

**ACCORD EUROPÉEN ET MÉDITERRANÉEN SUR LES RISQUES MAJEURS
 (EUR-OPA)**

PROJECT – Baywatch (CERU + CEPRIS)

**INVOLVING SALES AND TOURISM AGENTS ON EARTHQUAKE AND
 TSUNAMI MITIGATION MEASURES**

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| <p>Centro Europeu de Riscos Urbanos Lisboa - Portugal</p> | <p>Centre Euro-Méditerranéen pour l'Evaluation et la Prévention du Risque Sismique Rabat - Maroc</p> |

WP1 : Report of the Workshop on tsunami preparedness for hotels and beach concessions - summary, conclusions and recommendations

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PARTICIPANTS: Nacer JABOUR (CEPRIS, Morrocco)

Introduction

The CERU organized a workshop in Lagos, Algarve (south of Portugal), on the 2nd and 3rd April 2017, with the support of Lagos municipality.

The workshop was especially devoted to tourism agents and operators, hoteliers and beach concessionaires, marinas managers, water sports and touristic visits operators, apart from agents of the municipal civil protection services, security forces and fire departments, harbour masters and National Maritime Authority.

The objectives of this workshop were: (1) to aware people and organizations related to tourism on earthquake and tsunami risk; (2) to divulgate mitigation measures and how to implement them; (3) to present experiences from other European and non-European countries on these subjects; (4) to present actions already developed by the Portuguese Civil Protection Departments of several municipalities; (5) to discuss on lifeguard formation on tsunami risk (in particular, on evacuation beach procedures), the role of tourism agents on tourists protection and information, and the participation of the different authorities on the implementation of mitigation and information measures.

The Workshop

This workshop took place in Lagos, on 2 and 3 April 2017, at the City Council Auditorium. The Mayor of Lagos, Maria Joaquina Matos, opened the Seminar. Also invited for the opening ceremony was the President of the Algarve Tourism Region, Desidério Silva. The workshop was fortunate to have the presence of the Executive Secretary of EUR-OPA Majors Hazards Agreement, Gianluca Silvestrini, who also composed the opening Table, as well the coordinators of the two Specialised Centres involved in the project, Nacer Jabour (CEPRIS) and Paula Teves Costa (CERU).

CERU invited for this workshop representatives of Civil Protection Departments of several Portuguese municipalities (Cascais, Lagos, Lisboa, Setúbal and Torres Vedras), to present their projects and share experiences, as well as of institutions responsible for the alert and emergency in case of tsunamis: IPMA (*Instituto Português do Mar e da Atmosfera*) – Institute in charge of the National seismic network and responsible to give the warning to the civil protection, and ANPC (*Autoridade Nacional de Protecção Civil*) – Portuguese National Authority of Civil Protection. Other institutions and authorities, as the institute responsible to form the lifeguards, ISN (*Instituto de Socorro a Náufragos*), and the Lagos Harbour Master were also invited.

From abroad, CERU invited Christa von Hillebrandt-Andrade, from Puerto Rico and Chair of the Caribbean Tsunami Warning Program (CTWP). Christa von Hillebrandt-Andrade is a worldwide recognized expert on tsunami warning and she developed and accompanied several programs on mitigation measures and tsunami warning signalling in Caribbean. Coming from a very touristic area, sharing her experience on the implementation of this type of actions was a valuable contribution for this workshop.

Domenico Mangione, from the Italian Civil Protection, and Anthony Micaloff, from ICoD - Euro-Mediterranean Centre on Insular Coastal Dynamics (Malta), also

contribute to this workshop, presenting the actions developed in their countries and in others. Nacer Jabour, from CEPRIS, partner of this project, presented the tsunami warning system in Morocco, as well as other activities developed in the aim of this project.

The workshop was attended by 45 participants. Besides the 4 foreign invited above mentioned and the Executive Secretary of EUR-OPA Majors Hazards Agreement, 13 (12 + the Mayor) politicians and technicians from the Lagos municipality attended the workshop, as well as 6 Lagos residents, 5 technicians from other municipalities (Cascais, Setúbal, Lisboa, Torres Vedras and Vila do Bispo), 2 people from the Algarve Tourism Region (1 + the President), 1 marina head of maintenance, 1 beach concession manager, 1 Red-Cross coordinator, 1 nautical centre manager, 2 people from the Maritime Authority (from the Safety Division and the Master of the port of Lagos), 1 lifeguard coordinator, 1 hotel security technician, the President of the Drowning Prevention Association, 2 persons from the Wrecked Relief Institute (ISN), 1 person from the National Authority of Civil Protection, 1 from IPMA and 2 CERU experts (the Director + 1).

The program of the workshop, as well as the participants list, are presented in annex.

Following is a briefly summary of the workshop's sessions, focusing on the presented communications. At the end, a section of conclusions and recommendations is presented.

1. Opening Ceremony

The Mayor of Lagos, Maria Joaquina Matos, welcome all participants, highlighting the importance and pleasure of hosting this workshop in her city. Since many years, Lagos municipality has been collaborating and provided support to the projects developed by CERU on seismic and tsunami hazard and risk.

Desidério Silva, President of the Algarve Tourism Region, welcomed the initiative and thanked Maria Joaquina Matos for hosting this event. He expressed his support for early warning and awareness-raising actions to hotel units for tsunami risk mitigation. He stressed the importance that the conclusions, from this workshop, are not just ideas but they should contain proposals for concrete actions.

The Executive Secretary of EUR-OPA Majors Hazards Agreement, Gianluca Silvestrini, made a short presentation of the EUR-OPA Majors Hazards Agreement, of the Council of Europe, which consists on a platform for co-operation in the field of major natural and technological disasters among 25 states, 23 from Europe and 3 Mediterranean countries (Morocco, Lebanon and Algeria). There are 27 specialized centres, created under this Agreement, that implement projects under the main EUR-OPA priorities for action: (1) Using scientific and technological knowledge; (2) Developing cooperation among all decision-makers; (3) Promoting risk culture among population (children, adults and groups with special vulnerability); (4) Fostering population's active participation. Gianluca Silvestrini pointed out the importance of the work developed by these specialized centres, of which CERU is one of them. At the end he said that it

will be suitable that the conclusions and recommendations of this workshop will be grouped according to the four priorities for action of the Sendai framework for Disaster Risk Reduction 2015-2030: (1) Understanding disaster risk; (2) Strengthening disaster risk governance to manage disaster risk; (3) Investing in disaster risk reduction for resilience; (4) Enhancing disaster preparedness for effective response, and to “built back better” in recovery, rehabilitation and reconstruction.

Nacer Jabour, coordinator of the Euro-Mediterranean Centre for Evaluation and Prevention of Seismic Risk (CEPRIS), presented his personal greetings and also on behalf of the Director of CNRST (Morocco’s National Centre for Scientific and Technical Research), Driss Abutajdine, thanking the invitation of CERU and the Lagos municipality to participate in this workshop.

Paula Teves Costa, CERU’s Director, closed the opening ceremony thanking the Lagos municipality for its support, not only for this workshop but also for past CERU projects. She also thanked all entities and persons that will present communications, in particular the specialists coming from abroad. Finally, she thanked the Mayor of Lagos, Maria Joaquina Matos, for her hospitality, all the people present in the room, and wished to all participants a profitable workshop.

