



USAID | **ASIA**
FROM THE AMERICAN PEOPLE



US INDIAN OCEAN TSUNAMI WARNING SYSTEM (IOTWS) PROGRAM

WORKSHOP PROCEEDINGS RADIO & INTERNET (RANET) AND CONCEPT OF OPERATIONS (CONOPS)

AUGUST 2007

August 2007 Version 1.0

Prepared for the United States Agency for International Development
by the IRG-Tetra Tech Joint Venture



USAID
FROM THE AMERICAN PEOPLE



USGS
science for a changing world



US INDIAN OCEAN TSUNAMI WARNING SYSTEM (IOTWS) PROGRAM

**WORKSHOP PROCEEDINGS
RADIO & INTERNET (RANET) AND
CONCEPT OF OPERATIONS (CONOPS)**

August 2007

August 2007 VERSION 1.0

Prepared for U.S. Agency for International Development
by IRG-Tetra Tech Joint Venture under Contract No. EPP-I-02-04-00024-00

US IOTWS Program Document No. 24-IOTWS-07

DISCLAIMER

The views expressed in this document do not necessarily reflect the views of the United States Agency for International Development or the United States Government.



USAID | **ASIA**
FROM THE AMERICAN PEOPLE



RAudio & InterNET (RANET) Technical Training and Concept of Operations (CONOPS): Realizing a National Tsunami Warning System For Multi-hazard Warnings

August 6-10, 2007
Cinnamon Grand Hotel, Colombo, Sri Lanka

Implementing Agency:
Disaster Management Center (DMC)

Facilitating Institution:
National Oceanic and Atmospheric Administration (NOAA)
through the US Indian Ocean Tsunami Warning System (IOTWS) Program

Supported by:
United States Agency for International Development Regional Development Mission
for Asia (USAID RDM/A)





**Workshop Participants at the RANET & CONOPS Training Workshop, Colombo, Sri Lanka
August 6-10, 2007**

Contents

1.	BACKGROUND.....	1
2.	WORKSHOP OBJECTIVES	1
3.	INAUGURAL SESSION	2
4.	SUMMARY OF THE PRESENTATIONS.....	2
6.	CLOSING SESSION.....	3
	ANNEX 1: LIST OF PARTICIPANTS.....	4
	ANNEX 2: AGENDA.....	8

I. Background

The US Indian Ocean Tsunami Warning System (IOTWS) Program is a two-year initiative of the U.S. Agency for International Development (USAID) through which scientists and experts are sharing technical expertise and helping to build early warning system capacity within the Indian Ocean region.

The U.S. National Oceanic and Atmospheric Administration (NOAA) together with the Ministry of Disaster Management and Human Rights implemented the technical training workshop on Radio and Internet (RANET) and Concept of Operations (CONOPS) for realizing a national tsunami warning system for multi-hazard warnings. The workshop was held in Colombo, Sri Lanka, from August 6-10, 2007.

During the US IOTWS project NOAA has been involved in many trainings, technical assistance activities, and policy-setting working groups in the Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO). It has also supported the installation of critical earth observation and communications equipment, such as the GTS communications system recently installed at the Sri Lanka Meteorological Department. The training on CONOPS was the first to showcase the newly drafted *Tsunami Warning Reference Guide*, which provides an overview of the elemental parts of an end-to-end tsunami warning system (TWS). The workshop was tailored for the warning center and its partners to help give information about the global system and how to manage, operate, and sustain their system in a multi-hazard context. Concepts of Operations (CONOPS) describes a system of protocols, standards, decision trees, communication pathways, and other elements of a functional and effective tsunami warning system.

The RAdio and InterNET (RANET) technology was developed by NOAA to improve communication of early warnings, particularly at the local level. The training provided an opportunity for the Sri Lankan Government to undergo hands-on training on RANET equipment and to develop partnerships and collaboration on RANET activities in the future. The hands-on training course demonstrated the use of radio satellite technology (RANET) to download and distribute warning messages at the local level. RANET is a low-cost communications technology that creates the last-kilometer linkage in the end-to-end warning system. After the training, the RANET equipment will be handed over to the district disaster management coordinators.

