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Co-Evolve4BG

# Safety and security challenges

## - Mediterranean Scale -

MED

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# OVERVIEW

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REVIEW

## Authors

**Hatem KANFOUDI**, PhD

National Engineering School of Tunis, Tunisia

## Reviewers

**Martina BOCCI,** PhD

t-ELIKA, Venice – Italy

**Harry COCOSSIS**, PhD

International consultant

## Editor

**Béchir BEJAOUI**, PhD

National Institute of Marine Sciences and Technologies

http://www.instm.agrinet.tn/index.php/fr/

**Arnaldo Marin ATUCHA**, PhD Biology

University of Murcia

https://www.um.es/

## Contributors to the report

Béchir Béjaoui, Khouloud Athimen, Mahmoud Moussa, Giuliano Tallone, Erica Peroni, Serena Muccitelli, Stefano Magaudda, Paraskevi Chouridou, Maria Chamitidou, Kokkinos Dimitris, Savvas Chrysoulidis, Giorgos Gkiouzepas, Ioanna Papaioannou, Arnaldo Marin Atucha, Nuria Garcia-Bueno, Pedro Martinez-Banos, Alberto Ortiz, Nahed Msayleb, Sana Abi Dib, Talal Darwish, Amin Shaban, Malek Ghandour.

## LAYOUT

**Houaida BOUALI**, Engineer
National Institute of Marine Sciences and Technologies

**Mohamed Ali BRIKI**, Engineer
Coastal Protection and Planning Agency, Tunisia

**Laura PÉREZ**, Graphic Designer
Fundación Valenciaport

**Emma CASANOVA**, Technician
Fundación Valenciaport

**Carolina NAVARRO**, Engineer
Fundación Valenciaport

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# Abstract

This report aims to conduct a comparison on the main safety and security challenges for the countries: Italy, Spain, Greece and Tunisia. It is based on the review of existing security documents developed.

This report will analyse all the disasters and their consequences on the dynamics of interest of this study. The classification of natural disasters divides them into two macro-categories: natural disasters and man-made disasters. Although both have an impact on tourism in the Mediterranean and on economic activities, their dynamics of influence are completely different.

# I. Introduction

According to a widely accepted definition in literature, natural disasters are “all phenomena in the physical environment harmful to humans caused by external forces”. On the one hand, natural disasters are divided into several categories: geological (earthquakes, volcanic activity), meteorological (extreme temperatures, storms), hydrological (floods and landslides), climatic (droughts and fires), biological (epidemics and insect infestations) and extraterrestrial (impact of asteroids, meteorites and comets).

Anthropogenic disasters are all phenomena attributable to human activities that have an impact on the environment, such as pollution, industrial plant explosions, gas dispersions and lethal emissions into the atmosphere. Similarly, disasters such as forest fires directly caused by human activities are also classified as anthropogenic when they are directly related to industrial or human activities in general. It is now clear that certain economic activities in “at risk” areas can generate disasters that can be classified in this category. In addition, man-made disasters can cause not only loss of life, incidents, illnesses or other general health impacts, but also huge economic losses. These losses can be caused by several factors, such as the dysfunction of basic services, damage to private and public property, or even general social and economic dysfunction.

Today, the security factor has become a determining factor in the choice of a tourist destination.

In this report we present a comparison between the different countries (Italy, Spain, Greece and Tunisia) on the security threats that can seriously affect the tourism sector.

# II. Natural risks

## II. Natural risks

The classification of natural disasters is fundamental for understanding how to best react to these events even though there are very few prevention methods. Indeed, regardless of the technological leaps made in the last few years, there are still not enough instruments allowing to foresee disasters early enough. Therefore, these events provoke different reactions compared to anthropogenic ones. For natural disasters, a sense of helplessness and fatality prevails, generating an inevitable apprehension. When these events take place, the most common feelings are solidarity and mercy, since, regardless of human conduct, these disasters cannot be avoided. With this level of unpredictability, public welfare systems have the duty of first aid to populations that experience emergency situations. These services represent the only form of effective reaction for populations hit by disasters today. Although several improvements have been made so far, both in terms of velocity of reaction and in terms of concreteness of support, there is still a lot of room for improvement in tackling catastrophes.

### II.1. Seismicity

It is also necessary to specify that there are geographical areas that are more prone to certain disasters than others.

Let's take the example of Italy and more specifically in the Italian Peninsula the incidence of earthquakes in the area of the Appennini mountain range, which lies on a tectonic fault.

In Spain, the Iberian Peninsula is located within the seismotectonic context of the Mediterranean, on the border of the Eurasian and African plates that, despite not being among the most tormented areas of the world, seismically speaking, does present a history of important crises to take into account. Although without reaching the level of the eastern Mediterranean (Italy, Greece, Yugoslavia), the seismic danger in Spain is a reality that should not be overlooked.

In Spain, the most seismically active area is the southern third, especially the provinces of Granada, Córdoba, Jaén, Málaga, Almería, Murcia and Alicante. In this area the movements are continuous, although usually light or moderate. Another area of important seismicity is the one corresponding to the Pyrenean chain, especially the area belonging to the provinces of Huesca and Gerona. The Canary archipelago presents manifestations linked to its volcanic nature.

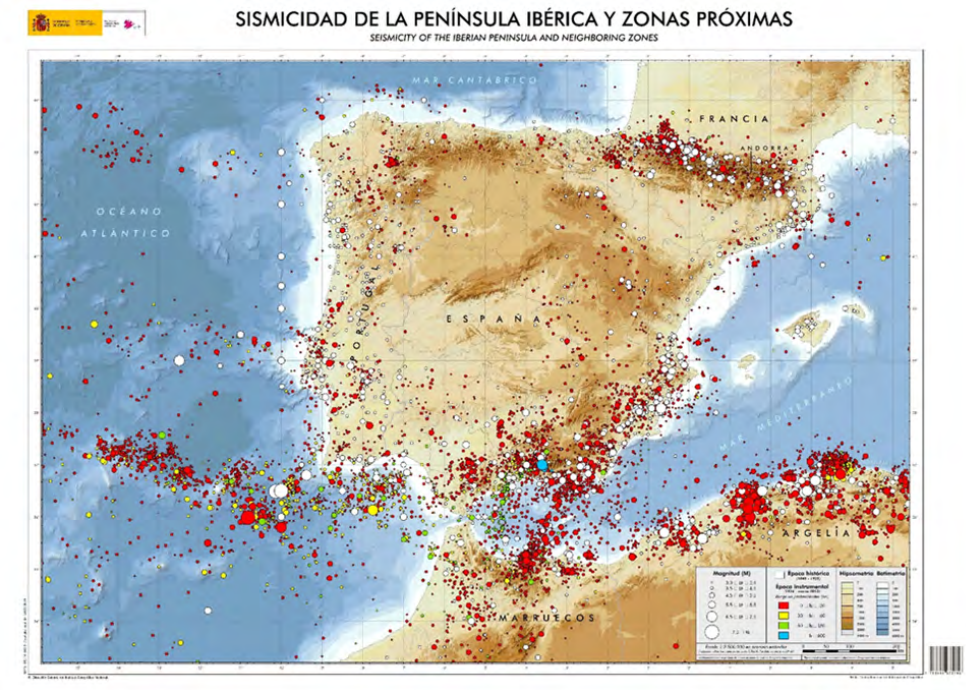


Figure 1. Seismicity map of the Iberian Peninsula and nearby areas.
Source: Instituto Geográfico Nacional: Mapas,sismicidad

In this regard, Spain has the following Plans and Protocols:

- Special plans for Seismic Risk: they will be prepared by those Autonomous Communities in whose territory there are areas where earthquakes of intensity equal to or greater than grade VI are foreseeable, delimited by the corresponding isoseismal map of the seismic hazard map for a return period of 500 years of the IGN, in accordance with the provisions of the Basic Directive on Civil Protection against Seismic Risk (BOE, 1995). They are Catalonia, the Balearic Islands, Murcia, the Basque Country, Andalusia, Extremadura, the Canary Islands, Aragón, Galicia, Valencia, Navarra and Castilla La Mancha.
- State Plan for Civil Protection against Seismic Risk: its objective in the face of simian risk is to establish the organization and action procedures of those State services and, where appropriate, of other public and private entities, which are necessary to ensure a response effective in the face of different seismic situations that may affect the Spanish State.

