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**TSUNAMI NEWS**

**New station covers coast**

A new Olympic Peninsula weather radio station started test operations in May to provide all hazard warnings to much of Washington's Pacific coastline.

The station, located atop Mt. Octopus in western Jefferson County, can broadcast weather and emergency alert and warning information that can be received from Forks to Raymond and South Bend. Previously, much of the Olympic Peninsula could not receive National Oceanic and Atmospheric Administration (NOAA) weather radio signals.

"The site's signal extends further out to sea, so that our fishing industry now can monitor what is happening in Grays Harbor," said Karin Frinell-Hanrahan, deputy director, Grays Harbor County Department of Emergency Management.

Seattle's National Weather Service office installed the NOAA radio site, which broadcasts on 162.425 MHZ. The

station will provide NWS warnings for high winds, high surf and flooding, tsunami alerts and warnings, and other important information.

The radio site project was a partnership between Washington Emergency Management Division; the local Tsunami Working Group; Clallam, Grays Harbor and Pacific counties; National Weather Service--Seattle; Radio Station KXRO; Cascade Regional Earthquake; Weyerhaeuser Co.; Washington Crab Producers; Mark Reed Hospital; the Quinault Indian Nation; and George Bisso of ORCA Electronics.

The NOAA weather radio tower dedication ceremony will be held Sept. 11, 2000 at Mt. Octopus, Washington. For more information, contact Karin Frinell-Hanrahan, Department of Emergency Management, PO Box 630, Montesano, WA 9856 : (360) 249-3911; or KFH@co.grays-harbor.wa.us. (See also, *TsuInfo Alert*, v. 1, no. 5, p. 4.)

**NEWS BRIEFS**

**WSEMA starts website**

Washington State Emergency Management Association (WSEMA) has a new web page to improve the exchange of information among local, state and federal and private sector emergency managers. The web page address is <http://www.wsema.org>.

Besides posting association membership information, the site will include news and information on professional development in the emergency management field, links to other emergency management sites, job postings, and registration forms for the 2000 WSEMA Fall Conference in Oak Harbor on Oct. 2-3.

Sean Davis, Benton County Emergency Management is the WSEMA web master. He can be reached at [sdavis@co.franklin.wa.us](mailto:sdavis@co.franklin.wa.us).

**Editors' note: This issue of *TsuInfo Alert* includes three articles about the great earthquake and tsunami in Lisbon, Portugal in 1755. This gives all of you time to plan your celebrations of the 245th anniversary of that event, November 1, 2000.**

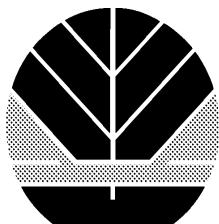
*TsuInfo Alert* is published monthly by the Washington Department of Natural Resources, Division of Geology and Earth Resources. This publication is free upon request and is available in print (by surface mail) and electronically (by e-mail). The 1999 issues are also available at <http://www.wa.gov/dnr/htdocs/ger/tsunami.htm>

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WASHINGTON STATE DEPARTMENT OF  
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# THE 1755 LISBON EARTHQUAKE AND TSUNAMI

by

Jan T. Kozak, Institute of Rock Mechanics, Czech Academy of Science  
Charles D. James, National Information Service for Earthquake Engineering

Note: With permission, this paper is abridged and edited from drafts of a longer work in progress by V. S. Moreira, C. Nunes and J. Kozak on the Lisbon Earthquake of 1755. Updated November 12, 1998. Send comments or questions to EERC Library

Although not the strongest or most deadly earthquake in human history, the 1755 Lisbon earthquake's impact, not only on Portugal but on all of Europe, was profound and lasting. Depictions of the earthquake in art and literature can be found in several European countries, and these were produced and reproduced for centuries following the event, which came to be known as "The Great Lisbon Earthquake."

The earthquake began at 9:30 on November 1st, 1755, and was centered in the Atlantic Ocean, about 200 km WSW of Cape St. Vincent. The total duration of shaking lasted ten minutes and was comprised of three distinct jolts. Effects from the earthquake were far reaching. The worst damage occurred in the south-west of Portugal. Lisbon, the Portuguese capital, was the largest and the most important of the cities damaged. Severe shaking was felt in North Africa and there was heavy loss of life in Fez and Meknes. Moderate damage was done in Algiers and in southwest Spain. Shaking was also felt in France, Switzerland, and Northern Italy. A devastating fire following the earthquake destroyed a large part of Lisbon, and a very strong tsunami caused heavy destruction along the coasts of Portugal, southwest Spain, and western Morocco.

The oscillation of suspended objects at great distances from the epicenter indicate an enormous area of perceptibility. The observation of seiches as far away as Finland, suggest a magnitude approaching 9.0. Precursory phenomena were reported, including turbid waters in Portugal and Spain, falling water level in wells in Spain, and a decrease in water flow in springs and fountains.

Detailed descriptions of the earthquake's effects in Morocco, were, in some cases, based on Portuguese manuscripts written by priests. The cities of Meknes, Fez, and Marrakesh in the interior, and the coastal towns of Asilah, Larache, Rabat, and Agadir (Santa Cruz during the Portuguese occupation) suffered much damage in the quake. Mosques, synagogues, churches, and many other buildings collapsed in Meknes, where numerous casualties were reported. The convent, church, and Hospital de S. Francisco collapsed completely.

## Lisbon

In 1755, Lisbon was one of the most beautiful cities in Europe. Conquered by Moors in 1147, it was kept under Moorish influence during the Middle Ages and Renaissance. This may be seen in the design of the streets in the quarters surrounding St. George Castle and extending as far

as Rossio, the central part of the city. The Rosario, or main square, was the commercial center of Lisbon. The Estatus Palace, situated to the north, was where illustrious visitors to the Kingdom were lodged. On the east side, Saint Dominic Church and the All Saint's Royal Hospital, with its magnificent facade, were erected. On top of the hill, an ancient royal residence was situated. To the west, the church and its Convent were among the most magnificent buildings in Lisbon. Other famous buildings near the city center include the Cathedral, St. Paul's Church, St. Nicholas' Church, and St. Roch's Church.

The architecture of the city was complemented by that of the suburbs, including a majestic aqueduct constructed by King D. Joao V. in 1731, the Jeronimus Church, and the Tower of Belem. With an estimated population of 275,000, Lisbon was, in 1755, one of the largest cities in Europe.

## The Fire

Soon after the earthquake, several fires broke out, mostly started by cooking fires and candles. Some of them were rapidly extinguished, especially in the densely populated areas. But many inhabitants fled from their homes and left fires burning. Narrow streets full of fallen debris prevented access to the fire sites. The public squares filled with people and their rescued belongings, but as the fire approached, these squares were abandoned, and the fire reached catastrophic proportions. Looters setting fire to some ransacked houses caused the belief that the fire had a criminal origin. The flames raged for five days.

All of the downtown area, from St. Paul's quarter to St. Roch, and from Carmo and Trindade to the Rossio square area to the Castle and Alfama quarters were burned, along with the Ribeira, Rua Nova, and Rossio quarters. Remolares, Barrio Alto, Limoeiro, and Alfama were partially burned.

Several buildings which had suffered little damage due to the earthquake were destroyed by the fire. The Royal Palace and the Opera House were totally gutted by the flames. The Patriarchal suffered relatively little damage in the earthquake, and religious services continued there during the afternoon, but the church was evacuated as the fire approached. Later the building was completely burned out.

## The Tsunami

Immediately after the earthquake, many inhabitants of Lisbon looked for safety on the sea by boarding ships moored on the river. But about 30 minutes after the quake, a

large wave swamped the area near Bugie Tower on the mouth of the Tagus. The area between Junqueria and Alcantara in the western part of the city was the most heavily damaged by the wave, but further destruction occurred upstream. The Cais de Pedra at Terreiro do Paco and part of the nearby custom house were flattened. A total of three waves struck the shore, each dragging people and debris out to sea and leaving exposed large stretches of the river bottom. In front of the Terreiro do Paco, the maximum height of the waves was estimated at 6 meters. Boats overcrowded with refugees capsized and sank. In the town Cascais, some 30 km west of Lisbon, the waves wrecked several boats and when the water withdrew, large stretches of sea bottom were left uncovered. In coastal areas such as Peniche, situated about 80 km north of Lisbon, many people were killed by the tsunami. In Setubal, 30 km south of Lisbon, the water reached the first floor of buildings.

The destruction was greatest in Algarve, southern Portugal, where the tsunami dismantled some coastal fortresses and, in the lower levels, razed houses. In some places the waves crested at more than 30 m. Almost all the coastal towns and villages of Algarve were heavily damaged,

except Faro, which was protected by sandy banks. In Lagos, the waves reached the top of the city walls. For the coastal regions, the destructive effects of the tsunami were more disastrous than those of the earthquake.

In southwestern Spain, the tsunami caused damage to Cadiz and Huelva, and the waves penetrated the Guadalquivir River, reaching Seville. In Gibraltar, the sea rose suddenly by about two meters. In Ceuta the tsunami was strong, but in the Mediterranean Sea, it decreased rapidly. On the other hand, it caused great damage and casualties to the western coast of Morocco, from Tangier, where the waves reached the walled fortifications of the town, to Agadir, where the waters passed over the walls, killing many.

The tsunami reached, with less intensity, the coast of France, Great Britain, Ireland, Belgium and Holland. In Madeira and in the Azores islands damage was extensive and many ships were in danger of being wrecked.

The tsunami crossed the Atlantic Ocean, reaching the Antilles in the afternoon. Reports from Antigua, Martinique, and Barbados note that the sea first rose more than a meter, followed by large waves.

## LISBON EARTHQUAKE AND TSUNAMI FACTOIDS

One of the few neighborhoods of Lisbon to survive the 1755 earthquake is the Alfama, the sailors quarter, which now hosts a midmorning market.

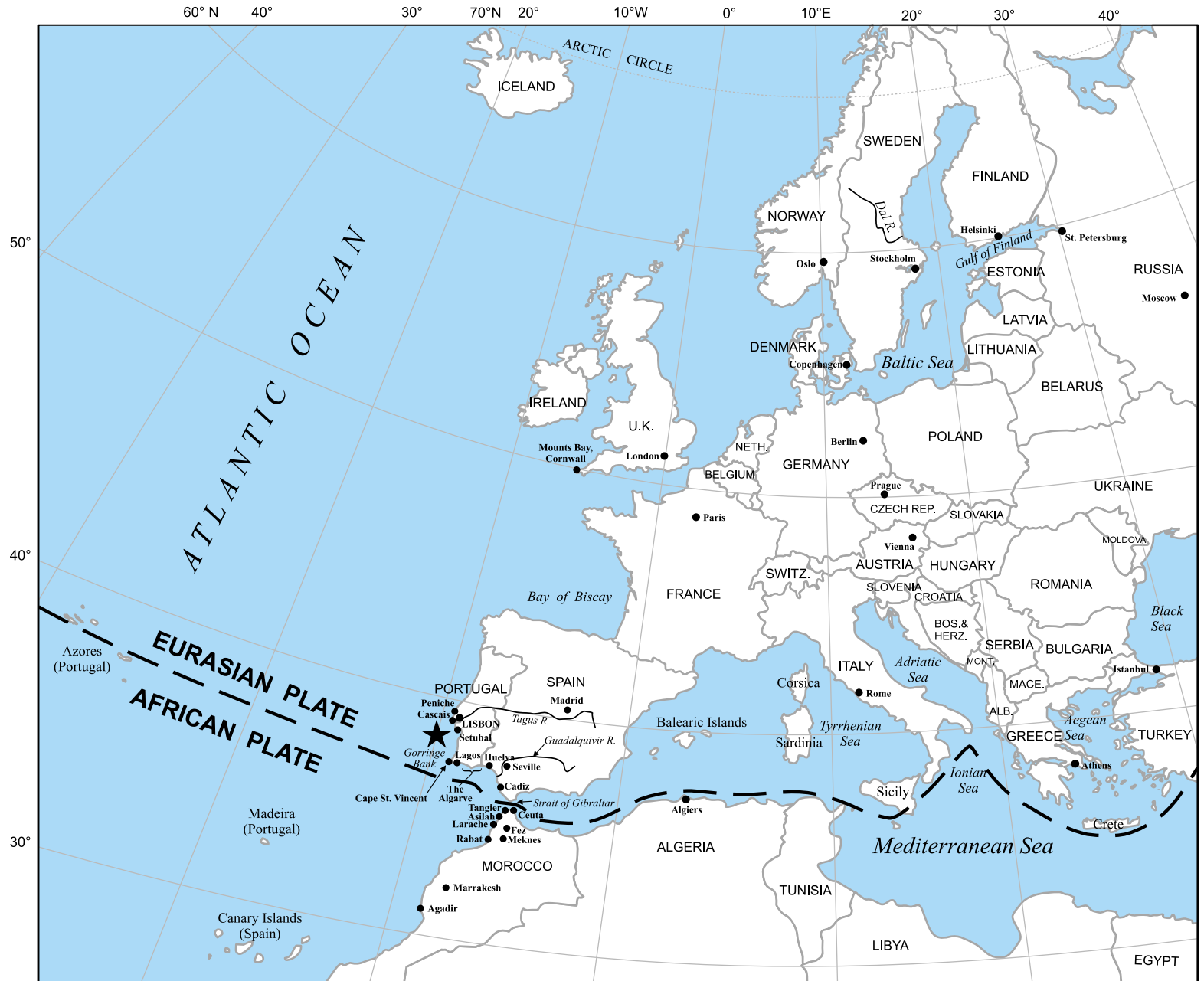
"There is some evidence to indicate that the 1755 Lisbon tsunami was not solely caused by a sea bed fault. Recently a large submarine slide complex has been identified on the seafloor adjacent to the Goringe Bank and tentatively dated to 1755. This discovery raises the possibility that the tsunami was partly generated by an earthquake-triggered fault on the seabed and partly by submarine sediment slumping."

