MEMBER REPORT

CAMBODIA

ESCAP/WMO Typhoon Committee
20th Integrated Workshop
Macao, China
1st - 5th December 2025

CONTENTS

I. Overview of tropical cyclones which have affected/impacted Member's area since the last Committee Session

1. Meteorological Assessment (highlighting forecasting issues/impacts)

In 2025, Cambodia continued to experience a tropical monsoon, climate, characterized by two distinct seasons influenced by regional monsoon dynamics and broader climate variability:

A. Dry Season (November–April)

Dominated by the Northeast Monsoon, bringing dry and cooler conditions from November to January, followed by hotter and increasingly humid weather from February to April. Temperatures ranged from 22–34°C early in the season, rising to 36–39°C during the pre-monsoon period (March–April).

Several provinces experienced heatwave days, especially in the central plains and lowland areas.

B. Rainy Season (May–October)

Influenced by the Southwest Monsoon, delivering the majority of annual rainfall. Monsoon onset occurred in late May, with widespread rainfall intensifying from June to September. Peak rainfall was observed in northern, northeastern, and southwestern provinces due to orographic effects.

Seasonal thunderstorms were frequent, bringing short-duration heavy rainfall, strong winds, lightning, and localized flooding.

Tropical cyclone view:

Cambodia is not directly landfall-prone to tropical cyclones; however, the country is regularly affected by outer circulation, remnants, and monsoon enhancement from tropical cyclones forming in the Western North Pacific and the South China Sea. These systems bring heavy rainfall, strong winds, thunderstorms, flash floods, and riverine flooding across several provinces.

During the reporting period, multiple tropical cyclones in the region influenced Cambodia's weather patterns, especially when they made landfall in Vietnam, moved across Lao PDR/Thailand, or enhanced the southwest monsoon.

Tropical Cyclone Influences on Cambodia

Although no tropical cyclone made landfall over Cambodia, several regional tropical cyclones affected weather conditions across the country through:

a). Cyclone Remnants and Outer Rainband Effects

Moderate to heavy rainfall in northern, northeastern, and central provinces. Increased thunderstorm activity with strong wind gusts. Localized flash flooding in low-lying and urban areas. Temporary inundation of farmlands

b). Monsoon Enhancement Effects

Typhoons and tropical storms over the South China Sea strengthened the Southwest Monsoon, producing:

- Multi-day rainfall episodes
- Elevated water levels in the Mekong River system
- Heavy rainfall over upland provinces (Ratanakiri, Mondulkiri, Preah Vihear)
- Seasonal flooding in the central plains

c). Notable Weather Patterns Associated With Regional TC Activity

- Persistent rainfall due to slow-moving or lingering storm remnants over Viet Nam/Laos
- Wind disturbances associated with monsoon surges and cyclone-induced convergence
- Meso-scale convective systems triggered by cyclone–monsoon interaction

d). Rainfall Characteristics

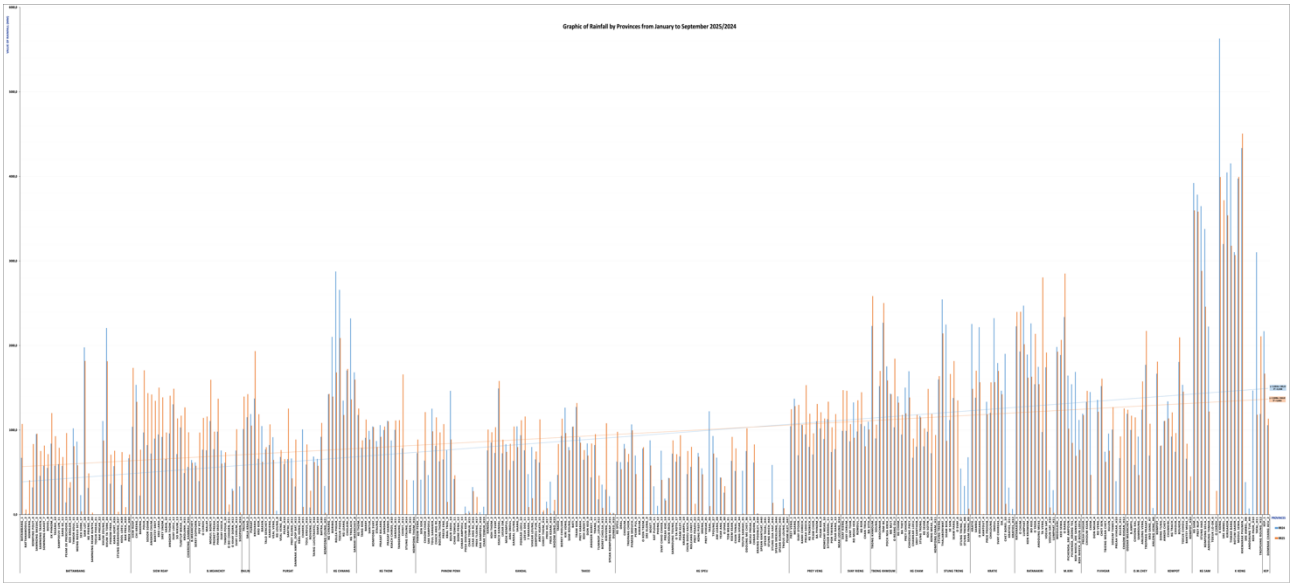
- Widespread rainfall episodes were recorded during periods of tropical storm influence.
- Rainfall totals exceeded seasonal averages in several provinces, especially along the Mekong Basin.
- Heavy rainfall events were often concentrated within short durations, increasing flash flood risk.

This is the rainfall graphic (Table: 1) extracted from 338 meteorological stations across the country, based on the data we received for September 2025 and a comparison with September 2024. From this, we observed that:

- In September 2025, rainfall was recorded at 269 stations, equivalent to 80%.
- In September 2024, rainfall was recorded at 316 stations, equivalent to 94%.

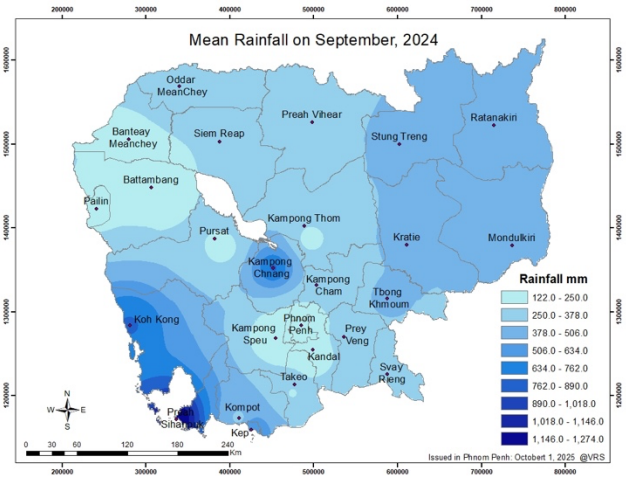
So that: In September 2025, rainfall occurred at fewer stations compared to 2024, by approximately 14%. In September 2025, the overall national rainfall amount was about 9% less than in 2024. Forecast for October 2025: Temperatures in October 2025 are expected to be similar to those in 2024, and rainfall is expected to be 20% to 40%

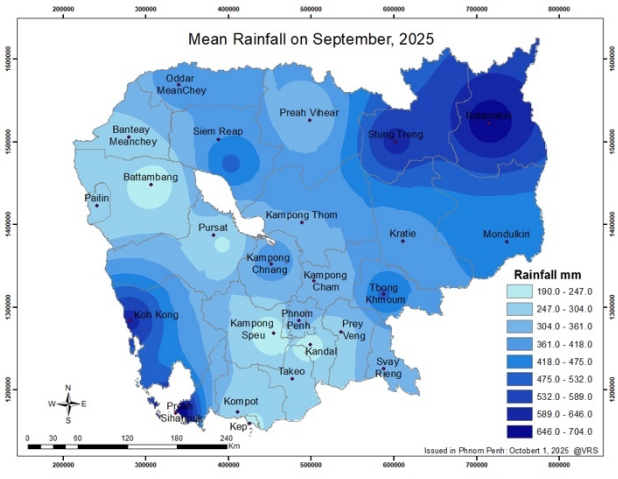
higher than in 2024. The 2025 rainy season has extended longer than the long-term average and is also longer than the 2024 season.



From the rainfall maps for January to September of 2024 and 2025, it is evident that rainfall intensity in 2025 was higher than in 2024. There were heavier and more concentrated rainfall events, resulting in widespread flooding across many areas in Cambodia, including the capital city, the lowland regions, plateaus, and mountainous areas.

