EUR-OPA MAJOR HAZARDS AGREEMENT
ACCORD EUR-OPA RISQUES MAJEURS

COUNCIL OF EUROPE CONSEIL DE L'EUROPE

Strasbourg, 10 April 2013

AP/CAT (2013) 1 *Bil.*

ACCORD EUROPEEN ET MEDITERRANEEN
SUR LES RISQUES MAJEURS
(EUR-OPA)

EUROPEAN AND MEDITERRANEEN
MAJOR HAZARDS AGREEMENT
(EUR-OPA)

RESEAU DES CENTRES EURO-MEDITERRANEENS SPECIALISES DE L'ACCORD EUR-OPA RISQUES MAJEURS

ACTIVITES SOUTENUES DANS LE CADRE DES PROGRAMMES COORDONNES POUR 2012 ET PREVUES POUR 2013

(Draft)

NETWORK OF SPECIALISED EURO-MEDITERRANEAN CENTRES OF THE EUR-OPA MAJOR HAZARDS AGREEMENT

ACTIVITIES SUPPORTED WITHIN THE COORDINATED PROGRAMMES FOR 2012 AND PLANNED FOR 2013

(Provisoire)

Table of Contents

1. USING INFORMATION TO SAVE LIVES AND HELP VICTIMS

1.A. Assessment of events and population alert

MULTI-SENSOR TECHNOLOGIES FOR EWS OF LANDSLIDES AND MAN-MADE STRUCTURES

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 1.A. Assessment of events and population alert

TITLE OF THE PROJECT : Multi-sensor technologies for EWS of landslides and man-made structures

TARGET COUNTRIES : France, Georgia, Italy

PARTNERS INVOLVED :

COORDINATING CENTRE : CERG Strasbourg, France

OTHER CENTRES: GHHD Tbilisi, Georgia,

OTHER PARTNERS : Delft University of Technology (TUD, T.A. Bogaard), National Research Council, Institute for the Dynamic of Environmental Processes (CNR-IDPA, S. Sterlacchini), National Research Council, Research Institute for Geo-Hydrogeological Protection (CNR-IRPI, S. Frigerio, L. Schenato), Centre National de la Recherche Scientifique, Institut de Physique du Globe de Strasbourg (CNRS-IPGS , J.-P. Malet), Restauration des Terrains de Montagne 04 (RTM, G. Guiter)

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

The purpose of the project is to test the use of multi-sensor technologies as possible early-warning systems for landslides and man-made structures, and the integration of the information in a simple Decision Support System (DSS). The final aim is the provision of timely and effective information that allows individuals exposed to hazard to take appropriate actions to avoid or reduce their risk and prepare for effective response. The observation techniques used are displacement sensors (such as low-cost GPS and tiltmeters), hydrological sensors (pore water pressure, temperature) and strain sensors (FO technology, possibly seismometers) for which some of the observations are transmitted automatically (GSM, web-services, etc.). Not all sensors will be tested at all the monitored sites, but the fluxes of data will be integrated in a simple DSS that will allow to manage the data, propose some interactive graphs, identify some thresholds and prospective hazard scenarios that could be used for pre-alert and alert. Finally (not within the scope of this 2-year project), the possibility of linking the fluxes of observation data to people in charge of the decision-making in case of major disaster will be considered.

In this project, particular attention will be paid to some new possibilities available in the field of distributed monitoring systems of relevant parameters for landslide and man-made structures monitoring (such as large dams and bridges), and among them the distributed monitoring of temperature, strain and acoustic signals by FO cables. This novel technology appears stable, very accurate, and has the potential to measure several independent physical properties. However, the operative implementation and performance testing of such technique has not still been evaluated in a quantitative approach.

The objectives of the project are:

1) To assess the applicability and limitations of FO cable technology in landslide and man-made structures monitoring based on both literature review and field experiments on relevant case studies in France, Georgia and Italy. Focus will be on the use of all physical variables that can be obtained using F0 (such as strain, temperature and acoustic signals) in order to provide timely and effective information on the dynamics of the structure.

2) To assess the use of arrays of multi-technique displacement sensors (tiltmeters, inclinometers, GPS, etc.) to monitor in real-time small ranges of displacement, on relevant case studies in France, Georgia and Italy.

3) To review the landslide and man-made structures EW systems already working in European countries in order to define to what extent multi-sensor technology can be incorporated in the EWs and what kind of added value can be provided.

4) To translate the observation and the analysed signals into a simple DSS able to visualize the data, identify some trends in the time series, and provide meaningful information usable to "foresee" a forthcoming possible catastrophic event.

The proposed activity associates three specialised centres (CERG, GHHD). The expertise of contributing academic partners (see above) guarantees the success of the research activities as they are already working closely together within European Projects. Co-funding to the research will be made available by each of the partners.

Specific yearly objectives :

2012 :

1) Analysis of the potential of FO cable technology for landslide monitoring (test site in France) through a 1 week field experiment.

2) Analysis of the potential of arrays of displacement sensors (tiltmeters, GPS, etc) with real-time data transmission for landslide monitoring (test site in France) and a large dam monitoring (test site in Georgia)

3) Development of a framework for a simple DSS system able to visualize the data, plot relevant information and

identify trends and thresholds in the time series. Definition of the concept for the diagnostic.
2013 :
1) Analysis of the potential of FO cable technology for dam/bridge monitoring (test site in Luxemburg)
2) Consolidation of the data transmission equipment/procedure for real time monitoring in Georgia.
3) Creation of the DSS system, and implementation of all the data acquired, and test of the performance of the system.

EXPECTED RESULTS

2012 :
1) Organisation of a 2-days workshop to initiate the work
2) Literature review on FO cable technology and arrays of displacement sensors for landslide and man-made structures monitoring.
3) Field experiment to test FO cable technology at a landslide test site in France.
4) Implementation of tiltmeters and data transmission systems at the Georgia test site (large dam).
5) Framework/concept for the development of the simple DSS (specifications, visualization, etc).
2013 :
1) Organisation of a 2-days workshop to discuss the progress of the work
2) Field experiment to test FO cable technology at one landslide in France.
3) Consolidation of the arrays of equipment and data transmission system at the Georgia test site (large dam).
5) Development of the DSS prototype, integration of data and test of the system.
5) Diffusion of the results through joint publications

RESULTS OBTAINED PREVIOUSLY (if any)

The proposed activity will take advantages of previous results obtained within the activity of CERG members, on the test of FO technology for soil temperature monitoring on landslide (Krzeminska et al., in press) and in rivers (Westhoff et al., 2011) and on the use of arrays of GPS and extensometers on landslides with a near-real time data transmission (Malet et al., 2011) . It can take advantage of the CERG activity 'Real-Time Management of Emergency Phase in the aftermath of Natural Disasters ' which objective was to develop a beta-version of a DSS system able to manage data and communications.

References:
Krzeminska, D.M., Steele-Dunne, S., Bogaard, T.A., Rutten, M., Sailhac, P. Géraud, Y. 2011. High-resolution temperature observations to monitor soil thermal properties as a proxy for soil moisture condition in clay-shale landslide. Hydrological Processes, DOI: 10.1002/hyp.7980
Westhoff, M. C., T. A. Bogaard, and H. H. G. Savenije, 2011. Quantifying spatial and temporal discharge dynamics of an event in a first order stream, using Distributed Temperature Sensing, HESSD, Hydrol. Earth Syst. Sci., 15, 1945–1957, 2011. doi:10.5194/hess-15-1945-2011
Peters, E.T. J.-P. Malet, T.A. Bogaard (2010). Multi-sensor monitoring network for real-time landslide forecasts in early warning systems. Pp. 335-340. Proceeding conference on Mountain Risks: bringing science to society (Ed. J.-P Malet, T. Glade, N. Casagli). Florence 2010. ISBN 2-9518317-1-5
Malet, J.-P., Ulrich, P., Déprez, A., Masson, F., Lissak, C., Maquaire, O., 2011. Continuous monitoring and near-real time processing of GPS observations for landslide analysis: a methodological framework. In: Margottini, C., Canuti, P. Sassa, K. (Eds): Proceedings of the Second World Landslide Forum, 3-7 October 2011, Rome, Italy, Springer (to be published in 2012).
Co-funding 2012 :
- TUD: KulturRISKProject funded by the European Commission by the Seventh Framework Programme - co-funding provided: 2000 €.
- CNR-IDPA/IRPI: CHANGES project funded by the European Commission by the Seventh Framework Programme - co-funding provided: 2000 €.
- CNRS / RTM : La Valette DSS System funded bt DTT Alpes-de-Haute-Provence - co-funding provided: 2000 €.
Co-funding 2013:
- TUD: KulturRISKProject funded by the European Commission by the Seventh Framework Programme - co-funding provided: 1000 €.
- CNR-IDPA/IRPI: CHANGES project funded by the European Commission by the Seventh Framework Programme - co-funding provided: 2000 €.
- CNRS / RTM : La Valette DSS System funded bt DTT Alpes-de-Haute-Provence - co-funding provided: 1000 €.

RESULTS OBTAINED IN 2012

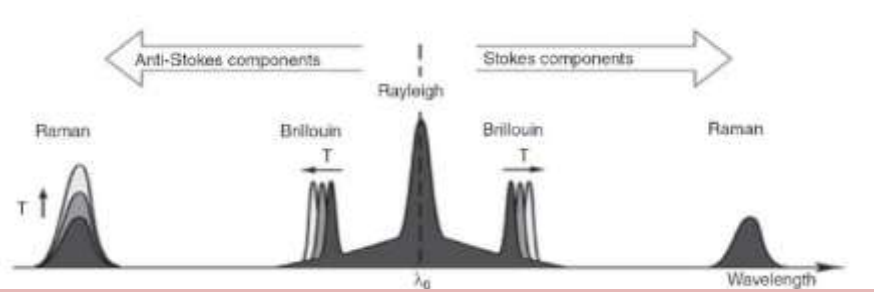
Work package 1 (prepared by CERG Strasbourg, France, TUD, CNRS, RTM*):*
Applicability and limitations of fiber optic cable technology for landslide and man-made structure monitoring
Associated deliverables:
1.1 Review on the use of FO cable technology for landslide and man-made structures monitoring (CERG)
1.2 Field experiment to test in practice the use of FO technology to monitor temperature, strains and acoustic signals on a landslide site in France (CERG)

Applications and limitations of fiber optic (FO) cable technology for landslide research

First, a thorough literature review was done to assess the applicability and limitations of FO cable technology. This review was focused but not limited to application in landslide research. Fiber optic cables have been developed in the telecommunication business to send large amounts of information over large distances with the speed of light. Because of the commercial application, production costs are relatively low. Using Fiber optics for measurements has several advantages: it is for instance immune to electromagnetic interference and can used in a wide range of applications; using Fiber optic cables as distributed measurement devices gives the opportunity to gain knowledge in different both engineering and science.
The review assessed the physical properties that can be measured and the physical background. The possibilities to measure physical phenomenon are abundant and before searching for new applications, it is important to know what is possible with Fiber optic cables. The table below shows the Fiber Optic technique and the physical property of light to measure.

Fiber Optic technique	What is measured
Amplitude modulated	Measuring the intensity losses of the light
Phase modulated	Measuring differences in phase of a lightwave
Polarization modulated	Measuring the total polarization of the light
frequency modulated	Measuring the changes in frequency of the light

The main form of application of Fiber Optic relates to the backscatter of light and the temperature (and strain) dependence of the backscatter wave forms (see figure below). Lastly, also the attenuation of energy is looked at as that influences the total range over which a Fiber Optic technique can be applied.



The different operational fiber optic measurement techniques are compared below.

Scattering	Rayleigh	Raman	Brillouin
Temp. sensitivity [% $°C^{-1}$]	0.54	0.8	0.01
Temp. range [°C]	5 to 110	0 to 70	-30 to 60
Accuracy [°C]	1	0.01[2]	1
Spatial resolution [m]	1	0.25[3]	3-5
Fiber length range [m]	170	1000	51000
Measurement time [s]	2.5	40	4
Strain [μm]	-	-	100

A full list of current applications is then reviewed, showing that applications are mainly concentrated in engineered structures (like dams) and for temperature monitoring in natural conditions. Limited applications are found that apply strain related measurements in natural conditions: the second year of the APO-funded project will focus on this.

Applications of multi-sensor technology for the hydrogeophysial monitoring of landslides

Introduction
Hydrogeophysics typically consists in the combination of hydrological and geophysical methods for a better understanding of hydrogeological systems. Among key petrophysical parameters that can provide time-lapse sections of the topsoil, we consider the electric conductivity for its sensitivity to soil water contents.
The study site is the Super-Sauze landslide (French Alps) largely documented and monitored since several years. Triggered in the 1960s, the landslide is representative of slope instabilities developed in clay-shales (Fig. 1a). Previous studies highlighted the importance of material rheology, bedrock geometry and changes in pore water pressures as controlling factors of the landslide kinematics. The latter is known to vary seasonally, with two rapid groundwater recharge episodes (spring and autumn) and a progressive drainage from June to April but the relation between water table levels and precipitations remain poorly understood (Malet, 2003).
Recently, Travelletti et al. (2011) showed the possibility to monitor the hydrological response of a weathered clay-

shale slope during a controlled rainfall experiment using time-lapse Electrical Resistivity Tomography (ERT). The high conductivity of the clayey soil generally results in poor resolution and sensitivity at depth. To avoid this problem, they used salt tracers and showed that it was possible to monitor water flows in the case of a simulated rainfall experiment, over short time periods.

In the present work, we consider a new electrical monitoring experiment at the Super-Sauze landslide dedicated to long period of monitoring (one year) under natural meteorological conditions. The monitoring is carried out along a profile located in the upper part of the landslide (Fig. 1b) within an area characterized by high displacement rates and several soil surface facies (with or without cracks, with different grain sizes and soil water conductivity). We present the experimental set up, and then show the first results in terms of electric resistivity but also streaming-potential (SP) and discuss about perspectives.

Setup of the GEOMON device on the Super-Sauze landslide

Contrary to most commercial systems that do not suit to permanent monitoring, the GEOMON4D resistivity monitoring system, developed by the Austrian Geological Survey (Vienna), was specifically designed for experiments needing high rate of data acquisition, records of full signal samples for noise detection, remote controlled management and automatic data transfer (Supper et al., 2002, 2003 & 2004). The device comprises 93 electrodes, separated in 24 injection and 69 potential electrodes. Their spacing, not regular, is 0.5, 1.0 or 2.0 m according to the cracking state of the topsoil for a total profile length of 113 m. 4300 quadripoles in a gradient array are acquired two times per day. SP measurements are also carried out every hour along the profile. The device is powered with a solar panel and an ethanol fuel cell (Fig. 1c) and the data are sent daily.

Wilkinson et al. (2010) show the importance of electrode movements in apparent resistivity measurement and propose to obtain displacement information directly from the resistivity data. Because our purpose is to monitor the underground water content through the electrical resistivity, we decided to monitor the electrode displacements independently. This is obtained by combining GPS campaign and time-lapse stereophotogrammetry. We equipped the 24 injection electrodes with 10 cm diameter white Styrofoam spheres on their top. Two high-resolution optical cameras were placed on stable crests nearby the profile; the cameras are spaced by 75 m and are able to monitor the displacement of the electrodes located 65 and 110 m downstream. The cameras are triggered every day at 12h, 14h and 16h so that the best picture (according to weather conditions and illumination) can be selected for the day. We monitor the electrode coordinate processing the pictures in four steps: (i) correction of the rigid camera movements (ii) detection of the white Styrofoam spheres centroïd plane coordinates based on a color detection algorithm (iii) correction of the lense distortion, and (iv) computation of the 3D global coordinate by stereo-restitution.

Multi-sensor instrumentation at the study site: a) Picture of the Super-Sauze landslide from 2006. b) Mean velocities and directions of horizontal displacements at the Super-Sauze landslide (modified from Amitrano et al., 2007). c) GEOMON4D device powered with a solar panel and an ethanol fuel cell.

The algorithm is tested on a period of one month in June 2012. During this period, we monitor the displacements of a permanent GPS antenna and show that the accuracy of the stereo-photogrammetry processing is 10 cm for the further electrode. Over this period, the profile had moved downhill between 50 cm and 76 cm. The obtained coordinate are then used in the ERT inversion.

In addition to the electrode displacements, other parameters are considered to correct possible effects on electrical resistivity changes as pointed by Travelletti et al (2011). Several hydrological sensors are set up along the profile to monitor soil temperature at several depths, groundwater conductivity, water temperature, and groundwater table level continuously at some places.

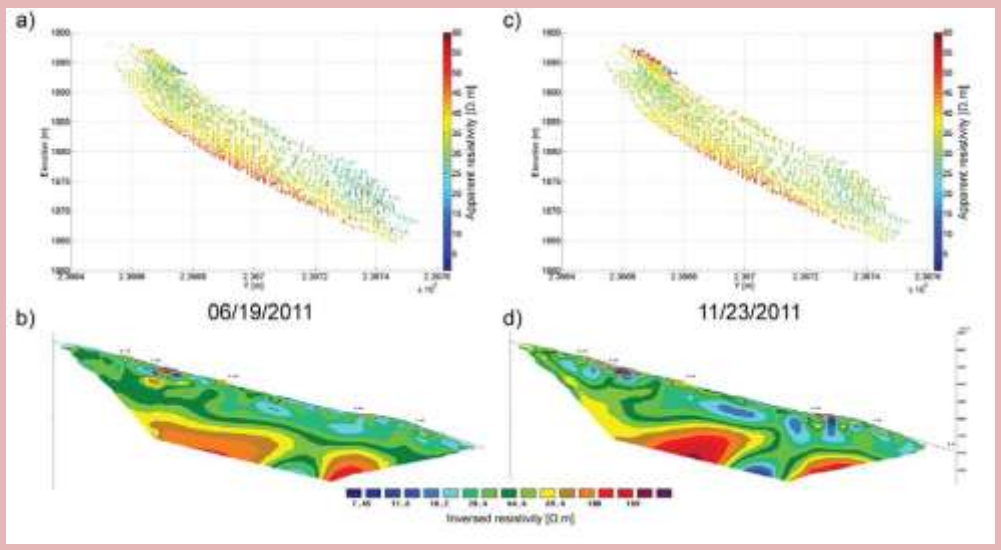
First results

They concern the electrical resistivity monitoring. Raw data are processed using three criteria:

- the measured voltage must be greater than 0.5 mV to ensure that the measure is not an ambient noise (e.g. magneto-telluric currents or sudden variations in streaming-potential);
- the error percentage between forward and reverse measurement must be lower than 15%, to ensure the good repeatability of the measurement;
- negative or null resistances are removed from the dataset.

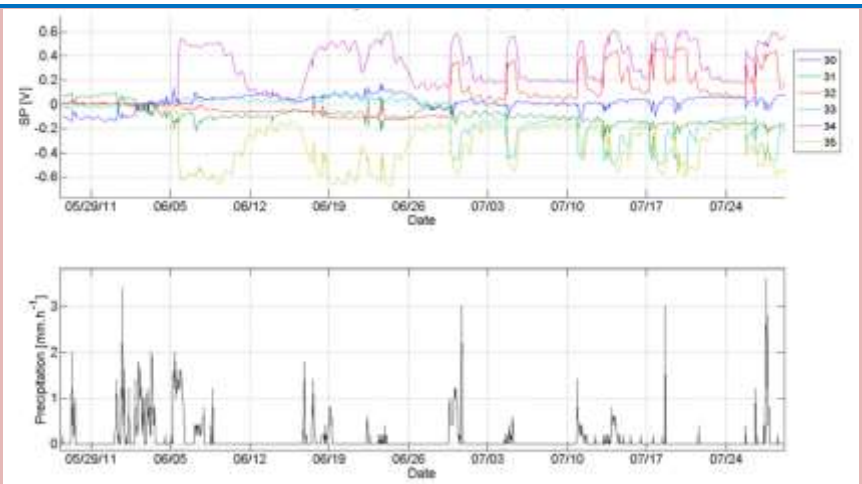
This pre-processing permits to select 98% of the initial data to be inverted. The remaining 2% of the initial data is

concentrated on a few quadripoles. Those low quality data appears to be more concentrated on dry periods an could be explained by a problem of contact between the electrodes and the ground due to shrinkage or swelling of the clay. This pre-processing allows verifying the coupling of the electrodes with the soil. Those problems can be periodically fixed when going back to the field.
Among 500 slices, we show the results at two very contrasting days. The figure below shows two pseudo-sections and the corresponding inverted sections with RES2DINV. Both dataset have been inverted in five iterations with a misfit function lower than 5%.



Apparent and inversed resistivities at different dates. a) Apparent resistivity from the 19th June 2011. b) Inversed resistivity from the 19th June 2011. c) Apparent resistivity from the 23th November 2011. d) Inversed resistivity from the 23th November 2011.

Although the two datasets have been inverted separately and with the conventional parameters of RES2DINV, we observe resistivity differences mostly located in the landslide layer. This can be attributed to large changes in the soil water content in the soil around the profile. More generally, apparent resistivity variations are noticeable during the six months of data. Some of them, for small quadripoles, are clear response to rainfall, and others show long wavelength variation. This first interpretation is done without consideration on the effect of temperature and groundwater conductivity that have to be considered when estimating actual water content from the resistivity.
Besides, the systems also provides the SP monitoring along the same profile; the figure belowshows a few dipoles. Although unpolarizable electrodes were not used, it seems by visual inspection that SP signals are stable enough and provides useful information. Indeed, their variations present different intensities, durations and are linked to some rainfall events (Fig. 3): a clear correlations is observed, for instance, on the 5th June 2011. Precise modelling of the SP do to the rainfall infiltration and groundwater flows would be necessary. Possibly, soil saturation plays a crucial role in these behaviors: Indeed, Allegre et al. (2012) has shown that coupling coefficient greatly depends on the water stauration, with smaller values at saturation than at lower saturation (at least in sand). Thus, SP data may provide important information on the infiltration that follows rainfall; both the observed time lag and the existence of non-appearance of SP response to rainfall could be related to the complex relation between rainfall and soil water content in the top soil.
SP monitoring from the 25th May to the 26th July 2011.a) SP voltage for 6 consecutive dipoles. b) Precipitation observed in the same period.



