PREPARING FOR EARTHQUAKES IN COASTAL TOURISM DESTINATIONS: THE CASE OF “TELEMACHUS” PROJECT

Asimina Kourou\textsuperscript{1}, Maria Panoutsopoulou\textsuperscript{2}
\textsuperscript{1}Education Department of Earthquake Planning and Protection Organization (GREECE)
\textsuperscript{2}Planning Department of Earthquake Planning and Protection Organization (GREECE)

Abstract

Tourism is an important economic sector in many countries worldwide and in Greece as well. A lot of tourism destinations are exposed to, or likely to be exposed to various natural hazards such as earthquakes and tsunamis. So, it is very vital for the local authorities, the stakeholders of tourism industry, the schools and the population to ensure the effective policy and proper disaster planning at all levels and to mitigate the impacts of a disaster. Part of the planning is the training of all the involved parties.

During last decades strong earthquakes have affected the Ionian Islands Region of Greece, which is the most seismic area of the country. Given the impact of these events in terms of lives lost, injuries, damaged infrastructure, psychological consequences and economic loss, it is obvious that the stakeholders should be prepared to handle an emergency situation.

“Telemachus” is an innovative operational project on seismic risk management issues in the Ionian Islands. In the framework of the abovementioned project, Earthquake Planning and Protection Organization (EPPO) implements educational actions for different target groups. The aim of these actions is to ensure that all stakeholders have a common understanding on seismic risk reduction, to empower local communities to improve their preparedness and to reconsider risk through a collaborative approach.

This study presents a holistic overview of the risk assessment and earthquake preparedness actions in this specific Region, and EPPO’s awareness and training actions as well.

In order to build disaster resilience in Ionian Islands, EPPO focused to plan educational activities to reframe how disaster risk can be understood and reduced. In particular, educational material on disaster risk issues have been developed tailored to fit in the needs of this region and the tourism industry. Also, for the development of the material have been taken into account the vulnerabilities faced by tourists and the particularities of them, such as the fact that they are transient, may have lack of knowledge of local hazards, perceive risks differently, and may have communication barriers.

Looking ahead, seminars and tabletop exercises will be implemented in 4 Ionian Islands for the information and education of specific target groups that involved in the tourism industry, presenting the necessity of earthquake management and its exploitation for the protection of tourists.

Experience has shown that the effective management of seismic risk is an important challenge for tourist resorts in the Ionian Islands. The long term issue of the EPPO’s Initiative and the “Telemachus” activities is to bridge the gap between the fields of disaster management and tourism planning, by suggesting the utilization of community and tourist awareness.

Keywords: Tourism, tourists, emergency planning, Ionian Islands Region of Greece, seismic risk, training material, disaster, seminars.

1 INTRODUCTION

“Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment, for personal or business/professional purposes” [1]. Tourism is a complex industry that involves a broad range of businesses, agencies and individuals. Each party in the chain contributes to the overall experience of the tourists.

Globally, major disasters such as earthquakes, tsunamis, floods etc. have significant effects on human lives, infrastructure and the economy of the affected area and country. It is well known that tourism sector is very vulnerable to disasters. On the other hand, it is generally accepted that tourism is arguably the most important economic development and recovery opportunity for many destinations after disaster strikes.
Greece is a country with high seismicity. The Ionian Islands Region, that is one of the most seismically active areas of the Mediterranean Sea, has been repeatedly affected by strong earthquakes [2], [3], [4]. Ionian Islands that traditionally called “Heptanese” (seven islands in Greek), is a group of 32 big and small islands covering an area of 2,307 km² on the west coast of Greece and hosts 2% of the total Greek population (234,332 inhabitants in 2011). The seven principal ones are: Corfu, Paxoi, Lefkada, Ithaca, Kefallonia, Zakynthos and Kythira “Fig. 1”. In recent decades, this region is clearly heavily specialised in tourism activities and piloted efforts to enhance quality and improve tourism businesses [5]. Thus, the tourism sector dominates the regional economy and all the other services in this Region.