2. Summary of the Workshop’s Technical Sessions

Theme 1 - Understanding the Hazard

Luis Matias start his presentation stressing that the ultimate goal of tsunami risk mitigation is to save lifes. Hotel’s guest and tourists are a tsunami vulnerable group. Often, they do not know the hazard neither the risk, and they do not know the site/city where they are, neither the safe places to go in case of tsunami.

Considering the phenomenon, it is important to know that a tsunami is not a surfing wave, but rather a wall of water, and the current speed is so strong that people cannot stand, even if the height of water is not very high. It is also important to know that the first wave is not always the bigger one, that there is not always a lowering of the tide, and that the tsunami can last several hours.

During last century, 3 tsunami occurred in Portugal, in 1941, 1969 and 1975. Fortunately they cause no damage, because they occurred during low season (autumn and winter – no people at the beach), some during the night, and at low tide conditions.

The arrival time of the first wave to the coast depend on the earthquake source location. In the Algarve this time is between 15 to 30 minutes. It is why it is necessary that all the people know the immediate actions to undertake. The maximum height wave is about 6 meters at the coast, but run-up can reach 12 meters.

Célia Marreiros presented the IPMA (Portuguese Institute for the Sea and the Atmosphere, in charge of the national seismic network and the official institution for sending warnings to the National Civil Protection Authority) activities on tsunami warning. She stressed that the main goal of a Tsunami Warning System/Centre is to

detect, monitor, verify and warn the community when a tsunami is generated. IPMA participates in the North-East Atlantic and Mediterranean Tsunami Warning System (NEAMTWS) from UNESCO. It is expected that in the near future IPMA will be a Tsunami Service Provider in the frame of NEAMTWS.

In 2013 the Global Tsunami Informal Monitoring Service (GTIMS-1) started with a training project supported by Joint Research Centre / European Commission (JRC). During 2015-2016, in addition to the objective of training, the project (GTIMS-2) also aimed to support the Emergency Response Coordination Centre (ERCC) of European Commission. Since 2016, IPMA is involved in *All Risk Integrated System Towards Trans-boundary holistic Early-warning (ARISTOTLE)* project, which aims to provide accurate and authoritative information on natural disaster to ERCC in the field of Meteorology and Geophysics.

Tsunami generation confirmation process at IPMA consists on the following steps: (i) earthquake steps; (ii) earthquake source model evaluation; (iii) tsunami numerical modelling. After, comparison between the model and the observations performed at the sensors (tide gauge and DART) will confirm (or not) tsunami generation.

As final remarks Célia Marreiros stated: (i) numerical modelling is an important tool for wave amplitude and tsunami travel time estimation and then relevant for any TWS in spite some limitations on source evaluation and bathymetric data; (ii) tsunami decision Matrixes that are based only in limited earthquake parameters (magnitude, depth and location) should be improved and revised in order to increase the number of considered parameters to taken in account (as focal mechanism, for instance).

At the end Célia Marreiros informed that IPMA will start functions on 24h / 7d basis, at national level, in the second half of present year (2017).

Theme 2 - Understanding the Warning

Under this theme the Morocco and Portuguese tsunami warning system were presented.

Nacer Jabour presented the existent Alert Shakemap system at the CNRST, in Morocco: the seismic network, the accelerometric network, the analysis and signal processing and the construction of shakemaps. He presented the tsunami catalogue for Morocco, enhancing those that reach both countries (Portugal and Morocco). He showed also some vestiges (ruins) inland, for several cities close to the coast, of past earthquakes.

Morocco has also several tide gauges installed along its coast. Data from the seismic network together with those from tide gauges are compared with numerical simulations to estimate the tsunami potential of an earthquake and affected areas, to decide then for the alert message to be communicated to the Civil Protection Authorities.

Carina Coelho presented the communication of Elsa Costa that, at last minute, could not attend the meeting. She began with a brief summary of natural disasters that occurred in recent years and that are increasing due to the increase of extreme events. It will be needed collective efforts and combined knowledge from all society sectors, to reduce the risks and it is necessary to decrease the vulnerability of our cities and make

our communities more resilient. In spite of the low probability of tsunami occurrence its impact can be very high and so the tsunami risk is considered high at national level. In Portugal the areas with high susceptibility to tsunamis events are the Algarve coast and the Tagus and Sado estuaries, close to the urban areas of Lisbon and Setúbal.

The mitigation of tsunami risk depends essentially on the prevention and preparation measures. The ANPC promoted different studies and used simulators to developed different earthquake and tsunami scenarios, identifying the potential flood areas. A map of tsunami flood for the coast of Portugal mainland was produced. Furthermore, several municipalities developed local analysis on tsunami risk to obtain a more detailed knowledge about it.

Since the tsunami and earthquake risk evaluation study for Algarve coordinated by the ANPC and published December 2010, that this region has a tool for hazard evaluation and emergency planning. This study included detailed inundation maps for 9 locations in Algarve. The Emergency Plan for Tsunami Risk in the Algarve (approved in 2014) involved more than 100 organizations and is tested and updated on a regular basis.

Periodic exercises are carried out at Local, Regional, National and International levels to assess the preparedness for earthquake and tsunami hazards. The last international exercise, which tested the Special Emergency Plan for Seismic and Tsunami Risk of the Algarve Region, was the International Exercise, WESTSUNAMI, which was played by Portugal, Spain and Morocco.

Carina Coelho presented some warning systems already implemented, namely in Setúbal and Cascais. Several public awareness initiatives, carried out by some Municipal Civil Protection Departments, were also presented.

Finally, Carina Coelho informed that a set of regulatory proposals to submit to the National Civil Protection Commission are in conclusion, aiming the harmonization of the acoustic and visual warning signs to be used in Portugal to inform citizens about the tsunami risk.

Theme 3 - Tsunami Preparedness and Mitigation: the last mile

Presentations on tsunami warning and risk signalling, as well as other ways to give information to local people as well as to tourists, were performed under this theme.

Frederico Paula presented the implementation plan of emergency signposting in case of tsunami of Lagos municipality. At this moment the first phase is completed (implementation of signs in Praia da Batata) and the second phase (implementation of signposting in the beaches close by) will start next year. Meia Praia is the more complex case at the intervention in the beach will be performed during the third phase.

At the Meia Praia beach there is no easy access to high ground places in case of a tsunami. For this beach, it is recommended the use of existing buildings as vertical shelters. To be classified as a vertical shelter, the building must include safe areas but it is also necessary to ensure that access to those areas is easy and free. It is recommended that future buildings to be constructed in this area should take into consideration their possible use as vertical shelter.

After, Frederico Paula presented the evacuation signposting in case of tsunami occurrence implemented in Praia da Batata, in Lagos. The signposting assumes that a detection and alert system in Lagos is ineffective, considering the arrival time of a tsunami to the city (20-30 minutes) and the time needed to implement evacuation procedures.

In that presumption, the principle is to advise people to seek for high ground (level 12 m is estimated as a safe level) in case they felt an earthquake.

The signposting was placed in October 2015 and evaluation inquiries were done last summer. The results will be presented in a further communication, to be presented by Paula Teves Costa. The conclusions of those inquiries will give information about the effectiveness of the signposting and the eventual adjustments to be done.