To monitor water flows in a clayey landslide, we monitor the electrical resistivity of the soil with time-lapse ERT technique. To allow a possible interpretation of the tomograms as groundwater content images, we also measured continuously the different parameters that affect apparent electrical resistivity (electrode movement, temperature and groundwater conductivity). The first results using the dataset of May-July 2011 show that apparent and inverted resistivities present low variations correlated with rainfall and large variations correlated with the increase of groundwater table. The GEOMON4D monitoring system also provides SP data which could be used to obtain information on the infiltration processes and the topsoil saturation. They could be used with the resistivity data to determine and classify the amplitude and durations of rainfalls which may lead to infiltration.

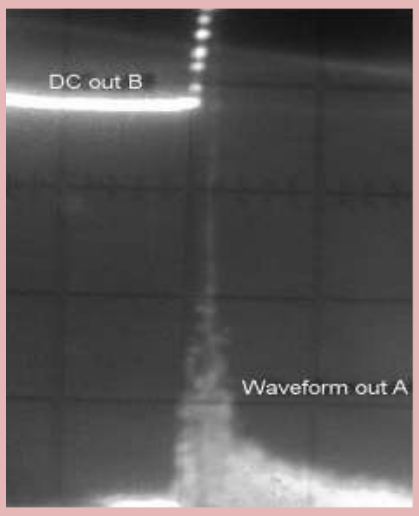
Work package 2 (prepared by GHHD Tbilisi, Georgia, CNRS*):*
Description:
Applicability and limitations of arrays of multi-sensor for the monitoring of landslide and man-made structures / Leader: GHHD
Associated deliverables:
D.2.1 Review on the use of displacement sensors for landslide and man-made structures monitoring (GHHD, CNRS)
D.2.2 1st stage implementation of the arrays of displacement sensors and telemetry at the Georgia test site, and pre-analysis of data (GHHD)

Modification of Loughborough University technique which is using acoustic sensor with gravel coating around waveguide

The goal of acoustic monitoring is to record acoustic signals generated by preliminary displacement of geologic formations before activation of the fast phase of landslides. The similar technique based on the recording of the acoustics generated by displacement in the gravel coating around acoustic sensor was earlier developed by Loughborough University team, but it demands drilling of relatively deep borehole down to the sliding surface. This procedure is quite expensive. Our objective was to develop a cost-effective version of the mentioned method. The idea is to use two sensitive acoustic probes grounded on different depths, one on the depth of several meters and other close to the day surface. The former probe is the basic and the role of latter one is to distinguish signals of surface origin, which in this case are considered as noise.

The probes are constructed from thick-wall stainless steel tube containing acoustic sensor (Fig.8). The length can be chosen according to the depth of investigation by screwing additional sections to the tube containing basic sensor. The length of these sections is 1.5 m; the maximal depth of probe is of the order of 4 m.
The upper part of the basic probe is manufactured as a cylinder rod with inclined cut. The precise finish of the cut surface guarantees good contact of acoustic sensor with probe tube. Investigation of various types of acoustic sensors in laboratory led to conclusion that for the frequency range of interest, i.e. frequencies generated by displacements in the gravel coating i.e. 5-25 KHz the best solution is the capacity capsule-microphone, glued with his sensitive membrane side to the surface of the upper end of the probe (Fig. 9b).
The whole electronic module, located in the upper part of the probe and consisting of capsule-microphone, filters and integrator schemes is seated into hermetic box to avoid environment impact. The hermetization of connection of electronic module to the probe tube is performed by the soft rubber in order to avoid damping and accordingly, decrease of acoustic signal amplitude (Fig.9c).
Electronic module consists of low-noise amplifier, buffer amplifiers of output for signal waveform A and precision peak-integrator and DC voltage output B for recording in the datalogger (Fig. 10 a,b). The integrator fixes in its memory the maximal value of obtained signal and after this the signal decays by the rate 5% per minute. Fixing on datalogger the readings with the sampling rate 1 per minute allow obtaining the necessary information on the variation of acoustic noise in the time domain.

Below is presented (Fig. 11) a real two-ray oscillogramm, where the acoustic burst arriving on the background of the ambient noise is visible as well as peak value of the signal from the output of the datalogger. It is evident that logger output fixes the peak output signal – the DC out B voltage increases rapidly according to the signal waveform out front.



A two-ray oscillogramm, where the acoustic burst arriving on the background of the ambient noise is visible as well as peak value of the signal from the output of the datalogger (clipped).

At present the system is tested in laboratory conditions.

Development of cost-effective telemetric system for real-time data communication from multi-sensor monitoring network to remote diagnostic centre

For the automation and telemetric data communication from multi-sensor monitoring network to remote diagnostic centre the GHHD and Institute of Geophysics prepared a technical project and the organization – "ALGO, ltd" was ordered to construct the real-time operating telemetric system. After laboratory testing the system was installed on the 360 m, 402 m and 475 m levels of the section 12 of the Enguri high arc dam for monitoring tiltmeter network data. The data acquisition and transmitting system (DAMWATCH) supports the collection of data in a form of an electronic data table and their transmission to the diagnostic center in Tbilisi for the further processing and analysis of the material. Though the system was developed for dam monitoring, it can be used for monitoring any dynamical system (constructions, bridges, landslide areas etc).

The system consists of several terminal controllers (in accordance to the quantity of points) and a central controller that is connected with the GSM/GPRS Modem (Fig. 8). The diagnostic center is equipped with a computer with a static IP address connected to Internet and supported by proper server programs. The number of the objects under monitoring and their geographic areas connected with one computer is limitless in the GSM/GPRS cover zones.

The terminal controller is a microprocessor with 3 similar inputs on the one hand and RS485 interface – on the other hand. The number of inputs may vary according to the tasks. The diagram of the figure 3 shows the controllers linked to a sensor that provide continuous measuring of the tilt X and Y components and the temperature T and their transformation into digital data. The terminal controllers are linked to the central controller by a RS485 bus-bar. The bus-bar is presented as a couple of overwound wires that are connected with all terminal and central controllers simultaneously. The permissible total length of the bus-bar is 1300 m. The maximal number of controllers connected to one bus-bar is 32.

The central controller receives information alternatively from the terminal controllers linked with the bus-bar, and then collects data in its memory and automatically transmits them by means of the modem in regular time intervals to the diagnostic center database. The transmitting time intervals are defined according to tasks and vary from one minute to several days. An extraordinary transmission of data from the objects is possible as well. The transmission is fulfilled by means of GSM/GPRS service that is quite necessary for the monitoring processes.

The central controller in the data exchange process functions as FTP client by means of the GSM/GPRS modem, and the computer in the diagnostic center is supported by FTP server and a special utility that provides the input of the data received from the client into the database. The central controller is operated and configured by SMS directives from the research center.

The database records the arrival time and the ordinal number of the data. Moreover, it informs about presence or absence of electric power as for the central controller as well for each terminal controllers. In case of electric failure the controllers are fed from the local batteries. The memory size of the central controller is 262144 bytes. In case of 3 terminal controllers the average size needed by one datum is 105 bytes. Thus, in a minute data transmission regime the whole memory is sufficient to save information during 41 hours.

After processing the data we obtain information about the dam tilts in angle seconds or about its displacement against the dam axis according to the current technical and tectonic processes practically in real time – with delay depending on technical details. It is evident that the accurate data received in short time intervals from multi-sensor will give huge information about the technical state of the construction. There is no problem in applying this system for multi-sensor monitoring of landslides and debris-flows.

Work package 3 (prepared by CERG Strasbourg, France , CNR-IDPA, CNR-IRPI, CNRS):
Description:
Development of a simple DSS system to manage the dataflow and identify thresholds in the time series
Associated deliverables:
D.3.1. Review of existing DSS system used to manage data acquired on landslides and man-made structures (CERG, CNR-IDPA, CNR-IRPI, GHHD) - M+6
D.3.2. Guidelines for the development of a simple operational; DSS - Definition of functionalities (CERG, CNR-IDPA, CNR-IRPI, GHHD) - M+12

Translate of the observations and the analyzed signals into a simple DSS able to visualize the data

On the basis of past experience, the priority is to design and make available solutions easy to use. Starting from this assumption, the proposed system has been designed in order to improve the capacity of local authorities to cope with natural disaster preparedness and response activities by acknowledging some important demands, needs, and policies from the expected final users. The system architecture (in terms of functionalities and characteristics) is based on the outcomes of some user's requirements meetings in which the stakeholders have specified their desiderata. Specifically, during these meetings, the actors that will interact with the system have been identified and the roles they play specified. The actors comprise the various types of stakeholders, system administrators, information providers, experts and any other external programs and data sources which interact with the system.
To this end, some system prototypes have been defined and submitted to the stakeholders and potential actors for their feedback and refinement. Based on the outcomes of this first step, the system architecture has been defined, including all components and considering their interactions. The system hereafter described provides tools able to identify and prepare people in charge to take actions, define the activities to be performed, be aware of available resources and optimize the communication system for data transfer and sharing. In this way, the system can help to plan in advance response and rescue to disaster-related emergency anticipating, as far as possible, the demand for disaster relief operations. This will rely on the main requirements and actions expected for each phase of the emergency concerning different risk scenarios. The signals derived from FO cables will be the input to give the start of the procedure managed by the system that is able to activate a flow of response actions according to pre-defined thresholds and on the base of the legislative framework in charge in each country involved in this project.
The system has been designed and tested in a Consortium of Mountain Municipalities (Valtellina di Tirano, Central Alps, Northern Italy) that has been affected by natural disasters over the past years, experiencing significant losses. Nowadays, the system is in full operation at a municipal and inter-municipal level, continuously updated by local end-users and it is expected to significantly improve the capacity of the community to face the negative effects of prospective disasters by organizing the delivery of timely response, rescue, relief and assistance activities. It is expected that the same system will be operational in a short time at Barcelonnette municipality, the largest town in the Ubaye Valley, given that many work phases (hazard and risk scenario definition, inventory of elements at risk, list of strategic resources and structures available for response and rescue, collection of Laws and Decrees concerning Civil Protection matters, etc.) have already be accomplished.

MANQUE GRAPHIQUE!

Emergency workflow. A detail of the main procedural steps related to Code 4 – hydrogeological critical state "Emergency" (in compliance with the regulations in Lombardy Region) is represented. Four other workflows are available for hydrogeological risks: from Code 0 – hydrogeological critical state "Null" to Code 3 – hydrogeological critical state "High".

Dissemination of project results
Gance, J., Sailhac, P., Malet, J.-P., Supper, r., Jochum, B., Ottowitz, D., Grandjean, G. 2012. Electrical Monitoring of the Super-Sauze Landslide (French Alps). Near Surface Geoscience 2012 – 18th European Meeting of Environmental and Engineering Geophysics, Paris, France, 3-5 September 2012 [Poster presentation]
Bogaard, T.A., Wenker, K., Malet, J.-P. 2013. A search for applications of Fiber Optics in early warning systems for natural hazards. EGU 2013 General Assembly, Vienna, 7-13 April 2013.

ACTIVITIES PLANNED IN 2013 (split by partner)
Working package 1 (prepared by CERG Strasbourg, France TUD, CNRS, RTM*):*
Description: Applicability and limitations of FO cable technology for landslide and man-made structure monitoring / Leader: CERG
Associated deliverables:
D.1.3 Writing of a joint publication (CERG, TUD, CNRS, RTM) -M+24
Work package 2 (prepared by GHHD Tbilisi, Georgia, CERG Strasbourg, France, CNRS):
Description:
Applicability and limitations of arrays of multi-sensor for the monitoring of landslide and man-made structures / Leader: GHHD
Associated deliverables:

D.2.3 2nd stage implementation of the arrays of displacement sensors and telemetry at the Georgia test site (GHHD) - M+18
D2.4 Analysis of data, and integration in the DSS system (GHHD, CERG, & CNRS) - M+21

Work package 3 (prepared by CERG Strasbourg, France, CNR-IDPA, CNR-IRPI):

Description:

Development of a simple DSS system to manage the dataflow and identify thresholds in the time series

Associated deliverables:

D.3.3 Development of the DSS system (CERG, CNRS, CNR-IDPA) - M+18
D.3.4 Integration of all the data and test of the system to identify trends and thresholds (CERG, CNRS, RTM) - M+24
D.3.5 Writing of a joint publication (CERG, CNRS, CNR-IDPA) -M+24

Work package 4 (prepared by CERG Strasbourg, France*)*:

Description:

Project management

Associated deliverables:

D.4.3 Mid-term project meeting with all participants - M+14
D.4.4. Project reporting (CERG) - M+24

FINANCING FOR 2013

EUR-OPA : € 13000
Split between partners : € 6000 for CERG Strasbourg, France
€ 7000 for GHHD Tbilisi, Georgia
Other contributors: € 4000 from CNRS, TUD & CNR-IDPA, CNR-IRPI

SURVIVING DISASTERS: A POCKET GUIDE FOR CITIZENS

DURATION: ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 1.A. Assessment of events and population alert

TITLE OF THE PROJECT : Surviving disasters: a pocket guide for citizens

TARGET COUNTRIES : Algeria, Azerbaijan, Belgium, Bulgaria, Cyprus, France, Georgia, Germany, Greece, San Marino, Luxemburg, Italy, Malta, Armenia, Moldova, Ukraine, Morocco, Portugal, Romania, Russian Federation, France, Macedonia, Spain, Turkey

PARTNERS INVOLVED :

COORDINATING CENTRE : CEMEC San Marino

OTHER CENTRES: TESEC Kiev, Ukraine; GHHD Tbilisi, Georgia; ECRM Yerevan, Armenia ; CUEBC Ravello, Italy

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :
Produce and circulate an handbook on emergencies including basic vital information about the main natural and technological hazards

Specific yearly objectives :

2012 :
Publishing English and French versions on the BeSafeNet web site.

2013 :
Publishing multilingual version on the BeSafeNet web site.

EXPECTED RESULTS

2012 :
Publishing English and French versions on the BeSafeNet web site

2013 :
Publishing multilingual version on the BeSafeNet web site.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by CEMEC, TESEC):
Description:
Hazards list definition and Task 1 action plan

The set of hazards already addressed is:
1.1 Urban Fires
1.2 Bushfires
1.3 Earthquake
1.4 Landslides
1.5 Slips
1.6 Floods
1.7 Toxic Gases Incidents and Leaks
1.8 CBRN events
Tsunami, Hurricanes and tornadoes, Extreme cold and Extreme heat will be dealt with in 2013.

TESEC
Being aware of possible natural and technological risks is vital for general population potentially involved in disasters. Although public awareness initiatives about disasters and major risks have been carried out in several countries, knowledge about safety measures, first aid and prevention is still lacking or insufficient. In addition, information material currently available has been produced by local agencies and institutions without taking into account additional and different expertise provided at an international level.
The SurvDis project will produce and circulate a handbook on emergencies including basic vital information about the main natural and technological hazards.
In 2012 the local knowledge (civil protection, civil defence) about already existing handbooks and guidelines has been collected and analysed. Proposals for English version have been prepared.

Work package 2 (prepared by CEMEC, GHHD):
Description:
Gathering local knowledge

Active discussions have been carried out among participating centers both by e-mail and face-to-face.
Participating centers have agreed about three major points:

- Basic information and advices for population in case of disaster can be shared among different European countries.
- Further (more detailed) information and advices for population in case of disaster must be tailored on local realities, laws and legislations.
- Both basic and detailed information for population must be provided in general terms and should not be considered as alternative or substitution of local procedures and protocols.

GHHD

Georgia is prone to all catastrophes, characteristic for mountainous countries (1-12). In the last two decades occurred the following large-scale natural disasters: avalanches in North Georgia, landslides in a mountainous Achara and Racha, flash floods, hurricanes and drought in the West and East Georgia, Racha earthquake of 1991 and Tbilisi Earthquake of 2002. These phenomena are very special both from ecological and from social-economical points of view. By the index of disaster risk obtained by UNDP, Georgia relates to the countries with medium and high level risk. So the natural disasters in Georgia have to be considered as a standing negative factor for the development process of the country. Such approach implies necessity of more active actions to reduce the risk of natural disasters by all possible means at each level to maintain the sustainable economic development of the country.
It is known that Georgia experienced significant losses, due to following natural hazards: earthquakes, landslides, debris flows, avalanches, floods and flashfloods, hurricanes, droughts, hail storms.
Average annual economic losses in Georgia: 84% of economic losses come from EQ-s (Push, 2004).
During the soviet time, some handbooks and guidelines, prepared by Institute of Geophysics, Seismic Survey of Georgia and Emergency Department of Ministry of Internal Affairs, were issued in Georgia. Significant errors in economic loss assessment by some sources have been discovered.
Earthquakes.
Earthquakes are the most destructive natural events in Georgia. The total economic losses from earthquakes in 1990-2010 years are of the order of 10 billion USD (not 350 USD as erroneously is assessed in (6)). The map of probabilistic seismic hazards for territory of Georgia (for the 2% probability of exceedance in 50 years), accepted as an official document in national building codes is shown in Fig. 3. It is evident that almost whole Georgia, including capital city Tbilisi is prone to Intensity shaking I = 8 and almost 50% - to Intensity I = 9 , which means that population should have a basic knowledge on surviving in case of strong EQ.
Landslides, debris flows
Up to now around 53,000 landslide phenomena and around 3,000 mudflows susceptible water channels and processes have been recorded in the territory of Georgia, where around 3,000 settlement units are considered to be at substantial risk of hazards. Since 1968 he human loss due to these geological disasters exceeded 1000. From 1995 to 2010 occur 5700 landslide events, which caused 39 human losses; corresponding numbers for mudflow events in the same time period are 2016 and 49. The total economic losses from both landslides and mudflows in this period amounts to 650 USD. Fig. 4, 5 present landslide and mudflow hazard for Georgia (http://drm.cenn.org).
Floods and flashfloods
The territory of Georgia is characterized by floods and flash floods (Fig. 7). In total, from 1995 t0 2010 there were documented 164 floods/flashfloods which caused 270 million USD losses and 24 casualities.
Hurricanes
A map of observed hurricanes in Georgia is presented.
Droughts
In Georgia, drought damages arid, semi-arid and semi-humid lands as the phase of increased consumption of water by plants does not coincide with the phase of increased precipitation. Major recurrence of droughts is observed during July-August in Eastern Georgia, while in western Georgia the same happens during April-May. Days are deemed droughty when the precipitation is less than 5 mm, the relative humidity is less than 30% and the average temperature is more than 25°C. The quality of aridity has been defined on the basis of the difference between the precipitation and water-consumption by plants and the index of humidity within the plant vegetation period (April-September) (NEA).
Hail Storms
In Georgia, hailstorms are observed on a seasonal basis throughout the entire territory of the country. Their intensity and frequency is extremely high in Eastern Georgia. From 5 to 15 cases of this event are annually recorded in Georgia, as a result of which, from 0.7% to 8.0% of agricultural land is destroyed. The years of 1983, 1987, 1993 and 1997 have been notable for the extreme frequency and intensity of hailstorms. According to incomplete data, the damage to the Country caused by hailstorms over the last 13 years exceeds GEL 140 million.

SOS-phones, which you need in case of emergency in Georgia (country code +995 32)

(Fire emergency)	011
Police	022
Ambulance	- 033
Gas emergency	04
Emergency Management Department, Ministry of Internal Affairs	2411852

Water emergency	2931111
Geological disaster department,	
Ministry of Environment	2439547
Seismic monitoring centre	2390091

Work package 3 (prepared by CEMEC, ECRM):
Description:
Designing EUR-OPA knowledge

Active discussions have been carried out among participating centers both by e-mail and face-to-face. It has been outlined that a booklet on emergencies preparedness and management is not a news, generally speaking; nevertheless, The "Surviving disasters: a pocket guide for citizens" booklet is the EUR-OPA message and version.
Significant discussions have been carried out among participating Centers and other EUR-OPA centers as well about the appropriate ways to circulate and promote the booklet. It has been agreed to implement an electronic version of the booklet accessible by smartphones and tablets. This will allow people to know local procedures in case of disaster when travelling in Europe.

ECRM
ECRM has prepared some relevant information materials, addressing awareness raising of the population about possible natural and man- made risks. There were created information materials, containing some brief information about the most devastating natural events typical of Armenia, the Southern Caucasus region, as well as of other countries, representing partner-centres of the present Project, however alongside with other country-members of the EUR-OPA Agreement. This brief information concerns such natural events as: earthquakes, floods, landslides, mudflows, avalanches, storms, and hurricanes in line with man-made hazards such as: accidents with the involvement of chemical substances and nuclear hazard. At the same time there were designed more detailed information materials, concerning calamities being the most devastating for Armenia, such as: earthquakes, floods, chemical and radiological (nuclear) accidents.
Being more precise, the drafts of these more detailed information materials were developed by support of the EUR-OPA Major Hazards Agreement within the pilot Project: "National and Municipal Campaigns on informing and warning the population at central and municipal levels about emergencies".
In 2012 from a pilot Project there were selected, further worked out and updated three additional information Modules (brochures), assigned for the municipalities at special risks: one for the municipalities at possible radiological risk; second for the municipalities, in whose territories some hazardous substances are being produced, utilized or stored; third one for the municipalities located in flood prone vicinities (with reservoirs adjacent to an inundation area), and at last also an information Module, assigned for the municipalities situated in earthquake prone areas.
Value, usefulness and possibility for these information materials to be used at both: further working on a final variant of the joint Project: "Surviving disasters: a pocket guide for the citizens" (SurvDis), as well as while preparing, on its basis, a pocket guide for Armenia, are based on the facts that:

- information, contained in them, in full corresponds to the aim, objectives and expected results of the SurvDis project;
- these materials have been created by given the both: specifics of Armenia and rich international experience, accumulated by different countries.

These information materials have been collected through involvement of some information sources, concerning:

- hazards of natural, man-made and other nature present in the Republic, its regions and areas, where the citizens live as well as hazards typical of other partner-countries;
- the degree of vulnerability of communities and level of risks, that communities are exposed to;
- likely specific disaster scenarios ;
- mechanisms and tools, used to inform and warn the population about disasters;
- how to prepare beforehand for a likely disaster and to act adequately in times of a specific disaster;
- behavior patterns when informed and warned about an impending disaster (in the preventive phase) and at the actual emergency situation (in the acute phase), as well as how to proceed in a recovery phase.

At this stage, the Project coordinating Centre CEMEC has sent us an English version of the above draft " Surviving disasters: a pocket guide for the citizens" (SurvDis). At present we are translating it Armenian, with further comparing it with the relevant information materials created in ECRM and available in the Republic of Armenia in the above area, will make some proposals in order to develop a final draft Project, as well to prepare, drawn on its basis, a "Pocket Guide for Armenia". Simultaneously we have submitted to the CEMEC the "BRIEF INFORMATION on information materials for AWARENESS RAISING OF THE POPULATION about possible natural and man-made risks" created by ECRM in 2012 within the framework of the Project "Surviving disasters: a pocket guide for citizens".