The event drew together participants from Sri Lanka and the Maldives for the CONOPS workshop. Instructors from Indonesia also participated in the RANET training. The list of participants is attached in Annex 4.

2. Workshop Objectives

The specific objectives of the workshop were to:

- Share U.S. expertise on building and managing a tsunami warning system through the Concept of Operations.
- Supply participants with a Resource Guide for Developing a Tsunami Early Warning System as linked to the Sri Lanka Road Map for Multi-Hazard Warning Systems.

- Provide a summary of the projects implemented in the Indian Ocean under the USAID project for the Indian Ocean Tsunami Warning System.
- Involve all levels of stakeholders in discussions about roles and responsibilities in establishing and sustaining a TWS.
- Share achievements and limitations of the US IOTWS efforts.
- Explore and discuss the IOTWS development with those countries engaged in the IOC process; Set priorities for sustaining the present level of operation and continuing the building process.
- Provide a venue for discussion of stakeholder efforts and contributions to the IOTWS.

3. Inaugural Session

- **Ms. Rebecca Cohn**, Director, USAID Sri Lanka Mission, welcomed participants to the workshop to enhance national early warning systems and establish an end-to-end concept of operations for a tsunami warning system.
- **Major General Hettiarachchi**, Director General, Disaster Management Center, Sri Lanka, opened the workshop and requested the participants to enhance cooperation between various organizations in the country, and to follow up on initial assessments to answer questions including: Where have we been? How is it going? What is next?

4. Summary of the Presentations

RANET:

- **Ms. Jennifer Lewis**, International Activities Office, National Weather Service, NOAA, presented an overview of the RANET WorldSpace modules and case studies of warning and non-warning applications in Uganda, the Pacific Islands, and Indonesia.
- **Mr. Priyatna Kusumah**, Indonesian Meteorological and Geophysics Agency (BMG), presented an introduction to the Tongshi DAMB-R WorldSpace receiver, how to unpack the unit, general setup considerations (e.g. antenna placement), software installation, system configuration, and receiving a broadcast.
- **Mr. Kelum Jayasoma**, Assistant Director, Disaster Management Center (DMC), Sri Lanka, presented on troubleshooting the RANET WorldSpace Module, help resources, and recommended maintenance, security, and operating practices.
- **Mr. Edward Young**, Deputy Director, Pacific Region, National Weather Service, NOAA, presented the sustainable communications systems at work in Pacific communities.
- **Mr. Surah Kahfi**, Indonesian Meteorological and Geophysics Agency (BMG), presented the BMG 5-in-1 system as an example of warning applications. He also provided an introduction to the RANET Alert Watcher-WorldSpace (RAW-WS) as another example.

CONOPS:

- **Mr. Curt Barrett**, International Tsunami Project Team Director, National Weather Service, NOAA, presented an update on the progress of U.S. Government support to the Indian Ocean Tsunami Warning System and gave an overview of workshop goals.
- **Mr. Edward Young**, Deputy Director Pacific Region, National Weather Service, NOAA, presented on the principles of a Concept of Operations and communication methods for tsunami warning systems.
- **Major General Gamini Hettiarachchi**, Director General, Disaster Management Center, presented Sri Lanka's tsunami warning system process with an overview of achievements and insights into the next steps planned.
- **Mr. Ghardi Dharmaratna**, Director, Sri Lanka Meteorological Department, presented on the role of the meteorology department in tsunami warning, Sri Lanka's tsunami warning system process, and achievements and insights into the next steps planned.
- **Dr. Abdul Muhusin Ramiz**, Director of the Meteorological Center, Maldives, presented on the country's tsunami early warning system, achievements to date, and insights into the next steps planned. He also discussed the system's strengths and challenges.
- **Dr. Gerard Fryer**, Seismologist and Geo Physicist, NOAA Pacific Tsunami Warning Center (PTWC), presented on national systems in the U.S. with a focus on PTWC's tsunami readiness and outreach from NOAA's National Weather Service.
- **Ms. Jennifer Lewis**, International Activities Office, National Weather Service, NOAA, gave an introduction to RANET and discussed the importance of community connections for building partnerships for tsunami warning, particularly with the media.