Visit to Praia da Batata to see the signposting in situ will be done during the workshop.

Domenico Mangione, from the Italian Civil Protection, presented the example of the Stromboli Island (in Italy). This island, a highly-sought place by tourists, is an example of integration of a local tsunami warning system and the community. After the December 2002 tsunami, a long process began, slow at first, boosted when the Mayor of the municipality welcomed the tsunami mitigation measures. Today security in the island and awareness of the risks posed by an active volcano are natural to the community. Tsunami signs and sirens are found at the beaches and evacuation route signs are everywhere in the low areas of the island. The tourists receive an instruction leaflet on their arrival, much like the security leaflets found in the airplanes. Touristic operators are now active partners and willing to learn (and teach to others) on how to be prepared and react in case of an event.

Anthony Micaleff, from Malta, presented the entities responsible for safety in the beaches (*Note – this communication should be presented in theme 5 but, due to time distribution along the day, it was presented in this theme*). In Malta, the lifeguard services are under the Malta Red Cross (*Malta Red Cross Lifeguards*). He presented the different lifeguards categories and their qualifications, as well a summary of their course on beach environment, hazards and beach supervision. However, no mention to tsunami hazard.

Anthony Micaleff also presented other examples coming from two countries: Australia (New South Wales) and United Kingdom. In Australia lifeguards are prepared to face tsunami risk. They have formation on tsunami characteristics, to recognize the phenomena and they contribute to tsunami education and warning dissemination in the community. They can close and evacuate the beach, in case of tsunami warning or unusual ocean behaviour and they assist people following a tsunami impact. They have a two-way radio, for communication, and in Australia beach emergency evacuation siren and flag exist.

Carina Coelho presented the communication of Abel Gomes that, at last minute, could not attend the meeting, on preparedness in the Algarve. She began to say a few words about the mission and organization of ANPC (the Portuguese National Authority for Civil Protection): 1 national command, 5 regional commands and 18 district commands, in Portugal mainland. At local level, in each municipality, there is a municipal civil protection service under the responsibility of the Mayor.

The National and district Command permanently ensure, the monitoring of all civil protection situations to guarantee the most adequate actions and a mobilization on time of the most adequate means. Daily briefings are held to keep the weather forecast updated and to analyse the occurrences that happened. The Integrated Protection and Relief Operations System (SIOPS) ensures that all entities involved on protection and rescue operations, and emergency assistance, in case of serious accident or catastrophe, work together assuring the appropriate means for the management of each occurrence.

The study of seismic and tsunami risk in the Algarve was developed between 2007 and 2009. Eighteen technical and scientific entities were involved, under the coordination of the ANPC. The main objectives were: (1) to deeply know the seismic and tsunami risks in the region in order to develop a special emergency plan; (2) to implement the results in a simulator to estimate damage scenarios. Concerning inundation scenarios, the entire coastline was studied but 9 sites were selected to be studied in more detail (Sagres–Ingrina, Boca do Rio, Salema–Lagos, Lagos–Portimão, Baía de Lagos, Armação de Pêra, Quarteira, Praia de Faro e Monte Gordo).

Because Algarve is tourist destination the seismic vulnerability of the hotels was, in particular, studied as well as the population fluctuations. All data were included in a geo-referenced scenarios simulator. Concluded the study, it was possible to establish the scenarios that served to prepare the Special Emergency Plan for Seismic and Tsunami Risk in the Algarve (2nd version, approved in 2014). This plan, which is in constant update, is an instrument to support the Civil Protection System for the Operational management in case of earthquake and/or tsunami occurrence.

However, in case of a strong earthquake, the Emergency Units cannot respond in the usual way because the roads could be blocked with debris or ruined, their offices may be collapsed and the human resources may be among the victims. For these reasons, the first aid will be done by the local survivors because the arrival of the relief forces could take some time. So, a good preparation of all citizens and a good response organization can considerably minimize loss of life and damage.

Carina Coelho presented the requirements to activate the emergency plan. Two stages are foreseen in the plan: emergency and rehabilitation. In the first phase the operational decisions are taken by the civil protection agents. The second is the technicians from different areas who decide. But there is a third phase – recovery - that does not make part of the plan. The politicians are responsible for this phase deciding on the reconstruction of the damaged structures and how and when the population can return to normal life.

Finally Carina Coelho presented the Response organization. There are 60 different entities involved, at both regional and local level. The goal is to ensure the participation and involvement of all entities, to ensure technical and operational coordination and to ensure unified command and control. Three exercises were performed to validate the plan: two at regional level and one international character. All these exercises served to make adjustments and improve the plan, so that we are now better prepared than before.

Theme 4 - Tsunami Ready for Beach Resorts

Christa von Hillebrandt-Andrade, from Puerto Rico, presented a communication on the participation of hotels in the Caribbean Tsunami Ready programs. In the Caribbean tsunami information is now currently provided in tourism offices and information desks, in hotels and resorts, on boards at the beach, by social media and TV.

In recent years, there has been a paradigm shift among tourist operators in the Caribbean. From the fear of losing business they are now aware that losing lives from an unprepared community in case of an event will destroy tourism for a very long time. Furthermore, most tourists appreciate organization, and like to feel protected and safe. That is the reason why some communities choose one of their tsunami signs to be “you are entering a Tsunami Ready Beach” instead of the traditional “you are entering a tsunami hazard zone”.

The “Tsunami Ready” program has been a huge success in involving local communities in tsunami awareness and preparedness. There are 13 guidelines that, when fulfilled, will bring National and International (by IOC) recognition to the community.

For hotels in the Caribbean there are **4-hours workshops for tsunami preparedness** focusing on the most practical aspects, like the Standard Operation Procedures in case of an event and a table top exercise at the end. Also, for hotels and beach related businesses a new program is emerging, not as demanding as the “Tsunami Ready” which is called “Tsunami Ready Supporter”.

Nacer Jabour presented the results of a tsunami questionnaire that was distributed in the hotels located in the region of Tangiers, Morocco. The aim was to test the questionnaire before its validation. This questionnaire was devoted to hotel managers and the questions were grouped in three 3 main chapters: i) knowledge of the hazard and memory of past events; ii) the warning system; iii) Preparedness and Response. Up to now, only 3 replies were received. However, instead of answers, this action triggered a set of questions from the touristic resort managers and staff.

Theme 5 - Waterfront preparedness & Lifeguards training

Christa von Hillebrandt-Andrade presented the Caribbean experience on this theme.

In the Caribbean Early Warning System (EWS) model, the Community is on the middle and not at the end. This means a strong involvement of all population in the implementation of mitigation measures (formation/information, signalling and evacuation routes and adequate procedures).

Christa von Hillebrandt-Andrade presented the Agenda of Lifeguard Tsunami Training and some examples of “tsunamis” in pools. For emergency planning it is necessary to define who issues and how much time it will take for the lifeguard to receive the official alert. Is it possible to define National alert levels?

For the local and regional tsunami emergency response plan for beaches it is necessary to identify the roles for people in charge. Not only for people that are on the beaches (i.e., lifeguards), but also for hotels, tourist operators and security services.

In the Caribbean large informative posters on tsunami hazard and evacuation routes are displayed in the beaches.