Work package 4 (prepared by CEMEC, CUEBC):
Description:
Implementing English and French electronic version

The Graphic Layout of the booklet has included simple comics and vignettes which visually reinforce the concepts included in the text.

The European University Centre for Cultural Heritage has been involved in CEMEC San Marino in the production of the booklet "Surviving Distaters: a pocket guide for citizens - Surviving Disaster pocket guide for citizens - Sopravvivere allle catastrofi: a vademecum per i cittadini" by ensuring the French translation by Centre staff and the revision of the text by a person whose mother tongue is French.
The English and French versions have been presented during the Meeting of the Directors of Centers held in Paris on December 4 and 5. Simplicity, immediacy, originality, legibility of the booklet have been outlined and appreciated. Several Centers have provided availability for translation in more European Languages (Arabic, Portuguese, Spanish).

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by CEMEC, ECRM, TESEC, CUEBC, GHHD)*:*
Description:
Collecting partners able and willing to translate in their own native language
Associated deliverables:
Work package 2 (prepared by CEMEC, TESEC, ECRM, CUEBC, GHHD)*:*
Description:
Implementing multilingual electronic versions
Associated deliverables:
Work package 3 (prepared by CEMEC)*:*
Description:
Publishing multilingual versions on the BeSafeNet web site
Associated deliverables:

FINANCING FOR 2013

EUR-OPA : € 25000
Split between partners : € 11000 for CEMEC San Marino
€ 3500 for ECRM Yerevan, Armenia
€ 3500 for CUEBC Ravello, Italy
€ 3500 for GHHD Tbilisi, Georgia
€ 3500 for TESEC Kiev, Ukraine

1.B. Networking between governments

PROPOSAL OF A REGIONAL AGREEMENT ON FIRE MANAGEMENT TRANSBOUNDARY COOPERATION

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 1.B. Networking between governments

TITLE OF THE PROJECT : Preparation of a proposal for a Regional Agreement on Transboundary Cooperation in Fire Management (for CoE / UNECE Member States)

TARGET COUNTRIES : CoE and UNECE Member States

PARTNERS INVOLVED :

COORDINATING CENTRE : GFMC Freiburg, Germany

OTHER CENTRES: ECFF Athens, Greece

OTHER PARTNERS : Regional Fire Monitoring Center (RFMC), Skopje, Macedonia

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

In 2010-2011 first suggestions have been developed by fire management experts from CoE and UNECE member states to develop a proposal for "Regional Agreement on Cross-Boundary Cooperation in Fire Management". This proposal has to be seen under the light of changes of land use, climate and socio-economic conditions in the past decade in the member States of the region, which have resulted in an increasing vulnerability of forests and open landscapes, including actively managed or abandoned agricultural and pasture lands, as well as wetlands / pit lands ecosystems. At the same time an increasing vulnerability of society to become affected by fires burning at the interface of urban and other residential areas is noted. Air pollution generated by wildfires is an increasing problem for human health and security in many UNECE member states. In order to meet the increasing threats of wildfires CoE / UNECE member states need to address the challenges arising from the consequences of changing environmental, climate and socio-economic conditions on forests. Public policies affecting forest fires need to be reviewed and adapted to changing and changed environmental and socio-economic conditions. International cooperation in fire management offers solutions to exchange expertise and enhance effectiveness of international collaboration during emergency situations. Together with the UNECE Forestry and Timber Section (Geneva) and the UNECE / FAO Team of Specialists on Forest Fire (which is chaired by GFMC) a Forum will be prepared and convened in Geneva in which Team members and delegates from governments will discuss and agree on a proposal for an agreement.

Specific yearly objectives :

2012:

Continuation of the preparatory process, which was initiated in 2010-11. Some selected delegates from member countries will meet at GFMC in 2012 in the frame of the Joint Meetings of the Global Wildland Fire Network / UNISDR Wildland Fire Advisory Group. ECFF and RFMC staff to work for short periods at GFMC to support preparatory process.

2013:

The Forum "Cross-Boundary Cooperation in Fire Management" will be held and followed up.

EXPECTED RESULTS

2012:

Advisory support by fire management experts from the region will be solicited at the Meeting in Freiburg (GFMC) in June/July 2012.

2013:

The Forum "Cross-Boundary Cooperation in Fire Management" has been held and resulted in a proposal on a voluntary agreement, which may become a voluntary or a legal agreement, or a chapter to a convention.

RESULTS OBTAINED PREVIOUSLY (if any)

Various meetings have been held by GFMC in 2010-2011 to solicit statements, proposals, etc. towards developing a regional agreement. A questionnaire has been drafted to be circulated to CoE / UNECE member states in preparation of the Forum.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by GFMC, ECFF, RFMC):

Description:

Preparing / organizing (with the support of . ECFF and RFMC) the different steps in convening the Forum in 2013 at the UN in Geneva. Additional fire management experts from Council of Europe / UNECE member states will also be

called in (FYROM, Russia, Ukraine), as well as three or four experts from South Asia, Central America and Africa where regional strategies for fire management are in place or developed.
Associated deliverables:
Recommendation of the consultation to be forwarded to UNECE for the next steps of preparing the Forum.

Tthe Global Fire Monitoring Center (GFMC) continued to prepare the concept for the development of a regional voluntary or legal agreement on transboundary cooperation in fire management, a multi-year endeavor.
The activities concentrated on the final preparation for the project "UNECE-FAO / CoE Regional Forum on Cross-boundary Fire Management" which is aiming at the development for a proposal for a "Regional Agreement on Cross-boundary Cooperation in Fire Management in the UNECE Region", to be associated with EUR-OPA agreement, UNISDR and OSCE.
This proposal has to be seen under the light of changes of land use, climate and socio-economic conditions in the past decade in the member States of the region, which have resulted in an increasing vulnerability of forests and open landscapes, including actively managed or abandoned agricultural and pasture lands, as well as wetlands / peatland ecosystems. At the same time an increasing vulnerability of society to become affected by fires burning at the interface of urban and other residential areas is noted. Air pollution generated by wildfires is an increasing problem for human health and security in many UNECE member states.
In order to meet the increasing threats of wildfires CoE / UNECE member states need to address the challenges arising from the consequences of changing environmental, climate and socio-economic conditions on forests. Public policies affecting forest fires need to be reviewed and adapted to changing and changed environmental and socio-economic conditions. International cooperation in fire management offers solutions to exchange expertise and enhance effectiveness of international collaboration during emergency situations. Together with the UNECE Forestry and Timber Section (Geneva) and the UNECE / FAO Team of Specialists on Forest Fire (which is chaired by GFMC) a Forum will be prepared and convened in Geneva in which Team members and delegates from governments will discuss and agree on a proposal for an agreement.
In June 2012, in conjunction with the biennial meeting of the UNISDR Wildland Fire Advisory Group, the GFMC invited experts from the Council of Europe member states as well as additional resource persons experienced in the development of border-crossing agreements for cooperation in fire management from outside Europe, to finalize the proposal for the Forum and the development of the agreement.
A revised proposal has been formulated now by the delegates and submitted, through the UNECE/FAO Timber Section, Geneva, to the Government of Germany. Based on the comments by the German GIZ (on behalf of the Federal Ministry for Agriculture) another revision of the proposal and financial matrix is underway in November 2012.
The project objectives include:
1. Prepare an in-depth analysis of:
- the key factors determining contemporary and expected future forest fire problems in the UNECE region, e.g. those that are newly arising from changes in land use, socioeconomical conditions and climate and which are threatening sustainable forest management;
- the state of current and need for future public policies to address the underlying causes of fire problems in the region
2. Development of guidelines for international cooperation in fire management (ground, aerial)
3. Representatives of UNECE / CoE member states to discuss the analysis and the draft guidelines in a Forum and to develop recommendations for national action and international response, e.g. for a regional agreement on cross-boundary cooperation in fire management.
4. Representatives of other regions to provide expertise in developing formal and informal bilateral and multilateral agreements on transboundary cooperation in fire management.
The Government of Germany has indicated in October 2012 to provide up to ca. € 370,000 for this project for implementation between January 2013 and June 2014.
While the report of the CoE-sponsored meeting in Freiburg is not yet ready, one of the major outputs was the discussion, modification and endorsement of the draft paper "Integrating the Management of Wildfire-related Risks in Rural Land and Forest Management Legislation and Policies" discussed and in its draft version endorsed by the WFAG meeting (Annex I). This paper has been submitted to FAO Committee on Forestry (COFO), the governing body of the FAO Forestry Department, in September 2012.
As pointed out in the proposal for this 2012 activity, in 2010-2011 first suggestions have been developed by fire management experts from CoE and UNECE member states to develop a proposal for "Regional Agreement on Cross-Boundary Cooperation in Fire Management".
The decision to postpone "UNECE-FAO / CoE Regional Forum on Cross-boundary Fire Management" to 2013 brought a delay of the political process but has not slowed down the preparatory work. With the submission of the revised financing proposal by UNECE to the German Government for preparing and organizing the Forum in Geneva or Krasnoyarsk (Russian Federation) in November 2013, there is a progress towards implementation of the plans developed since 2010. Once again, the interim financing of the dedicated work through the Administrative Arrangement by EUR-OPA was important and instrumental in order to further develop this process was successful in 2012.

Embedding the UNECE / CoE activities and Forum in the global context
It is clearly envisaged to utilize the upcoming Forum to take the lead globally in the development of a regional agreement and to embed this activity in the global development that is facilitated by GFMC. Besides inviting

representatives from other regions (cf. bullet 4 on top) it is now considered to call for an attached 1-day International Wildland fire Summit.
To prepare the Summit a dedicated Special Event is now requested to be held at the GPDRR in Geneva, May 2013. This Special event, tentatively entitled "Strengthening Cooperation of the United Nations and International Organizations in Wildland Fire Management" would follow the first informal UN Interagency Meeting on Cooperation in Fire Management, which was held 29 June 2012 at the United Nations Geneva and preceded the WFAG meeting in Freiburg (CoE was invited but had to apologize; the Secretary General of the EUR-OPA had provided a letter [dated 27 June 2012] to the meeting in which he proposed that the 2013 Forum would become a global character [cf. separate Attachment 01]). For the preparation of the Special Event the GFMC has reviewed the role of UN agencies and international organizations in the field of fire management (cf. separate Attachment 02, CoE / EUR-OPA activities mentioned in several contexts and in detail in section 3.2. [p. 19]).
At this event the "UN White Paper on Vegetation Fires and Global Change", which is now in its final stage of preparation, will be presented publicly.
This White Paper, for which the UNISDR Wildland Fire Advisory Group (WFAG) members contributed significantly, will be published by Springer (Dordrecht, Netherlands) in late 2012 or early 2013, and represent a contribution of WFAG to the UN and the international community (Annex II).

Work package 2 (prepared by GFMC):
Description:
Provision of seed funding to establish the REEFM in a room at the National University of Life and Environmental Sciences of Ukraine (Kiev), basic renovation, furniture and IT (PCs, internet connection).

In order to support and facilitate the dialogue with Eastern European countries, at the same time by strengthening the overall capacity of regional fire monitoring and policy support in Eastern Europe, a small nucleus for the establishment of a Regional Eastern European Fire Monitoring Center (REEFMC) was proposed to be established at the National University of Life and Environmental Sciences of Ukraine (Kiev, Ukraine). The Center would follow the successful example of the building the Regional Fire Monitoring Center in SE Europe / Caucasus (Skopje, FYROM) through EUR-OPA funding in 2010.
Parts of the 2012 budget were used to prepare the designated leader of the REEFMC, Prof. Dr. Sergiy Zibtsev, to familiarize himself with the administrative and conceptual environment of the UN and international organizations. A modest contribution of 1225 Euro has been made available to the National University of Life and Environmental Sciences of Ukraine to set up a special space for the REEFMC (by investing in infrastructure).
The establishment of the REEFMC fuelled the discussion about the need and prospects of establishing similar Centers in other regions of the world. The request by South Africa and the ongoing work to build a Regional Fire Monitoring Center for Central Asia (in Mongolia) was the reason to develop a paper on the roles and mandates of Regional Fire Monitoring Centers, following the examples of the EUR-OPA-sponsored Centers in SE Europe and Eastern Europe.

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by GFMC*):*
Description:
The three Centers will work together in the organization / realization of the Forum and the follow up. All travel costs cov by this project will be administered by GFMC.
Associated deliverables:
Forum has been held and report delivered to Council of Europe and UNECE.

FINANCING FOR 2013

EUR-OPA : € 13500
Split between partners : € 13500 for GFMC Freiburg, Germany
Other contributors: € 375 from UNECE. A proposal has been submitted to government of Germany in 2011, requesting ca. € 375,000, to be used by GFMC in the preparation and realization of the Forum (since time has progressed the amount requested may decrease).

1.C. Disaster medecine and psycho-social preparedness

2. USING KNOWLEDGE TO REDUCE VULNERABILITY

2.A. Knowledge diffusion

GUIDELINES FOR THE DEFENSE OF RURAL POPULATIONS, SETTLEMENTS AND OTHER ASSETS AGAINST WILDFIRES AND SMOKE POLLUTION

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.A. Knowledge diffusion

TITLE OF THE PROJECT : Development of Guidelines for the Defense of Rural Populations, Settlements and other Assets Against Wildfires and Smoke Pollution

TARGET COUNTRIES :

PARTNERS INVOLVED :

COORDINATING CENTRE : ECFF Athens, Greece

OTHER CENTRES: GFMC Freiburg, Germany

OTHER PARTNERS : Regional Fire Monitoring Center (RFMC), Skopje, FYROM

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

Collaborative work between the 3 Centers will result in the development and first publication (ENG) of "Guidelines for Defense of Rural Populations, Settlements and other Assets Against Wildfires". This project will address the wildfire threats of rural settlements (villages, towns, scattered farmsteads) and other rural assets (agricultural fields / crops, infrastructures and other values at risk), which in some regions of Europe / Mediterranean are increasingly endangered by wildfires due to rural exodus, weakening of rural work force and self-protection ability, and increasing wildfire hazard on abandoned lands. Vice-versa, increasing industrialization and concentration of populations in some areas exert a high pressure on natural resources for land use change, which is reflected by the high frequency of arson and 'unknown'-cause fires in the wildlands. The intermix of human settlements with natural ecosystems in many places create severe wildland / urban interface fire problems, which have become a major issue of political debate and confrontation. The Guidelines will be designed to provide information to local inhabitants (incl. farmers, community leaders / mayors, local fire service units, volunteer fire-fighters and village defence committees) with state-of-the-art information on wildfire damage prevention measures, and defense of wildfires threatening settlements and rural assets. Furthermore, the guidelines will provide information to the residents how to apply all fire safety regulations for their house (clearing vegetation, provide extra sources of water, use appropriate building materials, etc.) and to protect the communities against the adverse effects of vegetation fire smoke pollution on human health and security. Also, the issue of unexploded ordnance (UXO) will be addressed since many forest sites and non-forest lands in SE Europe and the Balkan region are contaminated by land mines and unexploded ordnance (UXO) stemming from recent conflicts. The relevance of the expected outcomes will be high for all CIS member states.

Specific yearly objectives :

2012 :

Collection of materials to be processed for the development of guidelines, bringing fire experts from SE Europe together in a regional workshop, co-organized by the 3 centers.

2013 :

Production of guidelines, with a second final workshop in the region

EXPECTED RESULTS

2012 :

State-of-the-art material collected; expert inputs by Workshop I are solicited.

2013 :

Final product of Guidelines (ENG) will be reviewed by experts from Greece, FYROM, Russia, Bulgaria, Turkey, and from specialists from other countries, including one or several invited specialists from North America (t.b.d.) (Workshop II). The Guidelines will be accompanied by a homeowner checklist ("How to make your home forest fire safe") and by a 10-minutes video presenting home & health protection guidelines. The Guidelines will also be accompanied by an example of a map of distribution of UXO and land mines (wherever exist), and instructions about precautionary measures and to how to respond during the wildfires.

RESULTS OBTAINED PREVIOUSLY (if any)

General expertise available. Mediterranean: Aristotelion University, Thessaloniki, Greece. Eastern Europe / EECCA: Specific human health threats by fire smoke emissions have been addressed by ECFF. Community-Based Fire Managment: GFMC expertise from countries worldwide. Cooperation between state agencies and civil society organizations including volunteers: RFMC.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECFF, GFMC, RFMC):
Description:
Development of the guidelines
Associated deliverables:
State of the art draft material

The development of the Guidelines is a collaborative project between the Global Fire Monitoring Center (GFMC) with and through its associated Regional Southeast Europe / Caucasus Fire Monitoring Center (RFMC) and the European Center for Forest Fires (ECFF). The Guidelines will address the wildfire threats of rural settlements (villages, towns, scattered farmsteads) and other rural assets (agricultural fields / crops, infrastructures and other values at risk), which in some regions of Europe / Mediterranean are increasingly endangered by wildfires due to rural exodus, weakening of rural work force and self-protection ability, and increasing wildfire hazard on abandoned lands. Viceversa, increasing industrialization and concentration of populations in some areas exert a high pressure on natural resources for land use change, which is reflected by the high frequency of arson and 'unknown'-cause fires in the wildlands. The intermix of human settlements with natural ecosystems in many places create severe wildland / urban interface fire problems, which have become a major issue of political debate and confrontation. The Guidelines will be designed to provide information to local inhabitants (incl. farmers, community leaders / mayors, local fire service units, volunteer firefighters and village defense committees) with state-of-the-art information on wildfire damage prevention measures, and defense of wildfires threatening settlements and rural assets.

Furthermore, the guidelines will provide information to the residents how to apply all fire safety regulations for their house (clearing vegetation, provide extra sources of water, use appropriate building materials, etc.) and to protect the communities against the adverse effects of vegetation fire smoke pollution on human health and security. Also, the issue of unexploded ordnance (UXO) will be addressed since many forest sites and non-forest lands in SE Europe and the Balkan region are contaminated by land mines and unexploded ordnance (UXO) stemming from recent conflicts. The relevance of the expected outcomes will be high for all CIS member states. Detailed background and rationale for the project "Guidelines for Defense of Rural Populations, Settlements and other Assets Against Wildfires", which will provide guidance and assistance to rural populations to defend their assets and ensure security of people against wildfires are provided in ANNEX I.

The development of the Guidelines is a 2-years project. In the first year the field work and other preparatory work have been terminated. The RFMC started with collection of all available data, documents, reports etc. in the region (in regards of the Guidelines). The same was done in the other centers, partners in the project. For that purpose but also for other activities in the frame of the project, a technical person was engaged - Ljubomir Netkov (forestry engineer).
There was a need for harmonization of the next steps for the organization of the first workshop. The first meeting of the centers was held in Freiburg from 30 June to 1 July 2012, in the frame of the UNISDR Global Wildland Fire Network / Wildland Fire Advisory Group Meeting 2012 (the meeting was an activity devoted to the preparation of the "UNECE Forum on Transboundary Cooperation in Fire Management", to be held in Geneva, late 2013. The duties were splitted among the centers and the place for the first workshop was determined - Skopje, FYR Macedonia.
In order to get much more precise data for the circumstances in Macedonia, a short field trip was organized. The region of the National Park "Pelister" (in the region of the border with Greece) was visited. It is very specific area with large number of UXO from I World War, forest fires, villages under threat of fires etc. Very valuable information was collected especially through contacts with the local population.

Work package 2 (prepared by ECFF, GFMC, RFMC):
Description:
Regional workshop(I) of SE Europe forest fire experts (Skopje, FYROM)
Associated deliverables:
Report on the results of Workshop (I)

At a workshop held in Skopje (FYROM) at the RFMC on 9 November 2012, the preparatory work was evaluated and as

main results the concept of the Guidelines were drafted and the duties for the next period were shared. Because the Guidelines could be used in the large region of Council of Europe Member States, we decided to invite other specialists in this area to contribute with their work and improve the Guidelines. The Final number of the participants was 9, from the follow countries: Greece, Germany, Turkey, Serbia, Ukraine and Macedonia. In the last moment participation of the representative from Russia was canceled even if he had contributed remotely.

Between in September and October 2012 an opportunity developed to possibly create synergies with a Greek Foundation to cooperate in the project. Following the devastating wildfire affecting ecosystems, land-use systems and livelihood of rural inhabitants of Chios Island (Greece) in August 2012 and the subsequent Congress "Our Response to the Fires – Working together for a better Chios", initiated and organized by the "Maria Tsakos Foundation – International Center of Maritime Research and Tradition N.G.O." (Greece), under the auspices of the Minister of Mercantile Marine and the Aegean and in co-operation with the Chios Municipality and Regional Unit (15-16 October 2012), the GFMC has proposed "Maria Tsakos Foundation" to consider cooperative efforts in testing the concept of the Guidelines on Chios Island and to eventually co-organize the public presentation of the Guidelines in Athens (Greece) in 2013.
The proposed cooperation and possible co-financing of some activities of the Guideline Project in 2013 by the "Maria Tsakos Foundation" is not yet finally agreed upon at the time of writing this report. On 11 December 2012 the "Maria Tsakos Foundation" sent a message that only limited cooperation is possible due to the restrictions by the Charter of the Foundation. However, the CEO of the Foundation offered to act as "intermediary" between our project work and the public authorities in Greece. It is not yet clear at this stage of the Foundation will provide the co-financing and logistical support as indicated at an earlier stage.