Greece and its neighbouring areas compose the most active area of the eastern Mediterranean and Europe. The main geotectonic features entail (a) Continental concentration, including the subduction of the oceanic part of the North African plate under the European plate (Figure 1), connected with solid crustal shortening and an uplift rate of a few mm/yr adjacent to the Hellenic Arc due to accumulation of sediments of the African plate under the overriding Aegean plate; (b) extensive, high-rate expansion in the back-arc area due to the rollback of the subducting African slab; (c) meaningful right-lateral strike-slip movement along the North Aegean trough (NAT), and the Cephalonia-Lefkada Transform Zone (CTFZ), which is due to the offset within the oceanic-continental convergence in the west and the westward distribution of the Anatolian plate in the east.

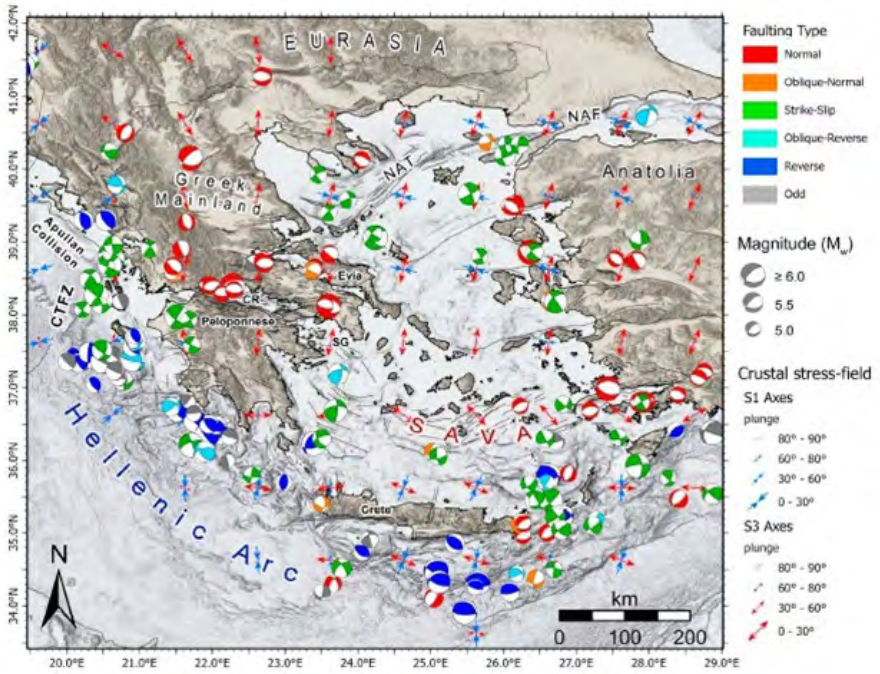


Figure 2. Summary map showing the main seismotectonic features of the Greek region. Blue and red arrows indicate the trend and plunge of the significant (S1 ) and minor (S3 ) principal stress axes. CTFZ: Cephalonia Transform Fault Zone, NAT: North Aegean Trough, NAF: North Anatolian Fault, CR: Corinth Rift, SG: Saronikos Gulf, SAVA: South Aegean Active Volcanic Arc. (source: Kassaras, Ioannis, et al. 2020)

The fault length and rupture character data can be used to evaluate the peak anticipated magnitude and average co-seismic displacement, using relevant empirical relations. This type of information is beneficial in planning land use and designing infrastructures and critical facilities close to or across active faults (Figure 2).

Greece presents high seismic vulnerability as it is one of the most seismically active regions in Europe. The analysis of physical risks and current socio-economic conditions shows a perilous ongoing situation. Vulnerability is a concept that referred to a set of general or considerable conditions formed of physical and socio-political factors that negatively affect an individual, a household, or a society's capability to mitigate, prepare for and respond to an earthquake emergency (ADPC, 2003). The range of physical damage and social disruption in periods of crises is the measure of the society and nation's resilience (Kassaras, Ioannis, et al. 2020).

Regarding the physical vulnerability aspect, Greece's current status presents significant vulnerability as about 80% have been constructed before 1985 without or with a reduced earthquake-resistant design (ERD) (Pomonis A et al., 2012). These have been verified as quite susceptible and in need of strengthening measures that are lacking. The pre-seismic investigation appears problematic, and although the central government ordered a fast-track inspection of all public buildings following the disastrous 1999 Athens earthquake, barely 15% of them have been examined today. Furthermore, 50% of schools and hospitals have been built before the present-day building code. At the same time, an urgent issue exists for the industrial buildings, whereby mandatory inspections are not performed and are often inappropriate for use or are operated without a license.

Another vital aspect of the issue at hand is the distribution of incorrect information by the mass media, which has to do with social vulnerability, often amplifying the seismic phenomenon, thus producing a cloud of chaotic perspectives, raising stress and insecurity. Awareness of the population is dependent mainly on the earthquake monitoring potential. The public information about earthquake activities has been improved in Greece, combining a permanent seismological system and two accelerometric networks. As a result, news of the public is quick and trustworthy, achieved within the electronic media in a few minutes after the appearance of earthquakes (e.g., http://www.geophysics.geol.uoa.gr).

In Greece, the outbreak of an earthquake hazard has shown to be a catalytic factor for changes – short-term though- in the socio-cultural mentalities of the stricken community. Seismic disasters reverse prevalent convictions among the stricken community, particularly those choosing the constant loss of land. Earthquake disasters lead to solidarity and social cohesion and remind that primary needs and necessities for safety, shelter, health, and food are not fulfilled and secured forever, even though the human society stands vis-u-vis natural surroundings.

In Tunisia, according to the recorded history, the magnitudes of earthquakes in Tunisia can exceed 5. In order to have a more precise idea of the seismic activities in Tunisia,

we present in Figure 3 the earthquakes recorded with a magnitude greater than 5 during the last seventy years. In Figure 4, we present the most recent earthquakes that occurred near the Tunisian coasts.

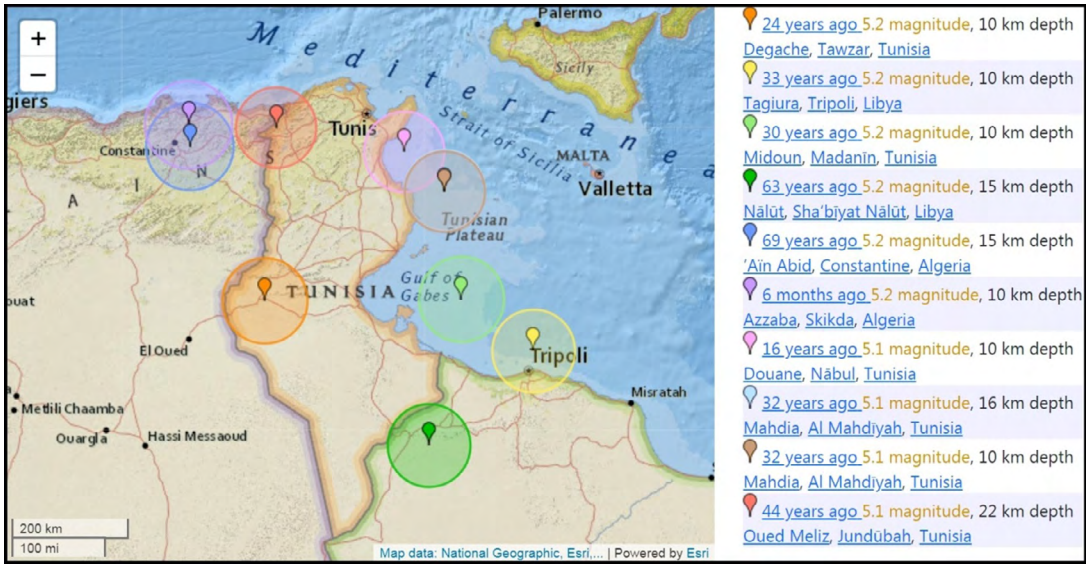


Figure 3. Location of earthquakes with a magnitude greater than 5 (https://earthquaketrack.com/p/tunisia/biggest, 2021).

