that may contribute to the implementation of the ARPA-AD. One of the key recommendations is for the establishment of a Technical Working Group on Adaptation to Drought.

1 INTRODUCTION



1.1 Background and rationale

Droughts are slow on-set events resulting from prolonged periods of deficient rainfalls, which can last from a few weeks to several years and, thus, are difficult to characterize and manage.¹ South-East Asia has been affected by a series of droughts, often triggered by El Niño events. Although starting slowly, a drought can have devastating cumulative impacts – striking hardest at the poor and heightening inequality, as well as degrading land and increasing the prospects of violent conflict.² There are many more dry years ahead, and the area affected is likely to shift and expand, with more parts of the region exposed to extreme drought conditions.

In South-East Asia, droughts have triggered major economic and social disruption, humanitarian disasters and food insecurity. Droughts are slow-onset events that, compared with the expected climate change, result in prolonged deficient precipitation. The scale of the impact depends on the extent, intensity, and duration of a drought. The outcome also varies according to local conditions, land-use patterns, and water usage.

The joint ASEAN-ESCAP study, *Ready for the Dry Years*, highlights that much will depend on a country's resilience to drought, and it will be affected by its level of economic development and technological capacity as well as by socio-economic factors, such as institutions and policies, social behaviour and culture.³ ASEAN countries will therefore need to recognize and plan for future changes in weather patterns.

As a slow-onset disaster, drought can have devastating impacts on agriculture, environment, socio economics, and livelihoods.⁴ In the ASEAN region, drought has gained attention in recent years due to its increasingly frequent occurrence, magnitude, and severity. The study further identifies how building resilience to drought will rely primarily on national action. However, national efforts also need to be set within frameworks of regional cooperation. These include the ASEAN Declaration on Culture of Prevention, ASEAN Vision 2025 on Disaster Management, ASEAN-United Nations Joint Strategic Plan on Disaster Management, ASEAN Agreement on Disaster Management and Emergency Response (AADMER) and ASEAN Disaster Risk Financing and Insurance. Drought resilience is also an integral part of the 2030 Agenda for Sustainable Development. Activities to build resilience contribute to the achievement of several Sustainable Development Goals (SDGs).

The recent droughts in 2015-2016 and 2018-2020 were notable for being the most severe and devastating disasters in ASEAN since the major El Niño of 1997-1998, which affected large parts of the region. A minimum one-quarter of South-East Asia's land area is normally affected when a severe drought occurs. The joint ASEAN-ESCAP publication series, *Ready for Dry Years*, has discovered a significantly different frequency of drought severity in ASEAN between 1951-2013 and 1981-2020 (figure 1). The ASEAN region is susceptible to droughts and there will be many more dry years ahead.

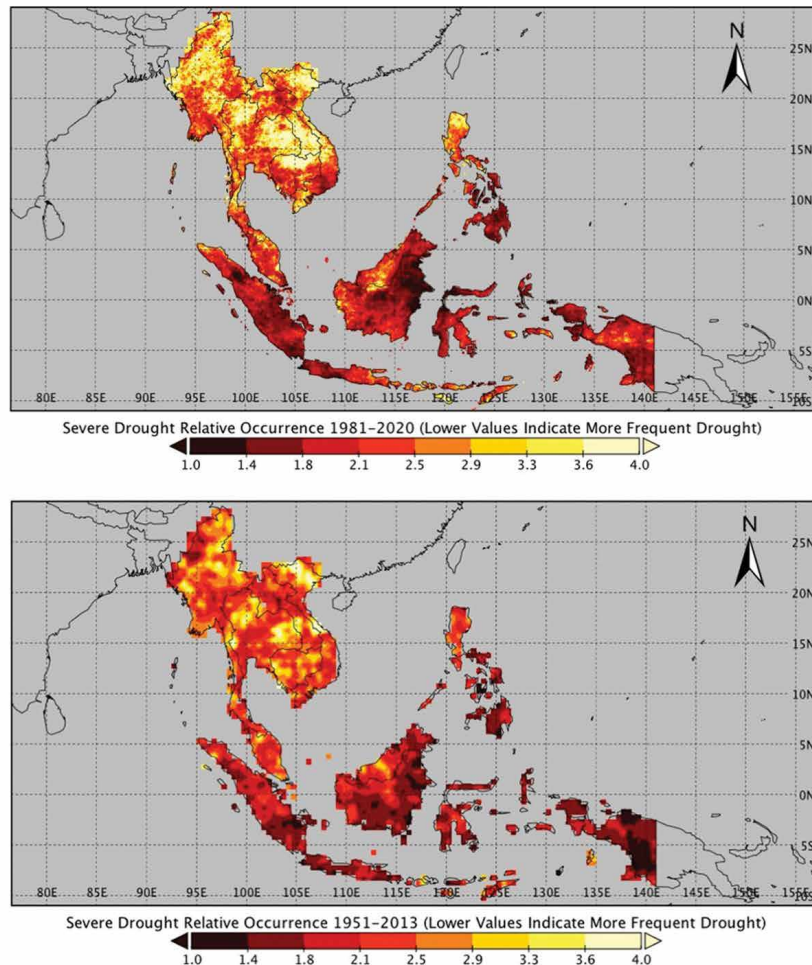
1 UNDRR, 2021, Special Report on Drought 2021: Global Assessment Report on Disaster Risk Reduction (GAR). Available at: <https://www.undrr.org/media/49386/download>

2 United Nations, 2020, Ready for the Dry Years: Building resilience to drought in South-East Asia, First Edition. A joint study between ASEAN and ESCAP. Published on 1 July 2019. Available at <https://www.unwater.org/building-resilience-to-drought-in-south-east-asia/>

3 Ibid

4 Ibid

Figure 1: Relative frequency of severe drought in South-East Asia, 1951-2013 (above) and 1981-2020 (below) (Ready for the Dry Years, 2021)



Source: United Nations, 2021, Ready for the Dry Years

In response to such underlying threats posed by droughts in the region, the high-level ASEAN leaders have made several commitments aimed at building ASEAN's regional capacity and preparedness to address these challenges. One of the most remarkable commitments was made at the Informal ASEAN Ministerial Meeting on Disaster Management on 22 May 2016 (figure 2) in Istanbul, Turkey. The ASEAN Declaration on the Strengthening of Adaptation to Drought adopted on 13 November 2020 is a clear signal that South-East Asia is essentially in need and ready to move forward in developing an effective regional action plan on drought adaptation and mitigation. This action is urgent in order to cope with meteorological, hydrological, land use and water management, and agricultural and socio-economic drought vulnerabilities.

Figure 2: Timeline and key milestones



1.2. ASEAN Declaration on the Strengthening of Adaptation to Drought

On 10 November 2020, the ASEAN Member States adopted the first ASEAN Declaration on the Strengthening of Adaptation to Drought which calls for substantial actions aiming to enhance adaptation to drought and mitigate its impact. Through the Declaration, ASEAN Member States resolved to undertake nine actions to promote a longer-term and more strategic approach, including a regional framework for strengthening adaptation to drought and mitigation of drought impact, and enhancing coordination between ASEAN sectoral bodies to effectively address the slow on-set and accumulative impact of drought on various sectors by:

- a. Strengthening regional cooperation and collaboration in research and innovation development and technology transfer to support drought management and mitigation;
- b. Enhancing national and regional capacity;
- c. Promoting regional cooperation among ASEAN Member States on transboundary drought management as well as data and information sharing mechanism;
- d. Encouraging ASEAN Member States to adopt national drought adaptation policies;
- e. Strengthening ASEAN sectoral bodies and working groups to assist and accelerate drought adaptation and mitigation actions; and
- f. Enhancing emergency response services to mitigate drought impact.

The Declaration was built based upon the most recent devastating drought disasters in 2015-2016 and 2018-2020, which had a severe impact on natural resources, environment, and socio-economics. The Declaration calls for, and encourages ASEAN Member States to strengthen collaboration between the ASEAN Committee on Disaster Management (ACDM), relevant sectoral bodies and stakeholders to:

- a. Develop an ASEAN Regional Plan of Action for Adaptation to Drought;
- b. Establish networks and a community of practices for adaptive learning and continuous improvement of drought risk management in different parts of the region, building on the traditional knowledge and local solutions of communities; and
- c. Mainstream drought risks and disasters in the AADMER Work Programme and other relevant guidelines.

1.3. Goal and objectives of the Regional Plan of Action for Adaptation to Drought

The goal of ARPA-AD is to enhance coordination at the regional and international levels for achieving sustainable management of drought, taking into account the impact of drought on the livelihoods of people, natural resources and ecosystem.⁵

The objectives of the ARPA-AD are to:

- a. Guide national and regional strategic actions and a time-bound action plan for drought awareness, early warning and preparedness, planning and management, and emergency response in ASEAN;
- b. Strengthen regional cooperation and collaboration in research and innovation development and technology transfer to support drought management and mitigation as well as promote a data and information sharing mechanism;
- c. Enhance national and regional capacity and promote regional cooperation among ASEAN Member States on transboundary drought management;
- d. Encourage ASEAN Member States that have yet to adopt national drought adaptation policies, and strengthen ASEAN sectoral bodies and working groups to assist and accelerate drought adaptation and mitigation actions, to address the cumulative impact on people's livelihood, natural resources and ecosystem, agriculture, energy and sustainable socio-economic development that could build climate resilience of the water sector..

⁵ Based on the ASEAN Declaration on the Strengthening of Adaptation to Drought made on 10 November 2020. Available at <https://asean.org/asean-declaration-strengthening-adaptation-drought/>

2 RATIONALE FOR ACTIONS ON DROUGHT IN ASEAN



2.1 Current Status and Challenges

With climate change and variability, drought in the South-East Asian region will still recur with different frequencies and severity. El Niño and human-induced climate change will be the driving force of future droughts, warmer conditions in general and an increase in the number of dry days projected in parts of the ASEAN region.⁶

Economically poor communities with low adaptive capacity and weak recovery strength tend to experience the hardest impacts on their livelihoods and daily income. The areas with such conditions are labelled as drought hotspots for the South-East Asian region that accommodate up to 25 per cent of the total population of ASEAN. Extreme poverty and malnutrition conditions from the agriculture-based households are found in some drought hotspots, mainly in Cambodia, Myanmar and the Philippines. More hotspots may be emerging because of anthropogenic climate change, which will require proper intervention and humanitarian support planning by Governments to strengthen drought resilience and minimize drought vulnerabilities in the region.

Attention from the governments of the ASEAN Member States as well as policymakers on drought combatting and adaptation is still very limited. Traditional methods known to be reactive against drought hazards are largely found in most ASEAN Member States that lack preparedness and planning for drought disasters. In the current agenda of AADMER on disaster management and response, impact and vulnerability assessment, early warning, and preparedness and planning for drought adaptation and mitigation are still missing. The joint ASEAN-ESCAP study in 2021 suggests that ASEAN Member States take the proactive approach that considers drought early warning and preparedness as the fundamental tools for taking action on drought adaptation. Three clear tracks of reduce and prevent, prepare and respond, and restore and recover are clearly introduced for ASEAN Member States.

