

Summary of WGH AOP Implementation Analysis

(draft)

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I. Background

1. AWG decided at its 2nd meeting held on 14 June 2023 in Ulsan, Republic of Korea to initiate a monitoring on the ongoing or previous efforts of TC Members in contributing to the four important pillars of the EW4all initiative, and consequently to enable an evaluation of the Committee's contributions to EW4All and identify opportunities for further enhancing its performance through Member's Report and WG's AOP specification.
2. Under the advice and guidance of AWG, TCS worked out the Work-plan for AOP evaluation and the Questionnaire.
3. AWG at its meeting on 26 Nov. 2023 advised TCS to use a term other than "Evaluation" to enhance Members' understanding and interpretation of the questionnaire.

II. Actions taken by WGH for AOP Implementation Review

4. Following the arrangement of the Work-plan, WGH took actions on AOP implementation review by TC 18th IWS as below:
 - TCS distributed the Questionnaire to all AOP leaders in the end of August;
 - All AOP leaders submitted the questionnaires by the end of September.
 - The initial progresses and information of WGH AOP implementation review were discussed at WGH 12th Working meeting which was held on 20-22 September 2023 in Bangkok, Thailand.
 - All AOP leaders updated their Questionnaires based on the discussion at WGH 12th Working meeting, and TCS distributed the filled-questionnaires by AOP leaders to WGH Chairpersons and Focal Points of all Members in the middle of October.
 - WGH Chairperson commented all filled-questionnaires by middle of November.
 - The focal points of 4 Members submitted their responses to all filled-questionnaires by middle of November, including: (1) Malaysia responded to AOP6; (2) Laos responded to all AOPs; (3) Philippines responded to AOP7; and (4) ROK responded to AOP2 and AOP3.

III. Synthesizing the Information from AOP Questionnaires

5. Currently, WGH has 9 AOPs on-going as listed in table 1.
6. The basic information of AOPs' implementation was listed in table 2.
7. The activities conducted for AOPs in the past 5 years were listed in table 3.

8. The benefits of AOPs to Members were listed in table 4.
9. The outcomes/achievement of AOPs thus far were listed in table 5.
10. The potential areas to be enhanced for the AOPs to be linked to the pillar(s) EW4All and how to enhance the alignment in future were listed in table 6.
11. The comments to AOPs from WGH Chairperson were listed in table 7.

IV. Findings from WGH AOP Implementation Review

12. WGH AOP leaders have demonstrated excellent performance on responding to AOP questionnaires.
13. All WGH AOPs' leading Members made great efforts on AOP implementation and conducted a series of positive and practical activities in the past 5 years, to fulfill their annual success indicators which were approved at TC Annual Session.
14. The topics of all WGH AOPs closely aligns with the one or more KRA(s) of Typhoon Committee Strategic Plan. The implementation and achievements of all WGH AOPs have played very important roles on realizing the Mission and Goal of the Committee.
15. The topics of all WGH AOPs closely aligns with one or more pillar(s) of UN EW4All initiative. The implementation and achievements of all WGH AOPs contributed remarkably to the four important pillars of the EW4all initiative.
16. All WGH AOPs fulfilled the scheduled tasks, achieved the expected goals and results in the period of implementation. The rich outcomes and achievements boosted the capacity building in TC Members on typhoon-related disaster risk reduction, especially the flood forecasting and early warning, and water resources management.
17. The implementation of all WGH AOPs benefited TC Members remarkably in all aspects and enhanced extremely the cooperation on the aspects of technical exchange, personnel training, and knowledge sharing in hydrological component among TC Members.
18. The implementation of all WGH AOPs fully and effectively used the TCTF annual allocation as seed's money. AOP participating Members, particularly the AOP leading Members contributed huge in-kind contribution including funding and expertise, which is very important and should be encouraged for conducting the AOPs' activities in future.
19. The review of WGH AOP implementation clarified the potential areas to be enhanced for the AOPs to be linked to the pillar(s) EW4All, and identified how to enhance the alignment to contribute to the pillars of EW4All in future. This will greatly help WGH to improve its strategy and cooperation on the aspects of AOP proposal, Members' participation, implementation planning, budget estimation, and result review, etc.

