

**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION  
of UNESCO**

**ICG/PTWS Steering Committee**  
29-31 June 2016  
Honolulu

**REPORT OF  
TASK TEAM FOR EVACUATION PLANNING AND MAPPING**

**DR. LAURA KONG  
TASK TEAM CHAIR**

## **PTWS TASK TEAM ON EVACUATION PLANNING AND MAPPING REPORT TO ICG/PTWS STEERING COMMITTEE, 29-31 JUNE 2016**

**Note:** This Report covers the period since ICG/PTWS-XXVI (April 2015).

### **1. BACKGROUND**

In July 2014, the Pacific Tsunami Warning and Mitigation System Steering Committee (PTWS SC) approved Working Group 3's (Disaster Management and Preparedness) that the next priority of the PTWS after the implementation of the PTWC New Products on October 1, 2014, should be on Preparedness. The International Tsunami Information Center (ITIC) recommended a capacity building focus on evacuation and proposed a new course that was accepted by the PTWC SC.

In April 2015 at the Twenty-sixth session of the ICG/PTWS, Member States affirmed the priority focus and established a Task Team on Evacuation Planning and Mapping, chaired by the ITIC Director and comprised of experts in Warning, Modeling, Disaster Management, Community Preparedness and Education and Outreach, to provide guidance to ITIC during the development of the Course. Following, the ICG/CARIBE-EWS also endorsed the new course and ITIC and CTWP are collaborating to develop the course piloting in Honduras and inviting Central America and Mexico to participate.

### **2. PTWS TASK TEAM ON EVACUATION PLANNING AND MAPPING**

The PTWS Task Team on Evacuation Planning and Mapping was established by Recommendation ICG/PTWS-XXVI.1 (April, 2015) under Chair Dr Laura Kong (ITIC) and with Terms-of-Reference as follows:

1. Develop a new programme aimed at facilitating tsunami resilience through community preparedness, specifically through the preparation of tsunami evacuation maps and associated response plans for tsunami-vulnerable coastal communities. Programme globally applicable and utilizing standardized tools and methodologies where they exist.
2. Take advantage of existing resources, the new programme should link existing training workshops, such that modules cover
  - Evacuation Planning
  - Evacuation Map Development (inundation modelling and map creation)
  - Tsunami Warning & Emergency Response SOPs
  - Conducting Tsunami Exercises (including evacuation)
3. Compile and take into consideration best practices worldwide.
4. Conduct a Pilot(s) using 'real' communities to produce an evacuation map.

5. After each training delivery, develop feedback mechanisms that will adapt and lead to improvements in the next course delivery.
6. Produce an IOC Manual and Guide on Evacuation Plans, Maps, and Procedures

Membership to include experts in Warning, Modelling, Disaster Management, Community Preparedness, Education and Outreach, reporting to the Steering Committee and chaired by Ms Laura Kong (ITIC).

The Task Team Members are:

Chair – Dr. Laura Kong, ITIC

Caribbean region: Alison Brome, Caribbean Tsunami Information Center; Patrick Tyburn, Martinique, France, ICG/CARIBE-EWS WG 4 Chair on Preparedness, Readiness, and Resilience

Central America region: Norwin Acosta, INETER, Nicaragua

Southeast Pacific region: Humberto Gomez, INOCAR, Ecuador, Chair, ICG/PTWS South East Pacific Working Group

Southwest Pacific region: 'Ofa Fa'anunu, Tonga Meteorological Services; Chair, ICG/PTWS South West Pacific Working Group

Disaster Risk Reduction and Community Preparedness: Julie Leonard, PTWS WG 3 Vice-Chair (since passed away); John Kimbrough, USAID/OFDA/LAC

Indian Ocean and Southeast Asia region: Ardito Kodijat, Indian Ocean Tsunami Information Center; Irina Rafliana, Indonesia

Mediterranean and North Atlantic Region (NEAMTWS): Gerassimos Papadopoulos, Greece

### **3. TEMPP PROJECT**

ITIC is leading the development of a standardized process and training course under its Tsunami Evacuation Maps, Plans, and Procedures (TEMPP) Project. TEMPP is a collaborative effort of the USA (NOAA, USAID/OFDA), IOC, and New Zealand. NOAA's Caribbean Tsunami Warning Program is a co-lead with ITIC for the TEMPP Project.

The TEMPP Project will develop a course that covers the process of producing reliable and practical community-level tsunami evacuation maps. The Course will cover cases where modeling is and is not available, demonstrate the application of different levels of tsunami modeling to construct inundation maps, work through the process of creating a community-owned evacuation map, with appropriate routing, safe area assembly, signage, and finally, use an exercise to test emergency response operational readiness of communities.