Drought effects reach far beyond water resources; they affect multiple sectors that fundamentally rely on water resources for growth, such as agriculture, forestry, waterborne navigation, environment, socio-economics, hydropower energy, infrastructure, tourism and recreation, and human lives can all be impacted by severe or extreme drought. Cross-sectoral communication and collaboration nationally and among the ASEAN Member States are unavoidably vital if national and transboundary drought management issues are to be fully addressed.

2.2 Emerging Issues

The IPCC Special Report on Climate Change and Land iterates that climate change can exacerbate land degradation processes through flooding, drought frequency and severity, extreme heat waves, dry spells etc. It has already threatened food security around the world through reducing agriculture crop yields by warming and changing precipitation patterns, and more frequent extreme events including drought.⁷

In South-East Asia droughts seem to receive less attention compared to other natural disasters and the region has yet to broadly study drought characteristics, its potential impacts on multiple sectors,

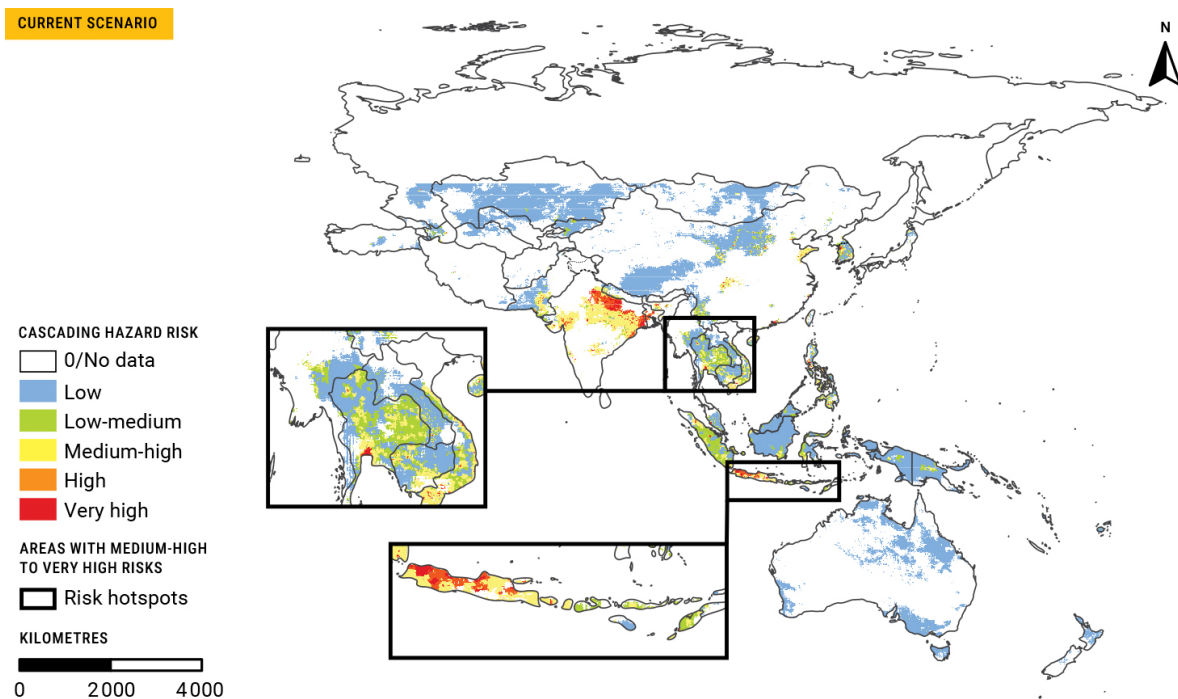
⁶ IPCC, 2021, Climate Change 2021: The Physical Science Basis; Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Available at https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf

⁷ IPCC, 2021, Special Report on Climate Change and Land: Summary for Policymakers. Available at <https://www.ipcc.ch/srccl/chapter/summary-for-policymakers/>

root causes as well as magnitude of vulnerability. Proactive strategies and planning based on impact and vulnerability assessment could enable national actions to reduce future drought risks.^{8,9} Drought forecasting and an early warning system are yet to be included in the ASEAN implementation agenda on disaster management and response. The system is used to provide credible and reliable information and the likelihood of areas at risk, in a timely manner, for water resources planners and policymakers to support their drought management and adaptation plans.¹⁰

The Asia-Pacific Disaster Report 2021¹¹ identifies the areas in South-East Asia where more people will be exposed to drought and related diseases in the worst-case climate change scenario. In Brunei Darussalam, the Lao People’s Democratic Republic, Malaysia, Myanmar, the Philippines, Timor-Leste, and Viet Nam the population exposed to drought and related diseases is expected to increase by between 2 and 9 per cent. However, other countries such as Thailand will remain at risk, with almost 14 per cent of the population being exposed to drought in the worst-case climate change scenario. With an almost 10 per cent increase in population exposure, both Myanmar and Viet Nam face the highest risk from future drought and drought-related diseases in the worst-case scenario (figure 3).

Figure 3: Population exposure to drought and related diseases under the current worst-case scenario in South-East Asia



Source: ESCAP, 2021.

8 UNCCD, 2019, Drought Impact and Vulnerability Assessment: A Rapid Review of Practices and Policy Recommendations. Published in August 2019. Available at http://catalogue.unccd.int/1248_UNCCD_%20Rapid_Review_Web.pdf

9 King-Okumu et al, 2019. Less to Lose? Drought Impact and Vulnerability Assessment in Disadvantaged Regions. Published 16 April 2020. Available at <https://www.mdpi.com/2073-4441/12/4/1136/pdf>

10 UNDRR, 2021, Special Report on Drought 2021: Global Assessment Report on Disaster Risk Reduction (GAR). Available at <https://www.undrr.org/media/49386/download>

11 ESCAP 2021, Asia-Pacific Disaster Report 2021. Available at <https://www.unescap.org/kp/2021/asia-pacific-disaster-report-2021>

Apart from the double burden created by the threat of climate change in the form of extreme weather events and the impact of successive droughts, the COVID-19 pandemic is aggravating the vulnerability of specific groups, such as women, in the ASEAN population through its unprecedented socio-economic impact on rural farmers and households who rely heavily on agriculture or small and medium-sized enterprises. Moreover, as the agriculture sector employs 26.7 per cent of all working women in ASEAN,¹² and as rural women are left further behind in development gains,¹³ it is critical that a strong gender focus be applied throughout the implementation of ARPA-AD.

2.3. Guiding principles for development and implementation of the Regional Plan of Action for Adaptation to Drought

Drawing on the principles contained in the AADMER Work Programme, 2021-2025, the implementation of ARPA-AD will be guided by the following principles, while taking into account national circumstances, and being consistent with meeting domestic laws as well as international obligations and commitments:

1. Institutionalization, localisation and communication. To implement multi-sectoral strategic actions on drought adaptation, mitigation, and emergency response at both national and subnational levels of AMS and encourage communication exchange among all stakeholders in the ASEAN Community;
2. Finance and resource mobilization. Exploit all available resources, both in-house and external ones, in a complementary fashion that supports the full implementation of ARPA-AD and its components;
3. Gender and social inclusion. Consider a whole-of-society approach in disaster management by recognizing the key roles and unique needs of those most affected during drought periods, including women, children, youths, the elderly, the poor and people with disabilities as well as other vulnerable groups;
4. Multi-hazards approach. Enhance regional capacities to assess, mitigate, prepare for, and respond to a wider range of national hazards and disaster risks beyond drought in the region;
5. Innovation. Enhance the efficiency and effectiveness of ASEAN's drought adaptation and emergency response mechanism through technological advancement and science-based approaches for better drought mitigation and adaptation;
6. Partnership. Strengthen and develop stronger multi-stakeholder partnerships among ASEAN Member States and with regional and international institutes and organizations for exchanging technical experience, including drought mitigation planning, adaptation, response, and drought monitoring and early warning systems, to support the implementation of ARPA-AD, 2021-2025;
7. Synergy. Coordination among multi-sectoral bodies of ASEAN Member States and ASEAN implementing agencies as well as ASEAN partner organizations, in order to effectively implement ARPA-AD and to ensure that the implementation of strategic actions is well-aligned with the global frameworks on disaster management.

¹² ASEAN and OECD, 2021, Strengthening Women's Entrepreneurship in Agriculture in ASEAN Countries.

¹³ ASEAN and United Nations Women, 2021, ASEAN Gender Outlook.

2.4. Other ASEAN initiatives on drought adaptation

Other regional initiatives addressing drought adaptation in ASEAN by different sectoral bodies are complemented by existing national and regional initiatives. These initiatives include:

- **The joint ASEAN-ESCAP publication series, *Ready for Dry Years: Building resilience to drought in South-East Asia*, published in 2019 and 2020.**

The terms of reference of the study were approved by the ASEAN Committee on Disaster Management (ACDM) at its April 2017 meeting in Vientiane. Draft versions were presented at the various meetings of the ACDM. Feedback from those presentations as well as the written comments from ASEAN Member States were considered in finalising the study. The final version was endorsed by the ACDM at its November 2018 session in Kuala Lumpur.

- **The Executive Summary Report on Building Resilience for Sustainable ASEAN from Water-Related Disasters, published in April 2017**

The Executive Summary Report is the product of the Republic of Korea-ASEAN Cooperation Project on “Building resilience for sustainable ASEAN from water-related disasters”. The findings, analysis and proposals for ASEAN regional cooperation were derived from each focal ministry of the ASEAN Working Group on Water Resources Management (AWGWRM). A regional approach to drought management is highlighted in the report.

Drought management and adaptation activities involve multi-sectoral cooperation and interventions; hence, to effectively implement ARPA-AD, close coordination among all relevant sectoral bodies and stakeholders is essential.

At the national level, the existing and planned national policies, guidelines and strategies related to disaster risk reduction and response, agricultural irrigation, water resources management, land degradation, climate change and people’s livelihoods are all local instruments that help enforce the national implementation plans of the concerned sectors for strengthening adaptation to drought, reduce vulnerability and mitigating cumulative impacts. Current strategies of the respective ASEAN Member States are listed in Annex 1.

2.5. Stakeholder consultation on the ASEAN Regional Plan of Action for Adaptation to Drought

Building on the aim of the ASEAN Declaration on the Strengthening of Adaptation to Drought, this regional plan of action has been developed through extensive stakeholder consultations with relevant experts, ACDM and the ASEAN Member States since June 2021. From the inception phase, regarded as a zero draft document, to the finalization phase with a full set of regional and national strategic sub-actions, two consultation workshops were carried out before the regional plan of action granted endorsement by ACDM:

- The thirty-eighth ACDM Meeting (via a video conference on 9 June 2021). The ASEAN Secretariat had the opportunity to introduce the overall outline and structure of the regional plan of action, regarded as a zero draft document, to ACDM members;
- The first Consultation Workshop (via a video conference on 29 July 2021) presented the first draft of ARPA-AD to ACDM, relevant ASEAN sectoral bodies and ASEAN Centres. Participants discussed the proposed strategic actions for regional and national levels and provided comments and recommendations;

- The first draft was also considered by the Technical Working Group on Protection, Gender, and Inclusion (TWG-PGI) (via a video conference on 18 August 2021);
- The second Consultation Workshop (via a video conference on 13 September 2021) involved ACDM, relevant ASEAN sectoral bodies and ASEAN Centres working on drought and climate change to share their inputs and feedback on the second draft document of ARPA-AD. The workshop provided clarification and elaboration on the responsibilities and involvement of the ASEAN sectoral bodies in the implementation of the regional plan of action in line with the ASEAN initiatives related to drought.

