

MEMBER REPORT

ESCAP/WMO Typhoon Committee
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Singapore

(SOCIALIST REPUBLIC OF VIET NAM)

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I. Overview of tropical cyclones which have affected/impacted Member's area in 2009

1. Meteorological Assessment (highlighting forecasting issues/impacts)

The meteorological conditions in Vietnam during 2009 were extreme with 5 tropical storms. Those are TS No. 4 (SOUDELOR – 0905), TS No. 7 (MUJIGAE – 0913), TS No. 9 (KETSANA – 0916), TS No.10 (PARMA – 0917), TS No. 11 (MIRINAE – 0921).

Besides that, tropical depression formed in South South China Sea in 3rd September, 2009, did not make landfall in Vietnam but its circulation, incorporating with strong South West monsoon, caused heavy rainfall for central part of Vietnam. Total rainfall for 6 days is 500 – 700mm in general, especially more than 1000mm in Thua Thien Hue (1022mm), Da Nang (1239mm).

TS No 4 (SOUDELOR – 0905) was upgraded from tropical depression over North South China Sea. At 06 UTC of 11th July, its locations was 20.1N – 114.1E with maximum wind speed of force 8, gust 9, 10. SOUDELOR entered Bacbo gulf and made landfall on Quang Ninh – Hai Phong provinces. This is not strong tropical cyclone with maximum wind speed recorded at Bach Long Vi station is 11m/s, gust 13m/s, Co To 15m/s, gust 22m/s, Mong Cai (Quang Ninh) 12m/s, gust 16m/s, Bai Chay (Quang Ninh) 13m/s, gust 17m/s. Minimum pressure was recorded of 994,3 mb at 10UTC 12th July, 2009 at Hon Dau station. SOUDELOR caused heavy rain for North Vietnam, total in 2 days (12th and 13th July) is 100mm in general, some stations get more such as: Moc Chau (Son La) 211mm, Nam Dinh 166mm, Hoi Xuan (Thanh Hoa) 175mm.



Figure 1. Tropical Storm SOUDELOR in July 2009

TS No 7 (MUJIGAE – 0913) was upgraded from tropical depression over North South China Sea. At 21 UTC of 09th September, its locations was 18.6N – 115.9E with maximum wind speed of force 8, gust 9, 10, moving WNW at 25km/h. After entering Bacbo gulf, MUJIGAE slowed down at 10km/h, then made landfall on Nam Dinh – Thanh Hoa provinces on 12th September morning. Maximum wind speed recorded at Bach Long Vi station is 20m/s, gust 27m/s, Co To 18m/s, gust 24m/s, Hon Dau 13m/s, gust 21m/s, Van Ly (Nam Dinh) 18m/s, gust 21m/s. Minimum pressure was recorded of 994,6 mb at 08.30UTC 11th September, 2009 at Bach Long Vi station. MUJIGAE did not cause really heavy rain for North Vietnam, total in 3 days (11th and 13th September) is 30-80mm in general, some provinces got more such as: Hoa Binh 180mm, Nam Dinh 159mm, Ninh Binh 231mm, Thanh Hoa 263mm.

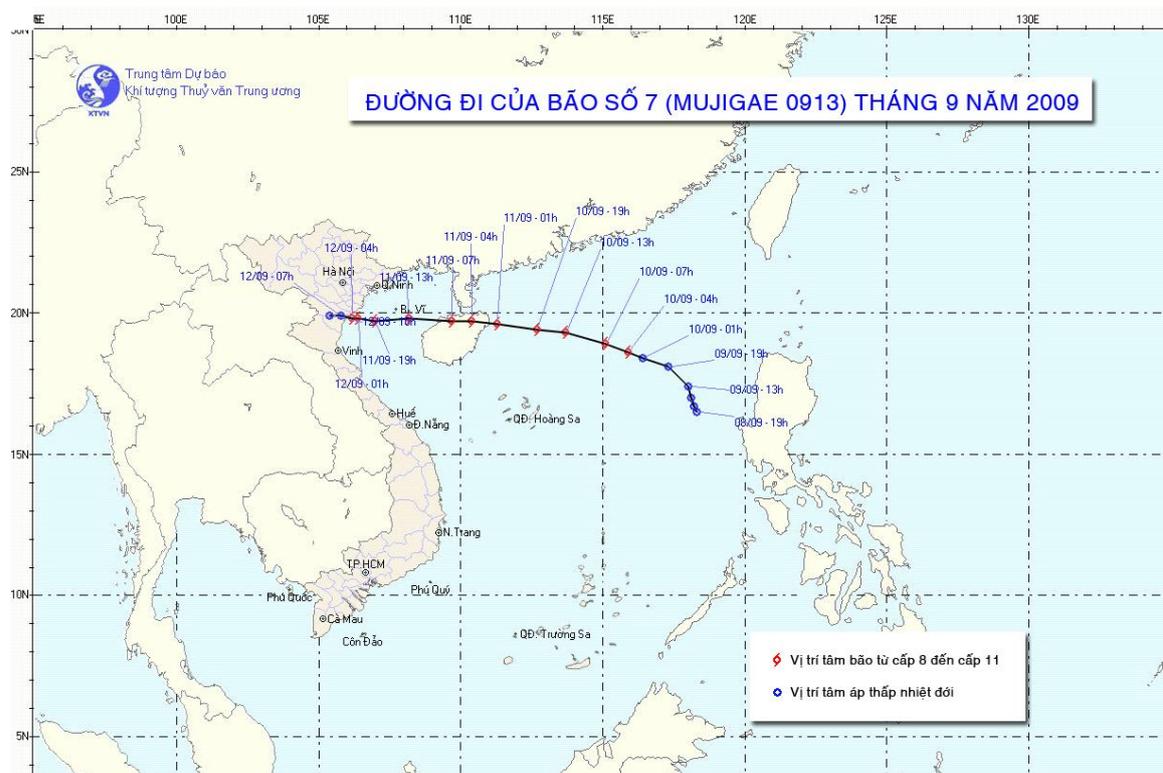


Figure 2. Tropical Storm MUJIGAE in September 2009

TS No 9 (KETSANA – 0916) was upgraded from tropical depression over East Philippine Sea. At 00 UTC of 26th September, its locations was 15.4N – 122.7E with maximum wind speed of force 8, gust 9, 10, moving Westward at 25km/h and intensified rapidly. After entering South China Sea, KETSANA continued to move West-ward at 20 - 25km/h, when KETSANA approached Hoang Sa archipelago, it reached maximum intensity of 13 beaufort scale, gust 14, 15. After crossing Hoang Sa archipelago, KETSANA continued its west-ward and slightly change its direction before making landfall on Quang Nam – Quang Ngai provinces on 29th September afternoon. Maximum wind speed recorded at Ly Son station is 32m/s, gust 43m/s, Con Co 17m/s, gust 24m/s, Da Nang 22m/s, gust 30m/s, Tam Ky (Quang Nam) 16m/s, gust 29m/s, Quang Ngai 16m/s, gust 22m/s. Minimum pressure was recorded of 964,7 mb at 05.30UTC 29th September, 2009 at Ly Son station. KETSANA did cause really heavy rain for Central

Vietnam (includes provinces from Quang Binh to Quang Ngai, Gia Lai, KonTum, total rainfall in 3 days (28th and 30th September) is 120-270mm in Quang Binh; 200 – 400mm in Gia Lai, Kon Tum, and Quang Tri to Quang Ngai; 400 – 600mm for provinces from Thua Thien Hue to Quang Ngai. Some provinces got more rainfall such as: Nam Dong (Thua Thien Hue) 884mm, Tra Bong (Quang Nam) 914mm... KETSANA also caused historic flood in some rivers in central Vietnam.