6. Closing Session

Major General Hettiarachchi and Mr. Curt Barrett closed the event. Major General Hettiarachchi stated that the CONOPS for Sri Lanka and the Maldives are unique as they focus on creating national warning centers. This is in contrast to efforts in Thailand and Indonesia, which have both committed to becoming regional watch providers. CONOPS will facilitate the initiation of the SOP process for Sri Lanka's interagency cooperation. The workshop identified key systems needing improvement, including communications, observations, training, maintenance, and coordination for system sustainability. Officials also mapped a pathway forward for cooperation with NOAA to enhance tsunami and multi-hazard warning capabilities in Sri Lanka. Finally, he suggested continuing to enhance capacity and use these resources given by NOAA/USAID as a model, but that they must be tailored to the Sri Lankan context. He stated, "We want to work at the appropriate scale and aim towards a multi-hazard warning system that will function well to save lives and protect our nation."

Annex I: List of Participants

Participants for the RANET Training

I. Disaster Management Centre

District Disaster Management Coordinators

<u>District</u>	<u>Name</u>
1. Ampara	Mr. J.K.R.A. Perera
2. Anuradhapura	Mr. S.H.S. Bandara
3. Badulla	Mr. K.P.K.S. Kulasinghe
4. Batticaloa	Mr. S. Carthigesu
5. Colombo	Wing Cdr. H.D.B. Chandrasekera
6. Galle	Captain Hirantha Senaratne
7. Galle	Jude Fernando
8. Gamhapa	Mr. Suranga Kahandawa/Asst. Coordinator
9. Hambantota	Wing Cdr. M.G.M. Chandralal
10. Jaffna	Mr. N. Selvarajah
11. Kalutara	Mr. Sanjeewa Samaranayake/Asst. Coordinator
12. Kegalle	Mr. K. Mudalige
13. Kurunegala	Mr. B. Wanninayake
14. Mannar	Mr. M.A.C. Mohamed Riyas
15. Matale	Mr. I.A.K. Ranaweera
16. Matara	Ms. Ruwani Senevirathne/UN Volunteer
17. Monaragala	Mr. M. Wahid
18. Polonnaruwa	Mr. P.R.U.S.K. Nanayakkara
19. Puttalam	Lt. Col. M.K. Mudannayake
20. Ratnapura	Mr. S.M.P.B. Abhayaratne
21. Trincomalee	Mr. A.G.C.J. Gamage/UN Volunteer
22. Kandy	H.R.K.P. Herath

Head Office/Colombo

23. Lt. Col. Keerthi Ekanayake, Communication Coordinator/EOC
24. Mr. Vajira Rambukpitiya, Computer Operator
25. Mr. Namal Rambukpotha, Asst. Coordinator/EOC
26. Mr. Asela Buddhika, Computer Operator
27. Mahinda Wickremasinghe, Asst. Coordinator/EOC

2. Department of Meteorology

28. Mr. Lalith Chandrapala, Deputy Director
29. Mr. Nuwan Kumarasinghe, Electronic Engineer
30. Mr. I.S.M. Abhayasinghe, Technical Officer
31. Mr. M.V.P.J. Kurera

3. National Aquatic Resources Agency

32. P. Jayasinghe

Participants for the CONOPS Seminar

I. Disaster Management Centre

District Disaster Management Coordinators

<u>District</u>	<u>Name</u>
1. Ampara	Mr. J.K.R.A. Perera
2. Anuradhapura	Mr. S.H.S. Bandara
3. Batticaloa	Ms. S. Carthigesu
4. Colombo	Wing Cdr. H.D.B. Chandrasekera
5. Galle	Captain Hirantha Senaratne Lt. Col. Jude Fernando
6. Gampaha	Captain Eranga Rathnayake Suranga Kahadawela/UN Volunteer
7. Hambantota	Wing Cdr. M.G.M. Chandralal
8. Jaffna	Mr. N. Selvarajah
9. Kalutara	Lt. Col. Janath Hettiarachchi Sanjeewa Samaranayake/Asst. Coordinator
10. Kegalle	Mr. K. Mudalige
11. Kurunegala	Mr. B. Wanninayake
12. Mannar	Mr. M.A.C. Mohamed Riyas
13. Matale	Mr. I.A.K. Ranaweera
14. Matara	Ms. Ruwani Senevirathne/UN Volunteer
15. Monaragala	Mr. M. Waheed
16. Polonnaruwa	Mr. P.R.U.S.K. Nanayakkara
17. Puttalam	Lt. Col. M.K. Mudannayake

