MEMBER REPORT

SOCIALIST REPUBLIC OF VIET NAM

ESCAP/WMO Typhoon Committee

20th Integrated Workshop

Macao, China

02-05 December 2025

CONTENTS

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

During January - November 2025, there were 14 tropical storms (TSs) and 05 tropical depressions (TDs) to make 19 tropical cyclones active in the BienDong Sea. The trajectories of these tropical cyclones are shown in the Figure 1.1. The year 2025 was marked by numerous strong typhoons and successive tropical depressions, causing major losses in human life, housing, crops, and infrastructure. The United Nations described it as a season with "more typhoons than usual" and issued a large-scale humanitarian response plan.

There was a clear pattern of compound disasters: floods, rain on saturated ground, landslides, and prolonged inundation. Several typhoons arrived in close succession, striking areas that had not yet recovered from previous storms. The regions hit hardest were the Northern Region (Hanoi, Thai Nguyen, Lang Son…), the North Central Region (Thanh Hoa, Nghe An, Ha Tinh, Quang Tri), and the Central Highlands (Gia Lai, Dak Lak)—with the main impact areas varying depending on each typhoon.

Economic losses were estimated at several trillion VND (approximately 200 – 600 million USD) per major storm (for example: Matmo ~ US$300 million, Kalmaegi ~ US$300 million, Bualoi ~ US$300-600 million), indicating extremely large impacts on reconstruction and government support needs.

1. Meteorological Assessment

Among the 19 tropical cyclones (TCs) active so far, six of them made landfall in Vietnam. These consisted of one tropical depression (TD) in August and five tropical storms (TSs). Tropical Storm FENGSHEN (2524) weakened into a low-pressure system as it approached the central coast of Vietnam and therefore is not included.

Vietnam has experienced a variety of severe weather phenomena this year, particularly in the central region. Notably, the highest national one-day rainfall record was broken, with 1,739.6 mm observed at the Bach Ma station from 12 UTC on 26 October to 12 UTC on 27 October 2025.

In terms of tropical cyclones, typhoon (TY) BUALOI (2520) moved at an unusually fast speed of approximately 35 km/h over the Vietnam East Sea before affecting the North-Central region of Vietnam with a prolonged strong wind and gust, causing significant damage. Moreover, the TY. KALMAEGI

(2525) was the strongest storm to make the landfall over the Gia Lai – Dak Lak region in recent years.

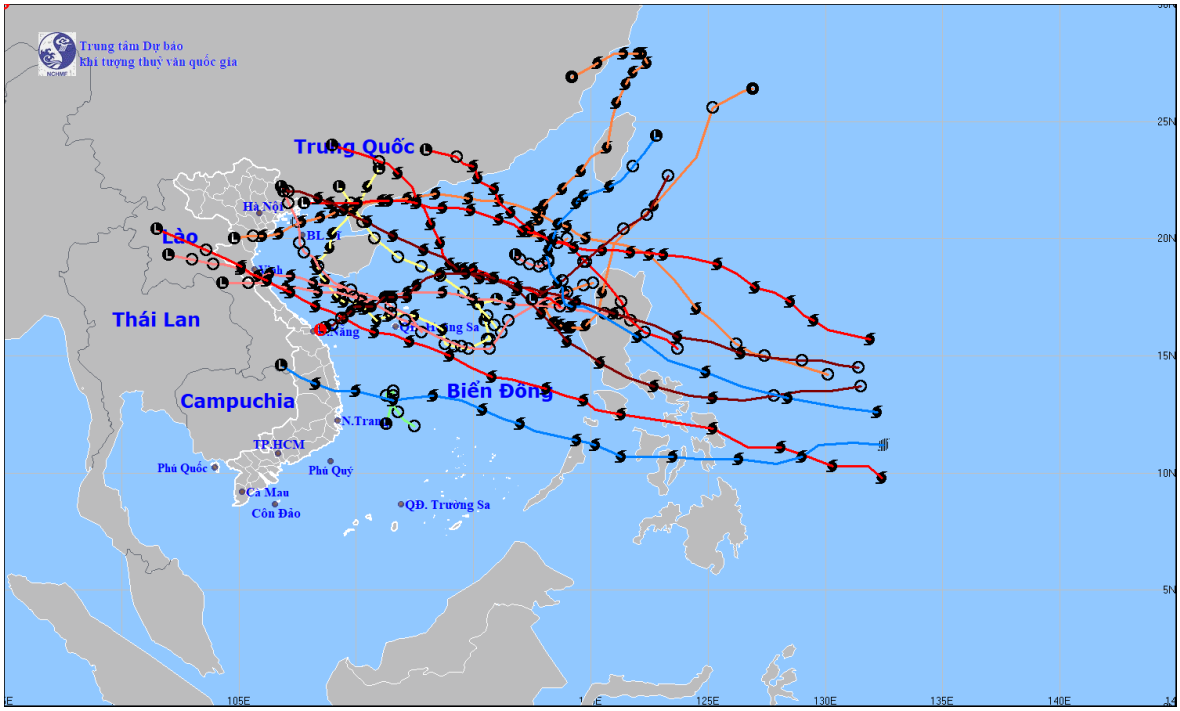


Figure 1.1. Tropical cyclone trajectories in the BienDong Sea during January – November 2025.

Following are detail information of tropical cyclones making the landfall over the Vietnam region this year, including the minimum sea-level pressure, maximum sustained wind, peak gust, and rainfall distribution observed at synoptic and automatic stations.

Table 1.1. Minimum sea-level pressure, maximum sustained wind, peak gust and rainfall distribution observed at synoptic and automatic stations over the Vietnam region for the STS. WIPHA (2506)

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48834	CO TO	980.8	00h20/22/7	22	SE	00h26/22/7	29	01h00/22/7	From July 21 to the night of July 22: The midland, delta, and coastal areas of Northern Vietnam, along with Hòa Bình and southern Sơn La, experienced moderate to heavy rain, with some places seeing very heavy rainfall. Rainfall amounts were generally 70–150 mm, with some locations over 200 mm. The Thanh Hóa and Nghệ An regions had heavy
48838	MONG CAI	984.7	17h18/21/7	15	SE	03h10/22/7	23	20h30/21/7, 22h00/21/7	
48/50	QUANG HA	985.6	19h30/21/7	13	NE	22h13/21/7	18	01h00/22/7	
48837	TIEN YEN	985.7	20h30/21/7	15	N	23h42/21/7	23	00h00/22/7, 01h00/22/7	
48836	CUA ONG	982.3	00h45/22/7	24	N	22h47/21/7	34	23h30/21/7, 01h00/22/7	
48833	BAI CHAY	982.1	01h32/22/7	21	N	01h01/22/7	26	01h00/22/7	
48/60	UONG BI			14	E	15h40/22/7	18	04h00/22/7, 07h00/22/7	
48826	PHU LIEN	982.8	04h30/22/7	15	E	04h21/22/7	20	04h30/22/7, 05h00/22/7, 07h00/22/7	
	CAT BA		20h40/21/7	12		20h40/21/7	20	20h40/21/7	
48839	BACH LONG VI	984.4	01h30/22/7	27	SW	01h59/22/7	33	04h00/22/7, 07h00/22/7	

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48828	HON DAU	980.8	03h45/22/7	22	SE	14h44/22/7	25	15h00/22/7, 16h00/22/7	to very heavy rain, with widespread totals of 150–350 mm, and some places over 400 mm
48/59	CHI LINH			10	N	05h25/22/7	13	00h30/22/7, 01h0/22/7, 04h00/22/7 - 05h30/22/7, 07h00/22/7,10h00 /22/7, 13h00/22/7, 16h00/22/7, 19h00/22/7	
48827	HAI DUONG	986	05h30/22/7	14	NE	15h05/22/7	17	15h30/21/7, 16h00/22/7, 19h00/22/7	
48/53	HIEP HOA			11	NE	11h45/22/7			
48/55	LUC NGAN	991.9	03h00/22/7	9	N	02h35/22/7	15	00h00/22/7	
48/56	SON DONG	988.4	01h30/22/7	9	N	00h20/22/7	12	00h30/22/7	
48809	BAC GIANG	990.1	04h00/22/7	8	N	10h55/22/7	13	11h00/22/7, 11h30/22/7	
48/54	BAC NINH	987.7	04h00/22/7	11	N	10h58/22/7	15	11h00/22/7, 11h30/22/7, 13h00/22/7	
48823	NAM DINH	984	5h10/22/7	11	NW	10h32/22/7	17	04h30/22/7, 05h00/22/7, 07h00/22/7, 13h00/22/7	
48829	VAN LY	983.1	05h42/22/7	19	SW	14h29/22/7	25	14h30/22/7, 16h00/22/7, 19h00/22/7	
	HA NAM		05h40/22/7	11		05h40/22/7	15	05h40/22/7	
48832	NHO QUAN	985.6	01h00/22/7	15	NW	04h45/22/7	20	05h00/22/7	
48824	NINH BINH	982.9	14h00/22/7	10	NW	10h40/22/7	21	09h00/22/7, 10h00/22/7, 13h00/22/7	
48/65	CUC PHUONG	986.2	01h00/22/7	9	NW	13h16/22/7	13	13h30/22/7, 16h00/22/7, 19h00/22/7	
48835	THAI BINH	981.8	04h25/22/7	17	NW	04h25/22/7	22	05h00/22/7, 07h00/22/7	
	THAI THUY		14h40/22/7	15.3		14h40/22/7	21.4	14h40/22/7	
48822	HUNG YEN	984.8	05h30/22/7	10	NW	06h10/22/7	17	06h30/22/7, 07h00/22/7	
48819	HOAI DUC	988.3	04h30/22/7	9	N	15h34/22/7	14	16h00/22/7, 19h00/22/7	
48825	HA DONG	988.6	04h00/22/7	8	NW	08h35/22/7	14	09h00/22/7, 10h00/22/7, 13h00/22/7	
48/68	SAM SON	986.8	09h25/22/7	10	N	09h28/22/7	18	09h30/22/7, 10h00/22/7	
48840	THANH HOA	987.1	12h59/22/7	9	W	12h34/22/7	16	13h00/22/7	
48/70	NHU XUAN	988.6	16h40/22/7	15	W	12h40/22/7	21	13h00/22/7	
48/66	NGA SON	985.8	12h30/22/7	12	SE	18h58/22/7	16	19h00/22/7	
48/77	QUYNH LUU	990.2	16h25/22/7	10	W	10h19/22/7	13	07h00/22/7, 08h30/22/7, 10h30/22/7, 11h00/22/7	
48/81	HON NGU	991.2	15h45/22/7	13	SW	09h52/22/7	16	10h00/22/7, 13h00/22/7	

Table 1.2. Same as Table 1 but for the Tropical Depression in August

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48834	CO TO	1002.2	02h53/19/8	12	E	14h38/18/8	18	01h00/19/8	From the night of August 15 to August 18: The area from Thanh Hóa to Hà Tĩnh and the southern part of the Red River Delta: generally 70–170 mm, with some locations over 250 mm. From August 18 to the morning of August 19: The Northeast region of Northern Vietnam and other areas in the Red River Delta: 40–100 mm, with certain locations over 120 mm.
48838	MONG CAI	1003.2	02h00/19/8	8	SW	08h35/19/8	12	08h30/19/8, 09h00/19/8,	
48836	CUA ONG	1000.6	02h40/19/8	12	NE	21h35/18/8	13	23h00/18/8, 01h00/19/8	
48839	BACH LONG VI	1000.9	20h30/18/8	15	W	07h28/19/8	18	07h30/19/8, 08h00/19/8	

Table 1.3. Same as Table 1 but for TS. NONGFA (2514)

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48/66	NGA SON	1003.7	14h40/30/8	11	NE	14h40/30/8	17	13h30/30/8, 16h00/30/8, 19h00/30/8	From the evening of August 29 to the morning of August 31: The Red River Delta, southern Phú Thọ, and the area from Thanh Hóa to Huế City: generally 50–100 mm, with some locations over 120 mm. The region from southern Nghệ An to Quảng Trị: 150–250 mm, and some places over 300 mm.
48/68	SAM SON	1002.6	13h40/30/8	17	SE	13h40/30/8	17	14h00/30/8, 16h00/30/8	
48/72	TINH GIA	1002.9	13h55/30/8	9	E	13h30/30/8	15	13h30/30/8	
48/77	QUYNH LUU	1001.9	14h50/30/8	14	E	14h55/30/8	18	16h00/30/8	
48/81	HON NGU	1000.6	15h20/30/8	16	N	12h08/30/8	21	12h00/30/8, 13h00/30/8, 16h00/30/8	
48845	VINH	999.6	15h00/30/8	8	E	11h59/30/8	16	12h00/30/8, 13h00/30/8	
48846	HA TINH	998	14h43/30/8	9	N	08h20/30/8	15	08h30/30/8	
48/73	HOANH SON	998.9	13h32/30/8	13	N	10h15/30/8	16	07h00/30/8, 10h00/30/8	
48/86	KY ANH	999.3	13h35/30/8	11	N	08h36/30/8	21	07h00/30/8	
48847	BA DON	1000.5	13h40/30/8	13	N	09h39/30/8	13	10h30/30/8	
48/89	CON CO	1000.9	04h47/30/8	14	W	09h07/30/8	19	10h00/30/8, 13h00/30/8	

Table 1.4. Same as Table 1 but for TY. BUALOI (2520)

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48834	CO TO	1005	01h30/29/9	18	SE	06h51/29/9	26	19h00/28/9	From the night of