V. Recommendation

20. The new proposed AOP should be closely aligned with the KRAs of TC Strategic Plan and the pillars of UN EW4All initiative.
21. The proposed AOP should involves 3 Members (including leading Member) at least.
22. The AOP leading Member should ensure the AOP leader and/or the leader's representative taking part in the WGH annual working meeting and/or TC IWS.

23. The approved implementation plan (implementation activities) of AOP at TC Annual Session should be conducted on the base of the schedule with the close cooperation of leading Member, participating Members and TCS.
24. The AOP implementation activities should be conducted on the platform of the Committee as far as possible and keep TCS informed.
25. The AOP implementation status should be reviewed annually by its working group targeting the success indicators which were approved at TC Annual Session.
26. The AOP related to training under different working groups, such as WGH AOP8 “Training Course on Hydrological Monitoring and Flood Management for Developing Countries”, may be come under the jurisdiction of TRCG.

Table 1 The list of WGH AOPs in 2023 and beyond

Item	Projects	Driver	Duration
AOP1	Knowledge Sharing on Storm Surge Inundation Mapping	USA	2020~2025
AOP2	Improvement of Hydrological Data Quality Control System by Using AI technology	ROK	2023~2027
AOP3	Improvement of Flood Forecasting modelling by Using AI technology	ROK	2023~2027
AOP4	OSUFFIM Phase-II: Extension of OSUFFIM Application in TC Members	China	2018~2023
AOP5	Impact Assessment of Climate Change on Water Resource Variability in TC Members	China	2018~2024
AOP6	Flood Risk Watch Project for Life-saving	Japan	2019~2023
AOP7	Flood resilience enhancement through Platform on Water Resilience and Disasters	Japan	2023~2027
AOP8	Training Course on Hydrological Monitoring and Flood Management for Developing Countries	China	2023~2025
AOP9	Synergized Standard Operating Procedures for Coastal Multi-Hazard Early Warning System (SSOP)-Phase III	USA	2023~2025

Table 2 The basic information of AOP implementation

AOP	Duration (years, to 2023)	No. of Participating Members (including the leading Member)	Alignment with KRAs	Alignment with pillars of EW4all initiative	In-kind contribution in total (10 ³ USD)
AOP1	3	3	5	4	N/A
AOP2	6	5	3	1	500
AOP3	6	4	3	2	500
AOP4	6	5	6	4	95
AOP5	6	4	2	3	25
AOP6	5	2	5	1	N/A
AOP7	1	3	5	1	6
AOP8	2	7	5	4	60
AOP9	5	7	6	4	9

Table 3 the summary of the activities of AOPs conducted in past 5 years (by 2023)