Prospects for 2013
The three Fire Centers involved in the project have agreed to swiftly go ahead in the finalization of the guidelines.
Activities will need to be re-budgeted, considering:
- There will be a cut of budget of 10%
- By reducing travel costs (invitees for the final workshop) finances should be foresee for hiring a graphics design specialists to design the drawings / figures / schemes needed for the final (printed and digital) version of the guidelines, for a clear understanding of the guidelines by local administrators and local rural people
- Consider the translation of the Guidelines (ENG) to Greece, to demonstrate / present the guidelines in a first European country that is in urgent need for such guidelines

Annexes
Annex I: Final Draft Outlines of the Guidelines
Annex II: Presentation of GFMC given at the opening of the Skopje Workshop on 9 November 2012

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by ECFF, GFMC, RFMC):
Description:
Workshop II: Guidelines will be reviewed by experts from Greece, FYROM, Russia, Bulgaria, Turkey, and from specialists from other countries (Athens, Greece).
Associated deliverables:
Report on the results of the Workshop II.
Work package 2 (prepared by ECFF, GFMC, RFMC):
Description:
Guidelines development with a homeowner checklist (How to make your home forest fire safe and protect the health of inhabitants against smoke pollution), and a 10 minutes video presenting home protection guidelines. The Guidelines will also be accompanied by an example of a map of distribution of UXO and land mines (wherever exist), and instructions about general precautionary measures and how to respond during the wildfires.
Associated deliverables:
Final guidelines (including DVD + Map)

FINANCING FOR 2013

EUR-OPA : € 15500

Split between partners : € 8500 for ECFF Athens, Greece

€ 7000 for GFMC Freiburg, Germany

REAL-TIME TELEMETRIC MONITORING/EARLY WARNING SYSTEMS OF LARGE ENGINEERING CONSTRUCTIONS WITH TIME SERIES LINEAR/NONLINEAR DYNAMICS PROCESSING TOOLBOX

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.A. Knowledge diffusion

TITLE OF THE PROJECT : Development of real-time telemetric monitoring/early warning systems of large engineering constructions with time series linear/nonlinear dynamics processing toolbox

TARGET COUNTRIES: Georgia, Morocco, Russia, Turkey, Bulgaria, FYROM.

PARTNERS INVOLVED :

COORDINATING CENTRE : GHHD Tbilisi, Georgia

OTHER CENTRES: ECNTRM Moscow, Russian Federation , ECILS Skopje, FYROM , CEPRIS Rabat, Morocco , ECRP Sofia, Bulgaria

OTHER PARTNERS : AFEM, Ankara, Turkey

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

The safety of large engineering objects (dams, etc.) depends not only on the quality of design and construction but also on the proper maintenance during exploitation and systematic monitoring of construction's condition. Accordingly, development of cost-effective real-time telemetric monitoring/early warning systems of large engineering constructions using network of tiltmeters, strainmeters and other sensors and toolbox of linear/nonlinear dynamics processing methods of monitoring time series for systematic control of construction's stability is the main objective of the project.

Specific yearly objectives :

2012 :

Development of cost-effective scheme of collecting real-time information on time-dependent strains /tilts from sensors and transmitting by Internet to the diagnostic centre and its realization. Testing of real-time telemetric monitoring/early warning systems at Enguri Dam International Test Area (EDITA) using the network of sensors. Distribution of developed technology to cooperating centres and collection of the data on large engineering constructions in their countries, which need monitoring systems. Permanent acquisition of analog signal measurements from sensors (tiltmeters, strainmeters, vibrometers) and finding, whether the latter ones are representative for the main characteristics of construction's mechanical behavior. Creation of long enough data bases of tilts, strains and low-frequency vibrations for linear/nonlinear analysis. Creation and development of the 3d static mathematical model of construction taking into account: geometric parameters; construction material properties, geologic conditions of foundation; operation loads of different origin. Comparative analysis of measured and predicted (by deterministic model-FEM, linear and nonlinear forecasting) data sets in order to derive the main statistical and dynamical features of construction's behavior patterns and to ensure appropriate decision making. Collection of information on selected objects (Large dams) in partner countries and the monitoring systems installed in these objects. Development of plans of cost-effective systems of monitoring automatization and telemetry at selected objects (dams) in partner countries.

2013 :

Compilation of data-base of recordings of sensors (tiltmeters, strainmeters, vibrometers) at EDITA and the selected objects in partner countries for an year 2013. Selection/development of data analysis linear (frequency, time-frequency, singular value decomposition, autocorrelation first zero crossing variation, etc.) and nonlinear (phase space structure, phase trajectory evolution, noise reduction, memory, long range correlation testing, etc.) methods, appropriate for measured tilt, strain, vibration meter data sets during one year load-unload cycle in order to establish construction response to water load. Selection of appropriate to the targeted problem linear (autoregressive) and nonlinear (based on topology of reconstructed attractor) forecasting methods and creation of special diagnostic toolbox for analysis of tilt/strain time series.

EXPECTED RESULTS

2012 :

Design of scheme of collecting real-time information on strains /tilts from sensors and transmitting by Internet to the diagnostic centre. Installation of real-time telemetric monitoring/early warning system at the Enguri Dam International Test Area using the network of tiltmeters and strainmeters and testing its reliability. Data base on monitoring systems in partner countries. Distribution of the scheme to partner centres and testing its applicability to selected objects (dams) in their countries. 3d static mathematical model of construction (Enguri Dam) taking into account: geometric parameters; construction material properties, geologic conditions of foundation; operation loads of different origin.

2013 :
Data-bases of recordings of sensors (tilts, strains) at EDITA and selected objects (Large dams) in partner countries. Processing of these data by the special diagnostic toolkit. Establishment of patterns of time-dependence of tilt and strains at stable state and defining of general signs of closeness to the critical situation for static and dynamic approaches.

RESULTS OBTAINED PREVIOUSLY (if any)

First steps in planning real-time telemetric monitoring/early warning systems of large engineering constructions in Georgia

References

1. M. Bartsh , A. Schiess Zamara, K.Steiger. 2011. Continuous dam monitoring: an essential basisfor reliable back-analysis. The International Journal on Hydropower & Dams. v.18, 51-56.
2. T. Chelidze, T. Matcharashvili, V. Abashidze, M. Kalabegashvili. 2011. Real time telemetric monitoring system of large dams (DAMWATCH): the case of the Enguri Dam International Test area. Proceedings of Symposium "Dams and Reservoirs under Changing Challenges", 29 May-3 June, 2011, Lucerne, Switzerland (electronic version).
3.V. Levtchouk, J. Alberto, E. Gaziev. 2000. Informational support system for diagnosis and prediction of dam's behavior. Geoecology and Computers. Yufin (Ed). Rotterdam, pp.309-314.
4. Automated dam monitoring systems. 2000. Bulletin 118. International Commission on Large Dams. Paris.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by GHHD):

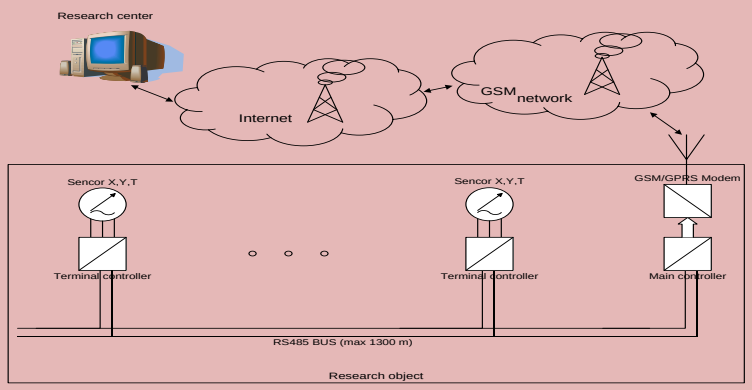
Description:

Development of cost-effective scheme of collecting real-time information on time-dependent strains /tilts from sensors and transmitting by Internet to the diagnostic centre and its realization. Testing of real-time telemetric monitoring/early warning systems at Enguri Dam International Test Area (EDITA) using the network of sensors. Distribution of developed technology to cooperating centres and collection of the data on large engineering constructions in their countries, which need monitoring. Permanent acquisition of analog signal measurements from sensors (tiltmeters, strainmeters, vibrometers) and finding, whether the latter ones are representative for the main characteristics of construction's mechanical behavior. Creation of long enough databases of tilts, strains and low-frequency vibrations for linear/nonlinear analysis.

Cost-effective scheme of telemetric collecting real-time information on time-dependent strains /tilts from sensors and transmitting by Internet to the diagnostic centre and its realization. Testing of real-time telemetric monitoring/early warning systems at Enguri Dam International Test Area (EDITA) using the network of sensors. Distribution of developed technology to cooperating centres and collection of the data on large engineering constructions in their countries, which need monitoring and installed monitoring systems. Permanent acquisition of analog signal measurements from sensors (tiltmeters, strainmeters, vibrometers) and finding, whether the latter ones are representative for the main characteristics of construction's mechanical behavior. Creation of long enough data bases of tilts, strains and low-frequency vibrations for linear/nonlinear analysis.

Deliverables:

The created system for large engineering constructions' monitoring data acquisition – DAMWATCH described in detail has been distributed to participating centres 12 October 2012.



The data acquisition system (Fig. 1.1) is a hardware and software suite for collecting data that are acquired by monitoring using sensors located at remote sites for their subsequent processing and analysis in a (research) diagnostic center. GSM/GPRS and SMS services rendered by all GSM service providers are employed as a communication tools. This is the most cost-effective way of communication for this kind of survey lacking the direct wiring path or access to the Internet.

Basic features of the system

Quantity of the monitoring devices (sensors) linked to the Research Center:	practically unlimited
Geographical range of separation of monitoring devices:	limited by GSM/GPRS coverage only
Quantity of sensors per object:	30
Maximum distance between the sensors:	1300 m.
Maximum sample rate:	1 sample per minute
Maximum amount of stored data:	262144 bytes
Running time of the master controller in lack of a power line:	48 h.
Running time of the terminal controller in lack of a power line:	48 h.
The cable used as RS485 bus:	UTP CAT5
Necessity of routine service:	not applicable

Requirements imposed to the computer operating as an FTP server at the Research Center:

- Without any special hardware requirements – any office WINDOWS PC having access to the Internet can be used without any restriction imposed to its basic functionality.
- Explicitly defined LAN IP address.
- Installed Software of the FTP server.
- Exclusion on FTP port in a WINDOWS firewall.

LAN requirements at the ResearchCenter

- Permanent access to the Internet
- Static IP address on the WAN side.
- Router with NAT function – routing the FTP port to the LAN IP address of a computer used as FTP server.

Approximate cost of the system without sensors

Approximate cost of the master controller:	1600 USD
Approximate cost of the terminal controller:	990 USD
Operational overheads:	at most 100 USD a year

[determined by the tariff of a GSM communication service provider per unit of transmitted data through the GPRS and SMS channels as well as by the operation mode (combination of parameters Qc, Tacq, and Qs - see below) and frequency of use of SMS messages]

Research Center EQP

At the Research Center, a computer permanently connected to the Internet with a static IP address and installed FTP Server software is operating, that enables to gather the acquired data in an EXCEL spreadsheet.

Terminal controllers

On an object undergoing the research, "terminal controllers" are installed, the number of which corresponds to that of sensor points. The terminal controllers (see the diagram in Fig. 2) are provided with two 18 bit ΔΣ analog-to-digital converter (ADC) units (U3) supplied by the company MICROCHIP, whereto high accuracy tiltmeters of model 701-2 supplied by the company APPLIED GEOMECHANICS, which enable to measure X and Y components of tectonic transports, are connected. The terminal controllers are built on the basis of 8-bit microcontrollers supplied by the company ATMEL, product line ATMEGA (U5), and programmed with a software specially developed to fulfill the given task. Under the control of the microcontroller, ADC performs every minute conversion of signals obtained from the tiltmeter outputs. The converted data are read by the microcontroller one-by-one from each ADC by means of a multiplexer. Moreover, the microcontroller reads the temperature value from a respective output of the tiltmeter by means of an integrated 10-bit successive-approximation ADC and performs voltage availability control in a power line. All read data are stored in the temporary storage of the microcontroller. On the other hand, the microcontrollers are provided with RS485 (U7) drivers supplied by company MAXIM, to be connected to RS485 bus made in the form of a twisted pair of wires. An unique number is assigned in the programming phase to each terminal controller on the bus. The terminal controllers are provided with LEDs (U4) for detecting the measurement processes locally and voltage availability in the power line, and a slot (U6) for connecting a LCD alphanumeric display capable of displaying all measured real time data. The terminal controllers are powered by AC current line of 220B/50Hz by means of a transformer power source (U1). In addition, they are provided with a rechargeable battery 12B/1.2AH operating in a buffer mode and constantly recharged by a charging circuit with voltage stabilization and current limitation whenever the voltage is available in the power line. The microcontrollers are powered with a DC voltage source of 5 V from a voltage stabilizer (U2).

Master controller

All terminal controllers are united by means of the RS485 bus in a common network controlled by a "master controller" (see the diagram in Fig. 3). The master controller is likewise built on the basis of a 8-bit microcontroller supplied by the company ATMEL, product line ATMEGA (U5), programmed by corresponding software specially developed to fulfill the given task. The master controller is connected to the above mentioned RS485 bus by means of RS485 (U7) driver supplied by the company MAXIM. It is provided with a non-volatile memory (U6) built on the basis of 4 chips supplied by the company ATMEL, each having 65536 bytes of memory, i.e. 262144 bytes of memory amount in total, as well as a GSM/GPRS modem (U4) supporting TCP/IP stack and FTP protocol on the basis of a module Q2406 supplied by the company WAVECOM, also being connected to the common RS485 bus by means of the RS485 (U7) driver. The present solution enables to employ a relatively low-cost microcontroller with a single (merely) integrated UART. The master controller is powered by AC mains 220V/50Hz by means of a power supply unit (U1) equipped with a transformer. Besides, it is provided with a floating battery 12V/1.2AH constantly recharged with a constant-voltage and limit current charging circuit (U1) whenever the voltage is available in the power line. The microcontroller is powered by constant voltage 5 V from a stabilizer (U2). The modem is powered by constant voltage 3.9 V from a stabilizer (U3).

System operation

The master controller interrogates all terminal controllers connected to the RS485 bus in a successive order with

predetermined periodicity (see below the parameter Tacq). In accordance with the specification, 32 devices are allowed to be connected to a single RS485 bus and the maximum length of the bus is limited to the value of 1300 meters. The system renders sufficiently manifold possibilities to employ systems built in the same manner. The terminal controllers are interrogated through their unique numbers assigned thereto at the programming stage. Having received the request on its own number, each terminal controller transmits current data – X and Y components of the tilts, temperature at the sensor point and information on availability of supply-line voltage, from its temporary memory to the bus. The data are exchanged in ASCII format on the bus. Having received the data, the master controller adds serial number of reading, time and date read on a timer and information on availability of supply-line voltage thereto and stores them in the form of a text string in a non-volatile memory. The master controller uses a timer as a clock that is integrated in the modem provided with an additional lithium-ion cell to retain the capability of time reading in lack of power supply. Having acquired the predetermined amount of data (see the parameter Qs below), the master controller establishes communication with a computer at the Research Center via the modem, and according to FTP protocol, creates in the hard disk memory a text file with the data having been stored in the non-volatile memory at that moment. Thereafter, the master controller cleans up the non-volatile memory and starts to acquire new portion of data. Such method – storing the data in a non-volatile memory and transmitting them to the Research Center batchwise, enables to save expenses imposed by billing systems of mobile communication service providers on service (protocol) data that are inevitably communicated in both directions in the course of establishment/completion of GPRS communication and opening/closing of FTP session so as to enhance useful traffic. Moreover, it enables to avoid data losses in case of short-term service disturbances in GSM network or on the Internet. Such being the case, in the instance where the master controller fails to establish communication with the Research Center computer, it resets the modem and retries to accomplish transfer. If the problem persists, it tries again in 30 minutes.

The non-volatile memory storage space allows to store 262144 alphanumeric characters, which means that in case of, for example, 7 terminal controllers on the bus (full record of one reading makes up 207 characters), and of maximal reading rate – 1 reading per minute – corresponds to 21 hours of data acquisition duration, and thus the loss of data can be avoided even in the case of long-term disturbances in communication systems.

The master controller makes access to the FTP server via the Research Center computer as FTP client with assigned USERNAME and PASSWORD, according to the preliminarily created account in the FTP server clients list. Number of such accounts for a single FTP server is virtually unlimited to link a single computer with infinite number of similar remote data acquisition systems throughout GSM/GPRS coverage area.

The software of the master controller provides for possible management and changing of some parameters remotely via a SMS massage or a call that can be sent to the controllers from a certain mobile numbers. If the received SMS massage contains a command that is valid for the controller, and if it has been sent from an acknowledged number, it responds in accordance with the received command and sends a response to the same number in the form of a SMS report. In addition, the master controller sends on some its own messages in case of certain events.

The master controller supports the following commands:

Info	SMS	requesting the SMS reply containing data on the state and current parameters;
Set	SMS	setting the system parameters;
Nums	SMS	setting the numbers of the mobile phones wherefrom the SMS is received by the controller;
Res	SMS	forcible restarting of the controller and modem (the accumulated data are maintained);
Clr	SMS	cleaning the non-volatile memory;
call	CALL	requesting non-scheduled data transmission;

Example of Command Info

Having received this command, the controller responds with the following type of SMS message:

```
Info
16.01.12 22:23:15;Y;2458;E00;00;41h;100%;
6;10:00;18:00;10;
7;53;
217.147.238.81;21;UN;PWD;
+995599XXXXXX;+995577XXXXXX;+995593XXXXXX;
```

The fields of the given message are separated by the symbol ";" (semicolon) and have the following content:

Info	title that determines the cause of the given message
16.01.12 22:23:15	date and time of the message transmission (according to an internal timer)
Y	availability of power to the master controller
2458	total amount of transmitted readings
E00;00	latest error code
41h	available storage amount in hours at a given moment
100%	percentage of the free available storage amount at a given moment
6	Tacq (see the description of the command Set)
10:00	Tm (see the description of the command Set)
18:00	Te (see the description of the command Set)
10	Qs (see the description of the command Set)
7	Qc (see the description of the command Set)
53	Msms (see the description of the command Set)
217.147.238.81	IPftp (see the description of the command Set)
21	PORTftp (see the description of the command Set)
UN	UNftp (see the description of the command Set)
PWD	PWDftp (see the description of the command Set)

+995599XXXXXX N1 (see the description of the command Nums)
+995577XXXXXX N2 (see the description of the command Nums)
+995593XXXXXX N3 (see the description of the command Nums)

Command Set

The non-volatile memory of the microcontroller stores the data defining its operation mode, which can be received remotely via SMS commands. The list of these parameters is given below:

Tacq - terminal controllers polling timeslot in minutes;
Tm - working day starting time – hh:mm (see the operation algorithm description below);
Te - working day ending time – hh:mm (see the operation algorithm description below);
Qs - amount of data after acquiring of which the controller has to send them to the Research Center;
Qc - quantity of the terminal controllers;
Msms - Mask of some parameters. Transmitted in the form of hexadecimal numerical symbols corresponding to one byte. Values of the bits of this number are given below:
MSb 7 - redundancy
6 - 0 – SMS induced by an event is always sent to the first number
1 - SMS induced by an event is always sent to the number wherefrom the latest SMS has been received
5 - 0 - GSM service provider MAGTICOM
1 - GSM service provider GEOCELL
4 - 1 - everyday congestion of the modem and controller
3 1 - messages "FTP err" are allowed (failure at opening the FTP session)
2 - 1 - messages "Power" are allowed (loss/restoring the main power line)
1 - 1 - messages "Start" are allowed (start/restart of the controller in the event of power supply/disturbances or errors)
LSb 0 - 1 - messages "FLASH err"are allowed (errors at accessing to the non-volatile memory of data)
IPftp - WAN IP address of the FTP server at the Research center;
PORTftp - FTP port number;
UNftp - USERNAME at FTP server for a given object;
PWDftp - PASSWORD at FTP server for a given object;

Example of command Set sent in the form of SMS message:
Set6;10:00;18:00;10;7;53;217.147.238.81;21;UN;PWD; -
after execution of which the following parameters are established:
Terminal controllers sampling rate in minutes: - 6 minutes
Working day start time: - 10:00
Working day end time: - 17:00
Amount of readings after collecting of which the controller has to send them to the Research Center: - 10
Number of the terminal controllers: - 7
Mask: - 53
SMS events are sent to the number wherefrom the latest SMS has been received;
GSM service provider MAGTICOM;
everyday restart of the modem and controller allowed;
messages “Start” allowed;
messages "FLASH err" allowed.
WAN IP address of the FTP server at the Research Center: - 217.147.238.81
FTP port number: - 21
USERNAME at FTP server for a given object: - UN
PASSWORD at FTP server for a given object; - PWD
and the controller responds with the following message:
Set
16.01.12 22:23:15;Y;2458;E00;00;41h;100%;
6;10:00;18:00;10;
7;53;
217.147.238.81;21;UN;PWD;
+995599XXXXXX;+995577XXXXXX;+995593XXXXXX;

After this command, the master controller will read data from the terminal controllers every 6 minutes (Tacq), and will transmit to the Research Center the chunk of data consisting of 10 latest readings (Qs), i.e. the data will be sent once in an hour – 10 latest readings at once. The entire non-volatile memory is sufficient for storing the data for 211 hours.

Command Nums

3 mobile phone numbers are also stored in the non-volatile memory of the microcontroller, through which SMS messages are received by the controller:

N1 - Number of the first mobile phone wherefrom the SMS is received by the controller;
N2 - Number of the second mobile phone wherefrom the SMS is received by the controller;
N3 - Number of the third mobile phone wherefrom the SMS is received by the controller;

An example of command Nums is given below:
Nums995599XXXXXX;+995577XXXXXX;+995593XXXXXX; - after execution of which the following numbers are established:
Number of the first mobile phone wherefrom the SMS is received by the controller: - +995599XXXXXX

Number of the second mobile phone wherefrom the SMS is received by the controller: - +995577XXXXXX
Number of the third mobile phone wherefrom the SMS is received by the controller: - +995593XXXXXX
and the controller responds with the following message:
Set
16.01.12 22:23:15;Y;2458;E00;00;41h;100%;
6;10:00;18:00;10;
7;53;
217.147.238.81;21;UN;PWD;
+995599XXXXXX;+995577XXXXXX;+995593XXXXXX;

SMS messages induced by events

The master controller can send unsolicited SMS messages in case of certain events depending on the value of the parameter Msms. On all occasions, the SMS contents are similar to the case with the command Info, except for the title, which can be as follows:

Start - start/restart of the controller occurred due to the power supply/disturbances or errors;
Power - loss or occurrence of line supply;
FTP err - transmission of the data to the server failed;
FL err - error occurred at accessing to the non-volatile memory;
Mem crit - non-volatile memory is filled to capacity – 90% (can occur in three cases if the controller fails to transmit the data to the server for a long while).

The master controller operation algorithm

The master controller polls the terminal controllers and reads the data in timeslots Tacq, adds a serial number of reading, time and date read on a timer integrated in the modem, and information on availability of supply-line voltage thereto and stores them in the form of a text string in a non-volatile memory. Whenever the number of the readings stored in the non-volatile memory reaches the value defined by the parameter Qs, the controller checks the current time, and in case it falls within the working day (>Tm and <Te), starts to establish connection with the server to transmit the data. Such organization of the operation mode envisioning the working hours of the Research Center allows to keep the server computer switched off outside of working hours if not necessary (the data received in non-working hours never can be handled by the personnel in the Research Center until the next working day) and, thereby, to save electric power and computer resources. In case of successful transmission of all data, the controller releases the non-volatile memory and starts to acquire new data in the same mode.