Following this, we have attached a report on the impacts to housing, agricultural crops, infrastructure, and other sectors.





d). Temperature and Wind

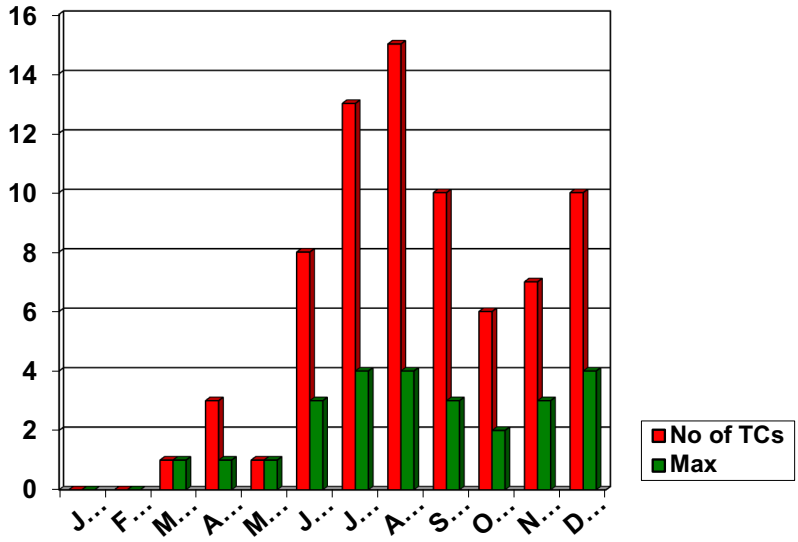
- Pre-cyclone cloud cover contributed to slightly lower daytime temperatures.
- Gusty winds occurred during thunderstorm periods associated with outer circulation bands.
- Localized tree damage and small-scale structural impacts were reported during severe thunderstorm events.

e). Sensitivity to Track Forecast Shifts

Small (50–100 km) shifts in cyclone tracks significantly influence rainfall patterns within Cambodia, requiring:

- Frequent updates
- Close monitoring of regional data
- Rapid dissemination of revised forecasts

Frequency of Tropical Cyclone in Cambodia (1991-2001)



The maximum (%) of monthly frequency of Tropical Cyclone Best Tracks Over Cambodia observed during August about 20.3 % = 15 numbers of TCs. (Record from 1991-2001)

Mon	Jan	Feb	Mar	Apr	May	Jun	Jul	Agu	Sep	Oct	Nov	Dec
No of TCs	0	0	1	3	1	8	13	15	10	6	7	10
%	0.0	0.0	1.4	4.1	1.4	10.8	17.6	20.3	13.5	8.1	9.5	13.5

Tropical Cyclone 2025

ID No	Name	Period of record	Duration	Effected
202501	STS WUTIP	Jun 10-15, 2025	6	***11-14
202502	TS SEPAT	Jun 23-26, 2025	4	
-	TD	Jun 25-27, 2025	3	
202503	STS MUN	Jul 1-10, 2025	10	
202504	STS DANAS	Jul 1-11, 2025	11	
202505	STS NARI	Jul 12-16, 2025	5	
202506	STS WIPHA	Jul 16-23, 2025	8	*20-21
202507	TS FRANCISCO	Jul 21-26, 2025	6	
202508	TS CO-MAY	Jul 23-26, 2025	4	
202509	TS KROSA	Jul 25-Aug 4, 2025	11	
202510	TS BAILU	Aug 2-Aug 7, 2025	6	
202511	TS PUDUL	Aug 8-17, 2025	10	
202512	TS LINGLING	Aug 20-21, 2025	2	
202513	STS KAJIKI	Aug 22-25, 2025	4	**24-25
202514	TS NONGFA	Aug 28-31, 2025	4	**30-31
202515	TS PEIPAH	Sep 2-5, 2025	4	
202516	TS TAPAH	Sep 7-8, 2025	2	*7-8
202517	TS MITAG	Sep 16-18, 2025	3	
202518	TY RAGASA	Sep 16-25, 2025	10	23-25***
202519	TY NEOGURI	Sep 16-27, 2025	12	
202520	TY BUALOI	Sep 23-30, 2025	8	27-29***
202521	TY MATMO	Sep 30-Oct 6, 2025	7	
202522	TY HALONG	Oct 2-10, 2025	10	
202523	STS NAKRI	Oct 7-15, 2025	9	`
202524	STS FENGSHEN	Oct 17-24, 2025	8	
202525	TY KALMAEGI	Nov 1-8, 2025	8	6-8***
202526	TY FUNG WONG	Nov 4-10, 2025	7	

- The Tropical cyclones which have affected/impacted Member's area since the last Committee Session:

From last June to November, there are 1 tropical cyclones pass to Cambodia: Typhoon KALMAEGI 2525, and 8 tropical cyclone there are not direct affected to Cambodia as: Server Tropical Storm WUTIP 2501, Server Tropical Storm WIPHA 2506, Server Tropical Storm KAJIKI 2513, Tropical Cyclone NONGFA 2514, Tropical Cyclone TAPAH 2516, Typhoon RAGASA 2518, Typhoon BUALOI 2520.

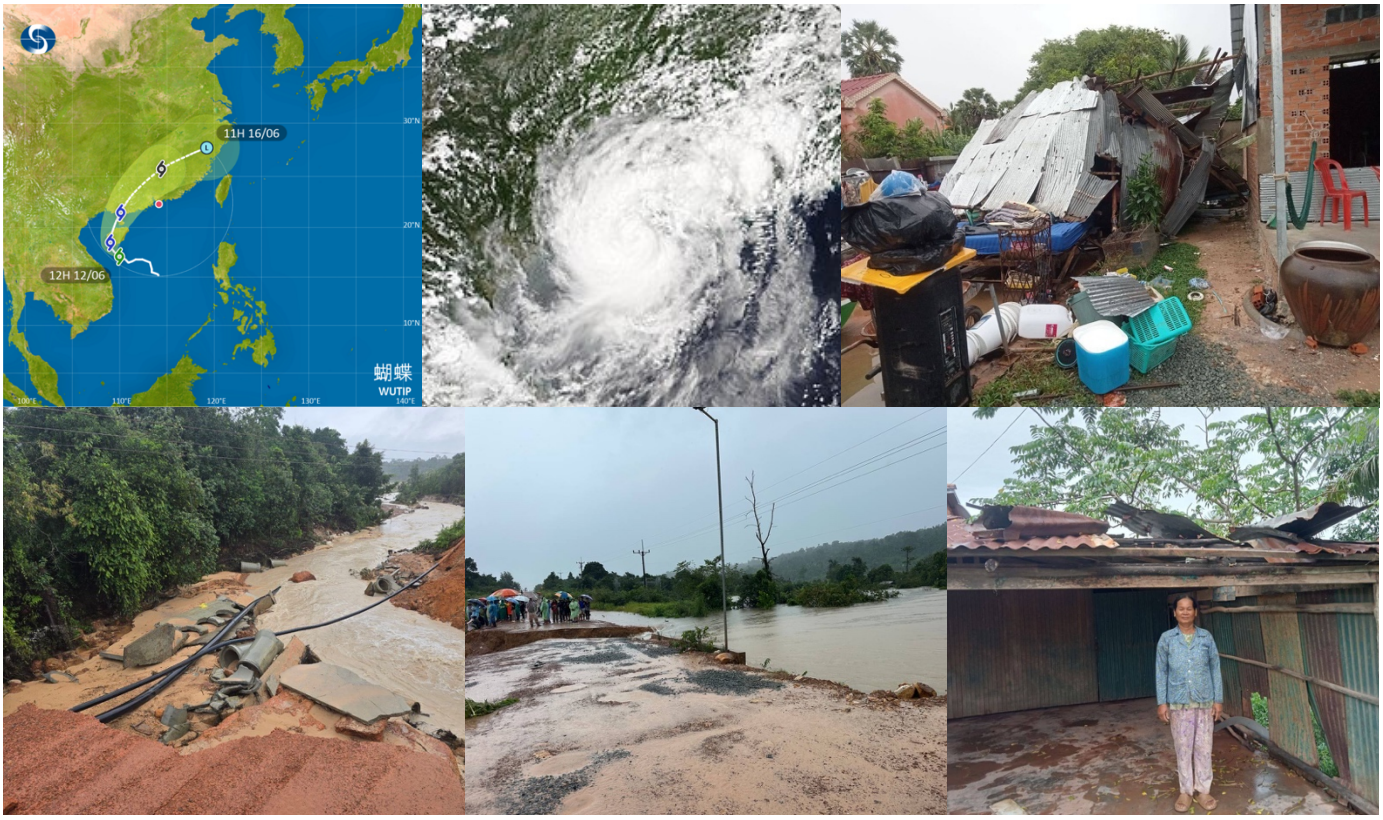
- **Server Tropical Storm WUTIP (2501)**

Wutip was the first tropical cyclone forming over the western North Pacific and the South China Sea in 2025 and also the first tropical cyclone indirect affecting Cambodia in 2025.