*from:* 2000 Natural Environmental Research Council, Coventry University and University College London  
<http://www.nerc-bas.ac.uk/tsunami-risks/html/HLisbon.htm>

### **Eyewitness to the Lisbon tsunami**

In England, contemporary observations by Borlase (1755; 1758) describe the arrival of the tsunami in Mounts Bay, Cornwall. Borlase noted, "...the first and second reflexes were not so violent as the 3rd and 4th (tsunami waves) at which time the sea was as rapid as that of a mill-stream descending to an undershot wheel and the rebounds of the sea continued in their full-fury for fully 2 hours...alternately rising and falling, each retreat and advance nearly of the space of 10 minutes until five and a half hours after it began."

*from:* <http://www.nerc-bas.ac.uk/tsunami-risks/html/HLisbon.htm>  
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**Map of Europe showing the areas impacted by the earthquake and tsunami of 1755. The star marks the approximate epicenter of the earthquake. The dashed line shows the boundary between the Eurasian and African plates. (Map compiled by Jari Roloff.)**

## THE 1755 LISBON EARTHQUAKE AND TSUNAMI--AN EYEWITNESS ACCOUNT

by The Reverend Charles Davy

(from: Tappan, E. M., editor, 1914, *The world's story--A history of the world in story, song and art*: Houghton Mifflin, v. p. 618-628. Scanned by Jerome S. Arkenberg, Cal. State Fullerton, text modernized by Prof. Arkenberg, available at: <http://www.fordham.edu/halsall/mod/1755lisbonquake.html>)

*"That was the year when Lisbon town  
Saw the earth open and gulp her down."*

THERE never was a finer morning seen than the 1st of November; the sun shone out in its full luster; the whole face of the sky was perfectly serene and clear; and not the least signal of warning of that approaching event, which has made this once flourishing, opulent, and, populous city, a scene of the utmost horror and desolation, except only such as served to alarm, but scarcely left a moment's time to fly from the general destruction.

It was on the morning of this fatal day, between the hours of nine and ten, that I was set down in my apartment, just finishing a letter, when the papers and table I was writing on began to tremble with a gentle motion, which rather surprised me, as I could not perceive a breath of wind stirring. Whilst I was reflecting with myself what this could be owing to, but without having the least apprehension of the real cause, the whole house began to shake from the very foundation, which at first I imputed to the rattling of several coaches in the main street, which usually passed that way, at this time, from Belem to the palace; but on hearkening more attentively, I was soon undeceived, as I found it was owing to a strange frightful kind of noise under ground, resembling the hollow distant rumbling of thunder. All this passed in less than a minute, and I must confess I now began to be alarmed, as it naturally occurred to me that this noise might possibly be the forerunner of an earthquake, as one I remembered, which had happened about six or seven years ago, in the island of Madeira, commenced in the same manner, though it did little or no damage.

Upon this I threw down my pen---and started upon my feet, remaining a moment in suspense, whether I should stay in the apartment or run into the street, as the danger in both places seemed equal; and still flattering myself that this tremor might produce no other effects than such inconsiderable ones as had been felt at Madeira; but in a moment I was roused from my dream, being instantly stunned with a most horrid crash, as if every edifice in the city had tumbled down at once. The house I was in shook with such violence, that the upper stories immediately fell; and though my apartment (which was the first floor) did not then share the same fate, yet everything was thrown out of its place in such a manner that it was with no small difficulty I kept my feet, and expected nothing less than to be soon crushed to death, as the walls continued rocking to and fro in the frightfullest manner, opening in several places; large stones falling down on every side from the cracks, and the ends of most of the rafters starting out from the roof. To add to this terrifying scene, the sky in a moment became so gloomy that I could

now distinguish no particular object; it was an Egyptian darkness indeed, such as might be felt; owing, no doubt, to the prodigious clouds of dust and lime raised from so violent a concussion, and, as some reported, to sulphureous exhalations, but this I cannot affirm; however, it is certain I found myself almost choked for near ten minutes.

I hastened out of the house and through the narrow streets, where the buildings either were down or were continually falling, and climbed over the ruins of St. Paul's Church to get to the river's side, where I thought I might find safety. Here I found a prodigious concourse of people of both sexes, and of all ranks and conditions, among whom I observed some of the principal canons of the patriarchal church, in their purple robes and rochets, as these all go in the habit of bishops; several priests who had run from the altars in their sacerdotal vestments in the midst of their celebrating Mass; ladies half dressed, and some without shoes; all these, whom their mutual dangers had here assembled as to a place of safety, were on their knees at prayers, with the terrors of death in their countenances, every one striking his breast and crying out incessantly, *Miserecordia meu Dios!* . . . In the midst of our devotions, the second great shock came on, little less violent than the first, and completed the ruin of those buildings which had been already much shattered. The consternation now became so universal that the shrieks and cries of *Miserecordia* could be distinctly heard from the top of St. Catherine's Hill, at a considerable distance off, whither a vast number of people had likewise retreated; at the same time we could hear the



St. Paul's Church, by LeBas, 1757(?). Reproduced with permission from <http://www.berkeley.edu/lisbon/>

fall of the parish church there, whereby many persons were killed on the spot, and others mortally wounded.

You may judge of the force of this shock, when I inform you it was so violent that I could scarce keep on my knees; but it was attended with some circumstances still more dreadful than the former. On a sudden I heard a general outcry, "The sea is coming in, we shall be all lost." Upon this, turning my eyes towards the river, which in that place is nearly four miles broad, I could perceive it heaving and swelling in the most unaccountable manner, as no wind was stirring. In an instant there appeared, at some small distance, a large body of water, rising as it were like a mountain. It came on foaming and roaring, and rushed towards the shore with such impetuosity, that we all immediately ran for our lives as fast as possible; many were actually swept away, and the rest above their waist in water at a good distance from the banks. For my own part I had the narrowest escape, and should certainly have been lost, had I not grasped a large beam that lay on the ground, till the water returned to its channel, which it did almost at the same instant, with equal rapidity. As there now appeared at least as much danger from the sea as the land, and I scarce knew whither to retire for shelter, I took a sudden resolution of returning back, with my clothes all dripping, to the area of St. Paul's. Here I stood some time, and observed the ships tumbling and tossing about as in a violent storm; some had broken their cables, and were carried to the other side of the Tagus; others were whirled around with incredible swiftness; several large boats were turned keel upwards; and all this without any wind, which seemed the more astonishing. It was at the time of which I am now speaking, that the fine new quay, built entirely of rough marble, at an immense expense, was entirely swallowed up, with all the people on it, who had fled thither for safety, and had reason to think themselves out of danger in such a place: at the same time, a great number of boats and small vessels, anchored near it (all likewise full of people, who had retired thither for the same purpose), were all swallowed up, as in a whirlpool, and nevermore appeared.

This last dreadful incident I did not see with my own eyes, as it passed three or four stones' throws from the spot where I then was; but I had the account as here given from several masters of ships, who were anchored within two or three hundred yards of the quay, and saw the whole catastrophe. One of them in particular informed me that when the second shock came on, he could perceive the whole city waving backwards and forwards, like the sea when the wind first begins to rise; that the agitation of the earth was so great even under the river, that it threw up his large anchor from the mooring, which swam, as he termed it, on the surface of the water: that immediately upon this extraordinary concussion, the river rose at once near twenty feet, and in a moment subsided; at which instant he saw the quay, with the whole concourse of people upon it, sink down, and at the same time every one of the boats and vessels that were

near it was drawn into the cavity, which he supposed instantly closed upon them, inasmuch as not the least sign of a wreck was ever seen afterwards. This account you may give full credit to, for as to the loss of the vessels, it is confirmed by everybody; and with regard to the quay, I went myself a few days after to convince myself of the truth, and could not find even the ruins of a place where I had taken so many agreeable walks, as this was the common rendezvous of the factory in the cool of the evening. I found it all deep water, and in some parts scarcely to be fathomed.

This is the only place I could learn which was swallowed up in or about Lisbon, though I saw many large cracks and fissures in different parts; and one odd phenomenon I must not omit, which was communicated to me by a friend who has a house and wine-cellars on the other side of the river, viz., that the dwelling-house being first terribly shaken, which made all the family run out, there presently fell down a vast high rock near it; that upon this the river rose and subsided in the manner already mentioned, and immediately a great number of small fissures appeared in several contiguous pieces of ground, from whence there spouted out, like a jet stream, a large quantity of fine white sand to a prodigious height. It is not to be doubted the bowels of the earth must have been excessively agitated to cause these surprising effects; but whether the shocks were owing to any sudden explosion of various minerals mixing together, or to air pent up, and struggling for vent, or to a collection of subterranean waters forcing a passage, God only knows. As to the fiery eruptions then talked of, I believe they are without foundation, though it is certain I heard several complaining of strong sulphureous smells, a dizziness in their heads, a sickness in their stomachs, and difficulty of respiration, not that I felt any such symptoms myself.

I had not been long in the area of St. Paul's when I felt the third shock, somewhat less violent than the two former, after which the sea rushed in again, and retired with the same rapidity, and I remained up to my knees in water, though I had gotten upon a small eminence at some distance from the river, with the ruins of several intervening houses to break its force. At this time I took notice the waters retired so impetuously, that some vessels were left quite dry, which rode in seven fathom water; the river thus continued alternately rushing on and retiring several times together, in such sort that it was justly dreaded Lisbon would now meet the same fate which a few years before had befallen the city of Lima; and no doubt had this place lain open to the sea, and the force of the waves not been somewhat broken by the winding of the bay, the lower parts of it at least would have been totally destroyed.

The master of a vessel which arrived here just after the 1st of November, assured me that he really concluded he had struck upon a rock, till he threw out the lead, and could find no bottom, nor could he possibly guess at the cause, till the melancholy sight of this desolate city left him no room

to doubt of it. The two first shocks, in fine, were so violent that several pilots were of opinion the situation of the bar at the mouth of the Tagus was changed. Certain it is that one vessel, attempting to pass through the usual channel, foundered, and another struck on the sands, and was at first given over for lost, but at length got through. There was another great shock after this, which pretty much affected the river, but I think not so violently as the preceding; though several persons assured me that as they were riding on horseback in the great road leading to Belem, one side of which lies open to the river, the waves rushed in with so much rapidity that they were obliged to gallop as fast as possible to the upper grounds, for fear of being carried away.

I was now in such a situation that I knew not which way to turn myself: if I remained there, I was in danger from the sea; if I retired farther from the shore, the houses threatened certain destruction; and at last, I resolved to go to the Mint, which being a low and very strong building, had received no considerable damage, except in some of the apartments towards the river. The party of soldiers, which is every day set there on guard, had all deserted the place, and the only person that remained was the commanding officer, a nobleman's son, of about seventeen or eighteen years of age, whom I found standing at the gate. As there was still a continued tremor of the earth, and the place where we now stood (being within twenty or thirty feet of the opposite houses, which were all tottering) appeared too dangerous, the courtyard being likewise full of water, we both retired inward to a hillock of stones and rubbish: here I entered into conversation with him, and having expressed my admiration that one so young should have the courage to keep his post, when every one of his soldiers had deserted theirs, the answer he made was, though he were sure the earth would open and swallow him up, he scorned to think of flying from his post. In short, it was owing to the magnanimity of this young man that the Mint, which at this time had upwards of two millions of money in it, was not robbed; and indeed I do him no more than justice in saying that I never saw any one behave with equal serenity and composure on occasions much less dreadful than the present.

Perhaps you may think the present doleful subject here concluded; but alas! the horrors of the 1st of November are sufficient to fill a volume. As soon as it grew dark, another scene presented itself little less shocking than those already described: the whole city appeared in a blaze, which was so bright that I could easily see to read by it. It may be said without exaggeration, it was on fire at least in a hundred different places at once, and thus continued burning for six days together, without intermission, or the least attempt being made to stop its progress.

It went on consuming everything the earthquake had spared, and the people were so dejected and terrified that few or none had courage enough to venture down to save any part of their substance; every one had his eyes turned

towards the flames, and stood looking on with silent grief, which was only interrupted by the cries and shrieks of women and children calling on the saints and angels for succor, whenever the earth began to tremble, which was so often this night, and indeed I may say ever since, that the tremors, more or less, did not cease for a quarter of an hour together. I could never learn that this terrible fire was owing to any subterranean eruption, as some reported, but to three causes, which all concurring at the same time, will naturally account for the prodigious havoc it made. The 1st of November being All Saints' Day, a high festival among the Portuguese, every altar in every church and chapel (some of which have more than twenty) was illuminated with a number of wax tapers and lamps as customary; these setting fire to the curtains and timber-work that fell with the shock, the conflagration soon spread to the neighboring houses, and being there joined with the fires in the kitchen chimneys, increased to such a degree that it might easily have destroyed the whole city though no other cause had concurred, especially as it met with no interruption.