3 ASEAN REGIONAL PLAN OF ACTION FOR ADAPTATION TO DROUGHT 2021-2025

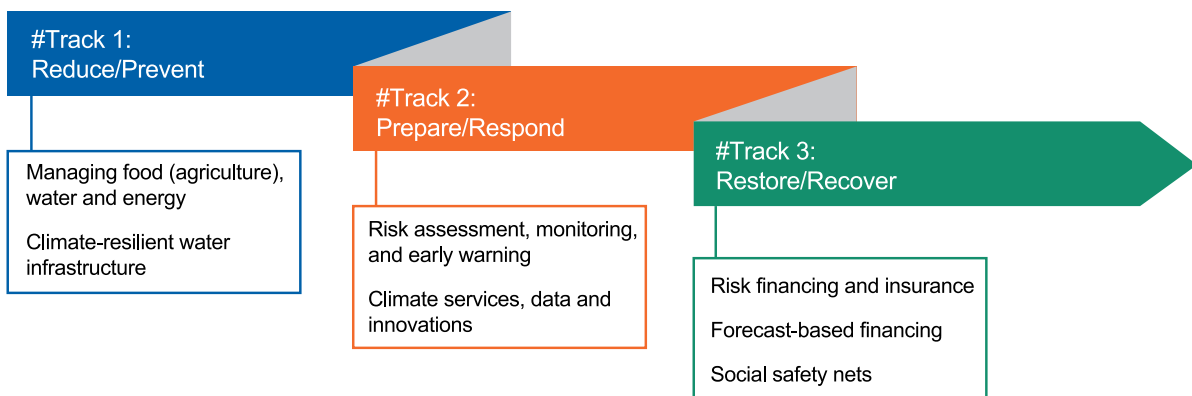


This Regional Plan of Action for Adaptation to Drought aims to develop drought policy towards managing drought risk, strengthening adaptive capacity, as well as minimizing drought vulnerability of the impacted groups and sectors by considering a wide range of factors such as:

- a. The historical and current drought situation and challenges in the ASEAN Member States as mentioned in Chapter 2;
- b. The present and potential disasters; and
- c. The other underlying issues highlighted in the ASEAN Declaration on the Strengthening of Adaptation to Drought.

The ARPA-AD is formulated to outline a clear regional plan of action based on the three parallel tracks for drought adaptation recommended by *Ready for the Dry Years* (figure 4).¹⁴ This is also in line with the three pillars of effective drought management highlighted in the Integrated Drought Management Programme 2019¹⁵ covering (a) monitoring and early warning; (b) vulnerability and impact assessment; and (c) mitigation, preparedness and response; to address the current drought hazards and the future climate-induced drought severity occurrence comprehensively.

Figure 4: Three parallel tracks for drought adaptation



Source: United Nations, 2021, *Ready for the Dry Years*

Referring to the three parallel tracks, four groups of actions are proposed to address the drought management issues in the ASEAN Member States being (1) risk, impact and vulnerability assessment, (2) early warning, preparedness and planning, (3) adaptation actions, and (4) response and recovery. Together with the four groups of actions, five more actions are formulated to ensure that the recommended actions of the ASEAN Declaration on the Strengthening of Adaptation to Drought are incorporated into the ARPA-AD. Specifically, those five actions are (1) strengthening coordination between ASEAN sectoral bodies, (2) partnership and collaboration, (3) capacity building/enhancement, (4) data sharing and dissemination, and (5) monitoring and evaluation.

¹⁴ United Nations, 2021, *Ready for the Dry Years: Building resilience to drought in South-East Asia, Second Edition*. A joint study between ASEAN and the ESCAP. Published on 27 November 2020; Page 71. Available at <https://www.unescap.org/publications/ready-dry-years-building-resilience-drought-south-east-asia-2nd-edition>

¹⁵ IDMP, 2019, *How to Communicate Drought: A guide by the Integrate Drought Management Programme for Central and Eastern Europe*, 2019, page 10. Available at <https://www.droughtmanagement.info/literature/GWP-how-to-communicate-drought-guide-2019.pdf>

Through discussions with ACDM and the ASEAN sectoral bodies during the consultation process as stated in Section 2.5, nine actions and 26 sub-actions are proposed for the ASEAN ARPA-AD. For each action, the objective and focus are clearly defined, with detailed sub-actions.

Table 1: Linkages between ARPA-AD and the Three-Parallel Tracks

Elements of drought management and mitigation			
	TRACK 1 Reduce and prevent Agriculture food, water, and energy	TRACK 2 Prepare and response Risk assessment and early warning	TRACK 3 Restore and recovery Risk financing and insurance
Policy support, planning and gender engagement	ACTION 3 3.1. Drought adaptation policies and mitigation strategies. 3.2. Regional or national study to assess the adaptive capacity and recovery ability.	ACTION 1 1.1. Drought risk, impact and vulnerability assessment framework and national integrated drought management programme. 1.2. National drought risk, impact and vulnerability assessment once every 10 years. 1.3. Institutionalisation of SADDD collection for risk, impact and vulnerability assessment.	ACTION 4 4.1. Regional guidelines on post-drought disaster recovery. 4.2. National technical team to evaluate post-drought damages. 4.3. Regional drought risk-based crop insurance programme.
	ACTION 2		
	2.4. Regional guidelines on drought risk reduction and intervention planning.	2.1. Regional study on the existing drought early warning system. 2.2. Enhancement of national early warning system. 2.3. Regional drought early warning system with data sharing from AMS.	
Strengthening coordination between ASEAN sectoral bodies	ACTION 5 5.1. Regional platform for the relevant ASB to collaborate supporting the implementation of the ARPA-AD. 5.2. Regional communication and coordination network to strengthen the coordination among the ASB to address drought impact. 5.3. Strengthening the cooperation and utilization of the existing emergency food reserve mechanism to mitigate the drought impact.		
Partnership, innovation and capacity building	ACTION 6 6.1. Regional collaboration with dialogue partners and other regional and international partner organisations for technical and financial support. 6.2. Regional cooperation and collaboration in research and innovation development and technology transfer associated with drought.		
	ACTION 7 7.1. Capacity building programmes on drought impact and vulnerability assessment and early warning system. 7.2. Six-month on-the-job training programmes to young professionals from AMS. 7.3. Capacity building for AMS on data collection and analysis, QA/QC, and data dissemination.		

Continued ▼

<p>Data sharing and dissemination</p>	<p style="text-align: center;">ACTION 8</p> <p>8.1. Regional data and information sharing platform on droughts of different scales, locations, and sectors.</p> <p>8.2. Weekly and monthly drought bulletins to disseminate current and future drought conditions to AMS</p> <p>8.3. National bottom-up reporting system with regular nation report sharing with the regional level on drought risks and water scarcity situation.</p> <p>8.4. Robust system at national level to transfer and disseminate drought early warning to community groups and local governments.</p>
<p>Monitoring and evaluation</p>	<p style="text-align: center;">ACTION 9</p> <p>9.1. Amendment of all existing drought management and related strategies and mitigation policies from different agencies for coherent implementation at national level.</p> <p>9.2. Monitoring and evaluation on the implementation progress of the regional and national action plans on drought adaptation and mitigation.</p>

3.1. Action 1: Risk, impact and vulnerability assessment

Objective: To assess at the regional and national levels (a) the past, present and potential drought impacts on economic sector, environment, and society; (b) basal or underlying causes of the impacts; and (c) drought vulnerability of the vulnerable groups driven by the underlying causes.

Focus: The action focuses on assessment framework as well as the underlying causes of the impacts and the potential economic losses.

Sub-actions:

1.1 Develop regional and national drought risk, impact and vulnerability assessment framework and develop detailed national integrated drought management programme by involving all relevant agencies (regional and national).

1.2 Conduct a national drought risk, impact and vulnerability assessment every decade (10 years) with experts from relevant agencies or partners (national).

1.3 Promote the institutionalisation of sex, age and disability disaggregated data (SADDD) collection for risk, vulnerability and impact assessments, and incorporation into drought preparedness and planning, prevention, and response and recovery policies (national).

3.2. Action 2: Early warning system, preparedness and planning

Objective: To enhance and develop: (a) regional and national drought conditions monitoring, forecasting, and early warning system; and (b) risk reduction and intervention planning prior to drought events.

Focus: The action focuses on drought forecasting and early warning tools, communication framework for drought information sharing within the ASEAN sectoral bodies and Member States to share and disseminate drought conditions and data across the region, and the mitigation plans.

Sub-actions:

2.1 Conduct a regional study on ASEAN and ASEAN Member States' existing drought monitoring, forecasting and early warning systems to collate best practices and lessons learnt to serve as reference for the future development/enhancement of such systems at regional level (regional).

2.2 Enhance national drought early warning system based on the national best practices through the national assessment study under sub-action 2.1 and build ground monitoring stations considering hydro-meteorological and agricultural parameters (national).

2.3 Develop and operate a regional drought early warning system - custodian to be identified - with data sharing from and exchanging with the national forecasting systems, in coordination with the AHA Centre, SEA Regional Climate Centre-Network (RCC-Network), and the ASEAN Specialised Meteorological Centre (ASMC). (regional and national).

2.4 Develop regional guidelines on drought risk reduction and suggested interventions that could be implemented by ASEAN Member States to mitigate the impact of drought, with the needs of vulnerable people taken into consideration (regional).

3.3. Action 3: Adaptation actions

Objective: To reduce drought risk, mitigate impacts, and strengthen resilience to raise adaptive capacity for vulnerable groups and stakeholders.

Focus: The action focuses on long-term drought adaptation strategies for social, economic and environmental aspects.

Sub-actions:

3.1 Develop recommended regional drought adaptation policies and mitigation strategies for identified drought risks and vulnerabilities as a guide for ASEAN Member States' consideration (regional and national).

3.2 Conduct regional or national study to assess the adaptive capacity and recovery ability of the vulnerable groups (national).

3.4. Action 4: Response and recovery

Objective: To develop post-drought financial relief/assistance, social welfare, and technical support to facilitate recovery of the impacted agricultural and industrial sectors, and the affected communities.

Focus: The action focuses on regional, national and subnational initiatives to provide financial and technical support to recover from a drought occurrence.

Sub-actions:

4.1 Develop regional guidelines on recommended financial and social welfare interventions for post-drought disaster recovery actions, informed by use of SADDD and gender analysis (regional).

4.2 Develop a national technical team comprising national focal points from relevant agencies to evaluate post-drought economic, social and technical damage by the severe drought hazards at the national and subnational levels with comprehensive reports (national).

