



ESCAP

Multi-donor Voluntary Trust Fund on Tsunami
Early Warning Arrangements in the Indian
Ocean and Southeast Asia

TERMINAL REPORT

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| <i>PROJECT TITLE</i> | Enhancing coastal hazard early warning and response: tools and institutional strengthening |
| <i>ORGANIZATION</i> | Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) |

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|----------------------|--------------|--------------------------|--------------|
| Total project budget | US\$ 484,990 | Funding received to date | US\$ 453,674 |
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|--|-------|--|-------|
| Percentage of total project budget spent | 70.7% | Percentage of funding received to date that has been spent | 75.6% |
|--|-------|--|-------|

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|--|--------|
| Interest earned on funding received from ESCAP | US\$ 0 |
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|--|-------------|----------------------------|------------------|
| Date of signature of Letter of Agreement | 6 July 2012 | Date of project completion | 31 December 2014 |
|--|-------------|----------------------------|------------------|

ANNEXES

- 1 Technical report on tsunami hazard and risk assessment and evacuation planning for Aunghlaing, Myanmar
- 2 Report of Users Meeting on tsunami hazard and risk assessment and evacuation mapping products, 22 December 2014, Labutta, Myanmar
- 3 Report of Users Meeting on tsunami hazard and risk assessment and evacuation mapping products, 3 November 2014, Hambantota, Sri Lanka
- 4 Report on tsunami exercise for integration of tsunami risk and evacuation information into local level disaster preparedness system, 4 November 2014, Hambantota, Sri Lanka
- 5 Report on tsunami exercise for integration of tsunami risk and evacuation information into local level disaster preparedness system, 26 December 2014, Aunghlaing, Myanmar
- 6 Planning, Implementing, and Evaluating a Tsunami Exercise (Sri Lanka)
- 7 Planning, Implementing, and Evaluating a Tsunami Exercise (Myanmar)
- 8 Summary of discussions of RIMES-INCOIS meeting on the India-funded project on Integrated Ocean Information System, which replicates TTF-17 tsunami risk assessment activities
- 9 Certificate of handover – PHIVOLCS
- 10 Final equipment inventory
- 11 External project evaluation report
- 12 Audited statement of expenditure for the project

I certify the accuracy of the substantive and financial information contained in this report.

A.R. Subbiah
Director, RIMES Program Unit
28 February 2015

OVERALL ASSESSMENT

Briefly state the main results of the project. These could include key activities and, more importantly, should include any evidence of capacities the project has built. Is there any evidence that the project has reduced gender inequalities?

Expected Outcome 1: Tsunami risk assessment capacities built within relevant technical agencies and research institutions

Performance indicators:

- At least 6 technical staffs of agencies in charge of bathymetric and topographic surveys each in Myanmar, Philippines, and Sri Lanka trained in planning for and undertaking near-shore bathymetric, topographic, and exposure surveys, data quality control, DEM generation and mosaicking, building footprint interpretation, building properties estimation, and DEM and building data combination
- At least 10 technical staffs of agencies and research institutions involved in tsunami risk assessment each in Myanmar, Philippines, Sri Lanka, and Thailand trained in data preparation and management, tsunami simulation and risk assessment, and tsunami hazard and risk mapping, using INSPIRE
- Technical agencies in charge of bathymetric and topographic surveys in Myanmar, Philippines, and Sri Lanka received survey methodology, equipment, materials, and software used during the training
- Technical agencies in charge of tsunami risk assessment received INSPIRE system used during the training

Accomplishments:

- Pool of trained personnel on tsunami risk assessment in the following institutions in the project countries created:

| Subject area | No. of personnel trained | | |
|-------------------------------|---------------------------------------|---------------------------------------|---|
| | Myanmar | Philippines | Sri Lanka |
| Near-shore bathymetric survey | MNHC: 8 DMH: 1 | NAMRIA: 6 PHIVOLCS: 1 | NARA: 4 CCD: 1 |
| Near-shore topographic survey | MSD: 9 | NAMRIA: 4 PHIVOLCS: 1 | Survey Dept: 5 DOM: 1 |
| Exposure survey | DMH: 3 RRD: 2 GAD: 2 | PHIVOLCS: 2 CDRRMO: 2 NAMRIA: 1 | DMC: 1 DOM: 1 CCD: 1 Survey Dept: 1 |
| Survey data processing | MNHC: 2 MSD: 2 DMH: 1 GAD: 1 | NAMRIA: 4 PHIVOLCS: 2 | CCD: 2 NARA: 2 Survey Dept: 2 DMC: 1 |
| INSPIRE | DMH: 4 GAD: 4 | PHIVOLCS: 11 NAMRIA: 2 | DMC: 9 DOM: 2 |

| | | | |
|--------|------------------------------|---------------|-------------------------------------|
| | RRD: 1 Min. of Defense: 2 | OCD/NDRRMC: 2 | CCD: 2 NARA: 3 Survey Dept: 2 |
| Total | 47 | 38 | 40 |
| Male | 45 | 33 | 33 |
| Female | 2 | 5 | 7 |

Women were encouraged to participate in the training activities. Not many women though are in these technical agencies, particularly in divisions involved in field surveys. This is due to the rigorous demands of fieldwork.

- Equipment, methodologies, and user manuals have been transferred to respective agencies in the project countries. User interfaces have been developed for DMH (Myanmar), PHIVOLCS (Philippines), and DMC (Sri Lanka) for customized access to INSPIRE system.

Expected Outcome 2: Improved tsunami warning capabilities within national tsunami warning centers and response capabilities within disaster management organizations and communities

Performance indicators:

- At least 15 staffs of NTWC, NDMO, and relevant risk information user agencies and institutions each in Myanmar, Philippines, Sri Lanka, and Thailand trained in the interpretation and use of tsunami risk maps
- At least 10 staffs of NDMO each in Myanmar, Philippines, Sri Lanka, and Thailand trained in data preparation and management and evacuation mapping, using ESCAPE
- At least 20 staffs of NDMO, relevant agencies, and local authorities and disaster management organizations from one pilot site, each in Myanmar, Philippines, and Sri Lanka, practiced in tsunami evacuation using ESCAPE outputs and UNESCO/IOC guidelines
- NDMOs in Myanmar, Philippines, Sri Lanka, and Thailand installed ESCAPE system and received multi-hazard exercise planning, implementation, and evaluation manual that were used in training

Accomplishments:

- Tsunami warning and response capacities enhanced through training in the following institutions in the project countries:

| Subject area | No. of personnel trained | | |
|---|--|--|---|
| | Myanmar | Philippines | Sri Lanka |
| ESCAPE | DMH: 4 GAD: 4 RRD: 1 Min. of Defense: 2 | PHIVOLCS: 11 NAMRIA: 2 OCD/NDRRMC: 2 | DMC: 9 DOM: 2 CCD: 2 NARA: 3 Survey Dept: 2 |
| INSPIRE and ESCAPE product applications | 70 national level stakeholders from 22 government agencies, mass-based | | 41 national level stakeholders from 20 government agencies, research institutions, UN |

| | | | | | |
|--|----------------------------------|---|--|---|--|
| | | <p>organizations, research institutions, and the academe</p> <p>25 local level stakeholders from Labutta Township and Ayeyarwady region from government agencies and international/ non-government organizations</p> | | <p>organizations, and the business sector</p> <p>78 local level stakeholders from Hambantota from the disaster management and education sectors</p> | |
| | Tsunami exercise (at pilot site) | <p>22 staffs of DMH, Labutta GAD and emergency response agencies (health, fire, etc.), Aunghlaing GAD, Aunghlaing Village Disaster Management Committee, and local response agencies (health, police, etc.)</p> <p>More than 700 members of Aunghlaing village participated during the exercise</p> | | <p>30 staffs of DDMC, response agencies (health, education, police, armed forces, etc.), and grama niladharis in Hambantota</p> <p>About 750 community members in Hambantota participated during the exercise</p> | |

- ESCAPE user manual and guidelines for tsunami exercise planning, implementation, and evaluation transferred to respective agencies in the project countries. User interfaces have been developed for DMH (Myanmar), PHIVOLCS (Philippines), and DMC (Sri Lanka) for customized access to ESCAPE system.