**Figure 1. Map of Ionian Islands [6].**

2 METHODOLOGY

This study presents a holistic overview of Earthquake Planning and Protection Organization (EPPO) risk assessment and earthquake preparedness actions to build a prevention and preparedness culture at individuals involved in tourism industry, agencies and enterprises, targeted to Ionian Islands Region.

As already mentioned, the Ionian Islands are located in an area exposed to, or likely to be exposed to, sudden-onset natural disasters, as earthquakes. So it is a necessity for the tourism industry to be ready to mitigate the impacts of a strong earthquake, in particular at beach and coastal areas. For the Greek tourism industry, earthquakes are clearly the most critical loss events, which represent the greatest loss potentials. Rather than effective response in case of earthquake, EPPO considers ways to be more proactive at tourism sector and look at how to implement the right measures to mitigate the impact of disastrous events. This option presents great opportunities for the tourism industry and policy-makers to develop solutions to enhance safety while enabling seamless travel.

From the point of view of seismic risk reduction, EPPO besides its other regular awareness initiatives, participates as partner to “Telemachus - Innovative Operational System for Ionian Islands Region Seismic Risk Management” Project. “Telemachus” is an innovative operational project on seismic risk management issues in the Ionian Islands. Moreover, it aims to become a valuable tool for earthquake management, helping to decisions making and finding the best solution in case of an earthquake. EPPO is one of the Telemachus project partners and a State Organization that is the competent authority to plan and implement effectively the national policy on seismic risk. In order to cover the referred topics, EPPO implements specific educational actions for different target groups.

“Telemachus” Project is funded by the National Operational Program titled “Ionian Islands” that has defined as priority the environmental protection and the sustainable development of the abovementioned area. The coordinator of the project is the Region of Ionian Islands and the other partners are: The University of Ionian Islands, the National and Kapodistrian University of Athens, the Institute of Geodynamics, and the Earthquake Planning and Protection Organization. The duration of the project is 36 months (11/2017 – 10/2020).

The role of EPPO in the abovementioned project is to plan and implement educational actions for different target groups. The aim of these actions is to ensure that all stakeholders have a common
understanding on seismic risk reduction, to empower local communities to improve their preparedness and to reconsider risk through a collaborative approach. As a basic input for the design of EPPO’s educational actions in the project are the results of a survey that is presented in this paper and investigates the knowledge, prevention and readiness level of different target groups of Ionian Islands at workplace level.

This paper presents:

a) the seismicity data, lessons learned from earthquake disasters that hit Ionian Islands and State’s efforts on seismic risk reduction to the specific region.

b) the results of a survey that investigates the knowledge, prevention and readiness level of different target groups of Ionian Islands at workplace level.

c) the EPPO’s actions to develop earthquake-resilient tourism destinations through “Telemachus” awareness, cooperation and education initiative.

A closed-form questionnaire was developed by EPPO in order to identify the needs of local population on emergency planning. This questionnaire includes questions regarding the following: a) knowledge of earthquake self-protective actions b) existence of earthquake emergency planning in the responders’ workplace and preparedness actions and c) performance of drills.

291 filled in questionnaires were gathered the last five years and were analyzed. The questionnaires were administered to responders during seminars organized by Department of Education – Information of EPPO at Corfu, Kefallonia, Zakynthos and Lefkada. The seminars entitled “Earthquake Emergency Planning at Workplaces” were addressed to personnel of agencies, hotels, schools, kindergartens etc.

3 RESULTS

3.1 Ionian Islands and Tourism

The Region of Ionian Islands is known for its great variety of landscape and the geomorphology of the coastline, the length of which represents roughly 8% of the entire country’s coastline. For these reasons Ionian Islands are among the most popular Greek tourism destinations. More specifically, these islands recorded an increase year-on-year in the number of tourist arrivals “Table 1”, “Table 2”.