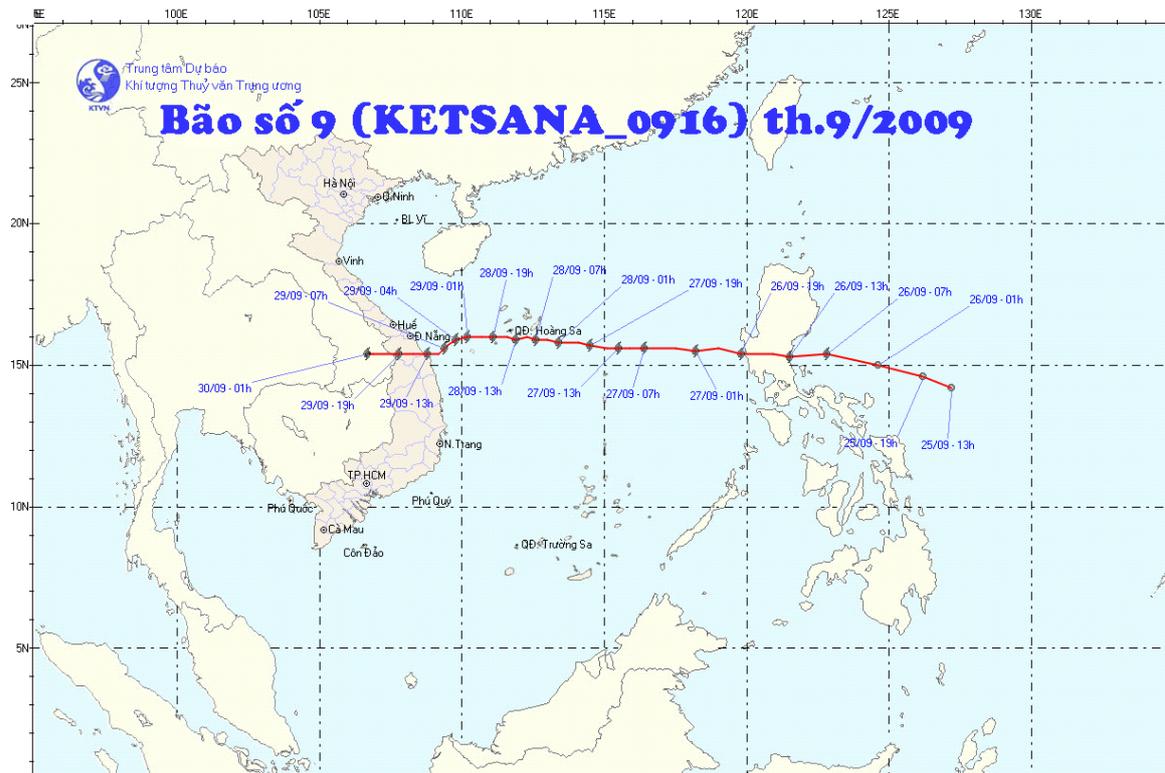


Figure 3. Tropical Storm KETSANA in September 2009

TS No 10 (PARMA – 0917) was upgraded from tropical depression over North West Pacific. At 12 UTC of 12th October, its locations was 10.0N – 146.0E. After entering South China Sea on 4th October morning, PARMA moved NNW, then WNW. At 00UTC, 5th November, PARMA was at 20,1N – 119,3E with maximum intensity of 10 beaufort scale. Since then, because of interaction with typhoon MELOR, TS. PARMA is almost stationary, moving ESE and then SE, going out of South China Sea. After crossing 122^oE longitude, PARMA came back, crossed Luzon once more and entered South China Sea on 9th October morning. Before entering Bacbo gulf, slightly intensifying and then dissipating over coastal area of Thai Binh – Nam Dinh provinces, PARMA moved Westward and NorthWestward with unstable speed. This is one of the most complicated-track-typhoon in 2009 over South China Sea. Although PARMA did not make landfall with tropical cyclone or tropical depression intensity, PARMA caused damage wind over Bacbo gulf, maximum wind speed of 42m/s, gust 53m/s for Bach Long Vi station; 18m/s, gust 30m/s for Co To station. For coastal area, PARMA also brought 18m/s, gust 24m/s for Cua Ong station; 12m/s, gust 16m/s for Mong Cai station. Minimum pressure of 989,0 mb was recorded at 08.15UTC 13th October, 2009 in Bach Long Vi station. PARMA

caused heavy rain for Quang Ninh – Hai Phong provinces, total rainfall in 3 days (13th and 15th October) is 100 - 150mm, some stations got more such as: Mong Cai (Quang Ninh) 181mm, Bach Long Vi 193mm, Co To 317mm, Thanh Hoa 179mm...

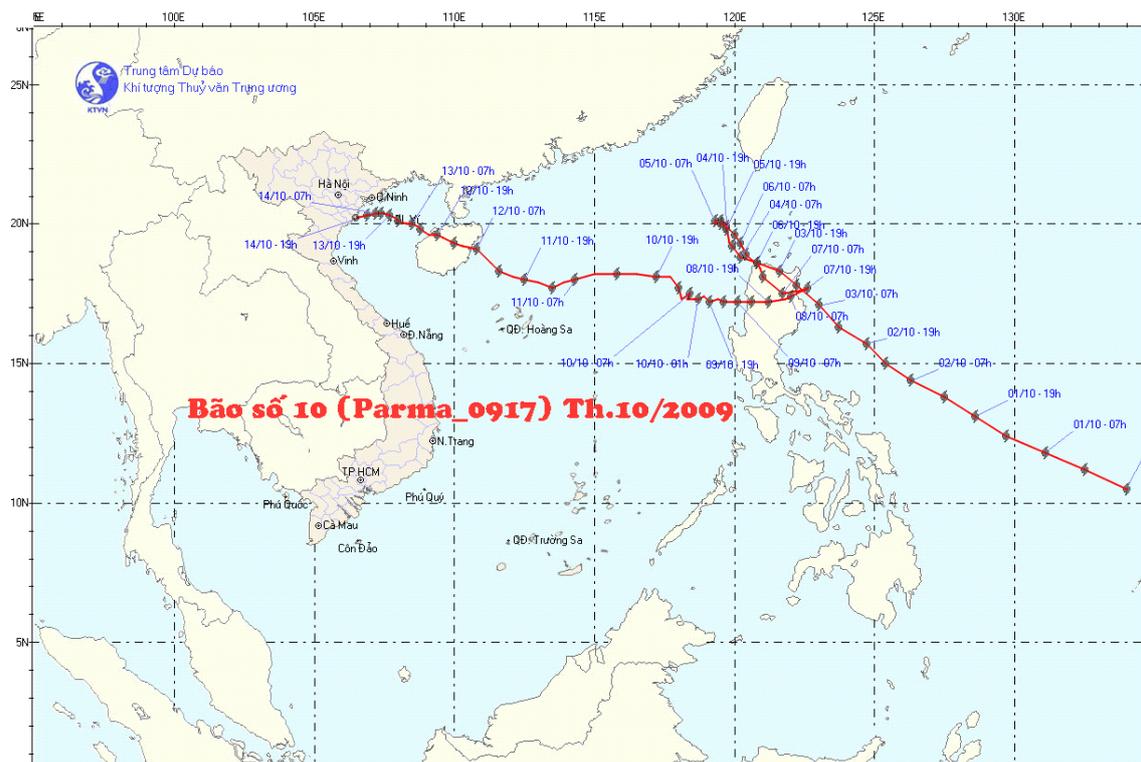


Figure 4. Tropical Storm PARMA in October 2009

TS No 11 (MIRINAE – 0921) was formed over North West Pacific. 31st October, MIRINAE crossed Luzon island, entering South China Sea. This is 10th Tropical Cyclone over South China Sea in 2009. MIRINAE moving mostly steady to the West at 20 - 25km/h and reaching its maximum intensity of 11 beaufort scale. When MIRINAE is 250km away from Binh Dinh – Khanh Hoa coastline, it turned to South-West before making landfall on Phu Yen – Khanh Hoa provinces on 2nd November. Maximum wind speed recorded at Ly Son station is 20m/s, gust 25m/s, Tuy Hoa 19m/s, gust 33m/s, Quy Nhon 17m/s, gust 28m/s, Nha Trang 12m/s, gust 22m/s. Minimum pressure of 989,5 mb was recorded at 07.30UTC 2nd October, 2009 at Tuy Hoa station. MIRINAE caused heavy rain for South Vietnam (includes provinces from Quang Ngai to Khanh Hoa, Gia Lai), total rainfall in 2 days (2nd and 3rd November) is 200 - 300mm. Some provinces got more rainfall such as: A Luoi (Thua Thien Hue) 377mm, Tra My (Quang Nam) 391mm, Van Canh (Binh Dinh) 666mm, Quy Nhon (Binh Dinh) 368mm, Van Ninh (Khanh Hoa) 355mm...

Rainfall in some places were higher than 300mm such as Muong Te: 443mm; Ban Chieng: 442mm; Ha Giang: 364mm; Bac Quang: 534 mm. Heavy rain mainly concentrated on 4-5 July with daily rainfall in some places was very large such as Muong Te: 208 mm; Ha Giang: 220mm; Bac Quang: 230mm. The big flood occurred in most of rivers in the North Vietnam. In some river the peak flood was exceeded the alarm level 2. The flood peak in Thao river at Yen Bai station was 30,16m with flood amplitude of 3.71m; in Da river at Ta Bu station was 116,75 m with flood amplitude of 6,67m and in downstream of Hong river at Hanoi station was 8,79m with flood amplitude of 5,73m. The maximum inflow to Hoa Binh reservoir was 11600 m³/s. *Especially, historical flood was occurred at Ta Gia on Nam Mu river and Tuyen Quang reservoir on Gam river.* The maximum inflow to Tuyen Quang reservoir was 7900 m³/s which is highest in observed data.

b) In the Central: During flood season of 2009, in rivers in Central Vietnam and the Highland, it is occurred 3 large floods and two medium and small floods. Three highest flood are described hereinafter

- *From 2 to 11 September 2009, due to affect of TD No.8 two flood events occurred on rivers from Quang Binh to Binh Dinh and Tay Nguyen area.*

From 2 to 5 September, the heavy rains, over 200-500 millimetres, were recorded in provinces from Quang Binh to Binh Dinh and Tay Nguyen area. The rain in some places was extreme heavy such as Phong Binh: 649mm, Nam Dong: 547mm, Da Namg: 651mm; Tam Ky: 562mm... Heavy rain mainly concentrated on 04 September with daily rainfall in some places was very large such as Phong Binh: 428mm; Phu Oc: 340mm; Nam Dong: 356mm; Da Nang: 391mm. Medium and small flood occurred in Quang Tri to Quang Nam provinces with flood amplitude from 2.5 to 4,0 m. Flood peak in most of rivers in the area was at the alarm level 1 and 2 except flood peak at Kim Long on Huong river which exceed the alarm level 3 by 0.06m.

From 6 to 9 September, heavy rains, over 100-350 mm was recorded in provinces from Thua Thien Hue to Binh Dinh and Tay Nguyen area. Rainfall in some places was higher than 400 mm such as Tien Phuoc: 480mm, Tra My: 455mm, Cau Lau: 404mm; Tam Ky: 588mm, Ly Son: 593mm; Chau o: 408mm, Tra Khuc: 349mm. Maximum daily rainfall in some places were higher than 200 mm such as Tra My: 226mm, Tien Phuoc: 247mm, Cau Lau: 224mm, Tam Ky TV: 283mm. The heavy rain caused flood in rivers from Thua Thien Hue to Quang Ngai provinces and Tay Nguyen area with flood amplitudes were from 1.5 to 3.5m and flood peaks were at the alarm level 2 except flood peaks at Ban Don on Serepok river and Daknong on Daknong river which exceed the alarm level 3 by 0.06m and 0.69m respectively.