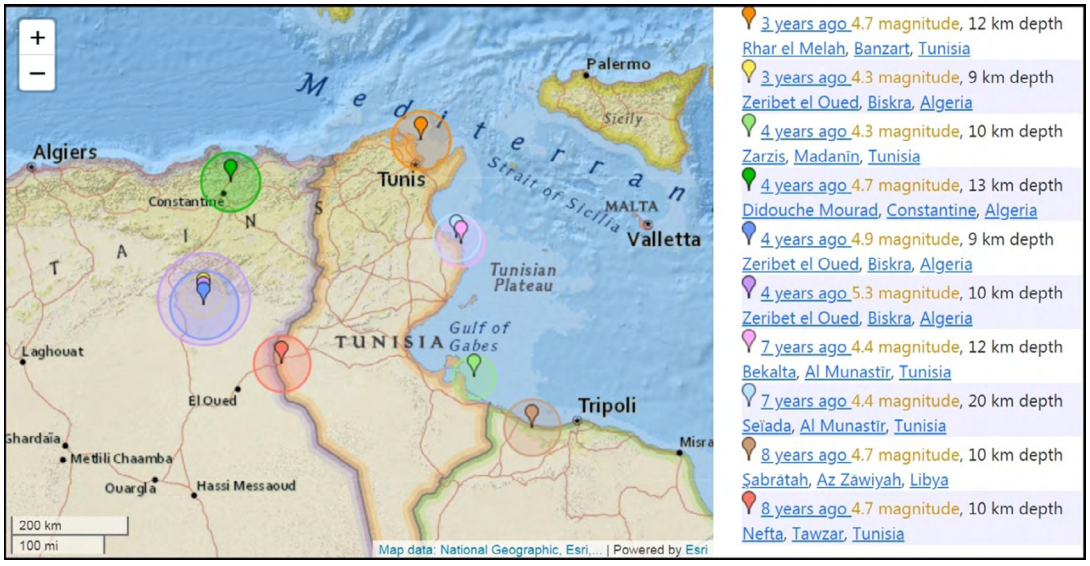


Figure 4. Location of the most recent earthquakes that occurred near Tunisian coasts (https://earthquaketrack.com/p/tunisia/biggest, 2021)

In Figure 5, we present the earthquake map of Tunisia (Ben Ayed & Zargouni, 1990). According to this map, the magnitudes of land earthquakes near the Tunisian coasts do not exceed MW=5 according to the Richter scale.

However, it was essential to take into account not only the seismic sources close to the Tunisian coasts, but also those located on the more distant shores of the Western Mediterranean.

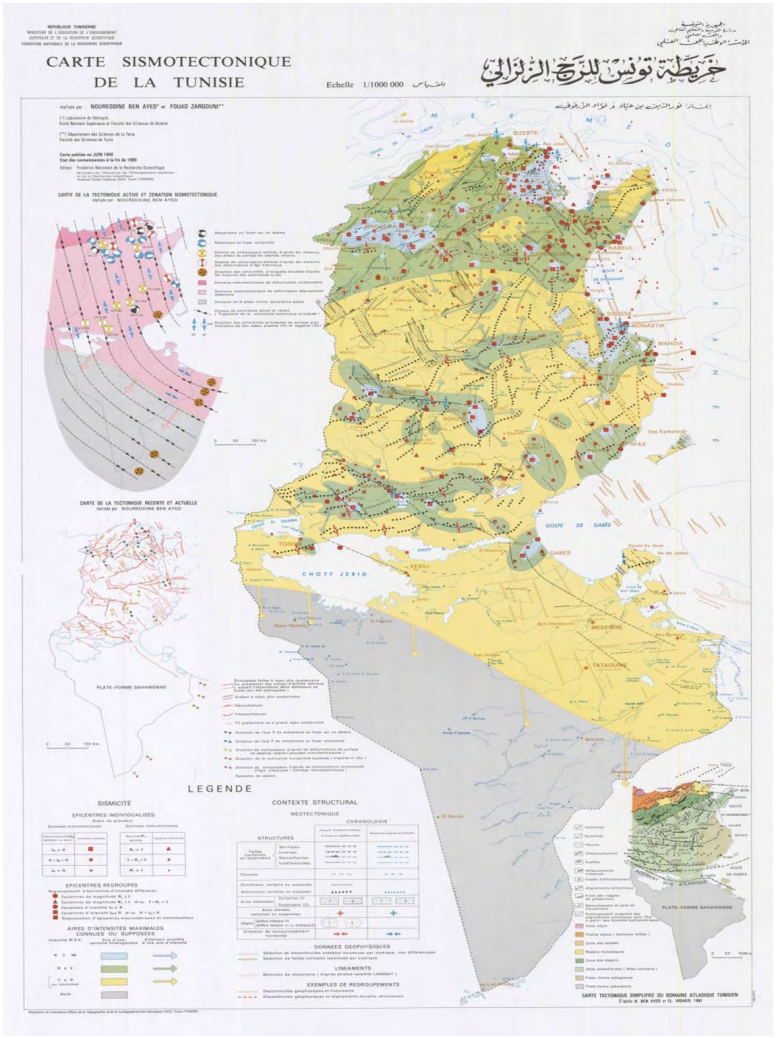


Figure 5. Tunisia earthquake map (Ben Ayed & Zargouni, 1990)

## II.2. Volcanism

For Italy, some of these volcanisms, such as Vesuvio, Vulcano and Campi Flegrei, have a very low eruptive frequency and are today in a condition of obstructed conduit. Some other volcanoes, such as Etna and Stromboli, have a more persistent activity, therefore, they erupt more frequently, but having a conduit not obstructed, they still

represent a low threat on the short run. For this reason, some of the Italian coasts have been subject in the past centuries to several events of tsunami that were proven to be caused by seismic activity in the area.

Since June 2004, the IGN has worked on the design and implementation of a Volcanic Alert and Surveillance System whose project is being launched, first on the island of Tenerife and then spread to the rest of the volcanically active islands. Similar to what happens with seismicity, the Canary Islands have a Special Plan for Volcanic Risk. In addition, there is the State Plan for Civil Protection against Volcanic Risk, similar to that of seismicity, but for this area. (Fernandez Garrido, 2008).

## II.3. Tsunamis

Tsunamis are violent waves triggered by other natural hazards, such as earthquakes, submarine or coastal landslides, and volcanic activity. These hazards can create a severe disturbance in the water mass, giving it high energy, ending in enormous waves.

Nevertheless, the principal cause of tsunamis globally is earthquakes. Their violence is straight linked to the features of the earthquake, which are length, magnitude, focal depth, and direction of the surface rupture of the activated fault. The more extensive tsunamis are connected with the subduction zones' geodynamic process along convergent plate boundaries (Ambraseys, N.; Synolakis, C., 2010). The central wave characteristics of tsunamis are similar to those of wind-generated waves, but the speed at which they can move is remarkably high, reaching up to hundreds of km/h (Bryant, E., 2014). Tsunamis can sustain their kinetic energy over lengthy distances, allowing them to spread in any direction and potentially affect any coastal area. Furthermore, the beginning developing wave height is significantly greater than the regular waves and can reach, in extreme circumstances, tens of meters.

Two principal features of a tsunami wave, describing its risk potential, are the run-up and the inundation zone. The run-up displays the maximum vertical distance among the mean sea level and the highest spot to which the flood zone spreads inland and indicates a short-term sea-level rise affected by a tsunami. In other words, run-up describes the maximum elevation at which the inundation flows can end. Inundation zone is designated as the maximum horizontal intrusion of the flood flows in the coastal area (Papadopoulos, G., 2014). Both of these characters are positively associated with the magnitude of the earthquake and reveal the intensity of the tsunami. Along with the components, as mentioned earlier, flow depth and flow velocity are critical factors impacting the potential building damage (Kelsey, H et al., 2002).