AOP	Activities conducted in past 5 years
AOP1	<ul style="list-style-type: none"> • Identifying beneficiary Members (China and Thailand); • Re-write of the program due to python 3 implementation and loss of ESRI ArcMap.
AOP2	<ul style="list-style-type: none"> • Two times field survey were conducted in 2019 with TC 4 target countries (Lao P.D.R, Malaysia, Philippines, Thailand) regarding to manage the hydrological data • published the technical report (Technical Report on Hydrological Data Quality Control Management in TC Region, TC/TD-No. 0022) in 2021 • Virtual wrap-up meeting of field survey was held in 2021 and virtual workshop for the hydrological data quality control system was hosted by ROK in 2022 • established the PC-version of hydrological data quality control system for TC members in 2022
AOP3	<ul style="list-style-type: none"> • Two times field survey was conducted in 2019 with TC 4 target countries (Lao P.D.R, Malaysia, Philippines, Thailand) regarding to operate flood forecasting model • Virtual wrap-up meeting of field survey was held in 2021 and virtual workshop for operation flood forecasting system was hosted by ROK in 2022 • To establish the PC-version of extreme flood forecasting system for TC members in 2022
AOP4	<ul style="list-style-type: none"> • 2018: Field survey to 5 Chinese urbanizing catchments, and two catchments, the Buji catchment and Chebei catchment were selected as the pilot studies of China, data for flood modeling was collected • 2018: Field survey to 3 Malaysia urbanizing catchments, and the Pinang catchment was selected as the pilot study of Malaysia, hydrological data for flood modeling was collected • 2018: Field survey to 3 VietNam urbanizing catchments, and the Hue catchment was selected as the pilot study of VietNam, data for flood modeling was partially collected • 2018: Field survey to 3 Philippino urbanizing catchments, pilot study was not selected as data for flood modeling is not available, and new catchment will be suggested and surveyed next year • 2019: Flood forecasting models were set up for Chebei catchment, and flood monitoring and forecasting system was also developed and implemented, trial operation was done • 2019: Field survey to Pinang catchment, the pilot study of Malaysia, was conducted to measure the river structure data, hydrological data was collected also, and the flood forecasting model was set up, a model set up training course was done onsite during this event • 2019: Field survey to the suggested pilot study, the Matina catchment, which was selected as the pilot study of Philippines, hydrological data was collected, flood forecasting model was set up, a model set up training course was done onsite during this event • 2020: Flood forecasting system was trial operated in Chebei catchment, one of the Chinese pilot studies • 2020: Flood forecasting model of Pinang catchment, the pilot study of Malaysia was improved with updated hydrological data • 2020: Flood forecasting models were set up for Buji catchment, flood monitoring and forecasting system was developed and implemented • 2021: Flood forecasting model of Pinang catchment, the pilot study of Malaysia was improved with updated hydrological data, and a journal paper for the modeling works was published • 2021: Flood forecasting model of Matina catchment, the pilot study of Philippines was improved with updated hydrological data, and a journal paper for the modeling works was published • 2021: Flood forecasting models for Buji catchment was updated with new hydrological data, flood forecasting system was operated, urbanizing pattern was detected with remote sensing imagery • 2021: Flood forecasting models for Chebei catchment was updated with new hydrological data, flood forecasting system was operated • 2022: Flood forecasting models for both the Buji catchment and Chebei catchment were improved, flood forecasting system were operated, and a journal paper for the modeling and operation was published • 2023: Flood forecasting models for both the Buji catchment and Chebei catchment were improved, and flood forecasting system were operated

AOP5	<ul style="list-style-type: none"> • 2019: Training Workshop in Nanjing on 18th - 21th January, 2019. Theme: Application of the RCCC-WBM model. Two experts from Laos, 2 experts from Malaysia, and 15 experts from China attended the workshop. • 2019: Field survey and meetings at Laos and Malaysia on 23th - 28th September, 2019. Theme: Discussion on the application of the RCCC-WBM model in typical catchments in Laos and Malaysia. • 2019: organized the 2nd Training Workshop in Nanjing on 27th - 29th December 2019. Theme: How to use the RCCC-WBM model to assess the impact of CC on water resources. Two experts from Malaysia and 1 expert from Laos attended the training. • 2021: organized an online training workshop on 15 December, 2021. 52 participants coming from TC member countries attended the workshop. • 2022: improved RCCC-WBM model by adding flow duration curve module and registered software. • 2022: selected 25 catchments with different hydro-meteorological characteristics across China and applied the improved model in these catchments. • 2022: finished the technical report and published it with the support from TCS.
AOP6	<ul style="list-style-type: none"> • Seminars on 3L WLG sin Japan and Malaysia in 2019. • Agreement to carry out test installations in Malaysia in 2019. • Recruiting companies, which participate in 3L WLG test observations in 2020. • Working on modification of water level gauges to meet Malaysian specifications for 3L WLG with Japanese specifications in 2020. • Completion of work on modification of 3L WLGs in December 2021 • Installation of 3L WLGs in April 2022 to August 2022. • Test observations in October 2022 to March 2023 (for 6 months).
AOP7	<ul style="list-style-type: none"> • A cross-sectoral framework for flood risk reduction and resilience was established as the Platform on Water Resilience and Disasters in each country of the Philippines, Myanmar, Sri Lanka, Pakistan, and Indonesia. In the Philippines, one of the TC Members, the Platform initiated activities among relevant stakeholders of sharing data on hazard, damage, and socio-economic, developing a flood monitoring and forecasting system, and assessing climate change impacts. The data, results, and findings were shared through the Data Integration Analysis System (DIAS) installed in Japan.
AOP8	<ul style="list-style-type: none"> • 2021: The first training class was held on 13 Oct 2021 with more that 95 participants from 20 countries, including 4 TC Members namely: Cambodia, Lao PDR, Philippines and Vietnam. • 2022: The 2nd training class was held on 26 October 2022 with more that 83 attendances from 15 countries, including 4 TC Members namely: Cambodia, Lao PDR, Malaysia and Philippines. Dr. Mamoru MIYAMOTO, TC WGH Chairperson, delivered a speech at the opening ceremony as invited guest. • 2023: The 3rd training class was held on 13 October 2023 with more that 65 attendances from 25 countries, including 4 TC Members namely: Cambodia, Laos, Malaysia, Philippines, Thailand, Vietnam. Dr. Duan Yihong, the Secretary-General of Typhoon Committee Secretary and Ms. Silvana Alcoz, Scientific Officer of Hydrological and Water Resources Services Division (HWR) of WMO delivered welcome speech at the opening ceremony as well.
AOP9	<p>Due to the COVID-19 pandemic, very little was accomplished between March 2020 and March 2023. Only recently has activities become more prevalent. However, The SSOP-II completed in November 2019 with all major activities accomplished, including:</p> <ul style="list-style-type: none"> • Conducted training course on SSOP for coastal multi-hazards early warning systems for disaster risk reduction experts and warning experts from 10 beneficiary countries • Conducted five consulting workshops at national-level for selected nations from TC and PTC regions on supporting, updating and improving the existing SOPs by using the knowledge of Manual of SSOP • TC/PTC exchanges through attachment trainings delivered by the RSMCs in Tokyo and New Delhi