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/ DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/ MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/M M GMT+7)	Rainfall Distribution
48838	MONG CAI	1007.2	09h53/29/9	11	E	09h53/29/9	14	08h30/29/9, 09h30/29/9 - 10h30/29/9,13h00 /29/9	September 26 to 28, the area from Huế City to Đà Nẵng: 200–450 mm, with some places over 500 mm. From the night of September 26 to 29, Hà Tĩnh - Quảng Trị: 200–400 mm of rainfall, with some locations over 450 mm. From the night of September 26 to the night of September 29, Thanh Hóa - Nghệ An recorded 350–500 mm, with some places over 600 mm. From September 28 to the night of September 30, Northern Vietnam: 100–200 mm, with some places over 250 mm; specifically, Phú Thọ, southern Sơn La, Lào Cai, Tuyên Quang, Thái Nguyên, and Hà Nội had 150–350 mm, with some locations over 450 mm.
48833	BAI CHAY	1004	04h07/29/9	17	NE	17h41/28/9	21	18h00/28/9, 19h00/28/9	
48837	TIEN YEN	1005.7	02h00/29/9	12	E	10h14/29/9	18	02h00/29/9, 04h00/29/9, 07h00/29/9,	
48/60	UONG BI			11	E	23h57/28/9	13	01h00/29/9	
48836	CUA ONG	1005.2	04h30/29/9	13	N	01h11/29/9	16	17h30/28/9, 19h00/28/9, 01h30/29/9, 04h00/29/9	
48839	BACH LONG VY	1002.7	02h03/29/9	17	E	12h27/28/9	23	12h30/28/9, 13h00/28/9	
48828	HON DAU	1002.1	04h10/29/9	19	E	10h25/29/9	25	06h00/29/9, 07h00/29/9, 09h00/29/9, 10h00/29/9, 13h00/29/9	
48835	THAI BINH	1000.9	03h20/29/9	12	SE	11h33/29/9	20	04h30/29/9, 07h00/29/9	
48829	VAN LY	999.4	05h20/29/9	28	E	05h27/29/9	32	05h30/29/9, 07h00/29/9	
48/67	YEN DINH	998.8	03h30/29/9	14	SE	09h20/29/9	23	09h30/29/9, 10h00/29/9, 13h00/29/9	
48/66	NGA SON	998.6	04h00/29/9	15	SE	12h46/29/9	22	07h00/29/9	
48/68	SAM SON	996.9	02h55/29/9	13	SE	02h10/29/9	21	04h30/29/9, 07h00/29/9	
48/69	BAI THUONG	998	04h40/29/9	12	E	09h05/29/9	28	13h00/29/9	
48840	THANH HOA	998.2	03h00/29/9	11	NE	03h04/29/9	22	10h00/29/9	
48/70	NHU XUAN	997.6	04h55/29/9	14	SE	07h47/29/9	22	10h00/29/9	
48/72	TINH GIA	996.4	04h00/29/9	13	SE	07h50/29/9	23	07h00/29/9 - 08h00/29/9	
48/74	QUY CHAU	997.5	06h20/29/9	11	E	09h09/29/9	18	09h30/29/9 - 10h00/29/9	
48/75	QUY HOP	993.6	06h40/29/9	12	SW	09h15/29/9	26	10h00/29/9	
48/79	CON CUONG	989.1	08h30/29/9	12	E	08h20/29/9	23	08h30/29/9	
48/77	QUYNH LUU	992.9	04h28/29/9	22	SE	06h23/29/9	31	06h30/29/9	
	DIEN CHAU			30.2		05h00/29/9	39,7	05h00/29/9	
48/80	DO LUONG	986.3	06h00/29/9	16	SW	06h30/29/9	27	07h00/29/9	
48/81	HON NGU	984.1	03h58/29/9	34	E	04h16/29/9	42	04h30/29/9, 07h00/29/9	
48839	VINH	980.5	03h50/29/9	16	SE	03h57/29/9	31	07h00/29/9	
48/82	HUONG SON	979.3	05h02/29/9	10	W	05h00/29/9	20	03h30/29/9, 04h00/29/9, 07h00/29/9	
48846	HA TINH	976.4	01h55/29/9	17	N	00h49/29/9	30	01h00/29/9	
48/84	HUONG KHE	982.1	02h15/29/9	18	NW	01h55/29/9	26	02h00/29/9, 04h00/29/9, 07h00/29/9	
48/73	HOANH SON	975.5	22h45/28/9	32	N	20h49/28/9	44	21h00/28/9, 22h00/28/9, 01h00/29/9, 04h00/29/9	
48/86	KY ANH	976.3	00h05/29/9	25	N	22h17/28/9	36	22h30/28/9, 01h00/29/9	

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
	KY ANH (KS)			26.5		22h50/28/9	41.4	22h50/28/9	
48/87	TUYEN HOA	985.7	00h32/29/9	11	W	02h50/29/9	21	03h00/29/9	
48848	DONG HOI	985.8	21h30/28/9	15	SW	21h21/28/9	26	22h30/28/9	
48847	BA DON	978.7	22h10/28/9	18	W	23h51/28/9	29	00h00/29/9 - 01h00/29/9	
	TIEN PHONG			25.1		21h10/28/9	39.2	21h10/28/9	
48/89	CON CO	981.5	16h30/28/9	25	SW	18h36/28/9	31	19h00/28/9	
48/85	LY SON	995	04h45/28/9	17	S	10h29/28/9	20	07h29/28/9, 10h00/28/9-11h30/28/9, 19h00/28/9	

Table 1.5. Same as Table 1 but for TY. MATMO (2521)

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48834	CO TO	998.1	02h14/06/10	13	W	04h03/06/10	25	07h00/06/10	From the night of October 5 to the night of October 7: Northeastern region of Northern Vietnam, southern Tuyên Quang (old Tuyên Quang), Thái Nguyên, and Hà Nội experienced heavy to very heavy rain with widespread totals of 150–250 mm, some places over 300 mm. Other areas in Northern Vietnam and Thanh Hóa had moderate to heavy rain, with some places experiencing very heavy rain, and typical amounts of 70–120 mm, with certain locations over 150 mm.
48838	MONG CAI	993.9	01h50/06/10	11	W	02h25/06/10	15	04h00/06/10, 07h00/06/10	
48836	CUA ONG	998.7	03h30/06/10	11	NW	21h13/05/10	14	21h30/05/10, 22h00/05/10, 04h30/06/10, 07h00/06/10	
48839	BACH LONG VY	1000.2	03h35/06/10	18	SW	05h02/06/10	23	20h30/05/10, 22h00/05/10, 01h00/06/10	
48826	PHU LIEN	1000	02h30/06/10	11	N	05h11/06/10	14	21h30/05/10, 22h00/05/10, 01h00/06/10, 05h30/06/10	
48/46	MAU SON			14	NE	19h00/05/10	19	19h00/05/10	

Table 1.6. Same as Table 1 but for TY. KALMAEGI (2525)

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM/DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48849	DONG HA	1004.9	02h27/07/11	11	N	01h49/07/11	15	02h00/07/11	From November 6–7: Hà Tĩnh to Lâm Đồng: moderate to heavy rain; some places had very heavy
48/94	TRA MI	1001.9	20h30/06/11	15	SE	20h40/06/11	15	22h00/06/11	
48/85	LY SON	1000.9	16h05/06/11	20	N	13h51/06/11	26	16h00/06/11, 19h00/06/11	
48/95	BA TO	993.5	17h00/06/11	14	NE	18h40/06/11	17	19h00/06/11	

Station Code	Station Name	Minimum Sea-level Pressure (hPa)	Time Observed (HHhMM /DD/MM GMT+7)	Maximum Sustained Wind (2 min. ave.) m/s	Direction	Time Observed (HHhMM/DD/MM GMT+7)	Peak Gust (m/s)	Time Observed (HHhMM/DD/MM GMT+7)	Rainfall Distribution
48861	DAK TO	994.7	22h50/06/11	16	NE	23h44/06/11	18	00h00/07/11, 01h00/07/11	rainfall of 50–100 mm, with certain locations over 150 mm. Quảng Ngãi to Đắk Lắk: heavy to very heavy rain; widespread amounts of 100–200 mm, with some places over 250 mm. From the night of November 7 to the night of November 8: Thanh Hóa–Nghệ An: moderate to heavy rain, with some localized areas experiencing very heavy rainfall.
48/96	HOAI NHON	996.6	27h30/06/11	16	E	20h31/06/11	24	20h30/06/11, 21h00/06/11, 22h00/06/11, 01h00/07/11	
	HOAI NHON DONG			20.6		17h30/06/11	30.2	17h30/06/11	
	PHU CAT			24.3		18h20/06/11	40.6	18h20/06/11	
48864	AN NHON	973.2	20h00/06/11	30	N	18h29/06/11	44	18h00/06/11, 19h00/06/11	
48870	QUY NHON	967	19h05/06/11	30	SE	18h05/06/11	39	20h30/06/11, 22h00/06/11, 01h00/07/11	
48867	AN KHE			22	S	22h30/06/11	25	23h00/06/11, 01h00/07/11	
48868	YALY	990.7	06h00/07/11	11	SW	23h20/06/11			
48872	AYUNPA			26	W	20h12/06/11	26	20h30/06/11	
48/97	SON HOA	987.6	18h30/06/11	18	W	18h50/06/11	28	19h00/06/11, 01h00/07/11	
48873	TUY HOA	988.7	17h35/06/11	16	SW	19h01/06/11	24	19h30/06/11, 22h00/06/11, 01h00/07/11	
48876	EAHLEO			13	NW	21h25/06/11			
48878	BUON HO	999.6	20h10/06/11	11	SW	21h05/06/11			
48/98	M DRAK	997.2	01h00/07/11	18	SW	17h54/06/11	26	19h00/06/11	
48869	EAKMAT			12	SW	18h50/06/11	14	19h00/06/11	

2. Hydrological Assessment

The 2025 flood season is characterized by unusual and extreme storm-induced rainfall and flooding in Vietnam. In total of 13 tropical storms (TS) came into the East Sea (as the time of reporting), the most typically affected to Viet Nam named Wutip, Wipha, Kajiki, Bualoi, Matmo and Kalmaegi.

The most serious abnormality was the disaster from June 11 to 14, 2025 due to the impact of storm No. 1 (Wutip) - the first storm was formed in the East Sea in June after more than 40 years in history. The storm did not make landfall directly into Viet Nam, but its circulation caused exceptionally heavy rainfall from South of Ha Tinh to Da Nang provinces, with total rainfall of 250-550mm, many places exceeding 800mm such as: at Bach Ma station (Hue city) reached 1,203mm/3 days - the highest in June's history. Up to 32 rain gauges were recorded total rainfall exceeding 200mm/6 hours, of which Loc Tri station (Hue city) was recorded 319.4mm/6 hours (a rare extreme value). The storm circulation caused major floods on rivers from Quang Tri to Quang Nam from June 12 to 14, the flood peak on rivers from Quang Tri to

Quang Nam was at Alarm Level (AL)1-AL2; water levels on Kien Giang and Thach Han rivers (Quang Tri), Bo (Hue City) are at AL3 (flood stage) and above AL3 - the highest flood level in the same period in the past 30 years. This is a historic disaster, clearly demonstrating the seasonal shift and increasing extreme intensity of weather and climate in Vietnam.

Two continuous tropical storm appearrances named Bualoi and Matmo during the end of September and the first week of October were the main causes of terrible floods with flood peaks on many rivers in the North and Central provinces reaching new historical flood levels and great damage to human life.

In 2025, the prominent disaster situation related hydrology in Vietnam can be summarized as:

- Major flood is a typical disaster of the year, mainly caused by storms, storm circulations and combinations of extreme weather patterns. Many provinces in the North and Central of Vietnam have been faced serious damage to people's lives and property.

- Flash floods, landslides in mountainous and highland areas, flooding in low-lying plains and urban areas are most dangerous hydrological phenomena.

- The saline intrusion in the Mekong delta area always occurs in every dry season. The severity of saline intrusion will depend on the situation of the upstream Mekong flow.

2.1. Flood, flash flood and landslide

2.1.1. Flood situation

a) Flood event by TS Wutip effect:

Due to the influence of the circulation of storm Wutip, a large flood occurred on rivers from South of Quang Tri to Quang Nam provinces from June 11-14, which is considered abnormal phenomenon in history and rarely seen in the same period in the observed statistical data series. The Figure 1.3 shows a total of rainfall and rainfall distribution in the Central provinces of Viet Nam from 10^{th} to 14^{th} June. As a result of this flood event, flooding, flasflood, landslides occurred in many places, causing damage to the provinces of Nghe An, Ha Tinh, Quang Binh, Quang Tri, Hue, Da Nang, and Quang Nam as follows:

- People: 09 people died (in which 04 in Quang Binh province, 03 in Quang Tri and 02 in Hue City).

- Housing: 05 houses collapsed; 94 houses damaged.

- Agriculture: 59,988 hectares of rice and crops flooded (Nghe An 426 hectares, Quang Binh 13,436 hectares, Quang Tri 25,372 hectares, Hue 18,853 hectares, Da Nang 1,901 hectares).

- Aquaculture: 2,341 hectares of aquaculture damaged; 324 aquatic cages and rafts damaged.

- Boats: 08 boats sank and damaged.

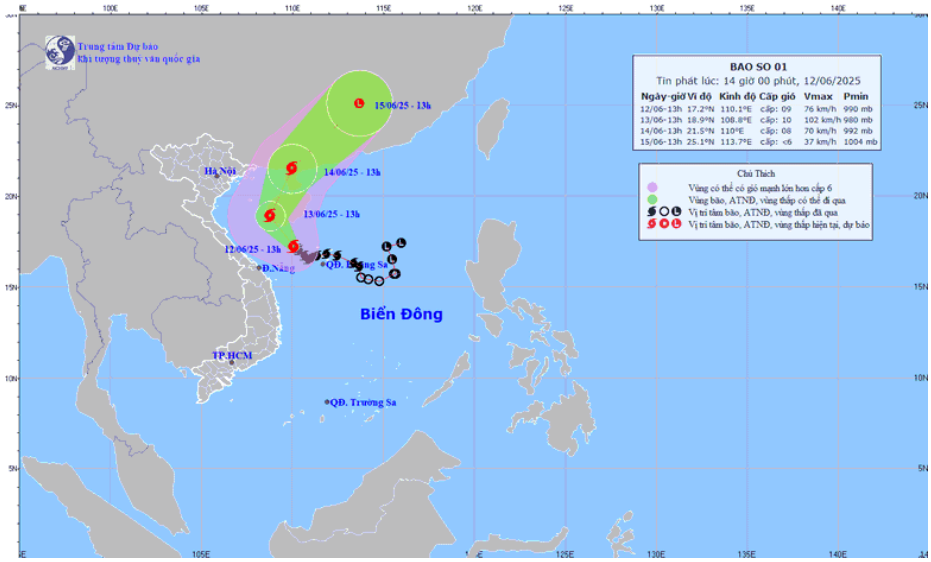


Figure 1.2. The track of the TS Wutip

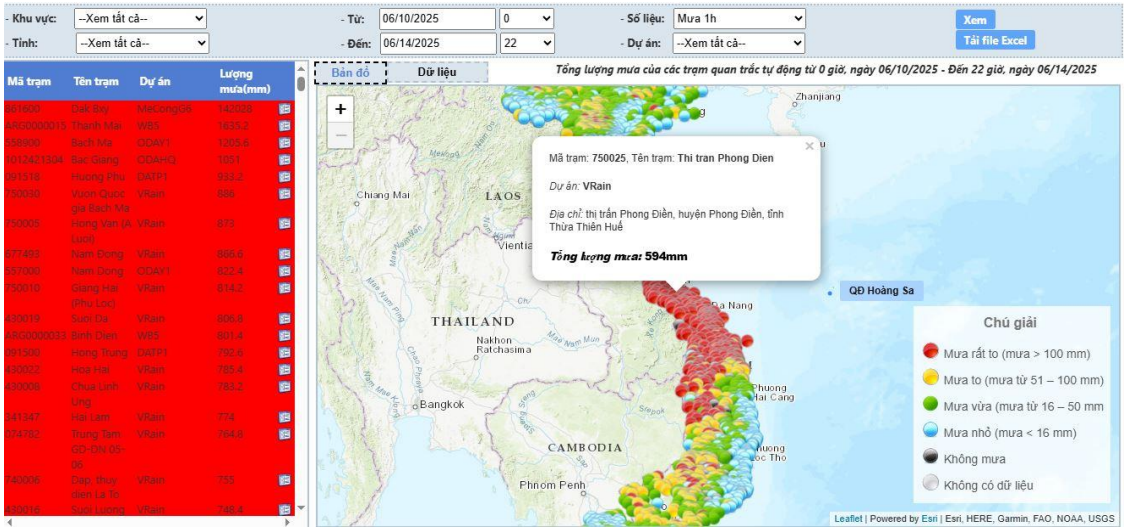


Figure 1.3. Total rainfall from 10th to 14th June 2025 in the Central provinces of Viet Nam during TS Wutip occurrence

b) Flood event by TS Wipha effect:

Due to the circulation of TS Wipha, from 21 to 27 July, a major flood occurred on rivers in Thanh Hoa and Nghe An provinces with flood peaks at

many stations exceeding AL3, of which at some stations were recorded historical flood levels (HF):

- On Ma and Chu rivers (Thanh Hoa), flood peaks at upstream stations were generally at AL1-AL2, and downstream stations were below AL1.