In case of failure or loss of connection with the server that leads to the failure of transmitting the complete data, the master controller restarts the modem and microprocessor in an attempt to establish the connection once again. In case of repeated failure, an SMS message with a title "FTP err" (if it is allowed by the parameter Msms) will be sent, and the attempt will be repeated in 30 minutes (if the shorter time is not defined by the combination of parameters Tacq and Qs). Meanwhile, it keeps acquiring the data from the terminal controllers and stores them in the non-volatile memory. This will be repeated until the end of the working day.

If for a long time the controller fails to send the data and the non-volatile memory is filled to capacity – 90%, the controller sends the message "Mem crit" and reattempts to send the data notwithstanding the working hours. The attempts will be repeated two times every 30 minutes after restarting the modem and microprocessor.

This process will run over and over again until successful transmission of the data and filling the memory completely. In the later case, the memory is cleaned, the data are lost and the process continues to run in ordinary way.

Correction of time in the integrated timer is performed automatically after each sent SMS, using the time of read from Delivery Report SMS containing the true time from the SMS service center.

2. Possible alternative realizations of the system

In case where the objects that undergo research allow to use the Internet connection, the master controller can be built by use of an Ethernet controller instead of a GSM/GPRS modem to allow lowering the operation costs due to the lower costs of data transmission and receiving readings in practically real time without the need of the non-volatile memory.

If the specificity of the parameters measured on an object that undergoes the monitoring requires the higher reading rate, the circuitry and software of the master and terminal controllers can be built in such a manner as to allow 1 reading per second. However, the amount of the non-volatile memory must be larger in this case. This problem can be solved by adapting the master controller in a manner as to allow using SD card as a non-volatile memory and, thereby, increasing the memory amount up to several gigabytes.

In the present realization, the system reads the data from sensors having analog outputs. Any sensors (other than aforementioned) having analog outputs within the range of +/-14,3V can be used as well. Moreover, the system can be modified so as to be adapted to sensors having any other types of outputs, e.g. with sensors having a current output and various digital protocols.

It should be noted that the aforementioned modifications of the system and its components will affect (increase) the cost of the software and hardware

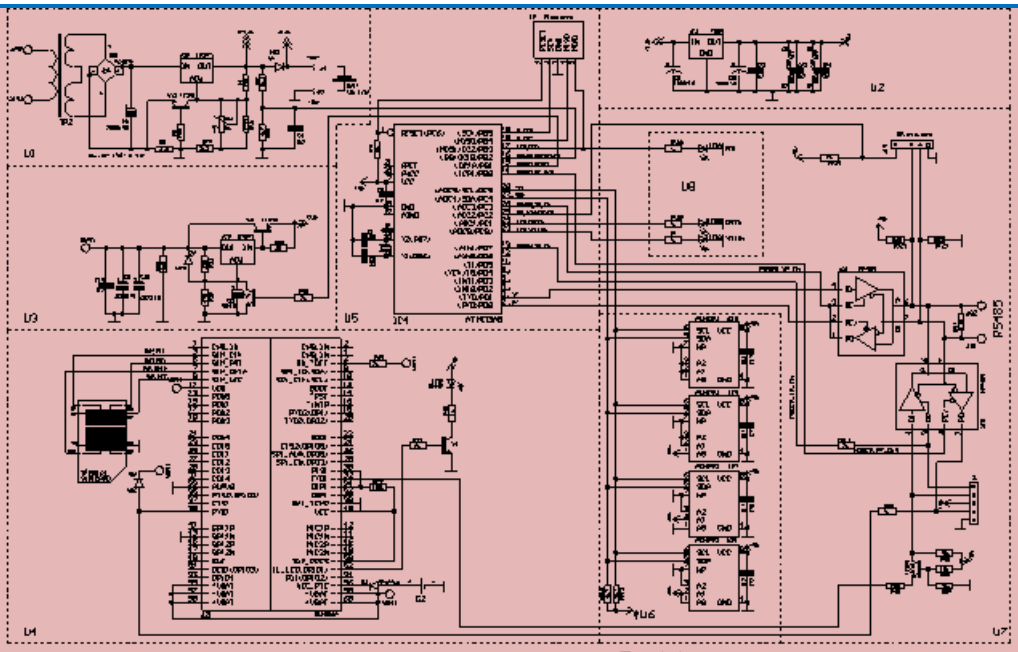


Fig.1.1

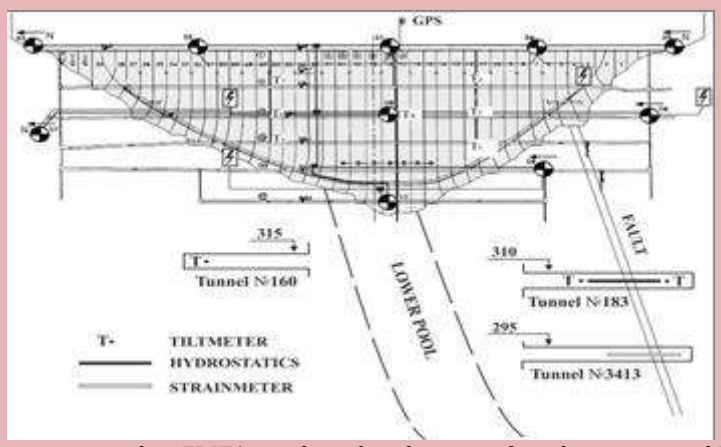


Fig.2.1. Scheme of monitoring network at EDITA, numbers show location of accelerometers and T - location of tiltmeters (downstream view).

Permanent acquisition of analog signal measurements from sensors (tiltmeters, strainmeters, vibrometers) and finding, whether the latter ones are representative for the main characteristics of construction's mechanical behavior. Creation of long enough data bases of tilts, strains and low-frequency vibrations for linear/nonlinear analysis.

Scheme of monitoring network at EDITA, is shown in Fig.2.1: numbers show location of accelerometers and T - location of tiltmeters (downstream view). The data from 7 tiltmeters located in the body of the dam are regularly transferred by the system DAMWATC to the diadnostic centre. The typical electronic table of data is presented below. The long enough data base (almost two years long) has been compiled.

Date Time	X1	Y1	T1	X2	Y2	T2	X3	Y3	T3	
08.04.10	0:00:01	0.00	0.00	12.4	0.00	0.00	12.7	0.00	0.00	13.7
08.04.10	0:01:00	-0.01	0.00	12.4	0.00	0.00	12.7	0.41	0.33	13.7
08.04.10	0:02:00	0.00	0.01	12.4	-0.03	-0.01	12.7	0.00	-0.05	13.7
08.04.10	0:03:00	0.00	0.01	12.4	-0.03	-0.01	12.7	0.18	-0.08	13.7
08.04.10	0:04:01	-0.03	0.00	12.4	-0.05	-0.01	12.7	0.55	0.14	13.7
08.04.10	0:05:00	-0.01	0.00	12.4	-0.01	-0.02	12.7	0.43	0.06	13.7
08.04.10	0:06:01	0.00	0.01	12.4	-0.01	-0.01	12.7	0.02	0.01	13.7
08.04.10	0:07:01	0.02	0.01	12.4	-0.03	-0.01	12.7	0.62	0.08	13.7
08.04.10	0:08:01	0.01	0.00	12.4	-0.03	-0.01	12.7	1.09	0.36	13.7
08.04.10	0:09:00	0.01	-0.01	12.4	-0.05	-0.03	12.7	0.45	0.09	13.7
08.04.10	0:10:01	0.00	0.00	12.4	-0.04	-0.02	12.7	0.57	0.12	13.7
08.04.10	0:11:00	0.01	0.01	12.4	-0.04	-0.01	12.7	0.13	-0.05	13.7
08.04.10	0:12:01	0.00	0.00	12.4	-0.02	-0.01	12.7	0.81	-0.05	13.7

08.04.10 0:13:00	0.01	0.00	12.4	0.00	0.00	12.7	0.11	-0.13	13.7
08.04.10 0:14:01	0.01	0.01	12.4	-0.02	-0.01	12.7	0.42	-0.01	13.7

3. Creation and development of the 3rd static mathematical model of construction taking into account: geometric parameters; construction material properties, geologic conditions of foundation; operation loads of different origin. Comparative analysis of measured and predicted (by deterministic model-FEM, linear and nonlinear forecasting) data sets in order to derive the main statistical and dynamical features of construction's behavior patterns and to ensure appropriate decision making.

During to the project 3 goals were accomplishment.1. Creation of "Enguri arch dam–foundation" system FEM model; 2. Retrospective analysis of dam deformation dynamics at various loading conditions; comparison of measured and FEM data; 3. Definition of the range of significant departures of dam dynamical characteristics from FEM-predicted, which will signal damage and approaching the pre-failure state;

Creation of "Arch dam - foundation" finite element model

By use of topographical map the following was determined: - levels of characterizing points of foundation shape;- parameters of dam abutment.

The 3D model of system "Dam-foundation" has been developed. The foundation model takes into consideration homogeneity areas manly represented by 4 layers areas according the geological cross sections. The dam calculating scheme's vertical lines are created according the arch dam structure cantilevers including gaps. The horizontal lines orientated towered the boundaries of constriction concreting blocks (Fig. 3.1).

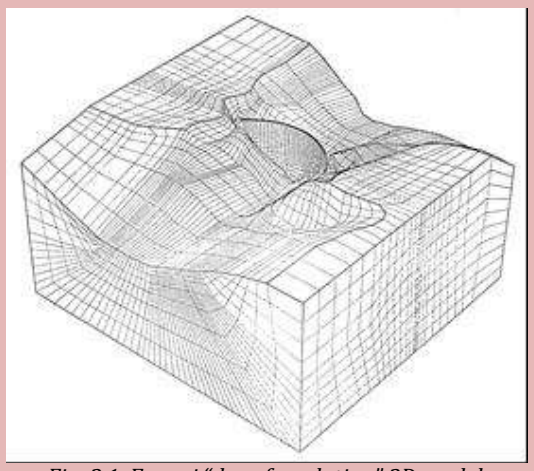


Fig. 3.1. Enguri "dam-foundation" 3D model.

In general, FEM calculations agree with observations of monitoring network on lower levels of the dam, but there are some problems at higher (closest to top) levels, where observed values exceed theoretical assessments for critical strains. At the same time the dam performs normally without any serious visual damage. This means that theoretical model should be re-considered.

Work package 2 (prepared by ECNTRM, ECILS, CEPRIS, ECRP):

Collection and exchange of information on the dam monitoring system for their respective country; selection of the dam to develop there real-time monitoring complex and complex of linear/nonlinear dynamics data processing methods for construction diagnostics;

Information on the dam monitoring system in for their respective country; selection of the dam to develop there real-time monitoring; assimilation of complex of linear/nonlinear dynamics data processing methods for construction diagnostics;

Deliverables:

Bulgaria

ECPR collected the information concerning dams in Bulgaria. They are managed mainly by four ministries:

- The Ministry of Economy, Energy and Tourism: 43 dams of the National Electricity Company;
- The Ministry of Agriculture and Food (Irrigation systems);
- The Ministry of Environment and Water;
- Ministry of Regional Development and Public Works.

These ministries issue a Regulation on the terms and conditions for implementation of the technical operation of the dam walls and installations. This regulation determines the main parameters of the dam walls monitoring system in Bulgaria.

Classification of the dam walls and the related installations:

1. Depending on the type of the construction:

- Gravitational – dam walls of concrete or embankment;
- Counterforce – massive and multi-arch;
- Arch.

2. Depending on the construction materials and the technology of construction:

- Concrete – massive of conventional concrete or rolled concrete, massive lightened, massive – counterforce type "Nötzli"

and arch;
- Embankment – earth, stone and mixed;
- Masonry;
- Inwash.

Large dam walls are determined depending on their summarized parameters – height, length along the top, volume of the water storage, in accordance with the classification of the International Commission on large Dams (ICOLD).
The classification of the dam walls and the related installations depending on the consequences in case of a failure and/or destruction is performed in accordance with the "Norms on Design of Hydrotechnical Installations" in Bulgaria.
The Water Act indicates a list of 52 complex and important dams, monitored by the Ministry of Environment and Water.
The dam walls and the related installations are categorized in accordance with the Territory Organization Act. The requirements for assurance of their security are determined in the project for operation and maintenance and the operating instructions. The person implementing the technical operation provides periodical assessment of the risk of compromising or destruction of the dam walls and the related installations depending on:
1. The updated hydrological information;
2. The changes in the seismological information;
3. The changes in the quality of the foundation, the construction materials and the construction;
4. The changes as a result of anthropogenic activity;
5. The results from the measurements and assessment of the operation of the Instrumentation Systems /IS/.

The risk during operation of dam walls and the related installations is determined by:
- The likelihood of occurrence of natural disasters;
- The specific topographic and geological conditions and the construction of the installations;
- The specific human activity.

The security under the conditions of operation is assessed through monitoring and control of indicators for:
- Their constructive security;
- Their technological security;
- Their impact on the environment.

The constructive security is the ability of the dam walls and the related installations and their foundation to retain:
- General local strength, carrying capacity;
- General resistance;
- Filtration resistance;
- Cracking resistance;
- Hardness;
- Fatigue effect strength;
- Frost resistance;
- Corrosion resistance;
- Wearing resistance;
- Temperature resistance;
- Bio-corrosion resistance.

The technological security is the ability to perform their main functions according to indicators for:
- Geometrical conformity with the design (dam wall ridge altitude, highest altitude of the anti-filtration device, water level altitude, head, slopes, permeability, etc.);
- Conformity with the properties of the materials (strength, water-tightness, head gradients, filtration coefficient);
- Technological term of operation.

The indicators for constructive and technological security and for preservation of the environment are determined in the project documentation:
- The person implementing the technical operation monitors for the occurrence of qualitative and quantitative signs of deviation from the indicators in the project for operation and maintenance and the operating instructions;
- The parameters controlled within the period of operation are compared to the design and forecast values obtained on the grounds of data from previous monitoring and measurements.

The assessment of the security of dam walls and the related installations includes:
- Updating of the classification of the installation;
- Analysis of the results from the inspections of the technical state;
- Analysis of the results of the operation of the Instrumentation Systems and the database from the monitoring;
- Assessment of the methods for monitoring and control;
- Assessment of the operating instructions;
- Assessment of the results from the performance of periodic inspections of the state of all types of equipment;
- Assessment of the results from inspections of the readiness of action groups according to the emergency plan and simulation of an emergency situation;
- Assessment of results from inspections of the compliance with the directions from previous analyses of the security;
- Drawing up of conclusions and recommendations.

An emergency plan for action in case of extreme and emergency situations is developed. The activities on realization of the meteorological and hydrological monitoring are performed in observation of the requirements of the International Organization for Standardization and the World Meteorological Organization.
Technical monitoring during operation of the dam walls and the related installations

The technical monitoring provides information for assessment of the security of the dam walls and the related installations with the possibility for simultaneous identification of potential dangers. For each dam wall and the related installations equipped with Instrumentation Systems there is a separate database with measurements, which is maintained and periodically updated. For interrelated events the database contains synchronized measurements from the technical, meteorological and hydrological monitoring.
The technical monitoring /the observations and measurements, their analysis and assessment/ covers the dam wall and the related installations, the geological foundation and the coasts in the areas of effect in the upper and lower section.
The observations and measurements related to the technical monitoring of dam walls and the related installations are:

- Obligatory;
- Periodic and constant;
- Simultaneous during observations and measurements of interrelated events;
- Comparable by time, hour and place.

The Instrumentation System (IS) is executed on the grounds of a design, an integral part of the project.
The organization of the observations and measurements provides:

- The measurements of the processes and events occurring, as foreseen in the project for operation;
- The possibility for simultaneous measurement of a specific event with at least two devices from the IS;
- The possibility for a reliable assessment of the measured processes and events;
- Gathering of information for an overall assessment of the state of the dam walls and the related installations.

The observations and measurements are performed in accordance with the program for technical control on three levels:

- Visual control – determined by place and time;
- Operative measurements in specific points;
- Full measurements of all monitored points according to the IS project and the operating instructions.

The measurements of newly constructed dam walls and the related installations are direct and remote, without or with a Central Measurement Station. In the case of old dam walls, when possible, the IS is gradually connected to the Central Measurement Station.
The technical monitoring of concrete dam walls includes observations and measurements of:

- The water level in the water storage;
- Filling of the water storage with deposits;
- Horizontal and vertical shifting;
- Reciprocal shifting between wall and foundation;
- Development of cracks in the wall;
- State of the joints;
- Water raise and pressure;
- Change in the quality of the concrete and the foundation;
- Filtration and leaks through, under and around the wall;
- Turbidity and chemical composition of the filtrated water;
- Deformations and tensions in the body of the wall;
- Deformations of the foundation;
- Temperature of the concrete, the water and the air;
- Seismic impacts.

The technical monitoring of dam walls from local materials includes observations and measurements of:

- The water level in the water storage;
- Filling of the water storage with deposits;
- Water back pressure;
- Filtration under and around the wall;
- Filtration through the body of the wall;
- Turbidity and chemical composition of the filtrated water;
- Position of the depression surface;
- Steam /hydrodynamic/ pressure;
- Horizontal and vertical shifting;
- Change in the quality of the embankment and the foundation;
- Deformations and disruption of the solidity of concrete installations to the wall;
- Deformations and tensions in the embankment;
- Seismic impacts.

The periodicity of observations and measurements is indicated in the program for technical control in accordance with:

- The category of the installation;
- The dynamics of the water level in the dam;
- Occurrence of an extraordinary event.

If there are no other directions, observations and measurements with IS are performed no less than:

- Once every three months for large dam walls;
- Once every six months for small dam walls.

In the case of new dam walls the measurements are performed in accordance with a special schedule.
The volume, type, form and manner of documentation of the results from the measurements are determined in the project for

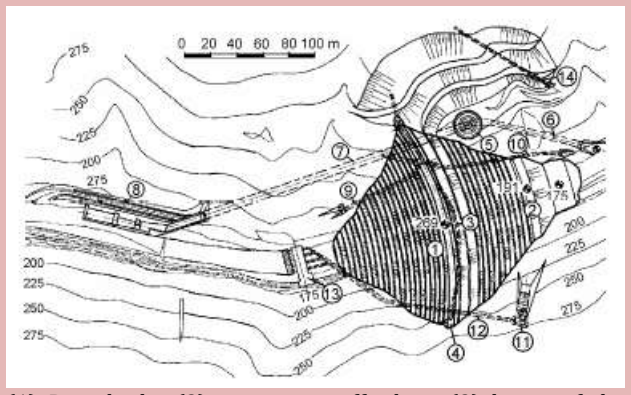
operation and maintenance of the IS. All observations and reports are recorded in the respective journal /form/ prior to and after the primary processing performed by the operating group. The results of all observations and reports, as well as their primary processing performed by the operating group, are recorded in the existing database and on paper.

Potential object of study
CHAIRA DAM in Bulgaria has been officially proposed by :
BASIC DATA

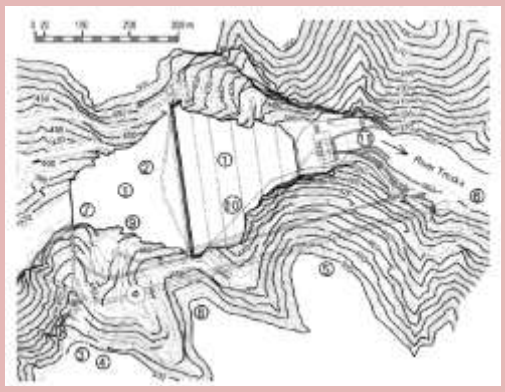
Location	Rila Mountains
Built on	Chairska River
Water catchment area, square km	18,6
Mean annual inflow, cub. m/s	1985-1988
Use	electricity generation
Water masses regulation	daily by reversible pressure tunnel - Yadenitsa Dam
WATER STORAGE	
Total storage, mln. cub. m	5,60
Usable storage, mln. cub. m	4,20
Max. water level, m	1261,30
Max. operational water level, m	1260,0
DAM	
Type	concrete, gravity dam
Waterproof component	grout curtain
Height from foundation, m	85,0
Crest length, m	305,0
Crest level, m	1263,0

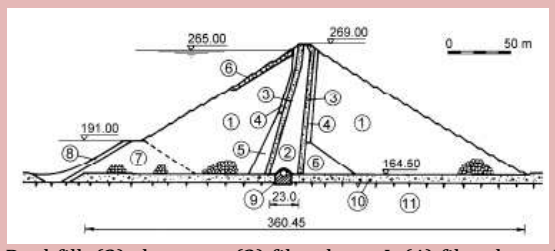
Former Yugoslav Republic of Macedonia
ECILS studied the suggested technology and is interested in the implementation. Potential object is not selected yet but two alternatives dams has been preselected by ECILS:

Dam: Tikveš Structural height: 113.5m Type: Earth-rock dam (E-R) River: Crna Reka Constructed: 1968	Dam: Kozjak Structural height: 126m Type: Earth-rock dam (E-R) River: Treska Constructed: 2004

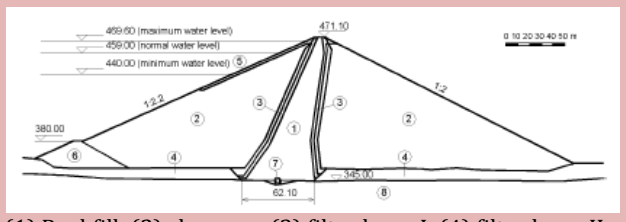


(1) Dam body; (2) upstream cofferdam; (3) layout if the grout curtain; (4) dam crest axis; (5) spillway shaft; (6) diversion tunnel; (7) spillway tunnel; (8) stilling basin; (9) access gallery; (10) bottom outlet; (11) intake structure; (12) head-race tunnel; (13) power house; (14) irrigation tunnel





(1) Rockfill; (2) clay core; (3) filter layer I; (4) filter layer II; (5) stone chippings; (6) coarse stones; (7) cofferdam of rockfill; (8) clay screen of cofferdam; (9) concrete block with a grouting gallery; (10) river sediment; (11) rock foundation



(1) Rockfill; (2) clay core; (3) filter layer I; (4) filter layer II; (5) stone chippings; (6) coarse stones; (7) cofferdam of rockfill; (8) clay screen of cofferdam; (9) concrete block with a grouting gallery; (10) river sediment; (11) rock foundation

Morocco

CEPRIS studied the suggested technology and is interested in the implementation. Potential object is not selected yet.