4.3 Develop a regional drought risk-based crop insurance programme for the ASEAN Member States to consider subscribing - potentially utilizing established relevant ASEAN mechanism - for the drought prone provinces/areas which are dependent on agricultural production where agriculture is at high risk during dry years to be implemented (regional).

3.5. Action 5: Strengthening coordination between ASEAN sectoral bodies

Objective: To establish coordination and communication networks among ASEAN sectoral bodies for close cooperation in the implementation of the ARPA-AD.

Focus: The action focuses on coordination and communication mechanisms within the ASEAN sectoral bodies on the implementation of ARPA-AD

Sub-actions:

5.1 Establish a regional platform (e.g., Technical Working Group) for the relevant ASEAN sectoral bodies to collaborate on regional initiatives to support the implementation of the ARPA-AD (regional).

5.2 Initiate a regional activity on communication and coordination network to strengthen the coordination among the ASEAN sectoral bodies to effectively address slow onset and accumulative impact of drought on, inter alia, the environment, agriculture, energy, and water under consideration of gender balance (regional).

5.3 Strengthen the cooperation and utilization of the existing emergency food reserve mechanisms, such as the ASEAN Plus Three Rice Reserve (APTRR), in order to mitigate the impact of drought on food security in the region (regional).

3.6. Action 6: Partnership and collaboration with non-ASEAN partners

Objective: To build partnerships and collaborate with non-ASEAN regional and international institutes, organisations, and research centres to exchange knowledge, expertise and experiences in drought management.

Focus: The action focuses on enhancement of drought adaptation, early warning, preparedness and planning, and response and recovery.

Sub-actions:

6.1 Establish networks and develop collaborative initiatives with dialogue partners, and other regional and international partner organisations for technical and financial support, and sharing of expertise on drought management (regional).

6.2 Further strengthen regional (and international) cooperation and collaboration in research and innovation development (R&D) and technology transfer associated with drought such as climate change adaptation, water resources management, drought risks, preservation, conservation, and the restoration of natural (including water) resources and management alternatives (regional).

3.7. Action 7: Capacity-building/enhancement

Objective: To build and enhance drought management and adaptation capacity and institutional capability on drought management

Focus: The action focuses on human resources and institutional capacity development on drought management and mitigation.

Sub-actions:

7.1 Coordinate and implement regional capacity building programmes with technical support from relevant ASEAN Centres on drought impact and vulnerability assessment and drought early warning system to support drought preparedness and drought management (regional).

7.2 Initiate six-month on-the-job training programmes to enable young professionals from ASEAN Member States to learn and exchange their knowledge and experiences on drought management (national).

7.3 Develop a national capacity-building programme on data collection (including disaggregated data) and analysis, quality assurance/quality control (QA/QC) and data dissemination to ensure high-quality and reliable data collection in a timely manner on socio-economic indicators of drought, its impacts and mitigation measures (national).

3.8. Action 8: Data sharing and dissemination

Objective: To establish standardised indicators for regional drought monitoring and analysis, and develop drought information and data sharing, and disseminating mechanism within ASEAN sectoral bodies and the ASEAN Member States.

Focus: The action focuses on data sharing and dissemination within ASEAN sectoral bodies Member States and ASEAN Member States during the process of implementing the ARPA-AD.

Sub-actions:

8.1 Develop a regional platform for data and information technologies, best practices, and lessons learned concerning droughts of different scales, locations, and sectors in the region, and in particular, the documentation of local practices of drought risk management and their resilience capacities, subject to the respective AMS' national laws and regulations (regional).

8.2 Develop weekly and monthly drought bulletins to disseminate current drought conditions and forecasts in the South-East Asia region to AMS (regional).

8.3 Develop national bottom-up data collection and reporting system with regular sharing of national reports with the regional level on drought risks and the water scarcity situation from different scales and sectors through mobile phones (national).

8.4 Establish a robust system and communication network at national and subnational levels to transfer and disseminate information on drought forecasting and early warning – including drought emergency situations and trends of water shortages – to local and vulnerable communities and are accessible for local governments (national).

3.9. Action 9: Monitoring and evaluation

Objective: To monitor and evaluate the implementation progress of the ARPA-AD to review the effectiveness and impact of the actions 1-8.

Focus: The action focuses on the progress of actions 1-8 and constraints faced during the implementation process.

Sub-actions:

9.1 Review and amend all existing drought management strategies and mitigation policies from different agencies to ensure a consistent and coherent implementation of national action plans on drought adaptation (national).

9.2 Develop clear indicators and monitoring system for the regional and national action plans on drought adaptation and perform periodic monitoring and evaluation of the implementation progress of the regional and national action plans on drought adaptation and mitigation (regional).

Table 2: Actions and Indicator

Action	Sub-Action	Indicators for sub-action
<p>Action 1: Risk, impact and vulnerability assessment</p> <p>• Objective: To assess at the regional and national levels (a) the past, present and potential drought impacts on economic sector, environment, and society; (b) basal or underlying causes of the impacts; and (c) drought vulnerability of the vulnerable groups driven by the underlying causes.</p> <p>• Focus: The action focuses on assessment framework as well as the underlying causes of the impacts and the potential economic losses.</p>	<p>1.1. Develop regional and national drought risk, impact and vulnerability assessment framework and develop detailed national integrated drought management programme by involving all relevant agencies (regional and national).</p>	<p>Regional and national drought risk, impact and vulnerability assessment mechanism and framework developed; and representatives from drought associated agencies invited to jointly develop national work programme on drought risk, impact and vulnerability assessment.</p>
	<p>1.2. Conduct a national drought risk, impact and vulnerability assessment every decade (10 years) with experts from relevant agencies or partners (national).</p>	<p>The past, present and potential drought impacts in AMS on (a) economic sector, environment, and society; together with (b) basal or underlying causes of the impacts; and (c) drought vulnerability of the vulnerable groups driven by the underlying causes fully carried out by expert group from relevant national agencies.</p>
	<p>1.3. Promote the institutionalisation of sex, age and disability disaggregated data (SADDD) collection for risk, impact and vulnerability assessments, and incorporation into drought preparedness and planning, prevention, and response and recovery policies (national).</p>	<p>SADDD routinely used for risk, vulnerability and impact assessment and considered in the policy making process for drought management.</p>
<p>Action 2 : Early warning system, preparedness, and planning</p> <p>• Objective: To enhance and develop: (a) regional and national drought conditions monitoring, forecasting, and early warning system; and (2) risk reduction and intervention planning prior to the drought events.</p>	<p>2.1. Conduct a regional study on ASEAN and ASEAN Member States' existing drought monitoring, forecasting and early warning systems to collate best practices and lessons learnt to serve as reference for the future development/enhancement of such systems at regional level (regional).</p>	<p>The existing operational system of drought forecasting and early warning with specific data and indices used at AMS thoroughly investigated and recommendations for a standardised regional establishment of the system formulated.</p>

Continued ▼

Action	Sub-Action	Indicators for sub-action
<ul style="list-style-type: none"> • Focus: The action focuses on drought forecasting and early warning tools, communication framework for drought information sharing within the ASEAN sectoral bodies and Member States to share and disseminate drought conditions and data across the region, and the mitigation plans. 	<p>2.2. Enhance national drought early warning system based on the national best practices through the national assessment study under sub-action 2.1 and build ground monitoring stations considering hydro-meteorological and agricultural parameters (national).</p>	National drought early warning system enhanced with routine weekly and monthly drought forecasting and early warning updated, and ground monitoring stations on drought parameters installed and daily accumulated data sent to National and Regional Centres.
	<p>2.3. Develop and operate a regional drought early warning system - custodian to be identified - with data sharing from and exchanging with the national forecasting systems, in coordination with the AHA Centre, SEA Regional Climate Centre-Network (RCC-Network), and the ASEAN Specialised Meteorological Centre (ASMC) (regional and national).</p>	Drought early warning system established and operational at AHA Centre with regular data sharing from the national level.
	<p>2.4. Develop regional guidelines on drought risk reduction and suggested interventions that could be implemented by ASEAN Member States to mitigate the impact of drought, with the needs of vulnerable people taken into consideration (regional).</p>	Regional guidelines on drought risk reduction developed and endorsed by ASEAN and the ASEAN Member States are able to apply drought adaptation and mitigation measures effectively at the national and subnational levels.
<p>Action 3: Adaptation actions</p> <ul style="list-style-type: none"> • Objective: To reduce drought risk, mitigate impacts, and strengthen resilience to raise adaptive capacity for vulnerable groups and stakeholders. • Focus: The action focuses on long-term drought adaptation strategies for social, economic and environmental aspects. 	<p>3.1. Develop recommended regional drought adaptation policies and mitigation strategies for identified drought risks and vulnerabilities as a guide for ASEAN Member States' consideration (regional and national).</p>	Regional drought adaptation policies and mitigation strategies developed and endorsed by ASEAN and recommended drought adaptation policies and mitigation strategies applied at national and subnational levels with effective results.
	<p>3.2. Conduct regional or national study to assess the adaptive capacity and recovery ability of the vulnerable groups (national).</p>	Adaptive level on water scarcity resilience crops and economics to drought of the vulnerable communities and strength to recover from drought impact comprehensively studied in drought prone areas of AMS.
<p>Action 4: Response and recovery</p> <ul style="list-style-type: none"> • Objective: To develop post-drought financial relief/ assistance, social welfare, and technical support to facilitate recovery of the impacted agricultural and industrial sectors, and the affected communities. • Focus: The action focuses on regional, national and subnational initiatives to provide financial and technical support to recover from a drought occurrence. 	<p>4.1. Develop regional guidelines on recommended financial and social welfare interventions for post-drought disaster recovery actions, informed by use of SADDD and gender analysis (regional).</p>	Regional guidelines on financial and social welfare interventions developed and endorsed by ASEAN; and drought impacted groups and households benefit from the interventions under post-drought recovery actions implemented by relevant agencies of AMS.
	<p>4.2. Develop a national technical team comprising focal points from relevant agencies to evaluate post-drought economic, social and technical damage by the severe drought hazards at the national and subnational levels with comprehensive reports (national).</p>	National technical team on drought management formulated; national and subnational damages on agriculture, economics, and people's livelihoods assessed.
	<p>4.3. Develop a regional drought risk-based crop insurance programme for the ASEAN Member States to consider subscribing - potentially utilizing established relevant ASEAN mechanism - for the drought prone provinces/areas which are dependent on agricultural production where agriculture is at high risk during dry years to be implemented (regional).</p>	A regional drought risk-based crop insurance programme formulated and operational through ASEAN crop financing insurance mechanism in the areas with agricultural drought severity occurrence.