- *From 28 to 30 September 2009, due to the Tropical Storm Kesana, the heavy rains, over 300-600 millimetres were recorded in provinces from Quang Binh to Quang Ngai, Gia Lai and Kon Tum in Vietnam. The rain in some places was very heavy and higher than 600mm such as Nam Dong: 884 mm, Tra Bong: 914mm. Heavy rainfall mainly concentrated on 29 September with daily rainfall from 200 to 450 mm. In some places The maximum daily rainfall was very large such as Nam Dong: 596 mm; Tra Bong: 748mm; Tra Khuc: 518mm, Minh Long 521 mm.*

The big flood occurred in rivers from Quang Binh to Phu Yen and Highland areas. Historical flood and extreme floods occurred on rivers from Quang Tri to Quang Ngai and Kon Tum provinces. The flood amplitude was from 11,0 to 16,5m in upstream and from 3,8 m to 6,3m downstream of rivers in Quang Tri and Quang Ngai. In Northern Highland, the flood amplitude was from 6.0 m to 8.0 m. The peak floods exceeded the alarm level 3 from 1.0 m to 4.0 m in rivers from Quang Tri to Quang Ngai and got over the historical value in Vu Gia, Tra Bong, Dakbla, Po Ko rivers. The heavy rainfall and extreme flood led very serious large, deep inundation about 1,0-4,5m during 3 - 7 days in these provinces. Flood peak on some rivers in Central and highland provinces are shown in table 1

Table 1: Flood peak on some rivers in Central and highland provinces

No	Province	River	Station	Flood Peak		Compare to The alam level 3 (m)
				Time	Water level (m)	
	Quang Binh	Gianh	Đồng Tâm	02h/01/10	14.29	Lower 1.71 m
	-	-	Mai Hóa	05h/01/10	6.67	exceeding 0.67m
	-	K.Giang	Lệ Thủy	21h/30/09	3.05	exceeding 0.35m
	Quang Tri	Quảng Trị	Thạch Hãn	07h/30/09	7.08	exceeding 1.68m, lower than historical flood 1999: 0,21m
	Thua thien Hue	Bồ	Phú Ô c	09h/30/09	4.26	lower 0.24m
	-	Huong	Kim Long	20h/29/09	4.57	exceeding 1.57m
	Quang Nam	Vu Gia	Aí Nghĩa	03h/30/09	10.77	exceeding 2.97m, exceeding historical flood 1964: 0,67m
	-	Thu Bồn -	Giao Thủy	04h/30/09	9.75	exceeding 1.15m
	-	-	Câu Lâu	07h/30/09	5.29	exceeding 1.59m, lower than historical flood 1964: 0.19m
	-	-	Hội An	10h/30/09	3.20	exceeding 1.50m, lower than historical flood 1964: 0.20m
	Da Nang	Hàn	Cầm Lệ	12h/30/09	3.16	exceeding 1.46m
	Quang Ngai	Trà Khúc	Trà Khúc	01h/30/09	8.12	exceeding 2.42m, lower than historical flood 1999: 0.24m
	-	Trà Bồng	Châu Ổ	20h/29/09	6.35	exceeding 2.25m, exceeding historical flood 1964: 0.67m
	-	Sông Vệ	Sông Vệ	22h/29/09	5.37	exceeding 1.27m
	Kon Tum	Đakbla	KonPLong	20h/29/09	597.20	exceeding 3.20m, exceeding historical flood 1996: 0.93m
	Kon Tum	-	Kon Tum	23h/29/09	524.15	exceeding 2.15 m, exceeding historical flood 1996: 1.13m
	Dak Lak	PôKô	Đắc Môt	23h/29/09	591.03	exceeding 7,03m, exceeding historical flood 2006: 4.39m
	-	Sêrêpôk	Bản Đôn	04h/30/09	174.00	exceeding 0.50m

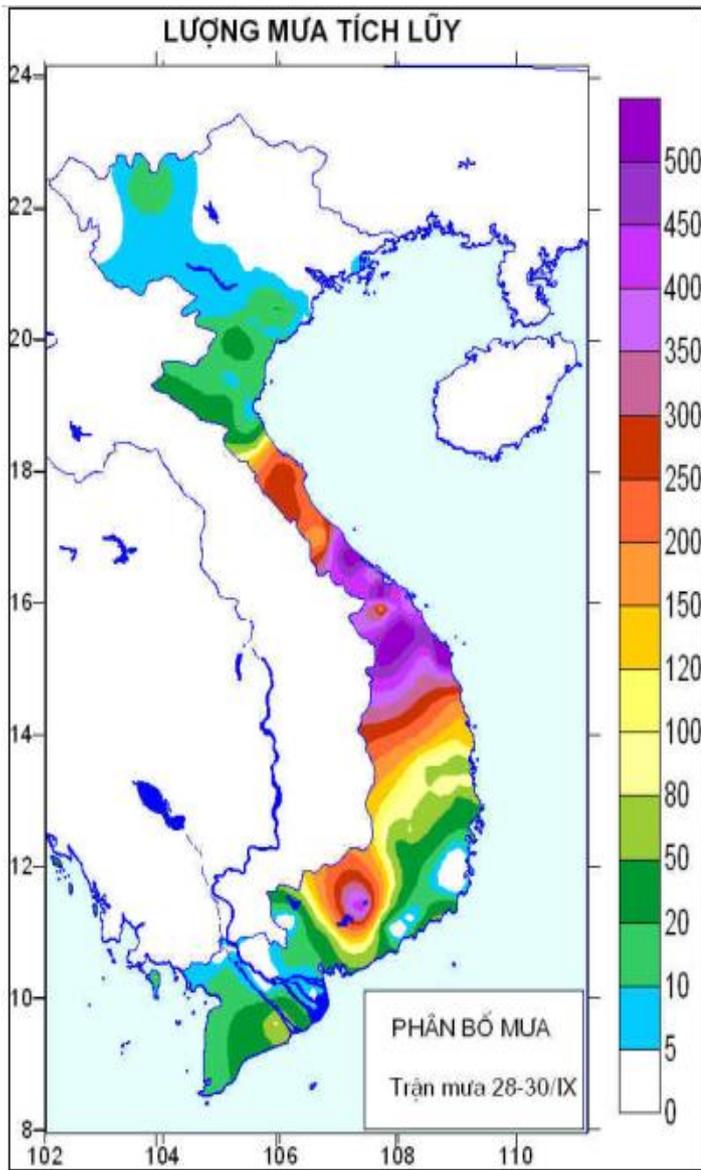


Figure 6. Accumulated rainfall from 28 to 30 September



Figure 7. Inundation in Quang Nam province in 30/09/2009



Figure 8. Inundation on Quang Ngai province in 30/09/2009

- From 02 to 03 November 2009, due to the affect of Tropical Storm Marinae in combination with cold air surge, the heavy rains over 100-300mm were recorded in Quang Tri to Ninh Thuan provinces in Central and Highland parts of Vietnam. The rainfall of 400 – 500 mm was recorded in some places, for instance Son Giang (Quang Ngai province): 428mm. Especially, rainfall of 842 mm with maximum rainfall intensity per 6 hours of 294mm was recorded at Vam Camh in Binh Dinh province. The heavy rainfall and concentrate in one short period led very serious flood and inundation in provinces from Quang tri to Ninh Thuan and Highland area. Historical flood and extreme floods occurred from Quang Ngai to Khanh Hoa and Gia Lai provinces. Peak floods in rivers from Thua

Thien - Hue to Quang Nam, Kon Tum và Dak Lak exceeded the alarm level 2, in in rivers from Quang Ngai to ninh Thuan and Gia Lai provinces exceeded the alarm level 2 by 1 to 4 m. Especially, Historical flood occurred in some rivers such as Ky Lo (Phu Yen province), Cai Nha Trang (Khanh Hoa province), Ba (Gia Lai province) as shown in table 2.