But what would appear incredible to you, were the fact less public and notorious, is that a gang of hardened villains, who had been confined and got out of prison when the wall fell, at the first shock, were busily employed in setting fire to those buildings which stood some chance of escaping the general destruction. I cannot conceive what could have induced them to this hellish work, except to add to the horror and confusion that they might, by this means, have the better opportunity of plundering with security. But there was no necessity for taking this trouble, as they might certainly have done their business without it, since the whole city was so deserted before night that I believe not a soul remained in it except those execrable villains and others of the same stamp. It is possible some among them might have had other motives besides robbing, as one in particular being apprehended (they say he was a Moor, condemned to the galleys), confessed at the gallows, that he had set fire to the king's palace with his own hand; at the same time glorying in the action, and declaring with his last breath that he hoped to have burnt all the royal family. It is likewise generally believed that Mr. Bristow's house, which was an exceedingly strong edifice, built on vast stone arches, and had stood the shocks without any great damage further than what I have mentioned, was consumed in the same manner. The fire, in short, by some means or other, may be said to have destroyed the whole city, at least everything that was grand or valuable in it.

With regard to the buildings, it was observed that the solidest in general fell the first. Every parish church, convent, nunnery, palace, and public edifice, with an infinite number of private houses, were either thrown down or so miserably shattered that it was rendered dangerous to pass by them.

The whole number of persons that perished, including those who were burnt or afterwards crushed to death whilst



digging in the ruins, is supposed, on the lowest calculation, to amount to more than sixty thousand; and though the damage in other respects cannot be computed, yet you may form some idea of it when I assure you that this extensive and opulent city is now nothing but a vast heap of ruins; that the rich and the poor are at present upon a level; some thousands of families which but the day before had been easy in their circumstances, being now scattered about in the fields, wanting every conveniency of life, and finding none able to relieve them.

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THE EARTHQUAKE AT LISBON IN 1755.

The earthquake and tsunامي in Lisbon, 1755, by Hartwig, 1887. Reproduced with permission from <http://www.berkeley.edu/lisbon/>

# THE LISBON EARTHQUAKE IN 1755: CONTESTED MEANINGS IN THE FIRST MODERN DISASTER

by

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Note: The author has granted permission to reprint this preliminary draft article. See also: Dynes, R. R., 2000, The dialogue between Voltaire and Rousseau on the Lisbon Earthquake--The emergence of a social science view: *International Journal of Mass Emergencies and Disasters*, v. 18, no.1, p. 97-115.

## Introduction

Some disasters are considered more important than others with similar impacts. The meaning of a particular disaster occasion is created independent of its consequences. When there are significant inconsistencies between the impact and the meaning associated with it, that should be of interest to the social sciences. The focus here is the Lisbon earthquake, Nov. 1, 1755, which can be considered the first "modern" disaster. It evoked a coordinated state emergency response as well as a forward looking comprehensive plan for reconstruction which included mitigation efforts to reduce future disaster effects. Of particular interest here are the circumstances which led to the earthquake being attributed to "natural" rather than "supernatural" causes. Prior to that, earthquakes traditionally had been interpreted as a dramatic means of communication between gods and humans. In particular, such events previously had been explained as indicating some disturbance between earthly and heavenly spheres. The Lisbon earthquake can be identified as a turning point in human history which moved the consideration of such physical events as supernatural signals toward a more neutral or even a secular, proto-scientific causation.

The timing of the Lisbon earthquake made it a topic of discussion and disputation among several intellectuals involved in the currents of European thought which has come to be known as Enlightenment. That intellectual movement, among other things, was characterized by a self conscious break with previous tradition, especially with religious authority. Consequently, in succeeding generations, knowledge about the Lisbon earthquake has often been drawn from these 18th century discussions. Voltaire used the Lisbon earthquake as a metaphor to attack others, especially Alexander Pope. Pope's *Essay on Man* (1733-34) contained what Voltaire said was a doubtful philosophy of optimism. Soon after the earthquake, Voltaire wrote a "Poeme su la disastre de Lisbonne" which countered Pope and later used that same event to attack the theodicy of Leibnitz in *Candide* (Gay, 1988; Wade, 1959).

While these attacks were central to the evolution of what has come to be known as the Enlightenment, it is the contention here that the changes in conception of the meaning of the Lisbon earthquake occurred more directly from the emergency response and early reconstruction of Lisbon which in large part, initiated Portugal's delayed move toward a modern state. The central figure in that transformation was Pombal, who, for all intents and purposes, ruled Portugal from 1750 to 1777. By structuring the subsequent

discussion around a major character, Pombal, there is no intent here to suggest a "great man" theory of social change. Pombal's actions occurred during a period of rapid transformation in Europe and his actions in Portugal was seen by most other Europeans as backward and despotic. He used the earthquake to consolidate his power and to move Portugal out of its backward status toward the beginnings of a modern state. In that transition, Pombal used his political skill and the Church itself to undercut the traditional interpretation that the earthquake was a signal of God's displeasure. In effect, here, the argument will be made that changes in the social structure of Portugal and its modernization was a more determinative factor in undermining the interpretation that earthquakes communicate God's wrath than the intellectual and theological arguments which have come to be characterized as the "Enlightenment." (For a selected chronology, see Table 1.)

## The Social and Political Context of the Lisbon Earthquake

It is contended here that the Lisbon earthquake was the first to register in modern consciousness. There were major earthquakes in Catania, Sicily and in Naples in 1693, but most of northern Europe was seismically stable. Too, there had been a major earthquake in Port Royal, Jamaica in 1692, which received some attention in Britain since the British governor had tolerated using Port Royal as a base for pirates and privateers to attack the Spanish fleet. But, for most Europeans, earthquakes were something that occurred elsewhere and in the past. When the Lisbon earthquake occurred, it became the focus of attention for the "relevant civilized world" (Kendrick, 1956, p. 25).

Woloch (1982) has suggested that the 18th century in Europe was characterized by a multiplicity of states linked together in a pattern of rivalry and mutual recognition (1982, p. 1), and that their rulers sought to promote their sovereignty by amassing power over policy and resources within the state and by competing with other states for influence and territory. Most European countries were undergoing rather dramatic transformation during the 18th century. At the time of the Lisbon earthquake, George II ruled in England; Louis XV in France; Maria Theresa in Austria; Frederick II in Prussia; and Elizabeth in Russia. By those comparisons, Portugal was considered a back-water and irrelevant country ruled by ineptness and indifference. In the first part of the 18th century, Portugal was ruled by John

V, 1705 to 1750. He spent most of his reign building monuments and palaces, funded by gold from Brazil. Much of his wealth was distributed in gestures of largess and prestige, but wealth made him independent of the court, which he rarely assembled. In 1742, his illness caused the affairs of state to fall increasingly in the hands of churchmen. The major governmental positions were filled by cardinals or priests and the king's confidential advisor was a Jesuit. Their interests were more in maintaining their positions than in furthering adaptation and change. In 1750, Portugal, with a population of less than 3 million people, had an army of clergy, perhaps numbering 200,000. Charles Boxer called 18th century Portugal "more priest ridden than any other country in the world, with the possible exception of Tibet" (Boxer, 1969, p.189).

At mid-century, Portugal's colonial operations in Brazil and Paraguay were being undercut by Jesuit control and independent merchants. The British Factory (an association of British merchants with favorable trade agreements) had a major grip on port commerce and on Brazilian gold. Aside from the long term conflictual alliance with British commercial interests, Portugal was not on good terms with France. It was traditionally suspicious of Spain and was not necessarily responsive to Vatican directives.

At the time, Lisbon was perhaps the fourth largest city in Europe, after London, Paris and Naples, with a population of 275,000. It was famous for its wealth. It was full of palaces and churches and, because of commercial activity, it was one of the best known cities in the world since traders, particularly English and German, did most of the business in town. But Lisbon was also known as a city of the Inquisition and was characterized as being a center of superstition and idolatry.

The key to understanding Portugal in the last half of the 18th century and the key to understanding the social construction of meaning of the earthquake centers on the career of Sebastiao Jose de Carvalho e Melo, who came from a family of modest gentry who had served Portugal as soldiers, priests and state functionaries<sup>1</sup>. (In late 1770, he was made Marques de Pombal and historically that name is usually associated with him.) Pombal was given the responsibility for the emergency response and reconstruction of Lisbon after the earthquake but this was only one part of his overall effort to "modernize" Portugal. From 1739 to 1743, which was a period of expansion and imperialism in England, he represented the Portuguese king in the Court of St. James. In that capacity, he came to distrust British ideas about expansion in South America, where Portuguese interests were critical. Too, he was offended at what he perceived to be British indifference to Anglo-Portuguese

affairs, which were central to Portugal's economic and social future. From 1745 to 1750, he was posted to Austria to Maria Theresa's court. He was irritated by the shift from London since he felt that this was intended to keep him away from economic and commercial issues, perhaps as a deliberate move by his "enemies" in the court. Too, during that time he was present to observe Maria Theresa's attempt to reform the censorship system and to wrest the University of Vienna from Jesuit control.

During his various experiences, Pombal sought to understand the economic and political weakness of Portugal. He was particularly concerned about how a small country could maintain economic viability, especially in an international system composed of larger and aggressive states such as Britain. He was interested in how the state might guarantee its economic interests. He was also distrustful of the Jesuits and of many of the aristocracy. The Jesuits had set up their own economic empires in South America with the rationale of having missions to protect and Indians to christianize. The Jesuits also had a monopoly on higher education in Portugal, which trained the aristocracy and rejected many new ideas, including scientific ones, through control and censorship. Also with his experience outside the country, Pombal had met many expatriates created by the Inquisition, whose talents had been lost to Portugal, but whose skills could be important in revitalizing the economic fortunes. Based upon his experience, Jesuits were a particular threat to Portugal's economic future and their close ties to the aristocracy and to the King made them especially dangerous.

Pombal's experience outside the country came to an end when John V died in 1750 and he was followed by his son, Jose I, then 36. Jose's main interests were not of the state but in riding, playing cards, attending the theater and opera and in devotions. Three days after John died, Pombal was appointed a minister and, three days later, was appointed to head the Department of Foreign Affairs and War. With Jose's interest in personal matters, this gave Pombal, in time, almost complete power over the direction of his responsibility. The King spent most of his days at his country estate in Belem and returned to confer with his ministers in the evening. Whether such conferences actually occurred is perhaps moot, but Pombal was able to gain and utilize his power in the name of the King until 1777. In his activities, Pombal was aided by others, including family members. Two of his brothers were close collaborators in his administration. Paulo de Carvalho, a priest, was elevated to cardinal by Pope Clement XIV. He became Inquisitor General and president of the municipal council of Lisbon, a position to which Pombal appointed his son, Henrique, when his brother died. Another brother, Francisco Xavier Mendonca Futado served as governor and captain general of the Brazilian provinces of Grao Para and Maranhao, an area which then covered the entire Amazon Valley. Later, he worked closely with Pombal as Secretary of State for overseas

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<sup>1</sup>Major sources of details on the career of Pombal are given in Maxwell's excellent biography (1995), on the reign of Jose I in Livermore (1976), and on some aspects of the earthquake in Kendrick (1956).

dominion. The involvement of family members was, of course, not unique to Portugal, but it provided a significant clue to Pombal's aspirations for his country and the direction of efforts to reform the country. For example, an expatriate friend, Duke Silva-Tarouca, whom Pombal had known in Vienna, recalled their conversations there and, on hearing of his appointment as minister, recommended to Pombal that "when new dispositions are necessary, they should always be put forward by ancient names and in ancient clothing." In effect, he was characterizing Pombal's future direction-- "a policy of reform disguised, when necessary, by traditional institutions and language" (Maxwell, 1995, p. 9). That stance of using tradition has often been misunderstood by subsequent historians who have generally excluded Pombal from discussions of the Enlightenment or have characterized him as a "despot," without any limiting adjectives. Maxwell, however, in his biography of Pombal, more accurately titled his book "Paradox of the Enlightenment"

### **The Initial Actions of Pombal as Minister**

Pombal, in his new position of responsibility, initiated a number of actions intended to strengthen the nation's control of its colonial empire and its domestic economy. When he came into office, there was ambiguity over boundaries in their holdings in South America. In the Treaty of Madrid (1750), Portugal agreed to relinquish control of Colonia do Sacramento and the land north of the La Plata, in exchange for Spanish recognition of their river transportation system. The acceptance of the boundaries placed the Jesuit's Seven Missions and their pasture land, long a part of Spanish control, under Portuguese rule. This would require the relocation of the Jesuits and their Indian converts. Pombal argued, in private correspondence, that since Portugal could not supply settlers to populate the vast open lands, it would be necessary to abolish the existing differences between the Indians and Portuguese, to encourage intermarriage, and to attract and use Indian labor. Married couples could be sent from the Azores and although slavery was banned in Portugal, the importation of African slaves to the colonies would be encouraged. This contradicted the tenants of Jesuit policy which had been devised to protect the Indians from exploitation by the settlers and to prevent their integration with the Portuguese. The Jesuits believed that the removal of their protection would be disastrous for the indigios population. Under the terms of the treaty, some 30,000 Indians would be expected to relocate. The Indians chose to resist (usually termed the Guarani resistance) until 1756 when a joint Spanish-Portuguese military force invaded the territory of the Seven Missions and forcibly ended their resistance. This experience reinforced Pombal's distrust of the Jesuits whom he blamed for the resistance.