<table>
<thead>
<tr>
<th>Industry/ Sector</th>
<th>Gross Value Added (amount in million euro)</th>
<th>% in total GVA of the Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, Forestry and Fishing</td>
<td>95</td>
<td>3.5</td>
</tr>
<tr>
<td>Mining, energy, water supply and waste management</td>
<td>57</td>
<td>2.1</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>67</td>
<td>2.5</td>
</tr>
<tr>
<td>Construction</td>
<td>80</td>
<td>2.9</td>
</tr>
<tr>
<td>Trade, transportation and storage, accommodation and food service activities</td>
<td>1,241</td>
<td>45.7</td>
</tr>
<tr>
<td>Information and Communication</td>
<td>30</td>
<td>1.1</td>
</tr>
<tr>
<td>Financial and Insurance activities</td>
<td>72</td>
<td>2.6</td>
</tr>
<tr>
<td>Real Estate activities</td>
<td>463</td>
<td>17.0</td>
</tr>
<tr>
<td>Scientific, administrative and support service activities</td>
<td>86</td>
<td>3.2</td>
</tr>
<tr>
<td>Public administration, education, health and social work activities</td>
<td>402</td>
<td>14.8</td>
</tr>
<tr>
<td>Arts, recreation and other service activities</td>
<td>124</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,717</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 1. Gross Value Added by Industry 2014 - Region of Ionian Islands [6].
Table 2. Tourism data for the Region of Ionian Islands at 2015 [6].

<table>
<thead>
<tr>
<th>REGION AND PREFECTURE</th>
<th>HOTELS EXCEPT CAMPS</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOURIST ARRIVALS</td>
<td>GREEK</td>
<td>FOREIGN</td>
</tr>
<tr>
<td>TOTAL GREECE</td>
<td></td>
<td>5,536,719</td>
<td>11,882,134</td>
</tr>
<tr>
<td>IONIAN ISLANDS REGION</td>
<td></td>
<td>182,737</td>
<td>1,061,815</td>
</tr>
<tr>
<td>Corfu</td>
<td></td>
<td>78,512</td>
<td>572,118</td>
</tr>
<tr>
<td>Zakynthos</td>
<td></td>
<td>39,694</td>
<td>378,269</td>
</tr>
<tr>
<td>Ithaca</td>
<td></td>
<td>2,478</td>
<td>1,696</td>
</tr>
<tr>
<td>Kefallinia</td>
<td></td>
<td>22,877</td>
<td>86,108</td>
</tr>
<tr>
<td>Lefkada</td>
<td></td>
<td>39,176</td>
<td>23,624</td>
</tr>
</tbody>
</table>

According to recent survey [5] like the rest of the country, the Ionian Islands Region is hard hit by the economic crisis, both in terms of economic activity and employment. Unemployment rose to 14.2% in 2011 from 8.5% in 2008 and in the construction sector, hit by a drop-off in both public and private investments, unemployment in some of the islands exceeds 75%. It should be highlighted that the main objectives focused on the regional tourism sector are to create new services and innovative start-ups in tourism sector, to empower regional actors for environmental risk management decision-making, and to provide regional support for innovative actions.

As noted above, the tourism and hospitality is a dynamic sector and it is a necessity to take into accounts the choices, needs, and orientations of tourists. Given the findings of a research targeted to Kefallonia’s tourists at 2017 [7], the tourists answered the following:

1. When they selected their holiday destination, they knew that Greece is a country with high seismicity (76%) and that Kefallonia island had been hit by strong earthquakes at 2014 (60%).

2. The 87% of responders replied that Kefallonia is a safe destination concerning natural disasters and the 12% answered “maybe”.

3. The 80% of the tourists claimed that they have not seen any emergency plan at their hotel (only the 11% answered positively).

3.2 Ionian Disastrous Earthquakes

In the framework of this research, the Ionian seismicity data gathered and presented in the Table 3. The most disastrous Ionian earthquake was the 1953 earthquake (also known as the Great Kefallonia earthquake) that struck the southern Ionian Islands on August 12. In mid-August there were over 113 recorded earthquakes in the area between Kefallonia and Zakynthos. The event caused 455 human losses and widespread damage mainly in Kefallonia and Zakynthos.

Earthquakes still regularly affect the islands of Zakynthos, Kefallonia, Lefkada, and Ithaka. The last fifteen years six strong earthquake events have caused damages at buildings and other constructions and large economic losses that represent a serious impediment to socioeconomic development and local tourism industry too.

