

EXECUTIVE SUMMARY OF MEMBERS' REPORTS 2015

(submitted by AWG Chair)

Summary and Purpose of Document:

This document presents an overall view of the progress and issues in meteorology, hydrology and DRR aspects among TC Members with respect to typhoons and related hazards in 2015.

Action Proposed

The Committee is invited to:

- (a) take note of the major progress and issues in meteorology, hydrology and DRR aspects under the Key Result Areas (KRAs) of TC as reported by Members in 2015; and
- (b) review and refine the draft Executive Summary in the APPENDIX with the aim of adopting a finalized version for reference by Members' governments and other collaborating or potential sponsoring agencies.

APPENDIX: Executive Summary of Members' Reports 2015 (draft version – Dec 2015)

EXECUTIVE SUMMARY OF MEMBERS' REPORTS 2015

Edwin S.T. Lai (AWG Chair)

This executive summary is based on Members' Reports submitted by Members of the Typhoon Committee at the 10th IWS in Kuala Lumpur, Malaysia on 26 – 30 October 2015, details of which can be found in: <http://www.typhooncommittee.org/10IWS/Members10IWS.html>

1. Objectives

1.1 The objectives of this Executive Summary are to extract the key aspects of tropical cyclone impact and related topical issues of regional interest in Members' countries or territories, and to consolidate the information and observations for:

- (a) the attention of Members' governments with a view to allocating the necessary resources strategically for the purposes of operational effectiveness and readiness, disaster mitigation and risk reduction, or leveraging available resources and support for technology transfer and capacity-building through regional cooperation initiatives; and
- (b) reference by sponsoring agencies with a view to coordinating and synergizing effort in the planning of relevant projects and programmes for such purposes, as well as channelling resources and aids into identified areas of gaps or needs.

2. Key Observations in 2015

2.1 *Overview*

2.1.1 There were 27 (JMA-numbered) tropical cyclones over the western North Pacific and the South China Sea in 2015, slightly above the normal (1981 -2010) of about 26 for the whole basin. Against the background of a strong El Niño event, genesis positions of tropical cyclones shifted towards the warm waters further east. With a longer sea track, tropical cyclones during the year generally had a longer life span and as such also a tendency to reach higher intensity. Despite a corresponding increase in landfall intensity, landfall impact as reported in 2015 was fortunately not particularly severe. In particular, the South China Sea had another relatively quiet year in terms of tropical cyclone activity.

2.1.2 Initiatives pursued by Members under relevant Key Result Areas (KRAs; see Annex) against the five major activity components of the Typhoon Committee were compiled from the input of 13 Members, as no report was received from Lao PDR at the time of the 10th IWS. Cambodia, the Philippines and Viet Nam only provided qualitative input with no detailed breakdown, and hence their effort cannot be reflected in the summary table below. Among the KRAs of TC, KRA 3 (Enhanced Beneficial Typhoon-related Effects for the Betterment of Quality of Life) received relatively less attention, while noting that rainfall associated with

tropical cyclones brought much needed relief to the drought or dry conditions reported this year in places such as the Korean peninsula and Viet Nam. On the other hand, extensive impact was also evident arising from flooding triggered by enhanced rainfall at tropical cyclone landfall (e.g. China) and prolonged heavy rain caused by slow-moving tropical cyclones at a distance (e.g. the Philippines). While how to reap the potential benefits and at the same time mitigate the hazardous impact of heavy rain associated with tropical cyclones remained a challenge, yet effort expended in KRA 3 had been reduced by half in 2015. Notable increases in effort could be found instead in KRA 5 (which could be considered as one way to contribute to KRA 3) and KRA 7.

KRA =	1	2	3	4	5	6	7
Meteorology	36	29	3	21	18	34	11
Hydrology	6	8	0	8	9	11	10
DRR	7	8	0	13	14	7	9
Training and research	1	1	2	7	5	13	7
Resource mobilization or regional collaboration	3	3	0	3	3	5	4
Total:	53	49	5	52	49	70	41

2.2 Summary of Members’ Reports

2.2.1 There was heavy rain in many places in **Cambodia** from mid-July to September in 2015. In particular, the landfall of Vamco over central Viet Nam in mid-September brought torrential rain and flash floods to the coastal areas of Cambodia, affecting 20,000 people and damaging at least 4,000 homes in Kampot province. During the year, 20 automatic weather stations were installed and weather forecasting skill was generally improved.