Wutip formed as a tropical depression over the central part of the South China Sea move forward near by Vietnam to Hog Kong

As strong winds associated with Wutip were expected to affect the Northern part of Cambodia on 11-14 June produce heavy rain in the Northern and Coastal area, which giving the strong monsoon.

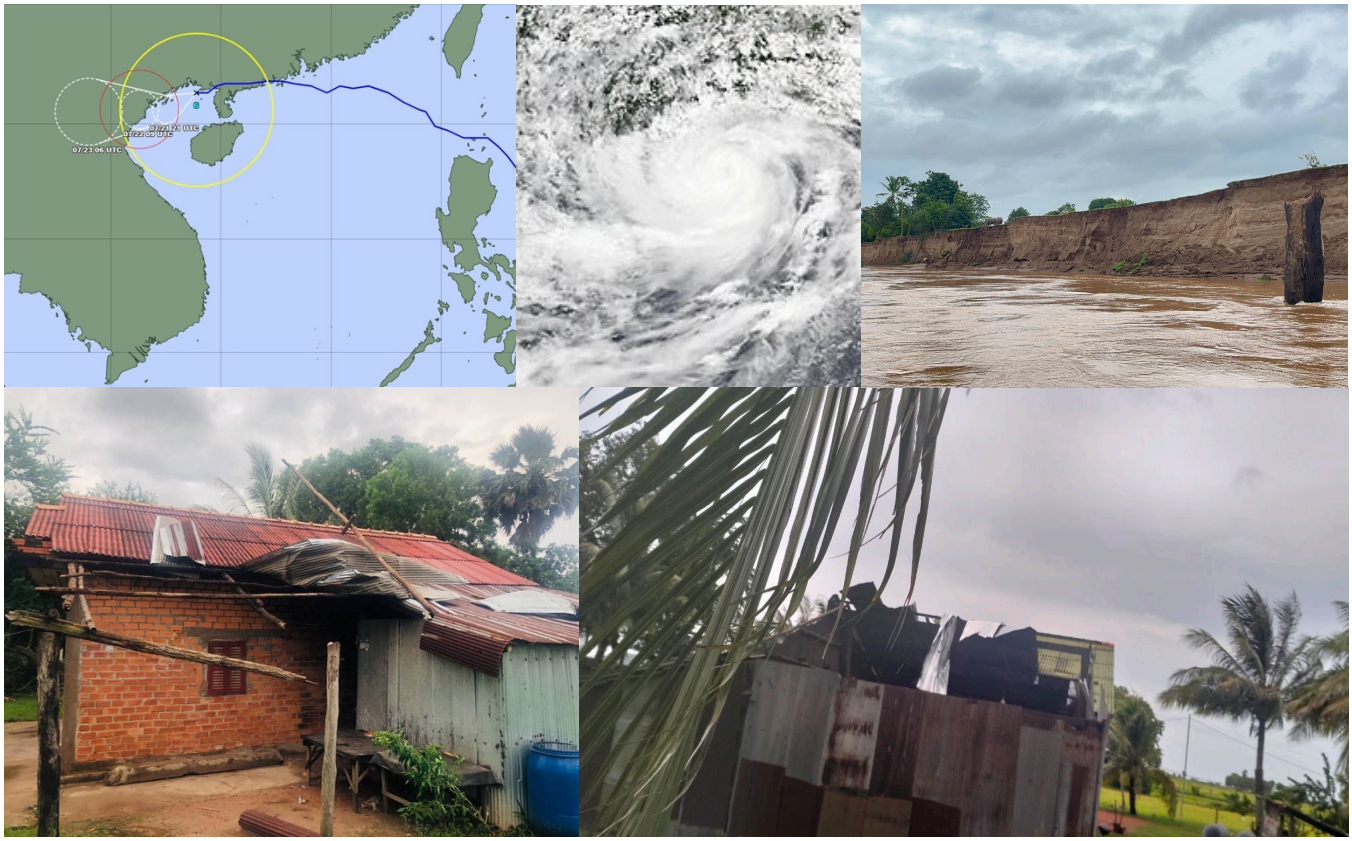
The local weather was mainly fine and extremely hot on 11 June, with the maximum temperature at the Kompong Thom Province to 36.0 degrees, levelling the record maximum for June since records began in 1992. Under the influence of the outer rainbands of Wutip, there were occasional Guest wind in Cambodia on 11 - 15 June. Showers were very heavy with more than 246,0 millimeters/24hours of rainfall recorded over most parts of the Coastal area on 11 June.



- **Server Tropical Storm WIPHA (2506)**

Severe Tropical Storm Wipha, known in the Philippines as Severe Tropical Storm Crising, was a strong and deadly tropical cyclone that affected South China and Northern Vietnam after crossing Northern Philippines, Hong Kong, and Macau during mid-July 2025. The sixth named storm of the annual typhoon season, Wipha originated from a disturbance in the Philippine Sea on July 16 and then intensified into a tropical storm on July 19. Wipha then passed through far northern Luzon before gradually intensifying into a severe tropical storm on the same day.

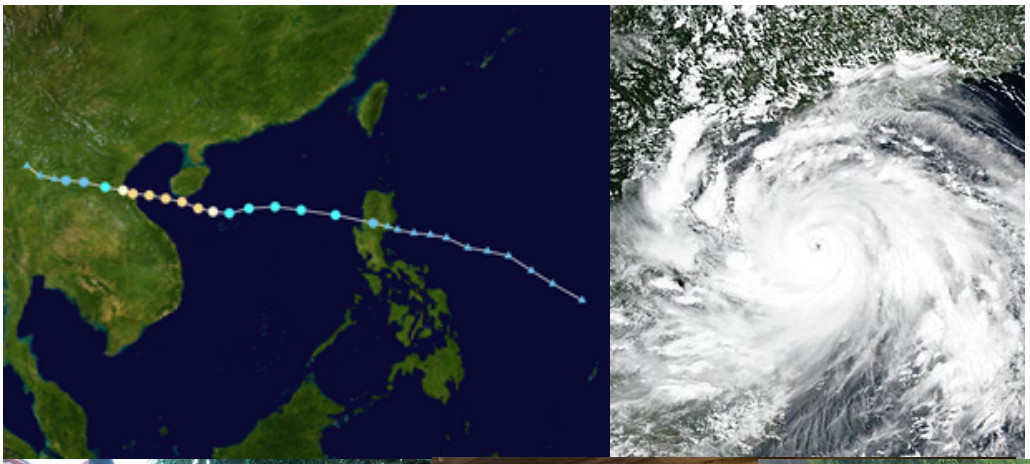
The local weather was mainly fine. Under the influence of the outer rainbands of WIPHA, there were occasional Guest wind in Cambodia on 20 - 21 June. Showers were very heavy with more than 104,0 millimeters of rainfall recorded over the part of Coastal area at Tatai and Koh Kong District on 20 June.



- **Server Tropical Storm KAJIKI (2513)**

Typhoon Kajiki, known in the Philippines as Tropical Storm Isang and in Vietnam as Typhoon, was a powerful tropical cyclone that impacted Northern Vietnam after skirting the southern portion of Hainan Island in late August 2025. The thirteenth named storm and fifth typhoon of the 2025 Pacific typhoon season, Kajiki originated from an area of low pressure east of the Philippines on August 22.

