# APPENDIX XV

# Report on activities of Working Group on Hydrology (WGH) of TC in 2015

In 2015, Working Group on Hydrology (WGH) of Typhoon Committee (TC) conducted a series of activities very positively referring to the decision of 47th Session (the 3rd Joint Session of TC and PTC) at the United Nations (UN) Building, Bangkok, Thailand, from 09 to 13 February 2015. This report was drafted mainly on the base of the outcomes of 4th WGH working meeting which was held in Daegu, the Republic of Korea from 15 to 17 April 2015 in conjunction with the 7th World Water Forum (WWF), and the discussion of the parallel session of TC 10th Integrated Workshop (IWS) which was held in Kuala Lumpur, Malaysia from 26 to 29 October 2015.

The report highlighted the main progresses and achievements on hydrological component in Members in past year; briefly described the activities of WGH conducted in 2015, and summarized the status of implementation of WGH AOPs 2015. Based on the communication among Members and the discussion at TC 10th IWS, WGH proposed the implementation plan of AOPs for 2016 and beyond; and consequently requested the TCTF allocation for supporting WGH activities in 2016.

# The Major Progresses on Hydrological Component of Members in 2015

1. The Members of the Committee in 2015 conducted a series of activities on hydrological component and achieved remarkable progresses.
2. In 2015, the serious flood disaster events, including river flood, urban flood, flash flood and debris flow happened in some Members such as China, Laos, Japan, Malaysia, Philippines, Vietnam, etc. The hydrological departments in the Members provided valuable service of flood forecasting and warning to the decision-making departments of the Governments.

# Review of the Fourth WGH Working Meeting

1. The WGH parallel session reviewed the 4th WGH working meeting from 15 to 17 April 2015 in conjunction with the 7th World Water Forum (WWF) which was held in Daegu, the Republic of Korea with about 41000 participants from the governments and other sectors of 168 countries and other governmental agencies, universities, private corporations and NGOs.
2. Totally 25 participants of hydrological component from 7 TC Members (Japan, Lao PDR, Malaysia, Republic of Korea, Thailand, USA and Vietnam) and TCS attended the proposed sessions and closing ceremony of 7th WWF, including:
3. Side-event Session (SE-085): 4th Working Meeting of TC WGH, 15 April, 2015
4. Thematic Session 1.3.3: with session title on Preparedness, Response and Adaptation against Extreme Flood under Climate Change, 16 April 2015
5. Concluding Session 1.3: with session title on Adapting to change: Monitoring risk and uncertainty for resilience and disaster preparedness, 17 April 2015
6. Totally 6 presentations from the Committee were presented at the Thematic Session 1.3.3 of 7th WWF, namely:

|  |
| --- |
| * Flood management in the Republic of Korea, Mr. Jun-ho Cha, HRFCO, MOLIT, Korea |
| * Extreme Flood and structural & non-structural flood control measures, Dr. Chung-Soo Kim, KICT, Korea |
| * Flood Management in Asia-Pacific Region, Mr. Jinping LIU, TCS |
| * Extreme flood and sustainable development, Mr. Yoshio Tokunaka, ICHARM, Japan |
| * 2011 Thailand Big Flood, Mr. Thada Sukhapunnaphan, RID, Thailand |
| * Current status of flood management in Mekong-river basin, Mr. Somphanh VITHAYA, DMH, Lao PDR |

1. Dr. Chung-Soo KIM from KICT presented the activities of the Thematic Session 1.3.3 at the closing session of Thematic 1.3. He emphasized the new trends of flood disasters and strategy on flood management in the region. Finally he summarized the conclusion of Thematic Session 1.3.3 as input of Implementation Roadmap which is a strategic commitment for realizing implementation mechanism of water-related goals for the better future.
2. WGH took the good opportunities to have shared the experience and strategies for flood damage prevention in TC region at WWF, one of the largest international events, and enhanced the visibility of the Committee in certain ways.
3. The WGH expressed their heartfelt appreciation to MOLIT, through HRFCO with cooperation of KICT, for kindly hosting the meeting and for all the excellent hospitality and logistic arrangement.