The tsunamigenic areas that affect Spain, the main one is the one corresponding to the seismic region of the Azores-Gibraltar line, which affects the southwest sector,

from Cape of San Vicente to the Gulf of Cádiz. As for the activity in the Mediterranean, which is considered an extension of the previous one, the most active part is the Alborán Sea, and it can affect southern Spain, southern Italy, northern Morocco and the Adriatic and Aegean coasts. Tsunamis are rare in Spain and generally of low intensity. (Fernandez Garrido, 2008)

In Greece, the responsible organization for monitoring, recording, and protecting against tsunami risk is the Hellenic National Tsunami Warning Centre (HL-NTWC). The HL-NTWC belongs to the Institute of Geodynamics of the National Observatory of Athens (NOA-IG), the head earthquake analysis and monitoring Centre in Greece. The tsunami warning services are offered nationally and at the international level. The HL-NTWC is one out of four accredited Tsunami Service Providers (TSPs) operating in the region of the North-Eastern Atlantic, the Mediterranean, and connected seas Tsunami Warning System (NEAMTWS). The HL-NTWC offers tsunami investigation, knowledge, and training, develops monitoring systems and other infrastructures, gives on a 24/7 basis tsunami warning services for the eastern Mediterranean Sea and Greece, and participates actively in international communication inspections and exercises.

The recent history of HL-NTWC goes back to the 1990s but only in 2010. The state authoritatively established it while it declared operational in August 2012.

Tsunami Warning Centre (HL-NTWC) is the Hellenic Unified Seismic Network (HUSN). NOA-IG coordinates HUSN, which incorporates more than 150 seismic stations (Figure 6) contributed by the NOA-IG's national Hellenic Seismic Network (HL) and other local seismic networks run by university laboratories (http//bbnet.gein.noa.gr/HL/). Moreover, seismic stations established in Greece and bordering countries that belong to interconnected, collaborative associate networks, such as GEOFON (GE), MEDNET (MN), INGV (IV), KOERI (KO), and Cyprus (CQ), are also involved in a near real-time acquisition and storage.

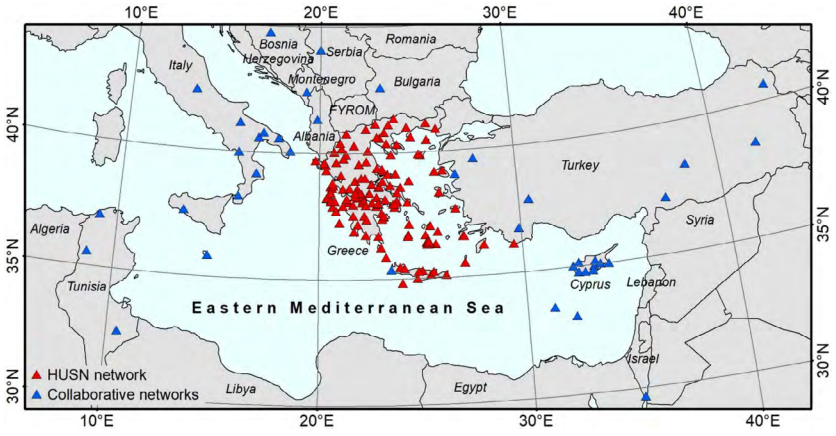


Figure 6. Map showing seismic stations being available online at NOA-IG (source: http://hl-ntwc.gein.noa.gr/)

For the monitor of the sea-level changes, the HL-NTWC is supported essentially by its tide-gauge network developed since 2013 and is fast growing in support of many national and international projects. The real-time tide-gauge network of NOA recently composed 18 real-time stations (Figure 7) equipped with radar and pressure type sensors with a very high frequency of sampling rate, which is suitable for recording tsunami waves and holding tsunami operations.

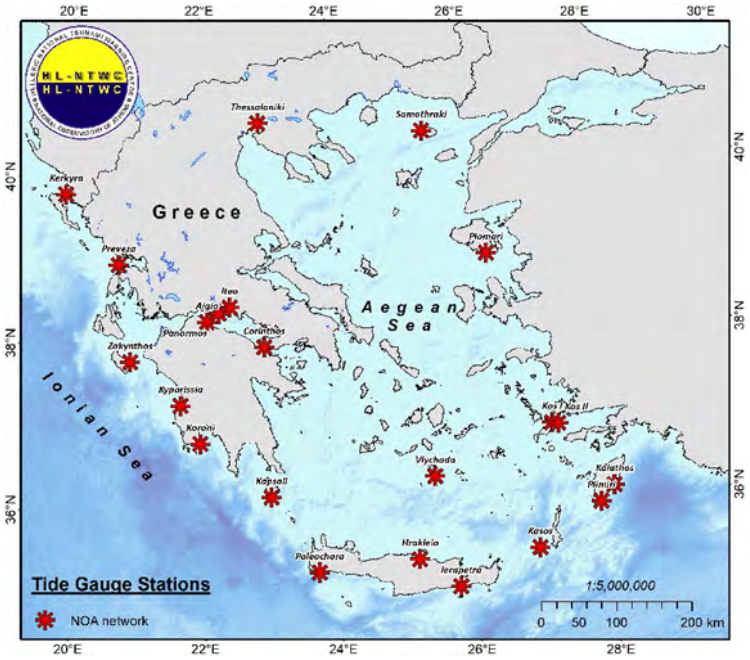


Figure 7. Map showing Tide-gauge stations being available online at NOA-IG

Vicinity to a tectonic plate boundary, particularly in subduction zones and submarine active significant fault zones, defines these particular coastal areas as prone to tsunamis and increases the risk (Batzakis, Dimitrios Vasileios, et al. 2020). Consequently, in Greece, these areas are under the monitoring of the potential threat of a tsunami wave, which could have devastating impacts both to the coastal and beach ecosystem and the coastline infrastructures.

In Tunisia, very few studies on tsunami impact on Tunisian coasts have been carried out. Among these very rare studies, recently, a team of researchers from the National School of Engineers of Tunis (ENIT) conducted a study for the Tunisian Electricity and Gas Company (STEG) on these impacts (STEG, 2015).

This study was based on numerical simulations of wave propagation generated by earthquakes. Seismic sources close to Tunisian coasts were exploited, but also those located on the more distant shores of the Western Mediterranean. The simulations were based on scenarios covering “rare” (MAX scenarios) and “common”

(MED scenarios) events. The results of each of these simulations are detailed in the report of (STEG, 2015). The results provided a first vision of the exposure of Tunisian Mediterranean coasts to flooding risks by Tsunamis.

The results indicate that the highest wave amplitudes are generated by distant earthquakes produced off the Maghreb. They do not exceed 1.0 m for the northern coasts of Tunisia (from Tabarka to Ghar El Melh), with an arrival time of about an hour after the earthquake, as shown by the results at the ports of Bizerte and Sidi Boussaid (Figure 8). On the other hand, the eastern and southern coastal areas of Tunisia (from Tunis to Gabès) are not vulnerable to tsunamis. Indeed, in these areas, the amplitudes of the highest waves do not exceed 0.2 m, as shown by the results at the ports of Monastir and Skhira (Figure 8).

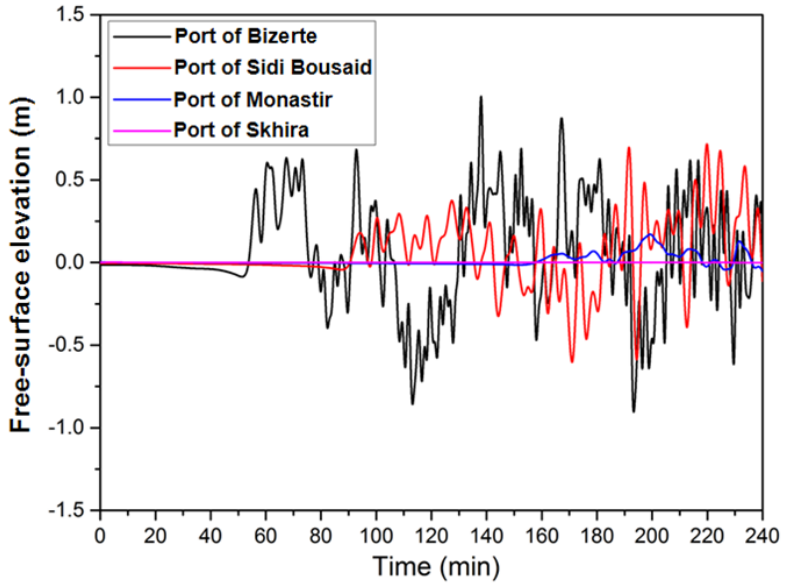


Figure 8. Simulation results for water body evolution due to a tsunami near the Tunisian coasts (STEG, 2015).