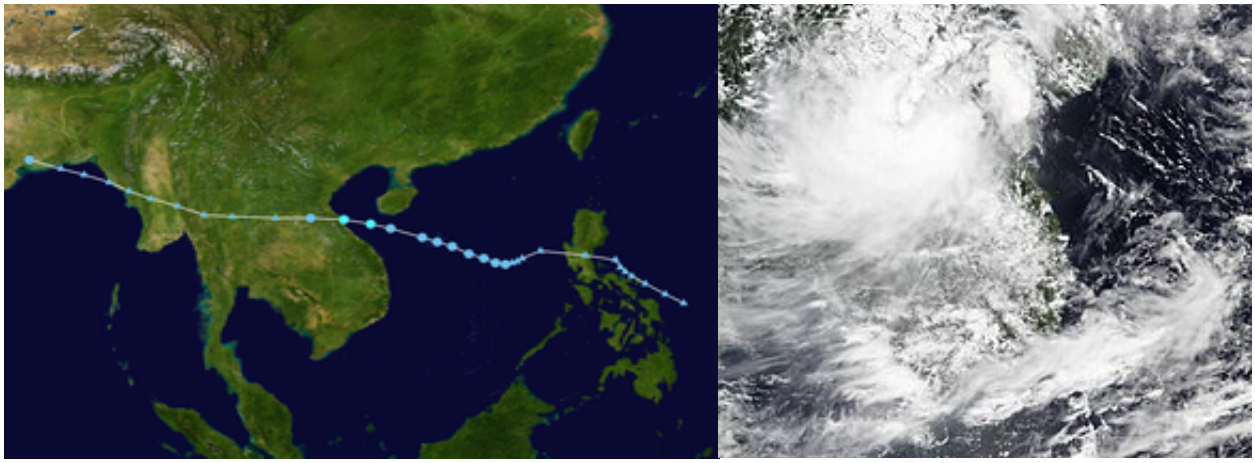
The local weather was mainly fine. Under the influence of the outer rainbands of KJIKI, there were occasional Guest wind in Cambodia on 24 - 25 August. Showers were very heavy with more than 78,2 millimeters of rainfall recorded over the part of Flat area at Sadan, Kompong Thom on 25 August.

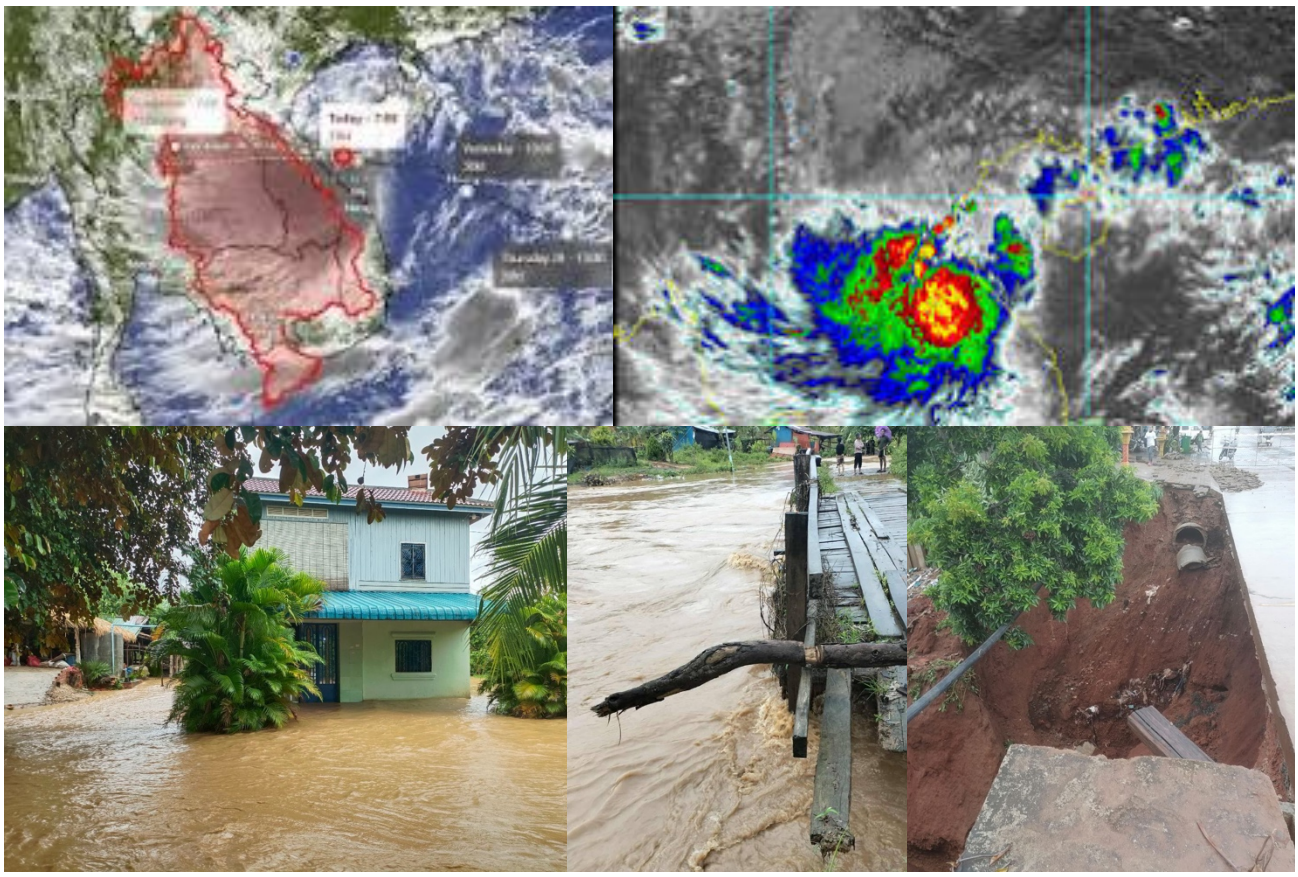


- **Tropical Storm NONGFA (2514)**

Tropical Storm Nongfa, known in the Philippines as Tropical Depression Jacinto, was a weak tropical cyclone that struck Vietnam and affected the Philippines as a precursor low in late August 2025. The fourteenth named storm of the annual typhoon season, Nongfa's origins can be traced from a disturbance east of Mindanao, which eventually crossed the Philippine archipelago before gradually becoming a tropical depression west of Luzon on August 27, 2025. Nongfa later entered in the South China Sea, where it strengthened into a tropical storm before it made landfall over Quảng Trị and Hà Tĩnh on August 30.

The local weather was mainly fine. Under the influence of the outer rainbands of NONGFA, there were occasional Guest wind in Cambodia on 28 - 31 August. Showers were very heavy with more than 136,0 millimeters of rainfall recorded over the part of Flat area at Angkor Thom, Siem Ream on 28 August.

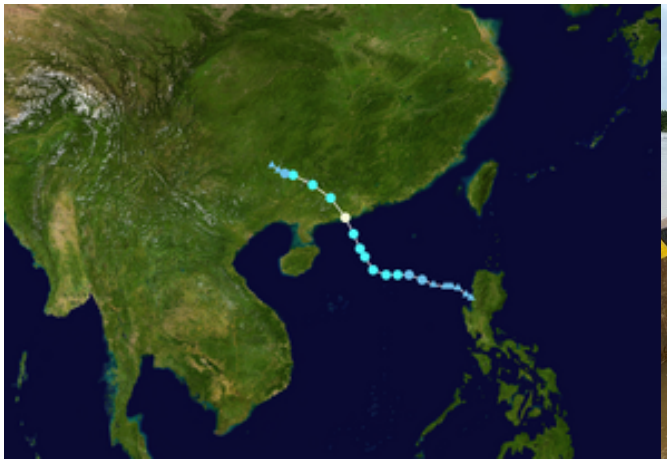




- **Tropical Storm TAPAH (2516)**

Typhoon Tapah, known in the Philippines as Tropical Depression Lannie, was a strong tropical cyclone that impacted Hong Kong, Macau, and South China in early September 2025. The sixteenth named storm and sixth typhoon of the annual typhoon season. Moving northwestward, Tapah was upgraded to a severe tropical storm early on September 8 before making landfall on Xiachuan Island at 07:00 CST (23:00 UTC). Shortly thereafter, it rapidly strengthened into a Category 1-equivalent typhoon and made a second landfall over Taishan, Guangdong, an hour later. Interaction with rugged terrain caused the system to quickly weaken, and it was last noted over Guilin, Guangxi, on September 9.