- On Ca river (Nghe An), an exceptionally large flood occurred in the upstream area, with flood peak levels above AL3, at some stations exceeding HF such as:

+ The flood peak at Muong Xen station was 145.89m, above BĐ3 3.89m (above the historical flood level in 2011 by 0.50m).

+ The flood peak at Tuong Duong station was 76.13m, above BĐ3 7.13m (above the historical flood level in 2018 by 4.30m).

+ The flood peak at Con Cuong station was 34.20m, above BĐ3 3.70m (above the historical flood level in 1975 by 1.66m).

+ The flood peak at Dua station is 24.64m, 0.14m above BĐ3 (0.33m lower than the historical flood level in 1988).

Table 1.7. Flood characteristics on main rivers in Thanh Hoa, Nghe An provinces caused by the TS Wipha

No	Province	River	Station	Time of flood peaks	Flood peaks (m)	Compared with AL	Compared with HF
1	**Nghe An**	**Ca**	Muong Xen	01h/23/7	145.89	**> AL3: 3.89m**	**> HF: 0.5m**
2			Tuong Duong	08h/23/7	76.13	**>AL3: 7.13m**	**> HF: 4.30m**
3			Con Cuong	14h/23/7	34.20	**>AL3: 3.70m**	**> HF: 1.66m**
4			Dua	07h/24/7	24.64	**>AL3: 0.14m**	**< HF: 0.33m**
5			Đo Luong	13h/24/7	17.02	>AL2: 0.52m	
6			Yen Thuong	01h/25/7	7.62	<AL2: 0.38m	

Note: Alarm Level 2 – AL2: defined as warning stage

Alarm Level 3 – AL3: defined as flood stage

As a result of TS Wipha by local government reports, losses of people and poverty are summerized on July 26 as follows:

- People: 03 dead; 02 missing; 05 injured.

- Housing: 377 houses collapsed; 1,441 damaged or roof blow up.

- Agriculture: 47,597 hectares of rice and crops damaged; 8,474 hectares of fruit trees, forest trees were damaged.

- Livestock: 1,298 cattle and 69,798 poultry died or swept away.

- Aquaculture: 660.8 hectares of aquaculture area, 239 cages damaged.

- Education: 25 schools damaged.

- Traffic: 709 traffic locations were eroded; 23 traffic bridges, spillways, and suspension bridges swept away.

- Irrigation: 9,670m of canals, 180m of embankments were eroded.

- Industry: 170 electric poles, 02 transformer stations were damaged.

- Health: 06 medical centers flooded and damaged.

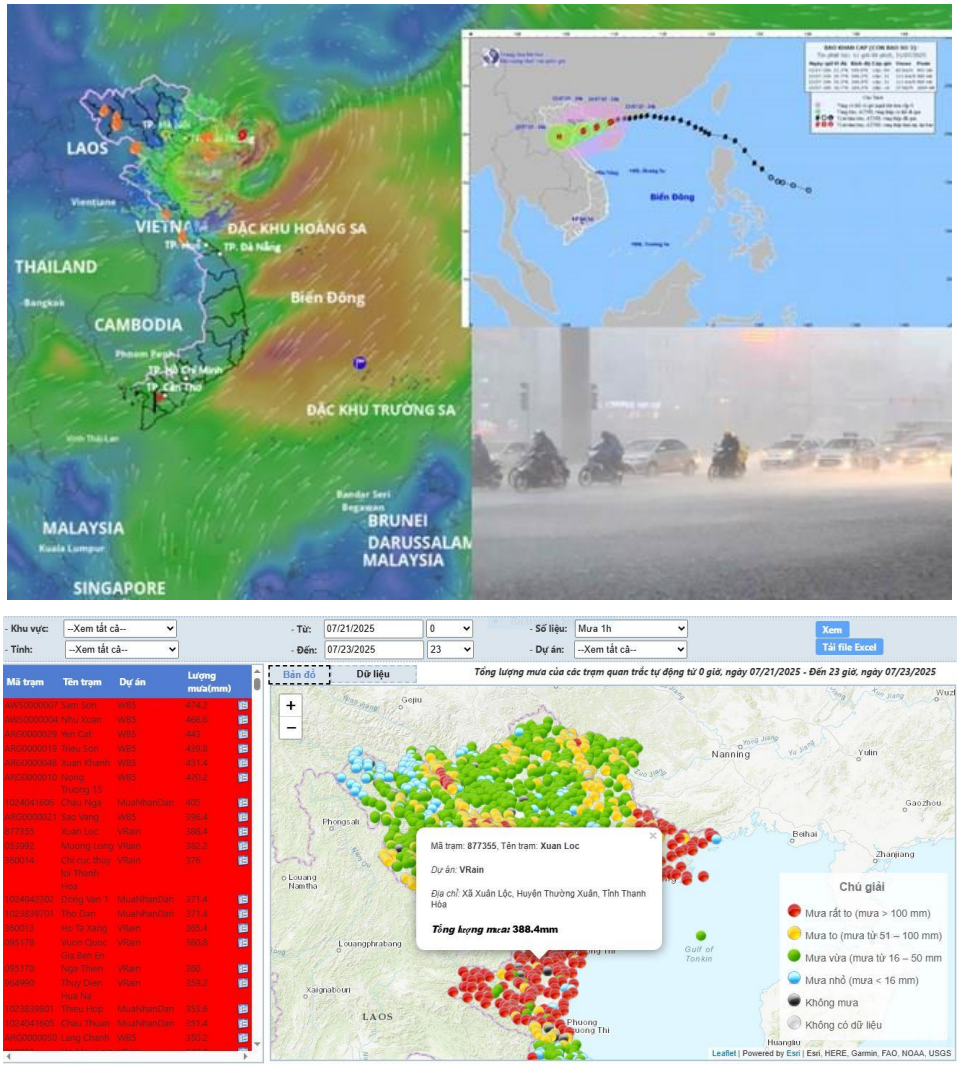


Figure 1.4. Storm Wipha (from 21st to 27th July 2025)

Figure 1.5. Flooding in Thanh Hoa and Nghe An provinces

c) Flood event by TY Kajiki effect:

Typhoon Kajiki formed over the East Sea in late August 2025, rapidly intensifying into a powerful typhoon that skirted Hainan Island before making landfall in Vietnam's Ha Tinh and Nghe An provinces. A significant characteristic of Kajiki was its unusually slow movement over land, leading to widespread and heavy rainfall that extended as far north as Hanoi and causing extensive damage and flooding. The storm's unusual trajectory, rapid intensification, and prolonged presence over land presented significant challenges to forecasting models and authorities, resulting in widespread damage across Vietnam.

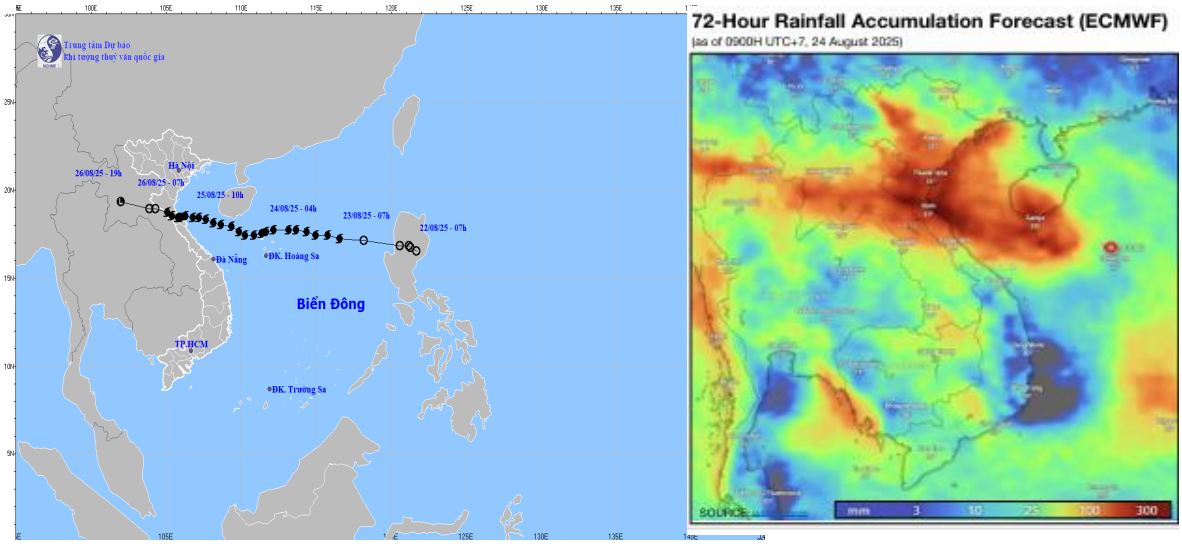


Figure 1.6. TY Kajiki track by NCHMF and accumulated rainfall in 72 hrs forecast by ECMWF

The consequences of TY Kajiki, major floods occurred in many river basins in the Northern part and Central provinces as Thanh Hoa, Nghe An, Ha Tinh, Quang Tri from August 25 to 28 with the following specific situation summarized in Table 1.8:

- On Thao rivers (Lao Cai), flood peaks at upper, middle part stations were over AL3, and downstream stations were below AL1.

- On Hoang Long river (Ninh Binh), flood peak at downstream station was over AL3.

- On main rivers from Thanh Hoa to Ha Tinh, flood peaks at stations on Buoi river, upper part of Ma and Chu rivers were record the waterl level above AL3; flood peaks at stations on Ngan Pho river (Ha Tinh), lower part of Chu, Ca rivers were at level between AL1 and AL2.

Table 1.8. Flood characteristics on main rivers in the Northern and North of Central provinces caused by the TY Kajiki from the 25th to the 28th August

No	Province	River	Station	Time of flood peaks (hh/dd/mm)	Flood peaks (m)	Compared with AL
1	**Lao Cai**	**Thao**	Yen Bai	01h/27/8	32.32	**> AL3: 0.32m**
2		**Ngoi Thia**	Ngoi Thia	13h/26/8	46.59	**>AL3: 0.09m**
3		**Ngoi Hut**	Ngoi Hut	16h/26/8	55.06	**>AL3: 0.56m**
4	**Bac Ninh**	**Cam Dan**	Cam Dan	10h/26/8	45.95	**>AL3: 0.95m**
5		**Luc Nam**	Chu	18h/26/8	12.24	>AL2: 0.24m
6			Luc Nam	01h/27/8	5.36	>AL2: 0.06m
7	**Thanh Hoa**	**Buoi**	Thach Quang	04h/27/8	17.34	**>AL3: 1.34m**
8			Kim Tan	21h/27/8	13.27	**>AL3: 1.27m**
9		**Ma**	Hoi Xuan	15h/26/8	64.43	**>AL3: 0.43m**
10			Cam Thuy	23h/26/8	21.52	**>AL3: 1.32m**
11			Ly Nhan	06h/27/8	11.89	<AL3: 0.11m
12			Giang	06h/27/8	6.62	**>AL3: 0.12m**
13		**Chu**	Cua Dat	21h/25/8	31.90	**>AL3: 0.9m**
14			Bai Thuong	12h/26/8	18.84	**>AL3: 0.84m**
15			Xuan Khanh	16h/26/8	10.32	<AL2: 0.08m
16	**Nghe An**	**Ca**	Muong Xen	22h/26/8	140.52	>AL2: 0.52m
17			Con Cuong	08h/26/8	31.21	**>AL3: 0.71m**
18			Dua	19h/26/8	22.36	<AL2: 0.14m

Beside, this flood event has caused many flash floods, landslides. Based on local goverment reports as of August 28, the economic and human losses occurring in the provinces of Vietnam are summarized as follows:

- People: 06 died; 02 missing; 47 injured.
- Housing: 34 houses collapsed; 31,161 damaged or roof blow up; 11,912 under water or flooding.
- Agriculture: 104,984 hectares of rice were damaged; 14,049 hectares of crops; 10,352 hectares of fruit trees.
- Livestock: 61,830 cattle and poultry killed or swept away.
- Aquaculture: 4,871 hectares flooding, 274 cages were damaged.
- Irrigation and dyke system: 5,375m of canals were eroded and washed away; 2,710m of river bank were damaged;
- Traffic: 667 traffic locations were eroded; 06 spillways, 13 traffic bridges, many suspension bridges were broken or washed away.
- Ship and boat: 102 ships and boats sunk and broken.
- Electric: 3,520 electric poles broken.
- Others: 164,876 broken trees; 21,670 hectares of forest and industrial crops damaged.

d) Flood event by TS Bualoi effect:

Due to the influence of the tropical convergence zone (ITCZ) after being affected by the circulation of TS Bualoi, very heavy rainfall occurred in many provinces in Northern part and from Thanh Hoa to Da Nang provinces concentrated from the 26th to the 30th September and a major flood occurred on rivers in Northern part and in the Thanh Hoa, Nghe An, Ha Tĩnh provinces from the 27th September to the 02sd October.

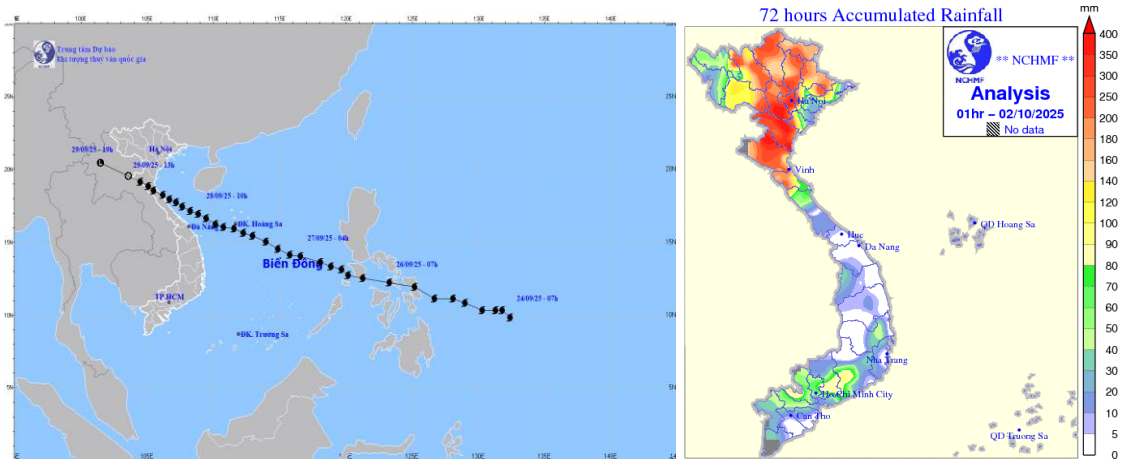


Figure 1.7. TS Bualoi track and accumulated rainfall in 72 hrs by NCHMF

In this flood event, flood peaks at many stations exceeding AL3, of which at some stations were recorded historical flood levels (HF) mentioned in the Table 1.9.