Table 4 The benefits of WGH AOPs to Members

AOP	Benefits to Members
AOP1	<ul style="list-style-type: none"> • Receive training and initial programming for POSSIM, with in-person training to teach the members the method of inputting data and method to setup program for additional locations.
AOP2	<ul style="list-style-type: none"> • Possible to check the quality of hydrological data with system and publish hydrological data report after controlling quality
AOP3	<ul style="list-style-type: none"> • To upgrade the flood forecasting system of TC members • To reduce the working time of flood forecasting and get the preparedness for flood evacuation
AOP4	<ul style="list-style-type: none"> • Enhanced the capacity building on urban flood modeling and forecasting at watershed level and community levels via training courses and pilot studies; • Promoted the community resilience to urban flood hazards; and • Reveled the awarness of urbanization impact on catchment flooding
AOP5	<ul style="list-style-type: none"> • Improved the capacity building on using hydrological model to assess the impact of CC on water resources variation via training workshops; • Enhanced the capacity building on multi-source data acquisition, evaluation and application via training workshops; • Promoted the water resources management policies at national and basin levels via providing quantitative assess of climate change on water resources
AOP6	<ul style="list-style-type: none"> • Learning about the features of 3L WLGs and the advantages of using them as an innovative technology of an efficient and effective hydrological observation. • Learning about the potential and opportunities to introduce 3L WLG to member countries.
AOP7	<ul style="list-style-type: none"> • To learn the importance of governance formulation of Platform on Water Resilience and Disasters for flood risk reduction and resilience • To learn the effectiveness of integrated system and interdisciplinary risk assessments • To learn the necessity of human capacity development who will be a catalytic being between the science community and local society
AOP8	<ul style="list-style-type: none"> • Allow participants to learn about China's hydrological monitoring technology • Share advanced concepts, management experience and cutting-edge technologies in the field of hydrological monitoring technology with the participating countries • Make members have comprehensive knowledge of hydrological monitoring equipment application • Promote international friendship, common development and further cooperation between participating countries and China
AOP9	<ul style="list-style-type: none"> • Enhanced capacity building on human resources of operating multi-hazards early warning via training courses and workshops; • Promoted the community resilience to coastal multi-hazards; • Improved the policy and institutional arrangements at national, district, and community levels through integrated, effective standard operating procedures (SOP) for multi-hazards early warning system; and • Improve cooperation and collaboration across regions through attachment training