Pombal's efforts in South America were assisted by his brother, Francisco Xavier de Mendonca Funtado. He had been a member of the Luso-Spanish boundary commission which had decided that the Jesuits must move some of their

commission to conform to the new boundaries. Pombal later appointed his brother as governor of Para and Maranhao in northern Brazil to enforce the implementation of a form of state capitalism, the Grao-Para Company. This company was intended to monopolize the trade of Brazil. This company was not greeted with enthusiasm by Portuguese merchants already trading in Brazil, nor was it seen positively by the Jesuits and British merchants. (Pombal also banned independent small merchants who often sold goods to the British.) Objections to these changes were met by rather immediate sanctions. A sermon preached in the Patriarchal church there criticized Pombal's action which he now could label as treasonous since they were now royal laws. The preacher was banished; three merchants involved in the Brazil trade were exiled to Africa; and four Jesuits, who had arrived in Lisbon soon after the earthquake, were expelled.

Opposition to Pombal's actions in the creation of the Company came not only from some merchants and the Jesuits. Pombal's acquisition of power also provoked many of the aristocracy to oppose him. Traditionally, the nobility expected that they would be appointed as ambassadors or governors and be given other responsibilities in the royal court. But during his responsibility, Pombal often appointed his family members and friends and publically suggested that titles should be a reward for service, not lineage. By 1777, Pombal had retired 23 titles and created 23, usually to reward merit. By the end of his tenure, one third of the nobility had been changed (Maxwell, 1995, p. 78). Pombal also tried to minimize status differences. As was the practice in other European countries, he allowed merchants to wear swords, which beforehand had been an obvious mark of nobility. On occasion, when state companies were formed, he would appoint some noblemen to boards of directors with the stated hope that they might learn some relevant commercial skills.

While the nobility in Portugal was relatively small compared to other neighboring countries, they often were at the center of activities to undercut the King or to cultivate his possible successor. After Jose became King, those who were in opposition to him began to center their attention on Maria, his daughter and successor, and Jose's brother, Pedro. Among those giving attention to their court was Diogo de Mendonca, Minister for Overseas Affairs, whose previous power had been gradually eroded by Pombal. In June, 1756, seven months after the earthquake, Pombal came upon some correspondence which criticized his Brazilian efforts. Pombal took the opportunity to arrest and banish Mendonca and replace him with his brother, who was recalled from Brazil. Others involved in the "conspiracy" were two palace Jesuits, a Dutch trader, and a cousin of the King. They were imprisoned, some exiled to Angola and the King's cousin sent to Vienna.

Opposition to Pombal's actions came principally from the Jesuits, whose international viewpoint clashed directly with Pombal's nationalism; from merchants who previously

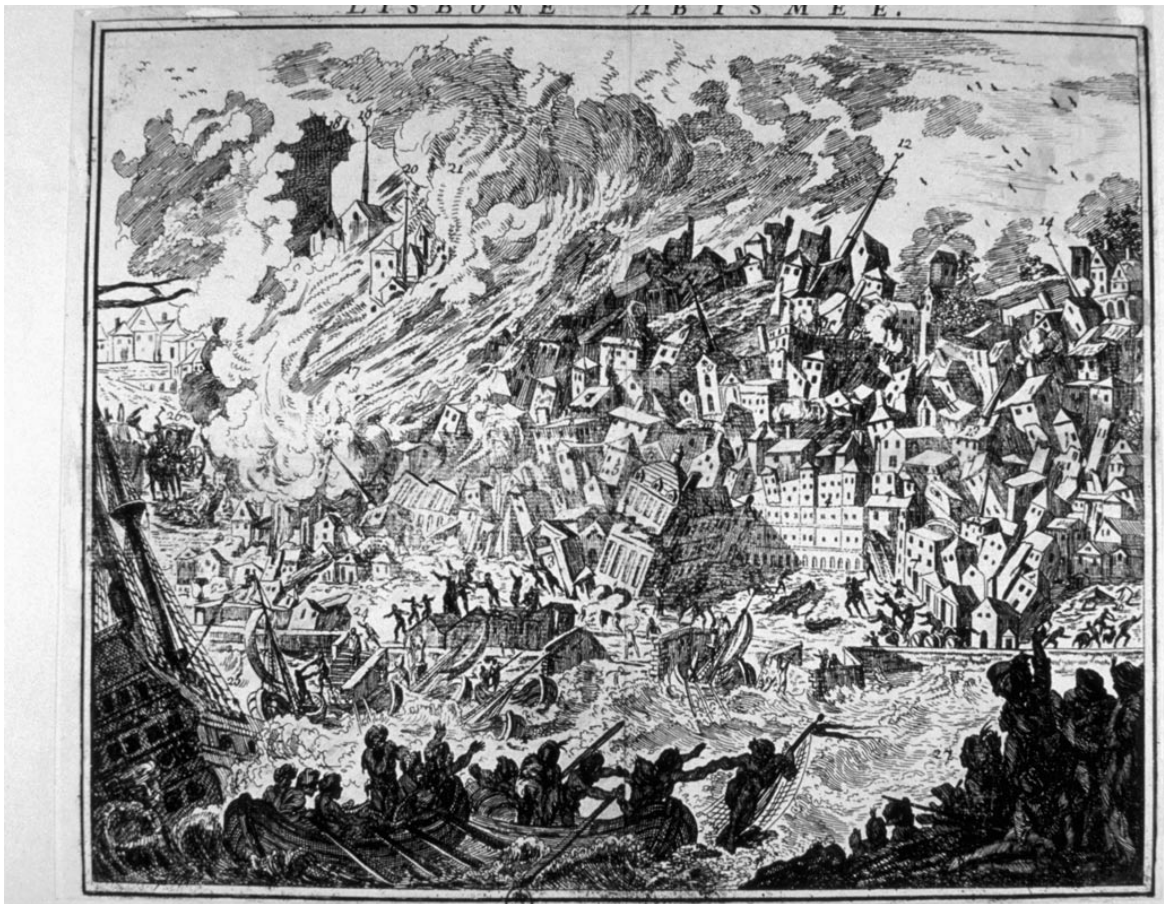
had advantages in colonial trade; and from the aristocracy, which was distrustful of Pombal's increased power, especially the segment which styled themselves as "puritanos"--that is, those whose blood was not "tainted" by Jewish or Moorish ancestry. Opposition and particularly collaboration among his enemies were sure to evoke action on the part of Pombal. Those "enemies" continued to bedevil Pombal when he had to assume the responsibility for the response and reconstruction of the earthquake.

### **The Consequences of The Earthquake**

The earthquake occurred at 9:30 a.m. on November 1st when many of the residents were at mass. That initiated the first of a series of problems for Lisbon. Sometime later, as a port city, there was also a seismic wave which created additional victims and new damage. There was also a major fire which, by some accounts lasted five to six days, destroyed many buildings not damaged by the earthquake. And Lisbon was plagued by aftershocks, over 500 in the next nine months. Even those who still had housing continued to live in tents. This included the Royal family.

Estimates of those who lost their lives, varied tremendously, some estimates suggested up to 70,000, but perhaps 5,000 to 10,000 might be a more accurate estimate. The deaths cut across social categories. Certainly several hundred priests and nuns were killed and some 20 or 30 of the 40 parish churches were damaged. As Kendrick (1956, p. 26) noted, many died "unconfessed and unforgiven". Since the major impacts were in the center of the city which contained the townhouses and palaces of nobility, perhaps 20 nobility were killed and some of their destroyed palaces contained significant art works and libraries. Being an international city, foreign victims often focused widespread attention. The deaths of the Spanish ambassador, the Head of the English Seminary and the great grandson of the French dramatist, Racine, provided a reason for attention from other European countries. Seventy seven members of the British Factory, most of them women, were among the casualties.

The amount of housing damage was considerable. Some estimates suggest that perhaps only 3,000 out of 20,000 dwellings were livable. More certain was the dam-



From an anonymous broadsheet illustration, probably of French origin. Reproduced with permission from <http://www.berkeley.edu/lisbon/>

age to landmark public buildings. The Royal Palace was destroyed, but the King and his entourage had been at Belem outside town, where the earthquake caused minimal damage. The Royal Opera House, finished the month before, was destroyed. The Royal Mint, Arsenal, and Custom House were gone. The church of the Inquisition and the church of the Patriarch were damaged. Some of the facilities for the busy port no longer existed and many merchants, including those from foreign companies, suffered significant losses. It was estimated that of the 48 million Spanish dollars losses, 32 million was the British share and perhaps 8 million were losses by Hamburg merchants. Obviously, the extent of the destruction of resources in Lisbon were a severe blow to Pombal's aspirations for Portugal's economic renewal and for new political directions.

The young King whose behavior had already evidenced a disinterest in affairs of state is supposed to have asked "What should we do?" And Pombal is supposed to have answered, "Bury the dead and feed the living" (Kendrick, 1956, p. 48). That exchange, perhaps apocryphal, indicated a more significant shift in political responsibility. The principal minister was old and ill and the minister with Pombal's previous responsibility could not be found. The King gave Pombal total responsibility for dealing with the emergency response and later for the reconstruction. A few months later when the principal minister died, Pombal assumed his position and the King further retreated into his personal concerns. In effect, Pombal ruled Portugal until 1777 when the King died.

### **The Emergency Response**

Pombal's assumption of the emergency responsibility led to a series of rather decisive actions which could provide a model for subsequent disasters, even more modern ones. Pombal's initial action was to ask the Chief Justice to appoint 12 district leaders with overarching emergency powers. The first and most immediate task was the disposal of bodies, since there was considerable fear of the outbreak of plague. The day after the earthquake, Pombal suggested to the Patriarch (the head of the church in Portugal) that the best way to dispose of the bodies was to collect them on barges, tow them out beyond the Tagus reef, to be weighted down and sunk. The Patriarch agreed and instructed the religious involved in collection of the bodies of this decision. This meant that traditional religious rites associated with death were disregarded. There were a number of emergency measures instituted to insure a continuing food supply. The military provided transportation for produce from the outside and the price of food was controlled. Fishing was encouraged. Some traditional taxes on fish were suspended, if the fish were sold within the impacted area. Ships which were in port at the time were not allowed to leave, until it was determined that their contents could not be used in the emergency.

Housing, of course, was at a premium. The king and his

family lived in tents in Belem, outside the city for nine months until a wooden palace was finished. Pombal, although his palace was undamaged, also lived in a hut in Belem. At the end of November, plans for a massive reconstruction were beginning to take shape. A survey was planned; land rents were controlled and laws passed which did not allow landlords to evict tenants. The debris was sorted to salvage materials which would be used in the reconstruction. Initial profiting in wood was controlled and supplies were sequestered. Unauthorized building which did not conform to the planned reconstruction was stopped.

Security became an issue. It is reported that gallows were set up in several parts of the city as a warning against looting. It was also noted that at least 34 were executed for looting, but as usual, it was claimed that most of them were "foreigners". Too, early in 1756, the Patriarch announced that excommunication would be the sanction for those posing as priests or nuns in order to get special advantages. It was feared that many persons would leave the city so those in charge of outlying provinces were instructed to send refugees back to the city. A pass system was set up to regulate entrance and exit from the city. There was, as might be expected, a concerted effort to maintain normalcy. The weekly newspaper, published just before the earthquake, kept on schedule.

### **On Delayed Economic Development and the Earthquake**

Obviously the responsibilities for emergency response and for reconstruction interrupted Pombal's attempt to make Portugal economically viable and politically strong. In particular, he was concerned how the earthquake would be interpreted by others. The day after the earthquake, when he asked the Patriarch for permission to initiate mass burials, he also asked him to stop "alarmist" sermons which were suggesting that the earthquake was a form of divine retribution for the "sins" of Portugal. He was also concerned that the call for devotional repentance might lead to personal withdrawal at a time when the city needed everyone for the tasks remaining. In the succeeding months, he was continually concerned with prediction of future earthquakes as continued punishment. A spate of new predictions came as the first anniversary approached. There were no indications that Pombal was not supportive of the impressive actions of most clergy during the response. Much of the temporary housing and the provision of food became the responsibility of the Church and churches became the center of temporary facilities for those displaced. One can conclude that Pombal saw danger only in the religious practices and interpretations which might inhibit or delay the reconstruction process.

There were several opportunities in the aftermath to further the economic viability of Portugal. Warships were sent to Brazil, India and Africa to indicate to those lands that trade with Portugal was still secure. Troops were sent to

the Algarve to prevent African pirates from taking advantage of trade opportunities during the preoccupation with reconstruction. While taxes were temporarily suspended, a four percent "donation" was levied on all imports. Members of the British Factory objected to that "tax" on the basis that previous treaties would exempt them, but the tax held. Even with these economic concerns, Pombal used the earthquake to further his conflict with Jesuits and the aristocracy.