For the boats that are in the sea it is suitable to use, or adapt, the U.S. Maritime Guidance on regional guidance for the minimum off shore safe depths for maritime vessel evacuation prior to the tsunami arrival. These indications should be provided by an administrative maritime authority. It is also recommended that the vessels, apart the minimum depth should be at least ½ mile from shore.

The Port or Maritime Authority should also give information/ recommendations for boaters that are in the port. Strong currents in ports (current speed may be very large – between 3 and 9 knots) could produce significant impact. Christa von Hillebrandt-Andrade showed small films with some examples. Modelling these currents requires high resolution bathymetry (10 m). In the Caribbean tsunami may arrive in 10-15 minutes.

Carlos Estibeira presented the tsunami risk mitigation measures implemented in Cascais. He began with a brief presentation of Cascais municipality environment and characteristics (area, population, lifelines, safety resources, etc.) and he presented the Civil Protection Service of Cascais Municipality command structure and resources.

The map of susceptibility to tsunami flood, included in the emergency plan, shows the inundation areas of the county. A study on evacuation routes (simulation of the best routes and identification of concentration points), for all beaches in the county, is already done. Maximum time of evacuation routes is 20 minutes to reach a safe area.

The Tsunami Warning and Alert System (SAAT) is composed by a set of technical resources that allows the population to be alerted in the event of a tsunami. The alert is transmitted by the Portuguese Institute of the Sea and Atmosphere (IPMA). At the moment, the activation of the Tsunami Warning and Warning System is only allowed with the presence of a human resource.

Future development of the tsunami warning and alert system was presented, in particular in what concerns population information and evacuation routes signalling.

Alexandre Aleluia presented the tsunami risk mitigation measures implemented in Setúbal, a city about 30 km SSE of Lisbon. They collaborated in some national and international projects to simulate inundation scenarios, according to the most important tsunami sources, to better know the potential impact of a tsunami and to prepare the mitigation procedures. Setúbal has a tsunami alert system, connected to the Joint Research Center (JRC) of the European Community, which allow transmitting audio and visual information to the population. The system has a sea level measuring station and an alert panel (in the Albarquel Urban Park), which supports written information, with a siren and a blue rotating light.

On November 5th 2016 they performed a population evacuation exercise in Albarquel Urban Park. The aim of this exercise was (i) to carry out emergency pedagogical actions with the population in the event of an earthquake with tsunami generation, and (ii) to validate the time of displacement of a group of people very heterogeneous. The evacuation routes and safe areas were signalled and the alert system (the panel) took a central role.

Future actions consist of placing tsunami signalling and to publish informative material for supporting population education.

Olga Marques, Second Lieutenant of the Portuguese Navy, presented a communication on the importance of national partnership in preventing of drowning. The development of viable and sustainable drowning prevention projects is a concern of the Portuguese National Lifesaving Institute (ISN – *Instituto de Socorros a Náufragos*). In order to ensure applicability and sustainability of the various projects ISN has established partnerships with several companies aiming to (i) access more sophisticated complementary water rescue resources, (ii) implement media prevention campaigns, (iii) develop awareness campaigns targeting specific groups, and (iv) provide online and real time information on patrolled beaches.

Examples of these partnerships are: (1) Fundação Vodafone Portugal, which funded the acquisition of resources (jet skis and motorcycles), developed an App concerning the beach weather and water conditions, offered minutes free communications, and supported school and beaches campaigns; (2) Lidl, a supermarket chain that sponsored some free training on basic life support and board rescue techniques; and (3) Destak, a daily free distributed newspaper that disseminated a message of awareness and prevention during the bathing, producing a weekly paper edition freely distributed on the beaches.

The partnerships established so far have been very relevant, reducing the number of deaths by drowning. Through them ISN was able to reach a broader audience and increase public awareness for coastal dangers. Next step of ISN will be to attract partners to assist on the implementation of beach safety systems in developing Portuguese-speaking countries, in order to help save more lives.

Paula Teves Costa presented the first results on the survey on the tsunami signalling of Praia da Batata carried on last summer. She began her presentation with a brief review of previous studies performed in Lagos concerning (i) earthquake and tsunami hazard in SW Iberia, (ii) numerical simulation of tsunami propagation, (iii) inundation scenarios, (iv) Evacuation modelling, (v) Population awareness, and (vi) Tsunami Signaling.

The objective of the questionnaire was to evaluate (i) the knowledge of the phenomenon (tsunami) by the people present on the beach, (ii) the public perception of the risk of tsunami and the need to take self-protection measures against this risk, and (iii) effectiveness of installed signage, ie the impact of signage on the risk perception of the persons present on the beach and their knowledge of the guidelines to follow in case of tsunami. The majority of respondents were selected randomly, between Portuguese and foreigners persons, being the survey available in Portuguese and English. Two lifeguards and a few owners of establishments on the beach were also selected to fill the questionnaire.

Main conclusions were: (1) Knowledge on tsunami hazards is widely reported among the population (most likely due to the occurrence in the last decades of two very severe tsunamis, as result of the Sumatra (2004) and Tohoku (2011) earthquakes); (2) The fact that an earthquake can and should be considered as a warning sign (or alert) of tsunami is generally known (in the case of Lagos and, in general, in the Algarve region, this knowledge is very important because the time elapsed between the

occurrence of the earthquake and the arrival of the tsunami is very short (less that ~20 minutes) and it is necessary that people know the correct procedures to adopt even before the tsunami alert are given by the authorities); (3) But, the general awareness of the tsunami risk problem is moderate (it should be noted that while risk perception is a necessary condition for its mitigation, it is not sufficient to induce adequate protective behaviours); (4) On the other hand, responses to the survey at Praia da Batata show that the population is very receptive to improve their preparedness for a tsunami emergence and their knowledge on the adequate preventive and self-protective measures; (5) Almost all people consider this signage useful and feel safer because they are aware of the risks in the region; (6) It is necessary to invest in additional initiatives to improve the impact and efficiency of the signage installed in Praia da Batata. As suggested by the participants in the survey, these measures may only involve the installation of signage in a more visible location.

Finally, it should be emphasized that the results and conclusions drawn from this survey should be used to more effectively implement tsunami warning signs and evacuation routes on other Portuguese beaches.

During the survey it was also remarked that most beach concessionaires working close to Praia da Batata were not aware of the reason for the tsunami signs, nor were aware of the tsunami risk. This observation calls for an improvement of awareness campaigns on future installations of this kind of signs, in order to make it more effective.

Visit to Praia da Batata tsunami signalling

At the end of the second morning all participants went to visit Para da Batata tsunami signalling. The presentation of the signalling was presented by Frederico Paula, in theme 3, and in the last communication Paula Teves Costa presented its evaluation performed with an in situ questionnaire.

Frederico Paula conducted the visit.

Most discussed issue was the visibility of the signs. As natural, the signs are not visible from all places in the beach. Some questionnaire respondents have already pointed this fact. Suggestion to improve its visibility came from some participants.

Some photos at the end of this report illustrate the visit.

3. Round Table and General Discussion

Discussion was performed among the participants in order to identify the main conclusions of this workshop. Comparison between the different competences of similar institutions (Civil Protection authorities at municipal and national levels, lifeguards, port managers, etc.) were discussed. Several suggestions/recommendations were also collected from the participants. Main conclusions and recommendations are presented in the next section.