Emphasis should be given to the fact that the majority of Ionian Islands are included in the third zone of Greek Seismic Hazard Map “Fig. 2”. It should be mentioned that in Zone III the ground acceleration value is 0.36g.
Table 3. Ionian Disastrous Earthquakes (1953 – till today) [8].

<table>
<thead>
<tr>
<th>Date</th>
<th>Affected Area</th>
<th>Magnitude</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/8/1953</td>
<td>Kefallonia, Zakynthos</td>
<td>6.4</td>
<td>Dozens of injured and a lot of damaged buildings</td>
</tr>
<tr>
<td>11/8/1953</td>
<td>Kefallonia, Zakynthos</td>
<td>6.8</td>
<td>A lot of damaged buildings</td>
</tr>
<tr>
<td>12/8/1953</td>
<td>Kefallonia, Zakynthos</td>
<td>7.2</td>
<td>455 human losses, 2412 injuries, 27659 damaged buildings (from the 3 events) etc.</td>
</tr>
<tr>
<td>14/8/2003</td>
<td>Lefkada</td>
<td>6.4</td>
<td>A lot of damaged buildings and monuments, rock falls, damage of harbors' piers etc.</td>
</tr>
<tr>
<td>12/4/2006</td>
<td>Zakynthos</td>
<td>5.9</td>
<td>150 damaged buildings, rock falls, damage of the harbor</td>
</tr>
<tr>
<td>26/1/2014</td>
<td>Kefallonia, Ithaka</td>
<td>5.8</td>
<td>A lot of damaged buildings and monuments, rock falls, damage of harbors' piers etc.</td>
</tr>
<tr>
<td>3/2/2014</td>
<td>Kefallonia, Ithaka</td>
<td>5.7</td>
<td>A lot of damaged buildings, rock falls, damage of harbors' piers etc.</td>
</tr>
<tr>
<td>17/11/2015</td>
<td>Lefkada</td>
<td>6.1</td>
<td>2 human losses, lot of damaged buildings, rock falls etc.</td>
</tr>
<tr>
<td>26/10/2018</td>
<td>Zakynthos</td>
<td>6.4</td>
<td>1 injured, many damaged buildings</td>
</tr>
</tbody>
</table>

As already evident, this Map shows the relative hazards in different areas and it is incorporated into the Hellenic Seismic Design Code of 2000, which was amended in 2003. Regarding to this Map Greece is divided into three seismic hazard zones I, II and III with ground acceleration 0.16g, 0.24g and 0.36g respectively [9]. The seismic hazard map should be used for land-use planning, mitigation, and emergency response too.

Figure 2. Seismic Hazard Map of Greece. The most of Ionian Islands are in Zone III [9].

In this respect and due to the fact that the Ionian Islands Region has water borders to the mainland, a particular focus should be given to improve the earthquake preparedness level and to strengthen the cooperation of existing private and public sectors (such as tourism) at Municipal and Regional level.

3.3 Need Analysis
At this section, the results of EPPO’s survey addressed to personnel of Corfu, Kefallonia, Zakynthos and Lefkada, will be presented.
3.3.1 Knowledge of Earthquake Protection Measures

According to the results, a significant majority of the responders reported that they have experienced an earthquake “Fig. 3”, which is quite normal taking into account that Ionian Islands Region ranks first in seismicity in Greece. Particular emphasis should be given to the fact that Greece is first in terms of seismicity in Europe and sixth worldwide.

The literature overview showed that the seismic risk perception differs from country to country, and from community to community, but the findings will be useful to develop policies and strategies for earthquake disaster reduction [10]. Thus, in the framework of this survey, the participants were asked to self-assess their level of their knowledge on earthquake protection measures. The results showed that the 90% of them claimed that they are familiar with the earthquake proper actions “Fig. 3”.

3.3.2 Prevention and Preparedness Measures at Workplace

Needless to say that according to the National Regulations every workplace should have assessed the potential hazards that are expected to affect its property and should develop a relative emergency plan. An emergency plan is a written set of instructions that outlines the roles and responsibilities of employer and employees in case of an earthquake situation, the emergency procedures, the evacuation routes etc. Besides the major benefit of providing guidance during an emergency, developing the plan has the advantage to discover unrecognized hazardous conditions, lack of resources (equipment, supplies) etc.