Table 1.9. Flood characteristics on main rivers in the Northern and North of Central provinces caused by the TS Bualoi from the 27th September to the 2sd October

No	Province	River	Station	Time of flood peaks (hh/dd/mm)	Flood peaks (m)	Compared with AL
1	**Phu Tho**	**Da**	Hoa Binh reservoir inflow	21h/29/9	11247 (m3/s)	< AL3 753 (m^3/s)
2	**Tuyen Quang**	**Gam**	Bac Me	18h/30/9	127.66	> **AL3 3.66**
3			Na Hang	01h/01/10	62.57	> **AL3 5.57**
4		**Lo**	Chiem Hoa	09h/01/10	43.79	> **AL3 5.29**
5			Ha Giang	14h/01/10	106.47	> **AL3 3.47**
6			Bac Quang	08h/2/10	73.11	> **AL3 1.11**
7			Ham Yên	19h/02/10	34.63	> **AL3 0.63**
8			Tuyen Quang	04h/02/10	26.34	> **AL3 0.34**
9	**Phu Tho**		Vu Quang	09h/02/10	19.73	> AL2 0.23
10	**Lao Cai**	**Chay**	Bao Yen	13h/30/9	83.88	> **AL3 0.34**
11			Thac Ba	7h/02/10	23.55	> **AL3 1.50**
12		**Ngoi Nhu**	Ngoi Nhu	6h/30/9	92.40	> **AL3 1.90**
13		**Ngoi Thia**	Ngoi Thia	20h/29/9	48.56	> **AL3 2.06**
14		**Ngoi Hut**	Ngoi Hut	01h/30/9	56.54	> **AL3 2.04**
15	**Phu Tho**	**Bua**	Thanh Sơn	20h/29/9	27.13	> **AL3 1.13**
16	**Lao Cai**	**Thao**	Lao Cai	04h/30/9	83.44	< AL3 0.06
17			Bao Ha	08h/30/9	60.48	> **AL3 3.48**
18			Yen Bai	11h/30/9	34.39	> **AL3 2.39**
19	**Ha Noi**	**Hong**	Ha Noi	22h/1/10	9.56	> AL1 0.06
20	**Ninh Binh**	**Hoang Long**	Ben Đe	1h/01/10	4.88	> **AL3 0.88**
21	**Thai Nguyen**	**Cau**	Gia Bay	5h/1/10	27.48	> **AL3 0.48**
22			Cha	3h/2/10	9.63	> AL2 0.63
23	**Bac Ninh**		Đap Cau	16h/2/10	6.5	> **AL3 0.20**
24	**Lang Son**	**Thuong**	Huu Lung	16h/1/10	19.89	> **AL3 0.89**

25	**Bac Ninh**		Cau Son	8h/1/10	15.76	> AL2 0.76
26			Phu Lang Thuong	8h/2/10	6.26	> AL2 0.96
27		**Luc Nam**	Cam Đan	0h/30/9	46.09	**> AL3 1.09**
28			Chu	0h/30/9	13.33	**> AL3 0.33**
29			Luc Nam	21h/30/9	6.16	> AL2 0.86
30	**Hai Phong**	**Thai Binh**	Pha Lai	10h/1/10	5.03	> AL2 0.03
31	**Thanh Hoa**	**Buoi**	Thach Quang	15h/30/9	17.93	**> AL3 1.93**
32			**Kim Tan**	**06h/01/10**	**14.33**	**> HF 0.08** **> AL 3 2.33**
33		**Ma**	Muong Lat	20h/29/9	169.08	< AL1 0.92
34			Hoi Xuân	16h/29/9	65.27	**> AL3 1.27**
35			Cam Thuy	02h/30/9	22.25	**> AL3 2.05**
36			Ly Nhan	11h/30/9	12.36	**> AL3 0.36**
37			Giang	9h/30/9	6.97	**> AL3 0.47**
38		**Chu**	Cua Đat	08h/29/9	32.41	**> AL3 1.41**
39			Bai Thuong	20h/29/9	19.06	**> AL3 1.06**
40			Xuan Khanh	02h/30/9	10.78	> AL2 0.38
41		**Am**	Lang Chanh	14h/29/9	54.38	**> AL3 2.88**
42		**Hieu**	Nghia Khanh	09h/30/9	40.86	**> AL3 0.86**
43	**Nghe An**	**Ca**	Muong Xen	08h/30/9	142.11	**> AL3 0.11**
44			Tuong Duong	13h/29/9	68.42	< AL3 0.58
45			Con Cuong	16h/29/9	32.99	**> AL3 2.49**
46			Dua	23h/29/9	24.6	**> AL3 0.10**
47			Đo Luong	15h/01/10	17.81	< AL3 0.25
48			Yen Thuong	15h/01/10	9.6	**> AL3 0.40**
49			Nam Đan	21h/30/9	7.38	< AL3 0.52
50	**Ha Tinh**	**La**	Chu Le	16h/29/9	13.21	< AL3 0.79
51			Hoa Duyet	12h/30/9	8.52	< AL2 0.48
52			Son Diem	08h/29/9	14.3	**> AL3 1.30**
53			Linh Cam	16h/30/9	5.37	< AL2 0.13

Following the report of the Civil Defense Command of provinces and cities in the Northern and Central regions until 06:00 AM on the 3rd October, the damages by TS Bualoi as follow:

- People: 51 died, 14 missing, 164 injured in which Lao Cai and Cao Bang are two provinces that sufferred the most human losses.

- Housing: 349 houses collapsed; 172,104 damaged or roof blow up; 65,820 under water or flooding.

- Agriculture and forestry: 88,999 hectares of rice, crops and other plants were damaged.

- Livestock: 2,265 cattles and 519,713 poultry were died or swept away.

- Aquaculture: 17,002 hectares of aquaculture were damaged.

- Irrigation system: 58,361m of canals were eroded and washed away; 203 irrigation works were damaged.

- Education: 1,486 schools were affected and damaged.

- Traffic: 7,573 points on routes in the provinces of Lao Cai, Son La, Phu Tho, Tuyen Quang, Lang Son, Cao Bang, Thai Nguyen, Bac Ninh, Hanoi, Thanh Hoa, Nghe An, Ha Tinh, Quang Tri suffered landslides, flooding, and traffic jams.

- Electric: 8,827 electric poles were broken and felled.

- Dyke and embankment system: 33,176m of embankments, river banks and seashores were eroded.

- Many other damages to telecommunications and trees.

Total preliminary economic damage in some provinces is 15,864 billion VND.

e) Flood event by TY Matmo effect:

Due to the influence of TS Matmo and the circulation of the low pressure area weakened from the storm, from the night of 5th October to the night of 7th October, an extremely heavy rainfall event occurred in the NorthEastern, the South of Tuyen Quang, Thai Nguyen and Hanoi City with amount ranging from 150-250mm, especially in Thai Nguyen province of 250-350mm.

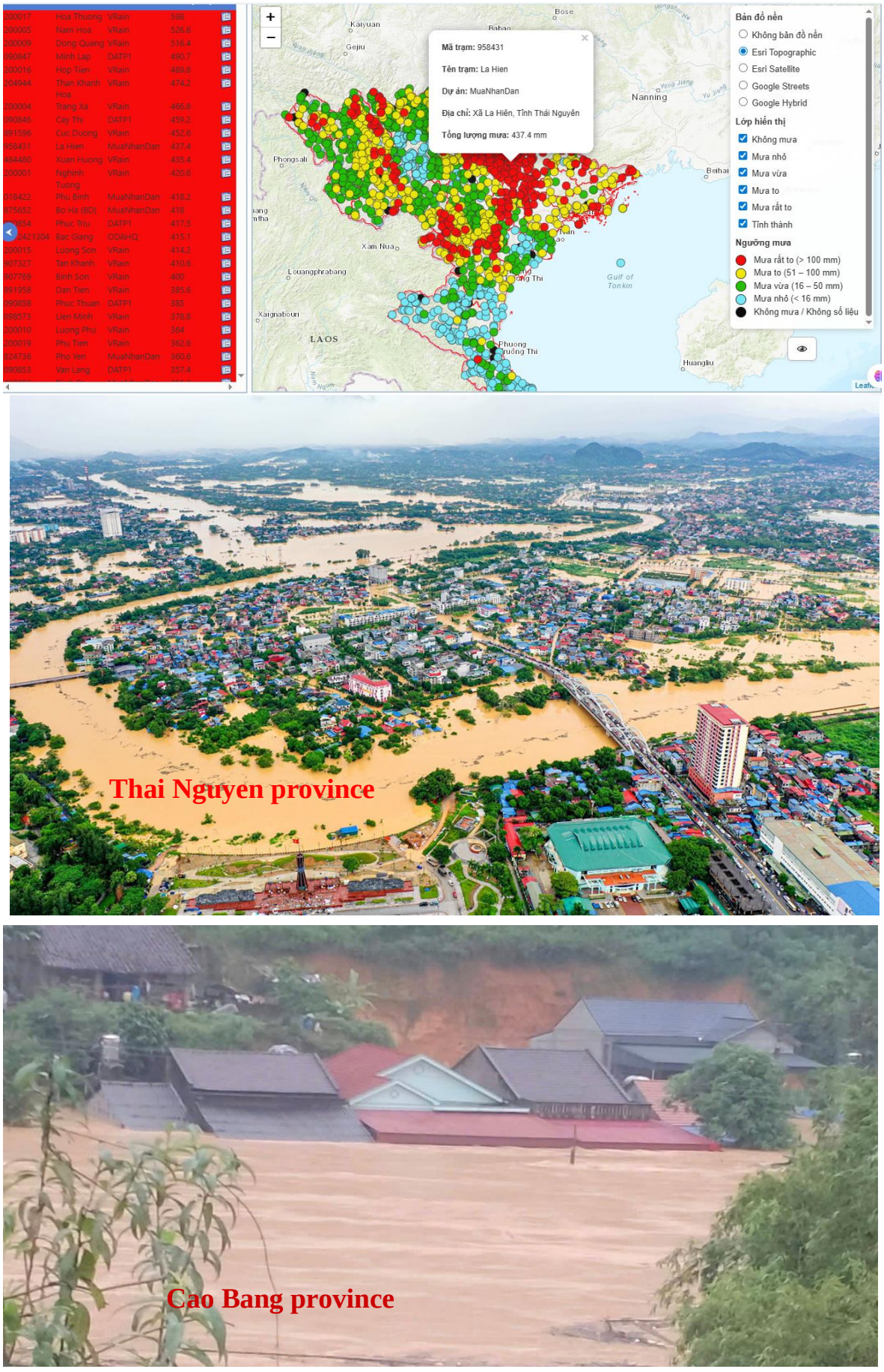


Figure 8. Extremely heavy rainfall and historical flooding in Thai Nguyen, Cao Bang provinces due to TY Matmo circulation

As a consequence of heavy rainfall, an extremely large floods occurred on many rivers in the Northern part provinces concentrated from the 6th to 10th October. During this flood, the flood peak on some small rivers reached AL3 and over AL3; the flood peak in the upper reaches of Lo (Tuyen Quang), Gam rivers (Tuyen Quang, Cao Bang) were at AL2- AL3; the flood peak on Cau river (Thai Nguyen, Bac Ninh), Bang river (Cao Bang), Bac Giang river (Lang Son) exceeded AL3 by 1.2-5.7m, some places over the historical flood level metioned as follow the Table 1.10.

Serious flooding has occurred widely in the provinces and cities of Thai Nguyen, Bac Ninh, Lang Son, and Cao Bang causing great damage to people and property.

Table 1.10. Flood characteristics on main rivers in the Northern part provinces caused by the TS Matmo

No	Province	River	Station	Time of flood peaks	Flood peaks (m)	Compared with AL	Compared with HF
1	**Tuyen Quang**	**Lo**	Ha Giang	06h/08/10	**10259**	> AL2 159	
2		**Gam**	Bac Me	21h/07/10	**12483**	**> AL3 83**	
3	**Cao Bang**		Bao Lac	14h/07/10	**19920**	**> AL3 120**	
4		**Bang**	Cao Bang	23h/07/10	**18579**	**> AL3 329**	**> HF 95**
5	**Lang Son**	**Bac Giang**	Van Mich	21h/07/10	**19573**	**> AL3 573**	
6	**Thai Nguyen**	**Cau**	Cho Moi	13h/07/10	**6028**	**> AL3 228**	
7			Thac Gieng	08h/07/10	**10110**	**> AL3 260**	
8			Gia Bay	03h/08/10	**2990**	**> AL3 290**	**> HF 109**
9			Cha	11h/09/10	**1202**	**> AL3 202**	**> HF 100**
10			Phuc Loc Phuong	09h/08/10	**998**	**> AL3 198**	**> HF 58**
11			Đap Cau	23h/09/10	**752**	**> AL3 122**	
12	**Lang Son**	**Trung**	Huu Lung	13h/08/10	**2431**	**> AL3 531**	**> HF 177**
13	**Bac Ninh**	**Thuong**	Cau Son	09h/08/10	**1837**	**> AL3 237**	
14			Phu Lang Thuong	03h/09/10	**760**	**> AL3 130**	**> HF 7**

According to the report of the Civil Defense Command of the provinces and cities of Tuyen Quang, Lang Son, Cao Bang, Thai Nguyen, Hanoi, Bac Ninh, Thanh Hoa, heavy rainfall and floods after TS Matmo caused the following damages with preliminary statistics as of October 13th:

- People: 18 died and missing, 15 injured.

- Housing: 1714 houses collapsed, broken; 234,469 under water or flooding (of which ~ 200,000 houses in Thái Nguyên province). As of 07:00AM October 13th, about 12,234 houses were flooded (Bac Ninh 10,073 houses, Hanoi 2,161 houses).

- Agriculture and forestry: 31,791 hectares of rice, crops were flooding.

- Livestock: 13,302 cattles and 685,012 poultry were died or swept away.

- Hydropower: Bac Khe 1 Hydroelectric Dam (in Tan Tien commune, Lang Son province) with a capacity of 4 million m^3 and a capacity of 2 MW broke due to the rapid inflow to the reservoir.

- Dyke and embankment system: 59 incidents in the provinces and cities of Thai Nguyen, Bac Ninh, and Hanoi; many of dyke system had to be organized to prevent overflow.

- Traffic, transportation: 03 national highway locations were eroded and flooded; many railway lines were temporarily suspended, many rural traffic routes were deeply flooded, isolated, causing traffic jams.