These results are later confirmed by the study of (Papadpoulos, 2016) to conclude that all Tunisian coasts, from North to South, do not present a serious risk of flooding by Tsunamis since its amplitude does not exceed 1 meter.

## II.4. Floods

In Spain, the rainfall regime is highly variable, going from states of drought to heavy rainfall that in a few hours reach values above the average. These extraordinary precipitations cause extreme flows, usually called floods, avenues, or floods, which when overflowing their usual channel cause the flooding of land, affecting people and property.

In Mediterranean countries, it is considered the catastrophic risk with the highest incidence due to its frequency and magnitude. This statement can also be applied to Spain, which is within this context: here floods not only constitute a threat to human lives but are precisely at the top of the list of natural phenomena in terms of damage production. Indeed, Spain has a remarkable list of historical episodes (Fernandez Garrido, 2008).

**Table 1.** Main catastrophic floods with fatalities that have occurred since the mid-twentieth century in Spain. Source : Fernandez Garrido, 2008

| FECHA | LUGAR | VÍCTIMAS |
|---|---|---|
| Octubre 1953 | Cuenca del Segura | 50 |
| Octubre 1957 | Valencia | 86 |
| Enero 1959 | Puebla de Sanabria (Zamora) | 150 |
| Septiembre 1962 | El Vallés (Barcelona) | 973 |
| Octubre 1963 | Murcia y Almería | 300 |
| Julio 1965 | Cáceres | 47 |
| Septiembre 1971 | Cuenca del Bajo Llobregat | 24 |
| Octubre 1973 | Granada, Almería y Murcia | 300 |
| Julio 1979 | Valdepeñas (C.Real) | 22 |
| Octubre 1982 | Cuenca del Júcar (Presa de Tous) | 38 |
| Noviembre 1982 | Gerona, Lérida y Huesca | 30 |
| Agosto 1983 | País Vascp, Cantabria y Navarra | 45 |
| Septiembre 1989 | Este de la Península | 14 |
| Noviembre 1989 | Málaga | 12 |
| Agosto 1996 | Biescas (Huesca) | 87 |
| Noviembre 1997 | Badajoz | 21 |
| Junio 2000 | Catalña | 16 |
| Marzo 2002 | Tenerife | 8 |
| **TOTAL** | | **2.223** |

The areas most affected by this risk are distributed mainly in Catalonia, the Valencian Community, Murcia, part of Andalusia, Asturias, Cantabria and the Basque Country. The main causes of floods are due to a combination of orographic characteristics and specific climatic situations.

In Greece, flood phenomena are caused by intense rainstorms generated by the entrance of depressions, probably accompanied by cold fronts, typically approaching from the west. Convectional weather types (characterized by a hard higher air mass that creates dynamic variability) are also accountable for several intense storms and flash floods, particularly in the summer period (Mamassis and Koutsoyiannis, 1996). Snowmelt-driven floods are rare in Greece.

Although the western regions are stormy, extreme floods are also common in Eastern Greece and the Aegean Islands. This reveals that, as we move from the west to the drier hydroclimatic regions of the east, the rainfall severity of storms remains high.

Coastal floods can lead to a wide variety of environmental effects at different spatial and temporal levels (Figure 9). Floods can destroy coastal habitats such as coastal wetlands and estuaries rivers and can erode dune systems. Besides, these Coastal structures are the natural means to protect the coast against the waves of storms. The continuous coastal floods and the rise of its level may reduce this natural protection, allowing the waves to penetrate greater distances inland, worsening erosion and promoting coastal floods. After flooding, the extended penetration of seawater can also cause the salinization of agriculturally fertile soils, thus leading to lost productivity for long periods. Coastal freshwater, including lakes, lagoons, and coastal aquifers freshwater, can also be affected by saltwater intrusion. This saltwater can destroy these water systems as habitats for organisms, freshwater, and drinking water sources for peoples (http://floods.ypeka.gr).

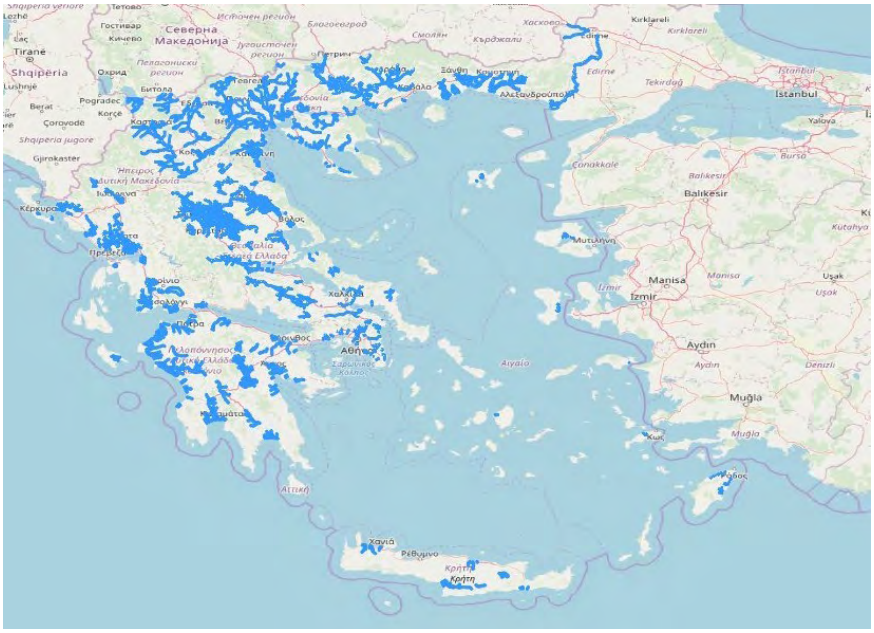


Figure 9. Flood Zone from Inland Waters recovery period T = 50 years (source: http://floods.ypeka.gr/)

Since the last century, most of Tunisia's large cities, particularly coastal ones, have experienced significant population growth and unbridled urban growth. The area most affected by this phenomenon is the Great Tunis (governorates of Tunis, Ariana, Ben Arous and Manouba located around Tunis City). According to the Great Tunis Urban Planning Agency, the urban area has been multiplied by about nine in 55 years: it has grown from 3,387 ha in 1957 to about 28,000 ha in 2012 (Fehri, 2014).

These changes, introduced by human occupation, have extended the urban fabric to the detriment of natural flows. They have led to changes in the functioning of the hydrographic networks. The densification of urban fabric has led to soil sealing, diversion and damming of rivers. These modifications have had undeniable repercussions on hydrological and hydraulic processes.

Soil sealing has been caused by the extension of urban roads, pavements, car parks, dense constructions, shopping and leisure malls and mega-projects (e.g. financial ports, marinas, shopping malls). In addition to this controlled densification, all kinds of anarchic constructions have occupied the public and hydraulic domains. The flows are then disrupted by more and more obstacles. This phenomenon has led to major changes, not only hydrological (e.g., an increase in the volume of water runoff) but also hydraulic (e.g. the roughness and length of the hydraulic paths have decreased), which has led to a reduction in the concentration time resulting in an increase in flow speeds.

An example cited in (Fehri, 2011) is the basin drained by El Ghrich and El Greb river (small catchment area of 26.4 km2 North of Tunis city) which was urbanized only at 5.7% in 1950, but rose to 70.5% urbanization in 2007 (Figure 10).

