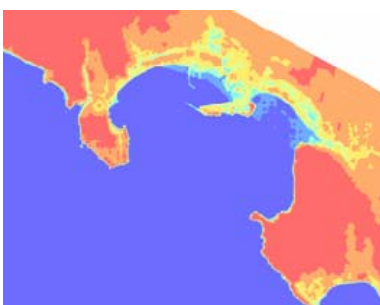
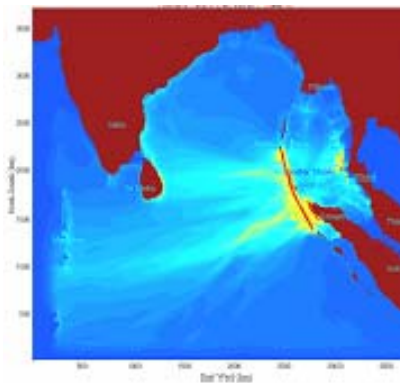




US IOTWS Small Grants Program

Natural Barriers Reduce Tsunami Risk

RISK ASSESSMENT AND DESIGN OF COUNTERMEASURES FOR TSUNAMI HAZARD:
CASE STUDY FOR THE PORT CITY OF GALLE, SRI LANKA



Understanding future threats:
Numerical simulation of potential tsunamis
and resulting inundation for the City of
Galle.

US IOTWS Small Grants Program

The US Indian Ocean Tsunami Warning System (IOTWS) Program has funded 17 small grants in India, Indonesia, Sri Lanka, and Thailand as part of its \$16.6 million two-year effort to support the development of an end-to-end warning system in the region. The small grants program catalyzed and promoted pilot activities that contribute to community and bottom-up results in disaster mitigation, preparedness, and response.

Risk Assessment and Design of Countermeasures for Tsunami Hazard: Case Study for the Port City of Galle

University of Moratuwa scientists designed the project around two principal scientific components: numerical and physical modeling of tsunami wave propagation, and investigations of countermeasures to minimize wave damage (i.e., coral reefs, coastal vegetation, sand dunes, and coastal structures). The project team correlated the modeling results with extensive field investigations to study tsunami impact, response, and recovery along the southern and western coast of Sri Lanka. Researchers also conducted socioeconomic investigations to help the project team determine the factors of vulnerability and capacity in coastal communities.

Project Achievements

The capability that was developed under this project to simulate tsunami waves will play a vital role in assessing future tsunami hazards and risks for Sri Lanka. Physical modeling studies led to the understanding of the performance of physical countermeasures during a tsunami, such as the presence of coral reefs, coastal vegetation and coastal structures. Critical issues, such as the ability of artificial and natural barriers to slow down the flow of water, were also investigated in this study. The project more accurately identified communities at risk and identified potential means for saving lives. By taking a multi-disciplinary approach to risk assessment, this study harnessed the local knowledge of risks in the community with scientific input from the University. Relationships between the University of Moratuwa and Geo Science Australia, University of Arizona, Ports & Airport Research Institute, and United Nations University will help to ensure the project results will continue to be implemented in the field.

Lessons Learned

Tsunamis represent a low frequency but high impact coastal hazard in the small island nation of Sri Lanka. The huge impact of tsunami necessitates a strategic approach for rehabilitation and conservation of the



Optimizing the performance of countermeasures: Investigating the countermeasures by the use of small and large scale physical models.

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coastal zone. Such an approach is best achieved by using a multi-hazard risk assessment framework to sustain high economic activity in coastal zones. Risk assessments are therefore a useful tool in designing physical countermeasures as well as designing emergency response or management measures for a given area. Countermeasures must therefore serve the dual purpose of mitigating impact and promoting successful evacuation.

Many cities in Sri Lanka are at a greater risk due to enhanced exposure, high vulnerability and lack of community resilience. Modeling and information on vulnerability can be used for strategic planning of coastal cities which are at high risk. The sustainable use of natural barriers such as coastal vegetation, sand dunes, and the preservation of coral reefs are appropriate long-term strategies to build resilience.

A well-informed and educated community—truly enhanced capacity at all levels of the community—enables the efficient implementation of countermeasures with high social and national responsibility. Stakeholder consultations clearly indicated the willingness of the community to contribute to disaster management and mitigation measures. There must also be a coordinated effort to build the capacity of children who will in turn be encouraged to educate others on the science of disasters.

Next Steps

The USAID-funded project opened several sustainable avenues of research including field investigations on the impact of tsunamis, numerical modeling, physical modeling of mitigation options, socio-economic studies and risk assessment. The work will be continued via the establishment of a Centre for Disaster Risk Reduction. This centre will provide a platform for collaborative research with the stakeholders, including the Disaster Management Centre and Coast Conservation Department.

Information of the organization

The Coastal Engineering Research Group of the Department of Civil Engineering of the University of Moratuwa implemented the project. Over two decades the University of Moratuwa developed its capabilities in the field of Coastal and Harbour Engineering and has contributed heavily towards national and international initiatives.

For more information on activities at the University of Moratuwa's Department of Civil Engineering, visit www.civil.mrt.ac.lk.

About the US Indian Ocean Tsunami Warning System (IOTWS) Program

The US IOTWS Program is part of the international effort to develop tsunami warning system capabilities in the Indian Ocean following the December 2004 tsunami disaster. The US program adopts an “end-to-end” approach—addressing regional, national, and local aspects of a truly functional warning system—along with multiple other hazards that threaten communities in the region. In partnership with the international community, national governments, and other partners, the US program offers technology transfer, training, and information resources to strengthen the tsunami warning and preparedness capabilities of national and local stakeholders in the region. For more information please visit www.us-iotws.gov.