- Electric and telecommunication: floods have caused power outages for 550,805 customers in the provinces of Thai Nguyen, Bac Ninh, Cao Bang, and Lang Son.

Estimated damage due to storm Matmo is over 8,720 billion VND.

f) Flood event caused by combination of critical weather patterns

From the night of 25th to October 30th, due to the influence of the Eastern wind disturbance combined with the strengthening cold air, provinces from Ha Tinh to Da Nang city, the East of Quang Ngai and Gia Lai provinces have moderate, heavy rainfall to very heavy rainfall. Particularly, the area from Hue city to the East of Quang Ngai province appeared very heavy rainfall with total rainfall in Hue city of 500-800mm; in Da Nang city 400-700mm; in the East of Quang Ngai 400-500mm. Amount of rainfall in the last 5 days of October is summarized in the Table 1.11.

Table 1.11. The highest rainfall at some stations during the night of 25th to October 30th

No	Provinces	Station	Amount of rainfall (mm)
1	Hue City	Bach Ma	3863
2		Nam Đong	1854
3	Da Nang City	Ba Na 1	1778

No	Provinces	Station	Amount of rainfall (mm)
4		Kham Đuc	1512
5	Quang Ngai	Tra Thanh	1809
6		Tra Nham	1469
7	Quang Tri	Dam reservoir La To	1374
8		Ta Long	799
9	Ha Tinh	Ban Nuoc	628
10		Ky Lien	529
11	Gia Lai	An Quang	652
12		Trong Thuong Reservoir	475

At the Bach Ma station recorded a daily rainfall of 1,739 mm (from 7 PM on 26th to 7 PM. on October 27th) show the highest rainfall ever recorded in Vietnam and the second highest in the world, below the 1,825 mm recorded at a French monitoring station in the Indian Ocean in January 1966.

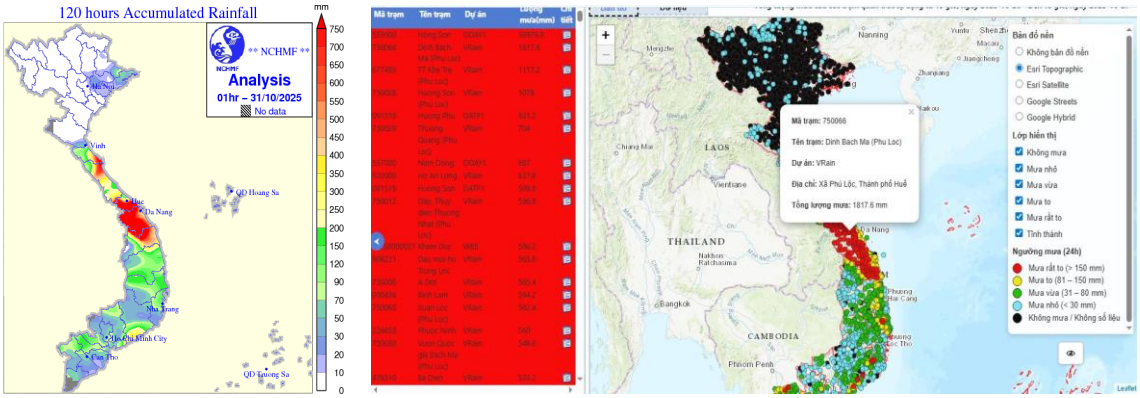


Figure 1.9. 120hr-accumulated rainfall (from 26 to 30 October) and 24hr-extremely heavy rainfall at Bach Ma station (Hue city)

A moderate to major flood occurred on rivers from Quang Tri to Quang Ngai provinces from 26th to October 31st, particularly extremely large flood on the Bo River and Huong River (Hue City) and the Vu Gia-Thu Bon River (Da Nang City) with flood peaks as follows:

- The flood peaks on the Gianh, Thach Han and Ben Hai rivers (Quang Tri) are at AL1-AL2, and above level BĐ2, except for the Kien Giang river at Le Thuy station reached AL2-AL3.

- The flood peak on the Bo River at Phu Oc station is 5.27m (18h/29/10), over AL3 0.77m, exceeding the HF of 2020 (5.24m) by 0.03m;

on the Huong river at Kim Long station is 5.05m (20h/27/10), over AL3 1.55m.

- Flood peak on Vu Gia river at Ai Nghia station is 10.60m (19h/29/10), over AL3 is 1.60m; on Thu Bon river at Cau Lau station is 5.62m (02h/30/10) over AL3 is 1.62m, exceeding the HF in 1964 (5.48m) by 0.14m.

Figure 10. Flood risk map of Huong and Bo rivers in Hue City and serious flooding in Hue

According to the report of the Civil Defense Command of Ha Tinh, Quang Tri, Hue, Da Nang, Quang Ngai and Lam Dong provinces; as of October 31st, extreme heavy rainfall and flood have caused the following damages and inundations:

- People: 35 people died, 43 injured
- House: 91 houses collapsed and swept away; 181 houses damaged.
- Agriculture: 4946 hectares of rice and crops flooded
- Livestock: 22,288 cattle and poultry died or swept away.
- Irrigation: 10,207m of embankments were eroded.
- Transportation: Many national highways were eroded and flooded.
- Riverbank and coastal line: 8,950m of riverbank and coastal erosion

2.1.2. Flash flood and landslide

During the 10 months of 2025, due to the impact of storms, storm circulation, prolonged heavy rainfall and localized heavy rainfall, 30 big flash flood and landslide events occurred in 23 provinces/cities in the midland and mountainous areas of the Northern and Central provinces. A typical example is the flash flood and landslide event on the 01st August in Dien Bien Phu province, a mountainous area in the North part.

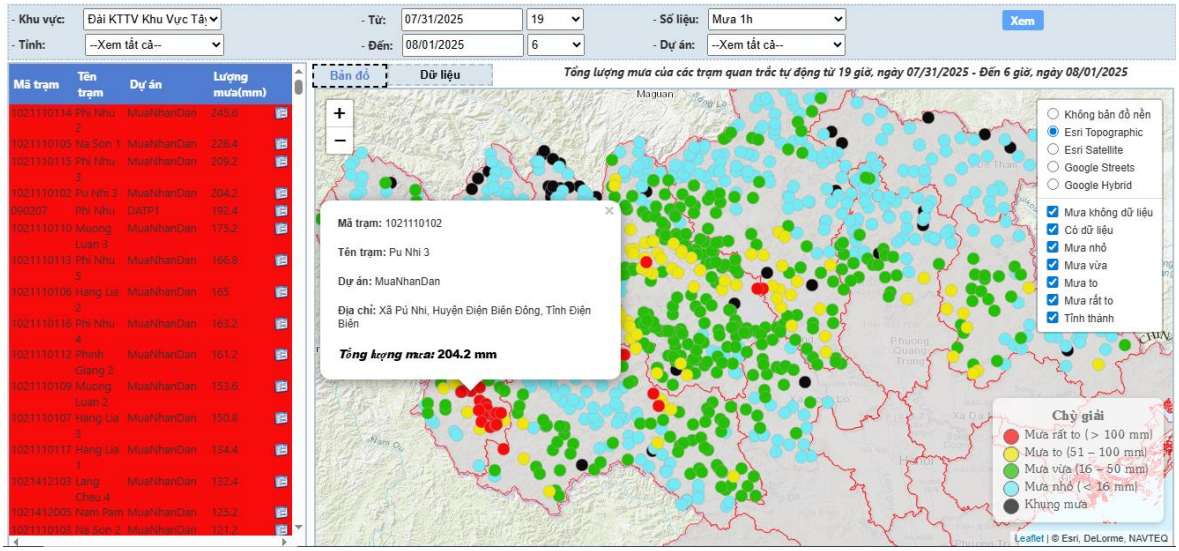


Figure 1.11. Total of rainfall in Dien Bien Phu province from 31st July evening to 01st August morning.

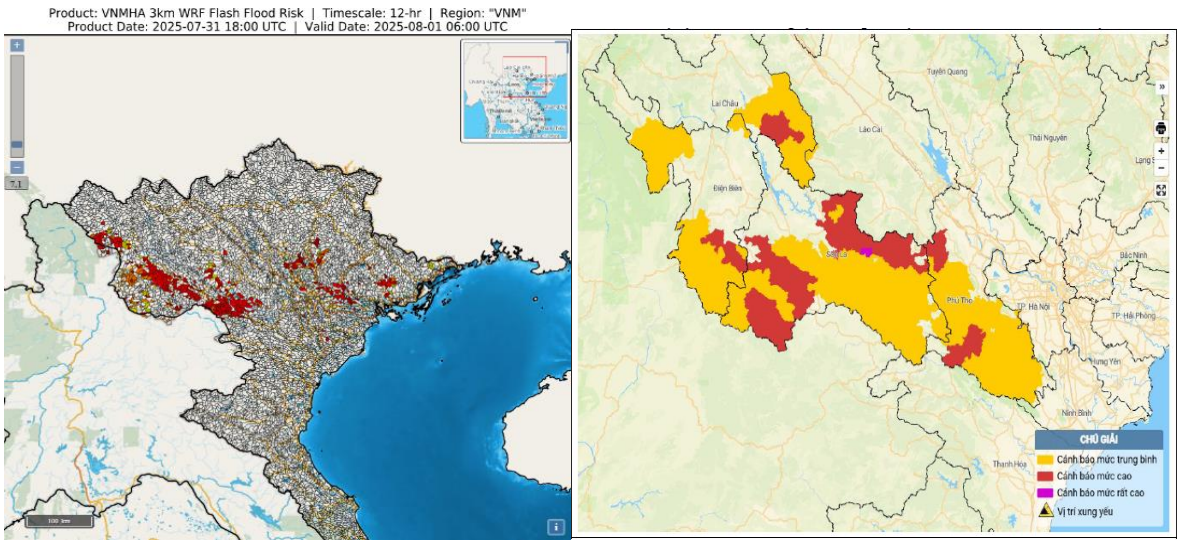


Figure 1.12. Flash flood risk (FFR) and lanslide warning map in FFEWS from the NCHMF

During July 31st morning to August 2nd morning, continuous heavy rainfall have occurred in many communes of Dien Bien province with observed rainfall over 200mm/day. Observation at automatic rain gauges were recorded as follows: *Phi Nhu 2: 320.8mm, Phi Nhu 3: 265,6mm; Phi Nhu 5: 365.4mm (Xa Dung commune); Na Son1 291.4mm (Na Son); Pu Nhi 3: 262mm (Pu Nhi commune); Mường Luan 3: 254.2mm (Muong Luan commune).*

The consequences of this heavy rainfall, flash flood and landslide event occurred on a large scale in Dien Bien province, with the most severely affected communes named Xa Dung, Tia Dinh and Muong Luan. The preliminary statistics of damage caused by this flash flood and landslide event are presented as follows:

- People: 10 death and missing.

- Houses: More than 319 households were damaged, many houses were swept away or severely damaged.

- Traffic: Many roads, both national and provincial levels, seriously eroded, causing traffic paralysis.

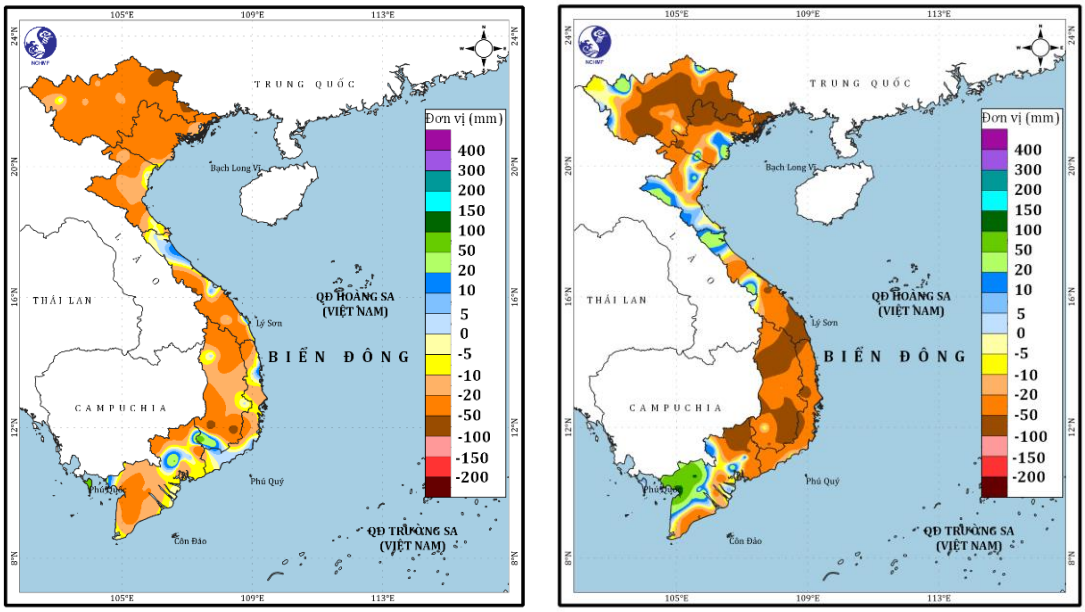
- Cost: Estimated damaged cost of 300 billion VND.

Figure 1.13. The devastation caused by flash floods and landslides in Xa Dung and Muong Luan communes of Dien Bien province

2.2. Drought, water shortage

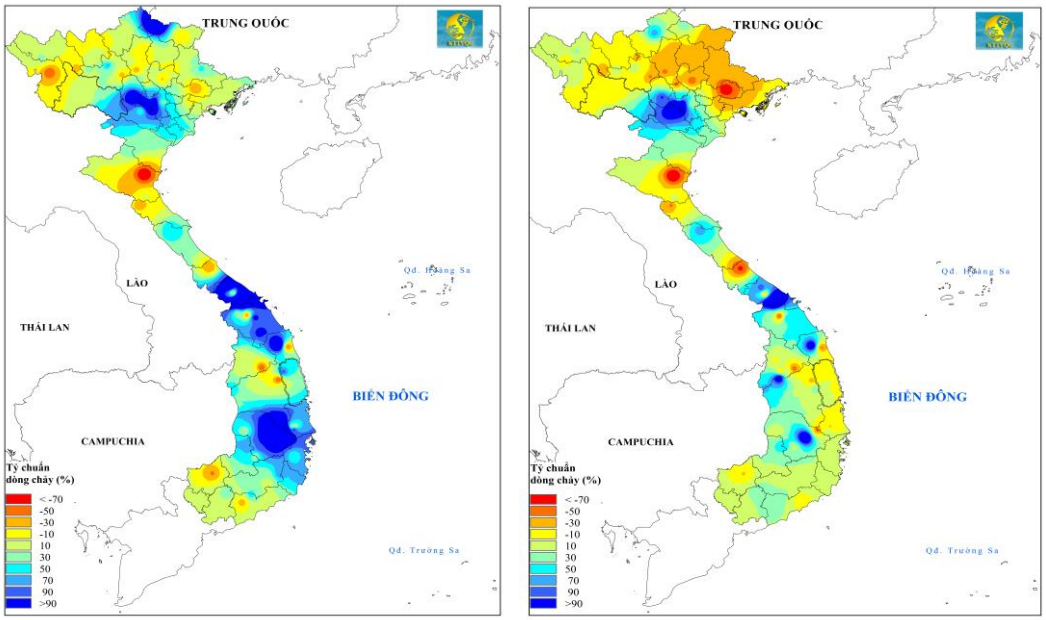
During dry season, due to a long-term lack of rainfall (from February to June), drought conditions and water shortages occurred in several provinces in the NorthEast, Central and Highland regions of Vietnam.