General recommendations are grouped following the Sendai framework priorities for action.

4. Conclusions and Recommendations

4.1 Main conclusions

- The workshop gathered representatives from all the public entities that have some responsibility on the mitigation of the tsunami risk at the beach: Municipal Civil Protection Services, Municipal political authorities, the National and Harbour Maritime Authority (AMN), the Algarve Touristic Council (RTA), the National Civil Protection (ANPC), the Portuguese Institute for the Sea and Atmosphere (IPMA), the regional Red Cross (CVP). The workshop also gathered concerned citizens, lifeguards and one NGO dedicated to prevent drowning at the beach and to promote swimming skills among the school population.
- But the workshop failed to gather a significant group of hotel and beach concession staff and managers. However, the four attendants representing the private sector working for one marina, beach concession, hotel and one nautical club, were very interested, attended most of the sessions and were participative, giving significant contributions and suggestions.
- As a result, the promoters of the workshop came out of the 2-day workshop better prepared to accomplish the ultimate goal of promoting tsunami awareness and preparedness for the hotel managers and beach concessionaires.
- The Batata beach in Lagos was the first one to have tsunami signals in Portugal. The signs were installed before the 2016 summer and its impact was evaluated by a dedicated questionnaire conducted in September 2016. The main results of this evaluation were presented by Paula Teves-Costa. Nearly only half of the people at the beach noticed the signs but the great majority considered them relevant. Also, a great majority of the people mentioned that they knew what to do in case of a tsunami alert.
- The Stromboli Island, a highly-sought place by tourists, is an example of integration of a local tsunami warning system and the community. After the December 2002 tsunami, a long process began, slow at first, boosted when the Mayor of the municipality welcomed the tsunami mitigation measures. Today security in the island and awareness of the risks posed by an active volcano are natural to the community. Tsunami signs and sirens are found at the beaches and evacuation route signs are everywhere in the low areas of the island. The tourists receive an instruction leaflet on their arrival, much like the security leaflets found in the airplanes. Touristic operators are now active partners and willing to learn (and teach to others) on how to be prepared and react in case of an event.
- In Italy the Community is addressed by the “Io non Rischio” campaigns, a good example to be followed. Another Italian experience that may be useful in other areas of the world is the organization of volunteer groups dedicated to hazard

awareness, preparedness and mitigation. These volunteers are trained by INGV. In Stromboli two of these groups already exist promoting stands on local fairs.

- The examples presented by Italy and the Caribbean showed that the success of mitigation measures at the Community level must have a clear political support by the Municipality administration, otherwise they will fail. The Caribbean experience also shows the importance of a “local champion” for tsunami awareness, usually a member of the civil society that helps to push forward the tsunami awareness campaigns.
- Lifeguard training and responsibilities are very diverse from country to country. In Portugal the lifeguards are formed by private schools but the exams and courses are validated by the National Maritime Authority through the Institute for Drowning Safety (ISN). The training is regulated by law and it has no particular provision for the prevention of hazards other than the ones related to the normal sea weather, beach profiles or water bodies. However, the general purpose of the lifeguard is to help the swimmers in case of any emergency, accident or danger. It looks like the responsibility of lifeguard is limited to the sea, not the surrounding area like the beach. The authority at the beach is the Maritime Authority. The beach concessionaires hire the lifeguards but they do not feel responsible for them or their training. The situation in Malta is very similar, but the lifeguards training is provided by the Red Cross, which is also the Malta Tsunami Focal Point. Risk assessment at the beach is included in the responsibilities of lifeguards and this could be the opening door to include tsunami preparedness training. In UK the training of lifeguards and their responsibilities include explicitly an evaluation and dealing with natural hazards, oceanic and coastal. In Australia the lifeguard is considered as a true civil protection agent with many responsibilities in dealing with hazards and managing evacuation plans. The lifeguard action at the beach begin only after an official alert is issued by the authorities. In Puerto Rico lifeguards are trained with a 4-hour session on tsunami hazard and preparedness, but lifeguards are not mandatory in all beaches, only on those that are run by the government.
- Since the tsunami and earthquake risk evaluation study for Algarve coordinated by the National Civil Protection, published December 2010, that this region has a tool for hazard evaluation and emergency planning. This study included detailed inundation maps for 9 locations in Algarve. One of the products is a simulator of earthquake and tsunami effects based on the epicentral location and magnitude of an earthquake. The emergency plan for Algarve (approved in 2014) is triggered by an earthquake with magnitude ≥ 6.1 or by an Intensity felt greater than VIII (MMI scale) or by tsunami wave height greater than 3 m in the whole Algarve Coast. Several exercises have been conducted both at the National and Regional levels to assess the preparedness for earthquake and tsunami hazards. The National Civil Protection Authority is monitoring all hazards in a 24/7 service, helped by a similar 24/7 service from GNR (National Guard).
- The Caribbean comprise 48 countries and territories of all sizes that rely heavily on tourism for their economy, over 90% in some cases. This situation has not

hindered their actions towards better preparedness and awareness of the tsunami hazard. In Puerto Rico all municipalities are today “Tsunami Ready”.

- Given the huge increase in coastal occupation, the death toll and destruction to be expected today by a tsunami will be exceedingly larger than what was experienced in the past. This conclusion applies to the Caribbean but also to Portugal and other regions that have suffered tsunamis in historical times.
- The official messages issued by authorities on the occasion of any earthquake that is felt, or may be felt at the coast, must include information on the tsunami alert level. The Portuguese agency IPMA is ready to issue this kind of messages to the civil protection and general public, but it is not doing so. IPMA will soon announce the starting of the National Tsunami Warning Centre and only then tsunami messages will be routinely broadcast. As today, Portugal is receiving the tsunami alert messages from the French System (operated by CENALT – *Centre d’Alert aux Tsunamis*).
- In the Caribbean tsunami information is now currently provided in tourism offices and information desks, in hotels and resorts, on boards at the beach, by social media and TV.
- In the Caribbean, in recent years, there has been a paradigm shift among tourist operators. From the fear of losing business they are now aware that losing lives from an unprepared community in case of an event will destroy tourism for a very long time. Furthermore, most tourists appreciate organization, and like to feel protected and safe. That is the reason why some communities choose one of their tsunami signs to be “you are entering a Tsunami Ready Beach” instead of the traditional “you are entering a tsunami hazard zone”.
- The “Tsunami Ready” program has been a huge success in involving local communities in tsunami awareness and preparedness. There are 13 guidelines that, when fulfilled, will bring National and International (by IOC) recognition to the community.
- For hotels in the Caribbean there are 4-hours workshops for tsunami preparedness focusing on the most practical aspects, like the Standard Operation Procedures in case of an event and a table top exercise at the end.
- For hotels and beach related businesses a new program is emerging, not as demanding as the “Tsunami Ready” which is called “Tsunami Ready Supporter”.
- The hotel questionnaire distributed in the region of Tangiers (Morocco) received only 3 replies, up to now. However, this action triggered a series of questions by the touristic resort managers and staff.
- Hotel guests, tourists and visitors at the beach or coastline are a “tsunami vulnerable group” because most of the times they are not aware of the nature and threat posed by the hazards in the waterfront facilities area; thus, they will not know what to do, and where to go if there is a disaster emergency. This implies that hotel and waterfront facility managers and staff have a responsibility towards tsunami preparedness and response.