2.2.2 Six tropical cyclones (Kujira, Chan-hom, Linfa, Soudelor, Dujuan and Mujigae) made landfall over **China**, with enhanced intensity up to an average of 41 m/s as compared to the multi-year average of 32.8 m/s. Together with Goni and Vamco, more areas were affected by heavy rain associated with tropical cyclones in 2015, and a number of provinces reported flash floods that caused water in some 50 rivers to rise to dangerous levels. The impact of Soudelor in August was most extensive, with 871 mm of rain falling at Zhejiang province and a tidal station in Fujian province reporting the third highest tidal wave since 1955. The passage of Dujuan in September also coincided with astronomical high tides, and warning levels at 36 tidal wave stations in Fujian, Zhejiang and Shanghai were exceeded by 0.03 – 1.18 m. However, it was Mujigae in October that brought the most direct economic loss. The passage of Mujigae over Guangdong province in early October was characterized by rapid intensification on its approach and enhanced intensity at landfall. Apart from high winds and heavy rain, there were also tornados spawned along its peripheral rainbands. According to preliminary statistics, disasters induced by tropical cyclones during the year affected 23.6 million people in 13 provinces or municipalities, with 63 people killed and 10 reported missing. Total direct economic loss was estimated at RMB 66 billion.

2.2.3 Among the initiatives highlighted by **China**, they were linked to TC KRAs and activities as below:

	KRA =						
	1	2	3	4	5	6	7
Meteorology	10	8	3	1	1	1	2
Hydrology	2	2					1
DRR	3	3		1			
Training and research	1	1	1				
Resource mobilization or regional collaboration	1						

2.2.4 **DPR Korea** was affected by two tropical cyclones (Chan-hom and Goni) in 2015. Despite the occurrence of heavy rain during their passages, no flooding was reported. The rainfall brought by the tropical cyclones was actually more beneficial than harmful as it provided much needed relief from the long-term drought suffered by the country.

2.2.5 Among the initiatives highlighted by **DPR Korea**, they were linked to TC KRAs and activities as below:

	KRA =						
	1	2	3	4	5	6	7
Meteorology					4		
Hydrology					3		
DRR				2	2		
Training and research				1	4		
Resource mobilization or regional collaboration				2	2		

2.2.6 **Hong Kong, China** had three tropical cyclones (Kujira, Linfa and Mujigae) necessitating the issuance of warning signals, of which gale signals were required for Linfa in July. Despite some heavy rain during their passages, no significant damage was reported.

2.2.7 Among the initiatives highlighted by **Hong Kong, China**, they were linked to TC KRAs and activities as below:

	KRA =						
	1	2	3	4	5	6	7
Meteorology	5	4		4	5	8	2
Hydrology					2	2	1
DRR		1		1	4	2	
Training and research				1		5	1
Resource mobilization or regional collaboration						2	

2.2.8 In 2015, 13 tropical cyclones of tropical storm intensity or higher came within 300 km of the Japanese islands as of 5 October. **Japan** was affected by seven of them (Noul, Chan-hom, Nangka, Halola, Goni, Etau and Dujan), with four making landfall. Three people were killed as a result of flooding rivers in heavy rain during the passages of Nangka and Goni; but the deadliest cyclone was Etau as flooding and landslides associated with heavy led to eight fatalities in September. Unprecedented heavy rain brought by Etau affected Kanto and Tohoku

regions and the cumulative rainfall in the Kinu River basin reached a record high. While a dyke collapsed along the river, it was also reported that water storage by four dams upstream had significantly reduced the volume of potential flood water affecting Joso City downstream.

2.2.9 Among the initiatives highlighted by **Japan**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	5	5		4	2	6	1
Hydrology	1	1		1		2	1
DRR				1		1	2
Training and research				1			2
Resource mobilization or regional collaboration							1

2.2.10 **Macao, China** had three tropical cyclones (Kujira, Linfa and Mujigae) necessitating the issuance of local warning signals. However, no significant damage was reported.

2.2.11 Among the initiatives highlighted by **Macao, China**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	4	4		2	2	1	
Hydrology							
DRR	2	2		1	3	1	1
Training and research				1			
Resource mobilization or regional collaboration	2	2					

2.2.12 **Malaysia** was affected by six tropical cyclones (Mekkhala, Kujira, Chan-hom, Linfa, Halola and Goni) even though none of them came close enough to cause significant damage. The impact was mostly restricted to enhanced rainfall and gusting winds due to the tail effect of typhoons passing by at a distance.