# Progresses of WGH AOPs in 2015 and Implementation Plan for 2016

1. The WGH has 7 AOPs in 2015 which are listed in table 1. The leading Countries made their great efforts and mostly achieved the expected results and progresses. The implementation statuses of WGH AOPs in 2015 are shown in Annex 1 and the success indicators of WGH AOPs for 2016 are shown in Annex 2.

Table 1 Summary of WGH AOPs in 2015

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Projects** | **Driver** | **Duration** |
| AOP1 | Project of Synergized Standard Operating Procedures for Coastal Multi-hazard Early Warning System (SSOP) | TCS | 2013-2015 |
| AOP2 | Extreme flood forecasting system | Korea | 2012~2017 |
| AOP3 | Estimation for Socio-economic Impact of Sediment-related Disaster | Japan | 2013~2016 |
| AOP4 | Development and Application of Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) for TC Members | China | 2014~2017 |
| AOP5 | Extension of Xin’anjiang Model Application in Selected River Basins in TC Members | China | 2013~2016 |
| AOP6 | Guidelines for extreme flood risk management in TC region | Korea | 2013-2016 |
| AOP7 | Study on Prediction of Debris flow and Shallow landslide by the Satellite Rainfall Data | Japan | 2013-2017 |

**AOP1: Project of Synergized Standard Operating Procedures for Coastal Multi-hazard Early Warning System (SSOP)**

1. This project was first one in the Committee funded by ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries and implemented by the Committee in cooperation with PTC. The project made the remarkable achievements and successfully terminated in 2015. The main activities of SSOP conducted in 2015 includes:

* Conducting two Consultancy Missions in PTC and TC Countries in January 2015, respectively, and submitted the two Reports for Missions on Hands-On Training and Technical Assistance on Interpretation, Preparation, and Improvement of SOPS for Users and Issuers.
* Conducting project evaluation and submitted the Evaluation Report and its Brief for SSOP project;
* Publishing the Manual and Quick Reference Guide on Synergized Standard Operating Procedures (SSOPs) for Coastal Multi-Hazards Early Warning System;
* Conducting the project auditing and submitted the Audit Report for Synergized Standard Operating Procedures (SSOPs) for Coastal Multi-Hazards Early Warning System Project.
* Submitted the Terminal Report for SSOP project to ESCAP.

1. The WGH recognized that, to conduct a series of training courses and workshops on the "mechanics" of preparing and implementing synergized standard operating procedures for coastal multi-hazards early warning system in beneficiary countries as continual project of completed SSOP could benefit the Members of the Committee in various aspects. The WGH expressed its willingness to conduct SSOP-II as a continual project of SSOP-I and to support the Committee to proceed with the project of SSOP-II should funds become available.
2. The WGH reached a consensus on the proposed activities under SSOP-II related to WGH, including:

* Workshop on Innovative Technology for Urban Flood Risk Early Warning to be held in BKK, Thailand (tentative); and
* Training Course on Real-time Operational Urban Flood Forecasting and inundation Mapping (OSUFFIM) to be held in SYS University, Guangzhou, China (tentative).

1. SYS University of China and RID of Thailand are willing to support the above activities proposed by SSOP-II and to establish a linkage with on-going project of OSUFFIM.
2. The WGH highly expressed its appreciation to ESCAP for the strong support and Guidance and to TCS for the great efforts and contribution for coordinating activities for SSOP and drafting the proposal of SSOP-II.
3. The WGH recognized that a qualified project manager/technical advisor will be very important for a success SSOP-II and suggested to seek a project manager/technical advisor among WGH to coordinate the activities related WGH in SSOP-II.

