

# **CHAPTER 12**

## **Community Preparedness & Response**



**GEER/EERI/ATC Cephalonia, Greece 2014**  
**Report Version 1**

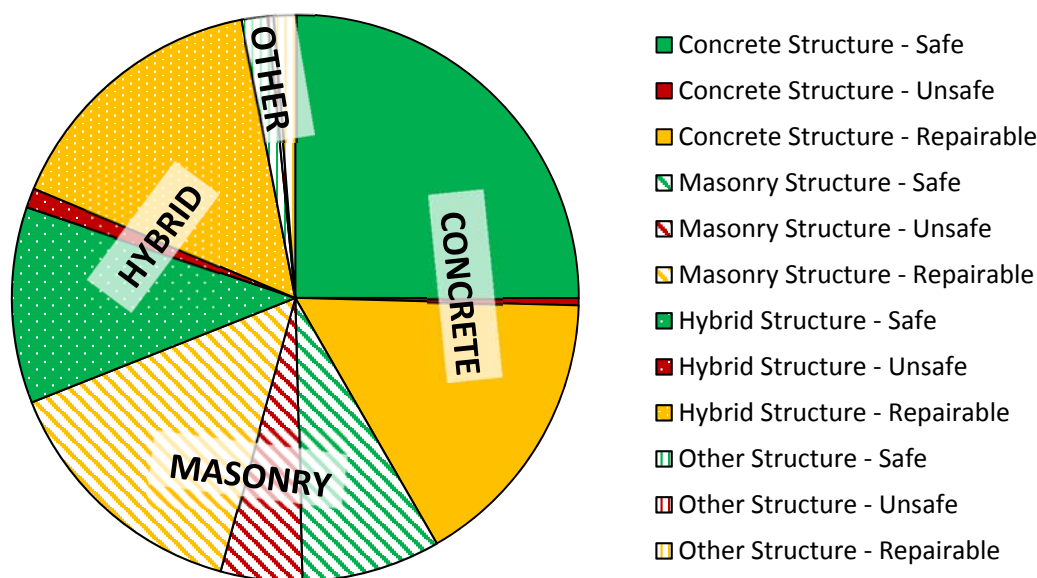


# 12 Community Preparedness and Response

## DAMAGE ASSESSMENT SURVEY

During the 2014 two main seismic events of January 26<sup>th</sup> (M<sub>w</sub> 6.1) and February 3<sup>rd</sup> (M<sub>w</sub> 6.0), some structural damage occurred, mostly during the 2<sup>nd</sup> earthquake. Damage assessment survey efforts were led by the Greek Seismic Rehabilitation Agency (YAS) in two phases: rapid (in 4,865 buildings) and detailed (in 2,770 buildings), mostly by teams of structural engineers who work for public agencies, explained in detail in Chapter 11. According to the Hellenic Earthquake Rehabilitation Services (HERS), the detailed assessment (shown in Fig. 12.1) tagged 46% of the buildings as safe (green), 48% as temporarily unsafe (yellow), and 6% as unsafe (red). Of the 180 red buildings, 5% were made of reinforced concrete, 73% were masonry, 17% were hybrid concrete-masonry, and 5% were other types, which indicated that masonry buildings suffered the most. Geographically, 76% of the red and 60% of the yellow buildings were in the Paliki peninsula area. By use and occupancy, 52% of the red buildings were farm storage, warehouses, stables, etc., or had been abandoned, 39% were residential buildings and 9% were commercial buildings such as offices.

### Detailed Assessment



**Figure 12.1.** Results of detailed assessment of 2,770 buildings (see Chapter 11 for details).

The underwater damage in ports was inspected by divers of the Greek military and divers commissioned by the water network facilities management; evaluation also included video camera inspections by the Athens Water Supply and Sewerage Company, EYDAP, which have been presented in Section 8.2 and Chapter 10, respectively.

## GOVERNMENT RESPONSE AND FINANCIAL AID

The Greek Government responded quickly to the aftermath of the disaster declaring Cephalonia a natural disaster zone. Shortly after the 1<sup>st</sup> event, government representatives - including the prime minister- visited the island, and public safety agencies promptly performed damage assessments and organized relief efforts, including assistance from the local Red Cross. Additional temporary instrumentation of accelerometers and seismographs was deployed to enhance the existing seismographic network (see Chapter 7), to record aftershocks and future mainshocks that were considered likely given Cephalonia's seismic history.