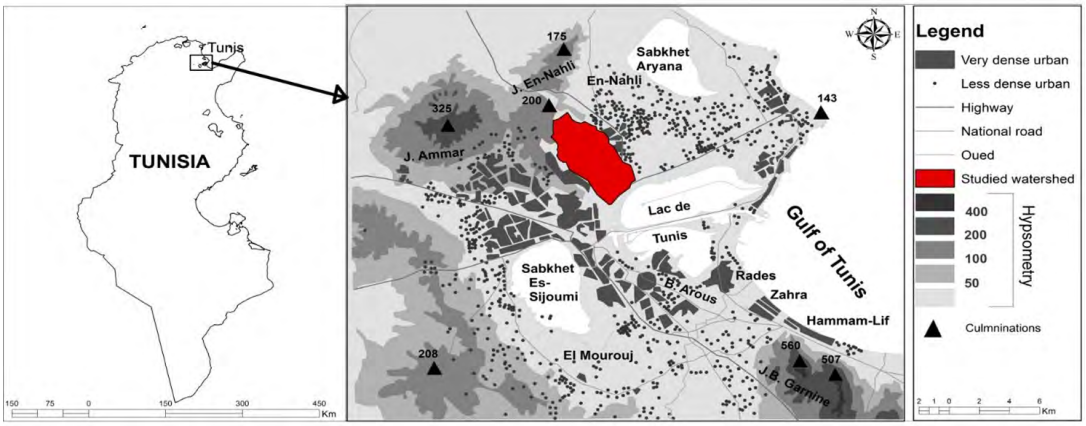


Figure 10. El Ghrich et El Greb river localization (Fehri et Zahar, 2016)

This urbanization also concerns the growth of touristic areas since the 1970s. Commercial tourism is the dominant model, characterized by hotels with high occupancy rates (hotels in the main touristic destinations in this region have an average occupancy rate of over 60%). In addition, the rate of illegal construction remains high throughout the Mediterranean basin and this phenomenon should be remediated. On the other hand, flood risk levels should be undertaken to limit the construction of infrastructures which can strongly alter landscapes and potentially influence the response of an area to heavy rainfall.

The floodable zones of Medjerda lower valley have been mapped by IRD team (formerly OROSTOM) at 1/100,000th (Claude, Francillon, & Loyer, 1977). Then, the flood maps at 1:50,000 scales were drawn up by teams from the Equipment and Major Hydraulic Structures Department (EGTH). In the Master Plan for Territorial Development (1998), a single map was identified, which represents flood and potential flood areas. According to the assessment of floodable areas in Tunisia resulting from this master plan: floodable areas represent an area equivalent to 11,538 km2, of which 11,000 km2 are agricultural areas and include 140 towns and many industrial zones. Medjerda valley in eastern Tunisia and the Kairouan region are the most affected and a quarter of the country's population is threatened by this risk (MEAT, 1998). Figure 11 shows the location of potentially floodable areas and cities in Tunisia, established by the Tunisian Ministry of Equipment and Territorial Development (MEAT, 1998). Hammamet touristic area is included. However, according to this map, touristic areas of the Center and the South do not seem to be concerned by the floods. A study is currently underway by MEAT to update this flood map in Tunisia. This study could show whether a more detailed assessment would be necessary. This study should lead to the proposal of a national strategy to fight future floods, especially in the most vulnerable regions.

Another document (GFDRR, 2020) lists the urban floodable areas and shows that flood urban risks are high, according to the modelling carried out. This modeling predicts that urban floods with the potential to cause damage and threaten lives have a 10% risk of occurrence. Figure 12 shows that the northern coastal areas have a high risk of urban flood. For Cape Bon, the risk is moderate, and for the rest of Tunisia the risk is low, except for Mahdia where the risk is very low.

In addition, Tunisia is subject to an irregular climate and is characterized by great aridity. Climate projections indicate a rise in temperatures, a change in rainfall patterns, a change in the frequency of extremes, a rise in sea level, and an intensification of desertification. These changes will undoubtedly increase the environmental and socio-economic vulnerabilities of Tunisia (Harzallah et al., 2018).

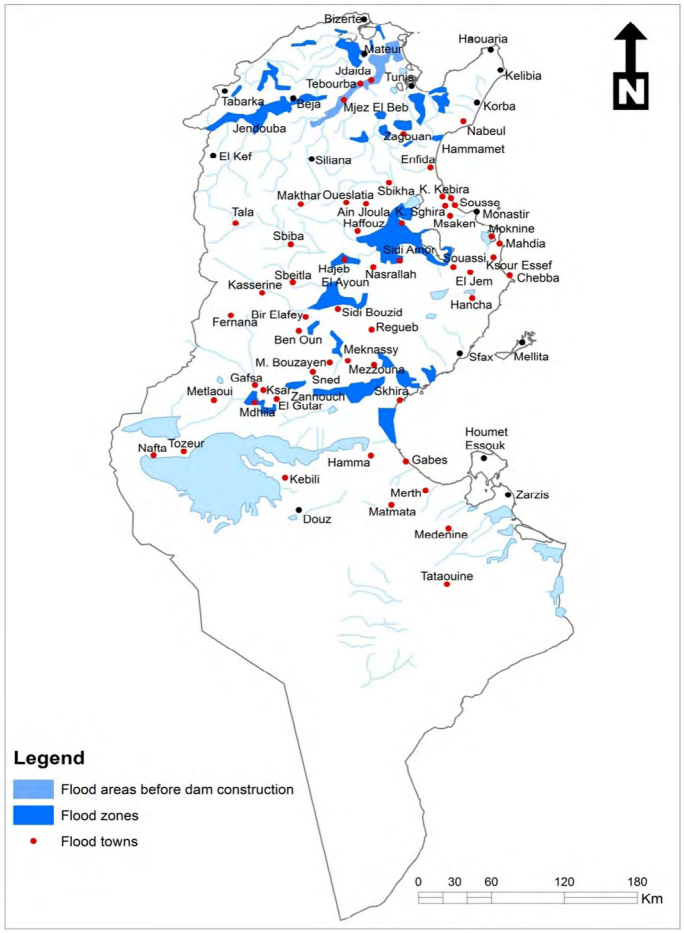


Figure 11. Floodable and potentially floodable areas in Tunisia (MEAT, 1998)

In a global and comprehensive vision, the interdependence of urban and tourist areas should be taken into account in order to better assess the vulnerability of the whole country to floods.

Faced with flood, tourists are particularly vulnerable because of difficulties in informing them about risks and alerting them in the case of an event. In addition, flood can have a significant impact on heritage, accommodation, and tourism infrastructure.

For example, following the latest flood in Cape Bon (the northeastern tip of Tunisia), on September 22, 2018, the damage amounted to tens of millions of Tunisian Dinars. They are considered the most devastating floods in the history of Tunisia. The area of Nabeul-Hammamet is the delta of many rivers. Touristic complexes are often located between two rivers. During this flood, several houses and even hotels were isolated. Beaches and sea were flooded, polluted by solid wastes of all kinds carried by rivers which have returned to their natural course, carrying everything in their path (e.g. cars, animals, garbage). They have had serious consequences on tourism. Indeed, the General Federation of Hoteliers has estimated at 12 million dinars the consequences

of these bad weather conditions that have affected Cape Bon. Tourism and handicrafts have suffered enormous damage: 29 units were affected, with 6 units including one in Korba and two in Nabeul forced to close. Other hotel units were damaged but were able to reopen their doors a week later. For example, a hotel in Nabeul (Figure 13) announced that his hotel has been submerged by a water rise of up to two meters which has led to cancellations of reservations.

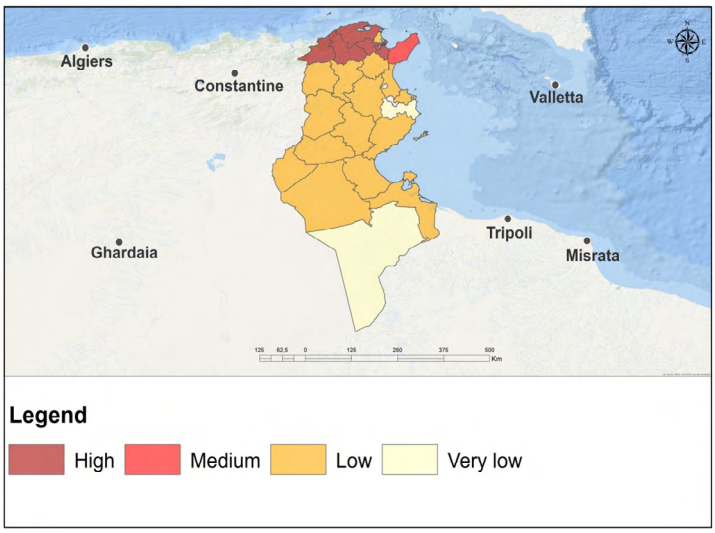


Figure 12. Urban flood risk in Tunisia (GFDRR, 2020)

Figure 13. Flood of a hotel in Nabeul (Tunisia), September 22, 2018 (Le Temps, 2018)

# III. Anthropogenic risks

## III. Anthropogenic risks

For many years, the exploitation of natural resources has caused catastrophic medium and long-term consequences on the environment and the reaction to these disasters on the local population is the feeling of anger, rebellion, and the search for civil justice.