**AOP2: Extreme Flood Forecasting System**

1. The AOP2 led by the Republic of Korea made progresses in 2015, including:
2. field survey wrap-up meeting was held in Republic of Korea
3. establishment of the platform and Level 1 module for the Extreme Flood Forecasting System
4. HRFCO of MOLIT of Korea, in cooperation with KICT successfully conducted the field survey wrap-up meeting from 6 to 8 October 2015 with 10 participants from Korea, Laos, Thailand, and Philippines. Results of the 1st -3rd field survey were shared and synthesized from selected river basins including Chao Phraya River in Thailand, Pampanga River in Philippine, Nam Ngum River in Lao PDR, Nakdong River in the Republic of Korea. The meeting noted that, the survey reached the expected goals including:
5. to gather additory data set for AOP2 and AOP6 to set an optimal direction for making the guidelines for flood risk management and establishing flood forecasting system in TC region;
6. to understand unique environmental, social and economic characteristics of each member counties for appreciate flood forecasting system;
7. to investigate and discuss the structural and non-structural flood control measures in 3 countries;
8. to strengthen international cooperation to reduce flood damage by typhoon; and
9. will be to publish the report of field survey until 48th TC session
10. The WGH expressed its sincere appreciation to Korea Government through HRFCO & KICT for organizing this field survey wrap-up meeting with providing funding support, and also to the close cooperation from Philippines, Thailand and Laos PDR.
11. The leading country submitted the Plan of AOP2 in 2016 and beyond, including:
12. completion of the extreme flood forecasting system with PC-version
13. conducting the publication of field survey report

**AOP3: Project on Estimation for Socio-economic impact of Sediment-related Disaster**

1. The AOP3, led by Japan, made the progresses in 2015, including:

* Furthermore, providing the draft format to collect the record of sediment-related disasters.
* Deciding the format.

1. The Japan-side submitted the implementation plan for this project in 2016, including:

* To make a “Sediment-related Disaster Record Database” to share the records in TC members.
* To report and share the results of estimation of socio-economic impact.

**AOP4:** **Development Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) for TC Members**

1. The project of OSUFFIM, led by China, conducted a series of activities and reached remarkable progresses in 2015, including:

* Applying funding support from China Government for OSUFFIM implementation in early 2015: A proposal for funding application for the OSUFFIM pilot studies in China and Thailand was submitted to the Department of Sciences and Technology of Guangdong Province, China, which is jointly prepared by the team of China led by Prof. Yangbo CHEN, the head of the Laboratory of Water Disaster Management and Hydro-informatics (LWDMH) of SYS University, and the team of Thailand led by Mr. Thada SUKHAPUNNAPHAN. This proposal was approved in May 2015 by Guangdong Provincial Government with total funding of around 84,000USD. The proposal was named as China-Thailand Cooperation Project on OSUFFIM.
* Conducting field survey in southern Thailand: the field survey in pilot cities of Thailand was conducted in early September by Thailand OSUFFIM team led by Mr. Thada SUKHAPUNNAPHAN, and jointed by OSUFFIM chief scientist, Prof. Yangbo Chen. The cities surveyed in this week-long survey in southern Thailand include Phuket, Phangnga, Krabi, Trang, Phatthalung and Hat Yai, and Hat Yai was selected as the Thailand pilot city.
* Conducting kick-off meeting of China-Thailand Cooperation Project on OSUFFIM: the kick-off meeting was held in Sun Yat-Sen (SYS) University, Guangzhou, China on September 23, 2015, organized by SYS University with participants from SYS University and Royal Irrigation Department (RID) of Thailand. 7 Experts were invited to join this meeting and give consultancy to the study plan. Team leader, Professor Yangbo Chen presented the study plan, including the purposes, objectives, methodologies and expected outcomes. The experts gave high assessments to the study plan and gave their own comments and suggestions, that will be very good inputs to this project.
* Conducting field survey in pilot city of China: the field survey was conducted in Dongguan city, Guangdong, China in middle September 2015. The participates includes Chinese OSUFFIM team led by Prof. Yangbo Chen, and Thailand OSUFFIM team led by Mr. Thada SUKHAPUNNAPHAN.
* Conducting one-month attachment training in SYS University from 15 November to 14 December 2015. Four trainees were from RID, Thailand and DID Malaysia. Prof. Chen and his team provided the courses and the software of Liuxihe river basin modelling and OSUFFIM were initially installed for both Thailand and Malaysia with proper running.