Continued ▼

Action	Sub-Action	Indicators for sub-action
<p>Action 5: Strengthening coordination between ASEAN sectoral bodies</p> <p>• Objective: To establish coordination and communication networks among ASEAN sectoral bodies for close cooperation in the implementation of the ARPA-AD.</p> <p>• Focus: The action focuses on coordination and communication mechanism within the ASEAN sectoral bodies on the implementation of the ARPA-AD.</p>	<p>5.1. Establish a regional platform (e.g., Technical Working Group) for the relevant ASEAN sectoral bodies to collaborate on regional initiatives to support the implementation of the ARPA-AD (regional).</p>	<p>A regional platform including a Technical Working Group established for coordinating the relevant ASEAN sectoral bodies and the ASEAN sectoral bodies actively involved in the operationalisation of the ARPA-AD from action 1-8.</p>
	<p>5.2. Initiate a regional activity on communication and coordination network to strengthen the coordination among the ASEAN sectoral bodies to effectively address slow onset and accumulative impact of drought on, inter alia, the environment, agriculture, energy, and water under consideration of gender balance (regional).</p>	<p>Accumulative impact of drought on various sectors significantly reduced through effective communication and coordination mechanism among the ASEAN Sector Bodies at the regional level.</p>
	<p>5.3. Strengthen the cooperation and utilization of the existing emergency food reserve mechanisms, such as the ASEAN Plus Three Rice Reserve (APTRR), in order to mitigate the impact of drought on food security in the region (regional).</p>	<p>Regional food security significantly improved through the emergency food reserve mechanism APTRR during severe drought disaster.</p>
<p>Action 6: Partnership and collaboration with non-ASEAN partners</p> <p>• Objective: To build partnerships and collaborate with non-ASEAN regional and international institutes, organisations, and research centres to exchange knowledge, expertise and experiences in drought management.</p> <p>• Focus: The action focuses on enhancement of drought adaptation, early warning, preparedness and planning, and response and recovery</p>	<p>6.1. Establish networks and develop collaborative initiatives with dialogue partners, and other regional and international partner organisations for technical and financial support, and sharing of expertise on drought management (regional).</p>	<p>MoUs and Agreements on technical and financial collaboration on drought management, especially drought early warning technology, between ASEAN and other regional and international organisations made.</p>
	<p>6.2. Further strengthen regional (and international) cooperation and collaboration in research and innovation development (R&D) and technology transfer associated with drought such as climate change adaptation, water resource management, drought risks, preservation, conservation, and the restoration of natural (including water) resources and management alternatives (regional).</p>	<p>MoUs and Agreements on technical collaboration in research and innovation development and technology transfer associated with drought and related subjects between ASEAN and other regional and international organisations officially signed and the areas of collaboration enhanced.</p>
<p>Action 7: Capacity building/enhancement</p> <p>• Objective: To build and enhance drought management and adaptation capacity and institutional capability on drought management.</p> <p>• Focus: The action focuses on human resources and institutional capacity development on drought management and mitigation.</p>	<p>7.1. Coordinate and implement regional capacity building programmes with technical support from relevant ASEAN Centres on drought impact and vulnerability assessment and drought early warning system to support drought preparedness and drought management (regional).</p>	<p>Representatives from relevant agencies well trained and able to implement drought impact and vulnerability assessment and early warning system to support national drought preparedness and management.</p>
	<p>7.2. Initiate six-month on-the-job training programmes to enable young professionals from ASEAN Member States to learn and exchange their knowledge and experiences on drought management (national).</p>	<p>Short-term on-the-job training programmes operationalised and young professionals from relevant agencies of AMS well trained on drought management subjects, especially the advanced technology for drought forecasting and early warning to support drought preparedness, planning, and mitigation.</p>
	<p>7.3. Develop a national capacity building programme on data collection (including disaggregated data) and analysis, quality assurance/quality control (QA/QC), and data dissemination to ensure high-quality and reliable data collection in a timely manner on socio-economic indicators of drought, its impacts and mitigation measures (national).</p>	<p>National trainings and knowledge exchange on data manipulation with QA/QC and analysis on social-economic indicators conducted and representatives from relevant agencies are capable in applying QA/QC and analyzing drought impacted socio-economic data.</p>

Continued ▼

Action	Sub-Action	Indicators for sub-action
<p>Action 8: Data sharing and dissemination</p> <ul style="list-style-type: none"> • Objective: To establish standardised indicators for regional drought monitoring and analysis, and develop drought information and data sharing, and disseminating mechanism within ASEAN sectoral bodies and the ASEAN Member States. • Focus: The action focuses on data sharing and dissemination within ASEAN sectoral bodies and ASEAN Member States during the process of implementing the ARPA-AD. 	<p>8.1. Develop a regional platform for data and information technologies, best practices, and lessons learned concerning droughts of different scales, locations, and sectors in the region, and in particular, the documentation of local practices of drought risk management and their resilience capacities, subject to the respective AMS' national laws and regulations (regional).</p>	<p>An online regional platform for drought related data and information is developed and shared with the ASEAN Member States.</p>
	<p>8.2. Develop weekly and monthly drought bulletins to disseminate current drought conditions and forecasts in the South-East Asia region to AMS (regional).</p>	<p>Weekly and monthly drought bulletins regularly shared with AMS and relevant agencies to notify the current drought conditions and forecasts.</p>
	<p>8.3. Develop national bottom-up data collection and reporting system with regular sharing of national reports with the regional level on drought risks and water scarcity situation from different scales and sectors through mobile phone (national).</p>	<p>A national reporting system through mobile phone on drought risks and water scarcity situation from local communities and water used sectors to national level developed and operational and shared with the regional level.</p>
	<p>8.4. Establish a robust system and communication network at national and subnational levels to transfer and disseminate information on drought forecasting and early warning - including drought emergency situation and trends of water shortages - to local and vulnerable communities and are accessible for local governments (national).</p>	<p>Local government and vulnerable communities easily access and receive information on drought forecasting, early warning, and emergency situation through a robust communication network developed at the national and subnational levels. The local knowledge on drought and drought emergency situation significantly enhanced.</p>
<p>Action 9: Monitoring and evaluation</p> <ul style="list-style-type: none"> • Objective: To monitor and evaluate the implementation progress of the ARPA-AD to review the effectiveness and impact of the actions 1-8. • Focus: The action focuses on the progress of actions 1-8 and constraints faced during the implementation process. 	<p>9.1. Review and amend all existing drought management strategies and mitigation policies from different agencies to ensure consistent and coherent implementation of national action plans on drought adaptation (national).</p>	<p>National drought management strategies and mitigation policies updated and action plans on drought management and adaptation carried out at country level.</p>
	<p>9.2. Develop clear indicators and monitoring system for the regional and national action plans on drought adaptation and perform periodic monitoring and evaluation on the implementation progress of the regional and national action plans on drought adaptation and mitigation (regional).</p>	<p>Regional and national indicative framework developed; quarterly, bi-annual output, and annual outcome reports routinely conducted; and problems encountered and options on solutions discussed and adopted for improvement.</p>

4 IMPLEMENTATION PLAN



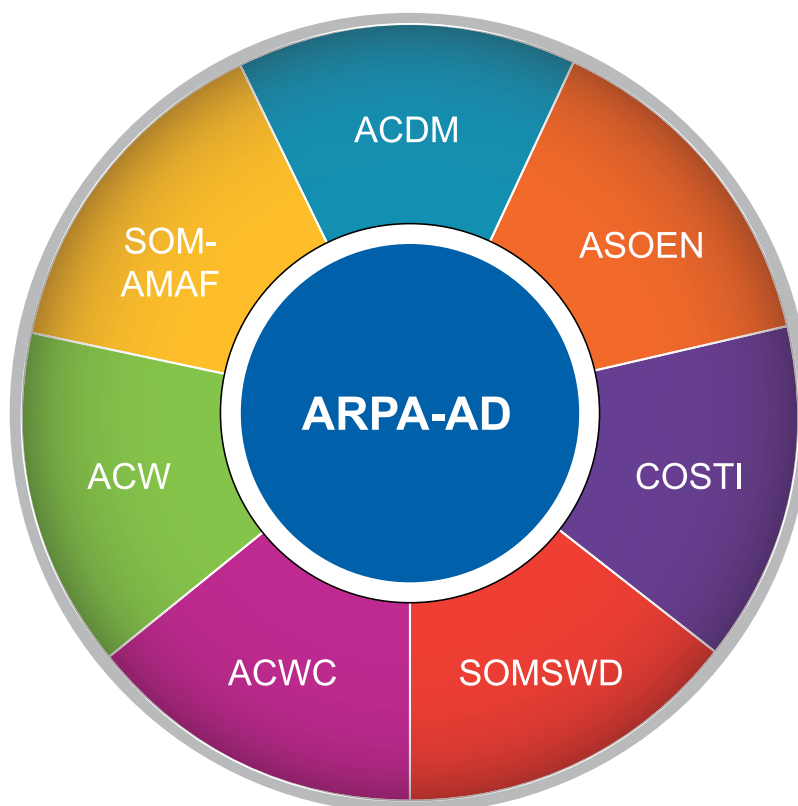
4.1 Proposed implementation arrangements

Drought management and adaptation activities involve multi-sectoral cooperation and interventions; hence, to effectively implement ARPA-AD, close coordination among all relevant sectoral bodies and stakeholders is essential. Those relevant sectoral bodies include:

- **ASEAN Committee for Disaster Management (ACDM)**
- **ASEAN Senior Officials on the Environment (ASOEN)/AMME**
- **ASEAN Ministerial Meeting on Agriculture and Forestry (SOM-AMAF)**
- **ASEAN Committee on Science, Technology, and Innovation (COSTI)**
- **ASEAN Sectoral Working Group on Climate Change (AWGCC)**
- **ASEAN Working Group on Water Resources Management (AWGWRM)**

To address social impacts, sectoral bodies such as the Senior Officials Meeting on Social Welfare and Development (SOMSWD), the ASEAN Committee on Women (ACW), and the ASEAN Commission on the Rights of Women and Children (ACWC) (figure 5) could be invited to contribute their technical expertise and practical experience.

Figure 5: Relevant ASEAN sectoral bodies



Relevant partners will include ASEAN Dialogue and Development Partners, regional and international organizations, the private sector, civil society, local government etc. The entire implementation process of ARPA-AD will go through three main important phases – the planning phase, the implementation phase, and the monitoring, reporting and evaluation phase.