- | | |
|-----------------|----------------------------------|
| 18. Ratnapura | S.M.P.B. Abhayaratne |
| 19. Trincomalee | Mr. A.G.C.J. Gamage/UN Volunteer |
| 20. Vavunia | Janath Kamalgoda |
| 21. Kandy | Mr. H.R.K.P. Herath |

Head Office/Colombo

- 22. Lt. Col. Keerthi Ekanayake, Communication Coordinator/EOC
- 23. Mr. Namal Rambukpotha, Asst. Coordinator/EOC

2. Department of Meteorology

- 24. Mr. S.H. Kariyawasam, Deputy Director
- 25. Mr. Ajith Weerawardena, Deputy Director
- 26. Mr. M.D. Dayananda, Meteorologist

3. Ministry of Disaster Management and Human Rights

- 27. Mr. C.S.H. Vithanaarachchi
- 28. Mr. Lalith Chandrapala

4. Department of Irrigation

- 29. Eng. G.K. Pathmakeerthi, Irrigation Engineer

5. National Building Research Organization

- 30. Ms. Kumari Weerasinghe/ Scientist

6. Coast Conservation Department

- 31. Eng. K.D.D. Wijewardena, Chief Engineer (Works)

7. Sri Lanka Army

- 32. Major S.P.D. Jayamahamudali

8. Sri Lanka Air Force

- 33. Sqn Ldr H.T.R.P. Wijesooriya, Chief Fire Officer

9. Geological Survey and Mines Bureau

- 34. Mr. S M A T B Mudunkotuwa, Deputy Director (Geology)
- 35. Mr. C H E R Siriwardena, Geologist
- 36. Mr. Sajjana De Silva, Mining Engineer

10. National Disaster Relief Service Centre

- 37. Mr. G.M.J.K. Gunawardene, Assistant Director

- 11. Sri Lanka Police**
 - 38. Mr. S.K. Shankar, Deputy Inspector General of Police
- 12. Sri Lanka Institute of Development Administration**
 - 39. Ms. Neranjala Jayasundera, Consultant
- 13. Sri Lanka Red Cross**
 - 40. Mr. Susil Perera
 - 41. Mr. Indu Abeyrathne
- 14. Sri Lanka Broadcasting Corporation**
 - 42. Sumith Kariyawasam
- 15. Maldives Meteorological Center**
 - 43. Dr. Abdul Muhusin Ramiz

Annex 2: Agenda

DAY I PROGRAM: Monday, August 6, 2007 – RANET Technical Training

08.30 – 09.00	Registration
09.00 – 09.30	Welcome and Introductions
09.30 – 10.00	Training Objectives and Review of Curriculum
10.00 – 10.30	Introduction to RANET
10.30 – 10.45	– Break –
10.45 – 11.15	Overview of the RANET WorldSpace Module <ul style="list-style-type: none"> - Functional Summary - Case Examples for Warning and Non-Warning Applications <ul style="list-style-type: none"> - Uganda - Pacific Islands - Indonesia
11.15 – 11.30	Quiz #1- Understanding Role of RANET and Basic Functionality of the RANET WorldSpace Module
11.30 – 12.00	Group Breakout – Mapping Current Systems and Information
12.00 – 12.30	Group Presentations and Discussion
12.30 – 13.30	– Lunch Break –
13.30 – 16.00 /w Break	Introduction to the Tongshi DAMB-R WorldSpace Receiver <ul style="list-style-type: none"> - Unpacking the Unit - General Setup Considerations (Antenna Placement) - Software Installation - System Configuration - Receiving a Broadcast
16.00 – 16.15	Quiz #2- Setup and installation of the Tongshi DAMB-R
16.15 – 16.45	Troubleshooting the RANET WorldSpace Module and Help Resources
16.45 – 17.15	Recommended Maintenance, Security, and Operating Practices