Russian Federation

ECNTRM studied the technology suggested by GHHD and decided that Russia has its own technology for monitoring engineering objects and it is not interested in the project.

ACTIVITIES PLANNED IN 2013 *(split by partner)*

Working package 1 (prepared by GHHD, ECNTRM, ECILS, ECRP, CEPRIS):

Description:

GHHD: Compilation of data-base of recordings of sensors (tiltmeters, strainmeters, vibrometers) at EDITA and the selected objects in partner countries for an year 2013. Selection/development of data analysis linear (frequency, time-frequency, singular value decomposition, autocorrelation first zero crossing variation, etc.) and nonlinear (phase space

structure, phase trajectory evolution, noise reduction, memory, long range correlation testing, etc.) methods, appropriate for measured tilt, strain, vibration meter data sets during one year load-unload cycle in order to establish construction response to water load. Selection of appropriate to the targeted problem linear (autoregressive) and nonlinear (based on topology of reconstructed attractor) forecasting methods and creation of special diagnostic toolbox for analysis of tilt/strain time series.
ECNTRM: compilation of monitoring data base on selected object; assimilation of special of linear/nonlinear dynamics diagnostic toolbox for analysis of monitoring time series and application to selected dam to develop criteria of stable functioning of construction
ECILS: compilation of monitoring data base on selected object; assimilation of special of linear/nonlinear dynamics diagnostic toolbox for analysis of monitoring time series and application to selected dam to develop criteria of stable functioning of construction
ECRP: compilation of monitoring data base on selected object; assimilation of special of linear/nonlinear dynamics diagnostic toolbox for analysis of monitoring time series and application to selected dam to develop criteria of stable functioning of construction
CEPRIS: compilation of monitoring data base on selected object; assimilation of special of linear/nonlinear dynamics diagnostic toolbox for analysis of monitoring time series and application to selected dam to develop criteria of stable functioning of construction
Associated deliverables:

FINANCING FOR 2013

EUR-OPA : € 18100
Split between partners : € 7500 for GHHD Tbilisi, Georgia
€ 3500 for ECNTRM Moscow, Russian Federation
€ 3500 for ECILS Skopje, FYROM
€ 1800 for ECRP Sofia, Bulgaria
€ 1800 for CEPRIS Rabat, Morocco

2.B. Risk mapping and vulnerability

PAN-EUROPEAN AND NATION-WIDE LANDSLIDE SUSCEPTIBILITY ASSESSMENT

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.B. Risk mapping and vulnerability

TITLE OF THE PROJECT : Pan-European and nation-wide landslide susceptibility assessment

TARGET COUNTRIES : Europe continental level with focus regional sites in Portugal, Romania and the Caucasus

PARTNERS INVOLVED :

COORDINATING CENTRE : CERG Strasbourg, France

OTHER CENTRES: GHHD Tbilisi, Georgia , ECBR Bucharest, Romania , ISPU Florival, Belgium ,

OTHER PARTNERS : University of Strasbourg (UdS, J.-P. Malet, A. Puissant), University of Lisbon (ULISBOA, J.-L. Zêzere), University of Caen (O. Maquaire), IGRA (M. Micu), Technical University of Catalonia (UPC, J. Corominas), Joint Research Centre (JRC, J. Hervàs, M. Van Den Eeckhaut), German Geological Survey (BGR, A. Günther), National Research Council, Research Institute for Hydrogeological Protection (CNR-IRPI, P. Reichenbach)

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

In the framework of the European Soil Thematic Strategy, a project to map landslide susceptibility at the scale of Europe (i.e.1:1 Million) was suggested in 2007 by the Soil Information Working Group (SIWG) of the European Soil Bureau Network (ESBN). The methodology consists of identifying the potential areas subject to generic landslide types by expert knowledge using available thematic and environmental data. The choice of the 1:1 M scale allows the use of harmonized data sets for all Member States as input to the susceptibility model.

Within this context and with support of the International Programme on Landslides (IPL), the German Geological Survey (BGR), the National Research Council, Research Institute for Hydrogeological Protection (CNR-IRPI) and the EUR-OPA Major Hazards Agreement, the Landslide Expert Group of JRC, among which 3 CERG members, proposed a preliminary heuristic assessment exploiting a reduced set of landslide conditioning factors derived from common pan-European data sources for the whole of the European Union and adjacent countries (Hervàs et al., 2007). Evaluation of the susceptibility estimates with national-level landslide inventory data from France, Great Britain and Italy suggests that zoning of Europe according to e.g. morphology and climate and preparation of individual models for each of these zones could give more reliable results (Günther et al., 2011; Malet et al., submitted).

The objectives of the project are:

1) To refine the preliminary assessment at the Pan-European scale by estimating three independent maps per landslide type (e.g. slides, falls and flows) and propose a methodology to combine the three independent maps in one unique compound landslide susceptibility map; the susceptibility modelling will be carried out by comparing a spatial multi-criteria approach (SMCE) and a fully data oriented statistical approach (logistic regression). This objective is being carried out as part of the Landslide Expert Group of JRC;

2) To propose nation-wide assessments of landslide susceptibility for three countries (Portugal, Georgia and Romania) by compiling national landslide inventories and using a statistical modelling approach (logistic regression) on a series of environmental factors on data with higher resolution than for the Pan European map. A method to integrate information on landslide triggers (rain, earthquake) in the analysis will be proposed and tested in Georgia, Portugal and Romania (possibly the use of meteorological information derived from remote-sensing imagery will be used);

3) To analyse (through a dedicated online questionnaire) the different methods of assessment (Landslide Risk Assessment Model; LRAM) and the categories of maps used in practice by the European Countries in their regulation for landslide susceptibility, hazard and risk mapping, and identify the pro & cons of each methodology.

The Project has a European dimension and a significant impact within the activities of the "European and Mediterranean Major Hazards Agreement" since it involves four specialised centres (CERG, GHHD, ECBR, ISPU). The expertise of the academic partners (see above) guarantees the success of the research activities, as some of them (JRC-BGR-UdS-CNR) are already working closely together within the 'Landslide Expert Group'. Co-funding to the research will be made available by each of the partners.

Specific yearly objectives :

2012 :

1a) Update of the actual landslide European inventory (focus on location and landslide type) with data from Portugal, Georgia and Romania in order to complement a database in construction within the Landslide Expert Group (CERG, GHHD, ECBR, BGR, JRC, IGRA).

1b) Test of the methodologies for susceptibility mapping per main landslide type (slide, flow and fall) at 1:1 M scale

using SMCE and logistic regression models at the Pan-European scale, and evaluation of the performance of the modeling (CERG, BGR, UdS, CNR, JRC, UPC).
1c) Collection and organisation of relevant data for the national and regional assessments in Portugal, Georgia and Romania (CERG, GGHD, ECBR, IGRA)
1d) Set up of the "Landslide Risk Assessment Model, LRAM" survey and launch of the questionnaire on the internet (ISPU, CERG).
2013 :
2a) Production of the national and regional susceptibility maps for Portugal, Romania and Georgia, and comparisons with the Pan-European map (CERG, GGHD, BGR, UdS, IGRA, CNR, JRC, UPC).
2b) Analysis of the response to the survey, and production of a synthetic report with the pro/cons of the methods used in each country (ISPU, CERG)
2c) Diffusion of the results through joint publications

EXPECTED RESULTS

2012 :
1) Organisation of a 2-days workshop in France (Strasbourg) to define the working methods and present the data already available
2) Organisation of a landslide inventory database (for scientific purpose) with indication on landslide location and landslide type at the European scale, and for Portugal, Georgia and Romania (the database will not be transferred).
3) Oranisation of a database of environmental factors (geology, slope, land cover, rain) for Portugal, Georgia and Romania
4) Test of the performance of the statistical models at the Pan-European scale.
5) Diffusion of the on-line internet questionnaire on LRAMs on the ISPU website, and identification of target people in each country.
2013 :
1) Organisation of a 2-days workshop in Portugal (Lisbon) to discuss the progress of the work
2) Production and diffusion of the European susceptibility maps per landslide types.
3) Test of the performance of the statistical models at the national and regional scales for Portugal, Georgia and Romania, and integration of triggering factors (rain, earthquake acceleration map) in the model. Set up of the methodology.
4) Analysis of the survey, and production of a synthetic report on the advantages and limitations of the different methods used in each country.
5) Diffusion of the results through joint publications

RESULTS OBTAINED PREVIOUSLY (if any)

The proposed susceptibility assessment obtained for France in 2011 for three landslide types (falls, flows, slides) and based on slope angle, lithology and land cover will be 1) extended by testing more robust statistical techniques, 2) tested on country-side data sets available for Portugal, Spain and Belgium, 3) and later applied to the European scale using the climate-physiographic regions suggested by Günther et al. (2011).
References:
Günther, A., Van Den Eeckhaut, M., Reichenbach, P., Hervás, J., Malet, J.-P., Foster, C., Guzzetti, F. (2011). New developments in harmonized landslide susceptibility mapping over Europe in the framework of the European Soil Thematic Strategy. In: Margottini, C., Canuti, P. Sassa, K. (Eds): Proceedings of the Second World Landslide Forum, 3-7 October 2011, Rome, Italy, Springer (to be published in 2012).
Hervás, J. (Ed.), 2007. Guidelines for Mapping Areas at Risk of Landslides in Europe. Proc. Experts Meeting, JRC, Ispra, Italy, 23-24 October 2007. JRC Report EUR 23093 EN, Office for Official Publications of the European Communities, Luxembourg, 53 pp.
Landslide Expert Group: http://eusoils.jrc.ec.europa.eu/library/themes/Landslides/
Malet, J.-P., Puissant, A., Mathieu, A., Van Den Eeckhaut, M., Fressard, M. (submitted). Landslide susceptibility assessment at 1:1M scale for France. Landslides, 15p. (submitted in July 2011).
Co-funding 2012:
- UdS: ChangingRISKS Project funded by the European Commission by the Seventh Framework Programme - Instrument ERA-NET CIRCLE - co-funding provided: 3000 €.
- JRC: Landslide Expert Group - co-funding provided: 1000 €
- ULISBOA: DISASTER - GIS Project funded by the Portuguese Foundation for Science and Technology - co-funding provided: 2000€
Co-funding 2013:
- UdS: ChangingRISKS Project funded by the European Commission by the Seventh Framework Programme - Instrument ERA-NET CIRCLE - co-funding provided: 1000 €.
- JRC: Landslide Expert Group - co-funding provided: 1000 €
- ULISBOA: DISASTER - GIS Project funded by the Portuguese Foundation for Science and Technology - co-funding provided: 2000€

RESULTS OBTAINED IN 2012

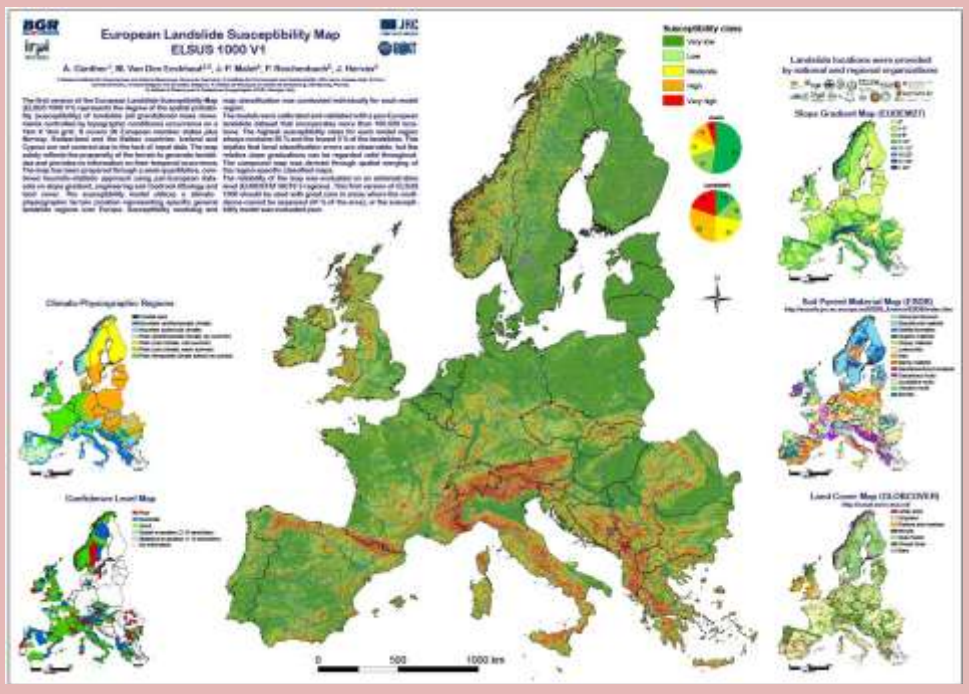
Work package 1 (prepared by CERG, GHHD, ECBR):
Description:

Refined Pan-European Landslide Susceptibility Map / Leader: CERG
Associated deliverables:
D.1.1 Update of the actual landslide European inventory of the Landslide Expert Group (CERG) - M+6
D.1.2 Spatial multi-criteria model (CERG) -M+9
D.1.3 Statistical (logistic regression) model (CER*G) -M+12*

Discussion on the methodology to progress in the European Landslide Susceptibility mapping of Europe according to landslide typology

In 2012, the main objective was to discuss on the methodology among a group of experts. A meeting has been organized in October 2012 in Berlin (hosted by BGR) where national landslide susceptibility assessments, different methods for evaluating the performance of the assessments, and access to data were discussed.
The time schedule and all presentations of the meeting can be found on the CERG website at: www.cerg.eu

Further to this meeting, several trials to validate the version 1 of the landslide susceptibility map of Europe have been realized, and the work will be presented at the forthcoming EGU 2013 Conference.



Different to previous continental and global scale landslide susceptibility studies, we start with collecting more than 102,000 landslides in 22 European countries. These landslides are heterogeneously distributed over Europe, but are

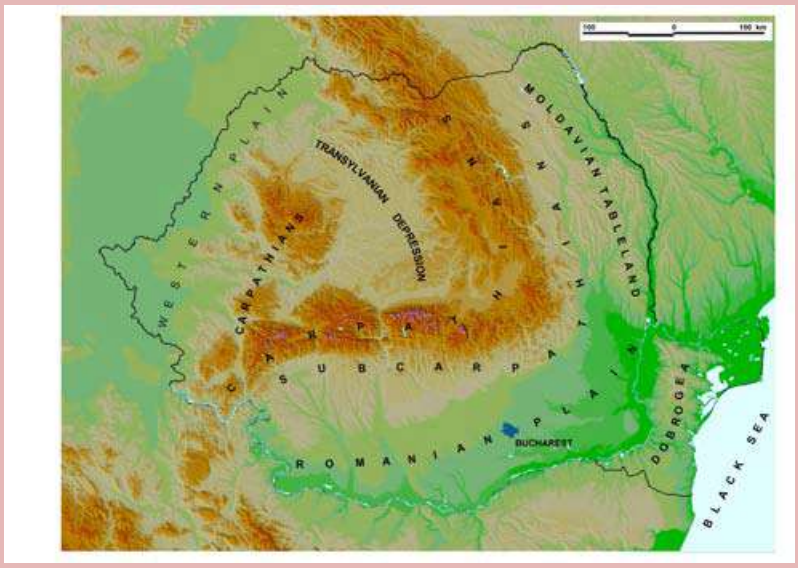
indispensable for the evaluation and classification of Pan-European datasets that can be used as spatial predictors for landslide susceptibility, and the validation of respective assessments. We further attempted a subdivision of the European territory into seven different climato-physiographic zones by combining morphometric and climatic constraints for terrain differentiation, and additionally defining coastal areas as a 1km inland from the coastline. Landslide susceptibility modelling was performed for the individual model zones involving heuristic spatial multicriteria evaluations, and validated with the inventory data using receiver operating characteristics. The reliability of the resulting susceptibility map ELSUS 1000 Version 1 was examined on an administrative terrain unit level in areas with landslide information. The ELSUS 1000 was further evaluated through comparisons with available national and regional landslide susceptibility maps. These evaluations suggest that although the first version of ELSUS 1000 is capable for a correct synoptic prediction of landslide susceptibility in the majority of the area, it needs further improvement in terms of data used. These should also consider differentiated susceptibility evaluations with respect to different landslide types. ELSUS 1000 Version 1 can be downloaded together with auxiliary data from the European Soil Data Centre (ESDAC) hosted at JRC.

Work package 2 (prepared by GHHD, ECBR, CERG*):*
Description:
National assessments of Landslide Susceptibility for three countries / Leader: GHHD
Associated deliverables:
D.2.1 Collection of inventory data and predisposing factors data for the three countries (Georgia: GHHD; Romania: ECBR; Portugal: CERG) - M+6
D.2.2 Organisation of the database for the three countries - M+9
D.2.3. Collection of triggering factors for the three countries - M+12
D.2.4. Statistical model for Portugal (CERG) - M+12

Nation-wide assessment of landslides: focus on Romania

In 2012, the project focused on creating a status of nation-scale landslide susceptibility mapping for Romania, and on preparing the data and maps needed for the analysis.

A brief overview on landslide typology in Romania
Romania represents one of Europe's main landslide hotspots. More than 2/3 of its territory corresponds to mountainous, hilly and tableland units (Fig.1) that are prone to a wide variety of landslides, which are triggered mainly by precipitation but also by earthquakes. Vrancea seismic area represents an intra-continental collision area, generating sub-crustal (90-150 km deep) earthquakes which may affect along a NE-SW direction a large European space extended from Ukraine to Bulgaria.
The complexity of landslide forms and processes is induced by the litho-structural parameters of the main relief units, by the climate characteristics (shifting from the more humid, Atlantic, in the western half to a continental one, marked by temperature and precipitation contrasts and extreme events in the east) and the long-lasting inhabitation.



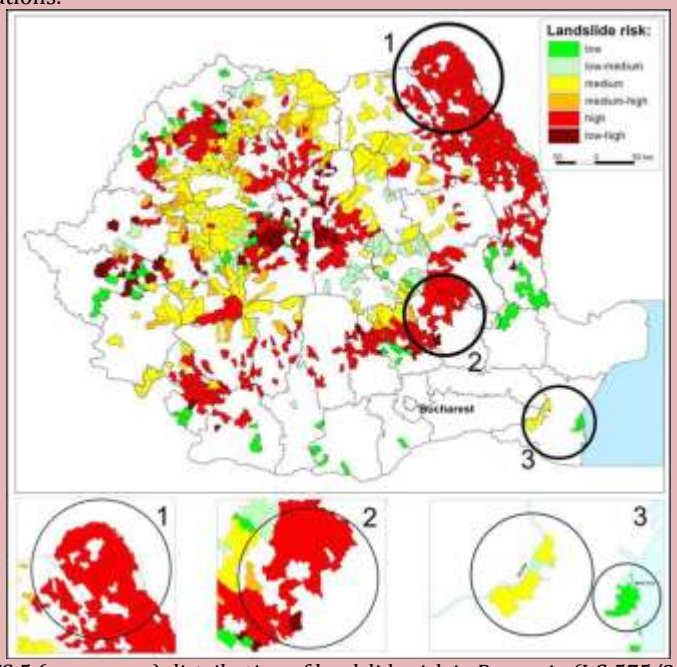
The main relief units of Romania

Throughout Romania's territory, several areas are showing an increased landslide occurrence (from both first time failures and reactivations points of view) potential: the Flysch Carpathians, the Subcarpathians, the Moldavian Tableland and the Transylvanian depression. The Flysch Carpathians represents mainly the outer-facing third of the Eastern and Curvature sector, and especially due to lithology (alternations of thin or thick, unconsolidated to well-cemented sandstone packages with schistose marls and clays) they are characterized by high magnitude/low

frequency deep-seated complex (alternation of translational and rotational sectors) debris and rock slides (the majority being considered reactivation of dormant, periglaciar landslide deposits). Their triggering framework involves quite often spring showers overlapping snowmelt. The loose lithology of the Subcarpathians (molasse deposits of clays, marls, sands and gravels in a very heterogeneous disposition of intensely folded and faulted strata) is also the main responsible for the wide variety of low magnitude but high frequency landslides: shallow and medium seated earth and debris slides, earth flows, rarely debris flows, triggered by heavy summer rainfalls, long-lasting autumn showers or thaw processes in early spring. The homocline relief build up on young (Neogene) sediments that forms the Transylvanian and Moldavian Tablelands is marked mainly by shallow and medium-seated earth slides and by complex (sometimes related to spreads) deep-seated slides called in Transylvania glimee. An update of landslide articles (and available data) in Romania is made by Balteanu et.all (2010) and within Loczy et.all (2012).

Landslide hazard and risk, legislative framework

From commune (local) to county (regional) and national level, the risk-related landslide issues are taken into consideration by several authorities, each one having specific attributions. At commune level, the Local Committee for Emergency Situations (organized by each municipality) issues post-failure documentations on damages-causing landslides to the next level, which is the County Inspectorate for Emergency Situations. Their preparedness/post-failure interventions are integrated within a county plan for landslide risk reduction measurements, which is discussed inside the County Committee for Emergency Situations, an institution that includes also the heads of County Prefecture and County Council. The County Council is responsible for developing the county landslide risk map, mandatory for the County Territorial Arrangement Plan. The main national institution that integrates such studies is the General Inspectorate for Emergency Situations, which works with other ministries in developing national-scale preparedness or intervention documentations.



NUTS 5 (communes) distribution of landslide risk in Romania (LG 575/2001)

The legislative framework is based on several laws (LG 575/2001, LG 124/1995, HGR 382/2003, HGR 447/2003, GT-019-98) which are regulating the procedures meant to develop landslide risk maps and to implement them into territorial planning procedures. The suggested method is a qualitative one, based on an expert judgment of the weights of several criteria: lithology, geomorphic, structural, hydrological and climatic, hydrogeology, seismicity, silviculture, human. Within the legislative framework there are some gaps, dealing with both form and fund issues. Besides an old conceptual and methodological framework (with obvious problems in explaining and applying the differences among susceptibility, hazard and risk), the subjectivity and uncertainty of the proposed method is increased by elusive expressions like "main valleys, reaching maturity stage, with young tributaries" or "slopes with average heights and average-high steepness" which are used as ranking criteria for landslide favorability classes. In the mean time, the legislation does not make any recommendations concerning a scale-methodology dependency.