1. The representative from DID Malaysia expressed that DID Malaysia is willing to conduct field survey in pilot cities and expressed the expectation of inviting Prof. Chen to visit DID. However, due to the busy schedule of prof. Chen, the visiting schedule could not be implemented in 2015 and hopefully to be conducted in 2016.
2. The representative of PAGASA of Philippines expressed the willingness to invite Prof. Chen to visit PAGASA for guidance on flood inundation mapping which is applying in Philippines.
3. The leading country submitted the implementation plan for OSUFFIM in 2016 which will focus on system installation and operation, including:

* On site OSUFFIM installation, training and maintenance in Chinese and Thailand pilot cities: In 2015, operational OSUFFIM system both in Chinese and Thailand pilot cities will be developed and installed, training on system operation and maintenance will be done at both Chinese and Thailand pilot cities, at least two trips to Thailand pilot city and five trips to Chinese pilot city for system installation and maintenance will be conducted by the team members including team leader, Professor Yangbo Chen.
* Installing the operation system in Malaysia subject to the condition of DID.
* Conducting field trip in pilot cites of other potential candidate: the field surveys in potential pilot cities in Chinese, Malaysia, Vietnam, Philippines may be conducted by team members led by Professor Yangbo Chen if conditions permitted, and two more pilot cities will be selected from these Members.
* Extending OSUFFIM modeling in newly selected pilot cities if needed: OSUFFIM models in the newly selected pilot cities will be studied and set up and validated based on the field survey results, data for model set up will be collected. According to the modeling results, operational OSUFFIM system for the Chinese pilot city will be set up, but the operational OSUFFIM system for cities outside China will not be set up until the next year, i.e., it will be set up in 2017 if condition permitted.
* Drafting OSUFFIM manual: the OSUFFIM manual of Chinese version and English version will be drafted and compiled by the team members led by Professor Yangbo Chen. The Chinese version will be first compiled, and used in Chinese pilot cities, and the draft version will be submitted before September 30, 2016, the English version will then be compiled based on the Chinese version, and be distributed to the other users excepting Chinese speakers, this work will be finished before the TC 49th Annual Session to be held in Tokyo, Japan.
* Providing technical support on urban flood inundation mapping to the Members of the Committee if needed.

1. The SYS University, as the development team of OSUFFIM, is willing to cooperate with the activities proposed in SSOP-II and to establish a linkage between OSUFFIM and SSOP-II.

**AOP5:** **Xin’anjiang Model Application in Selected River Basins in TC Members**

1. The Session noted that progresses achieved in 2015 for this project, including:

* Updating the English version of flood forecasting system using Xin’anjiang by Bureau of Hydrology (BOH), China;
* Applying Xin’anjiang model on trial in DID Malaysia

1. A job training for DID Malaysia was conducted in Beijing from 15 to 18 December 2015 for solving the problems happened in Xin’anjiang model application on trial in Malaysia. TCTF supported 3 staff from DID Malaysia.
2. BOH, China submitted the implementation plan for this project in 2016, including

* Continue providing technical support for application of National Flood Forecasting System (NFFS) of China in selected river basins in TC Members. China-side is willing to send experts to the Members for providing assistance to resolve the problems if needed.
* Perfecting the English version of Manual and software for the model application.

**AOP6: Guidelines for Extreme Flood Risk Management**

1. The project of AOP6, led by the Republic of Korea, achieved progresses in 2015 including:
2. Drafting the Guideline for extreme flood risk management in Korean;
3. Conducting 4th TC WGH Meeting was held in Daegu, the Republic of Korea
4. HRFCO of MOLIT of Korea, in cooperation with KICT successfully conducted the 4th TC WGH Meeting linked with the 7th World Water Forum from 14 to 17 April 2015 with 25 participants from 7 TC member countries (Korea, Japan, Laos, Malaysia, Thailand, USA, Viet Nam, and TCS). The meeting noted that, the meeting reached the expected goals including:
5. to discuss about the preparedness, response and adaptation against extreme flood under climate change in TC region;
6. to share the results of AOP 2, 6 including structural and non-structural flood control measures in TC region;
7. to review the implementation progresses of WGH Annual Operating Plan (AOP) and to discuss the preparation and hydrological contribution to prepare the 10th Integrated Workshop
8. The implementation plan for AOP6 in 2016 was informed as below:
9. To develop the practical guideline for extreme flood risk management
10. To held 5th TC WGH Meeting in Republic of Korea
11. The ROK requested to extend one more year for this project from 2016 to 2017.