A TEMPP Course Development Team (CDT) is working with ITIC to develop the Course. The CDT consists of :

Bernardo Aliaga, PTWS Technical Secretary, Programme Specialist, UNESCO/IOC  
Dr. Diego Arcas, Tsunami Modeler, NOAA Pacific Marine Environmental Laboratory (PMEL)

David Coetzee, Manager, Capability & Operations, NZ Ministry of Civil Defence and Emergency Mgmt  
Dr. Laura Kong, Director, ITIC  
George Crawford, Community Preparedness, retired from Earthquake and Tsunami Program Manager, USA Washington State Military Department Emergency Management Division  
Christa von Hillebrandt-Andrade, Chair, ICG/CARIBE-EWS; Manager, CTWP; Carolina Hincapie, CTWP  
Mylene Villegas, Chief Science Research Specialist, Geologic Disaster Awareness & Preparedness Division (GDAPD), Philippine Institute of Volcanology and Seismology (PHIVOLCS)  
Tim Walsh, Chief Hazards Geologist, USA Washington State, Dept of Natural Resources

The PTWS Task Team on Evacuation Planning and Mapping is providing guidance to the ITIC and the Course Development Team. The CDT is compiling and incorporating best practices worldwide, and linking existing materials and trainings on tsunami standard operating procedures and exercises. The course and process will build upon previous efforts to create a linked series of tsunami trainings. Upon completion, the Course and its methodologies will be formalized and offered widely, and published as part of the IOC Manuals and Guides series.

Targeted trainees will include Tsunami National Contacts and Tsunami Warning Focal Points, other governmental institutions staff (local and national) and civil society organizations leaders. Tsunami modeling training will target physical scientists and oceanographers in governmental institutions and universities.

### **3. TEMPP ACTIVITIES**

The TEMPP Project is using a Pilot to develop the Course. The Pilot is being run in Honduras with the communities of Cedeño (Pacific) and Sambo Creek (Caribbean). While the ITIC and partners are leading the effort, significant commitments from Honduras as the beneficiary country have been required in conducting the Pilot. The Pilot is structured to enable the relevant national agencies to work at the local level with communities in the development of tsunami evacuation plans, maps, and procedures. Upon the Pilot's completion, the host country should have sufficient training to replicate the process in other tsunami-prone communities in their country.

For each Honduras training, 1 representative for the other Central American Countries (Guatemala, El Salvador, Nicaragua, Costa Rica, and Panama), and Mexico, is also invited to participate. The typical class size is about 20 persons.

The direct outcomes for the host country include:

- Communities that know what to do and where to go, and
- Country capability and tools to replicate the community evacuation map process elsewhere

## ACTIVITIES

<b>Overall Timeline</b>	<b>Planned dates</b>	<b>Project Responsibility</b>
New Course and Pilot	2015-2017	ITIC
IOC Circular letter to select host	May 11, 2015	ITIC, PTWS WG 3, USAID, IOC, CTWP
Countries submit questionnaire to host	May 11-22 2015	Central America - Pacific Coast Countries
Host country selected	Week May 25, 2015	Pilot Selection Committee
Course Development	Throughout 27 April 2015 (Honolulu) 22-25 June 2015 (Honolulu) 11-14 April 2016 (Honolulu) Email – Google Hangout	Course Development Team
Course Guidance	Throughout 23 February 2016 (Paris) 28 June 2016 (Honolulu) Email	PTWS Task Team on Evacuation Planning and Mapping
Pilot Summary Report	December 2016	ITIC
IOC Guideline – Tsunami Evacuation Plans, Maps, and Procedures	2017	ITIC and Course Development Team

## TRAININGS

<b>Workshop/Training</b>	<b>Dates</b>	<b>Purpose</b>	<b>Outcome / Post-Training homework</b>
Training 1: Tsunami Inundation Modeling – ComMIT/MOST tool	27-31 July 2015	Inundation modeling training – How to use ComMIT tool with MOST model	Able to use ComMIT Homework: run scenarios
Training 2: Seismic Tsunami Sources for Honduras Meeting	29 Feb– 1 March 2016	Identify and agree on credible worst-case tsunami scenarios to use for inundation mapping	Honduras inundation mapping scenarios list
Training 2: Inundation Mapping for Evacuation – process	2-3 March 2016	How to create Inundation Map as ensemble of inundation scenarios; How to output results in GIS format	Inundation Map for evacuation mapping (GIS results layers)
Training 3: Evacuation Mapping – process, Tsunami Ready community recognition guidelines, Tsunami Awareness	15-19 August 2016	How to create Evacuation Map from Inundation Map using GIS tools with community engagement; Building preparedness using a Tsunami Ready (TR) program; Creating Essential Awareness materials	Evacuation map; TR recognition program, TR Board; Essential tsunami awareness materials developed (Info, signage, maps)
Training 4: Warning and Emergency Response, Socialization - Education & Awareness, Exercise planning	26-30 September, 2016	How to create a Tsunami Response Plan (SOPs for warning and community evacuation); How to conduct a Tsunami Exercise	Tsunami Response Plan; Community Tsunami Exercise Plan