Table 5 The main outcomes/achievement of WGH AOPs thus far

AOP	Main outcomes/achievement
AOP1	<ul style="list-style-type: none"> Identified initial beneficiary countries. Program re-write to make POSSIM completely open source.
AOP2	<ul style="list-style-type: none"> Two times field survey were conducted in 2019 with TC 4 target countries (Lao P.D.R, Malaysia, Philippines, Thailand) Possible to understand the status of managing hydrological data in TC region To publish the technical report (Technical Report on Hydrological Data Quality Control Management in TC Region, TC/TD-No. 0022) in 2021 Virtual wrap-up meeting of field survey was held in 2021 and virtual workshop for the hydrological data quality control system was hosted by ROK in 2022 To conduct TC users need analysis and user training course Establish the PC-version of hydrological data quality control system for TC members in 2022
AOP3	<ul style="list-style-type: none"> Two times field survey were conducted in 2019 with TC 4 target countries (Lao P.D.R, Malaysia, Philippines, Thailand) regarding to operate flood forecasting model; Possible to understand the status of operating flood forecasting system in TC region; Virtual wrap-up meeting of field survey was held in 2021 and virtual workshop for operation flood forecasting system was hosted by ROK in 2022; conducted TC user's need analysis and user training course; established the PC-version of extreme flood forecasting system for TC members in 2017
AOP4	<ul style="list-style-type: none"> Operational OSUFFIM was installed in Dongguan, China and RID, Thailand; Flood forecasting models and flood forecasting systems for Chebei catchment, Philippines and Buji catchment, China; Flood forecasting models for Pinang catchment, Malaysia and Matina catchment, Philippines; Journal papers for the modeling work of Chebei catchment, Pinang catchment and Matina catchment published in TCRR Special Volume.
AOP5	<ul style="list-style-type: none"> Main Output 1: The Technical Report of TC WGH AOP5 RCCC-WBM model and its application for impact assessment of climate change on water resource variability in December 2022. Main Output 2: Established the regular communication and cooperation with TC Member on climate impact assessment on water resources. Main Output: trained more than 70 persons for TC Members
AOP6	<ul style="list-style-type: none"> Test observations were carried out and the compliance to the requirement of water level gauges was verified. As a result of the test observations, all 3L WLGs from 4 participating companies were proved to be comparable with the water level gauge of the Department of Irrigation and Drainage (DID), Malaysia.
AOP7	<ul style="list-style-type: none"> Platform on Water Resilience and Disasters in the Philippines has been established and functional A prototyping of OSS-SR for Davao City in the Philippines has been developed and available as the flood monitoring/forecasting and climate change impact assessment system (Davao OSS). Two trainings for various stakeholders in Davao City were held; Introductory lectures on climate change, flood management, and disaster risk reduction, and Hands-on training on hazard mapping, contingency planning, and risk communicating
AOP8	<ul style="list-style-type: none"> More than 130 participants from more than 30 Countries; Eight TC Members are involved in the training course, and more countries in TC region are expressed their interests to the training course.
AOP9	<p>From SSOP phase I and II</p> <ul style="list-style-type: none"> Main Output 1: Manual and Quick Reference Guide on Synergized Standard Operating Procedures (SSOP) for Coastal Multi-Hazards Early Warning System, mainly focusing on hydro-meteorological service including SOPs related to warning providers, disaster managers, media, and fishermen Main Output 2: Regular communication and Cooperative Mechanism between TC and PTC on coastal multi-hazard early warning information, particularly among southern countries in the region Main Output 3: Improved SOPs for beneficiary members of TC and PTC

Table 6 The potential areas to be enhanced for the AOPs to be linked to the pillar(s) of EW4All and how in future