**AOP7: Study on Prediction of Debris flow and Shallow landslide by the Satellite to Rainfall Data**

1. The ICHARM of Japan, the driver of the project of AOP7, informed the decision to cancel this project and Japan-side will consider submitting a new proposal.
2. The WGH AOPs in 2016 and beyond are summarized in table 2.

Table 2 the summary of WGH AOPs in 2016 and beyond

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Projects** | **Driver** | **Duration** |
| AOP1 | SSOP-II: Implementation of Achievement of Project of Synergized Standard Operating Procedures (SSOP) for Coastal Multi-hazard Early Warning System | TCS | 2016-2017 |
| AOP2 | Extreme flood forecasting system | Korea | 2012~2017 |
| AOP3 | Estimation for Socio-economic Impact of Sediment-related Disaster | Japan | 2013~2016 |
| AOP4 | Development and Application of Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) for TC Members | China | 2014~2017 |
| AOP5 | Extension of Xin’anjiang Model Application in Selected River Basins in TC Members | China | 2013~2016 |
| AOP6 | Guidelines for extreme flood risk management in TC region | Korea | 2013-2017 |

# Other Activities

1. Mr. Thada SUKHAPUNNAPHAN of RID, Thailand as the representative of TC WGH was invited to participate in the 5th Guangxi Forum on Disaster Risk Reduction and Sustainable Development, which was held in Nanning, China on September 21, 2015 with the objective of exchange the information on hydro-meteorological DRR between China-Association of Southeast Asian Nations (ASEAN).
2. TCS hydrologist was invited to Participating in the Regional Workshop on Flood Management organized by Global Water Partnership (GWP) in Guangzhou, China from 14 to 15 December 2015 and gave a presentation on the Session of Community-based approaches to flood forecasting and management.

# Budget Proposed for WGH Activities in 2015

1. WGH proposed $24,000USD TCTF totally to support WGH activities in 2016 including regular request shown in Table 3.

Table 3 The summary of budget of TCTF to support WGH activities in 2016

|  |  |  |
| --- | --- | --- |
| **No.** | **Item** | **TCTF(USD)** |
| 1 | Support to attend Integrated Workshop (IWS) and other activities | 10,000 |
| 2 | Support reviewing the English version of guideline and seminar of extreme flood management linked with 5th WGH working meeting | 5,000 |
| 3 | Support activities related to OSUFFIM | 6,000 |
| 4 | Support activities related to Xin’anjiang Model Application | 3,000 |
|  | **Total** | **24,000** |

# Conclusions of WGH

1. On the basis of the outcomes 4th WGH working meeting and the discussion of the WGH Parallel Session at 10th IWS, the following conclusions were reached:

* The working meeting of WGH is very important to review hydrological activities and implementation status of WGH AOPs and to prepare IWS and annual session. The meeting should be continued.
* The Project of Synergized Standard Operating Procedures for Coastal Multi-hazard Early Warning System (SSOP), under the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries, is a very successful example to closely link the two regional bodies together. The outcomes and achievement of this project, which could benefit TC and PTC regions as well as other regions, should be transferred into application in practice of disaster risk reduction for promoting the capacity building in Members. As the continual project, SSOP-II, which was submitted by TCS and proposed to conduct a series of training courses and workshops on the "mechanics" of preparing and implementing SSOPs for coastal multi-hazards early warning system, will benefit the Committee in various aspects. As one part of supports for decision-making of disaster risk management, technical training on hydro-meteorological forecasting and warning is also very important to promote the capacity of coastal multi-hazards early warning.
* To promote the capacity of forecasting, early warning and risk management for urban flood is an urgent need among TC Members, especially urban flood forecasting and inundation mapping. As the subsequent activity of TC first Cross-cutting project of Urban Flood Risk Management (UFRM), the on-going project of WGH on Development and Application of Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) is a tangible measure on this aspect and it will play very meaningful and important role for TC Members to promote the capacity on the technique of urban flood forecasting and warning. This activity may be established a linkage with SSOP-II proposed by TCS.
* To develop the Extreme Flood Forecasting System and the Guidelines for Extreme Flood Risk Management will be definitely benefit the TC Members to strengthen their capacity on extreme flood risk reduction, especially under climate change. To enhance the achievement of development, the situation and needs on flood risk management in the Members should be considered and integrated into the System and Guidelines.