The figure 1.14 illustrating the Error Standard in March and April 2025, shortage of rainfall in April has increased. The amount of rainfall in the Northern part and Highland is lower around 50-100mm in comparation with the long-term average (Figure 1.15). As the result of lack shortage of rainfall, the river flow in NorthEast of Viet Nam had suffered from shortage of water source that would last untill May, 2025.

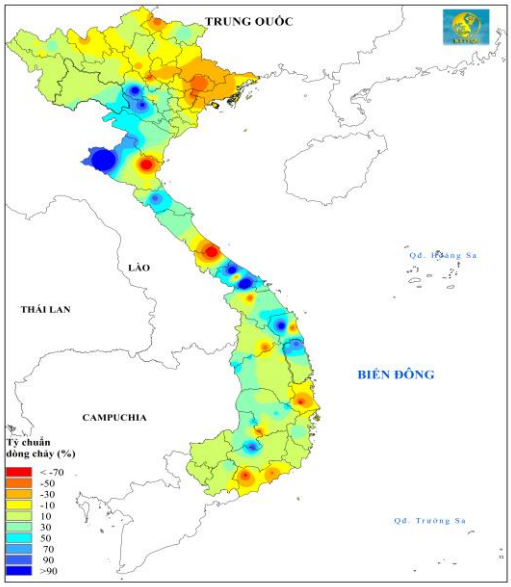


(a) (b)

Figure 1.14. Monthly rainfall standard error for March (a) and April (b) 2025



(a) (b)



(c)

Figure 1.15. Monthly flow standard deviation (%) for March (a), April (b) and May (c), 2025

2.3. Saline intrusion in the Mekong delta area

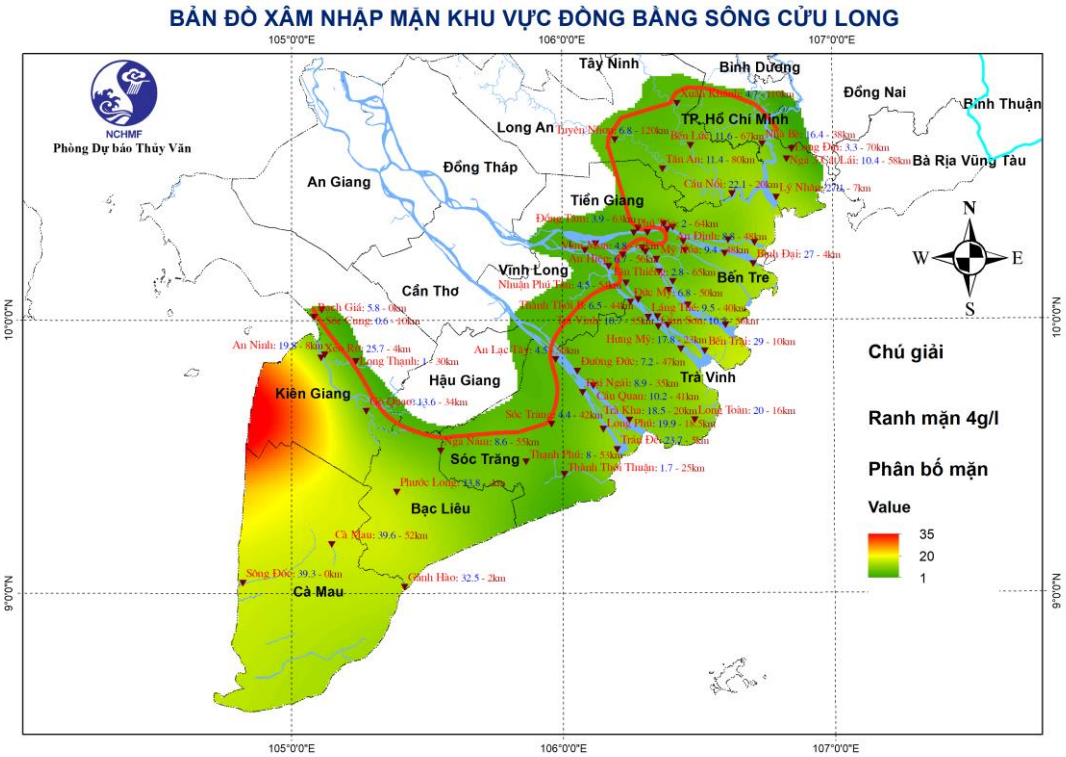


Figure 1.16. Saline intrusion map for dry season 2025 (from January to May) in the Mekong delta

Saline intrusion in the Mekong Delta in the 2024-2025 dry season had come earlier and was higher than the LTA and approximately last year 2023-2024. The increasing saline intrusion had started to affect agriculture and people's lives since the end of January 2025. From February to April 2025,

there were 03 highest saline intrusion periods, saline intrusion depth of 4g/l was recorded on several main river mouths as: on the Vam Co river from 90-120km, on the Mekong river mouths from 45-60km, on the Cai Lon river from 45-55km.

3. Socio-Economic Damage Assessment

From the Jan-Nov 2025, 20/21 types of natural disasters have occurred in all regions of Vietnam. Natural disasters have occurred in a rapid, fierce manner, on a large scale, with many unusual factors, exceeding historical levels

Many areas had to suffer natural disasters in a short period of time, leading to the phenomenon of double natural disasters: storms on top of storms, floods on top of floods, flash floods, landslides, especially in the mountainous provinces, midlands of the North, North Central, seriously threatening the safety of the traffic system, dykes, dams… Three storms Ragasa, Bualoi and Matmo appeared consecutively in the East Sea within 13 days (from September 22 to October 3, 2025), the circulation after the storm caused heavy rain and prolonged floods).

Until October 2025, natural disasters have killed or left missing 241 people, injured 390 people; 262,749 damaged or blown-off houses; flooded or damaged 529,809 hectares of rice, crops, and other plants; killed or swept away 45,031 livestock and 3,353,138 poultry; damaged 57,979 hectares of aquatic products... Total estimated damage is over VND 54,767 billion.

Vietnam's advocacy and support from international organizations:

Facing to the serious damage of the natural disaster, the National Civil Defense Steering Committee has sent a letter to international organizations about emergency support for localities severely damaged by the disasters, and assigned the Vietnam Disaster and Dyke Management Authority, Ministry of Agriculture and Environment to act as a focal point for coordination, information sharing and connection between donors and the authorities in affected provinces.

The Vietnam Disaster and Dyke Management Authority, has adopted the cooperation mechanism of the Disaster Risk Reduction Partnership to share updated information on natural disaster situations and the needs of local people to the Partnership Members and other interested international organizations; organized assessment teams with representatives of international organizations to the 06 most severely damaged provinces

including Tuyen Quang, Phu Tho, Cao Bang, Lang Son, Thai Nguyen, Bac Ninh; completed the on-site assessment for donors to review.

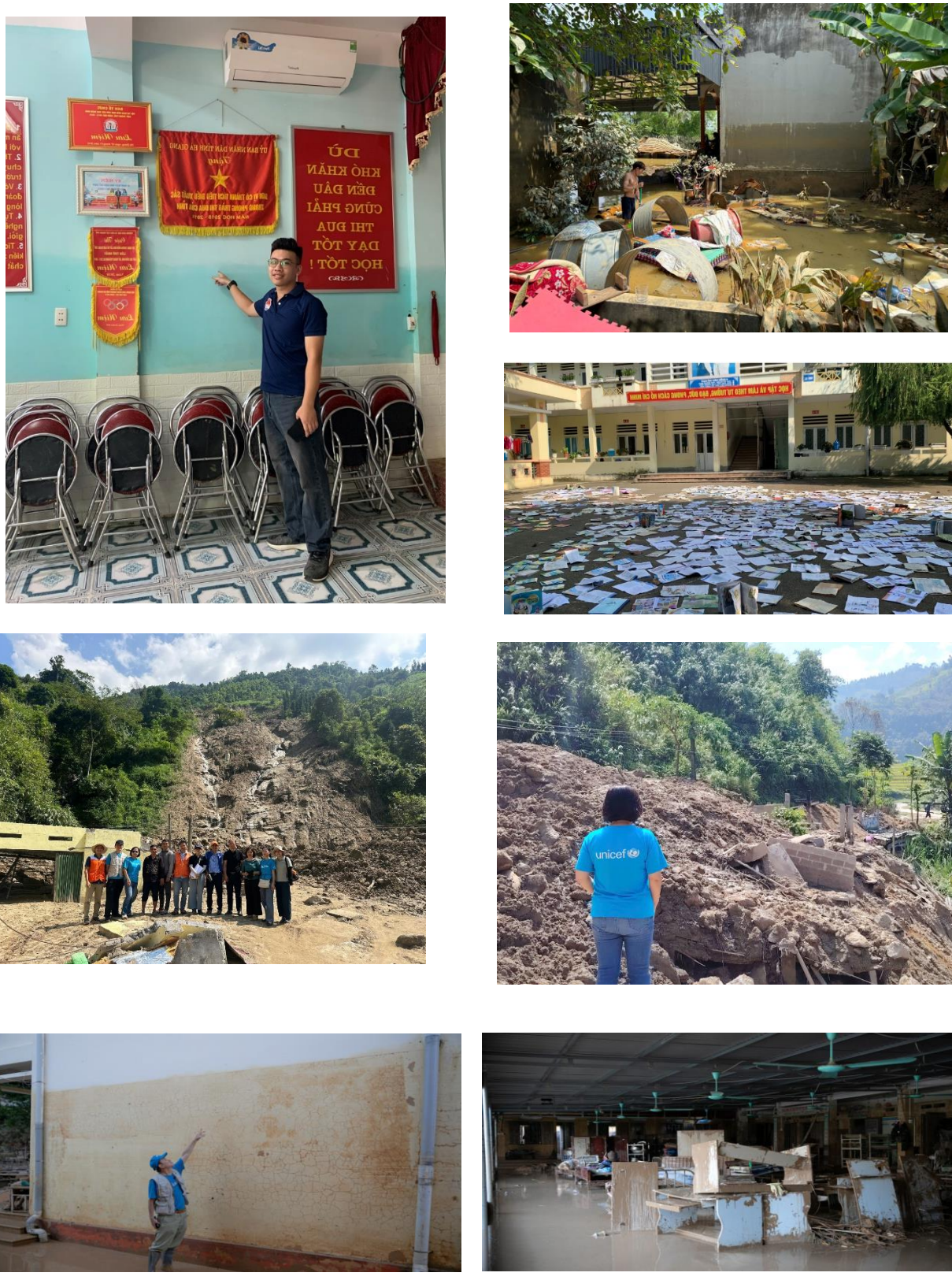


Figure 1.17. Pictures collected by the assessment teams

As of October 31, 2025, the Embassies and international organizations have provided aid and pledged aid to localities affected by storm Bualoi,

Matmo, Fengshen and post-storm heavy raifall with a total budget of about 10.1 million USD, from the Government of Japan, the Government of Australia, the Government of the Russian Federation, the AHA Center, the Government of Singapore, the Government of Korea, the Government of the United States, the Government of Ireland, the Government of Canada in Vietnam, the European Union Delegation in Vietnam, providing cash, support for agricultural livelihood recovery, bottled drinking water, water filtration equipment, blankets, plastic water tanks, multi-purpose plastic sheets, personal hygiene kits, household kits, home repairs, kitchen kits, school supplies, lifeboats... for affected people in the provinces of Lao Cai, Lang Son, Cao Bang, Tuyen Quang, Thai Nguyen, Bac Ninh, Hanoi, Ninh Binh, Thanh Hoa, Nghe An, Ha Tinh, Hue City.

Figure 1.18. The Vice Minister of Agriculture and Environment has handed the appreciation letters to the donors.

4. Regional Cooperation Assessment (highlighting regional cooperation success and challenges)

4.1 Hanoi Regional Forecasting Support Centre (RFSC) of the Severe Weather Forecasting Project (SWFP)

The Severe Weather Forecasting Programme (SWFP) for Southeast Asia was initiated in 2010 to enhance forecasting capabilities for Cambodia, Lao PDR, Thailand, and Vietnam, with the Philippines joining in 2012. The project designated Ha Noi as the Regional Centre Focusing on hazards like heavy rain, strong winds, the initiative has built regional capacity through

numerous training workshops. Since 2011, Vietnam has been responsible for managing and sharing forecasting products on the official portal, swfdp-sea.com.vn.

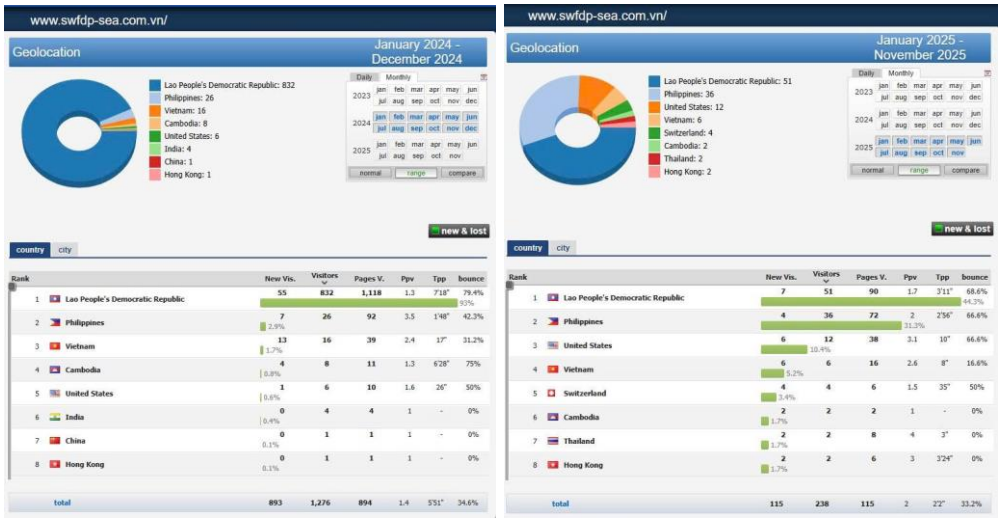


Figure 1.19. Statists of accessing RFSC's web portal in 2024 and 2025

Regarding the training activities, as recommended by the Regional Subproject Management Team (RSMT) of SWFP-Southeast Asia in the meeting in 2015 (Ha Noi, Viet Nam, August 2015) and agreed during its meeting in November 2017 in Ha Noi, Viet Nam, a two-week training desk had been organized at RFSC Ha Noi from 7 to 18 May 2018 with attachment of two experts from NMHSs of Philippines and Thailand and forecasters from Viet Nam Meteorological and Hydrological Administration (VMHA). Two expert lecturers from Hong Kong Observatory (HKO), Hong Kong, China joined and gave lectures at the training desk.