AOP	The potential Area to be enhanced to align with the Pillars of EW4All				Implementation Plan in future
	Pillar 1	Pillar 2	Pillar 3	Pillar 4	
AOP1	<ul style="list-style-type: none"> Identify areas most at risk for storm surge inundation 	<ul style="list-style-type: none"> Ability to forecast tentative inundation depths at target locations 	<ul style="list-style-type: none"> Allow earlier dissemination of watches/warnings based on likelihood of TC approach 	<ul style="list-style-type: none"> Allow Emergency Managers and DRR professionals to identify areas most likely to receive damage due to inundation, thus having resources available 	<ul style="list-style-type: none"> Assist beneficiary countries with program setup and train to make changes as needed. Identify additional beneficiary countries based on success with China and Thailand.
AOP2	<ul style="list-style-type: none"> To link to flood forecasting model in direct and can use high quality hydrological data in flood forecasting 	<ul style="list-style-type: none"> To produce the high-quality hydrological data for flood forecasting and provide hydrological data report after adding the report module 			<ul style="list-style-type: none"> Apply advanced technology such as AI and Big Data to improve the capacity of data quality control in TC Members
AOP3		<ul style="list-style-type: none"> To reduce the flood forecasting uncertainty and enlarge the flood leading time 			<ul style="list-style-type: none"> Apply advanced technology such as AI and Big Data to improve the capacity of flood forecasting in TC Members
AOP4	<ul style="list-style-type: none"> To enhance the knowledge dissemination at community, regional and national level 	<ul style="list-style-type: none"> To enhance the training courses and workshops on flood modeling and operational flood forecasting system set up To enhance pilot studies in TC and PTC members 	<ul style="list-style-type: none"> To enhance the dissemination of the operational flood forecasting results 	<ul style="list-style-type: none"> To enhance the capability of urban flood hazards preparedness and response under rapid urbanization at community, regional and national level 	<ul style="list-style-type: none"> To enhance the urban flood forecasting system already put into operation in China pilot study, and operate it continually, and to make it a flagship system for other TC and PTC members To finish the operational flood forecasting system for the pilot studies in Malaysia, Vietnam and Philippines, to make it operational as soon as possible To promote more pilot studies in other TC members, particularly in PTC members
AOP5	<ul style="list-style-type: none"> To enhance quantitative risk assessment of climate change on water resources in the future training workshop. Aiming to help users to calculate quantitative risk of climate change on water resources variability. 		<ul style="list-style-type: none"> To enhance data acquisition, evaluation and fusion in the future training workshop. Aiming to inform user to know how to make full use of multiple data sources effectively. 	<ul style="list-style-type: none"> To enhance quantitative impact assessment of climate change on water resources in the future training workshop. Aiming to help users to get more straightforward adaptive strategies to climate change. 	<ul style="list-style-type: none"> To organize face to face or online training workshops in TC countries. Training workshops will focus on (1) Global data acquisition and evaluation, (2) Model calibration and application; To extend RCCC-WBM model application in pilot catchments in interested TC Members for assessing climate change impact; Capacity building on knowledge exchange, experiences and lessons sharing on climate impact assessment on water resources variation;
AOP6		<ul style="list-style-type: none"> Application of 3L WLGs to actual fields of hydrological observation in member countries to enhance the effectiveness and efficiency of the water level observation. 	<ul style="list-style-type: none"> Application of 3L WLGs and its data collection, sharing and dissemination system in Members to enhance the opportunities to provide accessible water levels and related warning information to the residents. 		<ul style="list-style-type: none"> This theme will be completed in 2023 and the following themes will continue to be studied. New AOP6 theme; Flood Risk Mapping with Ground/Satellite Observation Data Opportunities for testing of 3L WLGs in member countries will continue to be sought.

AOP	The potential Area to be enhanced to align with the Pillars of EW4All				Implementation Plan in future
	Pillar 1	Pillar 2	Pillar 3	Pillar 4	
AOP7	<ul style="list-style-type: none"> Disaster risk and management can be learned through OSS-SR's learning functions to enhance disaster resilience by increasing disaster literacy 	<ul style="list-style-type: none"> OSS-SR can hydrologically forecast floods and inundations by mobilizing all available rainfall inputs, and can show remote sensing images of clouds, inundation extents, and so on. 	<ul style="list-style-type: none"> Warning information created by OSS-SR can be disseminated and used for risk communication with the translation by the "Facilitator" 		<ul style="list-style-type: none"> To develop and improve OSS-SR so that it can integrate more knowledge, technology, know-how, and experience of different disciplines related to flood disasters To conduct capacity development to foster local Facilitators utilizing OSS-SR as an E-learning tool To cooperate with Facilitators for disseminating scientific knowledge and technology to local stakeholders relevant to water-related disaster management To cooperate to implement the activities above with other working groups of the Typhoon Committee and international organizations
AOP8	<ul style="list-style-type: none"> To enhance the training courses and workshops on the Manual and the materials; To enhance pilot study in community level; 	<ul style="list-style-type: none"> To enhance the training courses and workshops on the Manual and the materials; To enhance pilot study in community level; 	<ul style="list-style-type: none"> To enhance the training courses and workshops on the Manual and the materials; To enhance pilot study in community level; 	<ul style="list-style-type: none"> To enhance the training courses and workshops on the Manual and the materials; To enhance pilot study in community level; 	<ul style="list-style-type: none"> Apply for the 4th Training Course on Flood Control and Early-Warning and Forecasting and Hydrological Monitoring for Developing Countries in 2024. The 4th training course is scheduled for a face-to-face gathering in September, 2024, at NIHWA in Nanjing, China, with the funding supporting selected participants from members countries, communication materials and official documents Strengthen international exchanges and cooperation, truly embed our own development in global development, achieve mutual benefit and win-win cooperation in benign interaction with other countries under the support of Typhoon Committee.
AOP9	<ul style="list-style-type: none"> Work with community leaders in determining local risk knowledge and advancing local hazard preparedness 	<ul style="list-style-type: none"> Work with local community leaders to enhance early detection of local hazards through local knowledge and responding appropriately 	<ul style="list-style-type: none"> Work with local community leaders to determine methods for receiving and disseminating warning and response information 	<ul style="list-style-type: none"> Work with local communities to advance or develop MHEWSs, and explain how to exercise these plans 	<ul style="list-style-type: none"> Based on the success of the initial results of SSOP-III, extensions to further years may be appropriate to allow for additional beneficiary Member countries participation.