# Recommendations of WGH

1. On the basis of the outcomes 4th WGH working meeting and the discussion of the Parallel Session of 10th IWS, the participants concurred to make the following recommendations to the TC 48th Session to be held in be held in Honolulu, Hawaii, from 22-25 February 2016:

* To allocate US$24,000 from TCTF in total for supporting overall WGH activities for 2016 calendar year.
* To approve extending one more year for WGH AOP6 to 2017.
* To request HRFCO, MOLIT of Republic of Korea to host WGH 5th working meeting with funding support in 2016.
* To request SYS University, China to provide technical support on urban flood inundation mapping to the Members of the Committee if needed.
* To request ESCAP and WMO to continue the support to implement further the on-going project of real-time Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM), which can be used in PTC and TC region.
* To request the working groups to proceed with the project of SSOP-II should funds become available, and to request China, the leading country of on-going project of OSFFIM, to establish a linkage with SSOP-II and to play the coordination role for the activities related to WGH in SSOP-II.
* To request WGH continue focusing on improving the ability to forecast hydrological phenomena and provide measures for the effectiveness of the improvements.

**Annex 1. Implementation Status of WGH AOP 2015**

**Annex 2.** **Successor Indicators of WGH AOP 2016**

**Annex 1. Implementation Status- WGH AOP 2015**

| **SP's KRA and SG** | **Objective Number** | **Objective** | **Action** | **Other WGs Involved** | **TCS Responsibility** | **Expected Quarter Completed** | **Other Organizations Involved** | **Success Indicators** | **Funding Required** | **Funding Sources** | **Completed**  **YES/NO** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| KRA 1 SG 1  KRA 2 SG 2  KRA 4 SG 4a,  SG 5a KRA 5 SG 5a  SG 5b  KRA 6  SG6b | 1 | Contribution to the development of SSOP Manual and SSOP Training | (a) To review and comment on the SSOP Manual and related Documents  (b) To review and provide input into planned SSOP Training | WGH  WGDRR  TRCG | 1st -4th | TCS,  Members,  ESCAP  WMO  PTC  ADPC  ABU | Seven beneficiary Members | NO | SSOP Budget | Project Manager, Steering Committee, and Task Team | Yes |
| KRA1  KRA 4 SG 4a  SG 4bKRA5  SG 5a  KRA 6 SG 6b | 2 | Extreme flood forecasting system | To design the computational draft of extreme flood forecasting system and publish the field survey report.  To operate the TC homepage for WGH members |  | See above | 1. First 2. Second 3. Third 4. Fourth | RID of Thailand, PAGASA of Philippines  Laos | (a,b) To design the computational draft of extreme flood forecasting system  (c,d) To collect the TC members comment about the system draft and develop the computational daft of system  (b,c) To host the wrap-up meeting of the field survey and publish the field survey report  (a,b,c,d) To operate the TC WGH homepage | TCTF $3,000 for hosting the wrap-up meeting of field survey and publishing the field survey report | MOLIT | (a,b)  Yes  (c,d)  On-going  (b,c)  On-going  (a,b,c,d)  Yes |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 3 | Project on estimation for socio-economic impact of sediment-related disaster | to improve former projects with establish common collecting format and methods of investigation for disasters to estimate estimation for socio-economic impact of sediment-related disaster and to share common technical background in TC members. | WGDRR | See above | (a)First  (b)Second  (c)Third  (d)Fourth |  | (a) Finalize and distribute the data format to collect the record of sediment-related disaster from Members  (b) To make a “Sediment-related Disaster Record Database” to share the records in TC Member.  (c) To report and share the results of estimation of socio-economic impact | NO | MLIT  NILIM  SABO  TCTF | (a)  Yes  (b)  Ongoing  (c)  No |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 4 | Development of Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) | To perfect operational system, prepare data required and train for OSUFFIM establishment in selected TC Members |  | diver | (a)First  (b)Second  (c)Third  (d)Fourth | BOH, China;  Sun Yat-Sen University of China;  RID of Thailand  DID, Malaysia  NHMS, Vietnam | (a-c) OSUFFIM English version development  (b-c) Pilot city(cities) field investigation and data collection  (d1) attachment training course;  (d2) report to IWS and Session | TCTF $4,500 for support the activities related to OSUUFIM;  TCTF $4,500 for support one-month attachment training for 2-3 participants from selected Members | BOH, China;  SYS Univ. ;  RID, Thailand;  DID, Malaysia  NHMS, Vietnam  TCTF | YES  YES  To be conducted in Nov-Dec.  On-going |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 5 | Extend application of Xin’anjiang Model in Selected River Basins in TC Members | To set up real-time operational application of Xin’anjiang Model |  | Coordination | (a)First  (b)Second  (c)Third  (d)Fourth | BOH and Hohai University of China; DID of Malaysia  RID, Thailand  NMHS, Vietnam | (a-c) to perfect English version of Model and document  (b-d) establish the real-time operational application of model  (d) report to IWS and Session | TCTF $3000 for support the activities related to Model application in selected Members | TCTF  BOH, China  DID, Malaysia  RID, Thailand  NMHS, Vietnam | YES  On-going  On-going |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 6 | Guidelines for extreme flood risk management in TC region | To develop the guideline (draft) and host the WGH meeting link with 7WWF |  | See above | (a) First (b) Second (c) Third (d) Fourth |  | (a,b) prepare and host the WGH working meeting  (b,c,d) To develop the guideline (draft) for extreme flood risk management in TC region | TCTF $2,500 for hosting the WGH meeting;  TCTF $4,500 for support the linkage of WGH meeting and 7WWF 2015 in Daegu, Korea. | MOLIT | a,b)  Yes  (b,c,d)  On-going |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a  KRA 5  SG 5a  KRA 6 SG 6b | 7 | Study on Prediction of Debris flow and Shallow landslide by the Satellite Rainfall Data | To study on prediction of debris flow and shallow landslide by the satellite rainfall data | WGDRR | See above | (a)First  (b)Second  (c)Third  (d)Fourth | accept application | (a-d) Developing Prototype system (ICHARM)  (a-d) Correcting ground truth data on test fields  (a-d) Analyzing on test fields  (c-d) Workshop on test fields | NO | PWRI/ICHARM |  |