The primary purpose of a workplace emergency plan is to ensure the safety of employees, visitors etc. In the framework of this survey, from a positive perspective, the 70% of the responders’ when asked if there is any earthquake plan at their workplace replied affirmatively “Fig. 4”.

Figure 3. Answers concerning the earthquake experience of the responders and their knowledge on earthquake protection measures.

Figure 4. Answers to the question: Is there an Earthquake Emergency Plan at your Workplace?
The provision of emergency supplies and the secure of tall and heavy furniture to the wall have the highest rate of workplace’s preparedness actions “Fig. 5”.

To cover the referred topics of the emergency planning and reduce the percentage of population that ignore if their workplace has earthquake planning, EPPO has intensified its efforts on the training of personnel of all workspaces, with emphasis to those involved with tourism.

3.3.3 Earthquake Drills

Drills are an important element in earthquake preparedness. Earthquake drills are, at least, an annual opportunity for staff to practice what to do in case of earthquake and provide tools, skills and resources on how the workplace can be prepared.

Although the 70% of the responders’ answered that their workplace has an emergency plan, the percentage of those who claimed that their workplace organize an earthquake drill annually is smaller (63%), “Fig. 6”.

It is generally accepted that the emergency plans may need to remain current and effective. The only way to achieve this is to test, evaluate, review and revise (if necessary) the plans on a regular basis. It should be mentioned that a thorough and immediate review after each exercise will point out areas that require improvement.
3.3.4 Training of Workplace Personnel

An emergency plan has a better chance of being successful if the proper amount of personnel’s training is implemented before an emergency. Teaching staff regarding what is to be expected by them in the case of earthquake will contribute to build workplace, employer and employee preparedness. According to the results of the present survey, the 77% of the responders’ claimed that they are familiar with workplace emergency plan and their roles in case of emergency, “Fig. 7”.

![Figure 7. Are you familiar with the workplace emergency plan and your responsibilities?](image)

Considering Ionian Islands Region as high earthquake risk area, the involved in tourism personnel may require additional information on emergency plans issues. However, the temporary status of hotels’ personnel, the huge number of guests etc. are underlined as barrier to achieve effective response in case of earthquake disaster.

3.4 EPPO Educational Actions and “Telemachus” Project

Worldwide there is a growing recognition that education is a critical component of any disaster impacts reduction effort and a great challenge too. Given this challenge, a broad range of awareness raising projects at all levels are implemented on regular basis and are continuously evaluated by EPPO.

Regarding the awareness and educating the population on earthquake preparedness issues, EPPO organizes training seminars for local civil protection authorities’ staff, teachers, officials and public servants, business staff, hotel staff, disabled and general public, etc. Also, EPPO develops and publishes informative material (booklets, posters, books, CD-ROMs, website) and participates in preparedness drills in schools and working places [11]. Recognizing the tourism sector as priority for Greece, EPPO:

a) implements specific educational projects addressed to civil protection staff of Municipalities or Regions, employees and employers of hotels, all the involved in tourism industry staff and embassies’ personnel. These initiatives aim to raise awareness, improve the level of emergency planning and build a seismic prevention culture.

b) has developed educational leaflet for tourists in Greek and 6 other languages. This leaflet aims to inform all visitors of the country about the appropriate actions to be taken in case of an earthquake that could be happened during their staying in Greece “Fig. 8”. Also, EPPO has developed guidelines concerning the development of emergency plans and exercises at workplaces.

c) organizes campaigns (presentations, TV social messages, website www.oasp.gr, facebook etc.).
Taking into account the results of the survey, it is obvious that the Ionian Islands Region should investigate proper policy tools to provide products and services aimed at the safety of tourists and at the improvement of preparedness of local tourism enterprises. To cover the earthquake prevention and preparedness issues on tourism sector of Ionian Islands, the “Telemachus” Project includes specific educational actions to support these crucial sectors of the regional economy i.e. tourism and environmental protection. From the EPPO’s point of view, the objectives of “Telemachus” educational actions are the following: a. to identify the needs of the stakeholders b. to share and implement best practices and methodologies gained from partners’ activities c. to create tools and guidelines on emergency planning, and d. to build a culture of earthquake preparedness to the involved in tourism sector.