Despite the fact that there were no casualties and that the majority of the building stock suffered little to no damage, the economic cost of the two events for the Greek government was significant, in part because financial aid has been offered by the government to repair buildings that were temporarily unsafe (yellow) or dangerous for use (red). More specifically, eighty percent [80%] of the aid will be covered directly from the state, and the rest 20% will be in the form of an interest-free loan to be paid back over a period of 15 years.

Specifically, for rebuilding structures of floor plan area up to 120 m<sup>2</sup>, (~ 1,200 ft<sup>2</sup>) the government will provide: (i) €1,000/m<sup>2</sup> (~ \$1,400/m<sup>2</sup>) for residential buildings, (ii) €500/m<sup>2</sup> (~ \$70/ft<sup>2</sup>) for business and public facilities, and (iii) €250/m<sup>2</sup> (\$32/ft<sup>2</sup>) for farm storage structures, warehouses, stables, etc. Churches will receive up to €800/m<sup>2</sup> (\$100/ft<sup>2</sup>) regardless of floor plan area. For structural damage repair, the government will provide €450/m<sup>2</sup> (\$57/ft<sup>2</sup>) (up to 120 m<sup>2</sup> area) for damage restoration of load-bearing and non load-bearing elements. For nonstructural damage, the financial aid will be up to €250/m<sup>2</sup> (\$32/ft<sup>2</sup>). Funds will be provided in successive instalments paid upon completion of specific stages of the work. For yellow or red building owners, the government will subsidize rents to owners for a period of two years; while for tenants, rent will be provided for up to six months.

Preliminary cost estimates of the financial aid plan described above bring the total cost of replacing or repairing the damaged buildings up to €200 million (\$275M), with additional costs for rental allowances and reconstruction aid in the order of €16M (\$22M) and €48M (\$65M), respectively. The Greek Government has appealed to European Union's Solidarity Fund for financial aid.

## **EARTHQUAKE INSURANCE DATA**

Earthquake insurance is not mandatory for residential or commercial structures, unless specified by the bank issuing the mortgage. For critical facilities, insurance is required for a fire event, but not for an earthquake. According to data from the Insurance Agencies Union (Ένωση Ασφαλιστικών Εταιρειών) 17.5% of residential housing stock of Cephalonia had earthquake insurance, mostly due to mortgage requirements. Approximately half of these were under the National Insurance Agency (Εθνική Ασφαλιστική), the largest insurance company in Greece (Foufopoulos, 2014).

Although Greece is located in one the most seismically active regions in the world, Greek homeowners typically opt out of earthquake insurance, which is symptomatic of a poor understanding of what earthquake insurance actually is, and what benefits it provides in the occurrence of a catastrophic event. Since the market is very small, earthquake insurance is not viewed as priority by the insurance companies. As a result, adding the earthquake risk factor in a homeowner's insurance does not increase the premium significantly. In simple terms, if an insurance premium is on the order of 0.2% of the value of the structure, and there is a deterministic hazard of a significant earthquake happening every 25 years, the total cost to the owner for this insurance would be  $0.2\% \times 25 = 5\%$  of the value in these 25 years of life. The repair costs for damage caused by one event may be smaller, damage however might be detrimental to the structural integrity due to event sequences in areas like Cephalonia.

Insurance reimbursement is based on the earthquake magnitude. In general, insured houses are reimbursed for damage caused by an earthquake of magnitude 6 or less. In the case of multiple events, if damages are evaluated by inspection of the insurance company and the house is deemed habitable, the insurance can adjust the premium and reimburse the owner for damages caused by the next event in the same sequence. For the 2014 events, more than €6 million (\$8.2M) will be distributed to the residents of Cephalonia, according to the Hellenic Association of Insurance Companies (HAIC, 2014, [ekathimerini.com](http://ekathimerini.com)).