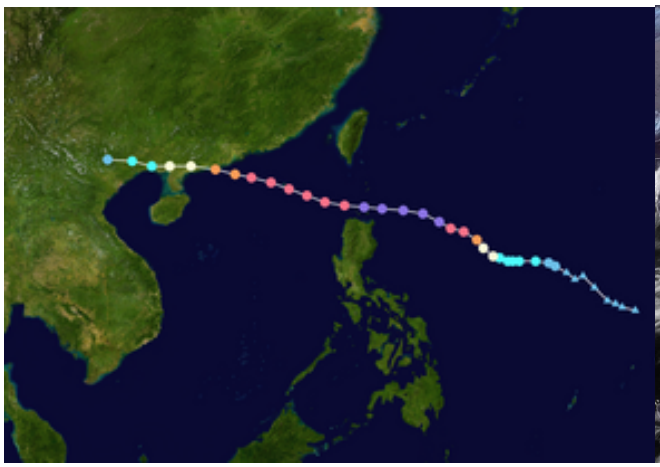
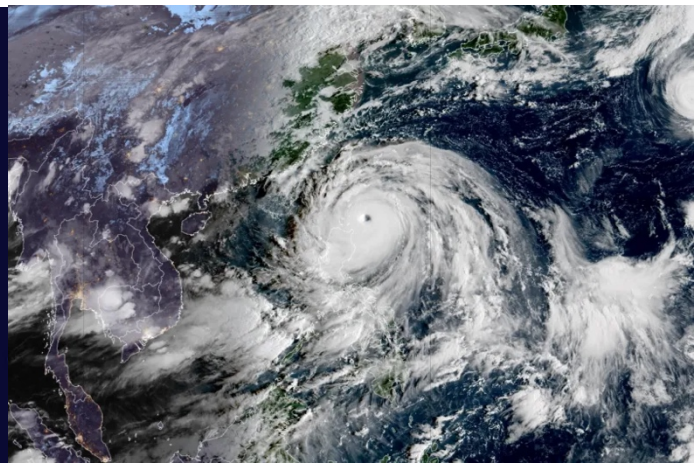
The local weather was mainly fine. Under the influence of the outer rainbands of TAPAH, there were occasional Guest wind in Cambodia on 7 - 8 September. Showers were very heavy with more than 122,5 millimeters of rainfall recorded over the part of high & mountain area at Tropeang Prasat, Oddar Mean Chey on 7 September.

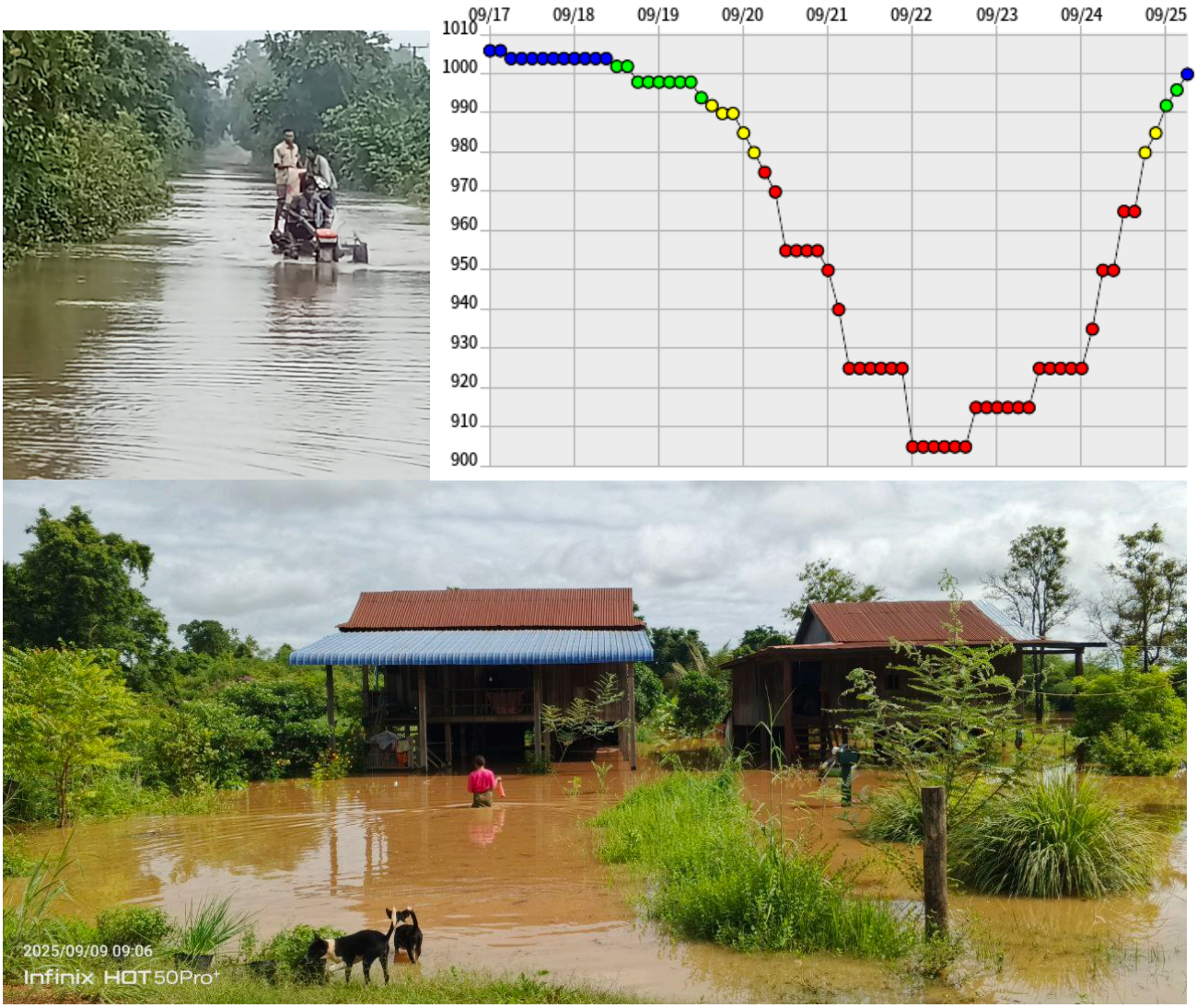



- **Typhoon RAGASA (2518)**

Typhoon Ragasa, known in the Philippines as Super Typhoon Nando, was a large, powerful, deadly and destructive tropical cyclone that severely affected the northernmost portions of Luzon island in the Philippines and Hualien County in Taiwan, and impacted Hong Kong, Macau, South China and Vietnam in late September 2025. The storm started to weaken gradually as it entered the South China Sea, with a second eyewall replacement cycle having commenced. It later passed near the south of Hong Kong. Ragasa made landfall over Hailing Island in Yangjiang, Guangdong province, in southern China on September 24, and on the following day it crossed the coastal area of Guangxi province in China and Quảng Ninh province in Vietnam as a weakening tropical storm before dissipating in the mountain regions of Northern Vietnam

The local weather was mainly fine. Under the influence of the outer rainbands of RAGASA, there were occasional Guest wind in Cambodia on 23 - 26 September. Showers were very heavy with more than 178,5 millimeters of rainfall recorded over the part of Coastal area at Khemarak Phumin, Koh Kong on 26 September.