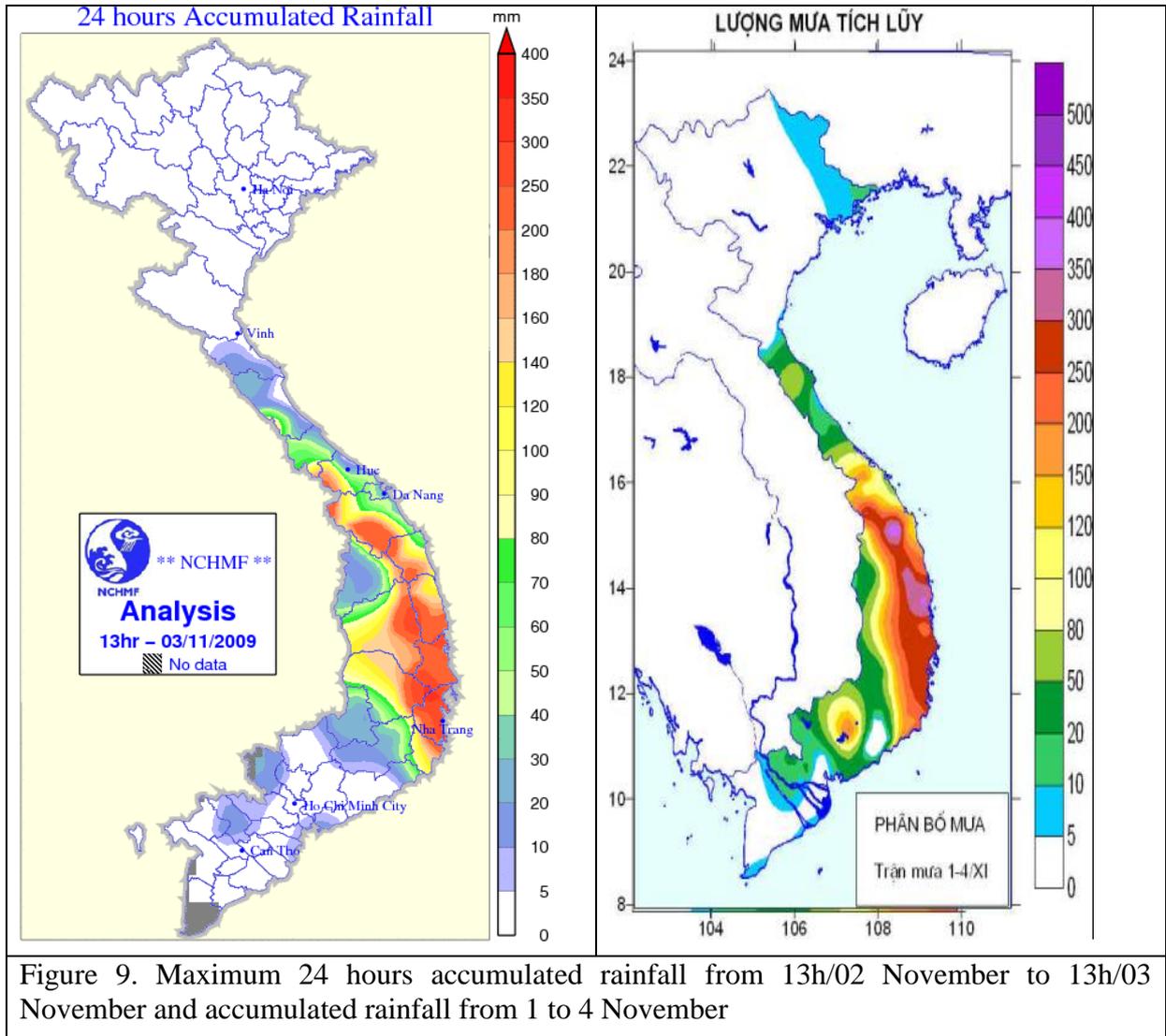


Figure 9. Maximum 24 hours accumulated rainfall from 13h/02 November to 13h/03 November and accumulated rainfall from 1 to 4 November



Figure 10: Inundation in Phu Yen province in 4 December 2009



Figure 11: Inundation in Binh Dinh province in 3 December 2009

Table 2. Flood peak on some rivers in Central and highland provinces

No	Province	River	Station	Flood Peak		Compare to The alam level 3 (m)
				Time	Water level (m)	
1	Quảng Ngãi	Trà Khúc	Trà Khúc	8h/3/11	6,91	exceeding 1,21
2		Sông Vệ	Sông Vệ	8h/3/11	5,38	exceeding 1,28
3	Bình Định	Kôn	Thạnh Hoà	14h/3/11	9,03	exceeding 1,53
4		Kỳ Lộ	Hà Bằng	4h/3/11	13,47	exceeding historical flood (1988 : 12,47m) 1,0
5	Gia Lai	Ayun	PMơ Rê	8h/3/11	677,19	exceeding 2,19
6		Ba	An Khê	9h/3/11	406,98	exceeding 0,48
7		Ba	Ayunpa	15h/3/11	158,63	exceeding historical flood (1988 : 157,97m) 3,13
8	Phú Yên	Ba	Củng Sơn	4h/4/11	37,65	exceeding 4,15
9		Đà Rằng	Phú Lâm	4h/4/11	4,65	exceeding 1,45
10	Khánh Hoà	Dinh	Ninh Hoà	16h/3/11	6,34	exceeding 1,34
11		Cái Nha Trang	Đồng Trăng	21h/3/11	13,42	exceeding historical flood (2003 ;13,34m) 3,42

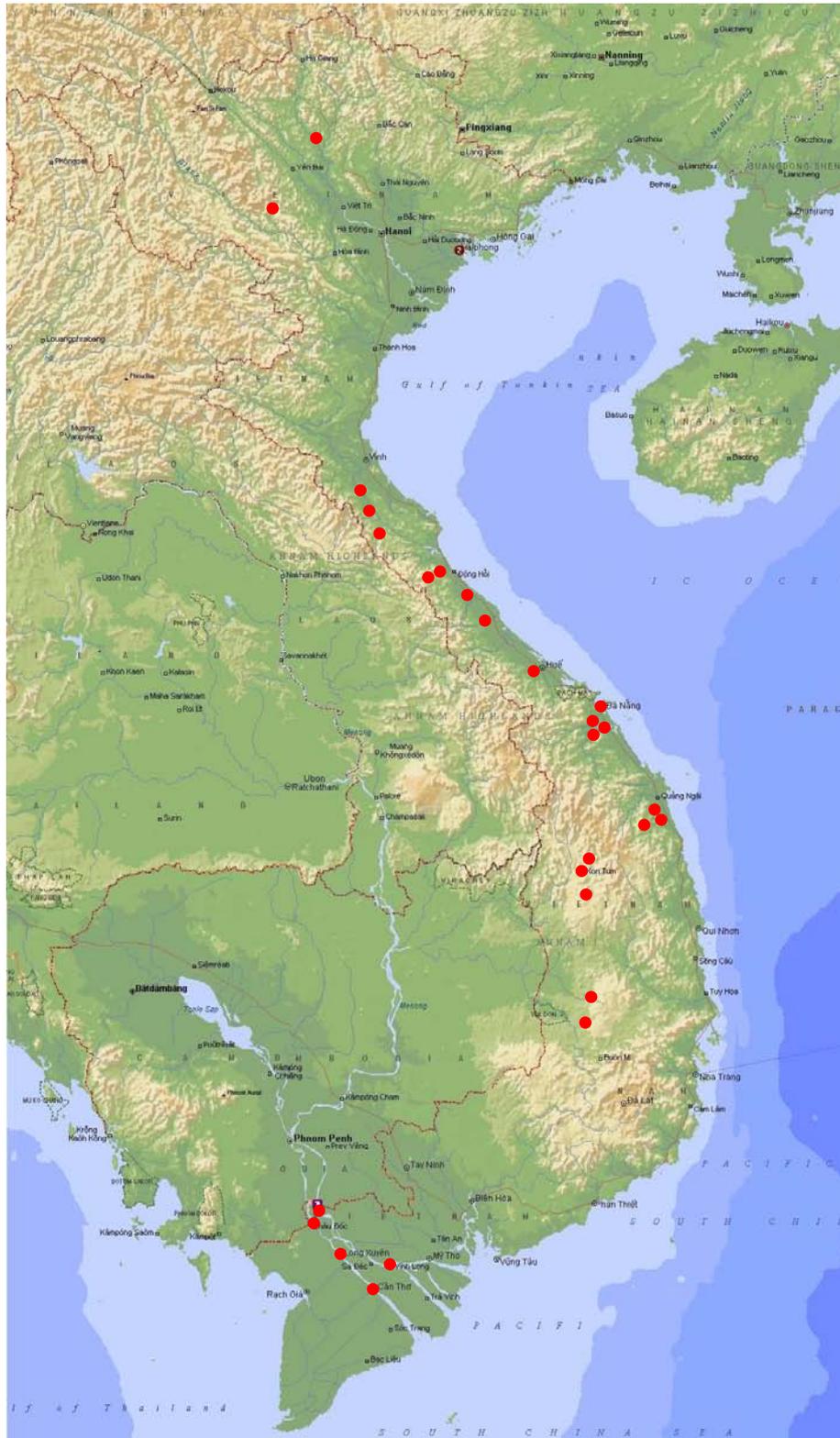


Figure 12: The points with flood peaks higher than III alert in 2009

c) Drought: Serious drought have occurred on large extend and lasted from August up to now in provinces belong to North and central Vietnam. Presently, water level on some rivers in North Vietnam was lowest in historical data observed and was lower than the yearly average value in comparison with the same period.

d) Flash Floods: 5 flash floods occurred in 4 provinces in the North and Central Vietnam such as Nghe An (25th May), Binh Thuan (07th October), Thanh Hoa (25th September), Bac Kan (04th July), Phu Yen (02th November). The flash floods caused extreme damages on human lives and properties to these provinces.