2.2.13 Among the initiatives highlighted by **Malaysia**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	1			1		1	
Hydrology	1	1		1		1	
DRR				1			
Training and research							
Resource mobilization or regional collaboration							

2.2.14 In the **Philippines**, 12 tropical cyclones entered into or developed within the its Area of Responsibility and six of them made landfall (Mekkhala, Maysak, Noul, Linfa, Mujigae and Koppu). While the impact due to Koppu in October was yet to be assessed, casualties arising from the other five tropical cyclones were not particularly heavy and economic damage amounted to over USD 5.6 million. However, the most devastating impact was actually caused by a slow-moving Goni which hovered over the Luzon Strait before moving northwards to the east of Taiwan in August. Enhanced southwest monsoon brought heavy rain and gusty winds to the Philippines, especially over the western part of Luzon. The number of casualties was reported to be 33 and damage caused was estimated to be nearly USD 93 million.

2.2.15 Four tropical cyclones (Chan-hom, Nangka, Halola and Goni) affected **Republic of Korea** during the year. Heavy rain brought by Chan-hom and Goni was instrumental in bringing much-needed relief to the severe drought in the Korean peninsula.

2.2.16 Among the initiatives highlighted by **Republic of Korea**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	6	3		1		9	1
Hydrology	1	1		1		1	1
DRR					1	1	2
Training and research						4	1
Resource mobilization or regional collaboration						3	1

2.2.17 Two tropical cyclones, Linfa and Vamco, indirectly affected **Singapore** in 2015 with enhanced rain and strengthened winds. No significant damage was reported.

2.2.18 Among the initiatives highlighted by **Singapore**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	2	2		2		1	
Hydrology	1						
DRR							
Training and research			1			1	
Resource mobilization or regional collaboration							

2.2.19 The passage of Vamco across Viet Nam and Lao PDR in September brought heavy rain to **Thailand** with flooding occurring in the eastern and southern parts of the country. Two people were killed and one was injured, with social and economic losses still being assessed.

2.2.20 Among the initiatives highlighted by **Thailand**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	2	2		2		3	1
Hydrology		1		3	1	2	2
DRR	1	1		1			
Training and research						1	1
Resource mobilization or regional collaboration							2

2.2.21 A strong El Niño led to enhanced tropical cyclone activity in the **USA** (western North Pacific Region) that had not been seen since 1997. Activity increased not only in terms of numbers but also in the intensity of the systems within Micronesia, with the genesis positions located well to the east compared to previous years. A total of 23 tropical cyclones passed through Guam's Area of Responsibility with 17 of them originating within the region, well above the climatological mean. Inundation was particularly an issue in 2015 with enhanced westerly swells affecting the low-lying Marshall Islands. Significant typhoons affecting Micronesia included Maysak, Soudelor, Bavi and Dolphin. In particular, the passage of Maysak over the Chuuk Lagoon led to four deaths as a result of falling trees and mudslide. Enhanced tropical cyclone activity was also reported in the central North Pacific region where several records were broken.

2.2.22 Among the initiatives highlighted by **USA**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	1	1		4	4	4	4
Hydrology		2		2	3	3	4
DRR	1	1		5	4	2	4
Training and research				2	1	2	2
Resource mobilization or regional collaboration		1		1	1		

2.2.23 The number of tropical cyclones affecting **Viet Nam** was less than normal in 2015 with only two, Kujira and Vamco, making landfall in the country. With relatively little rain during the year, heavy rain associated with Vamco in September brought an end to the prevailing drought conditions in the central part of Viet Nam.

2.2.24 Among the initiatives highlighted by **Viet Nam**, they were linked to TC KRAs and activities as below:

KRA =	1	2	3	4	5	6	7
Meteorology	x	x		x	x	x	x
Hydrology	x	x		x	x	x	x
DRR	x	x		x	x	x	x
Training and research	x	x		x			
Resource mobilization or regional collaboration							

Key Result Areas (KRAs)

KRA 1: Reduced Loss of Life from Typhoon-related Disasters

KRA 2: Minimized Typhoon-related Social and Economic Impacts

KRA 3: Enhanced Beneficial Typhoon-related Effects for the Betterment of Quality of Life

KRA 4: Improved Typhoon-related Disaster Risk Management in Various Sectors

KRA 5: Strengthened Resilience of Communities to Typhoon-related Disaster

KRA 6: Improved Capacity to Generate and Provide Accurate, Timely and Understandable Information on Typhoon-related Threats

KRA 7: Enhanced Typhoon Committee's Effectiveness, Efficiency and International Collaboration