Table 7 The comments from WGH Chairperson to the implementation of WGH AOPs

AOP	The comments
AOP1	<ul style="list-style-type: none"> • AOP1 is strongly committed to the five KRAs of the TC strategic plan and all pillars of EW4All due to its wide applicability from a perspective of coastal disaster management. • Their great efforts to date have significantly improved the usability of storm surge inundation mapping and forecasting programs. • Based on the success with China and Thailand, other members of the Typhoon Committee will be able to follow and benefit because most of the members have coastal areas within their borders and are at risk of storm surges.
AOP2	<ul style="list-style-type: none"> • In quality control of observed hydrological data, which is an important common issue for all members, selecting the suitable AI technology from among the many available ones is important. • While they are currently focusing on contributing to the three KRAs and the second pillar of EW4All, it can be expected to contribute to the first pillar of EW4All with publication of results.
AOP3	<ul style="list-style-type: none"> • AOP3 directly link with three KRAs and second pillar of EW4All in terms of flood monitoring and forecasting. • Since it is also connected to AOP2 of data quality control, it can be expected an integrated approach that utilizes AI for observation and forecasting. It will be useful for members aiming an integrated approach to flood monitoring and forecasting.
AOP4	<ul style="list-style-type: none"> • Since AOP4 targets urban flood disasters, which are an urgent issue for each member, it is relevant to six KRAs and all EW4All pillars. Therefore, the development of an operational flood forecasting system has the potential to be extended to all members.
AOP5	<ul style="list-style-type: none"> • Since AOP5 covers a wide range of contents such as multi-source data management, hydrological model application, and climate change impact assessment, it is linked with KRA3, KRA6, and three pillars of EW4All. The active training and publication of reports and guidelines are also beneficial for members to understand the impact of climate change.
AOP6	<ul style="list-style-type: none"> • AOP6, which covers everything from the installation of 3L (Low-cost, Long life, and Localized) water level gauges to the use of that data for flood monitoring, was pioneered in Malaysia and has been proven to be of equivalent quality to DID's observation. • The 3L water level gauge, which can be beneficial to all TC members, is committed to the five KRA and second EW4All pillars. Additionally, this method, which uses common communication lines, has great potential to contribute to the third pillar of EW4All.
AOP7	<ul style="list-style-type: none"> • AOP7, which aims to build effective governance, develop integrated systems, and foster facilitators, is committed to six KRAs and a second, EW4All. It will be able to contribute to the first and third pillars of EW4All by strengthening the e-learning function and dissemination system based on the synthesis of data and information from different disciplines.
AOP8	<ul style="list-style-type: none"> • AOP8 provides comprehensive training content on hydrological monitoring, thus widely relating to the five KRAs and all EW4All pillars. Further contributions to the KRA and EW4All pillars are foreseen as the training themes will be expanded to include flood control and flood early warning.
AOP9	<ul style="list-style-type: none"> • The Typhoon Committee's comprehensive training and community support efforts through the Multi-Hazard Early Warning Systems (MHEWSs) Standard Operating Procedures fully engage the six KRAs and all pillars of EW4All. The bottom-up approach from the community level, in which TC, PTC, and TCC collaborate, can be highly praised as a truly inclusive style.