Because of climate change due to greenhouse gas emissions and because of some specific characteristics of the Mediterranean Sea, it is calculated that it will lose thousands of square kilometers of coastline in the next 100 years. Indeed, the Mediterranean Sea is fed mainly by the Atlantic Ocean through the Strait of Gibraltar.

According to (IFRC 2014), anthropogenic hazards are defined as technological disasters and man-made disasters. Technological - man-made disasters occur within or near the boundaries of human residential areas. The cause of the immediate provocation is human. However, they can occur indirectly as a result of a natural disaster. These situations are usually recorded accidents with loss of life or injury, pollution and environmental degradation.

### III.1. Terrorism

An attractive touristic destination needs to have some essential features. First and foremost, it must be a safe place, free from wars and terrorism, and, more in general, from dangerous situations of any kind.

Unfortunately, this it is not always granted: most of tourists travels for leisure and wishes to spend peaceful and quiet vacations, but there is still who prefers a more adventurous experience and still wants to visit “dangerous destinations” that may interfere with personal safety.

When talking about safe tourism, it is important to keep into consideration the environmental factor: the territory, the features of natural environments, the climate, the consequences of the anthropization are just as important as other safety concerns. There are numerous cases known to the world news in which significant environmental issues have had great importance for the tourism of the destinations involved: volcanic eruptions, earthquakes, tsunamis, floods, avalanches, snowstorms, not to mention environmental disasters caused by men.

Terrorism directly threatens the lives and security of citizens, seeks to undermine our democratic institutions and puts at risk our strategic interests, infrastructure, supplies and critical services. Preventing and defeating terrorism, whether of national or transnational origin, is a national and European priority objective.

In Spain, terrorism has been one of the major concerns of Spanish society, as the periodic sociological consultations show.

This phenomenon is currently reflected in two major threats: the one derived from the violence perpetrated by the terrorist organization ETA and the one posed by Islamist-inspired terrorism, also known as international or global, perpetrated by the Al Qaeda organization and other associated groups. or self-constituted cells. The probable permanence of this last threat in the coming years, advises the design of a counterterrorism strategy in the medium and long term. This is derived from the lessons that emerge from the long experience in the fight against the terrorist phenomenon that our country treasures and from the evaluation of the antiterrorist policies adopted during the democratic period in response to ETA's terrorism.

Terrorism appears significant in determining tourist arrivals in Greece. It seems that the variable measuring casualties resulting from terrorist attacks in Europe are marginally more beneficial. The fact remains that in all cases, the level of responsiveness of the rate of arrivals to terrorist activity appears to be somewhat limited, a view that seems harmonious with other recorded results in the relative to this matter literature (Aly and Strazicich, 2004) that argue in support of the temporary impact of terrorist attacks on the flow of tourists to a particular destination. (Figure 14).

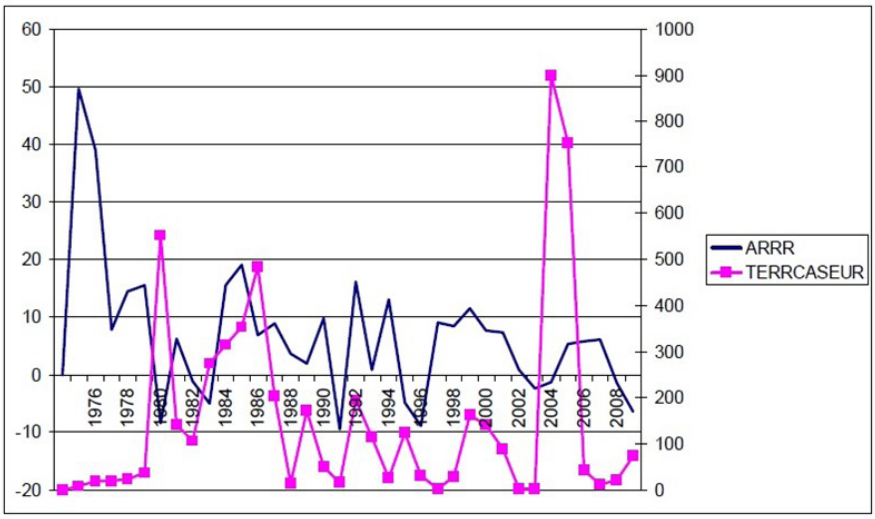


Figure 14. Rate of travel arrivals in Greece and terrorist casualties in Europe

In Tunisia, tourism sector is very sensitive to security incidents. The crisis in the tourist sector has started since the attacks of 11 September 2001 in the USA and 21 April 2002 in Djerba. This last attack was the cause of the loss of the German clientele which constituted the first market for Tunisia until these dates.

Tunisia after the revolution of January 14, 2011, has suffered from the consequence of the climate of insecurity. The political assassinations and terrorist attacks, which followed this event, have seriously shaken tourist activity (Figure 15). TOs are influenced by the increase in their insurance prices and by the media.

The crisis has become stifling following the attacks on the Museum of Bardo and Sousse in 2015 which killed dozens of people, most of whom were tourists of different nationalities. The event has been interpreted by some media as a disaster that heralds the end of tourist activity in Tunisia.

These media and the consular reports of issuing countries in Europe have influenced the insurance prices for TOs and subsequently the intention of the latter to book on the destination Tunisia. Moreover, the perception of Tunisia as a country of seaside tourism less secure than before has influenced bookings downwards. The weakening of its image means that it can be replaced by any destination, especially among its direct competitors in the Mediterranean basin. Faced with this situation, the curve of tourist arrivals and overnight stays has not stopped dropping in recent years, justifying the vulnerability of the seaside tourism sector in Tunisia and the extent of its crisis (The World Bank, 2020).

Despite all the security measures taken by the Tunisian authorities (Figure 16), TOs and tourist customers do not seem to be tolerant towards Tunisia as a destination, following the second attack which targeted tourists in their place of stay in Sousse. Arrivals and overnight stays have since recorded a significant decline so that the destination Tunisia is a greater crisis of attendance.

Even if there is a recovery in 2017 in terms of tourist arrivals (7,052,813 in 2017, against 5,724,021 in 2016), we note that there is a slight increase in foreign currency inflows

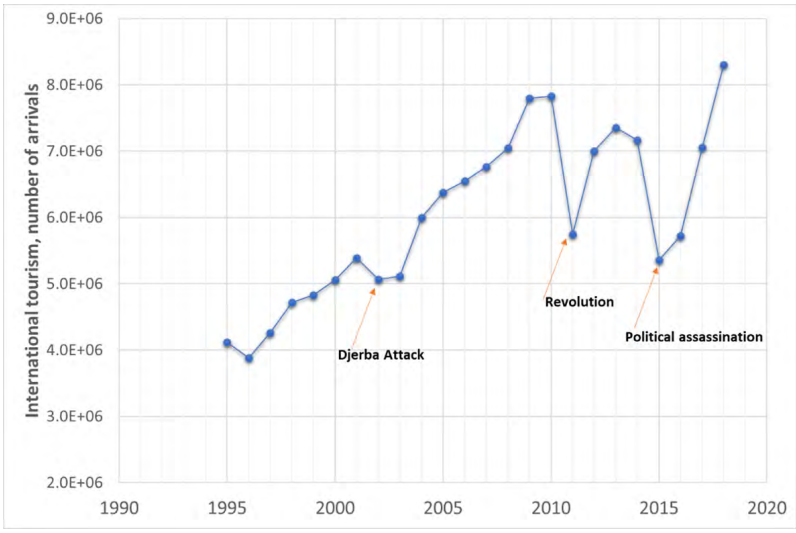


Figure 15. Sensitivity of tourist entrances to socio-political and security events


Figure 16. The permanent presence of the Police to ensure security in the face of empty beaches

Finally, Tunisian tourism, which is already suffering from a structural crisis since the early 1990s, is further weakened by the security incidents that occurred in the country following its revolution of January 14, 2011 (Figure 17). Tunisian destination therefore becomes more vulnerable compared to its direct competitors in Mediterranean basin, namely Morocco, Egypt and Turkey, if it offers a one-design product, mass beach tourism.