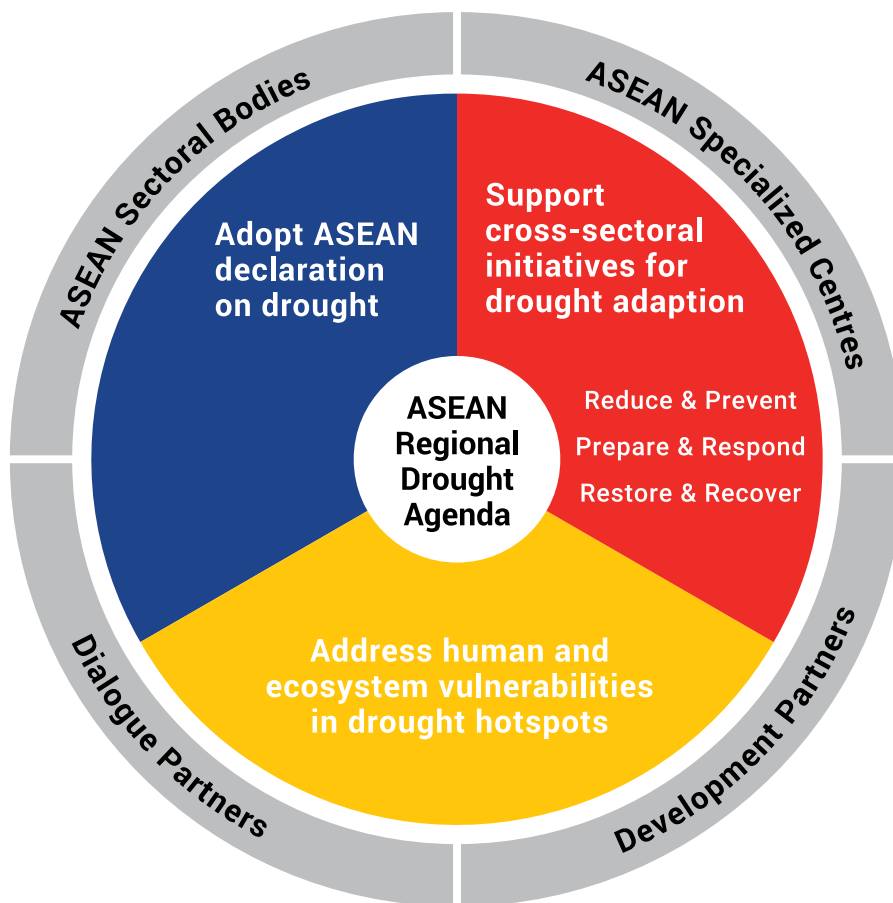
4.1.1. Planning phase

The planning phase is the most important phase of which the institutional arrangement, resource mobilization, and communication and coordination network need to be properly set up before the process of the regional actions can get started.

(a) Institutional arrangement

ASEAN Member States primarily need to discuss and decide on how the institutional arrangement is set up. The establishment of a Technical Working Group on Adaptation to Drought (TWG-AD) for implementation management, facilitation and coordination, as well as monitoring and evaluation of ARPA-AD is recommended (figure 6). The Terms of Reference will be developed to elaborate on the composition, focal points, scope, expected outputs and/or deliverables for the working group.

Figure 6: Proposed implementation arrangement



Source: United Nations, 2021, Ready for the Dry Years

(b) Resource mobilization

Resource mobilization includes the programme staff, and financial and material resources. The financial resources are the key element for ASEAN Member States to be able to support the TWG-AD as well as to effectively implement ARPA-AD. Thus, all levels of funding sources, including national, regional and international sources, are essential. They need to be financially secure, institutionally capable and materially adequate for ensuring successful implementation of ARPA-AD.

(c) Communication and coordination network

As all agree that sectoral bodies play a vital role in jointly implementing ARPA-AD, a strong and effective communication and coordination network under TWG-AD needs to be established to implement ARPA-AD, concurrently with the institutional arrangement and resource mobilization. A key focal person or coordinator is required to lead the activities and facilitate the coordination process.

4.1.2. Implementation phase

The implementation phase shall begin once the preparation or planning phase has been properly set up. All key personnel, sectoral bodies, stakeholders and partners will act according to the TOR and responsibilities developed and agreed during the institutional arrangement process. An indicative workplan and timeline for implementation is displayed in table 3.

Table 3: Indicative timeline of the actions and sub-actions

Action/Sub-Action	2021	2022	2023	2024	2025
1. Impact and vulnerability assessment					
1.1. Develop regional and national drought impact and vulnerability assessment frameworks with best practice of assessment models and develop detailed national work programme by involving all cross-cutting sectors to implement and attract financial support from the development partners (regional and national).					
1.2. Set up a national team on drought management and mitigation which consists of experts from all drought associated sectoral bodies to carry out the drought impact and vulnerability assessment at country level once every 10 years (national).					
1.3. Develop and implement national workplan with specific estimated budget and submit to the Central Government or the National Disaster Management Organisations for national budget allocation (national).					
1.4. Formulate and carry out a national activity on development or updating of gender analysis for all cross-cutting sectors of AMS complemented by the SADDD data to incorporate into drought preparedness and planning, prevention, and response and recovery policies (national).					
2. Early warning, preparedness, and planning					
2.1. Develop and implement a regional action on national assessment study of the existing drought monitoring, forecasting and early warning system currently being adopted in relevant national agencies of each ASEAN Member State to serve as lessons learnt and develop best practices for future development of the system at regional level (regional).					
2.2. Develop and implement a regional and/or enhance national drought monitoring, forecasting and early warning system with ground monitoring stations (hydro-meteorological and agricultural parameters) based on the national best practices through the national assessment study at 2.1, in coordination with the AHA Centre, SEA Regional Climate Centre-Network (RCC-Network), and the ASEAN Specialised Meteorological Centre (ASMC) and develop an operational manual with weekly and monthly drought bulletin to disseminate drought conditions of South-East Asia region to AMS (regional and national).					

Continued ▼

Action/Sub-Action	2021	2022	2023	2024	2025
2.3. Develop a regional guideline with comprehensive workplan on drought risk reduction and intervention planning to be taken during drought hazard for AMS by considering women, children, elderly people, and people with disability with high priority (regional).					
2.4. Develop regional guidelines on drought risk reduction and suggested interventions that could be implemented by ASEAN Member States to mitigate the impact of drought, with the needs of vulnerable people taken into consideration (regional).					
3. Adaptation actions					
3.1. Develop recommended regional drought adaptation policies and mitigation strategies for identified drought risks and vulnerabilities as a guide for ASEAN Member States' consideration (regional and national).					
3.2. Conduct regional or national study to assess the adaptive capacity and recovery ability of the vulnerable groups (national).					
4. Response and recovery					
4.1. Develop regional guidelines on recommended financial and social welfare interventions for post-drought disaster recovery actions, informed by use of SADDD and gender analysis (regional).					
4.2. Develop a national technical team comprising national focal points from relevant agencies to evaluate post-drought economic, social and technical damage by the severe drought hazards at the national and subnational levels with comprehensive reports (national).					
4.3. Develop a regional drought risk-based crop insurance programme for the ASEAN Member States to consider subscribing - potentially utilizing established relevant ASEAN mechanism - for the drought prone provinces/areas which are dependent on agricultural production where agriculture is at high risk during dry years to be implemented (regional).					
5. Strengthening coordination between ASEAN sectoral bodies					
5.1. Establish a regional platform (e.g., Technical Working Group) for the relevant ASEAN sectoral bodies to collaborate on regional initiatives to support the implementation of the ARPA-AD (regional).					
5.2. Initiate a regional activity on communication and coordination network to strengthen the coordination among the ASEAN sectoral bodies to effectively address slow onset and accumulative impact of drought on, inter alia, the environment, agriculture, energy, and water under consideration of gender balance (regional).					
5.3. Strengthen the cooperation and utilization of the existing emergency food reserve mechanisms, such as the ASEAN Plus Three Rice Reserve (APTRR), in order to mitigate the impact of drought on food security in the region (regional).					
6. Partnership and collaboration with non-ASEAN partners					
6.1. Establish networks and develop collaborative initiatives with dialogue partners, and other regional and international partner organisations for technical and financial support, and sharing of expertise on drought management (regional).					
6.2. Further strengthen regional (and international) cooperation and collaboration in research and innovation development (R&D) and technology transfer associated with drought such as climate change adaptation, water resource management, drought risks, preservation, conservation, and the restoration of natural (including water) resources and management alternatives (regional).					
7. Capacity-building/enhancement					
7.1. Coordinate and implement regional capacity building programmes with technical support from relevant ASEAN Centres on drought impact and vulnerability assessment and drought early warning system to support drought preparedness and drought management (regional).					
7.2. Initiate six-month on-the-job training programmes to enable young professionals from ASEAN Member States to learn and exchange their knowledge and experiences on drought management (national).					

Continued ▼

Action/Sub-Action	2021	2022	2023	2024	2025
7.3. Develop a national capacity building programme on data collection (including disaggregated data) and analysis, quality assurance/quality control (QA/QC), and data dissemination to ensure high-quality and reliable data collection in a timely manner on socio-economic indicators of drought, its impacts and mitigation measures (national).					
8. Data sharing and dissemination					
8.1. Develop a regional platform for data and information technologies, best practices, and lessons learned concerning droughts of different scales, locations, and sectors in the region, and in particular, the documentation of local practices of drought risk management and their resilience capacities, subject to the respective AMS' national laws and regulations (regional).					
8.2. Develop weekly and monthly drought bulletins to disseminate current drought conditions and forecasts in the South-East Asia region to AMS (regional).					
8.3. Develop national bottom-up data collection and reporting system with regular sharing of national reports with the regional level on drought risks and water scarcity situation from different scales and sectors through mobile phone (national).					
8.4. Establish a robust system and communication network at national and subnational levels to transfer and disseminate information on drought forecasting and early warning - including drought emergency situations and trends of water shortages - to local and vulnerable communities and are accessible for local governments (national).					
9. Monitoring and evaluation					
9.1. Review and amend all existing drought management strategies and mitigation policies from different agencies to ensure consistent and coherent implementation of national action plans on drought adaptation (national).					
9.2. Develop clear indicators and monitoring system for the regional and national action plans on drought adaptation and perform periodic monitoring and evaluation on the implementation progress of the regional and national action plans on drought adaptation and mitigation (regional).					

4.1.3. Monitoring, reporting and evaluation phase

A monitoring, reporting and evaluation mechanism for the implementation of ARPA-AD will cover the following procedures:

- **Progress on development of national and regional plans of action**

The progress on development of national and regional plans of action initiated in ARPA-AD will be closely monitored by TWG-AD. Key indicators laid out in table 1, together with the timeline of achievement as well as constraints and problems encountered, will be used to evaluate the progress. Solutions and options for encountered problems will be proposed and shared with sectoral bodies and ASEAN Member States to tackle the constraints.

- **Annual reporting**

The TWG-AD will provide an update on the progress of activities and outputs of ARPA-AD to ACDM, in coordination with the ASEAN Secretariat, implementing agencies and partners.

- **Mid-term review**

A mid-term review is proposed to be carried out during the third year of the implementation of ARPA-AD. It will report the progress and impacts of the implementation against the indicators of the regional plan. Challenges encountered during the first-half period of implementation and recommended solutions will also be addressed in the mid-term review report. The report may be conducted by an external consultant.

- **Final evaluation**

A final evaluation report will be carried out by the end of the implementation period. It will detail the overall outcomes against the set indicators and the percentage of achievement for each strategic action. It is a mandatory task required by the donors, if the programme is financially supported by international donors or development partners to evaluate the overall performance of the programme. This final evaluation report may be carried out by an external consultant.

5 CONCLUSION



The ASEAN Regional Plan of Action for Adaptation to Drought is the first strategic document formulated for the ASEAN Member States to implement sustainable management of drought by (a) strengthening its adaptive capacity, (b) developing regional and national drought mitigation strategies for relevant ASEAN sectoral bodies, including enhancement of the drought forecasting and early warning systems, and (c) building national capacity and institutional capability to better manage and adapt to drought. It also creates a chance for ASEAN Member States that have yet to adopt national drought management and an adaptation policy to start formulating its national strategic actions, contributing to the operationalisation of the ARPA-AD.

