

## Distinguished Lecture

**Tsunami - Waves of Destruction Mitigating the Impact of Tsunamis and other Marine Disasters - Land Use and Engineering Considerations**

### Dr. George Pararas-Carayannis

Director, International Tsunami Information Center, United Nations Educational Scientific and Cultural Organization - Intergovernmental Oceanographic Commission, 1974 to 1992

Chief Scientist and Consultant to United Nations Development Programme on Southwest Pacific Mission to Develop a Regional Five Year Plan for Disaster Mitigation

Consultant to United Nations Disaster Relief Organization, Geneva

**Date** Monday, 21 March 2005

**Time** 6:15p.m. – 7:45p.m.  
(Refreshment will be served at the Theatre Lounge from 5:30p.m.)

**Venue** Chiang Chen Studio Theatre  
The Hong Kong Polytechnic University Hung Hom, Kowloon, Hong Kong



Faculty of Construction and Land Use  
Distinguished Lecture  
Monday, 21 March 2005

蔣震劇院  
Chiang Chen Studio Theatre  
(Ground Floor of  
Chung Sze Yuen Building)

# Reply Form

(Please return by fax at 2362 - 2574 on or before Tuesday, 15 March 2005)

To: Ms. Becky Chang  
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**I will / will not \* attend the**

**Faculty of Construction and Land Use**

## Distinguished Lecture

**“Tsunami - Waves of Destruction Mitigating the Impact of Tsunamis and other Marine Disasters - Land Use and Engineering Considerations”**

to be delivered by

**Dr. George Pararas-Carayannis**

on Monday, 21 March 2005 at 6:15p.m.  
at Chiang Chen Studio Theatre  
The Hong Kong Polytechnic University  
Hung Hom, Kowloon, Hong Kong

Name: \_\_\_\_\_  
(Given Name) (Surname)

Title: Dr/Ir/Mr/Mrs/Ms/Miss\*

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Position: \_\_\_\_\_

[\* Please delete as appropriate]

# Tsunami - Waves of Destruction Mitigating the Impact of Tsunamis and other Marine Disasters - Land Use and Engineering Considerations

by **Dr. George Pararas-Carayannis**

Of all natural disasters, tsunamis are among the most terrifying and complex phenomena, responsible for great loss of lives and vast destruction of property. Enormous destruction of coastal communities has taken place throughout the world by such great waves since the beginning of recorded history. The impact of tsunamis on human societies can be traced back in written history to 1645 BC, when the Minoan civilization in the Eastern Mediterranean was wiped out by great tsunami waves generated by the volcanic explosion of the island of Santorin.

In the Pacific Ocean where the majority of these waves have been generated, the historical record shows tremendous destruction. In Japan, which has one of the most populated coastal regions in the world and a long history of earthquake activity, tsunamis have destroyed entire coastal communities. There is also history of tsunami destruction in Alaska, in Hawaiian Islands, and in South America.

While most of the destructive tsunamis have occurred in the Pacific Ocean, devastating tsunamis have also occurred in the Atlantic, the Indian Ocean, and in the Caribbean and Mediterranean Seas. The recent tsunami disaster in Southeast Asia is a sad reminder of the enormous destruction and human suffering tsunamis can cause in regions that do not have programs of disaster preparedness and an early warning system. A recurrence of another disastrous tsunami in the Indian Ocean in the near future is likely possibility. A Tsunami Warning System is needed for the Indian Ocean.

In the last 30-40 years there has been tremendous growth and development of the coastal areas in most of the developing or developed nations of the world. This is the result of population growth and of technological and economic developments that have made the use of the coastal zone more necessary than before. Many of the countries have populations with natural maritime orientation. For many of these countries foreign trade is a necessity so they maintain major port facilities. Others have extensive ship building facilities, electric plants, refineries, and other important coastal structures. A number of countries throughout the world have now begun important aqua culture industries and canneries. This combination of social and economic factors makes a number of developed and developing countries particularly vulnerable to the threat of tsunamis and other marine hazards.

To protect life and property in the Pacific an International Pacific Tsunami Warning System has been organized under the auspices of UNESCO-Intergovernmental Oceanographic Commission (IOC). The Warning System uses an extensive network of seismic and tidal stations and deep water sensors, as well as satellite telemetry and communications, to ensure that the warning information is prompt and accurate. Other vulnerable regions of the world in the Indian and Atlantic Oceans and the Caribbean and Eastern Mediterranean Seas have similar needs for Tsunami Warning Systems.

To ensure cost-effectiveness, warning systems in the Indian Ocean and elsewhere should encompass a multitask approach to the mitigation of all marine related hazards in the region. Comprehensive plans of disaster preparedness should include proper land use and the adaptation of engineering and building guidelines that should consider all geologic, environmental and marine hazards. Risk assessment of tsunami and other marine hazards must be incorporated in developing coastal zone management and land use. While some degree of risk is acceptable, government agencies should promote new development and population growth in areas of greater safety and less potential risk. These agencies gave the responsibility of evaluating the tsunami and other marine hazards and establishing adequate warning procedures to protect the communities under their jurisdiction. Furthermore, these agencies should establish proper training for public safety personnel, and formulate land-use regulations for given coastal areas - particularly if these areas are known to have sustained damage from marine hazards in the past.