Experts and forecasters from VNMHA has attended the Regional Training Workshop on Severe Weather and Impact based Forecasting and Warning Services in Vientiane, Lao PDR form 19 February - 1 March 2019. VNMHA experts have shared the current status of warning and information delivery, current challenges in impact-based forecasting and risk-based forecasting as well as exchanging these solutions to enhance the forecasting, alerting activities of Viet Nam.

At the eighteenth World Meteorological Congress (Cg-18, June 2019) through its Resolution 15 (Cg-18) decided among others to remove the 'demonstration' designation of the SWFDP and renamed it as Severe Weather Forecasting programme (SWFP). Subsequently, the SWFDP-SeA became SWFP-SeA.

With the acceptation for Project Proposal "Training workshop based on the Severe weather Forecasting Project (SWFP) for the Southeast Asian Region" from ASEAN Committee on Science and Technology (COST), the second two-week Training Desk was organized at RFSC Ha Noi in December 2019. In 2020, the third Training Desk was organized via online platform hosted by Vietnam. In 2021, The Training Workshop on Severe Weather and Impact Based Forecasting and Warning Services was held on 1-12 February via online platform. In 2022, The Training Workshop on Severe Weather and Impact Based Forecasting and Warning Services was held again on 28 February -10 March. This year, the Training Desk and Study Visit for Cambodian forecasters was organized at RFSC Ha Noi on 19-23 May 2025.

4.2. Development of Southeast Asian Flash Flood Guidance System (SeAFFGS)

VNMHA has been operating as the SeAFFGS under Global Flash Flood Guidance System of WMO which is developed by Hydrologic Research Center - USA. The purpose of the SeAFFGS project is the development and implementation of FFGS specifically for Cambodia, Lao PDR, Thailand, Viet Nam.

The system is integrated with different high quality rainfall data sources such as: Radar extratpolation, WRF model provide rainfall forecast from 1 – 24hrs: WRF-3km (VNMHA), WRF-ARW 2km (TMD), WRF-6km (TMD), WRF-4km (MRC); it also integrates automatically rain gauges observation.

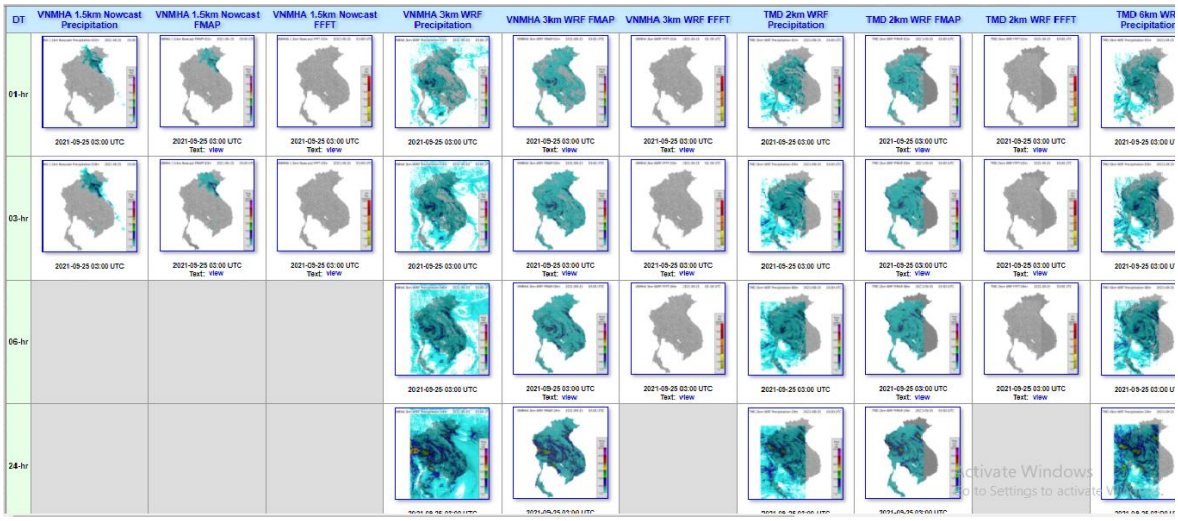


Figure 1.20. The SeAFFGS –flash flood supporting warning system

Since January 2025, the Global Hydro Estimator (GHE) has been substituted by a new satellite precipitation product (SCaMPR)

4.3. Other collaborations

VNMHA keeps contacting RSMC Tokyo colleagues by posting our discussion and questions on tropical cyclone analysis and forecast in RSMC Tokyo forum at https://my.redmine.jp/tc_communication/login; VNMHA also commuicate regularly with CMA on tropical cyclone and heavy rainfall forecast, especially for those TCs landfalling in the two countries nearby region.

Bilateral cooperation with developed countries and regional countries (i.e CMA, KMA, Laos DMH, Cambodia DoM) have been promoted both in in-depth and practical manner. Vietnam has joined The Weather and Climate Science for Service Partnership (WCSSP) Southeast Asia which currently involving four partner countries: the Philippines, Malaysia, Indonesia and Vietnam. This project aims to jointly develop and improve underpinning capability in global and regional forecasting systems, and advance the understanding of high-impact weather events in order to provide better advice and mitigate their socio-economic impacts. This cooperation has been renewed in late 2021.

- Vietnam has been keeping close coordination with multilateral organizations such as the World Bank, Asian Development Bank, UN agencies, JICA, KOICA etc. has been promoted to seek for technical assistances and financial supports as well as high quality human resources of disaster prevention and control;

II. Summary of Progress in Priorities supporting Key Result Areas

1. System infrastructure and forecasting products for operational purposes and for the RFSC

At VNMHA, the operational computing system includes an HPC system (CrayXC40) with a computing capacity of ~80 TFlops and a Central Data Hub (CDH) shared from VNMHA to provincial offices. The CrayXC40 system enables deterministic forecasting at a 3km resolution and 32-member ensemble forecasting at a 9km resolution, covering the entire territory of Vietnam and Bien Dong Sea. Central Data Hub (CDH) is a part of the information integration system that provides the forecasting sub-systems access to all required data sources. The CDH will support and provide each separate forecasting sub-system the access to different data sources such as synoptic manual observation, automatic weather station, automatic rain-gauge, water level and sea level data, radar and satellite data will be also stored in CDH. The CDH and the forecasting sub-systems are independent

systems but they are closely linked, with the CDH has a key role in collecting (near) real-time data from all required sources, so latest available data is always available from CDH, and for providing forecast data to the services, provided by VNMHA.

Identified opportunities/challenges, if any, for further development or collaboration:

VNMHA is providing severe weather warning for short-range and medium range everyday and NWPs on SWFDP-SeA website for member countries to use in daily severe weather forecast and warning. Feedbacks and suggestions from members are welcome for a better information design and delivery.

Priority Areas Addressed:

KRA 1: To mitigate against the damaging impacts of typhoons and enhance the beneficial typhoon related effects for the betterment of quality of life through scientific research, technological development and operational enhancement.

KRA 4: To enhance capacity to generate and provide accurate, timely and understandable information on typhoon-related threats

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: Social Republic of Vietnam
Name of contact for this item: Dr. Du Duc Tien
Telephone: +84936067015
Email: duductien@gmail.com

2. Short-range Regional Ensemble Prediction System (SREP-32)

As mentioned, the current high resolution of deterministic forecast (3km, Southeast Asia domain, WRF3kmIFS) based on using the Weather Research and Forecasting Model with Advanced Research with ARW dynamical core (WRF-ARW) using boundary conditions (from ECMWF) and the 32 member regional ensemble (SREPS) forecast was also upgraded by with various physical model configurations (generated from different typical

cumulus, shortwave radiation, boundary layer and from simple to complex cloud micro-physic schemes). These products are used effectively in forecasting heavy rain, extreme rainfall, and typhoons.

VNMHA also applied the data assimilation for WRF-ARW at 3km using almost quality controlled observation data from NCEP and Vietnam's local observation, namely as WRF3kmIFS-DA, and this product is shared daily via SWFP for SeA portal for all members of the project.

The radar data (10 radar stations of Vietnam) was also assimilated based on WRFDA system (WRF3kmIFS-RAD) and the 10 minute interval rainfall forecast from WRF3kmIFS-RAD is experimently blended with nowcasting products of SWIRLS system of Hong Kong Observatory.

An example of high resolution products for improving short range forecast of heavy rain is show in Figure 2.2 and support for Tropical Cyclone forecasting is show in Figure 2.3.

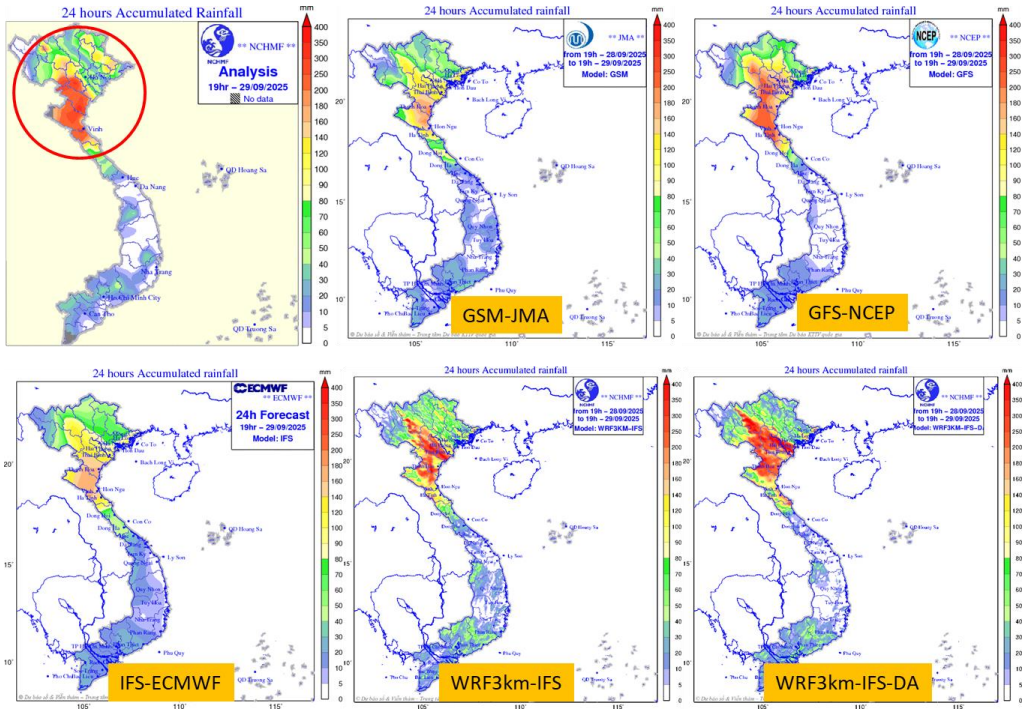


Figure 2.1. Comparison of observations (Vietnam's observation) and models: GSM-JMA, IFS-ECMWF, GFS-NCEP, WRF3km-IFS and new data assimilation product WRF3km-IFS-DA for heavy rainfall over the Northern Vietnam on 29-Sept-2025.

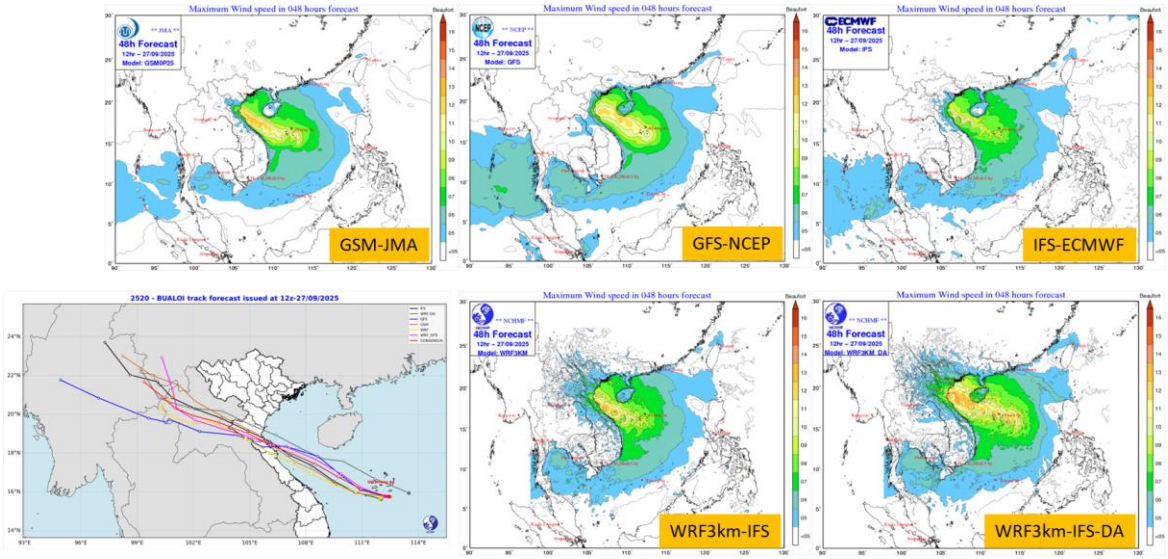


Figure 2.2. BUALOI track forecast from models and maximum wind speed forecast from GSM-JMA, IFS-ECMWF, GFS-NCEP, WRF3km-IFS and WRF3km-IFS-DA at 12UTC (19 LT) of 27 Sept 2025

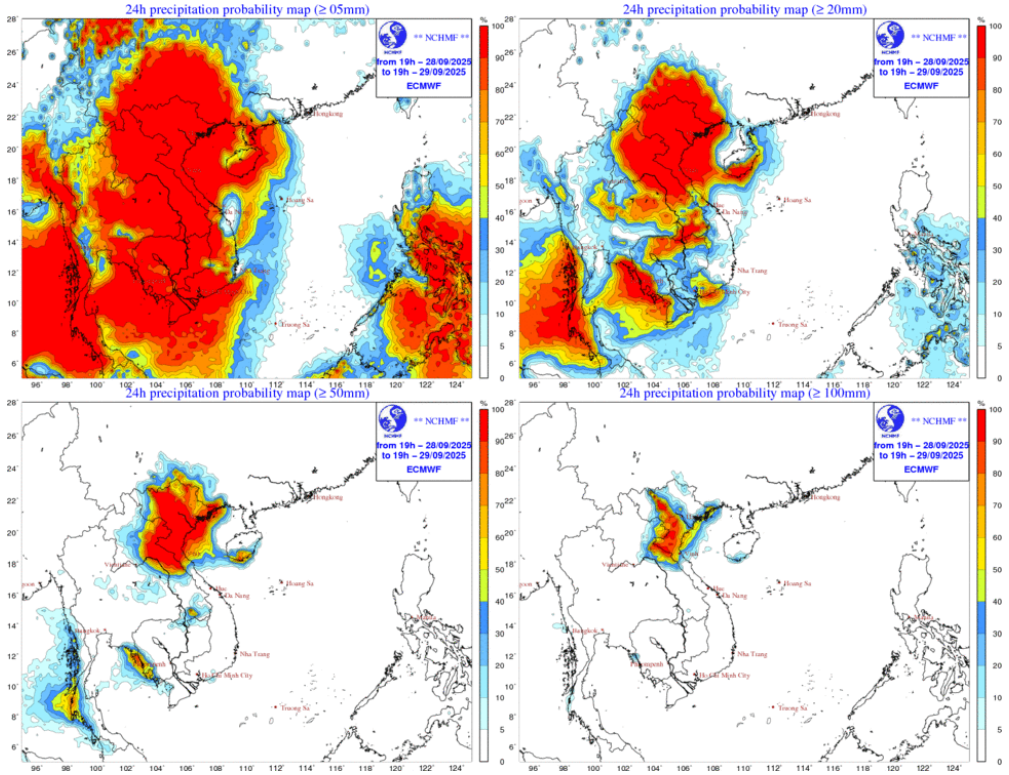


Figure 2.3. 24-hour rainfall ensemble forecast from ECMWF (51 members) at 12 UTC (19 LT) of 28 Sept 2025