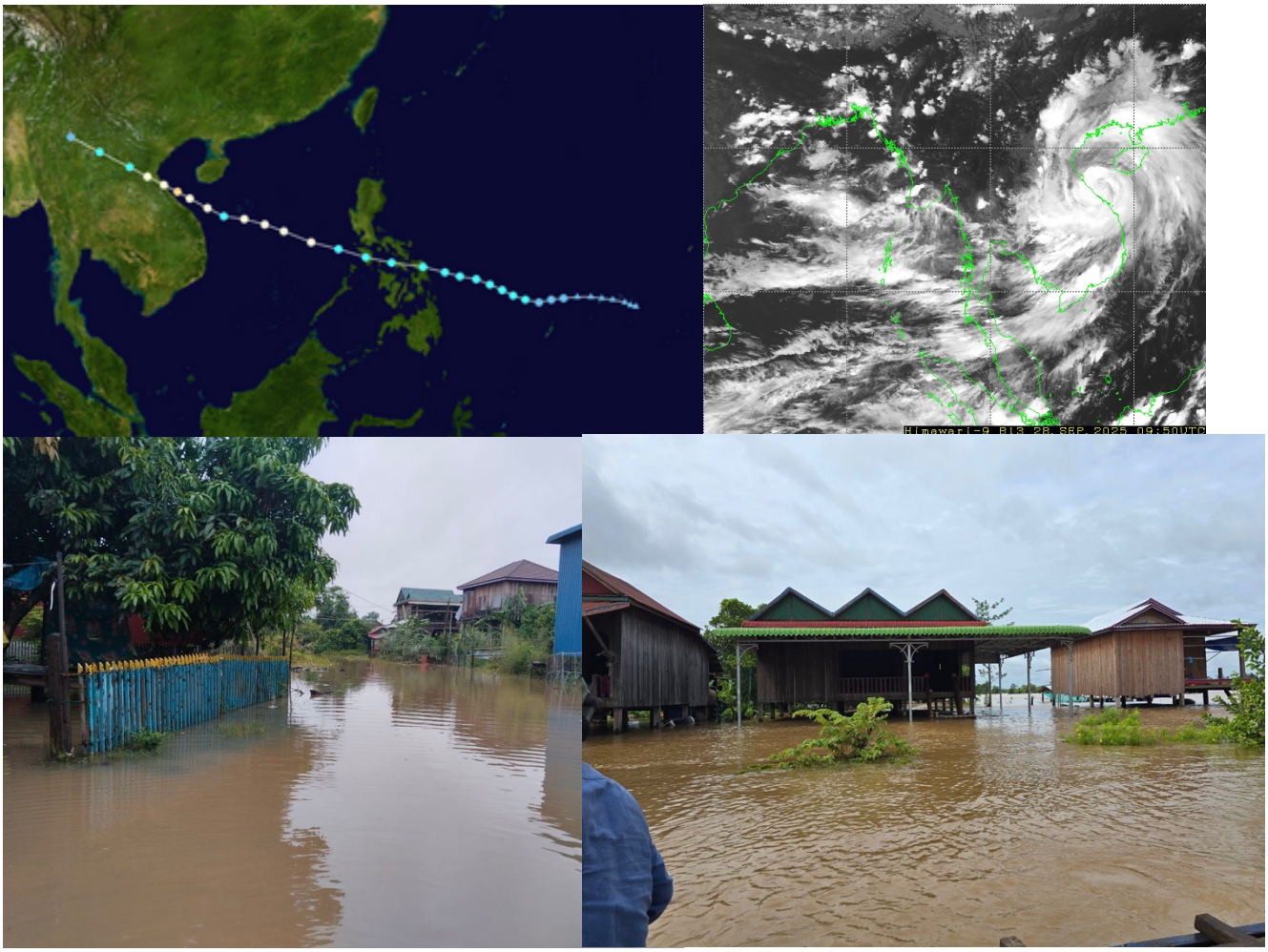





- **Typhoon BUALOI (2519)**

Typhoon Bualoi, known in the Philippines as Typhoon Opong and in, was a strong and deadly tropical cyclone that caused significant damage and loss of life across the central Philippines, particularly the regions of Bicol and Eastern Visayas, as well as Northern and Northern Central Vietnam, particularly Nghệ An and Hà Tĩnh in late September 2025. It strengthened into a tropical storm on September 24 and was later upgraded to a severe tropical storm as it moved west-southwest. Bualoi subsequently made six landfalls across Eastern Visayas and Mimaropa before reemerging through the Mindoro Strait, where it intensified into a Category 1-equivalent typhoon according to the JTWC. Bualoi gained more strength, reaching its peak intensity as a Category 2-equivalent typhoon before it made a final landfall over Hà Tĩnh on September 29. It later moved inland over Laos, where it rapidly weakened into a remnant low before it was reportedly dissipated on the following day.

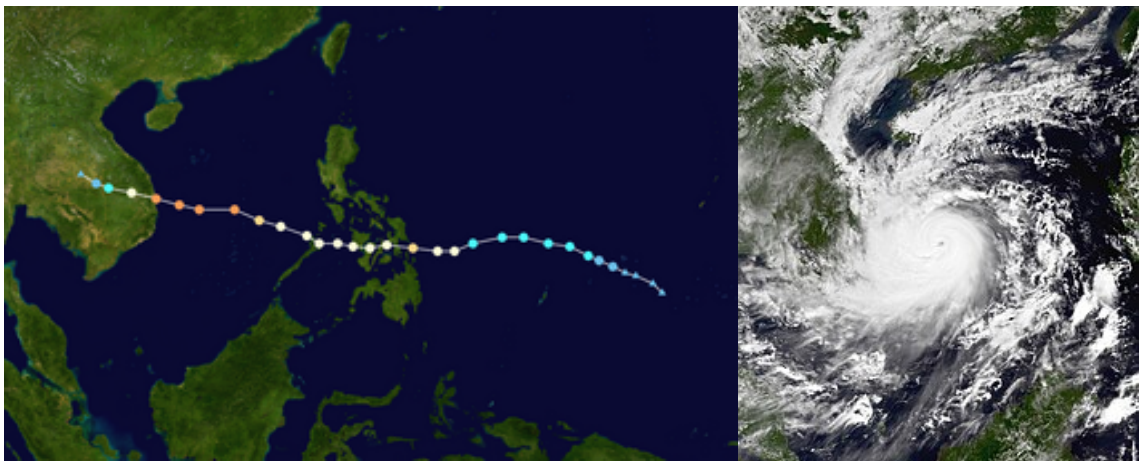
The local weather was mainly fine. Under the influence of the outer rainbands of BUALOI, there were occasional Guest wind in Cambodia on 27 - 29 September. Showers were very heavy with more than 190,5 millimeters of rainfall recorded over the part of High & Mountain area at Anlong Veng, Oddar Mean Chey on 28 September.



- **Typhoon KALMAEGI (2525)**

Typhoon Bualoi, known in the Philippines as Typhoon Opong and in, was a strong and deadly tropical cyclone that caused significant damage and loss of life across the central Philippines, particularly the regions of Bicol and Eastern Visayas, as well as Northern and Northern Central Vietnam, particularly Nghệ An and Hà Tĩnh in late September 2025. It strengthened into a tropical storm on September 24 and was later upgraded to a severe tropical storm as it moved west-southwest. Bualoi subsequently made six landfalls across Eastern Visayas and Mimaropa before reemerging through the Mindoro Strait, where it intensified into a Category 1-equivalent typhoon according to the JTWC. Bualoi gained more strength, reaching its peak intensity as a Category 2-equivalent typhoon before it made a final landfall over Hà Tĩnh on September 29. It later moved inland over Laos, where it rapidly weakened into a remnant low before it was reportedly dissipated on the following day.

The local weather was mainly fine. Under the influence of the outer rainbands of KALMAEGI, there were occasional Guest wind in Cambodia on 6 - 8 November. Showers were very heavy with more than 102,5 millimeters of rainfall recorded over the part of High & Mountain area at Kon Kromum, Rattanakiri on 6 November.



2. Hydrological Assessment (highlighting water-related issues/impact)

2025 hydrological conditions in Cambodia have been characterized by strong wet-season flows and elevated water levels in the Mekong mainstream. Despite some weeks without alarm-level flooding, the potential for localized flooding and flash floods has been elevated.

The Tonle Sap's hydrological dynamics remain central to Cambodia's flood-pulse ecology and aquatic livelihoods; any variation in its behavior is a key risk. Water management challenges continue: real-time monitoring, improved forecasting, and stronger early warning systems are needed.

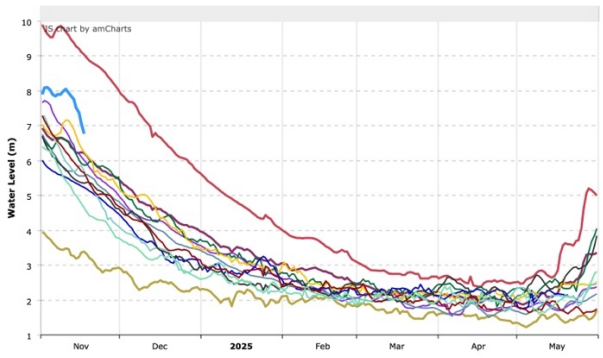
The socio-economic impacts of hydrological extremes (both flood and drought) remain significant and require integrated risk management.

a. River Water Levels and Flood Regimes

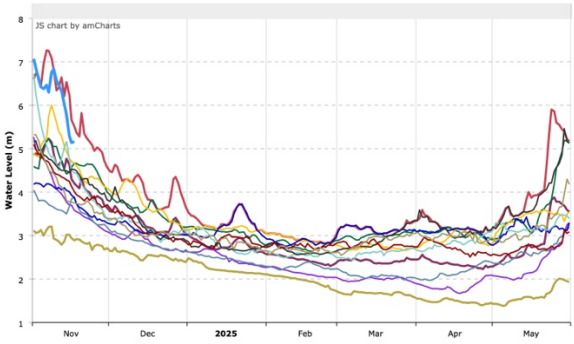
Mekong Mainstream

During mid-June (10–16 June 2025), water levels along the Mekong in Cambodia (e.g., at Kratie, Phnom Penh) rose significantly. For the week of 17–23 June, the MRC reported that water levels at key Mekong stations did not exceed flood alarm thresholds, but flows were increasing. By end of June (24–30 June), water levels continued to rise in several mainstream stations including Kratie, Phnom Penh (Bassac), and Prek Kdam.