- Despite the fact that 5 municipalities in Portugal are undergoing actions for alerting the beaches using signs and or sirens, it was not clear from the workshop what are the operational procedures in case of official or natural alerts.
- Commercial harbours have a very important economic role in most countries, Portugal, Spain and Morocco being no exception. Together with small harbours and marinas, they are much more vulnerable to tsunamis than beaches. The explanation is resonance and energy plumbing. Tsunami energy entering a closed harbour will not dissipate easily and can cause large amplitude waves and currents for many hours, even for small scale tsunamis.
- The coasts of Portugal, Morocco and Spain, like in the Caribbean, could be hit by a tsunami generated by an earthquake in less than half an hour, sometimes only a few minutes after the earthquake. This has a very important consequence on the preparedness and response to a tsunami. Everybody should be prepared to move to high ground whenever a strong earthquake is felt at or close to the coast, without waiting for any confirmation message by authorities. This means also that the Community must be able to react to two lines of alert messages: the natural ones, like also disturbances of the sea level, and the official one. In case the shaking is caused by a small to moderate earthquake the national system must issue a “no-tsunami alert” message as fast as possible (typically 3 to 5 minutes).
- One challenge for these countries is to translate the Tsunami Science into a Risk Culture, with awareness and preparedness as major concerns. This is a long-term activity and routine exercises may have an essential role on this.

4.2 Recommendations to future BAYWATCH activities

- The current actions of CERU and its partners under the project BAYWATCH, and on future projects, should be inline, and explicitly refer to the priorities mentioned in the Sendai Framework.
- Future actions dedicated to touristic operators, staff and managers, beach concessionaires, should be shorter, half a day or one day maximum.
- It is recommended that additional approaches to the private sector must be tried. Instead of inviting them to a 2-day workshop, we must go to their own meetings and ask for time to give a brief presentation on tsunami awareness and preparedness.
- By the Portuguese law, all staff from the private sector must receive a total of 50 hours of formation/training every year. The formation and training on tsunamis could be considered as formation time if a system of inscriptions is formalized and a diploma or certificate is given at the end. The private sector will welcome this type of formation. It is recommended that future actions should be organized in that way.

- The tsunami signs in Batata beach were evaluated by the workshop attendants and some recommendations resulted from that observation: i) some signs are not properly oriented, given an ambiguous information; ii) the size of the escape route may be increased; iii) the large location map at the beach must be modified to include clear indications on the danger areas and evacuation areas, in light of what has been done in other areas of the Caribbean or United States; iv) it is recommended that the concentration point sign includes, on the back, information on the *following* procedures and contacts.
- At the Meia Praia beach there is no easy access to high ground places in case of a tsunami. For this beach, it is recommended the use of existing buildings as vertical shelters. One building to classify as a vertical shelter must include safe areas but also ensure that access to those areas is free. It is recommended that future building plans in that area should take into consideration the possible use as vertical shelter.
- It was remarked that most beach concessionaires working close to the Batata beach were not aware of the reason for the tsunami signs, nor were aware of the tsunami risk. This observation calls for an improved awareness campaign on future installations of this kind of signs.
- Tsunami awareness and preparedness are never ending activities that must be pursued for the benefit of the Community and future generations, particularly in regions like Portugal, Spain and Morocco that suffer rare but destructive events.

4.3 General Recommendations

First Priority for Action of the Sendai framework: “Understanding disaster risk”

Using scientific and technological knowledge to better assess evolving risks and adapt accordingly the resilience strategies

- We need science to define the evacuation areas on land and the safe depths for ships at sea. An example is provided by the US Maritime Guidance that defines the safe depths as a function of the distance to the tsunami source, which is a function of the current speeds to be expected in each case.
- It is essential to use scientific knowledge to prepare and provide information to the population, namely the tourist operators and hotels professionals.

Second Priority for Action of the Sendai Framework: “Strengthening disaster risk governance”

Developing cooperation among all decision-makers to better define authorities’ adequate role in Disaster Risk Reduction

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- The Algarve region, as well as other coastal regions in Portugal, has seen a considerable increase in the number of tourists and visitors during recent years. In particular, the Algarve Touristic Region Council marketing campaigns have insisted on the concept that “Algarve is a safe touristic destiny”. This concept should also extend to the preparedness and to natural events, such as tsunamis.
 - One hotel staff member was inquired on the tsunami and earthquake risk in Lagos and she demonstrated a great lack of knowledge. The staff is not trained to reply to a series of tsunami related questions, which can make the visitor feel unsafe. This calls for another recommendation addressed to the tourist guide training and also to the Algarve University that has an Hotel School.
 - It is recommended that the training of touristic guides include a module dedicated to natural hazards in the Algarve region, including earthquake and tsunami formation. Here a cooperation with the Algarve Touristic Council is sought.
 - This recommendation is also extended to the formation at the University level. Here a cooperation with the Algarve University must be sought. Tourism professionals should be trained to give full information to tourists and visitors on the natural hazards that may occur in Algarve and other regions.
 - It is recommended to include a modulus on tsunami hazard and mitigation measures, on the lifeguard’s formation. Since the lifeguard formation is established by law and its compliance is evaluated by the Portuguese Maritime Authority, it is recommended that a coordinated action with the main stakeholders is pursued.
 - The local Community should be at the centre of any Tsunami Warning System and not at its end, as commonly pictured. Only prepared communities will be able to save a significant number of lives in case of a tsunami. This is the leitmotiv of the “Tsunami Ready” initiative that began in the United States and now is extending to the Caribbean, South America and Indonesia.
 - The “Blue Flag” initiative could be extended to include preparedness for natural events like tsunami, in their guidelines. This is a subject that may deserve exploration by all agencies concerned, national and international.
 - Given the high economic value of harbours it is recommended that particular attention must be dedicated to Port authorities and managers in relation to the tsunami hazard. High-resolution modelling can provide harbour managers with knowledge that could result in appropriate recommendations in case of an event. The process of detailed hazard evaluation in harbours is currently undergoing in the United States.
 - The level of preparedness at the Community level must be maintained in a systematic way by conducting regular tsunami exercises. *For instance, in the Caribbean, these exercises are conducted once per year simultaneously for all countries, involving the last one nearly half a million of people, including some volunteer tourist in hotel resorts. The exercise date is already in the regular*

calendar of *authorities and general people*. *The Caribbean example should be followed in other countries*

- Tsunami information from official channels must reach the areas at risk on the coastline, beaches, marinas, harbours, as fast as possible and using as much communication channels as possible, like the TV, cell broadcast, social media, etc.