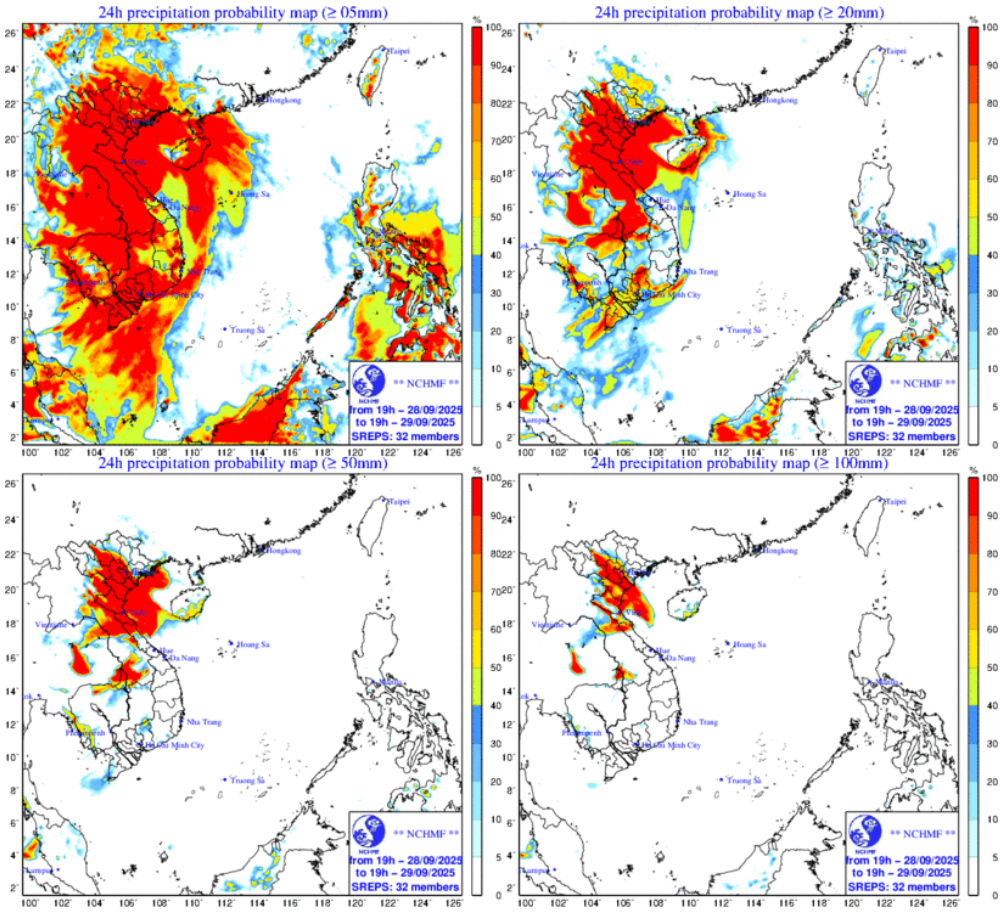


Figure 2.4. 24-hour rainfall ensemble forecast from SREPS-32 at 12UTC (19 LT) of 28 Sept 2025

Regarding the regional ensemble system, the resolution of 32 ensemble members is 9km and using GFS-NCEP as boundary conditions. Figure 2.3 and 2.4 are examples of 32-member SREPS and ECMWF's ensemble forecast for a heavy rainfall case in 2025 with probability map products at different thresholds.

Identified opportunities/challenges, if any, for further development or collaboration:

VNMHA is providing high resolution NWPs (WRF3kmIFS, WRF3kmIFS-DA) and the regional ensemble SREPS products on SWFP-SeA website for Member countries to use in daily severe weather forecast and warning. In the near future, the SREPS (currently with boundary conditions from GFS-NCEP) will also be tested with boundary conditions from ECMWF.

Feedbacks and suggestions from Members are welcome for a better information design and delivery.

Priority Areas Addressed:

KRA 1: To mitigate against the damaging impacts of typhoons and enhance the beneficial typhoon related effects for the betterment of quality of

life through scientific research, technological development and operational enhancement.

KRA 4: To enhance capacity to generate and provide accurate, timely and understandable information on typhoon-related threats

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:

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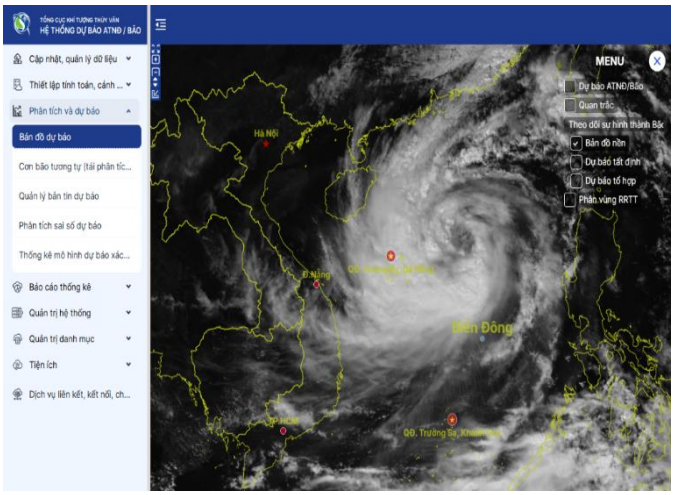
Email: duductien@gmail.com

3. New Tropical Cyclone Forecasting Support system at VNMHA

Since 2025 tropical cyclone season, VNMHA starts to use an upgraded system to supporting tropical cyclone forecasting - Tropical Cyclone Forecasting SupporT - TCForeST. The previous software (TCAid) is now a backup system for TCForeST.

The new system helps to collect and display various types of synoptic, automatic observation data, satellite and radar images, deterministic NWP model forecast products, and ensemble forecast products of Vietnam and other international resouces (i.e ECMWF, GSM, GFS, WRF-3km, WRF-DA, SREPS, ECEPS…). The new system supports forecasters to extract NWP rainfall, windspeed… forecast data for any location,

The user can also compare different forecasts from NWP models and international TC forecast centers and generate tropical cyclone track forecast and identify affected areas of tropical storms and tropical depressions to share with units inside and outside the VNMHA as well as on the VNMHA's different communication channels (i.e website, facebook, zalo).


HỆ THỐNG DỰ BÁO ATNĐ / BÃO
Cập nhật, quản lý dữ liệu
Thiết lập tính toán, cảnh ...
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Bản đồ dự báo
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Quản lý bản tin dự báo
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Báo cáo thống kê
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Đà Nẵng
Biển Đông
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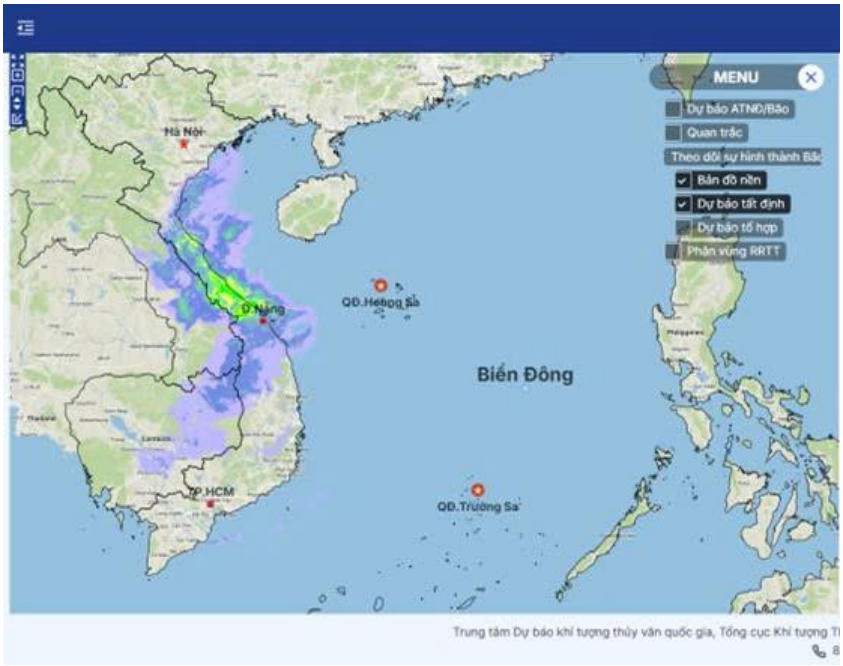
QĐ. Trường Sa, Khánh Hòa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Đà Nẵng
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Biển Đông
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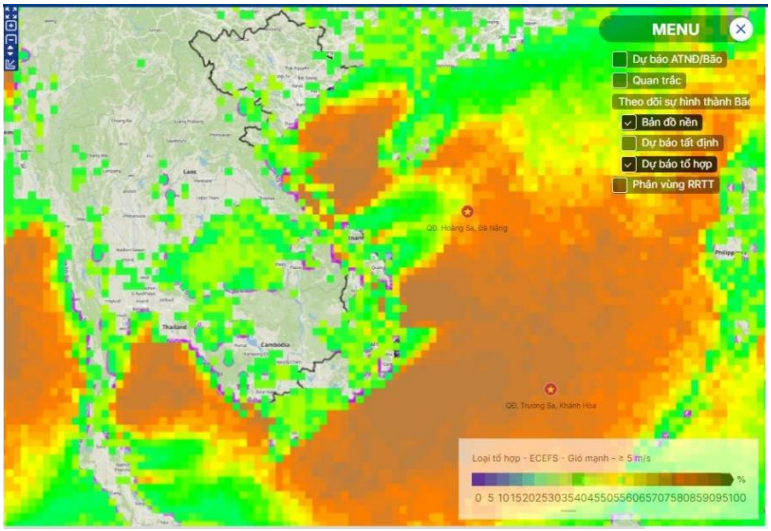
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Dự báo tổ hợp
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QĐ. Trường Sa, Khánh Hòa
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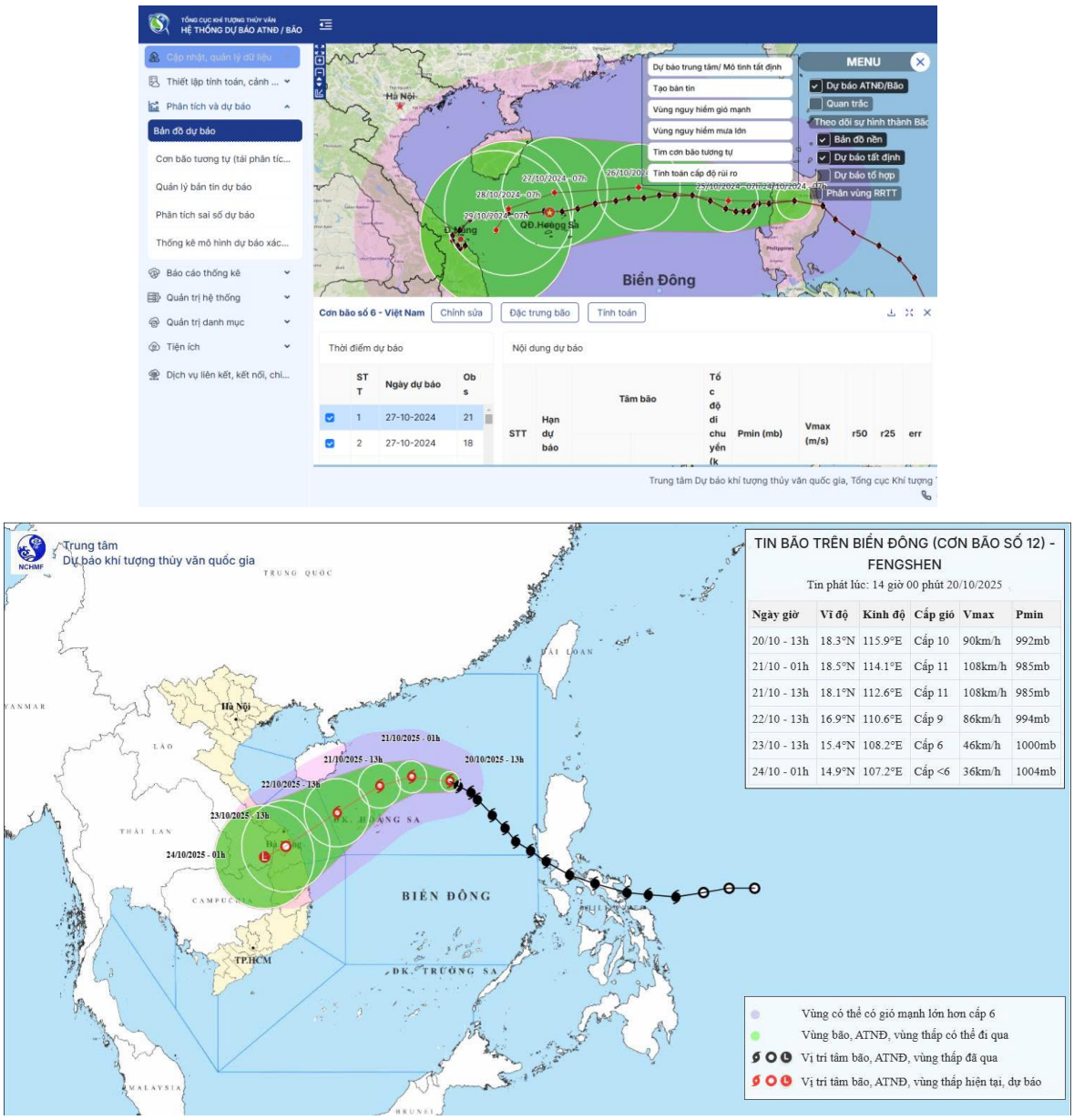

Figure 2.5.

Priority Areas Addressed:

KRA 1: To mitigate against the damaging impacts of typhoons and enhance the beneficial typhoon related effects for the betterment of quality of life through scientific research, technological development and operational enhancement.

KRA 4: To enhance capacity to generate and provide accurate, timely and understandable information on typhoon-related threats

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	✓

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