The law 575/2001 makes a hierarchy of 987 communes and towns showing differenced landslide risk levels. Besides the bizarre distribution of risk classes (Fig.2, medallion 1 and 2), which shows high values all across the Moldavian plain, overestimating the intensity of the phenomenon compared with the Subcarpathians, one may notice also, sometimes, the complete absence of landslide risk inside high risk areas. The list also contains information about potential Danube lateral erosion and sea cliff undermining (Fig.2, medallion 3) Adding to that the fact that a lot of communes in the Subcarpathians showing indeed a high risk (Catina, Chiliile, Chiojdu, Odaile: CHANGES FP7) are curiously excluded from the hierarchy, the representativity of such a map is reduced to a rather general overview, and should be compared with other existing maps (Balteanu et.all, 2010) in order to built a proper confidence map.

Nation-wide assessment of landslides: focus on Georgia

1. Collection and organisation of relevant data for the national and regional assessments in Georgia:
Elevation data - DTM (Digital Terrain Model)
Relief slope's database
Hydrological data
Engineering Geology map of Georgia
The active fault system of Georgia
Land use
Landslide database
2. Test of the methodologies for susceptibility mapping per main landslide type (slide, flow and fall) at 1:1 M scale using SMCE and logistic regression models at the Pan-European scale, and evaluation of the performance of the modelling.
3. Set up of the "Landslide Risk Assessment Model, LRAM" survey and launch of the questionnaire on the internet.
Report structure:
In the Introduction (chapter 1) the overall description of the problem and its significance is discussed.
In the second chapter the main goals, objective and sub objectives are represented
The next chapter shows the short description of the available dataset.
The methodologies and application for the territory of Georgia is shown in the chapter N4.
The full report has been given to coordinating Centre, CERG.

Work package 3 (prepared by ISPU, CERG):
Description:
Analysis of the Landslide Risk Assessment Models used for mapping in the CoE members states
Associated deliverables:
D.3.1. Workshop of 1 day in Brussels to define the scope of the survey (CERG & ISPU) - M+6
D.3.2. On-line (web-based) creation of the survey (ISPU) - M+9
D.3.3.Diffusion of the survey to identified persons - M+10

The workshop was cancelled as it finally appeared as not necessary. Unfortunately, the survey was received only in December and it was technically not possible to transform in a web-based survey in 2012.

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by CERG, GHHD, ECBR):
Description:
Refined Pan-European Landslide Susceptibility Map / Leader: CERG
Associated deliverables:
D.1.4 Test of the performance of the model - quality control (CERG) - M+18
D.1.5 Writing of a joint point publication (CERG) -M+24
Work package 2 (prepared by GHHD, ECBR, CERG):
Description:
National assessments of Landslide Susceptibility for three countries / Leader: GHHD
Associated deliverables:
D.2.5 Statistical model for Georgia (GHHD & CERG) - M+14
D.2.6 Statistical model for Romania (ECBR & CERG) - M+14
D.2.7 Methodology to integrate dynamic factors in the analysis (CERG & GHHD) - M+18
D.2.8 Statistical model integrating triggering factors for the three countries (CERG & GHHD) - M+24
Work package 3 (prepared by ISPU, CERG):
Description:
Analysis of the Landslide Risk Assessment Models used for mapping in the CoE members states
Associated deliverables:
D.3.4 Analysis of the questionnaire's response (ISPU) M+14
D.3.5 Synthetic report on the advantages and limitations of each LAMs per country (ISPU & CERG) - M+9
D.3.6.Publication of the results on-line at the ISPU website - M+24
Work package 4 (prepared by CERG):
Description:
Project management
Associated deliverables:
D.4.3 Mid-term project meeting with all participants in Portugal (CERG) - M+14
D.4.4. Project reporting (CERG) - M+24

FINANCING FOR 2013

EUR-OPA : € 24000

Split between partners : € 9000 for CERG Strasbourg, France

€ 6500 for GHHD Tbilisi, Georgia

€ 3000 for ECBR Bucharest, Romania

€ 5500 for ISPU Florival, Belgium

Other contributors: € 4000 from UdS, JRC & ULISBOA

SEISMIC PROTECTION OF MONUMENTS

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.B. Risk mapping and vulnerability

TITLE OF THE PROJECT : SEISMIC PROTECTION OF MONUMENTS

TARGET COUNTRIES : GREECE, ITALY, ARMENIA

PARTNERS INVOLVED :

COORDINATING CENTRE : ECPFE Athens, Greece

OTHER CENTRES: CUEBC Ravello, Italy , ECRM Yerevan, Armenia

OTHER PARTNERS : EUROPEAN COUNCIL OF CIVIL ENGINEERS

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

The main objective of the proposal will be the preparation of a "Regulatory document for the design of structural interventions in monuments in earthquake prone areas". The proposed action is aiming at: a) a better understanding of the main issues in selecting the level of seismic actions used in the design of structural interventions of monuments, and b) demonstrating the necessity and elaborating the contents of a Regulatory Document on aseismic design of structural interventions in monuments. The preparation of this document will be based on relevant documents already developed in Greece (by EPPO and ECPFE in collaboration with the Ministry of Culture) and in Italy (by the Ministry of Cultural Heritage and Activities).To this end an international working committee composed by experts from selected European Centers specialized in the above topic will be established with the aim to prepare the relevant document. The present action is proposed in the framework of the issues of special concern "Cultural Heritage and Risk" of the Committee of Permanent Correspondents for 2012-2013 biennium.

Specific yearly objectives :

2012:

A first Draft of the document in English language will be prepared

2013:

Finalization of the draft, including case studies (one case study per partner), to better illustrate its application. Dissemination of the goals achieved.

EXPECTED RESULTS

2012:

A workshop of the Committee members will be held in one of the three capitals of the members (Athens, Ravello, Yerevan) to initiate the preparation of the document.

2013:

A Seminar will be held at the end of 2013 including Case Studies concerning the applicability of the Document in one of the three capitals of the members (Athens, Ravello, Yerevan) to disseminate the goals achieved.

RESULTS OBTAINED PREVIOUSLY (if any)

The preparation of this document will be based on relevant documents already developed in Greece, in the framework of 2011 ECPFE' s Activities (by EPPO and ECPFE in collaboration with the Ministry of Culture) and in Italy (by the Ministry of Cultural Heritage and Activities). Results obtained by ECPFE and EPPO:

1.A two-day international meeting was organized in Athens by EPPO and ECPFE in 2006 and in 2009, concerning the Seismic protection of Monuments.

2. Two Seminars on the same topic were also organized by EPPO and ECPFE in Athens and in Thessaloniki in 2010 and in 2011 respectively.

3. A first document was elaborated on the proposed topic by EPPO - ECPFE in collaboration with the Hellenic Ministry of Culture and Tourism. This document constitutes a basis for further development by the Committee proposed to be established with the participation of experts from the CUEBC, ECRM and EUROPEAN COUNCIL OF CIVIL ENGINEERS.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECPFE Athens, Greece, ECRM Yerevan, Armenia, CUEBC Ravello, Italy)

Description:

The formation of a scientific committee deployed by distinguished scientists nominated by the European Centers (ECPFE, CUEBC, ECRM) and other Competent Authorities with main goal the syntax of a first draft of a Regulatory document for the design of structural interventions in monuments in Earthquake prone areas.

The document will include the following :
Definition of the main issues affecting the selection of seismic actions: contradicting Principles (monumental and social values as well as performance requirements), need for classification of monuments in various categories and definition of the importance level of each category, definition of visibility levels and acceptable damage levels. Elaboration of specific proposals for the selection of the value of seismic actions, which will be based on an optimization process taking into account also its eventual consequences on monumental values, as well as on human lives, costs and technical performances. Brief elaboration of the contents of the Regulatory Document on aseismic design of structural interventions on monuments.
The members of the Scientific Committee will communicate via internet facilities
At the end of 2012 , a Workshop will be held in Athens, Ravello or Yerevan so as to present the relevant work
Associated deliverables:
A draft of the document in English

ECPFE
A draft of the document in English is already available ????

CUEBC
The research was based on the recovery of data which emphasize the level of studies on local seismic cultures, and in particular the new methodological approach for this type of study. We did a thematic bibliographical review, through which most significant elements for the advancement of studies on the subject were collected. Theoretical knowledge were crossed with case studies conducted over the years with this new methodology.
In order to assess the need to implement protocols for identifying elements of the Local Seismic Culture and to disseminate knowledge in areas with minor seismic intensity, but with similar elements relating to old buildings, the study of the urban structure of Atrani (Amalfi Coast) was done. Data relating to the historical centre was collected. We started from the bottom of the valley to move first on the east side and then to the West side, trying to make, where possible, horizontally following the curves of altitude. From each copy was recovered photographic documentation and the cartographical positioning was performed.
The findings highlight the need to apply in priority to seismic zones the protocols already prepared following the "Ravello" approach and accompanying this activity with training for technicians.

ECRM
…

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by ECPFE, CUEBC, ECRM):
Description:
Elaboration of Case studies so as to check the applicability of the Document. Finalization of the Document
The members of the Scientific Committee will communicate via internet facilities.
At the end of 2013, a Seminar will be held in Athens, Ravello or Yerevan so as to present the relevant work.
Associated deliverables:
The final Document

FINANCING FOR 2013

EUR-OPA : € 11500
Split between partners : € 6500 for ECPFE Athens, Greece
€ 2500 for CUEBC Ravello, Italy
€ 2500 for ECRM Yerevan, Armenia
Other contributors: € 8000 from E.P.P.O.

ASSESSMENT OF INTERVENTIONS IN EARTHQUAKE PRONE AREAS

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.B. Risk mapping and vulnerability

TITLE OF THE PROJECT: Assessment of interventions in Earthquake Prone Areas

TARGET COUNTRIES: Greece, Bulgaria, Romania

PARTNERS INVOLVED:

COORDINATING CENTRE : ECPFE Greece

OTHER CENTRES: ECRP Sofia, Bulgaria , ECBR Bucharest, Romania

OTHER PARTNERS : EUROPEAN COUNCIL OF CIVIL ENGINEERS

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

The main objective of the proposal, belonging to the line of action: "Reduction of the Vulnerability ", will be the preparation of a document concerning Assessment and Interventions on Reinforced Concrete and Masonry Buildings. The document will take into account the Part 3 of the Eurocode 8, elaborating specific objects and facilitating its implementation. It will be complementary to EC8 Part3 and non-contradictory. Specific Case Studies will be included in the document in order to facilitate its application .To this end an international working committee composed by experts from selected European Centers specialized in the above topics will be established with the aim to prepare the relevant document. The Committee will work using mainly internet facilities, as only one or two meetings/workshops of the Committee per year may be envisaged. At the end of the second year a seminar will be held in order to disseminate the goals achieved.

Specific yearly objectives :

2012:

Collecting and sharing information on experience in Greece, Bulgaria and Romania and identification of issues that may cause differences in large scale practical application of EC 8 part 3 in each partner country;

2013:

Identification of needed changes in EC 8 part 3 and national regulations and proposing anticipated preparative in order to fulfill needs of coverage in conjunction with needs of safety and vulnerability data, coping with the European requirements. -

EXPECTED RESULTS

2012 :

State of the art of experience concerning the post-earthquake assessments and interventions in partner countries-

2013:

The specific of buildings stock and needs of vulnerability reduction in each partner country- the degree of detailing needed in interventions and/or strengthening design, in different stages of work

RESULTS OBTAINED PREVIOUSLY (if any)

Romania has adopted in the last years several national laws requesting and supporting the identification and the strengthening of buildings vulnerable to earthquakes (Law OG No. 20/1994, revised) as well as the upgrading of thermal comfort of buildings. The existing building stock in Romania and in many countries of Europe has various age, comfort and structural safety and reliability. The change of occupancy of buildings during the building lifespan, the cumulative structural damage produced by natural hazards and the upgrading of knowledge, standards and materials used for design of buildings and their technical equipment make the rehabilitation of buildings a major challenge for contemporary society in Europe. Since 2007 it was enforced the new Code P100-1 for seismic design. A new Romanian Methodology MEE 003-2007 for post-earthquake emergency investigation of safety of buildings and framework solutions of intervention, was enforced in 2007 by the Ministry of Regional Development and Tourism; the draft was coordinated by INCERC in collaboration with UTCB, IPCT and NCSRR. The enforcement of EC 8 part 3, as National Annex SR EN 1998-3: 2005 /NA 2009 raised some issues of correlation with the National Code P100-1 and with the new Romanian code P 100-3/2008 for seismic assessment of existing buildings. Thus, there is a need of a concerted approach, at least among S-E European countries.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECPFE, ECRP, ECBR):

Description:

The formation of a scientific committee deployed by distinguished scientists nominated by the European Centers (ECPFE, ECRP, ECBR) and other Competent Authorities with main goal the syntax of a first draft of a document

concerning Assessment and Interventions on Reinforced Concrete and Masonry Buildings for the design of structural interventions in Earthquake prone areas. The document will be complementary to EC8-part 3.
The members of the Scientific Committee will communicate via internet facilities.
At the end of 2012, a Workshop will be held in Athens, Sofia or Bucharest so as to present the relevant common work.
Associated deliverables:
ECPFE : A draft of the document in English.
ECBR: presenting the Romanian experience on post-earthquake investigations to derive observed vulnerability data, as they were carried out after March 4, 1977 earthquake; outline of the new Romanian Methodology MEE 003-2007 for post-earthquake emergency investigation of safety of buildings and framework solutions of intervention, enforced in 2007 and correlations with EC 8 part 3 needs of data.
ECRP:

ECPFE
A Workshop on «Assessment of interventions in Earthquake Prone Areas» was scheduled for the end of 2012 in Athens, in order to disseminate the above work among distinguished Scientists from other European Centers, who will also deliver relevant presentations. The workshop has to be postponed to the beginning of 2013 (probably in March), due to the following reasons:
a) Better organization among the partners of the Section «Reduction of the vulnerability» and invitation of experts from Europe, taking into account that the end of the year is always a rather «heavy» period for most academicians;
b) Wider participation (of speakers as well as of engineers), since by mid December a Workshop on «Seismic Protection of Monuments» was already scheduled.
The working Group (nominated by E.C.P.F.E. in collaboration with EPPO) who produced in 2011 the five first chapters of a non-contradictory complementary document (in Greek and in English) to elaborate specific objects and facilitate the implantation of EC8-Part 3, has produced in 2012 the draft of chapters 6 to 11 of that document "Code of Interventions (KAN. EPE), final harmonized Text" in English, namely:
Chapter 6: BASIC BEHAVIOUR MODELS
Chapter 7: ASSESSMENT OF BEHAVIOUR OF STRUCTURAL ELEMENTS
Chapter 8: DESIGN OF INTERVENTIONS
Chapter 9: SAFETY VERIFICATIONS
Chapter 10: REQUIRED CONTENTS OF THE DESIGN
Chapter 11: CONSTRUCTION – QUALITY ASSURANCE - MAINTENANCE

ECRP
The main objective of the planned activities will be the preparation of a "Regulatory document for the design of structural monuments in earthquake prone areas". The preparation of the above Regulatory document was supposed to be based on the relevant documents, already created in Greece and Italy. In particular, a first document (elaborated on the proposed topic by EPPO-ECPFE in collaboration with the Hellenic Ministry of Culture and Tourism) constitutes a basis of further development of the Scientific Committee proposed to be established with the participation of experts from the Project Coordinating Centre and Partner Centres. As proposed by the Coordinating Centre, ECRM has submitted candidatures from Armenia to the Project International Scientific Committee and began to assemble a working group from relevant specialists. Awaiting an English version of the above draft "Regulatory document", ECRM in 2012 within the Project has carried out researches addressing two directions.
In the first direction, an array of analyses were conducted of the existing legislative and regulatory documents of the Republic of Armenia dealing with seismicity and seismic resistance of constructions in general, as well as the availability in the above mentioned documents of the elements, concerning structural interventions in monuments in earthquake prone areas, in particular.
In the second direction, some comparative analyses were conducted of comparing the legislation of the Republic of Armenia with that of the European Union in the field of Civil Protection and Disaster Risk Reduction , in general, from a point of view of clarifying the coincidences and discrepancies existed in approaches to their formation; specifying some fundamental structural and contents related discrepancies in legislation and proposing the ways towards harmonization of the legislation of Armenia and that of the European Union in the above field.
Our work would have become more effective had we got an extended summary in English of the "Draft framework Regulatory Document for structural intervention to and seismic protection of monuments", which is called to serve a basis for our common work, or would have allowed to make at least a first step towards it, in case we have received a short "Annotation" in English of the mentioned document. At receiving of the above documents, we will immediately start translating them from English into Armenian and to continue target work with the involvement of the experts from Armenia on analyses of the documents, comparing them with the Provisions of the Armenian Legislation in the above field being analyzed by ECRM in 2012 within the Project, and development of relevant suggestions.

ECBR
…

ACTIVITIES PLANNED IN 2013 ***(split by partner)***
Working package 1 (prepared by ECPFE, ECRP, ECBR)

Description:
Elaboration of Case Studies so as to check the applicability of the document and finalization of the Document.
The members of the Scientific Committee will communicate via internet facilities. At the end of 2013, a Seminar will be held in Athens, Sofia or Bucharest so as to present the goals achieved.
Associated deliverables:
ECBR: comparisons between the requirements of Romanian code P 100-3/2008 for seismic assessment of existing buildings and EC 8-part 3, vs. EC 8 requirements for newly designed buildings. case studies in using analytical assessments and calibrating them with field inspections and measurements of dynamic characteristics of buildings made of concrete and masonry and according with different codes, as to derive vulnerability patterns
ECRP:

FINANCING FOR 2013

EUR-OPA : € 11500
Split between partners : € 6500 for ECPFE Athens, Greece
€ 2500 for ECRP Sofia, Bulgaria
€ 2500 for ECBR Bucharest, Romania
Other contributors: € 8000 from EPPO

UNDERSTANDING AND QUANTIFICATION OF NATURAL HAZARDS

DUREE: ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LIGNE D'ACTION: 2.B. Risk mapping and vulnerability

TITRE DU PROJET: Understanding and quantification of natural hazards

PAYS VISES: All interested member countries, Japan, Democratic Republic of the Congo and Rwanda

PARTENAIRES IMPLIQUES :

COORDINATING CENTRE: ECGS Walferdange, Luxemburg

OTHER CENTRES:

OTHER PARTNERS : GFZ German Research Centre for Geosciences in Potsdam, Germany, Royal Museum for Central Africa (Tervuren, Belgium), Musée national d'histoire naturelle Mnhn (Luxembourg)

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013:

During the past few years, ECGS has contributed to the aims of the EUR-OPA Major Hazards agreement as outlined in the guidelines for the programme of activities 2012-2013 [AP/CAT 2011(21)] through a range of research and education activities. These included, among others, research activities aiming at a better understanding of the physical characteristics of earthquake ground motions (the latter being the fundamental prerequisite for adequate seismic hazard assessment, which in turn represents the basis for risk assessment and vulnerability reduction), the improvement of earthquake early warning systems (based on an in-depth investigation of the Istanbul earthquake early warning system), research aiming at monitoring ground deformations using state-of-the art space borne or ground based methods (e.g. for volcano monitoring, natural or man made ground subsidence…), as well as several specialised workshops dealing with topics such as induced seismicity (ECGS-FKPE workshop 2010). These and other projects were carried out in collaboration with high-profile academic partners worldwide.

Specific yearly objectives:

2012:

In the framework of the 2012-2013 programme of activities of the EUR-OPA Major Hazards agreement, ECGS intends to continue and extend these research activities aiming at a better understanding and quantification of natural hazards in the Euro-Mediterranean region, but also on a global scale.

Indeed, ECGS is strongly involved in the processing of Japanese earthquake strong motion data, and in the coming two years, one aspect on which we will concentrate is the study of the implications of the massive M 9 earthquake that occurred on 11 March 2011. This is the first time that such a wealth of near-source strong motion data have been recorded from such a mega thrust earthquake, and thus the results obtained from the study of the near-source strong ground motions generated by this earthquake are of particular interest also for other regions threatened by the potential occurrence of mega thrust earthquakes. Besides the study of this particular earthquake, we will also work on the analysis of the variability of earthquake ground motions, an issue of utmost significance for seismic hazard calculations worldwide. These research activities will be carried out in close collaboration with scientists from the GFZ German Research Centre for Geosciences in Potsdam, Germany.

Besides these aspects of fundamental earthquake ground motions research, ECGS is also currently investing its efforts in developing a permanent seismic network for Luxembourg and the Great Region around (i.e. Luxembourg and neighbouring regions of Belgium, France and Germany), an infrastructure that was so far missing. With these efforts, we intend to close the gap of missing seismological recordings in the Grand Duchy and collect the necessary data to contribute to a significantly improved assessment of the seismic hazard in the area.

Furthermore, ECGS will also remain deeply involved in the study of volcanic hazards and ground deformation mainly in Africa and in the Great Region. For instance, in close collaboration with the Museum for Natural History of Luxembourg and the Royal Museum for Central Africa (Tervuren, Belgium) as well as European universities from Belgium, France and Italy, we study the Virunga Volcanic Province (VVP) at the bordering region of the Democratic Republic of the Congo and Rwanda. Two of the most actives volcanoes of Africa (Nyiragongo and Nyamulagira) indeed lie in the VVP and threaten the > 1 million inhabitants of the city of Goma and neighbouring urban areas and villages. In particular, the volcano-tectonic risk is extremely high in Goma as shown by the recent 2002 Nyiragongo eruption that destroyed 10% of the city, a city where the population doubled over the last 10 years. Similarly, methods developed for the study and the monitoring of that region were also successfully applied to other volcanic and tectonic areas such as in Tanzania, Cape Verde, and South Kivu as well as in the Great Region. This allowed to address in previous studies important questions such as whether the occurrence of recent seismic sequences in the East African rift were of purely tectonic origin or whether there was any magma involved (which has important impact in hazard assessment), as well as bringing fundamental information about the continental rifting process itself.. Applying these methods developed on the African targets and new methods developed recently by a postdoctoral fellow at ECGS, we also detected long-term subsidence related to the mining activity in Luxembourg and the Great Region.