Third Priority for Action of the Sendai Framework: “Investing in disaster risk reduction for resilience”

Fostering active participation of the population in Disaster Risk Reduction

- It was suggested that a “Guide to Tourists at the Beach” could include the most important recommendations in case of natural hazards, much like the “Guide for Pedestrians” that contains recommendations to the walkers on trails. This guide could be prepared by the National Civil Protection Authorities.
- The “Tsunami Ready” program and the companion “Tsunami Ready Supporter” have been very successful in promoting preparedness and awareness at the community level in other tsunami prone areas. It is recommended that such initiatives should be also stimulated in *Mediterranean countries, like Portugal and Morocco*.
- To engage stakeholders at the community level, like hotels and beach concessionaires, leaflets distribution is ineffective. These stakeholders must be included in the whole civil protection system and must be part of it. They must be aware, understand and participate in the evacuation planning in case of a tsunami. The community must be empowered to use the science that helped to define the safe areas and evacuation routes. Questionnaires addressed to hotels and coastal businesses is just one step on that process of empowerment.
- Standard Operational Procedures for official alert messages must be clear and end with the “all clear” or “cancellation” information. The official messages issued by authorities *when an earthquake is felt, or may be felt at the coast*, must include information on the tsunami alert level. The ordinary people or security staff and resort managers, who have the responsibility to order evacuation actions for their facilities, cannot be transformed into seismologists.
- Given that the official communication system can take up to 20 minutes (or more) the community must learn to respond when natural signs are perceived. For an effective response of the community to a tsunami event it is recommended that all operational procedures in case of official or natural alerts are clearly defined and known by stakeholders.
- The work that has begun in recent years by a few municipalities in Portugal regarding tsunami signs on the coastline and sirens, in order to save lives in the event of a tsunami, must pursue and expand to other coastal municipalities at risk. *Similar actions must be implemented in other coastal countries*.

Fourth Priority for Action of the Sendai Framework: “Enhancing disaster preparedness”

Promoting risk culture among population

- At the community level, past experience has proved to be of the utmost importance in the preparation for future events. This historical memory must be one of the subjects in any awareness campaign.
- National or International recognition for tsunami preparedness may be appealing for the tourism business and could help to promote tsunami awareness among them.
- Children and schools are one of the key groups to be addressed by the tsunami and natural hazards awareness campaigns and it was rewarding to know that activities at schools are routinely done by the municipality civil protection services. It would be more difficult to include these subjects in the school syllabus, but it should be also an objective to consider by official and government authorities.
- The prevention for drowning in beaches and other swimming places is pursued by several NGO that may be contacted to include tsunami preparedness in their activities.
- To facilitate the tsunami awareness campaigns among the young generations it is recommended the use and promotion of educational apps and games, social media, in addition to the more traditional *materials, like websites, leaflets and posters.*

5. Further developed actions

After the workshop and according to the suggestions made by some participants, we met with the following entities in order to plan further awareness sessions gathering the target public (hotel managers, beach concessionaires and other tourism agents):

- Algarve Hotel School (ESHGT – Faro, June 2017)
- Algarve Touristic Council (RTA – Faro, June 2017)
- Algarve Hotel and Tourism Establishments Association (AHETA – Albufeira, June 2017)
- National Maritime Authority (Lisbon, July 2017)
- Wrecked Relief Institute (ISN – Caxias, August 2017)

Annexes

- **Seminar Program**
- **Participants list**
- **Some photos of the Seminar**

PROJECT BAYWATCH

WORKSHOP ON TSUNAMI PREPAREDNESS FOR HOTELS AND BEACH CONCESSIONS



CENTRO EUROPEU DE RISCOS URBANOS - LISBOA, PORTUGAL (CERU)

**CENTRE EURO-MÉDITERRANÉEN POUR L'ÉVALUATION ET LA PRÉVENTION DU RISQUE
SISMIQUE - RABAT, MARROCOS (CEPRIS)**



**PAÇOS DO CONCELHO SEC. XXI AUDITORIUM
CÂMARA MUNICIPAL DE LAGOS**

3rd & 4th APRIL, 2017

SPONSOR



CÂMARA MUNICIPAL DE LAGOS

About the Project “Baywatch”

The “BAYWATCH” project is the natural follow-up of the partnerships between the European Centre on Urban Risks (CERU - Centro Europeu de Riscos Urbanos CERU) from Lisbon, Portugal, and the Euro-Mediterranean Centre for Evaluation and Prevention of Seismic Risk (CEPRIS - Centre Euro-Méditerranéen pour l'Évaluation et la Prévention du Risque Sismique) from Rabat, Morocco, in the aim of EUR-OPA European and Mediterranean Major Hazards Agreement, from the Council of Europe.

Started in the 2012-2013 biennium with the Project “VULRESADA - Coastal Management Towards Seismic and Tsunami Risks: Socio-Economic Impact - Evaluating Vulnerability, Resilience and Adaption of the cities of Cascais and Lagos, in Portugal, Tangier and M'Dieq, in Morocco”, continued in the 2014-2015 biennium with the Project “INSPIRED - Inform and Involve People in Seismic and Tsunami Risk Prevention, Contributing to minimize damages and Increase Resilience”, to which the CUEBC (Centro Universitario Europeo per i Beni Culturali, from Ravello, Italy) was associated, and has now reached the 2016-2017 biennium with the Project “BAYWATCH”.

These projects involved local authorities, such as City Councils and their civil protection services (in particular Lagos and Cascais, Portugal), informing and involving people in seismic and tsunami risk prevention, fundamental to increase its resilience and minimize eventual damages, as an informed and aware population can adopt a set of suitable procedures in terms of collective response to a disaster situation.

Actions of extreme importance are framed in these objectives as risk reduction and resilience increase are concerned, such as broadening knowledge and available information, promoting its exchange and dissemination, developing alert systems, analyse risk areas and propose measures to risk mitigation, develop routines and preventive and preparative procedures, such as exercises and simulations, studding solution to the most vulnerable population, particularly to people with conditioned mobility.

The Project “BAYWATCH” is essentially concerned to tsunami risk prevention in touristic areas, seeking to engage hotels and beach concessions, and entities with responsibilities in those areas.

The Workshop is therefore especially devoted to tourism agents and operators, hoteliers and beach concessionaires, marinas managers, water sports and touristic visits operators, responsible teams for beach life guard courses, municipal civil protection services, security forces and fire departments, Harbour masters and National Maritime Authority.

Workshop admission is free and official language of presentations is English.

Monday, 3rd April

09:00 Registration

10:00 – 10:40 OPENING SESSION

10:00 Welcome address

Maria Joaquina Matos (Mayor of Lagos)

Desidério Silva (President of Região de Turismo do Algarve)

Nacer Jabour (CEPRIS Director)

Gianluca Silvestrini (Executive Secretary of EUR-OPA Majors Hazards Agreement)

Paula Teves Costa (CERU Director)

10:50 Theme 1 - Understanding the Hazard

Moderator: Paula Teves Costa (CERU & IDL-FCUL)

10:50 Tsunami hazard in the Ibero-Magreb region

Luis Matias (IDL - Instituto Dom Luiz, Faculdade de Ciências da Universidade de Lisboa)

11:10 Coffee break

11:30 Tsunami warning – Confirmation process

Célia Marreiros (IPMA - Instituto Português do Mar e da Atmosfera)

11:50 Theme 2 – Understanding the Warning

Moderator: Luis Matias (CERU & IDL-FCUL)

11:50 The Morocco Tsunami Warning System

Nacer Jabour (CEPRIS)

12:10 The Portuguese Tsunami Warning System

Elsa Costa & Carina Coelho (ANPC – National Authority of Civil Protection)