Expected Outcome 3: Regional resource sharing for improved warning information generation and dissemination

Performance indicators:

- Regional data sharing policy and mechanism agreed to and adopted by RIMES Member States
- Mechanism for regional online interaction of forecasters during tropical cyclone occurrence agreed to and adopted by RIMES Member States
- At least 5 countries not covered by this proposed project learn from experiences and lessons/ successes shared through RIMES Council meetings, and identify activities and funding sources for replication

Accomplishments:

- RIMES Council's 5th Meeting in June 2012 adopted the regional data sharing mechanism and decided to expand the program to cover more countries. The meeting also decided for RIMES Program Unit to facilitate an online interaction among forecasters during extreme events.
- Project activities are being replicated in Comoros, Mozambique, Seychelles, and Tanzania, with Government of India funding. India plans to expand the project to cover Madagascar, Mauritius, and Vietnam.

LESSONS LEARNED

- Inter-agency processes take time, as they involve trust building and new coordination mechanisms, which may not be simple, such as in Myanmar. The project, however, fostered cooperation among agencies that otherwise do not coordinate.
- Tsunami risk assessment studies provide evidence for advocating the consideration of risks into development planning. In Sri Lanka, risk assessment results for Hambantota indicate the creation of tsunami risk due to the recent port construction. In Myanmar, risk assessment results highlight the need to relocate vital government facilities in Aungmyethar, which are shown to be in a tsunami inundation zone.
- Apart from connecting science-based products with local level users, the tsunami drills in the pilot sites raised awareness of local authorities and disaster management officials on requirements for locating evacuation shelters, and on gaps that exist in warning and response systems, noting the lead time available (before impacts of the hazards are felt) and the time required to complete evacuation.
- Countries actively participate in regional data sharing when they see concrete benefits from it. This is demonstrated by Bangladesh, Maldives, Myanmar, and Sri Lanka, wherein RIMES is engaged in improving forecast products through TTF-16 and in developing decision support systems (in Myanmar only) through TTF-23.
- Ensuring that project activities are integrated into government institutional partners' programs and activities requires time and perseverance, noting their own program timelines and priorities. Implementation of project activities in the Philippines was fast-paced from 2012 to 2013, but stalled in 2014 due to major activities programmed for the year, which includes the hosting of the Asian Seismological Commission General Assembly Conference in November.

SUSTAINABILITY

Please elaborate on any progress towards ensuring that this project results in a long-term benefit to the project stakeholders.

- Early on during project implementation, partner institutions recognized the value of the tools offered by the project, which resulted to active involvement in providing data, undertaking survey preparatory works, and providing equipment for use in the project.
- Partner institutions appreciate the value of the low-cost methodologies used, for replication. Equipment, methodologies, and manuals have been transferred to the relevant partner agencies. User interfaces have been developed for DMH (Myanmar), PHIVOLCS (Philippines), and DMC (Sri Lanka) for customized access to the regionally shared INSPIRE and ESCAPE systems.
- Demand for replication is high, particularly in Myanmar and Sri Lanka, wherein user demands have been articulated in the ESCAP-supported Monsoon Forums. Respective agencies have been trained to respond to this demand. A mechanism among these agencies needs to be worked out, particularly in sharing resources required for survey, in order to generate high resolution tsunami risk assessment products. As articulated by RIMES in these forums, RIMES shall provide back-up technical support whenever required.
- The ESCAPE tool has been adopted by DMC in Sri Lanka. In the Philippines, PHIVOLCS, through its outreach program, could bring the ESCAPE tool to local government units, which have the mandate for emergency management. In Myanmar, the tool could remain with DMH until RRD is able to fully embrace the tool and GADs at the local level have the infrastructure to operate the tool.

SUSTAINABILITY

- Keeping INSPIRE and ESCAPE as a regional resource, which is hosted at RIMES, is beneficial for countries with limited resources to invest in a high-capacity server. The softwares could also be updated by RIMES to integrate new demands and trends (e.g. use of transport for evacuation, etc.)