**Annex 2. Successor Indicators of WGH AOP 2016**

| **SP's KRA and SG** | **Objective Number** | **Objective** | **Action** | **Other WGs Involved** | **TCS Responsibility** | **Expected Quarter Completed** | **Other Organizations Involved** | **Success Indicators** | **Funding Required** | **Funding Sources** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a,  SG 5a KRA 5 SG 5a  SG 5b  KRA 6  SG6b | 1 | SSOP-II:  to promote the capacity on coastal community resilience to coastal multi-hazards through extending the achievement of SSOP-I in TC and PTC regions | To conduct a series of training courses and workshops on the "mechanics" of preparing and implementing synergized standard operating procedures for coastal multi-hazards early warning system in beneficiary countries | WGM  WGDRR  TRCG | Secretariat support and coordination | TCS,  Members,  ESCAP  WMO  PTC | 16 beneficiary Members from TC and PTC | (b,c) Workshop on Innovative Technology for Urban Flood Risk EW (2days in BKK, Thailand)  (c,d) Training Course on Real-time Operational Urban Flood Forecasting and inundation Mapping (3 days in SYS University, Guangzhou, China) | SSOP-II Budget (ESCAP Trust Fund) | Project funding;  BOH, China;  RID, Thailand;  DID Malaysia |
| KRA1  KRA 4 SG 4a  SG 4bKRA5  SG 5a  KRA 6 SG 6b | 2 | Extreme flood forecasting system | To conduct the publication of field survey report  To complete the extreme flood forecasting system with PC-version  To operate the TC WGH homepage |  | See above | 1. First 2. Second 3. Third 4. Fourth | RID of Thailand, PAGASA of Philippines  Laos | (a,b) To review the field survey report with the subject country members  (a,b,c) To establish the extreme flood forecast system with PC-version  (a,b,c, d) To operate the TC WGH homepage |  | MOLIT, TCTF |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 3 | Project on estimation for socio-economic impact of sediment-related disaster | Establish common collecting format and methods of investigation for disasters to estimate estimation for socio-economic impact of sediment-related disaster and to share common technical background in TC members. | WGDRR | See above | (a)First  (b)Second  (c)Third  ~~(d)Fourth~~ |  | (b) To make a “Sediment-related Disaster Record Database” to share the records in TC Member.  (c) To report and share the results of estimation of socio-economic impact |  | MLIT  NILIM  SABO |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 4 | Development of Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) | On site OSUFFIM installation, training and maintenance in Chinese and Thailand pilot cities  Field survey and modeling in Malaysia and Vietnam pilot cities  OSUFFIM English version completion | BOH, BOH BOH and  Sun Yat-Sen University of China;  RID of Thailand  DID, Malaysia | See above | (a)First  (b)Second  (c)Third  (d)Fourth | BOH, China;  Sun Yat-Sen University of China;  RID of Thailand  DID, Malaysia  NHMS, Vietnam | (a-c)Implementation of OSUFFIM in Chinese and Thailand pilot cities  (c-d)Model set up of OSUFFIM in Malaysia and Vietnam pilot cities  (d) Submission of draft OSUFFIM manual English version | TCTF $6000 for support the OSUFFIM installation, training and maintenance in Thailand pilot cities,  Field survey and modeling in Malaysia pilot cities | BOH, China;  