Training 5 Official Adoption Ceremony, Functional Exercise	November - December 2016	Official Adoption of Maps, Functional Tsunami Exercise, including evacuation, Tsunami Ready recognition ceremony, Pilot Wrap-up meeting	Official Evacuation Map, Tsunami Ready Recognition
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## **COURSE CONSIDERATIONS AND OTHER LESSONS LEARNED TO DATE**

To date, the TEMPP Project has conducted two trainings. The following were identified as lessons learned:

1. A Kick-Off in-person meeting is essential to confirm answers provided in the Country Questionnaire, especially on modeling and mapping data availability. The visit should include an official Project Kick-Off Ceremony. The Questionnaire asked questions on agency commitments (1-2 yr process) for hosting and personnel to be trained (and their backgrounds), candidate communities, and available data that would be needed for inundation modeling and evacuation mapping.
2. Tsunami Modeling. While a larger number may attend the training, it is essential that a Core Team is identified and these scientists will be the persons responsible for making the country's inundation maps.
  - a. 'Good' bathymetry is required if numerical modeling is to be conducted. 1 pilot community had adequate bathymetry for modeling, and the other one will use a 'bathtub' model guidance based on a single observation.
  - b. Bathymetric data files need to be assembled and gridded beforehand since the ComMIT training does not cover this topic. Gridding may require additional training.
3. Tsunami Seismic Sources. If not already available, an Expert meeting should be convened before modeling begins to agree on earthquake scenarios that will be used.
4. Communities with low tsunami hazards, or no known historical tsunami impact. This may be a common situation in many countries. Communities should nonetheless still be prepared, e.g., have an tsunami response plan and identify safe areas,

While still generally on-schedule, the TEMPP Project has incurred delays due to

1. Changes in Project and Host Country staffing
2. Delay in convening Expert Tsunami Seismic Sources meeting
3. Non-availability of adequate bathymetric data for 1 pilot community requiring mid-Project decision on how to proceed.

## **4. PTWS TASK TEAM MEETINGS**

The PTWS Task Team on Evacuation Planning and Mapping met on 23 February 2016 (Paris, France) on the margins of the TOWS WG and Inter-ICG Task Teams, and on 28 June 2016 (Honolulu, Hawaii, USA) as part of the PTWS WG and TT meetings. Both meetings were participated to by a subset of the Task Team, and also by participants

already attending the other meetings (e.g., TOWS, PTWS WG/TT). At each meeting the Chair provided TEMPP status, and asked for feedback on planned training agenda topics.

Task Team and CDT Participants to the 23 February 2016 meeting were:

- Alison Brome, Caribbean Tsunami Information Center
- Patrick Tyburn, Martinique, France, ICG/CARIBE-EWS WG 4 Chair on Preparedness, Readiness, and Resilience
- Ardito Kodijat, Indian Ocean Tsunami Information Center
- Gerassimos Papadopoulos, Greece
- Bernardo Aliaga, IOC
- David Coetzee, NZ Ministry of Civil Defence and Emergency Mgmt
- Christa von Hillebrandt-Andrade, CTWP

Task Team and CDT Participants to the 28 June 2016 meeting were:

- Patricia Arreaga, INOCAR, Ecuador (on behalf of the SEP WG Chair) \*
- 'Ofa Fa'anunu, Tonga Meteorological Services
- Bernardo Aliaga, IOC
- Dr. Diego Arcas, NOAA Pacific Marine Environmental Laboratory (PMEL) \*
- David Coetzee, NZ Ministry of Civil Defence and Emergency Mgmt
- Christa von Hillebrandt-Andrade, Carolina Hincapie, CTWP \*

\* participated remotely

Additional participants are listed were those attending the PTWS WG/TT and Steering Committee meetings 27 June – 1 July 2016 and listed at [http://ioc-unesco.org/index.php?option=com\\_oe&task=viewEventParticipants&eventID=1868](http://ioc-unesco.org/index.php?option=com_oe&task=viewEventParticipants&eventID=1868)

## 5. RECOMMENDATIONS

The Task Team offers the following recommendations to the Steering Committee:

**Notes** with appreciation the progress that has been made with regards to the establishment of a training programme for the creation of Tsunami Evacuation Maps, Plans, and Procedures (TEMPP) under the lead of Dr Laura Kong, Director of ITIC;

**Notes** continuing challenges by countries in obtaining adequate bathymetric and elevation data sets for inundation and evacuation mapping, but that basic maps can be established that should not require detailed inundation modelling;

**Emphasizes** the importance that every tsunami-vulnerable community should have an evacuation map and plans; and

**Notes** the interest of the Cook Islands in the TEMPP process, and that the topic and interest will be further discussed at the PTWS South West Pacific Working Group in 22-23 August 2016;

**Encourages** Member States to make this a highest priority action to save lives.