DAY 2 PROGRAM: Tuesday, August 7, 2007 – RANET Technical Training

08.30 – 09.00	Review of Day I Material and Key Points
09.00 – 09.30	Exercise – Setup, installation, and downloading content using the WorldSpace Tongshi DAMB-R
09.30 – 10.00	System in Detail: Formatting and Broadcasting Your Content
10.00 – 10.30	System in Detail: Understanding the Scheduling System
10.30 – 10.45	– Break –
10.45 – 11.00	Quiz #3- Formatting Content and the Scheduling System
11.00 – 12.30	Introduction to the BMG 5-in-1 as an Example Warning Application
12.30 – 13.30	– Lunch Break –
13.30 – 14.00	Demonstration and Wrap-Up Presentation of BMG 5-in-1
14.00 – 14.30	Introduction to RANET Alert Watcher-WorldSpace (RAW-WS) as an Example Warning Application
14.30 – 15.00	Demonstration and Wrap-Up Presentation of RAW-WS

15.00 – 15.15	– Break –
15.15 – 15.45	Participants Become Trainers: Groups Prepare 5-10 Minute Lessons
15.45 – 16.45	Participants Become Trainers: Groups Give Lessons
16.45 – 17.15	Training End and Close Out
17.15 – 17.30	Group Photo

DAY 3 PROGRAM: Wednesday, August 8, 2007 – Concepts of Operations including RANET

Expected Outcome for Day 3:

Participants gain knowledge about U.S. and Sri Lankan tsunami warning systems and the importance of having a concept of operations that includes both technical and human systems.

08:30 – 09:00 Registration

09:00 – 10:30 Opening Session

- Welcome Address by Local Officials - Major General Gamini Hettiarachchi
Introduction by Disaster Management Center of Sri Lanka
Keynote: Opening Addresses and Greetings
 - ❖ Government of Sri Lanka: **Mr. P. D. Amarasinghe, Secretary, Ministry of Disaster Management and Human Rights**
 - ❖ Government of the United States: **Ms. Rebecca Cohn, Director, USAID Sri Lankan Mission**
 - ❖ Presentation: Update on the progress of U.S. Government support to the Indian Ocean Tsunami Warning System; Overview of workshop goals – **Curt Barrett, International Tsunami Project Team Director, National Weather Service, NOAA**
 - ❖ Presentation: What is a concept of operations (CONOPS)?, **Edward Young, Deputy Director, Pacific Region, National Weather Service, NOAA**

10.30 – 10.45 Coffee and Tea Break

10:45 – 11:00

Workshop introduction: Overview and introduction to the Tsunami Warning Concept of Operations Resource Guide Systems, **Mr. Curt Barrett, Tsunami Program Manager, International Activities Office, National Weather Service, NOAA**

- Introductions of workshop participants and agency role in tsunami warning system; Overview of workshop process and outcomes
- Meetings and business arrangements
- Review of workshop agenda

- 11:00 – 12:00 Presentation: What have we accomplished? U.S. systems contribution to the Indian Ocean Tsunami Warning System **Mr. Curt Barrett, Tsunami Program Manager, International Activities Office, National Weather Service, NOAA**
- Earth Observation Data
 - Data & Information Collection
 - Tsunami Detection & Prediction
 - Tsunami Decision Support
 - Warning & Other Products
 - Notification & Dissemination
 - Community Connection & Response
- 12:00 - 13:00 Lunch
- 13:00 – 13:30 Presentation followed by Q&A: Sri Lanka’s tsunami warning system process with an overview of achievements and insights into next steps planned. Overview of the strengths and challenges needing improvement. **Major General Hettiarachchi, Director of Disaster Management Center**
- 13:30 – 14:00 Presentation followed by Q&A: Role of Meteorology Department in tsunami warning, Sri Lanka’s tsunami warning system process with an overview of achievements and insights into next steps planned. Overview of the strengths and challenges needing improvement. **Dr. Ghardi Dharmaratna, Director, Sri Lanka Meteorological Department**
- 14:00 – 14:30 Presentation followed by Q & A: Maldives tsunami early warning system, tsunami warning system process with an overview of achievements and insights into next steps planned with overview of the strengths and challenges needing improvement. **Dr. Abdul Muhusin Ramiz, Director of the Meteorological Center Maldives**
- 14:30- 15:30 Small Group Discussions: Discuss the current Sri Lanka and Maldives tsunami warning system within your group to understand the roles of each organization involved. Make note of the processes which could be more clearly defined and aided by increased communications and technologies. See handouts.
- 15.30 – 15:45 Coffee Break
- 15:45- 16:45 Small Group Report Out
- 16:45- 17:15 Presentation followed by Q & A: Overview of operational regional tsunami warning center. U.S. systems and showcase of National Oceanic Atmospheric Administration Pacific Tsunami Warning Center operations (NOAA PTWC), **Gerard Fryer, Seismologist and Geo Physicist, NOAA Pacific Tsunami Warning Center**
- Earth Observation Data
 - Data & Information Collection