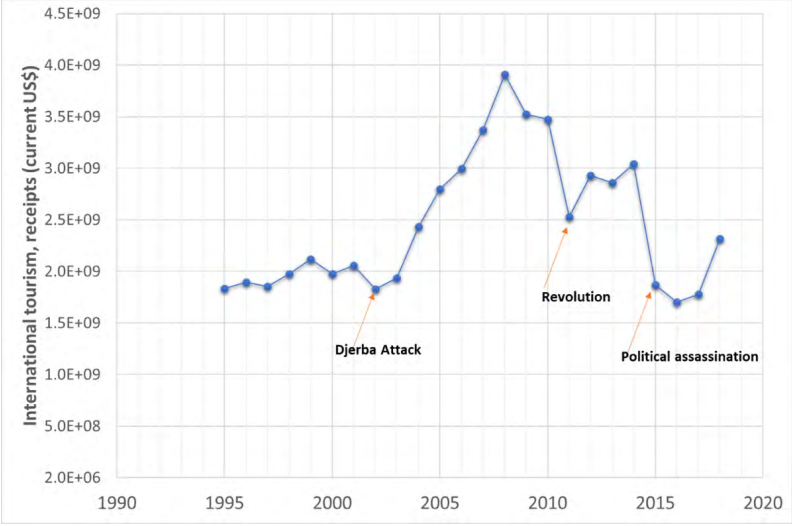


Figure 17. Evolution of tourism revenues in Tunisia

## III.4. Health risks

Spain, due to its geographical location, experiences intense cross-border traffic with Africa and other areas of the planet, of people, food and merchandise, as well as migratory birds, which can act as an important factor risk in the introduction of these diseases. However, of all these factors, the focus is on immigrants who come to Spain from underdeveloped countries by attributing to them the introduction of new diseases or the reappearance of some endemic ones in our country. But the data show us how, first of all, and for mere statistical purposes, the more than 50 million tourists that Spain receives each year pose a much higher risk of introducing diseases than the 400,000 immigrants a year, a clear example being the current health crisis derived from COVID.

On the other hand, our better standard of living means that more and more Spaniards, for vacations or for business, go to other countries where unknown diseases prevail, in addition to rural tourism that has increased certain pathologies. Finally, it has not been possible to establish an intense relationship between these phenomena; Furthermore, although we find outbreaks of diseases such as tuberculosis that take time to declare, especially if we are faced with irregular immigrants, we cannot forget that the strength of the Spanish health system absorbs these cases. (Spanish Security Strategy, 2011)

In 2019, 34 million tourists visited Greece from various countries producing €18.2 billion international tourist receipts. These were historical record figures for the Greek tourism industry. In addition, 2020 looked even more eminent till the pandemic outbreak in mid-March in Greece. The fatal infectious disease (Covid-19) hit the Asian countries first and then reached Europe and the rest of the world. Almost all countries forbade international travel. The Greek tourism market collapsed, as did all the world's tourism markets, particularly in Europe (Papanikos, Gregory T. 2020).

Table 2 presents the history of international tourism in Greece. As a percentage of GDP, global tourism receipts raised their GDP share from 5 percent in 2005 to almost 10 percent in 2019. Both GDP and tourism receipts are displayed in nominal terms. Thus, measurements over time can be made only using the percentage of tourism receipts to GDP.

**Table 2.** International Tourist Arrivals and Receipts, 2005-2019

| Year | Int'l Tourism Receipts Billion € | Int'l Tourism Arrivals Millions of Tourists | Spending per Tpurist Arrival € | GDP Billion € | Torism Receipt as a % of GDP |
|---|---|---|---|---|---|
| 2005 | 10.73 | 14.39 | 746 | 199.2 | 5.39% |
| 2006 | 11.36 | 15.23 | 746 | 217.9 | 5.21% |
| 2007 | 11.32 | 16.17 | 700 | 232.7 | 4.86% |
| 2008 | 11.64 | 15.94 | 730 | 242.0 | 4.81% |
| 2009 | 10.40 | 14.91 | 697 | 237.5 | 4.38% |
| 2010 | 9.61 | 15.01 | 640 | 226.0 | 4.25% |
| 2011 | 10.50 | 16.43 | 639 | 207.0 | 5.07% |
| 2012 | 10.44 | 16.95 | 616 | 191.2 | 5.46% |
| 2013 | 12.15 | 20.11 | 604 | 180.7 | 6.73% |
| 2014 | 13.39 | 24.27 | 552 | 178.7 | 7.50% |
| 2015 | 14.13 | 26.11 | 541 | 177.3 | 7.97% |
| 2016 | 13.21 | 28.07 | 470 | 176.5 | 7.48% |
| 2017 | 14.63 | 30.16 | 485 | 180.2 | 8.12% |
| 2018 | 16.09 | 33.07 | 486 | 184.7 | 8.71% |
| 2019 | 18.18 | 34.00 | 535 | 187.5 | 9.70% |

*Data source: GDP (AMECO).* International Tourism Receipts (Bank of Greece).

Research has shown that the Covid-19 pandemic had a minimal (5 percent) impact on Greece tourism in the first quarter of 2020. Table 4 are illustrated three scenarios of an overall reduction of 90 percent, 75 percent, and 60 percent. The estimates are shown in Table 3. Three scenarios are reported assuming (a) a reduction of 90 percent, which implies that only 10 percent of tourism receipts will be made relative to 2019; (b) a reduction of 75 percent and (c) a reduction of 60 percent. The last is the best-case scenario.

The economic influence of any pandemic is tough to calculate, including the number of people contracting the virus and dying. The review of the literature shows that the outcomes (positive and negative) can be immediate due to lockdown, medium due to time needed to adjust to a pre-pandemic state, and long-run through its effect

on human capital, which might last more than one generation as this has been confirmed by the empirical verification of the fatal origins hypothesis. Based on the head indicators of pre-bookings, this study has found that the impact of the 2020 pandemic on international Greek tourism arrivals is tremendous. The effect on GDP is anticipated to be unusual for a non-war period.

**Table 3.** The Pandemic Impact on Greek Tourism: A Scenario Analysis

| | 2019 Actual (€M) | Coef. A | 2020 Scenario A (worst case) | Coef. B | 2020 Scenario B (average) | Coef. C | 2020 Scenario C (optimistic) |
|---|---|---|---|---|---|---|---|
| Q1 | 747 | 0.95 | 709 | 0.95 | 709 | 0.95 | 709 |
| Q2 | 4667 | 0.1 | 467 | 0.25 | 1167 | 0.4 | 1867 |
| Q3 | 10693 | 0.1 | 1069 | 0.25 | 2673 | 0.4 | 4277 |
| Q4 | 2072 | 0.1 | 207 | 0.25 | 518 | 0.4 | 829 |
| total (year) | 18179 | | 2452 | | 5067 | | 7682 |
| % of 2019 | | | 13.5% | | 27.9% | | 42.3% |
| % Reduction | | | 86.5% | | 72.1& | | 57.7% |
| GDP Impact | 29086 | | 3924 | | 8108 | | 12291 |
| % of GDP Impact | 16% | | 2.1% | | 4.3% | | 6.6% |

Even the economic crisis that hit the Greek economy strong cannot compare with the impact of the Covid-19 on the Greek economy. Tourism arrivals reductions are foreseen to have an effect that ranges from 9 to 14 percent of GDP. And this is the 2020 impact. Unless the uncertainty and risk are reduced (measured by zero cases in the last 14-days), the tourism impact will continue to exert enormous pressure on economic resources. Government interventions by spending public money to support household and small business proprietors‟ income cannot be sustained for an extended period.

# IV. Conclusions

## IV. Conclusions

This analysis is based on literature research, academic studies, and bibliographic reference, which study and analyse the safety and security challenges. In Italy, Spain, Greece and Tunisia, the main natural and human-made/technological risks affecting the level of the safety and security within the specific challenges have been identified.

The results indicated that the principal impacts from current safety and security challenges regarding tourism are crucial and of paramount importance for the financial status for these countries.

Tourism remains the “heavy industry” of these countries and very adverse impact can distract the national development for many years. Especially, Covid-19 pandemic shown the vulnerability of the economic indicators and the need to develop a national growth plan where except of the tourism will be and other domains as economic pillars.

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