While drought impacts occur across multiple sectors, the effectiveness and efficiency of ARPA-AD implementation will rely largely on the coordination role of the ASEAN sectoral bodies as well as the national implementing agencies, which will need to communicate and cooperate very closely with each other when implementing regional and national sub-actions on adaptation to drought. Drought impact and vulnerability assessment will be a joint responsibility of all stakeholders from impacted sectors to determine the main impacts, the basal causes, magnitude and severity, risk and vulnerability levels as well as evaluate the economic losses of each individual sector. A promising mechanism is building a robust and active coordination network comprising regional and national working groups on drought adaptation and mitigation to effectively implement the regional and national action plans on drought adaptation, with participation by all involved ASEAN sectoral bodies and government agencies.

The developed actions and sub-actions will help to enhance coordination at the regional and international levels for achieving sustainable management of drought, taking into account the impact of drought on the livelihoods of people, natural resources and ecosystem, in line with the three parallel tracks of drought policy intervention identified in the joint ASEAN-ESCAP study *Ready for the Dry Years*: (i) reduce and prevent, (ii) prepare and respond, and (iii) restore and recover.

Objective (a) of the ARPA-AD on national and regional strategic actions has been addressed in actions 1-4. Objective (b) on strengthening the regional cooperation and collaboration has been addressed in actions 6 and 8. Objective (c) on enhancing national and regional capacity and promoting regional cooperation among ASEAN Member States has been addressed in actions 7 and 5. Objective (d) on encouraging ASEAN Member States to adopt national drought adaptation policies, and strengthen ASEAN sectoral bodies and working groups to assist and accelerate drought adaptation and mitigation actions has been addressed in actions 9 and 5.

The above actions take into consideration the principles of the AADMER Work Programme 2021-2025. In line with the ASEAN Declaration on the Strengthening of Adaptation to Drought, the ARPA-AD defines substantial actions aiming to enhance adaptation to drought and mitigate its impact. It provides a needs-driven approach to building resilience towards disasters and climate change in line with the Sustainable Development Goals.



ANNEXES

Annex 1. Implemented, existing and planned national strategies in the ASEAN Member States related to drought



Brunei Darussalam: The country has adopted, and has been enforcing the National Haze Action Plan of Brunei Darussalam's Strategic National Action Plan for Disaster Risk Reduction, 2012-2025. Brunei Darussalam also has a National Climate Change Policy where Strategy 8 of Climate Resilience and Adaptation focuses on building resilience and enhancing adaptation to reduce the impact of climate change, including the impact of drought.



Cambodia: Cambodia has implemented its Climate Change Strategic Plan for Water Resources and Meteorology, 2013-2017, National Strategic Development Plan, 2014-2018, the Plan of Action for DRR in Agriculture, 2014-2018, and Climate Change Action Plan, 2016-2018. The country is undertaking the Climate Change Strategic Plan, 2014-2023, National Action Plan for DRR, 2019-2023, and National Framework for DRR, 2019-2030.



Indonesia: Indonesia's National Action Plan on Climate Change Adaptation was launched in 2012 focusing on increases in sea level and changes in weather, climate, and rainfall. The national action plan for adaption to climate change covers short-term for 2013-2014, medium term for 2015-2019 and long-term for 2020-2025.

The country has completed its National Disaster Management Strategic Policy 2015-2019 and the Grand Design for the Prevention of Forest, Plantation, and Land Fires 2017-2019. The government of Indonesia started the pilot program on crop insurance in 2013 but the program concentrated only in the Sumatra and Java islands leaving behind the drought-prone regions of East and West Nusa Tenggara.



Malaysia: Malaysia has enforced the Eleventh Malaysia Plan, 2016-2020, National Climate Change Policy, and the Standard Operating Procedure (SOP) for Drought Response. The country currently has National Climate Change Policy, Standard Operating Procedure (SOP) for Drought Response, and Twelfth Malaysia Plan, 2021-2025.



Myanmar: The country has implemented the Climate Smart Agriculture Strategy, 2015 and Myanmar Action Plan on Disaster Risk Reduction, 2017. Myanmar Climate Change Strategy and Master Plan prioritizes six main sectors. Its National Disaster Management Committee has set up the Myanmar Action Plan of Disaster Risk Reduction (MAPDRR). It has also developed the National Environmental Policy of Myanmar. The county is currently drafting a Myanmar Action Plan of Transboundary Haze Pollution Control. In 2019, It launched the Myanmar Climate Change Policy, Myanmar Climate Change Strategy, and Master Plan, 2018-2030.



Lao People's Democratic Republic: The Lao PDR recently finished the enforcement of the Action Plan on Climate Change (2013–2020) and the Eighth National Economic and Social Development Plan, 2016-2020. The country has also successfully implemented its National Adaptation Programme of Action to Climate Change, 2009, National Disaster Management Action Plan, National Strategy on Climate Change (NSCC), 2010, and Plan of Action for Disaster Risk Reduction and Management in Agriculture, 2014-2016.



The Philippines: The country has completed the implementation of its National Drought Plan for the Philippines, 2019, and is still implementing its Agriculture and Fisheries Management Plan, 2018-2023, Aligned Philippines National Action Plan to Combat Desertification, Land Degradation and Drought, 2015-2025, National Climate Change Action Plan, 2011-2028, National Disaster Risk Reduction and Management Plan, 2011-2028, and the Philippines Development Plan, 2017-2022. The country has developed a national action plan on desertification and drought towards 2025, called the Aligned Philippine National Action Plan to Combat Desertification, Land Degradation and Drought, 2015-2025. There are some action plans by the sectoral bodies including the Agriculture and Fisheries Management Plan, 2018-2023, National Climate Change Action Plan, 2011-2028, National Disaster Risk Reduction and Management Plan, 2011-2028, and Philippine Development Plan, 2017-2022.



Singapore: Singapore has carried out its National Climate Change Strategy, 2012, and the country has a Whole-of-Government Integrated Risk Management Policy Framework.



Thailand: The country has fully implemented its National Disaster Risk Management Plan, 2015, and is still in the process of implementing the Agriculture Strategic Plan on Climate Change, 2017-2021, Climate Change Master Plan, National Adaptation Plan, and 20-Year Water Management Master Plan.



Timor-Leste: The country has implemented its National Adaptation Program of Action for Climate Change, 2010, and National Disaster Risk Management Policy, 2008. Timor-Leste has also been enforcing its National Action Plan to Combat Land Degradation. The only available national plan associated with drought of Timor-Leste is the National Action Plan to Combat Land Degradation.



Viet Nam: Viet Nam has ended its National Strategy for Disaster Prevention, Response and Mitigation to 2020; and the National Strategy on Climate Change, 2011.

The country is implementing the National Strategy on Natural Disaster Prevention and Control to 2030, with a vision to 2050; Irrigation Strategy of Viet Nam to 2030, vision to 2045.



ANNEX 2: ASEAN Declaration on the Strengthening of Adaptation to Drought

WE, the Ministers in charge of disaster management and environment of Brunei Darussalam, the Kingdom of Cambodia, the Republic of Indonesia, the Lao People's Democratic Republic (Lao PDR), Malaysia, the Republic of the Union of Myanmar, the Republic of the Philippines, the Republic of Singapore, the Kingdom of Thailand, and the Socialist Republic of Viet Nam, of the Member States of the Association of Southeast Asian Nations (hereinafter referred to as "ASEAN");

GUIDED BY the ASEAN Charter, which sets out the purposes and principles of SEAN in particular, to enhance regional resilience by promoting greater political, security, economic and socio-cultural cooperation; and to promote sustainable development so as to ensure the protection of the region's environment, the sustainability of its natural resources, the preservation of its natural heritage, and the high quality of life of its people;

ADHERING TO the ASEAN Community Vision 2025 for a peaceful, stable and resilient Community with the enhanced capacity to respond effectively to threats and challenges in the region;

RECALLING our commitment at the informal ASEAN Ministerial Meeting on Disaster Management on 22 May 2016 in Istanbul, Turkey, to build our regional capacity and preparedness to address the challenges posed by drought;

CONCERNED WITH severe drought and its cumulative impact, especially from 2015 to 2016 and 2018 to 2020, which has had gradual but critical long-term implications on the people and the environment of the region in the social, economic and environmental aspects such as poverty, agriculture, food security, human development outcomes, ecological integrity (e.g., environmental quality and natural resources), energy and other economic sectors such as tourism;

CONCERNED that the region is facing a double burden of disasters, namely the stress and the threat of climate change and extreme weather events, as well as the impact of successive droughts compounded by the unprecedented socio-economic impact of the COVID-19 pandemic exacerbating the vulnerabilities of specific groups in the population, such as low-income, small-holder farmers and households dependent on agricultural livelihoods, food insecurity, workers in the informal economy and micro, small and medium enterprises (MSMEs); and

BUILDING ON our commitment in the ASEAN Vision 2025 on Disaster Management, and our commitment to implement the ASEAN Agreement on Disaster Management and Emergency Response (AADMER), ASEAN Working Group on Climate Change (AWGCC) Action Plan, ASEAN Working Group on Water Resource Management (AWGWRM) Action Plan, and ASEAN Joint Statement on Climate Change to the United Nations Framework Convention on Climate Change.

DO HEREBY:**Resolve to undertake the following actions, taking into account the impact of drought on the livelihoods of people, natural resources and ecosystems, agriculture, energy and sustainable socio-economic development:**

1. Promote a longer-term, holistic and more strategic approach including a regional framework to strengthening adaptations and mitigation to drought, based on adapting to future drought risk on a short-term and long-term basis in a changing climate, which includes preparedness, responses, relief, recovery measures, integrated drought management policy, strategy, and planning;
2. Strengthen coordination between ASEAN Sectoral Bodies to effectively address the slow onset and accumulative impact of drought on, *inter alia*, the environment, agriculture, energy and water;
3. Further strengthen our regional cooperation and collaboration in research and innovation development (R&D) and technology transfer associated with drought, such as climate change adaptation, water resources management, drought risks, preservation, conservation, and the restoration of natural (including water) resources and management alternatives;
4. Enhance our national and regional capacity to deal with drought, including the conducting of risk assessments and the improvement of early warning systems for drought preparedness and drought management, to enable protection and assistance for all, especially for the most vulnerable groups and the environment;
5. Promote cooperation among ASEAN Member States on transboundary drought management through existing ASEAN mechanisms;
6. Promote the sharing of data and information technologies, subject to the respective ASEAN Member States' national laws and regulations, best practices, and lessons learnt concerning droughts of different scales, locations, and sectors in the region and, in particular, the documentation of local practices of drought risk management and their resilience capacities;
7. Encourage ASEAN Member States that have yet to adopt national drought adaptation policies to do so in a manner that is consistent with their national laws and regulations, and resilience vision, guided, *inter alia*, by the following considerations:
 - Identifying constraints and accelerating adaptation actions in key systems to sustainably produce food, manage water resources, produce clean and sustainable energy, prevent land and ecosystem degradation, and preserve the natural environment;
 - Continuing with efforts to implement the 2018 ASEAN Guidelines on Promoting Responsible Investment in Food, Agriculture and Forestry (ASEAN-RAI) to increase resilience, and contribute to the mitigation of and adaptation to disasters, climate change and other shocks;
 - Considering developing legal and policy frameworks to harness the private sector in order to find diverse and innovative insurance products and services that consider the risks arising from the increased frequency of droughts, floods and other extreme weather-related events, with a particular focus on the role of Information Communication and Technology;

- Applying advances in science, technology and innovation to improve ASEAN Member States' national capacity to (i) prepare and respond to drought through the use of meteorological and hydrological drought forecasts, leading to more effective risk assessment, monitoring and early warning, sound policy formulation for drought response and relief, appropriate early action, and promoting resiliency; and (ii) recover from recurrent and future drought through innovative risk financing opportunities; and
 - Facilitate regional and international support on capacity-building for ASEAN and its Member States in drought mitigation and adaptation;
8. Harness the collective strength of ASEAN bodies and working groups to provide assistance to accelerate drought adaptation and mitigation actions in key systems of food, water, energy, land, the environment, and to improve national capacity to enhance drought monitoring and early warning systems for short- and long-term drought response and preparedness measures, and to enable adaptive and shock-responsive social protection, insurance as well as economic and investment planning; and
 9. Strengthen the cooperation and utilization of the existing emergency food reserve mechanism in order to mitigate the impact of drought on food security in the region.