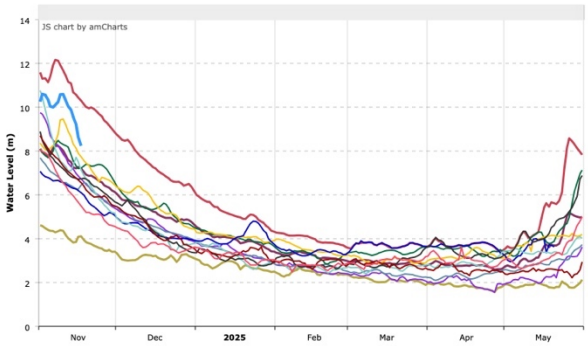
Phnom Penh



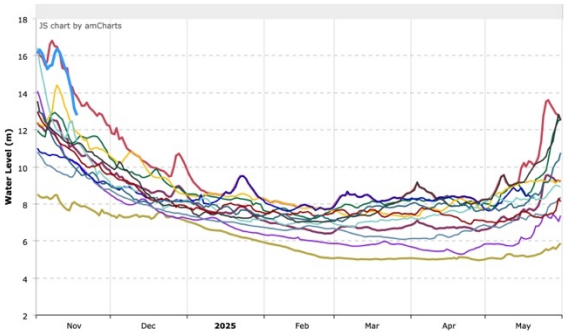
Stung Treng



Kompong Cham



Kraties



Tonle Sap System

The Tonle Sap Lake and River continue to play a key role in Cambodia's hydrology. The seasonal flow reversal remains a critical mechanism for distributing floodwater into the lake during the wet season. Shifts in timing or magnitude of flood pulses (e.g., due to upstream flow regulation) remain a concern for floodplain fertility, fisheries, and food security.

3. Socio-Economic Assessment (highlighting socio-economic and DRR issues/impacts)

In 2025, Cambodia experienced intensified hydrometeorological activities, including heavy monsoon rainfall, flash floods, and elevated Mekong–Tonle Sap water levels. These events caused widespread socio-economic impacts across multiple sectors, particularly affecting vulnerable rural communities dependent on agriculture and fisheries.

- Population and Human Impact

Seasonal floods affected tens of thousands of households, particularly in lowland provinces and urban centers with poor drainage. Thousands experienced temporary displacement due to rising water levels and flash floods. Several fatalities and injuries were reported during peak flooding periods, highlighting persistent community exposure to hydrological hazards.

- Agriculture and Food Security

Floods damaged extensive areas of rice fields, cassava, maize, and vegetable crops, reducing yields and putting pressure on rural incomes. Tonle Sap water-level fluctuations affected fish breeding cycles, impacting household nutrition and the local fishery economy. Short dry spells earlier in the year delayed rice planting in some provinces, compounding seasonal losses.

- Infrastructure and Public Services

Floodwaters damaged key rural roads, small bridges, culverts, irrigation canals, and urban drainage systems, leading to transport disruptions. Water supply systems in rural areas experienced increased turbidity and contamination, creating short-term challenges for drinking water and sanitation. Market access was temporarily interrupted in several districts due to inundated road links.

- Economic Losses

Direct economic losses included Damage to crops and livestock, Repair needs for transport and irrigation infrastructure, Reduced household income and productivity.

Indirect losses were observed through disrupted local markets, increased transport costs, and delayed agricultural cycles.

- Key DRR Issues and Systemic Gaps

Early Warning Limitations: Limited coverage of real-time hydrological and meteorological stations reduced lead-time for warnings.

Flash-Flood Vulnerability: Rapid-onset floods continued to affect districts across lowlands, plateaus, and mountainous regions.

Impact-Based Forecasting: Forecasts are not consistently translated into clear, actionable messages for community-level decision-making.

Infrastructure Planning Risks: New water infrastructure and land-use changes increase long-term exposure if not rigorously assessed.

4. Regional Cooperation (highlighting regional cooperation and related activities)

➢ Cooperation Within the Mekong Basin

Cambodia continued to actively cooperate with Mekong River Commission (MRC) member countries-Lao PDR, Thailand, and Viet Nam-on hydrological data sharing, flood forecasting, and drought monitoring. Key collaborative actions included:

- Exchange of near-real-time water-level and rainfall data to strengthen regional flood forecasting.
- Participation in the MRC Flood and Drought Monitoring Systems (FDMS) development and technical working groups.
- Joint assessment and dialogue on basin developments to improve transboundary water management and ensure regional preparedness.

➢ Engagement with WMO and Regional Specialized Centers

Cambodia worked closely with WMO Regional Specialized Meteorological Centers (RSMCs) for tropical cyclone tracking, seasonal forecasting, and early warning guidance. Activities included:

- Regular reception of tropical cyclone advisories from RSMC Tokyo and timely dissemination to national authorities.
- Participation in WMO/ESCAP Typhoon Committee training, workshops, and technical exchanges to improve forecasting skills and institutional capacity.
- Collaboration with RIMES on improving drought early warning and impact-based forecasting products.

➢ ASEAN and Subregional Collaboration

Under the ASEAN framework, Cambodia engaged in multiple regional DRR and meteorology-related programs:

- Participation in ASEAN Committee on Disaster Management (ACDM) technical sessions.
- Cooperation with ASEAN Specialized Meteorological Centre (ASMC) for haze monitoring, seasonal climate outlooks, and fire danger rating information.
- Joint training and capacity-building initiatives supported by ASEAN-COB, ADRC, and other partners.

➢ CREWS & Climate Resilience Partnerships

Through the CREWS Initiative (Cambodia–Lao PDR Project), Cambodia collaborated with regional and global partners including WMO, UNDRR, and the World Bank. Key areas of cooperation included:

- Development of impact-based forecasting (IBF) methodologies aligned across the region.
- Strengthening cross-border early warning protocols.
- Joint technical missions and knowledge exchange focused on early warning system modernization.

➢ Humanitarian and Development Partner Coordination

Cambodia maintained active cooperation with regional humanitarian partners: IFRC, WFP, FAO, UNDP, UNESCAP, ADPC, and others supported national flood preparedness, anticipatory action, and community-level resilience. Engagement in Asia-Pacific Dialogue Platforms on Anticipatory Action, contributing to regional learning and uptake of FbA and early action triggers

II. Summary of Progress in Priorities supporting Key Result Areas

Cambodia made strong and measurable progress across all Key Result Areas in 2025. Major achievements include improved forecasting capabilities, expansion of early warning dissemination, enhanced regional collaboration, and strengthened community preparedness. Continued investment in digital transformation, hydrometeorological infrastructure, and institutional coordination will further advance Cambodia's resilience to climate-related hazards.

1. Strengthening Early Warning Systems (EWS)

- Enhanced national monitoring capacity through expansion of automatic weather stations and upgrading of hydrological gauges in priority basins.
- Improved dissemination channels (SMS alerts, social media, radio networks) for faster community-level warning delivery.
- Significant progress in institutionalizing impact-based forecasting (IBF) under the CREWS Initiative, with national guidelines under development.

2. Advancements in Meteorological and Hydrological Services

Continuous improvements in weather and flood forecasting using updated regional inputs from RSMC Tokyo, MRC, and ASEAN Specialized Meteorological Centre.

Operational adoption of satellite-based rainfall estimates and high-resolution numerical weather models, enabling more accurate short-term predictions.

Strengthened analysis of seasonal climate outlooks for agriculture and water-resource planning.

3. Disaster Risk Reduction (DRR) and Community Preparedness

- Increased coordination between MoWRAM, NCDM, MAFF, and provincial authorities to support preparedness before heavy rainfall and flood events.
- Implementation of community training on flood risk, evacuation planning, and protective actions, supported by IFRC, WFP, UNDP and ADPC.
- Expansion of anticipatory action triggers and pre-positioning of emergency supplies in high-risk provinces.

4. Data, Information, and Digital Transformation

Improved data integration across meteorological, hydrological, and disaster management sectors. Progress made in developing centralized EWS data platforms for real-time observation and forecast visualization. Increased use of GIS and remote sensing for hazard mapping, flood monitoring, and impact assessment.