In designing important engineering structures in the coastal zone, the risk resulting from marine disasters - including tsunamis - should be evaluated and construction should incorporate adequate safety features. Finally, programs of preparedness need to invest in education and training in the ocean related sciences in order to produce the qualified specialists that will effectively manage the efforts needed to implement proper construction and land use that will help mitigate the impact of tsunamis and other marine disasters.



## Biography of Dr. George Pararas-Carayannis



**EDUCATION** 1959, B.S. Chemistry-Mathematics, Roosevelt University, Chicago, U.S.A. 1963, M.S. Chemistry, Roosevelt University, Chicago. 1967, M.S. Oceanography, University of Hawaii. 1975, Ph.D. Marine Sciences, University of Delaware, Newark, Delaware. (Received Ph.D. with 4.0 grade point average - First Ph.D. awarded by the University of Delaware in Marine Sciences.

**EMPLOYMENT** \*Director, International Tsunami Information Center, of UNESCO-IOC (United Nations Educational Scientific and Cultural Organization- Intergovernmental Oceanographic Commission), (1974 to 1992). \* Tsunami Advisor, State of Hawaii, Civil Defense Agency (1974-1992). (Volunteer Community Service) \* Oceanographer, U.S. Army, Coastal Engineering Research Center (CERC), Washington, D.C. (1972-1974). \* Oceanographer for the New York District of the U.S. Army Corps of Engineers (1970-1972). \* Technical Director and Geologist, Mermex S.A. Mining Corporation, Mexico (1970). \* Director, World Data Center A-Tsunami.

**SPECIAL ASSIGNMENTS** \* Chief Scientist and Consultant to UNDP (United Nations Development Program) on Southwest Pacific Mission to Develop a Regional Five Year Plan for Disaster Mitigation. \* Consultant to: Intergovernmental Oceanographic Commission / Marine Sciences Section of UNESCO \* Consultant to UNDRO (United Nations Disaster Relief Organization), Geneva \* Member: Special UNESCO Committee which developed the program of implementation for the Secretary General of the United Nations on the International Decade for Natural Disaster Mitigation (IDNDR). \* Consultant: Nuclear Regulatory Commission and predecessor agency, the Atomic Energy Commission, on nuclear plant siting, Hurricane and hurricane surge effects, review of Environmental impact statements, and other varied assignments.

**SPECIAL EXPERTISE** \* Applied tsunami research, including: Focal mechanisms of earthquakes and tsunamis (with N. S. F. support); \* Development of methodology for studying tsunami propagation and terminal effects; \* Historical documentation of tsunamis in Hawaii, Alaska, the Pacific and Atlantic Oceans; \* Quantitative surveys of the most important tsunamis to strike Hawaii for the last fifty years; \* Development of tsunami inundation limits for coastal evacuation and zoning; \* Development of mathematical modeling for tsunami travel times and paths; \* Development of methodology for fast earthquake epicenter determinations; real time assessment of the tsunami hazard for warning purposes. \* Earthquake, Tsunami, and Hurricane Surveys \* Development of a multi phase approach to environmental hazard vulnerability reduction and preparedness. \* Planning and preparedness for environmental hazard risk reduction. \* Standard Operating Plans for Civil Defence Agencies.

### INTERNATIONAL COOPERATION / LEADERSHIP IN DISASTER MITIGATION

As Director of ITIC under the auspices of the United Nations Educational Scientific and Cultural Organization and its Intergovernmental Oceanographic Commission, handled and processed all Tsunami investigations around the world; monitored tsunami warning system automation; published and distributed educational newsletters to 75 countries around the world; prepared, participated and distributed master plans for the development of tsunami warning systems in the Pacific; assisted developing countries with disaster preparedness; conducted liaison activities and international cooperation with agencies in more than 50 different countries.

### INTERNATIONAL SCIENTIFIC SOCIETIES

Co-founder and officer of the Tsunami Society (Vice-President, Treasurer, Secretary) and the International Society for Natural Hazards Mitigation (Vice-President, incorporating it as a non-profit international organization in Hawaii). Served as Chairman or co-organizer of Conferences for these societies in Hawaii, Canada, China, former Soviet Union, Mexico, and in Perugia, Italy.

**AWARD** In 1988, nominated and was one of the two finalists for the prestigious United Nations (UNDRO-Sasakawa) award for international contributions to disaster mitigation (award given to the Prime Minister of Fiji). In September, 1993, at an International Conference in Tokyo, Japan, a gold plaque was awarded for numerous contributions to the Intergovernmental Oceanographic Commission of UNESCO, over an 18-year period as Director of the International Tsunami Information Center. Most recent award (2002) of the International Tsunami Society for original and outstanding contributions to the Science of Tsunami Hazards <http://www.sthjournal.org/award.htm>