### **The Role of Malagrida**

One person who tended to personify all that Pombal had come to dislike was Gabriel Malagrida. Born in Italy in 1689, he had gone as a Jesuit missionary to Brazil in 1721 where he became famous for his fervent sermons and for the stories that he told about his adventures with Indians. There he had restored decaying churches and established convents. His fame as a saint and a prophet preceded him when he came to Portugal in 1749. His reputation and his knowledge of the colonies allowed him access to the palace where he became confessor to King John. Malagrida's reputation grew when it was reported that the King had died in his arms and he informed the Queen that he would also act as her confessor, when her time came. Malagrida returned to Brazil in 1749, traveling on the same boat with Pombal's brother who was going to assume his administrative duties, but in 1753, he returned from Portugal and attached himself to the Queen Mother. But his influence now evoked suspicion and when she fell ill, he was forbidden entrance to her apartments. Returning to his house in Setubal on August 14, 1754, while preaching a sermon, he interrupted it to announce the death of the Queen. With that prediction verified, his reputation as a prophet was enhanced. Many of those who encouraged him were members of the court who opposed Pombal. Malagrida specialized in holding retreats, which he suggested were necessary for everyone. He espoused hopes of building a retreat house in Lisbon for such occasions.

In the fall of 1756, Malagrida published *Juizo da verdadeira causa do toremoto* (an opinion On the True Cause of the Earthquake) which was a summary of the sermons he had been preaching for the last year suggesting it was scandalous to pretend that the earthquake was a natural event. Approaching the first anniversary of the earthquake he insisted the people of Lisbon had continued on their sinful ways including their love for theater, music, dance, and bull fighting and that their efforts to repent were shortsighted. They were advised by Malagrida that by going to a retreat at a Jesuit house for six days they could be properly instructed about making peace with God. The pamphlet structured the debate in rather stark terms. Malagrida said: "Learn, O Lisbon, O the destroyers of our houses, palaces, churches, and convents, the cause of the death of so many people and of the flames that devoured such vast treasures, are your abominable sins, and not comets, stars, vapors and exhalations, and similar natural phenomena" (Kendrick, 1956, p.

89). That argument undermined the significant work of the parish priests and those of other orders whose work provided significant service during the emergency response. Malagrida sent copies of his sermon to Pombal and to members of the Royal Family. He continued his retreats at Setubal, exhorting those who attended with his view on the "causes" of the earthquake.

Malagrida presented a particular problem for Pombal. For the state to act against a Jesuit, Pombal would need a papal dispensation. But for religious orders, turning someone over to state authorities usually was interpreted as an indication of guilt. The route of administrative sanction was too risky for Pombal and he acted with considerable indirection. In May, 1757, he ordered the secularization of civil powers in Para, extinguishing the missions and declaring the Indians free. Jesuits were limited to duties of parish priests. Then when some priests removed sacred images from their churches, they were informed that they were now state property. There was also the charge that the Jesuits were armed, but they claimed their small cannons were only ceremonial. In September, when the royal confessor in Lisbon had been sufficiently alarmed about this tension in the colonies between the state and the Jesuits, he found his access to the King blocked. The royal confessor and other Jesuits in the palace were then ejected and forbidden to return without the King's permission. Their previous duties were reallocated to members of other orders - Franciscan, Augustians and Carmelites. Later Pombal sent his cousin to seek a secret audience with the Pope to push for reform of the Jesuits on the grounds that they attempted to usurp the power of the Sovereign and that they had an insatiable desire for wealth. In early 1758, Pombal wrote a widely translated tract accusing the Jesuits of attempting to create their own state. And in April, the Pope, Benedict XIV, authorized the Cardinal-Patriarch to reform the Society in Portugal. In May, the Cardinal prohibited the Jesuits from engaging in illegal commerce and, in June, Jesuits were forbidden to preach or hear confessions and their superior was banned from Lisbon. Malagrida appealed to the new Pope, Clement XIII, in the following words; "What a fatal scene. What a grievous spectacle! What a sudden metamorphosis! The heralds of the word of God expelled from the Missions, prescribed and condemned to ignominy...and who does this? Not his most Faithful Majesty...but the minister Carvalho, whose will is supreme at court. He, yes, he, has been the architect of so many disasters and seeks to darken the splendor of our Society, which dazzles his livid eyes, with a flood of bigoted writings that breathe an immense, virulent, implacable hatred. If he could behead all the Jesuits at one blow, with what pleasure would he do so?" (Livermore, 1976, p. 227-228). It is assumed here that Pombal was aware of such correspondence.

In September of that year, Pombal took advantage of an incident to further weaken his traditional enemies. The King was returning to Belem late in the evening after an amorous



adventure when he was ambushed and shot several times. Although rumors were circulated that he had been ambushed by some of the nobility, nothing was done for over three months. In December, a Royal decree was issued to create a special court to investigate the attempt and it waived customary legal protection and allowed the court to sentence and execute the guilty on the same day. It also accused certain persons of prophesying the King's death and of conspiring to bring it about. Troops were sent to arrest six titled persons, their families, and servants. Malagrida and twelve other Jesuits were arrested and all of the Jesuit colleges were surrounded by the troops. The two major conspirators were the Duke of Aveiro who was the highest ranking noble after the Royal Family and the head of the supreme court and the Marques of Tavora who had been a general and Viceroy of India.

A new voice in the political landscape was added when the Casa dos Vinte Quatro, an urban municipal council of the guilds, expressed the desire of the "people" that the guilty should be punished, that the trial should be held in secret, and that the King should be permitted to use torture in this circumstance. Later the Casa exhorted the King to "withdraw unwonted clemency." On January 12, 1759, sentence was pronounced and executions held. On a scaffold in Belem, various guilty parties were beheaded, broken on a rack and burnt. The whole scaffold was then set alight and the ashes scattered in the Tagus river. This event certainly overrode the usual prerogative of the nobility when the ashes of both nobles and servants were mingled in their final resting place. This event received considerable attention across Europe since such high ranking nobles had seldom been punished in this way, and reinforced the view of others that Portugal was "backward".

The ecclesiastical "suspects" still presented a problem. The priests were confined to their colleges. The Pope agreed that any priests involved in the assassination attempt could be tried in secular court, but hoped the King would not condemn the whole for a few. However, the Pope's message was never delivered to Pombal. On September 3, 1759, the anniversary of the assassination, a royal edict was issued identifying the crimes of the Jesuits and outlawing them from Portugal. Jesuits then in Portugal were sent to Rome and those in Brazil arrived there by sea the following year. That is, all except Malagrida and others in prison. Malagrida was to be condemned as a heretic by the Inquisition. Since the extant Inquisitor-General was not too keen to supervise this proceeding, Pombal's younger brother, Paulo de Carvalho, took his place. Pombal himself drew the indictment in which Malagrida was charged with planning regicide from his house in Sebutal. In addition, he was charged with heresy for some of his writings, not, however, his discourse on the causes of the earthquake. He was found guilty on January 12, 1761, and was publically executed on September 20th, slightly less than six years after the earthquake. The rather spectacular auto do fe lasted all day, two

hours of which was devoted to reading his sentence. Malagrida was strangled and later his body was burned and his ashes thrown in the river.

### **The Reconstruction**

One of the first actions Pombal took after the earthquake was to appoint several military engineers and surveyors to make inventories of property rights and claims and to assure that the sanitary and leveling operations were carried out safely and with dispatch. The engineers were also charged with drawing up plans for a new city. The waterfront area and the zone back from the river Tagus to Rossio Square were leveled and the rather steep western slopes were reduced. Streets were fixed at 60 feet in width-- 50 feet for the roadway and 10 feet for sidewalks. Street crossings were set at right angles. To both speed up reconstruction and to encourage local enterprises, efforts were made to prefabricate and standardize materials which would be needed: ironworks, wood joints, tiles and ceramics. In addition, a wooden frame, called a gaiola, which had flexibility in the event of future earthquakes, was mandated for all construction and a standardized facade for the new buildings was required. These construction innovations were used later in the construction of new buildings at the University of Combra and in the construction of a new town on the Algarve on the border with Spain. In the plans drawn for reconstruction, there was the decision to put a great square on the waterfront as the centerpiece of the plan. The new square, placed on the old Royal plaza was and still is called, the Praca do Comercio--the place of commerce. That naming reflects Pombal's direction for the future of Portugal.

The ongoing reconstruction of Lisbon was only one part of Pombal's transformation efforts. Wolloch (1983, p.4) has suggested that, in the 18th century, a ruler's success could be measured by developing a monopoly over coercion, taxation, administration and lawmaking. In the 1760's, Pombal was concerned with a series of "solutions" to continuing problems. In particular, there was the creation of a new system of public education to replace Jesuit education and a new curriculum more attuned to educating others than just nobility. There was the assertion of national authority in religious and church administration. There was strengthening of the state's taxing authority, military capabilities and security. In the 1760's, Pombal established the office of general supervisor of police of the court and the Kingdom. In all cases, the legislation necessary for these new measures was codified and systemized into law with the reasoning outlined and justified. Colonial policy continued to be given attention. Pombal's brother joined the cabinet as minister of overseas dominion and moved quickly to create a new commercial company to control the major centers of Brazilian commerce and production in the sugar producing regions. In 1761, a royal treasury was established which was a key element in Pombal's effort of rationalization and centralization. Pombal appointed himself inspector general



and the aim of the treasury was to centralize jurisdiction for all fiscal matters and to be responsible for different sectors, from customs houses to the allocation of royal monopolies. This completed his reform of revenue collection. Finally, certain changes were made in the Inquisition. The Inquisition's police powers had been given to the police in 1768 and its book censorship roles were assumed by a royal commission that year. In 1769, Pombal removed the Inquisition's power to act as an independent tribunal and all of the property confiscated by the Inquisition was transferred to the national treasury. Public *auto da fe* were eliminated as was the death penalty.

In June 1775, the reconstruction of Lisbon was far enough along to hold a dedication of the Praca, adorned with the equestrian statue of Jose I. For the three day celebration, the unfinished buildings around the square were filled in with wood and canvas to give the impression of what the final effect would be. Several days after the celebration, Pombal sent Jose a series of reflections in which he described their "joint" accomplishments. These included improvements in literacy, industry, and culture and Pombal indicated that the square indicated prosperity--that "observant foreigners did not fail to remark about the millions spent in public and private buildings after the earthquake. They saw a most magnificent square surpassing all others in Europe" (Livermore, 1976, 237-238).

In 1776, Jose fell ill and died February 24, 1777. The next day, when Pombal arrived at the palace, Cardinal de Cunha met him and told him, "Your Excellency no longer has anything to do here" (Livermore, 1976, p.238). Twenty years before, as an archbishop, de Cunha had issued a pastoral letter against the Jesuits at Pombal's request. But with Jose's death, the opposition that Pombal had faced during his tenure coalesced quickly and with certain vengeance. Pombal spent the rest of his life defending himself and his past accomplishments against charges of abuses of power. In 1781, Dona Marie I intervened in the persistent attacks and declared that Pombal was deserving of "exemplary punishment" but because of his age and feeble condition, no formal proceedings would be initiated. Pombal died the following year. In one sense, his enemies finally won but most of the changes he had made prepared the transition which was necessary for Portugal to move toward a modern state. Maxwell concludes that, "The story of Pombal's administration is, therefore, an important antidote to the overly linear and progressive view of the role of the eighteenth-century enlightenment in Europe and the relationship between the Enlightenment and the exercise of state power" (p.161).

### Final Comments

The Lisbon earthquake can be called the first modern urban disaster. Previous disasters in the Western and Christian world had usually been interpreted as communicating some message from God to Mankind. But, in the Lisbon

case, a "natural" explanation for the cause of the earthquake emerged. That explanation was not related to the growing acceptance of new geologic explanations about earthquakes, although some of those theories were beginning to be generated. Nor was that explanation related to the philosophical challenges to religious authority, which characterized the intellectual climate which has come to be known as the Enlightenment. Nor was this natural explanation challenged by most of those in positions of authority in the Church of Portugal. The change in conception occurred because the earthquake happened in the context of the development of a more centralized and "modern" state of Portugal. No other European state going through the state building process had to deal with major destruction in their capital city. But Portugal has never been considered a useful case study in discussions of state building in the 18th century. Key figures in the 18th century, of interest to later historians were those whose actions seemed to strengthen liberty rather than those who used power. In that context, Pombal is usually identified with abuses of power rather than for his accomplishments in organizing the first modern governmental response and reconstruction as well as his insistence in defining the earthquake as a "natural" event. That suggests, however, that a "natural" explanation of disaster is closely tied to the state building process.

In his monumental work on the "civilizing" process, Norbert Elias (1982) focuses on generalized causes of state building. In particular, he traces the struggles among the nobility, the Church and the Princes and later the emergence of the bourgeois. In that struggle, Elias says, there is the gradual accumulation of land, then money, in fewer and fewer hands. This tends toward a monopoly, which he labels the "royal mechanism". In this process, what was previously the private power of individuals gradually becomes public or state power until one social unit, the state, is able to control more and more opportunities. The process is enhanced by gaining control of both physical violence and taxation. The development of centralization and monopolization means that what was previously done by military or economic force would now become amenable to planning by the state.