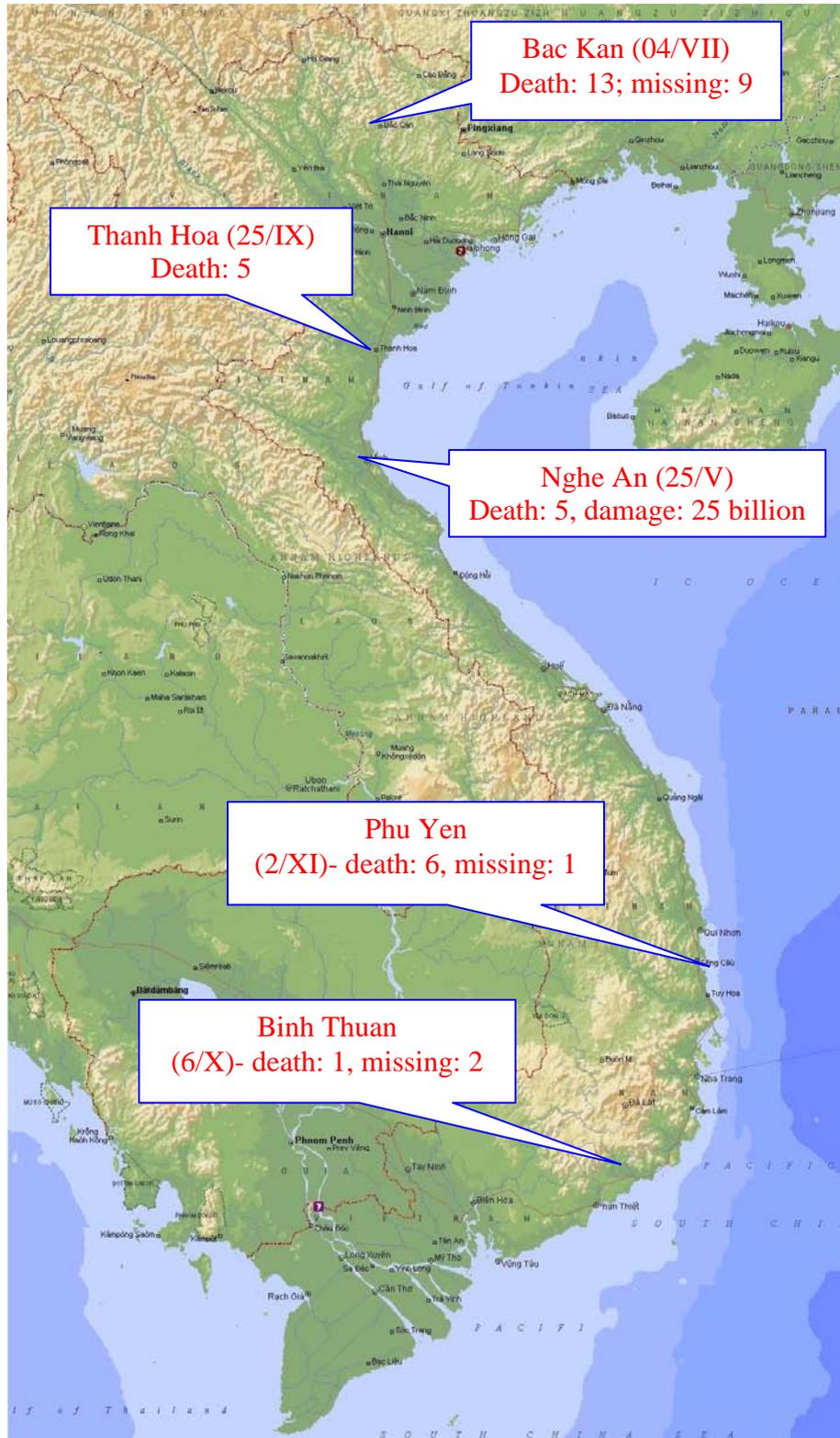


Figure 13: The provinces where flash floods occurred in 2009

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

Table 3: Summary report on damage caused by disaster in Vietnam in 2009

Category	Item damaged	Unit	Flood	Tropical cyclones	Others	Total
People	Killed	No	79	308	48	435
	Injured	No	29	1,310	51	1,390
	Missing	No	15	9	9	33
Housing	Houses collapsed, drifted	No	223	12,618	513	13,354
	Houses submerged and damaged	No	33,586	374,315	3,963	411,864
School	School collapsed	Room	0	1,364	0	1,364
	School submerged and damaged	Room	35	7,453	55	7,543
Hospital, clinics	Clinics collapsed	No	0	0	0	0
	Clinics submerged and damaged	No	1	13,306	1	13,308
Agriculture	Rice fields submerged	Ha	131,973	77,048	28,777	237,798
	Farms submerged, damaged	Ha	40,189	123,213	10,259	173,661
	Food damaged by water	Ton	920.7	52,583	8	53,511
Water Resources	Land washed away	m ³	589,887	2,426,327	16,988	3,033,202
	Stone drifted	m ³	450	392,055	0	392,505
	Dykes slumped	m	11,570	52,380	0	63,950
	Small hydraulic structures collapsed	Unit	97	332	16	445
	Small hydraulic structures damaged	Unit	527	1,438	392	2,357
Transportation	Land drifted	m ³	1,128,810	9,019,245	173,138	10,321,193
	Rock drifted	m ³	100	84,444	0	84,544
	Bridge, sewer collapsed	Unit	13	8	13	34
	Bridge, sewer damaged	Unit	330	890	1	1,221
	Roads damaged	Km	25.4	38,102	4	38,131
Aquatic product	Shrimp, fish poll broken	Ha	4,203	5,098	123	9,424
	Ships sunk, lost	Unit	39	638	6	683
	Ships sunk, damaged	Unit	4	237	2	243
Communication	Telephone poles collapsed	Unit	0	3,101	0	3,101
	Telephone wire broken	m	0	483,600	340	483,940
Energy	High voltage electric towers broken	Unit	0	0	1	1
	Electric distribution poles broken	Unit	108	5,519	57	5,684
	Electric wire broken	m	0	607,226	800	608,026
	Total damage	Bil VND	1690.3	21,901	154	23,745

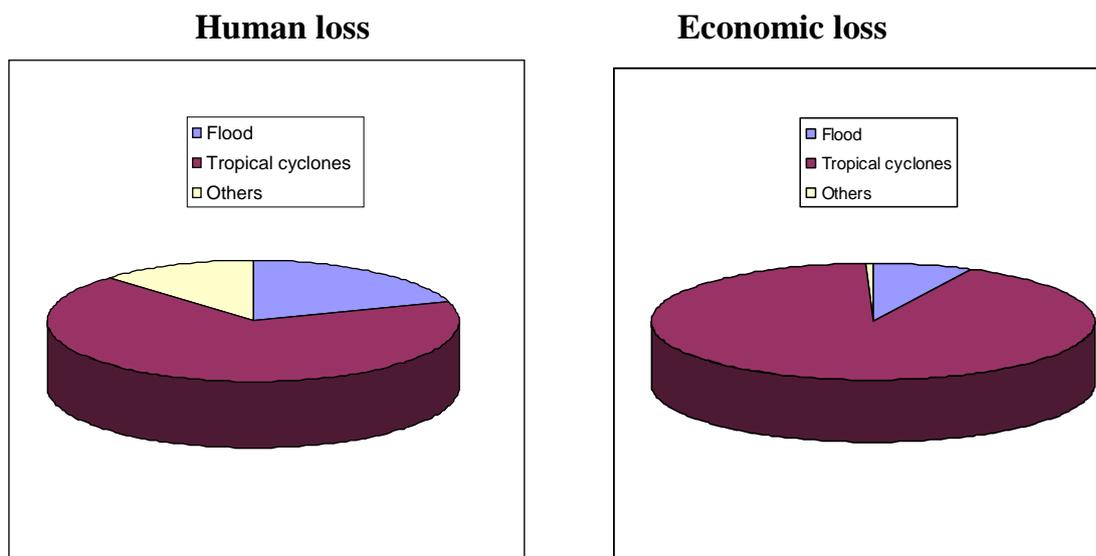


Figure 14. Human loss and Socio-economic impacts by disasters in Vietnam during 2009

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

- Existing Contract for Network Improvement of Data Transfer from the National Center for Hydrometeorological Forecasting of Viet Nam (NCHMF) to the Regional Flood Management and Mitigation Center between The Mekong River Commission Secretariat (MRCS) and NCHMF. The objective of this contract is to upgrade and improve the network coverage of the rainfall stations of the NCHMF and to secure proper delivery to the MRCS timely, accurate and reliable real-time water level and rainfall data, which was used for the operational flood forecasting.

- Existing agreements between Mekong committee and NCHMF for exchanging the hydrological data from China, Thailand, Laos and Cambodia and for flood forecasting and warning agency and disaster management agency of Viet Nam.

- Existing cooperation between HMS Vietnam and DHI for using Mike-11 model to flood forecasting.

- On going the Project “Strengthening the flood warning and forecasting capability in Viet Nam (ODA Italy). The periods of the project runs from 2003 to 2009 and invested in 5 provinces including: Quang Binh, Quang Tri, Thua Thien Hue, Quang Nam, Quang Ngai. Invested scope is focused on main issues: Install automatic observation equipments for 74 observation stations (new 15 rain gauges, 16 automatic meteorological stations, 43 automatic water level stations, install calculating equipment for 6 forecasting Centers, install telecommunication for observed data, Apply and establish flood forecasting model Mike-11.

- On going the Mahasri Project to improve the forecasting, warning capability for Central Viet Nam to speed up and facilitate the cooperation with other countries in the region and in the world. The budget is about 3,685 millions USD funded by Japanese Government. The project period is from 2008 to 2013. The scope is of: install 28

automatic rain gauges from Thua Thien Hue to Quang Ngai province, install 6 automatic water level stations on Huong and Thu Bon-Vu Gia river, install 01 automatic meteorological station at Ba Na, install 20 modems for transferring real time observed data for 20 stations.

II. Summary of progress in Key Result Areas (For achievements/results which apply to more than one Key Result Area, please describe them under the most applicable Key Result Area. Then, at the end of the description, place in parentheses () the other applicable Key Result Areas)

1. Progress on Key Result Area 1: Reduced Loss of Life from Typhoon-related Disasters. (List progress on the Strategic Goals and Associated Activities in the Strategic Plan and progress on the 2008 Typhoon Committee Annual Operating Plan goals)

- a. Meteorological Achievements/Results
- b. Hydrological Achievements/Results
 - Established the flash flood warning system with 8 automatic rainfall gauges in Lao Cai province
 - Established the flood warning system with 2 automatic rainfall gauges in Kon Tum province.
 - Established the flood warning system with 10 automatic rainfall gauges in Thua Thien Hue province on frame of MAHASRI's near-realtime rainfall data in Central Vietnam.
- c. Disaster Prevention and Preparedness Achievements/Results
- d. Regional Cooperation Achievements/Results
Nil.
- e. Identified Opportunities/Challenges for Future Achievements/Results
Nil.