SYS Univ. ;  RID, Thailand;  DID, Malaysia  NHMS, Vietnam  TCTF |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 5 | Extend application of Xin’anjiang Model in Selected River Basins in TC Members | Application of Xin’anjiang Model included in the National Flood Forecasting System (NFFS) of China in selected river basins in TC Members | BOH and DID of Malaysia  RID, Thailand  NMHS, Vietnam | See above | (a)First  (b)Second  (c)Third  (d)Fourth | BOH and Hohai University of China; DID of Malaysia  RID, Thailand  NMHS, Vietnam | (a-c) to perfect English version of Model and document  (b-d) establish the real-time operational application of model  (d) report to IWS and Session | TCTF $3000 for support the activities related to Model application in selected Members | TCTF  BOH, China  DID, RID,  NMHS |
| KRA 1 SG 1 KRA 2 SG 2 KRA 4 SG 4a KRA 6 SG 6b | 6 | Guidelines for extreme flood risk management in TC region | To hold the 5th WGH meeting in the R.O.K  To develop the practical guideline for extreme flood risk management in English |  | See above | (a) First (b) Second (c) Third (d) Fourth |  | (b,c) To prepare and host the WGH working meeting  (b,c,d) To develop the guideline for extreme flood risk management for collecting the members opinion | $5000TCTF for review the English version of guideline and seminar of extreme flood management linked with 5th WGH meeting | MOLIT, TCTF |

SG1: To enhance cooperation among TC Members to reduce the number of deaths by typhoon-related disasters by half in the ten years of 2006 – 2015 (using the ten years of 1990 - 1999 as the base line).

SG2: To reduce the socio-economic impacts of typhoon-related disasters per GDP per capita by 20 per cent in the ten years of 2006- 2015 (using the ten years of 1990 - 1999 as the base line).

SG 3a: To identify and explore the beneficial use of resources such as rainfall brought by typhoon.

SG 3b: To study and promote the increasing use of typhoon-related beneficial effects among the Members.

SG 4a: To provide reliable typhoon-related disaster information for effective decision making in risk management in various sectors.

SG 4b: To strengthen capacity of the Members in typhoon-related disaster risk management in various sectors.

SG 4c: To enhance international and regional cooperation and assistance in the field of disaster risk reduction.

SG 5a: To promote and enhance culture of community-based disaster risk management among the Members.

SG 5b: To promote education, training and public awareness of typhoon-related disasters among the Members.

SG 6a: To facilitate RSMC capability to respond to the needs of the Members in forecasting and capacity building.

SG 6b: To improve capacity of Members to provide timely and accurate user-oriented and friendly tropical cyclone products and information.

SG 6c: To enhance capacity of Members' typhoon-related observation, monitoring, forecasting and warning.

SG 7a: To strengthen the capacity of Typhoon Committee to effectively discharge its responsibilities and functions described in this Strategic Plan and completed its stated mission in accordance with the Typhoon Committee’s Statute.

SG 7b: To mobilize available resources and engage collaborators for the implementation of the strategic goals.

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.