One cannot infer that Pombal substituted a naturalistic interpretation of the earthquake since, at the time, no well differentiated "scientific" theory existed. It is possible that Pombal might have been familiar with Thomas Burnet's *The Sacred Theory of the Earth* (1691, repr. 1965) which argued that, since God operated through natural processes, the Biblical flood could be explained in scientific terms. Burnet's theory also had an explanation for earthquakes and his theory was being widely discussed in England when Pombal was there, and it was also a topic of interest for Enlightenment intellectuals. There are indications, however, that Pombal did act to introduce new ideas and structures in his reforms. He was interested in movements in Europe, such as Gallicanism and regalism, which give more autonomy to

"national" churches against Rome and the Pope. In his educational reform at the university, he sought to modernize the faculties of theology and canon law. Two new faculties were created, mathematics and philosophy, which included the new natural sciences, based on observation and experiment. In his transfer of censorship from the Inquisition to the state, he appointed persons more identified with the reformist ideas so that books by Locke and Montesquieu previously banned were released, although books that contained "irreligion" were still not allowed. One of Pombal's closest collaborators in educational and ecclesiastical reform, Antonio Ribeiro dos Santos, commented on the paradox of the authoritarian and enlightenment strains in his actions "(Pombal) wanted to civilize the nation and at the same time to enslave it. He wanted to spread the light of the philosophical sciences and at the same time to elevate the royal power of despotism" (cited in Boxer, 1969, p.191). This suggests that, in the context of institutional change, seldom is there a direct confrontation between equivalent ideologies, but instead some interpretations begin to erode and, over time, other ideologies are substituted. In this way, Pombal's action cleared the way for the later substitution of more naturalistic interpretations.

Extending those ideas, more recently Stallings (1998) has argued, that most useful for sociological theory is the idea that disasters create disruption in social routines. The state has increasingly assumed more and more control over those disruptions since disasters create a threat to social order. One of the major functions of the state is to promote political order and social stability since predictability is necessary for decision making and strategic planning. Stallings says "That is the state's disaster role is to minimize the disruptions to economic routines caused by disaster (without adversely affecting business in the process) and to restore those routines as quickly as possible when they are disrupted" (1998, p. 142).

The identification of unique turning points in history cannot be easily determined by comparative and/or longitudinal analysis, but the case study of the Lisbon earthquake suggests certain reasonable conclusions. Other than encouraging individual acts of charity and devotions, supernatural interpretations of the "causes" of disaster undercut organized efforts to deal with an emergency response. Supernatural interpretations also undermine collective efforts to engage in longer term reconstruction. With the development of the modern state in Europe in the 18th century, notions of the collective responsibility of the state for the welfare of "citizens" and for the continuity of the society make the Lisbon earthquake a test case for these changes. Changes in the social structure of Portugal, especially changes in the political and economic sectors, made the earthquake especially problematic. The Lisbon earthquake was the first modern disaster in which the state accepted the responsibility for mobilizing the emergency response and for developing and implementing a collective effort for reconstruction and in

order to accomplish that, traditional notions of supernatural causation were opposed, rather harshly. This opposition was not directed toward the Portuguese church itself, but directed toward those segments of the church with more international and universal aspirations, the Jesuits. This shift in the interpretation of the meaning of disaster did not stem from sets of ideas concerning the nature of authority and liberty which has come to be identified as the Enlightenment but it stemmed from the efforts of Pombal to build a Portugal which was economically and politically more secure in the context of a competitive Europe where countries were also going through similar developments. It is ironic that Portugal which was defined by most other countries as being backward and superstitious would be the location of the emergence of naturalistic interpretations.

In *Candide*, Voltaire uses the Lisbon earthquake as the backdrop for criticizing optimism which he saw then as prevalent among intellectuals, such as Leibnitz. The entire work is filled with ironic images and situations, and includes a discussion between Candide and Pangloss of the sufficient cause of the earthquake as well as a discussion with a member of the Inquisition who is arguing for an interpretation of the earthquake as a consequence of sin. Voltaire says "After the earthquake, which had destroyed three fourths of Lisbon, the Portuguese pundits could not think of any better way of preventing total ruin than to treat the people to a splendid *auto da fe*." Voltaire, thus, missed the ultimate irony--that the last victim of the Inquisition was Malagrida who had insisted on a religious interpretation of the earthquake.

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# INFREQUENTLY ASKED QUESTIONS-- THE LISBON EARTHQUAKE AND TSUNAMI OF 1755

compiled by  
Lee Walkling

## Which catastrophic earthquake/tsunami prompted a poem by Voltaire?

The 1755 Lisbon earthquake/tsunami, and topic of this issue of *TsuInfo Alert*.

*Poem on the Lisbon Disaster, or  
An Examination of that Axiom 'All Is Well,' 1755*

Oh, miserable mortals! Oh wretched earth!  
Oh, dreadful assembly of all mankind!  
Eternal sermon of useless sufferings!  
Deluded philosophers who cry, "All is well,"  
Hasten, contemplate these frightful ruins,  
This wreck, these shreds, these wretched ashes of the dead;  
These women and children heaped on one another,  
These scattered members under broken marble;

One-hundred thousand unfortunates devoured by the earth  
Who, bleeding, lacerated, and still alive,  
Buried under their roofs without aid in their anguish,  
End their sad days!

In answer to the half-formed cries of their dying voices,  
At the frightful sight of their smoking ashes,  
Will you say: "This is result of eternal laws  
Directing the acts of a free and good God!"  
Will you say, in seeing this mass of victims:  
"God is revenged, their death is the price for their crimes?"  
What crime, what error did these children,  
Crushed and bloody on their mothers' breasts, commit?  
Did Lisbon, which is no more, have more vices  
Than London and Paris immersed in their pleasures?  
Lisbon is destroyed, and they dance in Paris!

## Who might be called the first "modern" emergency manager?

Because Portuguese King Jose I had other interests (theatre, riding, cards), he appointed Sebastiao Jose de Carvalho e Melo, the Marques de Pombal, to deal with the 1755 Lisbon earthquake-tsunami-fire aftermath. For more about King Jose I, Pombal, and the effects of that event in Lisbon, see Dynes' article, on pages 10 to 19.

## Just how big was the Lisbon earthquake?

The Lisbon earthquake of 1755 is believed to have had a magnitude of 8.5, according to Lesley Newson, in *Devastation! The World's Worst Natural Hazards*, DK

Publishing Inc., 1998. That source also calls that event "Europe's strongest earthquake."

## For what is Gorrige Bank famous?

Gorrige Bank is a ridge off the coast of Portugal uplifted by the northward movement of the African Plate against the Eurasian Plate (there is convergence between the plates going on, but the closest true subduction occurs far to the east, beneath Italy). On 1 November 1755, a magnitude 8.6 earthquake at Gorrige Bank destroyed much of Lisbon (population 250,000). Minutes after the earthquake, the tsunami arrived. At least three great waves about ten meters high entered the city. The waves also raked the nearby coasts of Spain and North Africa, and did extensive damage in the Azores, Madiera, and Canary Islands. Minor damage occurred as far north as Ireland and as far west as the West Indies. Gorrige Bank remains a severe tsunami threat for Portugal, and the Portuguese are now installing seafloor pressure gauges there to get advance warning.

from: <http://www.soest.hawaii.edu/GG/ASK/tsunamis.html>  
by Gerard Fryer, Hawaii Institute of Geophysics and Planetology

## Why is the Lisbon earthquake/tsunami regarded as the birthplace of modern seismology?

"Empirical observations of the effects of earthquakes were rare, however, until 1750, when England was uncharacteristically rocked by a series of five strong earthquakes. These earthquakes were followed on Sunday, November 1, 1755, by a cataclysmic shock and tsunami that killed an estimated 70,000 people, leveling the city of Lisbon, Portugal, while many of its residents were in church. This event marks the beginning of the modern era of seismology, prompting numerous studies into the effects, locations, and timing of earthquakes.

Prior to the Lisbon earthquake, scholars had looked almost exclusively to Aristotle, Pliny, and other ancient classical sources for explanations of earthquakes. Following the Lisbon earthquake, this attitude was jettisoned for one that stressed ideas based on modern observations. Cataloging of the times and locations of earthquakes and studying the physical effects of earthquakes began in earnest, led by such people as John Michell in England and Elie Bertrand in Switzerland."

This account is loosely based on *The Founders of Seismology*, by Charles Davison, Arno Press, New York, 1978.  
<http://www.crustal.ucsb.edu/ics/understanding/history/history1.html>

**PARTNERS IN PREPAREDNESS:  
THE ISLAND COUNTY BEACH WATCHER'S- SHIPS NATURALIST PROGRAM**

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The natural beauty of the Puget Sound Basin in Washington State draws visitors from around the globe... visitors who may be unaware of the destructive potential of the earthquake faults underlying this same area. To better inform the public of earthquake and tsunami hazards within the Puget Sound, a successful partnership has been developed between the Washington State Ferry System, Island County Emergency Services, and Island County Beach Watchers from the Washington State University Cooperative Extension Office.

The W.S.U. Beach Watchers are trained volunteers dedicated to protecting and preserving the fragile environment of Island County and Puget Sound waters through education and public awareness. Beach Watchers attend over 100 hours of classes, and in return, graduates of the program monitor nearly thirty beaches in Island County, provide educational displays, speak to community groups, lead field trips, and work to inform the public about environmental issues.

One of the most successful Beach Watcher projects is the Ship's Naturalist program. Since 1998, summer riders on Washington State ferries sailing between Whidbey Island/ Port Townsend, and between Anacortes/ Friday Harbor, may listen to Ship's Naturalists speak on a variety of subjects... including earthquake, volcano, and tsunami hazards. Educational materials supplied by Island County Emergency Services, including maps, newspaper articles, and handouts from FEMA, USGS, and the Red Cross are

used by the Ship's Naturalists to offer up-to-date information to residents and visitors regarding geologic hazards, local emergency plans, and preparedness tips for travelers.

The intent of this cost-effective program is two-fold. First, ferry commuters are provided with useful information regarding western Washington's geologic wonders and associated hazards. As awareness of these issues increase, a better understanding of and respect for fragile local ecosystems is fostered. Second, visitors and residents become better informed about the potential for earthquakes within the region, and may be encouraged to review their own families' preparedness strategies both at home and while travelling... thereby decreasing the economic and social impact of disaster upon limited local resources.

Earthquake and tsunami education is regularly offered to all Beach Watchers, with Emergency Services and DNR personnel (including retired DNR geologist Gerald Thorsen) providing research updates and presentations at annual spring workshops and fall retreats. The WSU Beach Watcher program is now planning to offer campfire talks in local state parks, which will also include information on disasters.

For more information on this program, please call Don Meehan, Director or Sarah Schmidt, Beach Watcher Program Coordinator, at the WSU Cooperative Extension Office in Island County- (360) 679-7327.

**New Tsunami Mitigation Materials  
Added to the DGER Library, June and July, 2000**

compiled by  
Connie J. Manson

Note: **Free reprints of these materials are available.** (See page 2 for ordering information)

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## **CONFERENCES, SEMINARS**

### **September 10-15, 2000**

XXVII General Assembly of the European Seismological Commission. **Lisbon**, Portugal: September 10-15, 2000. To host its 2000 General Assembly, the European Seismological Commission has aptly chosen Lisbon, the site of the great earthquake, tsunami, and fire of 1755. The assembly will examine all aspects of seismology, from earthquake source physics, to prediction research, to engineering seismology. More information is available from the *Conference Secretariat, XXVII General Assembly of the European Seismological Commission*, Rua da Escola Politecnica, 58, 1269-102 Lisbon, Portugal; email: [esc2000@fc.ul.pt](mailto:esc2000@fc.ul.pt); or <http://www.igidl.ul.pt/esc2000/>

*from: Natural Hazards Observer*, v. 24, no. 6, p. 20

### **September 17-22, 2000**

**National Earthquake Risk Management Conference.** Organizer: Western States Seismic Policy Council (WSSPC). Seattle, Washington: See: <http://www.wsspc.org/currenteq/events/nec2000.htm>; or contact: Patricia L. Sutch, WSSPC, 121 Second Street, 4th Floor, San Francisco, CA 94105; (415) 974-6435; fax: (415) 974-1747; e-mail: [psutch@wsspc.org](mailto:psutch@wsspc.org); WWW: <http://www.wsspc.org>.

*from: Disaster Research #323*, June 21, 2000

### **October 9-11, 2000**

First International Global Disaster Information Network (GDIN) Information Technology Exposition and Conference. Honolulu, Hawaii. The GDIN is a major national and international effort to coordinate and enhance the use of various advanced information technologies and technologically derived information (from satellite imagery to geographic information systems) via the Internet to improve disaster response worldwide. Sessions will address emergency management information needs and applications, data resources, networking technologies, funding strategies, information analysis and assessment, and many other aspects of the use of advanced information technology to mitigate and respond to disasters. For more information, contact Peter Colvin, GDIN Information Technology Conference, c/o ERIM International, PO Box 134008, Ann Arbor, MI 48113-4008; (734) 99-1200, ext. 2438; email [pcolvin@erim-int.com](mailto:pcolvin@erim-int.com); <http://www.erim-int.com/CONF/GDIN.html>.