2. Progress on Key Result Area 2: Minimized Typhoon-related Social and Economic Impacts. (List progress on the Strategic Goals and Associated Activities in the Strategic Plan and progress on the 2008 Typhoon Committee Annual Operating Plan goals)

- a. Meteorological Achievements/Results
Nil.
- b. Hydrological Achievements/Results
Nil.
- c. Disaster Prevention and Preparedness Achievements/Results
 - The Disaster Relief Fund for the Central Region was established to support the post-disaster recovery in the region
 - The Program on reinforcement of sea dyke system from Quang Ngai to Kien Giang was approved by the Prime Minister in May 2009. This program includes 3 phases: 2009 – 2012; 2013 – 2016; and 2017 – 2020.

- The Program on reinforcement of river dyke system was approved by the Prime Minister in December 2009. This program from 2009 to 2020.
- The National Report on the implementation of the Hyogo Action 2008 was developed by the Ministry of Agriculture and Rural Development.

d. Research, Training, and Other Achievements/Results

- In October, 2009, Asian Disaster Preparedness Center in cooperation with the Ministry of Education and Training and Tien Giang province to organize a workshop on “Provincial Partnership for implementing and maintaining the School Flood Safety Program in Flood area” in Tien Giang. More than 60 people from the Ministry of Education and Training, The Mekong River Commission Secretariat (MRCS), Vietnam National Mekong River Commission, Department of Dyke Management – Flood and Storm Control, provincial line agencies, teachers and students of project provinces, neighbour provinces such as Ben Tre, An Giang and Dong Thap participated in the meeting.

The purpose of the workshop was to consolidate the experiences and lesson learnt from the School Flood Safety Program since 2007 in the Mekong Delta and to activate the existing provincial partnership to further conduct child safety awareness programs in the schools by the teachers as part of regular activity of the school in the long term.

The School Flood Safety Program (SFSP) in Mekong Delta, which is implemented by The Asian Disaster Preparedness Center (ADPC) through The Mekong River Commission Secretariat (MRCS) with the funding support from the German Government development agency GTZ and European Commission Humanitarian Aid department (ECHO), is an innovative public awareness program involving the Primary and Secondary School teachers and the students to reduce the impact of the annual flooding due to Mekong River

- Regional training course on "Methods to assess the damage and loss” in Bangkok, Thailand, 6-9/1/2009
- The first session of Committee for Disaster Risk Mitigation in Bangkok, Thailand, 24-28/3/09
- Workshop “ cooperation for response capacity enhancing to Disaster in Tu Xuyen, China, 27-30/5/09
- Global forum on disaster mitigation in Switzerland, 16-19/6/09
- ASEAN Regional Forum on Natural Disaster Mitigation (ARF-ISM) held in Hawaii, United States, 15-20/9
- Forum ARDEX-09 in Philippine, 22-29/10/2009
- National forum and activities in the Hyogo framework of the European countries, held in London, UK, 11-13/11/09

e. Regional Cooperation Achievements/Results
Nil.

f. Identified Opportunities/Challenges for Future Achievements/Results
Nil.

3. Progress on Key Result Area 3: Enhanced Beneficial Typhoon-related Effects for the Betterment of Quality of life. (List progress on the Strategic Goals and Associated Activities in the Strategic Plan and progress on the 2009 Typhoon Committee Annual Operating Plan goals)

- a. Meteorological Achievements/Results
- b. Hydrological Achievements/Results
Nil.
- c. Disaster Prevention and Preparedness Achievements/Results
Nil.
- d. Research, Training, and Other Achievements/Results
Nil.
- e. Regional Cooperation Achievements/Results
Nil.
- f. Identified Opportunities/Challenges for Future Achievements/Results
Nil.

4. Progress on Key Result Area 4: Improved Typhoon-related Disaster Risk Management in Various Sectors. (List progress on the Strategic Goals and Associated Activities in the Strategic Plan and progress on the 2009 Typhoon Committee Annual Operating Plan goals)

- a. Meteorological Achievements/Results
- b. Hydrological Achievements/Results
- c. Disaster Prevention and Preparedness Achievements/Results
 - The 2009 conference on the national storm and flood prevention and response, and search and rescue was expedited online, chaired by the Deputy Prime Minister Hoang Trung Hai.
 - The 2009 workshop on dyke management and maintenance, and flood and storm control operations for the Northern, Central and Highland provinces with dykes was organized in April in Danang, Central Region.
 - The Government's Decree on the responsibilities and duties of the CCFSC and the committees at lower levels was amended
 - The Program on Community Based on Disaster Reduction Management until 2020 was approved by the Prime Minister in July 2009. The program includes 3 phases: 2009 – 2010; 2011 – 2015; and 2016 – 2020. This project is

expectedly implemented for 12 years (2009-2020) for over 6,000 villages and communes frequently affected by natural disasters. The total budget for the project is approximately VND 988.7 billions, with 55% being contributed by the state budget, 5% public contribution and 40% ODAs with no obligations to repay granted by international organizations.

- In March 2009, National Disaster Mitigation Partnership (NDMP) and Disaster Management Centre (DMC) jointly organized and facilitate a *Workshop on Planning for the Future of Natural Disaster Mitigation Partnership and the Disaster Management Model*. The second half of this workshop focused on discussions of the current model or structure for disaster management in Vietnam, the major issues and challenges, and both needs and ideas for the future.
- In May 2009, Standing Office of Central Committee for Flood and Storm Control (Standing Office of CCFSC) and CARE in the facilitation of a *Workshop on Initiating the Process for Development of Legislation on Disaster Management in Vietnam* under the DIPECHO funded JANI project. This workshop sought to develop a roadmap for the development and approval of disaster management legislation, in line with the legislative approval procedures of the Government of Vietnam.
- In June 2009, Standing Office of CCFSC organise and run a consultation workshop in southern Vietnam. The purpose of the workshop was to get provincial feedback on Government plans to revise the decree outlining the functions, duties and organizational structures of the CCFSC. The workshop was broadened to include consultation with representatives from lower levels of Government, the academic community and civil society.
- In June 2009, CCFSC held a major workshop on *International Disaster Management Models*. The workshop, focusing on all disaster management, decentralized disaster management and institutional systems for disaster management, was considered extremely successful with a large amount of interest and involvement, particularly from Government participants. International guest speakers from Australia, Japan and ADPC gave presentations and lead discussions on disaster management approaches and arrangements in other countries. A senior Government official responsible for national security capability development in Australia came to Vietnam for the workshop. In the course of his visit initial informal discussions were also held regarding the possibility of establishing an ongoing relationship between Vietnamese and Australian disaster management institutions. It is hoped these discussions will be followed up in the near future.

d. Research, Training, and Other Achievements/Results

- Provincial flood and storm control planning capacity building in Mekong river delta

Learning workshop and training for flood and storm control planning capacity building was conducted for 4 days, 9 – 12 June, 2009 in Ben Tre province. It was co-organized by Ben Tre Committee for Flood and Storm Control, Mekong River Commission and the Asia Disaster Prevention Centre. This workshop is one of the activities under the 6th action plan of DIPECHO funded by the European Humanitarian Committee.

Ben Tre is one of the Southern provinces in the Mekong river delta having prepared the provincial action plan for disaster management to implement the National Strategy for Natural disaster prevention, response and mitigation and annual flood and storm control plan for 2008 – 2009. This shows that the provincial flood and storm control committee has been well prepared and ready for responses to disaster at any time.

The workshop focused on consulting members of the provincial flood and storm control committee on action planning, capacity building for annual flood and storm control plan development and implementation, and inter-sectoral coordination for implementing the National Strategy to 2020 under the instruction of the Central Committee for Flood and Storm Control.

The workshop was attended by 73 participants who are representatives of Ben Tre province and 9 districts in the province, the Department of Dyke management and Flood and Storm control, the International Mekong river commission, the Asia Disaster Prevention Centre, and the neighbouring provinces such as Tien Giang, Dong Thap, and An Giang.

- 2nd conference of ACDM: training programs and sense of community in Vientiane, Laos, 21-22/1/2009
- 13th annual meeting of ACDM, 16-21/2/2009
- Workshop “Sharing information about damages caused by storm in Seoul, Korea.”, 27-30/4/09
- Training Course on ASEAN Disaster Risk Management in Yango , Myanmar, 27-31/7/09
- Meeting on next activities of the 3rd Asia Ministerial Conference prepared for the Ministerial Conference of the 4th Asian Disaster Risk Mitigation held in South Korea., 9-15/8/09
- Annual meeting of the 14th ACDM in Indonesia, 30/11-1/12/09

e. Regional Cooperation Achievements/Results

f. Identified Opportunities/Challenges for Future Achievements/Results

5. Progress on Key Result Area 5: Strengthened Resilience of Communities to Typhoon-related Disasters. (List progress on the Strategic Goals and Associated Activities in the Strategic Plan and progress on the 2008 Typhoon Committee Annual Operating Plan goals)

a. Meteorological Achievements/Results

- Special arrangements are made with the national television channels to improve weather programs. Forecasted parameters and fields are automatically sent to the TV by a reserved server. In the case of extreme weathers such as tropical cyclone, additional briefings are provided to the TV weather interpreters so that the weather situations can be better explained to the public. As a result, the weather forecasts as well as tropical cyclone warnings have become more popular and understandable to the people.