## **COMMUNITY HOUSING AND SUPPORT**

Following the two mainshocks and numerous aftershocks, some critical and essential facilities were temporarily evacuated. In some cases, evacuation was enforced as a preventive measure –given the earthquake history of the island-- which created discomfort to the residents. Such examples include the Lixouri hospital, senior citizen housing and schools (see also

Chapter 11), whose functions were moved to large cruise ships, public facilities or precast temporary settings for several weeks (Figs. 12.2, 12.3).



**Figure 12.2.** Temporary housing options included a cruise ship (photo by reconnaissance teams).



**Figure 12.3.** Temporary housing options of tents (left AP, N. Stamenis, [vcstar.com](http://vcstar.com)) or public facilities and churches for the elderly (right, from the web).

Temporary housing included tents offered by the army, two navy ships in Argostoli (550 beds) and the “Aegean Paradise” cruise boat in Lixouri with 600 beds (including free breakfast and dinner offered by the ship owner for two months). Rainy weather made living conditions hard, and several homeless people had to be moved to the ships. Many owners of houses deemed as inadequate for use preferred to stay either with relatives or in their cars in order to protect their houses from looting. Alternative housing options by the government included



public buildings tagged as safe or precast temporary housing. Several local chapters of the Greek Red Cross were immediately activated to help the communities and provide supplies, as shown in Fig. 12.4 from the Patras Red Cross and Good Samaritan Volunteers and Lifeguards (Σώμα Εθελοντών, Σαμαρειτών, Διασωστών και Ναυαγοσωστών).



**Figure 12.4.** Assistance by the Greek Red Cross immediately after the events. Photos from Patras volunteers of the Red Cross and Good Samaritans (Σώμα Εθελοντών, Σαμαρειτών, Διασωστών και Ναυαγοσωστών). Photos from [patrasevents.gr](http://patrasevents.gr).

Water supply was interrupted in Lixouri after the 2<sup>nd</sup> event, and bottled water was distributed until the network was repaired (Fig. 12.5). Government authorities, churches and volunteers also provided food and other aid to those whose homes were deemed unsafe. Gracious financial support has been provided by various sources, including fundraising by Greek communities -locally and abroad- (Fig. 12.6) and private donations from organizations such as the athletic team Olympiacos, who offered €500,000 (about \$700,000) towards school recovery.

The people of Cephalonia generally handled the events stoically, as they have likely experienced other earthquakes in their lifetime. This helped minimize panic and allowed for emergency response to proceed smoothly. Psychological support was provided, especially to children and families who had not experienced such a natural disaster before, including support by the Children’s Psychology Clinic under their study for psychosocial needs due to seismic events at “Aghia Sophia” Children’s Hospital in Athens.

However experienced with the earthquake phenomenon and terminology, the public did not seem to understand that nonstructural damage is expected after large seismic events for code-compliant structures. The expectations by the residents were higher than the non-collapse requirements of the seismic code, which was very effectively achieved under very strong ground motions. The people complained about the impact of the earthquakes to their personal and professional lives, which were mostly affected by nonstructural damage. This appears to be the case in other earthquake-prone areas, and suggests that more effort is needed to educate the public on their risk exposure and expectations of operations after large earthquakes.



**Figure 12.5.** Distribution of bottled water to Lixouri residents following the 2<sup>nd</sup> event (photo by reconnaissance teams).



**Figure 12.6.** Fundraising efforts in Athens and Sydney, Australia.



Art has always been a big part of the Greek culture and a means of coping with strenuous ordeals. Members of the Telethon for the Support of Cephalonia Committee filled the unique bottle of Fig. 12.7 with water from the shore of Syros in the Aegean sea (at the east) to be emptied from Lixouri in the Ionian sea (to the west). This gesture was inspired by the concept that the two seas surrounding Greece are connected by the people who can face any difficulty by being united and supporting each other in times of crisis. The bottle artwork was done by archaeologist Maria Rota.



**Figure 12.7.** The bottle of water from the Aegean sea that was emptied at Lixouri in the Ionian sea to symbolize their connection and mutual support in the aftermath of the Cephalonia earthquakes of 2014. Artwork by archaeologist Maria Rota, photo from [inkefalonias.gr](http://inkefalonias.gr).