*from: Natural Hazards Observer*, v. 24, no. 6

### **October 17-19, 2000**

13th Annual Emergency Preparedness Conference. Vancouver, British Columbia, Canada. Sponsors: Emergency Planners and Managers Association of British Columbia, and others. Contact: Emergency Preparedness Conference, 700 West 57th Avenue, Vancouver, BC Canada V6P 1S1 (604) 322-8365; email: [ccox@vanhosp.bc.ca](mailto:ccox@vanhosp.bc.ca)

### **December 5 and 6, 2000**

**Public Risk Management Association (PRIMA) 2000 Risk Management Seminar Series:** Seminars on Crisis Management. Seattle, Washington: December 5, 2000; Portland, Oregon: December 6, 2000. Contact: PRIMA, 1815 North Fort Myer Drive, Suite 1020, Arlington, VA 22209-1805; (703) 528-7701; fax: (703) 528-7966; e-mail: [info@primacentral.org](mailto:info@primacentral.org); WWW: <http://www.primacentral.org>.

*from: Disaster Research #323*, June 21, 2000

### **January 8-11, 2001**

Coastal GeoTools. Sponsored by National Oceanic and Atmospheric Administration Coastal Services Center. Charleston, South Carolina. This conference is designed to enhance participants' ability to use geospatial data, tools, and technology, including geographic information systems, the Internet, remote sensing, metadata, and global positioning systems. Among others, areas to be addressed include hazard mitigation and shoreline erosion. For a conference flyer, contact the NOAA Coastal Services Center, 2234 South Hobson Avenue, Charleston, SC 29405-2413; (843) 740-1200; <http://www.csc.noaa.gov/GeoTools/>

*from: Natural Hazards Observer*, v. 24, no. 6, p. 20

### **August 19-24, 2001**

#### **First World Congress on Disaster Reduction.**

Sponsors: American Society of Civil Engineers (ASCE) and others. Washington, D.C. Contact: Walter Hays, ASCE, 1801 Alexander Bell Drive, Reston, VA 20191; (703) 295-6054; e-mail: [whays@asce.org](mailto:whays@asce.org); or Michael Cassaro, ASCE; e-mail: [macass@aye.net](mailto:macass@aye.net).

## NEWS BRIEFS

### **FEMA Seeks Comments on Proposed Rule Permitting Funding of Mitigation Debris Removal**

The Federal Emergency Management Agency (FEMA) has issued a proposed rule that would provide funding of debris removal under the agency's Public Assistance program. The money would be available to communities that, under a FEMA hazard mitigation program, acquire property substantially damaged by a disaster and convert it to open space or other appropriate uses. Comments were due June 30. The complete proposed rule can be found in the May 16 Federal Register, pp. 31129-30.

*from: Disaster Research #322, June 7, 2000*

### **U.N. Plans 2000 World Disaster Reduction Campaign: "Disaster Reduction, Education, and Youth"**

The United Nations recently announced its 2000 World Disaster Reduction Campaign - "Disaster Reduction, Education, and Youth" - and released a document that outlines the overall goals and objectives of the campaign and provides a guide for actions that can be taken at the local level.

During the International Decade for Natural Disaster Reduction (IDNDR, 1990-1999), the International Day for Disaster Reduction significantly contributed to raising awareness of disaster reduction in countries and local communities around the world. Considering the success of this annual event, when the IDNDR came to an end and was succeeded by the International Strategy for Disaster Reduction (ISDR), the General Assembly of the U.N. decided to continue observing the day on the second Wednesday of October. Each year, the event is the culmination of a year-long public awareness campaign organized by the secretariat of the ISDR to promote disaster prevention measures among the communities at risk.

The theme for 2000 - Disaster Reduction, Education, and Youth - recognizes the importance of establishing a "culture of prevention" (as opposed to a culture of fatalism) by instilling awareness and knowledge beginning as early as possible in a child's development. The main objectives are to:

- \* Promote a shift from a mentality of reaction to hazards to one of management of risks
- \* Promote stronger commitment to incorporating disaster reduction in education curricula
- \* Promote greater participation of youth in disaster reduction activities

In support of this mission, the ISDR Secretariat and several other national and international agencies are hosting the Second Hemispheric Conference on Disaster Reduction in the Education Sector in the Americas in Caracas, Venezuela, October 2-4, 2000.

Additionally, the secretariat is creating a booklet by and for young persons. Young people of the world are invited to

send their personal accounts, essays, poems, and illustrations by August 31 to be collected and published in a booklet that will serve as an inspiration for decision makers.

The secretariat also invites interested individuals and educational institutions to send examples of exemplary national or local education programs that are participatory and demonstrably contribute to building a culture of prevention. These will also be published by the secretariat.

As in previous years, the secretariat is holding a worldwide photo contest on the theme of the campaign, with a first prize of US \$2,000. Interested individuals and organizations are encouraged to send entries illustrating disaster reduction and its relevance to this year's campaign. The deadline for submissions is also August 31, 2000.

Support material for the 2000 World Disaster Reduction Campaign is being prepared by the ISDR Secretariat, including:

- ISDR brochure
- Campaign poster
- Guidelines for local activities
- Teacher's guide
- Re-print of the 1995 children's booklet
- Audio-visual material
- CD-ROM
- Report on the 1999 campaign
- Kids' corner on the ISDR Web site (<http://www.unisdr.org>)
- Application form to participate in the U.N. Disaster Prevention Award

The International Day for Disaster Reduction will be held on October 11, 2000, with important celebrations taking place at the U.N. and locally across the globe. For more information about the 2000 ISDR campaign, as well as suggestions for local activities and events, contact the Awareness and Promotion Issues Officer, Secretariat of the International Strategy for Disaster Reduction (ISDR), Palais des Nations, 1211 Geneva 10, Switzerland; tel: (41 22) 917 90 00; fax: (41 22) 917 90 98/99; e-mail: [isdr@un.org](mailto:isdr@un.org); WWW: <http://www.unisdr.org>. Interested persons can also contact Helena Molin Valdes, ISDR Unit for Latin America and the Caribbean; e-mail: [hmolin@undpcos.nu.or.cr](mailto:hmolin@undpcos.nu.or.cr); also see the Web site of the Regional Disaster Information Center, CRID: <http://www.crid.or.cr>.

*from: Disaster Research #323, June 21, 2000*

### **Red Cross Releases "Masters of Disaster"- Children's Disaster Safety Curriculum**

The "Masters of Disaster" children's disaster safety curriculum (see DR #312) is now complete and available to Red Cross chapters and stations to order from the General Services Division (GSD).

The curriculum is intended to aid teachers of science, math, social studies, and language arts to integrate the



"hazards" of hurricanes, floods, tornadoes, lightning, earthquakes, and, in general, family disaster preparedness, into their regular lesson plans. A complete listing of national teaching standards and which lessons in the curriculum help meet those standards is included with each curriculum package.

The curriculum comes as a set of materials in a box. There are separate boxes for teachers of grades K-2, 3-5, and 6-8. Within each box is a "Teacher's Guide," "Activities Book" (reproducible activity pages), age- and hazard-specific video, interactive poster, and for the K-2 and 3-5 kits, stickers and an order card for "The Notagains" disaster

preparedness CD-ROM. A "class set" of all materials for up to 30 students that the teacher would need are included in each box.

Note: For teachers and the general public, these materials are available for order ONLY from local Red Cross chapters or stations, which can provide price and availability information. Schools or other third parties should not contact the Red Cross General Services Division or offices of the Red Cross National Headquarters to place orders.

*from: Disaster Research, number 324, July 6, 2000*

## NEW WEB RESOURCES

<http://www.fema.gov/library/>

Although we've cited the Federal Emergency Management Agency's on-line library before, it deserves additional mention since it is one of the better Internet repositories of disaster information and since several new documents have been added recently. Some of the library's newer offerings include:

*from: Disaster Research #322, June 7, 2000*

*From the Response and Recovery section--*

<http://www.fema.gov/library/lib08.htm>

- "Remote Sensing in Federal Disaster Operations - Standard Operating Procedures"

- "Your Civil Rights and Disaster Assistance"

*From the Preparedness, Training, and Exercises section--*

<http://www.fema.gov/library/lib07.htm> - contains

\*numerous\* publications on personal, family, and business mitigation, preparedness, response, and recovery - many in multiple languages. Also note that the library has an entire section devoted to Spanish-language publications.

"The Marginalization of Disaster Response Institutions" is now available from the Natural Hazards Center Web site at

<http://www.colorado.edu/hazards/sp/sp.html>. The report can be viewed on-line or downloaded in Microsoft Word97 or PDF format. A Spanish version is also available either in print or on-line from the Regional Disaster Information Center for Latin America and the Caribbean (CRID):

<http://www.crid.or.cr>, or

<http://www.crid.or.cr/crid/ENG/NEWS/not7.htm>.

Printed copies of "The Marginalization of Disaster Response Institutions" (SP36, 44 pp.) remain available and can be purchased for \$10.00, plus shipping (\$5.00 for the U.S., Canada, and Mexico; \$8.00 for international mail beyond North America). Orders should be directed to the Publications Clerk, Natural Hazards Research and Applications Information Center, Campus Box 482, University of Colorado, Boulder, CO 80309-0482; (303) 492-6819; fax: (303) 492-2151; e-mail: [janet.kroeckel@colorado.edu](mailto:janet.kroeckel@colorado.edu). Checks should be made

payable to the University of Colorado.

*from: Disaster Research #323, June 21, 2000*

<http://www.ContinuityPlanner.com>

ContinuityPlanner.com is a free service hosted by the Disaster Recovery Information Exchange in Canada. Open to all individuals interested in business continuity planning, the site is nonprofit, supported by corporate sponsorship. It includes a job bank; sample business continuity plans, templates, and guides; back issues of the "Disaster Recovery" E-zine; members' Web pages; information on scheduled training and professional certification; links to other sources of current information; on-line bulletin boards and meeting rooms; and more.

*from: Disaster Research #323, June 21, 2000*

<http://www.fema.gov/nwz00/erosion.htm> or

<http://www.heinzcenter.org>

The Federal Emergency Management has released a major study on erosion hazards - "Evaluation of Erosion Hazards" - prepared for FEMA by The Heinz Center for Science, Economics and the Environment. The study provides a comprehensive assessment of coastal erosion and its impact on people and property. According to the report, approximately 25% of homes and other structures within 500 feet of the U.S. coastline and the shorelines of the Great Lakes will fall victim to the effects of erosion within the next 60 years. For details and links to the Executive Summary and the full report, see either the FEMA or Heinz Center Web site listed above.

*from: Disaster Research, number 324, July 6, 2000*

<http://www.grid.unep.ch/preview/>

The United Nations Environment Program (UNEP) Global Resource Information Database (GRID) Project for Risk Evaluation, Information and Early Warning (PREVIEW) has developed a new tool for quickly locating relevant Web sites from among 100 organizations offering reports, data, and early warning information on natural and complex hazards. The index covers climatic hazards (floods,

droughts, tropical cyclones); tectonic hazards (earthquakes, tsunamis, volcanoes, landslides); eco-degrading hazards (erosion, forest fires, biodiversity loss, deforestation); and polluting hazards (air, water, soil, oil spills, nuclear waste). Information from the PREVIEW Web site can be accessed by theme or by geographical location. The offerings are not intended to be exhaustive, but instead represent a selection based on a list of organizations provided by the U.N. IDNDR (now ISDR) Secretariat. The pages provide the names of the organizations, a description of their products, their objectives, and their Web URL.

*from: Disaster Research, number 324, July 6, 2000*

[risk-com-request@umich.edu](mailto:risk-com-request@umich.edu)

A new e-mail discussion group has been formed by members of the Risk Communication Specialty Group of the Society for Risk Analysis. "Risk-com" is an unmoderated public discussion forum, designed to promote communication among those interested in this growing field. To subscribe, send an e-mail message to the address above with the word "SUBSCRIBE" as the subject of the message.

*from: Disaster Research #323, June 21, 2000*

[http://www.fema.gov/mit/tsd/ft\\_mhira.htm](http://www.fema.gov/mit/tsd/ft_mhira.htm)

The Federal Emergency Management Agency's "Multi-Hazard Identification and Risk Assessment" document is now available on-line. As part of the agency's national effort to mitigate human and economic loss caused by disasters, FEMA initiated a research project to clarify and document previous efforts to identify natural and technological hazards and to assess associated risks. Subsequently, this document was prepared to summarize the findings. It reviews virtually all atmospheric, geologic, hydrologic, and other natural hazards, as well as numerous technological risks. It then summarizes several risk assessment approaches and identifies the various activities that compose the National Mitigation Strategy. It concludes with a summary and numerous appendices.