5. Regional Collaboration and Capacity Development

Active participation in MRC, WMO, ASEAN, RIMES, and CREWS regional platforms.

Joint technical training on flood forecasting, climate modeling, and IBF supported capacity-building for DoM and hydrology specialists.

Ongoing cross-border coordination with Lao PDR, Thailand, and Viet Nam on flood information exchange and Mekong flow monitoring.

6. Policy, Institutional Coordination, and Planning

Progress in aligning national EWS and climate services with national climate change strategies and DRM frameworks. Drafting and consultation on updated sectoral plans that integrate climate risk management (water, agriculture, urban planning). Strengthened governance structures for multi-hazard early warning and emergency response.

7. Support to Socio-Economic Resilience

Improved linkage between climate information and agricultural advisory services to reduce crop losses.

Promotion of climate-smart agriculture and water-saving technologies in drought-prone and flood-prone areas.

Social protection programs and livelihood recovery activities integrated with early warning information.

1. Project: CREWS 2.0

Title of the project: Strengthening Multi-Hazard Early Warning Systems and Climate Services in Cambodia (CREWS Cambodia–Lao PDR Project)

2. Hydrometeorological Focus

Title of the project: Enhancement of Meteorological, Hydrological and Climate Service Delivery for Disaster Risk Reduction in Cambodia

3. Disaster Risk Reduction Focus

Title of the project: Building Community Resilience through Improved Early Warning and Preparedness in Flood- and Drought-Prone Areas

4. Water Resource Management Focus

Title of the project: Integrated Flood and Drought Risk Management for the Mekong–Tonle Sap Basin in Cambodia

5. Capacity Development Focus

Title of the project: Capacity Strengthening for Impact-Based Forecasting and Early Action in Cambodia

6. Digital Transformation Focus

Title of the project: Development of a National Hydromet Data Platform for Real-Time Monitoring and Early Warning

Identified Opportunities and Challenges for Further Development or Collaboration - Cambodia

- **Opportunities**

a. Expansion of Multi-Hazard Early Warning Systems

Ongoing CREWS and regional WMO initiatives offer strong opportunities to modernize national forecasting, integrate impact-based forecasting (IBF), and expand community-level EWS coverage. Potential to scale digital platforms and real-time data networks nationwide.

b. Strengthened Regional Data Sharing

Enhanced collaboration with MRC, RIMES, ASMC, and RSMC Tokyo provides opportunities for more consistent hydrological and meteorological data exchange. Cross-border Mekong and storm-related monitoring can improve forecasting accuracy and lead-time.

c. Capacity Building and Technical Training

Opportunities exist for advanced training in NWP, hydrological modeling, GIS/remote sensing, radar interpretation, and climate services. Regional training platforms (WMO RTCs, ASEAN, UN agencies) can further develop national technical expertise.

d. Integration of Climate Services into Key Sectors

Agriculture, water management, health, and urban planning can benefit from tailored climate information. Strong opportunities to expand climate-smart agriculture and anticipatory action approaches.

- **Challenges**

1. Limited Coverage of Observation Networks

Gaps in meteorological and hydrological stations, especially in remote and upland regions, constrain real-time monitoring and flash-flood detection.

2. Data Integration and Inter-Agency Coordination

Challenges persist in linking data systems between MoWRAM, DoM, NCDM, MAFF, provincial authorities, and humanitarian partners. Lack of standardized data formats reduces operational efficiency.

3. Technical and Human Resource Constraints

Insufficient trained personnel in advanced forecasting, hydrological modeling, and system maintenance. High turnover and limited long-term training programs.

4. Funding and Sustainability

Continued reliance on external project financing makes long-term sustainability of hydromet improvements challenging. Maintenance of new equipment and digital systems requires stable recurrent budgets.

5. Community-Level Preparedness Gaps

- Variability in local capacity to interpret warnings and take early action.
- Rural and low-income communities remain highly vulnerable to flash floods and seasonal extremes.

6. Climate Change and Increasing Hazard Frequency

- Intensifying rainfall, prolonged wet seasons, urbanization, and expansion of high-risk settlements increase exposure.
- Need for long-term adaptation planning across sectors.

➢ **Areas for Future Collaboration**

- Joint regional flood and drought forecasting with MRC and neighboring NMHSs.
- Development of national impact-based forecasting protocols with WMO/CREWS support.
- Technical assistance for radar systems, satellite data utilization, and hydrological modeling.
- Strengthened multi-agency EWS governance, including standard operating procedures (SOPs) for early action.
- Pilot projects on community-based early warning, anticipatory action, and resilience building.

Priority Areas Addressed

- ➢ Enhancement of Early Warning Systems: Strengthening national forecasting capabilities, upgrading observation networks, and improving dissemination of timely and actionable warning messages to communities.
- ➢ Disaster Risk Reduction and Preparedness: Supporting capacity-building for provincial and local authorities, improving community awareness, and integrating risk information into planning processes.
- ➢ Hydro-Meteorological Data and Infrastructure Improvement: Expanding monitoring stations, enhancing data quality and availability, and promoting digitalization of hydrometeorology services.
- ➢ Climate Resilience and Adaptation: Advancing climate-resilient practices, supporting sectoral adaptation planning, and aligning with national climate strategies and NAP priorities.
- ➢ Regional and International Collaboration: Contributing to regional platforms, strengthening cooperation with WMO, ASEAN bodies, and development partners for knowledge exchange and joint initiatives.
- ➢ Capacity Development and Technology Transfer: Improving technical skills of staff through training, workshops, and adoption of modern forecasting tools, models, and GIS-based systems.

Key Pillars of UN's Early Warnings for All (EW4All) Initiative Addressed:

Key Pillars of EW4All	Please ✓ the related pillar(s)
Disaster risk knowledge and management	✓
Detection, observation, monitoring, analysis, and forecasting	✓
Warning dissemination and communication	✓
Preparedness and response capabilities	✓

Contact Information:

Member: Cambodia
Name of contact for this item: Dr. SETH VANNARETH
Telephone: (+855) 70761727
Email: sethvannareth2023@gmail.com

Appendix I - Priority Areas of Working Groups for the Strategic Plan 2022-2026

WG	Priorities
Integrated	1. Strengthen the cooperation between TRCG, WGM, WGH, and WGDRR to develop impact-based forecasts, decision-support and risk-based warning.
	2. Strengthen cross-cutting activities among working groups in the Committee.
	3. Enhance collaborative activities with other regional/international frameworks/organizations, including technical cooperation between TC/AP-TCRC and TC/PTC cooperation mechanism.
Meteorology	4. Enhance the capacity to monitor and forecast typhoon activities particularly in genesis, intensity and structure change.
	5. Develop and enhance typhoon analysis and forecast techniques from nowcast to medium-range, and seasonal to long-range prediction.
	6. Enhance and provide typhoon forecast guidance based on NWP including ensembles, weather radar and satellite related products, such as QPE/QPF.
	7. Promote communication among typhoon operational forecast and research communities in Typhoon Committee region.
	8. Enhance training activities with TRCG, WGH, and WGDRR in accordance with Typhoon Committee forecast competency, knowledge sharing, and exchange of latest development and new techniques.
	9. Enhance RSMC capacity to provide regional guidance including storm surge, in response to Member's needs.
Hydrology	10. Improve typhoon-related flood (including riverine flood, flash flood, urban flood, and coastal flood) monitoring, data collection and archiving, quality control, transmission, processing, and sharing framework.
	11. Enhance capacity in typhoon-related flood risk management (including land-use management, dam operation, etc.) and integrated water resources management and flood-water utilization.
	12. Strengthen capacity in effective flood forecasting and impact-based early warning, including hazard mapping and anticipated risk based on methodological and hydrological modelling, and operation system development.
	13. Develop capacity in projecting the impacts of climate change, urbanization and other human activities on typhoon-related flood disaster vulnerability and water resource availability.
	14. Increase capacity in utilization of advanced science and technology for typhoon-related flood forecasting, early warning, and management.
DRR	15. Provide reliable statistics of mortality and direct disaster economic loss caused by typhoon-related disasters for monitoring the targets of the Typhoon Committee.
	16. Enhance Members' disaster risk reduction techniques and management strategies.
	17. Evaluate socio-economic benefits of disaster risk reduction for typhoon-related disasters.
	18. Promote international cooperation of DRR implementation project.
	19. Share experience/knowhow of DRR activities including legal and policy framework, community-based DRR activities, methodology to collect disaster-related information.