- A link has been established from NCHMF to the office of Emergency Rescues for a quick dissemination of meteorological information (satellite images, observations, weather bulletins and TC warnings)
- b. Hydrological Achievements/Results
 - c. Disaster Prevention and Preparedness Achievements/Results
 - d. Research, Training, and Other Achievements/Results
 - e. Regional Cooperation Achievements/Results
 - f. Identified Opportunities/Challenges for Future Achievements/Results
6. **Progress on Key Result Area 6: Improved Capacity to Generate and Provide Accurate, Timely, and understandable Information on Typhoon-related Threats.** (List progress on the Strategic Goals and Associated Activities in the Strategic Plan and progress on the 2008 Typhoon Committee Annual Operating Plan goals)
- a. Meteorological Achievements/Results

a.1 Observation network

a.2 Technical advancement

- A new receiving station of FY satellite has been installed since November 2007 for getting geostationary satellite images, which provide additional information from satellite observations to forecasters.
- DVORAK technique is adopted to estimate the intensity of tropical cyclones in operational forecasting.

a.3 Numerical Weather Prediction

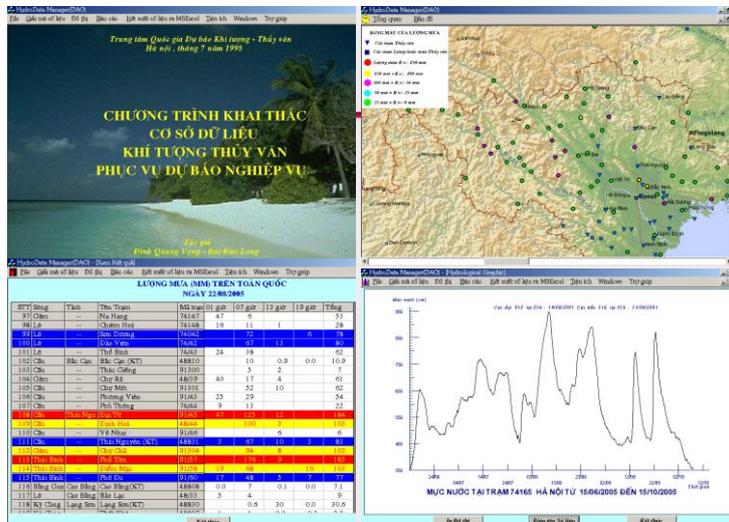
- The High Resolution Model (HRM) is operationally running 4 times per day with the increased horizontal resolution of 14km x 14km with different initial and boundary conditions interpolated not only from the DWD's global model GME, but also from the Japanese GSM model
- The ETA model has been put into the operational running twice per day for the Vietnamese region.
- The storm surge model adopted from Japanese version has been used semi-operationally when a typhoon is predicted to affect our region. The input data are taken from either the forecast fields from Japanese GSM model, HRM outputs or the predicted tracks. Additionally, the wave model (WAM) has been studied for running on the parallel computer.
- Short-range ensemble forecast system (SREFS) with 20 members from 5 global models (GEM, GFS, GME, GSM and NOGAPS) for 4 regional models (BoLAM, ETA, HRM, WRF-NMM) was developed and under testing for operational application.

a.4 Software

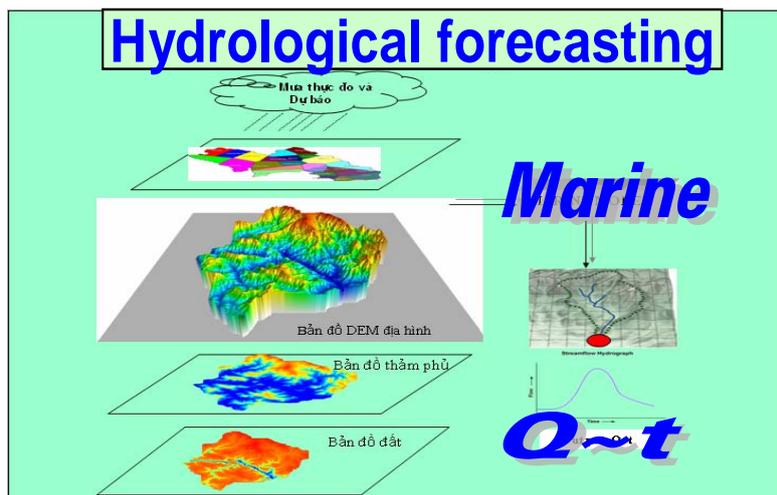
- The GEMPAK/N-AWIPS package from UNIDATA/UCAR has been installed, studied and undergone the adaptation to be used with the data feed from local sources at NCHMF.
- An interactive software for assisting tropical cyclone forecasting (“TCAid”) has been used operationally by forecasters in producing TC subjective guidance. This software was developed in 2007 as a new version of “TCInfo” using Microsoft SQL Server 2000 database. Inheriting all the advantages of “TCInfo” and applying the advanced IT technology, “TCAid” has many other convenient functions to meet forecaster’s requirements in operational work and it has been used for the 2009 typhoon season.
- “HMSTyph” software was developed for displaying TYPH observations at hourly intervals during the TS approaching coastal areas of Vietnam.

b. Hydrological Achievements/Results

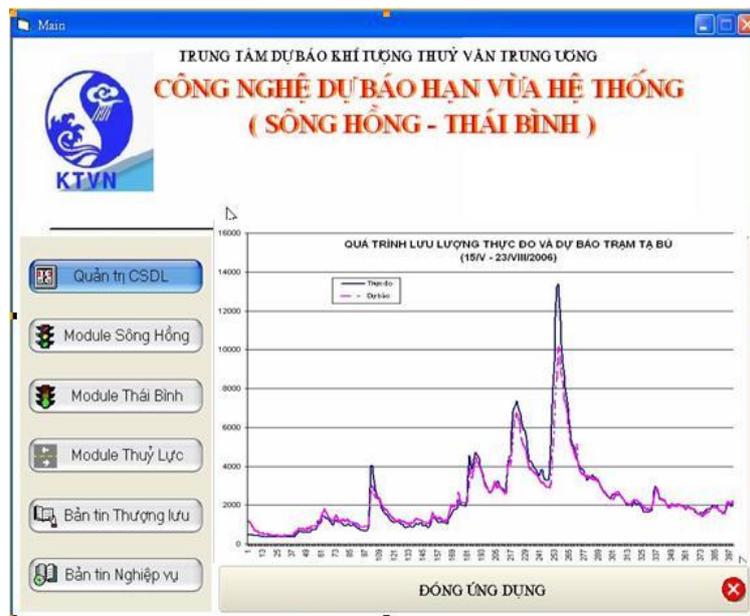
- *Improvements of software in data processing and analysis:* Continued to develop the software for the preservation of hydro-meteorological database, for hydrological data collection, processing and timely transmitting hydrological information and forecasts to end-users.



- Employ the MARINE and FIRR models to forecast flow in upstream area of Da, Thao, Lo rivers, *Reservoir Flood Routing* model for reservoir’s regulation in Da river and create the input for the Hydraulic model TL2 in lower stream of Red river.

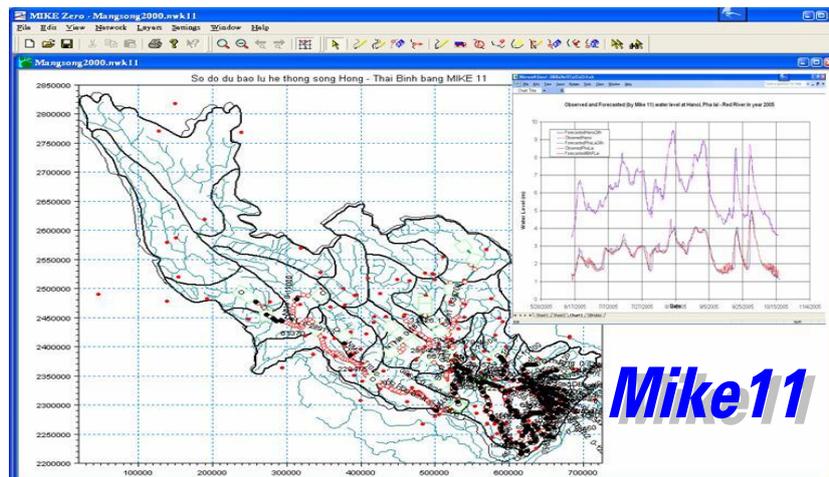


- Developing the TANK Model for flood forecasting with lead time 120h and time step of 6h since flood season of 2005