WE support the strengthening of collaboration between the ASEAN Committee on Disaster Management, relevant sectoral bodies and stakeholders, to (i) develop an ASEAN Regional Plan of Action for adaptation to drought; (ii) establish networks and a community of practices for adaptive learning and continuous improvement of drought risk management in different parts of the region, building on the traditional knowledge and local solutions of communities; and (iii) mainstream drought risks and disasters into the AADMER Work Programme and other relevant guidelines.

WE further support the strengthening of collaboration between the ASEAN Committee on Disaster Management, relevant sectoral bodies and stakeholders, to enhance efforts in protecting and preserving the natural environment of the various river basins in the region through cooperation in water resources utilization and management, biodiversity and infrastructures, and continuous work towards economic cooperation for sustainable development in the region.

DONE on the tenth day of November in the Year Two Thousand and Twenty.



ANNEX 3: Drought indicator indices

The drought indices being used in South-East Asia are:

1. Meteorological drought indices

- Percentage of normal rainfall: A simple method which is used for rapid drought frequency analysis. It is best worked with longer historical precipitation data of more than 30 years.¹⁶
- Standardised Precipitation Index (SPI), which is a simple and flexible but powerful and effective method of meteorological drought indexing which utilizes only precipitation as the input data. The SPI is based on the probability of precipitation over any duration of interest (weeks, months, growing season etc).¹⁷ In Asia, SPI application is more popular than other drought indices due to its practical data requirements, flexibility, and simple calculation.
- Palmer Drought Severity Index (PDSI), which is the first comprehensive drought index developed in the United States.¹⁸ It is a soil moisture procedure calibrated for regions that are relatively homogenous in terms of climate, landscape, soil, geology, vegetation and land use, and is the standard United States Department of Agriculture measure for activating drought mitigation and response programmes. Its application is considered limited in Asia as the observational networks are not extensive.

2. Agricultural drought indices

- Soil Moisture Anomaly (SMA), which is a basic component representation of the hydrological cycle from plant growth with precipitation and evapotranspiration. It is an important indicator used by the Copernicus European Drought Observatory (EDO) to determine the start and duration of agricultural drought conditions.¹⁹ It can be used weekly or every 10 days.

16 Sadiq A. A., W. S. Williams and A. I. Tukur, 2020, Application of Percent of Normal Precipitation Method for Meteorological Drought Intensity Assessment and its Impact on Agricultural Production, in Asian Journal of Agricultural and Horticultural Research. Published on 30 September 2020. Available at <https://www.journalajahr.com/index.php/AJAHR/article/download/30080/56447#:~:text=It%20is%20calculated%20by%20dividing,is%20considered%20to%20be%20100%25>.

17 WMO, 2012, Standardized Precipitation Index User Guide. Available at https://library.wmo.int/doc_num.php?explnum_id=7768

18 Palmer, W. C., 1965, Meteorological Drought. Research Paper No. 45, United States Weather Bureau, Washington, D.C. Available at <https://www.ncdc.noaa.gov/temp-and-precip/drought/docs/palmer.pdf>

19 European Commission, 2019, Soil Moisture Anomaly (SMA): EDO Indicator Factsheet. Available at https://edo.jrc.ec.europa.eu/documents/factsheets/factsheet_soilmoisture.pdf

- Soil Moisture Different Index (SMDI), which is a relatively complicated tool of the Soil Moisture Index, is used to assess conditions of agricultural drought for a prolonged period of time. The index uses daily data to calculate a weekly mean, weekly minimum and maximum for computation of the soil water deficit.²⁰
- Keetch-Byram Drought Index (KBDI) is a continuous reference scale model for estimating the dryness of the soil and duff layers. The tool is primarily based on recent rainfall patterns to measure the meteorological drought.²¹
- Index of Soil Water Fraction (ISWF). This is a soil water fraction tool that uses the average soil moisture (ASM) for the upper zone (20-30 cm depth) water content of the Sacramento Soil Moisture Accounting Model (SAC-SMA) for each sub-basin to calculate soil water fraction anomalies for assessing agricultural drought conditions in the Lower Mekong Basin. The ASM is primarily used to detect flash floods as rainfall continues and then generates run-off.²²
- Normalized Difference Vegetative Index (NDVI), which is a remote sensing-based indicator of agricultural drought that is used to measure surface reflectance and quantitative estimation of vegetation growth and biomass.²³ While ground soil moisture data are very limited, NDVI is widely used in South-East Asia to detect historical drought for drought monitoring.
- Normalized Different Water Index (NDWI), which is a remote sensing-based indicator used to detect the change in water content of leaves. It can be extracted directly from MODIS band 2.²⁴
- Vegetation Condition Index (VCI), which is a remote sensing-based drought monitoring index used to assess vegetation conditions due to effects of low rainfall resulting in drought severity. Its maximum value represents the suitable climate condition, while the minimum value represents the least suitable climate condition, such as drought.²⁵
- Standardized Vegetation Index (SVI), which is a drought monitoring index that uses satellite data to obtain vegetation dynamics. The standardized value of SVI can be calculated based on the NDVI that is extracted from MODIS.²⁶

20 Narasimhan B. and R. Srinivasan, 2005, Development and Evaluation of Soil Moisture Deficit Index (SMDI) and Evapotranspiration Deficit Index (ETDI) for Agricultural Drought Monitoring. Published on 20 July 2005. Available at <https://ssl.tamu.edu/media/11641/afm2005.pdf>

21 Open Development Mekong, 2020, Keetch-Byram Drought Index (KBDI) in the Mekong Region. Available at <https://data.opendevdevelopmentmekong.net/dataset/keetch-byram-drought-index-kbdi>

22 Based on the Average Soil Moisture (ASM) guidance document produced by the WMO-FFGS. Available at <https://etp.wmo.int/mod/resource/view.php?id=14341>

23 ScienceDirect, 2018. Environmental Research – Normalized Different Vegetation Index. Available at <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/normalized-difference-vegetation-index>

24 Europe 2011. Product fact sheet-Version 1. NDVI: Normalized Different Water Index. Available at https://edo.jrc.ec.europa.eu/documents/factsheets/factsheet_ndwi.pdf

25 Uttarak Y. and T. Laosuwan, 2018, Drought detection by application of remote sensing technology and vegetation phenogy. Journal of Ecological Engineering, vol.18, No. 6. Available at <https://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-92374648-6133-4bc9-b7d5-3d4b6d02c68c>

26 Rotjanakusol T. and T. Laosuwan (2018), Remote sensing-based drought monitoring in the middle-part of northeast region of Thailand. Vasile Goldis University Press, vol. 28, No.1. Available at <http://studiauniversitatis.ro/pdf/28-2018/28-1-2018/2-SUVG-28-1-T.R.-14-22.pdf>

- Vegetation Health Index (VHI) is a remote sensing-based drought index used to assess drought-based vegetation stress and to understand the vegetation status condition and its response to environmental changes. VHI can be calculated from NDVI.²⁷
- Temperature Condition Index (TCI), which is a remote sensing-based drought index that is usually used in composite with VHI to measure vegetation stress. It can be calculated from the Land Surface Temperature (LST).²⁸
- Vegetation Temperature Condition Index (VTCI), which is a remote sensing drought index used to monitor and evaluate soil moisture and drought conditions for cropland with a rainfed or irrigated system.²⁹ It is often used with NDVI or LST.
- Crop Moisture Index (CMI), which uses a meteorological approach to monitor week-to-week crop conditions. It is based on the mean temperature and total precipitation for each week within a climate division, as well as the CMI value from the previous week. The CMI responds rapidly to changing conditions, and is weighted by location and time.

3. Hydrological drought indices

- Palmer Hydrological Drought Severity Index (PHDI), which is an updated version of PDSI for a longer period of drought that reduces surface and groundwater supply.³⁰
- Streamflow Drought Index (SDI). This is a relatively powerful hydrological drought index used to characterise drought with two dimensions – severity and frequency.³¹

4. Composite or modelled indices

- Combined Drought Indicator/Index (CDI). This is a composite tool of two or more drought indicators used to identify a potential drought threat to agriculture where vegetation is already affected, and the recovery progressing areas after a drought episode.³²

27 Masitoh F. and A. N. Rusydi, 2019, Vegetation Health Index (VHI) analysis during drought season in Brantas Watershed. Available at <https://iopscience.iop.org/article/10.1088/1755-1315/389/1/012033/pdf>


28 Ibid.

29 Khan J. and others, 2018. Mapping MODIS LST NDVI Imagery for Drought Monitoring in Punjab Pakistan. Published on 2 April 2018. Available at <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8329424>

30 Glossary of Climate Terms. Carolinas Precipitation Patterns & Probabilities: An Atlas of Hydroclimate Extremes. Available at <https://www.cisa.sc.edu/atlas/glossary.html>

31 Nalbantis, I., 2008, Evaluation of a Hydrological Drought Index. European Water 23/24: 67-77, 2008. Available at: https://www.ewra.net/ew/pdf/EW_2008_23-24_06.pdf

32 EDO, 2019, Combined Drought Indicator (CDI). EDO Indicator Factsheet. Available at https://edo.jrc.ec.europa.eu/documents/factsheets/factsheet_combinedDroughtIndicator.pdf



Drought frequency, severity, and magnitude have increased in South-East Asia, particularly over the past two decades. Prolonged and severe droughts adversely impact agricultural productivity, threatening food security and livelihood of rural households and poor communities. The ASEAN Regional Plan of Action for Adaptation to Drought presents a set of drought management interventions for policy makers at the national level as well as a roadmap for comprehensive drought management and adaptation at the regional level.

This regional plan of action identifies nine actions on regional and national levels for drought risk, impact, and vulnerability assessment; drought early warning system and preparedness and planning; adaptation actions; and response and recovery from drought disaster. The actions are complemented by 26 sub-actions and an implementation plan covering 2021-2025.