12:30 Discussion on Themes 1 & 2

13:00 Lunch break

14.30 Theme 3 – Tsunami Preparedness and Mitigation: the last mile**Moderator: Sérgio Morais (Torres Vedras Municipality - Civil Protection)****14:30 Emergency signposting in case of tsunami in Lagos****Frederico Paula (Lagos Municipality - Civil Protection)****14:50 Tsunami risk mitigation in Stromboli****Domenico Mangione (Italian Civil Protection)****15:10 The experience from Malta and UK****Anton Micaloff (ICoD - Euro-Mediterranean Centre on Insular Coastal Dynamics, MALTA)****15:30 Preparedness in Algarve****Abel Gomes & Carina Coelho (ANPC – National Authority of Civil Protection)**

15:50 Coffee break

16.20 Theme 4 – Tsunami Ready for Beach Resorts**Moderator: Frederico Mendes Paula (Lagos Municipality)****16:20 The Participation of Hotels in the Caribbean Tsunami Ready programs****Christa von Hillebrandt-Andrade (CTWP)****16:50 Hotel questionnaire implementation in Morocco – preliminary results****Nacer Jabour (CEPRIS)**

17:10 - 17: 40 Discussion on Themes 3 & 4

Tuesday, 4th April

09:10 Theme 5 – Waterfront preparedness & Lifeguards training**Moderator: Luis Matias (CERU & IDL-FCUL)****09:10 The Caribbean experience****Christa von Hillebrandt-Andrade (CTWP)****09:50 Tsunami risk mitigation in Cascais****Carlos Estibeira (Cascais Municipality - Civil Protection)**

10:10 Tsunami risk mitigation in Setúbal

Alexandre Aleluia (Setúbal Municipality - Civil Protection)

10:30 Importance of national partnership in preventing of drowning

Sub-Tenente Olga Marques (Instituto de Socorro a Náufragos)

10:50 Survey on the tsunami signalling of Praia da Batata – Fist results

Paula Teves Costa (CERU & IDL-FCUL)

11:10 Coffee break

11:30 Visit to Praia da Batata tsunami signalling

Frederico Mendes Paula (Lagos Municipality)

13:00 Lunch break

14.30 General discussion and conclusions

14:30 Discussion on Theme 5

14:50 Round Table and General Discussion

Moderator: Isabel Pimentel (Lisbon Municipality - Civil Protection)

Paula Teves Costa (CERU & IDL-FCUL)

Christa von Hillebrandt-Andrade (CTWP)

Nacer Jabour (CEPRIS)

Frederico Mendes Paula (Lagos Municipality)

Claudia Ruivinho (Algarve Regional Tourism)

15:50 Workshop Conclusions

Isabel Pimentel (Lisbon Municipality - Civil Protection)

Luis Matias (CERU & IDL-FCUL)

Frederico Mendes Paula (Lagos Municipality)

16.20 Closing session

16:20 Farewell message

Maria Joaquina Matos (Mayor of Lagos)

Paula Teves Costa (CERU Director)

Participants list

| NOME | INSTITUTION |
|--|---|
| Alexandre Aleluia | SMPCB - Setúbal (Eng. Geógrafo) |
| Anthony Stephen Micallef | Euro-Mediterranean Centre on Insular Coastal Dynamics (ICoD) - Director (Valleta - Malta) |
| António Gil Leitão | CM Lagos (Jurista) |
| Basílio Candeias | CM Lagos (Serviço Municipal de Protecção Civil) |
| Carina Coelho | ANPC (Autoridade Nacional de Protecção Civil) - Técnica de Protecção Civil |
| Carlos Estibeira | CM Cascais (Serviço Municipal de Protecção Civil) |
| Carlos Manuel Martins da Saude Fernandes | Pres. Junta de Freguesia de S. Gonçalo - Lagos |
| Carlos Silva | Marlagos - Chefe de manutenção |
| Catarina Viegas | Resp. de Concessão Balnear |
| Célia Marreiros | IPMA - Instituto Português do mar e da Atmosfera (Geofísica) |
| Christa von Hillebrandt-Andrade | USA - NOAA Caribbean Tsunami Warning Program (Sismóloga) |
| Claudia Ruivinho | Região do Turismo do Algarve (Eng ^a de Ambiente) |
| Desidério Silva | Presidente da Região de Turismo do Algarve |
| Dina Gonçalves | CM Lagos (Assist. Técnico) |
| Domenico Mangione | Departamento de Protecção Civil de Itália |
| Emanuel Glória | Cruz Vermelha portuguesa - Delegação de Lagos (Coordenador Local de Emergência) |
| Ercídia Pereira | Sopromar (Centro Náutico - Lagos) - Gerente |
| Frederico Mendes Paula | CM Lagos (Arquitecto) |
| Gianluca Silvestrini | Secretário-Geral do Acordo EUR-OPA, Conselho da Europa |
| Isabel Pimentel | CM Lisboa (Téc. Protecção Civil) |
| José Carlos de Sousa | Func. Público - Lagos |
| José Jácome | Solicitador & Membro da Ass. Municipal de Lagos |
| José Velho Gouveia | Direção-Geral da Autoridade Marítima - Divisão de Segurança Marítima |
| Kyell-Ove Háger | Geólogo (reformado) |
| Lais Amaral | Advogada |
| Luis Claudio | CM Lagos |
| Luis de Abreu | Professor (aposentado) |
| Luis Duarte | AMN (Autoridade Marítima Nacional) - Capitão do Porto de Lagos |
| Luis Gloria | CM Lagos (Assist. Técnico) |
| Luis Manuel Marques Matias | CERU & IDL - FC - UL |
| Margareta Háger | Moradora em Lagos (Doméstica) |
| Maria Filomena Ventura | CM Lagos |
| Maria Helena Castaldo | CM Lagos (Assist. Técnico) |
| Maria Joaquina Matos | Presidente da CM Lagos |

| | |
|------------------------------|--|
| Maria Teresa Baptista | CM Lagos |
| Nacer Jabour | Coord. CEPRIS (Centre Euro-Méditerranéen pour l'Évaluation et la Prévention du Risque Sismique), Rabat - Morocco |
| Nemésio Damas | Nadador - Salvador (Coordenador) |
| Nuno Fialho Gomes | CM Vila do Bispo (Téc. Superior) |
| Olga Sofia Gaboleiro Marques | ISN - Instituto de Socorros a Náufragos (Sub-Tenente - Oficial da Marinha) |
| Patricia Gavina | Marlagos (TSSHT) |
| Paula Teves Costa | CERU (Presidente) & IDL - FC - UL |
| Pedro dos Santos Cruz | Neptune Serenity - Associação de Prevenção do Afogamento (Presidente da Direção) |
| Rui Ferreira | AMN (Autoridade Marítima Nacional) - Capitão do Porto de Olhão |
| Sara Maria Coelho | Vereadora CM Lagos |
| Sérgio Morais | CM Torres Vedras - Coord. do Serviço de Protecção Civil |
| Virgílio Mesquita Chim | ISN - Instituto de Socorros a Náufragos - Autoridade Marítima Nacional (Oficial da Marinha) |

Workshop Technical Sessions





Technical Visit to Praia da Batata







Group photos