*from: Disaster Research - July 24, 2000*

<http://members.spree.com/education/helpu>  
<http://members.spree.com/education/helpu/maynews2000.html>

The HELPU Web site is intended to serve all members of the disabled community, their care-givers, attendants, fire and rescue personnel, and emergency services departments. The site offers *numerous* pages with tips on emergency/disaster preparedness for various hazards. Interested persons should take a look at <http://members.spree.com/education/helpu/mitigationcalendar.html> for a "Mitigation and Preparation Scheduling Calendar."

*from: Natural Hazards Observer, July 2000, v. 24, no. 6*

<http://www.tallytown.com/redcross>

In support of FEMA's Project Impact and disaster reduction generally, the Mitigation and Community Disaster Preparedness Unit of the American Red Cross publishes a newsletter, *What's New--Mitigation and Preparedness Activities Across the Country*, which is available in PDF format from the Web site of Florida's Capital Area Chapter of the Red Cross. Click on the "News" button to obtain a list of downloadable issues.

*from: Natural Hazards Observer, July 2000, v. 24, no. 6*

<http://coe-dmha.org>

The Center of Excellence in Disaster Management and Humanitarian Assistance in Hawaii has completely revamped its Web site (including moving to the new address above). The new site lists the many training and education opportunities supported by the center, incorporates an on-line version of the Center's magazine *The Liaison*, and provides much other information about disaster management and humanitarian aid worldwide.

*from: Natural Hazards Observer, July 2000, v. 24, no. 6*

<http://state-of-coast.noaa.gov>

In 1996, Vice President Al Gore challenged federal agencies to develop a "report card" on the state of the nation's environment. In response, the National Oceanic and Atmospheric Administration (NOAA) created the *State of the Coast Report* provided at this Web site. The foundation of the report is a series of essays on important coastal issues, two of which are entitled "Population at Risk from Natural Hazards" and "Reducing the Impacts of Coastal Hazards." These thorough articles include overviews of the problem of coastal hazards nationally, regional analyses, specific case studies, interviews with experts, suggested readings and references, and glossaries.

*from: Natural Hazards Observer, July 2000, v. 24, no. 6*

<http://mceer.buffalo.edu/utilities/quakeline.asp>

As one might suspect, the Multidisciplinary Center for Earthquake Engineering Research (MCEER) QUAKELINE database provides information on earthquake engineering literature. However, QUAKELINE *\*also\** provides access to literature for other hazards - both natural and human-made - including high winds, floods, tsunamis, volcanoes, landslides, hazardous material spills, and blasts/bombings. In addition, QUAKELINE covers the social and economic effects of earthquakes, the psychological effects of disasters, legislative and policy issues, as well as emergency/disaster management.

Users can easily search the QUAKELINE database at no charge at the MCEER Web site above. While the majority of QUAKELINE records cover highly technical publications, an effort has been made to include material suitable for students in middle school and high school and for the general public. QUAKELINE records contain

bibliographic information for each publication: author(s), title, publisher, and year of publication, as well as a list of keywords and a brief abstract. The database presently contains over 34,000 records.

All the items listed in the QUAKELINE database are located in the University at Buffalo libraries or the MCEER Information Service, so obtaining copies is simply a matter of submitting a request via the Web site, e-mail, fax, phone, or postal mail. For more information about purchasing the database on CD-ROM or searching QUAKELINE, contact Marsha Flett, MCEER Database Coordinator, e-

mail: [flett@acsu.buffalo.edu](mailto:flett@acsu.buffalo.edu). For reference/document delivery requests or information about fees, contact Laura Taddeo, MCEER Information Specialist, e-mail: [ltaddeo@acsu.buffalo.edu](mailto:ltaddeo@acsu.buffalo.edu). Both people can also be reached at the MCEER Information Service, c/o Science and Engineering Library, 304 Capen Hall, Buffalo, NY 14260-2200; (716) 645-3377; fax: (716) 645-3379; e-mail: [mceeris@acsu.buffalo.edu](mailto:mceeris@acsu.buffalo.edu); WWW: <http://mceer.buffalo.edu/infoService/default.asp>.

from: Disaster Research, no. 325, July 24, 2000

### THE AUGUST-SEPTEMBER '00 EENET SCHEDULE

Below is a list of satellite broadcasts scheduled by the Federal Emergency Management Agency's Emergency Education Network (EENET) (all programs begin at 2:00 pm Eastern time, except where noted):

August 9 - "Around the Table" in Emmitsburg featuring faculty and staff from FEMA's Emergency Management Institute Advanced Public Information Officer Course  
August 16 - National Alert Broadcast  
August 23 - Highlights from the Second Fire and Emergency Services Higher Education Conference  
August 30 - Consequence Management News, Equipment, and Training Magazine  
Sept 6 - Learning Again - revisiting the 1995 Oklahoma City Murrah Federal Building bombing  
Sept 13 - USDA Emergency Preparedness Satellite Seminar - Day 1 (10:30 am-4:30 pm)  
Sept 14 - USDA Emergency Preparedness Satellite Seminar - Day 2 (10:30 am-4:30 pm)  
Sept 20 - National Alert Broadcast  
Sept 27 - Gems from EENET - "Partnerships - Private, Public, and Federal"

Additional broadcasts are often added. For up-to-date information, a description of each of these programs, and satellite broadcast information, visit the EENet Web site: <http://www.fema.gov/home/emi/eenet.htm>.

from: Disaster Research, number 324, July 6, 2000

## Directories

### NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM STEERING GROUP

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Division of Geology and Earth Resources  
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Olympia, WA 98504-7007  
(360) 902-1432; Fax (360) 902-1785  
email: [tim.walsh@wadnr.gov](mailto:tim.walsh@wadnr.gov)

## STATE EMERGENCY MANAGEMENT OFFICES

For general emergency management information, contact:

**Alaska** Division of Emergency Services  
Department of Military & Veterans Affairs  
P.O. Box 5750  
Fort Richardson, Alaska 99505-5750  
(907) 428-7039  
Fax (907) 428-7009  
<http://www.ak-prepared.com/>

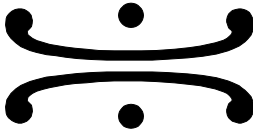
**California** Office of Emergency Services  
2800 Meadowview Road  
Sacramento, California 95832  
(916) 262-1816  
Fax (916) 262-1677  
<http://www.oes.ca.gov/>

**Hawaii** State Civil Defense  
Department of Defense  
3949 Diamond Head Road  
Honolulu, Hawaii 96816-4495  
(808) 734-2161  
Fax (808) 733-4287  
E-Mail: [rprice@pdc.org](mailto:rprice@pdc.org)  
<http://iaio.pdc.org>

**Oregon** Division of Emergency Management  
595 Cottage Street, NE  
Salem, Oregon 97310  
(503) 378-2911 ext 225  
Fax (503) 588-1378  
<http://www.osp.state.or.us/oem/oem.htm>

**Washington** State Military Department  
Emergency Management Division  
Camp Murray, WA 98430-5122  
(253) 512-7067  
Fax (253) 512-7207  
<http://www.wa.gov/mil/wsem/>

Provincial Emergency Program  
455 Boleskin Road  
Victoria, BC V8Z 1E7  
**British Columbia**, Canada  
(250) 952-4913  
Fax (250) 952-4888  
<http://www.pep.bc.ca>



## SUMMER VACATION ASSIGNMENT FOR ALL AGES

- 1) Learn the height of your street/road above sea-level.  
(City Engineer, local library, topographical map, legal description of property?) \_\_\_\_\_
- 2) Know the distance of your street/road from the coast and other high-risk waters.  
(Surveyor, topographical map...) \_\_\_\_\_
- 3) Find the evacuation route signs in your community and see where they lead. \_\_\_\_\_
- 4) Find the closest locations to your house, school and workplace that are 100 feet above sea level, as far inland as you can walk in 15 minutes. Every foot upland or inland can make a difference. Mark the different routes and destinations on a map.  
(Topographical map...) \_\_\_\_\_
- 5) Locate the name and phone number of your emergency manager.  
(Library, phone book, Internet, local newspaper...) \_\_\_\_\_
- 6) Listen to the NOAA weather radio station serving your area; their broadcasts will be critical to learn when it is finally safe to return home. \_\_\_\_\_ station call letters
- 7) Get a copy of USGS Circular 1187 "Surviving a Tsunami--Lessons from Chile, Hawaii, and Japan." free. 18 p.  
(from your local emergency manager; or write USGS Information Services, Box 25286, Denver, CO 80225; or call 1-888-ASK-USGS) \_\_\_\_\_
- 8) Visit 2 tsunami websites. \_\_\_\_\_  
(At home or at the local library's computer) http:// \_\_\_\_\_  
http:// \_\_\_\_\_
- 9) Has there been a tsunami in your county within the last 100 years? If so, when? How much damage did it do? What caused it?  
(Local library; State Geological Survey, emergency manager) \_\_\_\_\_
- 10) How many miles is your house from Lisbon? \_\_\_\_\_

**This assignment is due before the next tsunami hits.**



## VIDEO RESERVATIONS

Place a check mark ( ' ) beside the video(s) you want to reserve; write the date of the program behind the title.  
Mail to TsuInfo Alert Video Reservations, Lee Walkling, Division of Geology and Earth Resources Library, PO Box 47007, Olympia, WA 98504-7007; or email lee.walkling@wadnr.gov

- Adventures of Disaster Dudes** (14 min.)  
Preparedness for pre-teens
- The Alaska Earthquake, 1964** (20 min.)  
Includes data on the tsunamis generated by that event
- Cannon Beach Fire District Community Warning System** (COWS) (21 min.)  
Explains why Cannon Beach chose their particular system
- Disasters are Preventable** (22 min.)  
Ways to reduce losses from various kinds of disasters through preparedness and prevention.
- Killer Wave: Power of the Tsunami** (60 min.)  
National Geographic video.
- Numerical Model Aonae Tsunami - 7-12-93**  
(animation by Dr. Vasily Titov) and
- Tsunami Early Warning** by Glenn Farley, KING 5 News (The Glenn Farley portion cannot be rebroadcast)
- The Prediction Problem** (58 min.)  
Episode 3 of the PBS series "Fire on the Rim."  
Explores earthquakes and tsunamis around the Pacific Rim.
- The Quake Hunters** (45 min.)  
A good mystery story, explaining how a 300-year old Cascadia earthquake was finally dated by finding records in Japan about a rogue tsunami in January 1700.
- Raging Planet; Tidal Wave** (50 min.)  
Produced for the Discovery Channel in 1997, this video shows a Japanese city that builds walls against tsunamis, talks with scientists about tsunami prediction, and has incredible survival stories.
- Raging Sea: KGMB-TV Tsunami Special.** (23.5 min.)  
Aired 4-17-99, discussing tsunami preparedness in Hawaii.
- The Restless Planet** (60 min.)  
An episode of "Savage Earth" series. About earthquakes with examples from Japan, Mexico, and the 1989 Loma Prieta earthquake in California.
- Tsunami and Earthquake Video** (60 min.)  
Includes "Tsunami: How Occur, How Protect," "Learning from Earthquakes," and "Computer modeling of alternative source scenarios."
- Tsunami: Killer Wave, Born of Fire** (10 min.)  
NOAA/PMEL.  
Features tsunami destruction and fires on Okushiri Island, Japan; good graphics, explanations, and safety information. Narrated by Dr. Eddie Bernard, (with Japanese subtitles).
- Tsunami: Surviving the Killer Waves** (13 min.)  
Two versions, one with breaks inserted for discussion time.
- Tsunami Warning** (17 min.)  
San Mateo (California) Operational Area Office of Emergency Services.  
This is a good public service program, specifically made for San Mateo County. Citizens are told what to do in cases of tsunami watches or tsunami warnings, with specific inundation zones identified for the expected 20-foot tall tsunami. An evacuation checklist is provided, as well as locations of safe evacuation sites. This video gives the impression that all tsunamis are teletsunamis (generated at a source more than 1000 km from the coastline) which therefore provide time for warnings. Locally-generated tsunamis are not discussed
- Understanding Volcanic Hazards** (25 min.)  
Includes information about volcano-induced tsunamis and landslides.
- The Wave: a Japanese Folktale** (9 min.)  
Animated film to help start discussions of tsunami preparedness for children.
- Waves of Destruction** (60 min.)  
An episode of the "Savage Earth" series. Tsunamis around the Pacific Rim.
- The Wild Sea: Enjoy It...Safely** (7 min.)  
Produced by the Ocean Shores (Washington) Interpretive Center, this video deals with beach safety, including mention of tsunamis.

Check the title(s) you would like and indicate the date of your program. The video(s) will be mailed one week before the program date. You will be responsible for return postage.

Name: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Mailing address: \_\_\_\_\_  
City, State, Zip: \_\_\_\_\_  
email: \_\_\_\_\_

# STOP THE PRESSES!!

Dr. Russell Dynes just sent us a copy of the MOST AMAZING CD!!

"Earthquake Emergency Management, Lisbon, "  
includes TONS of information about the 1755 event,  
with Stunning graphics and animation and sound!

We're working now to find out how to get copies of it for YOU.

Watch This Space for further developments.



WASHINGTON STATE DEPARTMENT OF  
**Natural Resources**  
Jennifer M. Belcher - Commissioner of Public Lands

Library  
Department of Natural Resources  
Division of Geology and Earth Resources  
P.O. Box 47007  
Olympia, WA 98504-7007