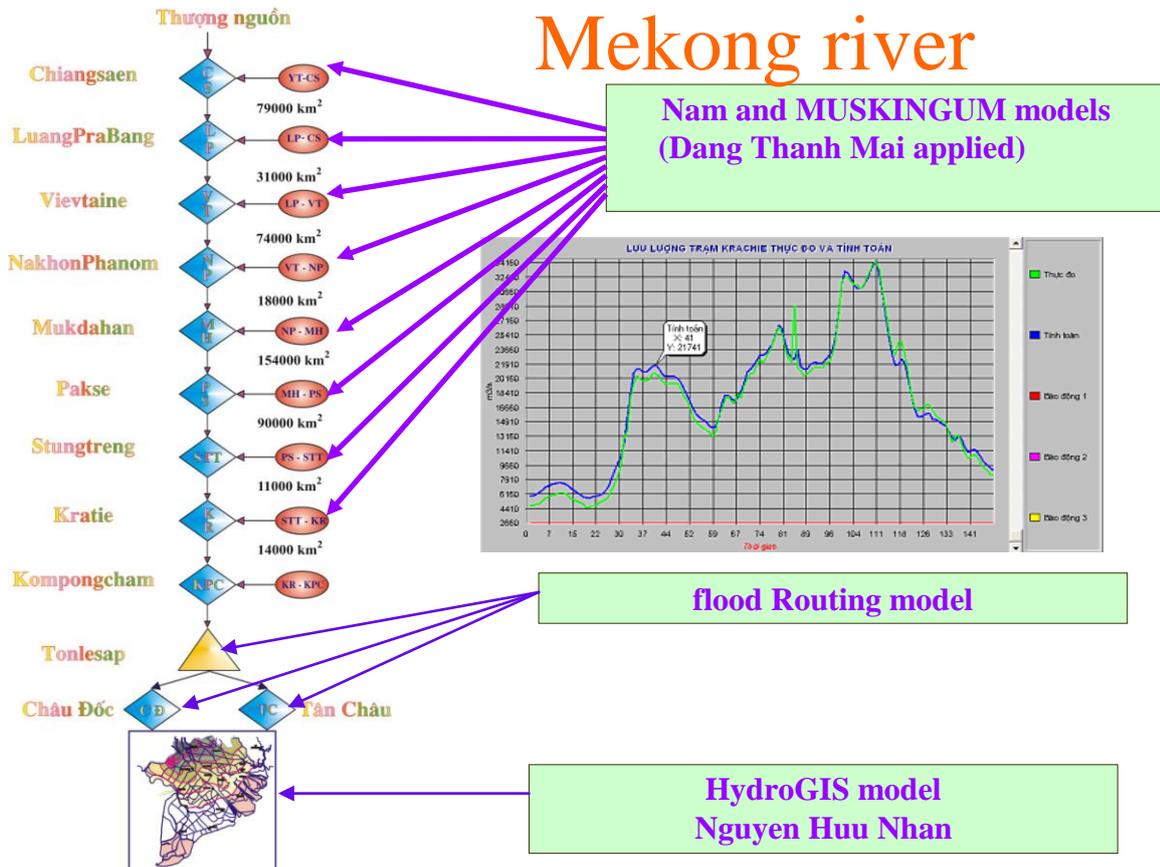
TANK + Muskingum + Cunge
for flood forecasting with lead time 120h

- Developing MIKE-11 Model for flow forecasting with lead time 48h in the lower Red river.

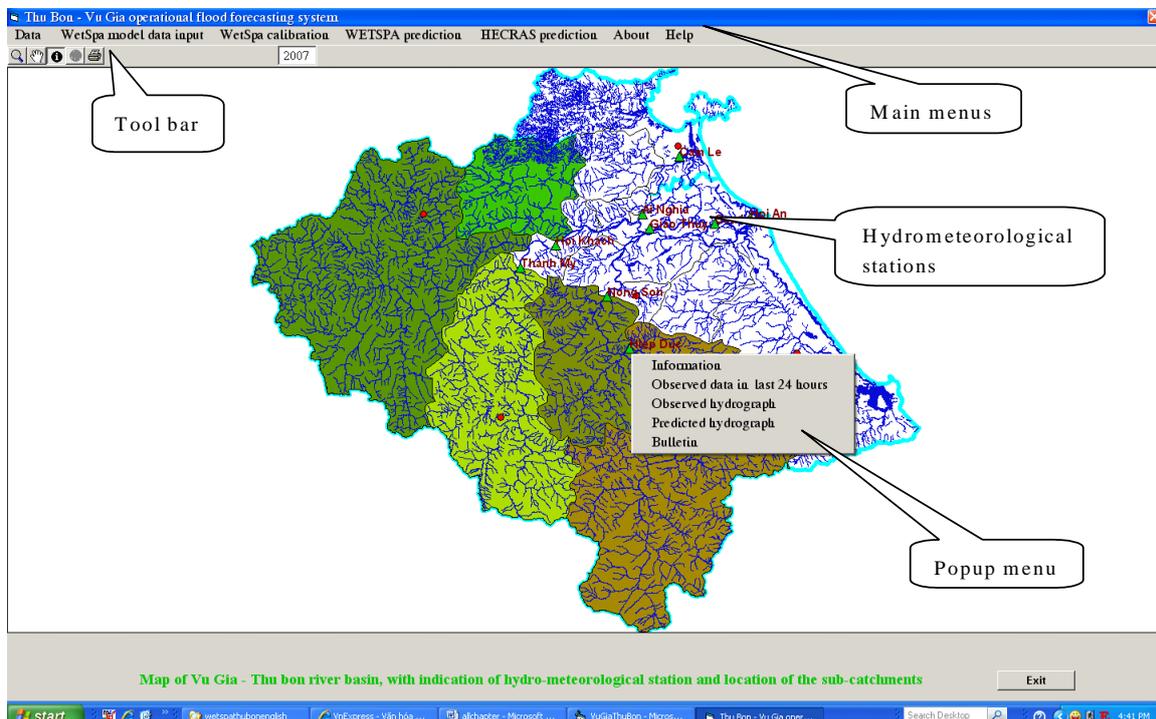


- Developing the HydroGIS model for flood forecasting with lead time 5 days in lower Mekong River.

Mekong river



- Developing the distributed hydrologic model WETSPA and hydraulic model HECRAS for flood forecasting with lead time 24 – 36 hours in Vu Gia – Thu Bon river system



- Assessing impacts of reservoir systems in Da and Lo rivers on dry season flow in downstream of Hong river system and proposing solutions for ensuring water resources for the downstream.

c. Disaster Prevention and Preparedness Achievements/Results

d. Research, Training, and Other Achievements/Results

d1. Research:

- On-going Ministry Project: Study and experiment on quantitative rainfall forecasting by using statistical methods on HRM and GSM models
 - On-going Ministry Project: Development and application of forecasting system on meteorological factors using statistical methods on HRM model
 - Study and application of ETA model and products of global model GFS on operational weather forecasting.
 - Development of software to display surface-meteorological data on AERO
 - Development of Hydro-meteorological database system to serve operational forecasting and research in NCHMF
 - On-going Ministry Project: Development of method of estimating quantitative rainfall base on geostationary satellite images MTSAT
 - On-going Ministry Project: Development of short-term weather ensemble forecasting system in Vietnam
 - Experiment and application of satellite data FY-2 on hydro-meteorological operational forecasting
 - Application NAWIPS software to analysis and display weather maps on computer
 - Study of data assimilation on WRF model to serve weather and typhoon forecasting
 - Study using weather radar DWSR 2500C at Nha Be station to serve warning and observing rainfall.
 - On-going Ministry Project: Investigating, surveying, zoning and warning possibility of occurring flash flood in mountainous area of Vietnam
 - On-going Ministry Project: Application of climate information and climate prediction to serve social-economic industries and disaster preparedness in Vietnam
 - ODA Project: Sea level scenarios and possibility of minimizing natural disaster-related hazards
 - ODA Project: Impacts of climate change on water resources and adapting methods
- 2 projects are continuous executing:
 - Flash flood mapping Project with purposes: drawing up of flash flood map and establishing flash flood warning system in the North Viet Nam (the first phase 2006-2008 in Ha Giang provinces with more than 70 automatically rainfall stations)
 - Establish the alarm system of water level in Vietnam.
 - On-going National Project: Development and application of the American NWSRFS Model for Flood and inundation forecasting and warning in Hong – Thai Binh river system.

- On-going Ministry Project: Development of flood prediction and inundation warning technology in Ve – Tra Khuc river system, the technological experiment and transfer.
- On-going Ministry Project: Development of 5-day flow prediction technology to large reservoirs in Da and Lo river system.

d2. Training:

- Training course on “Mekong river commission’s flash flood guidance (MRCFFG) system” in hydrologic research center, USA, from 8 to 22 June 2009
- In depth regional Training course and hands - on operations “the Mekong river commission’s flash flood guidance (MRCFFG) system” in SiemReap, Cambodia, from 19 to 23 October 2009
- Vietnam Training course on “Mekong river commission’s flash flood guidance (MRCFFG) system” in Hanoi, Vietnam from 16 to 18 December 2009
- Training course on “Advanced analysis of COMS data” in Koica, Korea from 3 September 2009 to 24 September 2009.
- Training course on “Building Sustainability and resilience in high risk areas of the typhoon committee: Assessment and action” in Cebu, Philippines from 14 to 18 September 2009.
- Training workshop on “Application and verification of Global Flood warning system (GFAS)” in Tshukuba (Japan) from 3 to 7 August 2009.
- The 4th International Coordination Group (ICG) meeting of the GEOSS Asian Water Cycle Initiative (AWCI) held at the Kyoto Research Park, Kyoto, Japan, 6-7 February, 2009
- The 5th meeting of the GEOSS Asian water Cycle Initiative (AWCI) international Coordination Group (ICG) held on the University of Tokyo campus in Tokyo, Japan on 15-17 December 2009, with a satellite data training course and workshop on 17-18 December at the same venue.
- Vietnamese-Japanese workshop on “the Hue Water along community” held on the University of Tokyo campus in Tokyo, Japan on 11-12 January 2010.

e. Regional Cooperation Achievements/Results
(Nil)

f. Identified Opportunities/Challenges for Future Achievements/Results
(Nil)

7. **Progress on Key Result Area 7: Enhanced Typhoon Committee’s Effectiveness and International Collaboration.** (List progress on the Strategic Goals and Associated Activities in the Strategic Plan and progress on the 2009 Typhoon Committee Annual Operating Plan goals)

- a. Meteorological Achievements/Results
(Nil)
- b. Hydrological Achievements/Results
(Nil)
- c. Disaster Prevention and Preparedness Achievements/Results
(Nil)
- d. Research, Training, and Other Achievements/Results
(Nil)
- e. Regional Cooperation Achievements/Results
(Nil)
- f. Identified Opportunities/Challenges for Future Achievements/Results
(Nil)

III. Resource Mobilization Activities

IV. Update of Members' Working Groups representatives

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5. Resource Mobilization Group

Nil