- Tsunami Detection & Prediction
- Tsunami Decision Support
- Warning Message & Other Products

17:15 – 17:30 Wrap-up for Day 1: Facilitator

18:30 – 20:00 Hosted Dinner – Please join us in the hotel atrium

DAY 4 PROGRAM: Thursday, August 9, 2007

Expected Outcome for Day 2:

Participants deepen their understanding of the importance of communications in tsunami warning and how it is at the heart of the Concept of Operations.

09:00-9:05 Review of Day 2 Process and Expected Outcomes – Facilitator

9:05 – 10:15 Presentation followed by Q&A: Methods of communications in the tsunami warning system, **Edward Young, Deputy Director of the Pacific Region, National Weather Service, NOAA**

- Earth Observation Data
- Data & Information Collection
- Tsunami Detection & Prediction
- Tsunami Decision Support
- Warning & Other Products
- Notification & Dissemination
- Community Connection & Response

10:15 – 10:30 Coffee Break

10:30-11:15 Small Groups: Describe the communications systems currently used by each of the agencies and local officials in your area. What are their strengths? Where are the gaps? Where are the communications issues, mechanisms, or messages?

11:15 – 12:00 Small group report out: Facilitator

12:00 - 13:00 Lunch

13:00 – 13:30 Presentation followed by Q&A: What is RANET? **Ms. Jennifer Lewis, International Activities Office, National Weather Service, NOAA**

- Warning & Other Products
- Notification & Dissemination
- Community Connection & Response

- 13:30 – 14:15 Presentation followed by Q&A: Tsunami ready and outreach from NOAA's National Weather Service, **Gerald Fryer, Expert, Pacific Tsunami Warning Center, National Weather Service, NOAA**
- 14:15 – 14:45 Presentation followed by Q&A: Community Connection – Building Partnerships, **Ms Jennifer Lewis, International Activities Office, National Weather Service, NOAA**
- 14:45 – 15:45 Small group discussion: Complete questions from the Community Connection section of the Tsunami Resource Guide and discuss improving partnerships
- 15:45 – 16:00 Coffee Break
- 16:00 – 17:00 Small Groups Report-out – Facilitator
- 17:15 – 17:30 Wrap-up for Day 1: Facilitator

DAY 3 PROGRAM: Friday, August 10, 2007

Expected Outcome for Day 3

Participants will discuss sustainability and the importance of multi-hazard warning systems as they plan a course forward to fill gaps in current system.

- 09:00 – 09:05 Review of the Day 3 Process and Expected Outcome: Facilitator
- 09:05 – 09:45 Presentation followed by Q&A: Role of local level partners in achieving resilient communities and preparedness in costal areas, Sri Lankan Red Cross
- 09:45 – 10:45 Presentation followed by Q&A: Partnerships with the media in tsunami warning: An analysis of current practice in messages for warning, DMC representative, Department of Meteorology, and two members of Sri Lankan press panel
- 10:45 – 11:00 Coffee Break
- 11:00 – 12:00 Small Groups: Making an implementation plan for the whole system – Gap analysis for long-term sustainable systems
- 12:00 – 13:00 Lunch
- 13:00 – 14:30 Sustainability Panel, representatives from NOAA and Sri Lanka discuss current systems SOPs and plans for sustaining and improving the tsunami warning systems
- 14:30 – 15:00 Large Group Exercise - The way forward: From gap analysis to a plan

- 15:00 – 15:15 Certificates presentation by DMC, Meteorological Department, and NOAA,
- 15:15 – 15:30 Formal Workshop Close: DMC