As already evident, disaster management in hotel units requires a systematic approach, public-private cooperation and is aimed at a dynamic and effective response to potential earthquake threat. It is a process that includes risk identification, assessing the vulnerability of the hotel unit, development of emergency planning, implementation and evaluation of drills, and update of planning when required. Focused to the needs of Ionian Islands Region, EPPO:

a) has already prepare specific presentations for the education of those involved in the tourism industry. These presentations are focused on topics of relevance, such as: emergency planning at workplace, safety measures during the earthquake, buildings’ vulnerability, lessons learned from past earthquakes, planning for disabled, best practises on earthquake management at hotels etc.

b) will organize specific workshops and table top exercises per main island (Kephallonia, Zakynthos, Lefkada and Corfu). At the present time the Ionian Islands Region is clearly heavily specialised in tourism activities. Working collaboratively with the locals, EPPO’s thematic specialists will advise and mentor the tourist enterprises in their emergency planning activities and seismic risk reduction issues.

c) encourages the local tourism sector and community to focused to awareness of tourists. As noted above, if an area is hit by strong earthquake, the image of tourism destination will suffer. Information safety campaigns targeted on tourists is significant investment in regional policy and can provide opportunities for changes at the attitude of tourists and the adaptation of the right actions in case of an earthquake. Globally, stakeholders have already elaborated such ideas and understand that these policy measures are high-value added for the tourism sector.

4 CONCLUSIONS

Ionian Islands Region is a high seismic risk area and also it is a burgeoning tourism industry, which, over the last decades has shown remarkable growth. Last decades strong earthquakes have affected this region. Given the impact of these events in terms of damaged infrastructure, psychological consequences and economic loss, it is obvious that the stakeholders should be prepared to handle the emergency situation. The effective earthquake management is fundamental and still an important challenge for regional and local level and engaged with tourism too.

Hellenic Earthquake Planning and Protection Organization has as priority, among its other actions, the awareness and training of different target groups on earthquake management issues. The aim of these actions is to ensure that all stakeholders have a common understanding on seismic risk
reduction, to empower local communities to improve their preparedness, to reconsider risk through a collaborative approach, and also to develop earthquake-resilient tourism destinations, such as Ionian Islands.

According to the results of an EPPO’s survey that presented in this paper, a lot of efforts have been done till now in order to enhance the preparedness at workplace level, but it is still room for improvement. The aim of this survey was to investigate the knowledge, prevention and readiness level of different workplace’s target groups of Ionian Islands, in order to plan next State’s actions. For example, it is encouraging that the 70% of the responders’ claimed that their workplace has earthquake emergency plan and the 63% that implement earthquake workplace drill annually.

“Telemachus” is an innovative operational project on seismic risk management issues in the Ionian Islands. The long term target of the EPPO’s activities through “Telemachus” is to bridge the gap between the fields of disaster management and tourism planning, by suggesting the utilization of community and tourist awareness. In the framework of the abovementioned project, EPPO developed specific educational material on seismic risk reduction issues tailored to fit in the needs of this region and the tourism industry. Looking ahead, seminars and table top exercises will be implemented in 4 Ionian Islands (Corfu, Kefallonia, Zakynthos and Lefkada) in the next months. These educational actions aim to the information and education of specific target groups that involved with the tourism industry, presenting the necessity of earthquake management and its exploitation for the protection of tourists, and also taking into account the specific vulnerabilities that these groups are facing.

The importance of cooperation on disasters is already recognized. Thus, “Telemachus” educational actions will help stakeholders to develop seismic risk management policies and initiatives to mitigate earthquake impacts on tourism and other sectors by strengthening regional and local capacities to prepare for, assess and respond at seismic emergency and convincing people that to build a culture of safety is worthwhile.

REFERENCES