The large datasets of satellite Radar images owned at ECGS (acquires since the nineties over active tectonic regions in Africa and over Luxembourg and surrounding areas) and the necessary computing facilities and processing tools, as well as various ancillary data or equipment to complement these remote sensing studies (GPS, tiltmeters, gravimeters, etc.) provide us with outstanding tools for conducting fundamental research and hazard assessment-oriented research. In the years 2012-2013, further studies will be carried out, in particular with the aim of gaining insights into the magmatic system of Nyiragongo volcano. As a first step towards this goal, a field mission was carried out in September 2011, providing an invaluable dataset to tackle this issue

2013:

see above

EXPECTED RESULTS

2012:

see above

2013:

see above

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECGS):

Description:

Fundamental seismological research on ground motion prediction equations and ground motion variability

Associated deliverables:

A better understanding of how earthquake ground motions are generated and how their variability can be treated in seis hazard assessment

During the year 2012, significant progress has been made in the project "Understanding and quantification of natural hazards", led at the European Center for Geodynamics and Seismology. The year was in particular marked by the work or ground motion and source parameter variability of earthquakes in Japan, and the workshop Earthquake source physics o various scales, which was organized by ECGS with cofounding from the EUR-OPA Major Hazards Agreement, and relates directly to the research carried out at ECGS.

In 2012, we carried out a study on the regional variability of earthquake source parameters (such as stress drop and rele seismic energy) in Japan, starting from the earlier results of Oth et al. (Geophysical Research Letters, 37, 19304, 2010), w had analyzed the average source scaling behavior (i.e., how earthquake source parameters scale with earthquake size) in Japan. The more detailed analysis of the regional variations of these parameters revealed very interesting insights. First c crustal earthquakes in the northern part of Japan's largest island Honshu exhibit very low stress drops and released ener per unit moment, while the contrary is the case for the island of Kyushu in southernmost Japan. Compared to the distribu of quaternary volcanoes (i.e., the volcanic arc of Japan) and heat flow measurements throughout the country, there is a striking relationship between the latter and the source parameters of earthquakes. In the volcanic areas, where the crust obviously warmer, stress drops are very small. When compared to other geophysical parameters, such as strain rate determined from GPS measurements or the focal mechanisms, the relation of the source parameters to heat flow seems t the most robust, indicating that most likely, the thermal strength of the crust is the main determining factor for how muc energy is radiated by an earthquake.

Furthermore, there are also clear regional variations in the scaling, and not only in the absolute stress drop values. These currently under further investigation, and we are currently in the process of preparing a publication on this work.

Work package 2 (prepared by ECGS):

Description:

Establishment of permanent seismic network in Luxembourg

Associated deliverables:

Operating seismic network covering the entirety of the Luxembourgish territory by the end of 2013

Progress was also made concerning the establishment of a seismic network in Luxembourg. A temporary network of 6 se stations is already up and running, in cooperation with the Karlsruhe Institute of Technology (KIT). ECGS has purchased seismic sensors that are currently in the process of being deployed. The first three of these are deployed in the framewor project funded by the National Research Fund of Luxembourg (FNR), with the aim of using seismological measurements t make estimations of bedload transport in rivers (project BEDLOAD). While these stations are primarily destined to serve project for the coming 1-2 years, they will nevertheless also provide earthquake registrations, since they are measuring continuously. The other 3 stations will be deployed in Luxembourg for seismological monitoring purposes, in addition to permanent station in the Walferdange Underground Laboratory for Geodynamics (WULG) and the six stations already present. This network provides the first dataset of continuous seismic recordings covering the entirety of the Luxembour territory.

Work package 3 (prepared by ECGS):

Description:

Processing of the field mission data acquired on Nyiragongo Volcano in September 2011
Associated deliverables:
Improved understanding of the dynamics of the Nyiragongo lava lake

The work on the field mission data acquired on a field mission on Nyiragongo volcano in September 2011 has started and will be continued throughout the coming year.

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by ECGS)*:*
Description:
Associated deliverables:

EXPECTED FINANCING FOR 2013

EUR-OPA : € 9000
Split between partners : € 9000 for ECGS Walferdange, Luxemburg

RISK AND VULNERABILITY MAPS FOR SELECTED COASTLINES IN MALTA & TURKEY WITH REGARD TO TSUNAMIS & SLR

DURATION: ☒ 2012 ☐ 2013 ☐ 2012 – 2013

LINE OF ACTION: 2.B. Risk mapping and vulnerability

TITLE OF THE PROJECT : Development of risk and vulnerability maps for selected coastlines in Malta & Turkey with regard to tsunamis & SLR

TARGET COUNTRIES : Euro-Mediterranean countries

PARTNERS INVOLVED :

COORDINATING CENTRE : ICoD La Valletta, Malta

OTHER CENTRES:

OTHER PARTNERS : Middle East Technical University (METU), Turkey

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013:
Identification and mitigation of risk and vulnerability to Sea Level Rise and Tsunamis for selected low lying coastal areas in the Maltese islands and Turkey.

Specific yearly objectives :

2012:
3-year project conclusion (see expected results)

EXPECTED RESULTS

2012:
- Development of Risk / Vulnerability maps.
- Comparison of the scenario solutions and computational results.
- GIS based inundation mapping.
- Producing vulnerability risk maps under the conditions of tsunami and sea level results.

RESULTS OBTAINED PREVIOUSLY (if any)

2010: Identification of historical events, selection of study areas from Turkey and Malta subject to possible effects of tsunamis, collection of necessary data (near-shore bathymetry and topography, distribution of coastal and marine structures and their characteristics, wind, wave and sea level data), public surveys, processing of data and database development for the computational tools.
2011: Development of regional / local scenarios (e.g. forecasted climate change impact on Sea Level Rise and possible tsunami events, downscaling from global to regional to local scenarios); Correlation of Mediterranean regional history of tsunamis to local vulnerability, wind and wave climate studies for selected sites, wave transformation studies, tsunami simulations and computations of the near shore tsunami parameters at selected sites, development of database for the vulnerability risk maps.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ICoD, Middle East Technical University):
Description:
Development of Risk / Vulnerability maps.
Associated deliverables: see above

xxx

Work package 2 (prepared by ICoD, Middle East Technical University):
Description:
Comparison of the scenario solutions and computational results.
Associated deliverables: see above

xxx

Work package 3 (prepared by ICoD, Middle East Technical University):
Description:
GIS based inundation mapping

Associated deliverables: see above

xxx

Work package 4 (prepared by ICoD, Middle East Technical University):
Description:
Producing vulnerability risk maps under the conditions of tsunami and sea level results .
Associated deliverables: see above

xxx

2.C. Impact of climate change and environment issues

COUPLING TERRESTRIAL AND MARINE DATASETS FOR COASTAL HAZARD ASSESSMENT AND RISK REDUCTION IN CHANGING ENVIRONMENTS

DURATION: ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.C. Impact of climate change and environment

TITLE OF THE PROJECT: Coupling terrestrial and marine datasets for coastal hazard assessment and risk reduction in changing environments

TARGET COUNTRIES: Euro-Mediterranean countries

PARTNERS INVOLVED:

COORDINATING CENTRE : ICoD La Valletta, Malta

OTHER CENTRES: CERG Strasbourg, France

OTHER PARTNERS : Università di Modena e Reggio Emilia (UNIMORE, Italy), Université de Caen Basse-Normandie (UNICAEN, France), Consiglio Nazionale delle Ricerche: Istituto di Scienze Marine (ISM, Bologna, Italy); CNR-IRPI (Padua, Italy)

OBJECTIVES OF THE PROJECT

Preliminary note:

The global objectives of this activity fit in priority within the line of action "2.C - Impact of climate change and environment" and secondarily within the line of action "2.B Risk mapping and vulnerability".

Background:

Coastal hazards are a topical issue nowadays which involves scientists and stakeholders trying to define the best procedures to face risks and increase community resilience, either reducing natural hazards or diminishing vulnerability. Coastal environments are particularly sensitive and susceptible to relevant damages in case of both sudden events (e.g., tsunamis, landslides, storm surges) and long-term processes (e.g., sea-level changes).

Coastal instability phenomena which cause heavy socio-economic consequences and fatalities have increased significantly in recent years due to global changes, which determine more frequent extreme meteorological events, and progressive urbanisation of coastal areas, especially in developing countries. Furthermore, if coastlines are located in tectonically active areas, such as the Mediterranean Sea, the situation can be even more problematic.

The study areas are the Normandy coast (France) and the coasts of the Island of Malta, which show different morphoclimatic and tectonic setting, but which have been and are at present affected by significant changes in sea level since the Last Glacial Maximum, when the sea level was some 120 metres lower than present. Previous research carried out in the frame of the "Coastline at risk" project has shown that several landslides along the coastlines of Normandy and Malta are extending well below the sea level.

The Projects involves two specialised centres, CERG and ICoD. The expertise of the academic partners (see above) guarantees the success of the research activities. Co-funding to the research will be made available by each of the partners.

Global objectives 2012 - 2013:

• Delivering an original contribution and new directives for risk reduction in coastal areas taking into account historical and possible future climate changes based on the outputs of the CERG 2009 - 11 Project "Coastlines at Risk: methods for multi-hazards assessment".

• In the absence of documented research aiming at a joint knowledge of 'land and sea' environments and related risks, this project aims to develop a multidisciplinary methodological approach which is capable to integrate terrestrial and marine datasets.

• Focusing on two study areas where significant data have been collected within the "Coastline at Risk" Project with respect to terrestrial processes and related risks. Special emphasis will be devoted to landslides, taking also into consideration the influence of climate change and coastal erosion on sea-level rise, as possible conditioning factors.

• Application of a multidisciplinary geomorphological, engineering-geological and geophysical approach to recognise landforms which are presently under the sea level, but which were not in very recent geological periods and which may be still active (e.g., faults, landslide accumulations, sand bars).

• A better understanding of landslide kinematics through generation of knowledge of their submarine spatial and temporal development. This knowledge would of course enable to provide a more comprehensive picture of landslide hazard conditions.

• Generation of information and knowledge related to risk reduction through pilot studies, with the possibility of extending the methodology to other European coastal areas, improving their environmental resilience.

• The Projects is intended to have a European dimension and a significant impact within the activities of the "European and Mediterranean Major Hazards Agreement".

Specific yearly objectives :

2012 :

1) Integration and coupling of existing terrestrial and submarine datasets;
2) Outline of marine level variations since the LGM;
3) Acquiring new data on submarine landforms and processes along the Normandy and Malta coastlines selecting pilot-areas where to conduct multi-beam surveys;
4) Continue the monitoring of coastal processes initiated within the "Coastline at risk" Project.

2013 :

1) Integration of newly acquired data (terrestrial and submarine) with the existing ones;
2) Propose a temporal reconstruction of the evolution of the study areas, with particular emphasis on creating maps when the sea levels was below the actual one;
3) Outline a methodology for hazard assessment taking into account climate and sea level changes (thus also focusing on terrestrial and submarine information).
4) Monitoring of coastal processes.

EXPECTED RESULTS

2012 :

Definition and assessment of the relationships between terrestrial and submarine morphological features in relation to landslide processes.

2013 :

1) Improvement of existing hazard maps taking into account issues related to climate change (sea-level, more frequent extreme meteorological events etc.);
2) Acquisition of necessary knowledge to define methods to perform landslide monitoring offshore (on the seafloor);
3) Definition of protocols which can be used in other coastal environments for risk reduction and resilience improvement.

The expected results could be used by others to prepare a guideline on climate change impact and integrate in the BE-SAFE-NET website

RESULTS OBTAINED PREVIOUSLY (if any)

The proposing partners have obtained significant results which can be functional to the development of the present Project within the CERG 2009-11 Project "Coastline at risk: methods for multi-hazard assessment".

RESULTS OBTAINED IN 2012

Study sites in Normandy coast

Along the Normandy coast, the research focuses on landslides and storm surges: the landslides studied are falls in hard rocks (cliff falls, debris fall and boulder and rock falls) and slides in soft rocks.

Location of the main processes in the study sites in Normandy

Two selecting pilot areas are:

The Villerville-Cricqueboeuf Landslides (Lower Normandy Coast, France).

The 12 km long Pays d'Auge coast in lower Normandy is periodically affected by rotational and translational landslide since several centuries. These landslides occurred in marly formations covered by chalks and quaternary deposits. In January 1982, major landslides have caused several damages (roads, destroyed houses). The affected slopes are the Cirque des Graves at the West of the city of Villerville and the Fosses du Macre at the East of the city of Cricqueboeuf.

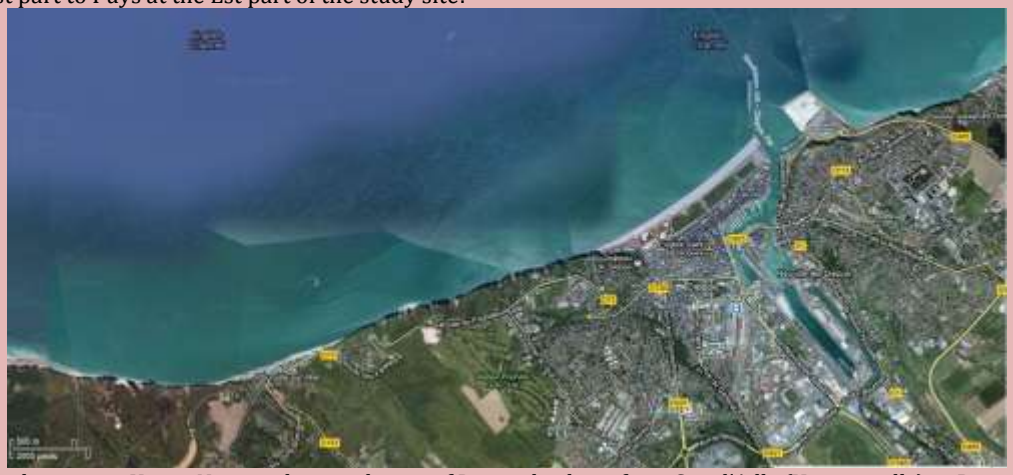
Aerial view of the Villerville-Cricqueboeuf landslide in Lower Normandy

The Pays d'Auge Plateau is bordered on the North by high cliffs of up to 140 m. The topography and geology of the cliffs are various. The main scarp is composed of Cenomanian chalk overlying glauconitic sands. Below, a thick layer of marls is on top of the sandy limestone of Hennequeville which shapes the cliff toe and constitutes a reef flat between Trouville and the Pointe du Heurt. Below the scarp, the slope is more gentle and composed of an accumulation of thick superficial heterogeneous materials (blocks and debris of chalk and flints, loamy sands). These formations have been placed during the Upper Pleistocene period. For coastal risk assessment, the main issues are focused on:

- reconstruction of the long term evolution of the instable slopes;
- definition of the morphology and internal structure of the landslides;
- integration of terrestrial and marine datasets,
- study of the relationship between the predisposal and triggering factors (i.e. the influence of climate change and coastal erosion on sea-level rise),
- definition of the dynamic of the active landslides and the different threshold in order to define a specific 'Landslide Early Warning System'.

Hard rock cliff in Upper Normandy

The other selecting pilot area is located in Upper Normandy along the hard rock cliff subjected to landslides (cliff falls, debris fall and boulder and rock falls) and storm surges, in each part of Dieppe arbour from Cap d'Ailly (Varengeville) at the west part to Puys at the Est part of the study site:



Selecting pilot area in Upper Normandy in each part of Dieppe harbour from Cap d'Ailly (Varengeville) to Puys (Est part).

For coastal hazard assessment, three issues coupling terrestrial and submarine datasets are requiring for:

- definition of the production of debris (flint) from cliff erosion which feeding intertidal sedimentary stock, gravel beach,
- definition of infratidal sandy inputs on gravel beach, which participate to the functioning of these accumulation,
- definition of the impacts of harbor jetty on infratidal sedimentary drift (onshore-off shore and longshore drift).

Study sites in Maltese coast

During this year of research, the existing terrestrial and submarine datasets have been collected through a bibliographic and archive research.

A multidisciplinary approach to integrate and couple terrestrial and submarine datasets has been defined, which foresees contributions from geomorphology, marine geology, geophysics and engineering geology.

The newly acquired submarine data (see specific following section) and the elaboration of a detailed DTM of the seafloor along the north-west coast of the Island of Malta, has enabled to outline for the first time the submerged landforms of this stretch of coast. A first attempt to compare terrestrial and submarine landforms has been performed

with the aim of producing, during the second year of research, a comprehensive geomorphological map capable to illustrate terrestrial and submarine landforms in the same sheet, which could serve as a useful tool for hazard assessment.

Work package 1 (prepared by CERG, IcoD, Università di Modena e Reggio Emilia, Université de Caen Basse-Normandie, Consiglio Nazionale delle Ricerche: Istituto di Scienze Marine; CNR-IRPI):
Description:
Integration and coupling of existing terrestrial and submarine datasets;
Associated deliverables:

Normandy case study
For the two sites, all existing terrestrial and submarine datasets have been integrate in a GIS platform (Arcgis 10). The main efforts have been focused in the research and the integration of the submarine datasets (bathymetric characteristics, sedimentary characteristics of sea floor (Figure 3), beach's sedimentary stock evolution on the beaches and at the cliffs foot). This information is very important especially to assess the sandy exchanges between near shore zone and sub-aerial beach.
Several maps, DTM (Digital Terrain Model) at the different scales and resolutions, meteorological data and hydrodynamic conditions (wave climate, tide regime, storm sea level …) have been collected from the bibliography and previous researches. Also, historical census events allow to know (1) the types of atmospheric circulation, (2) meteorological conditions (thresholds), and (3) flood extension.
The quality and the density of information are very diverse for the test sites. In example, for the Villerville-Cricqueboeuf landslides, the bathymetric data are relatively low and incomplete. A multibeam sonar survey has been carried out by the SHOM (French Hydrographic Office) but the area covered by the survey stopped at the West part of the Villerville town. At the East part, only information provided by the submarine paper map is available (Figure 4).

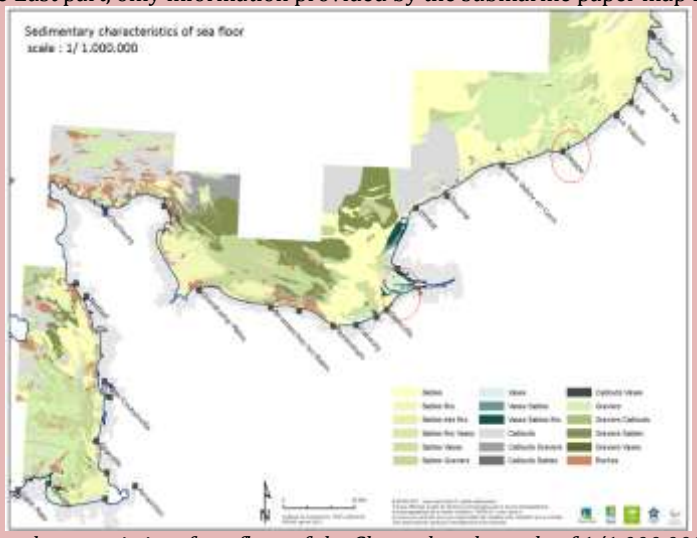


Figure 3. *Sedimentary characteristics of sea floor of the Channel at the scale of 1/1.000.000. (from SHOM, 2011)*

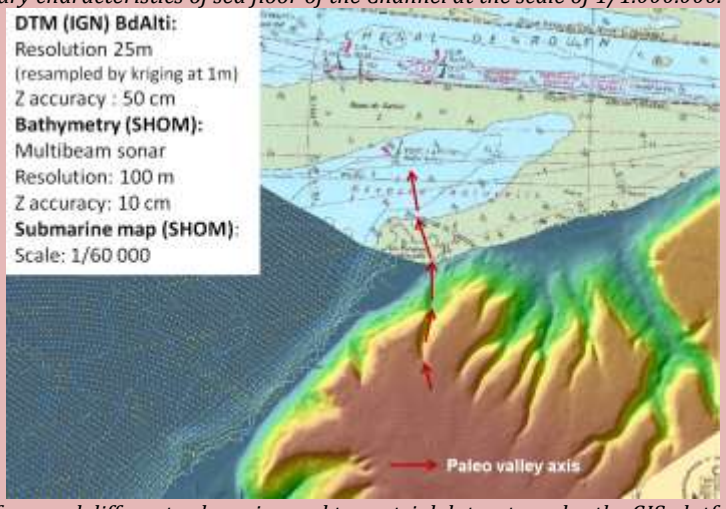
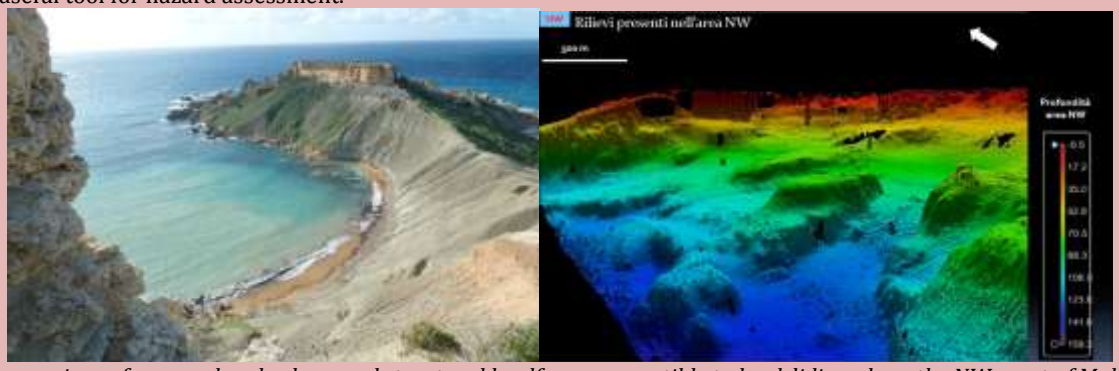


Figure 4. *Example of merged different submarine and terrestrial datasets under the GIS platform for the Villerville-Cricqueboeuf landslides test site.*

Malta case study

During this year of research, the existing terrestrial and submarine datasets have been collected through a bibliographic and archive research. A multidisciplinary approach to integrate and couple terrestrial and submarine datasets has been defined, which foresees contributions from geomorphology, marine geology, geophysics and engineering geology.
The newly acquired submarine data (see specific following section) and the elaboration of a detailed DTM of the seafloor along the north-west coast of the Island of Malta, has enabled to outline for the first time the submerged landforms of this stretch of coast (see figure below). A first attempt to compare terrestrial and submarine landforms has been performed with the aim of producing, during the second year of research, a comprehensive geomorphological map capable to illustrate terrestrial and submarine landforms in the same sheet, which could serve as a useful tool for hazard assessment.



Comparison of emerged and submerged structural landforms susceptible to landsliding along the NW coast of Malta

Work package 2 (prepared by CERG, IcoD, Università di Modena e Reggio Emilia, Université de Caen Basse-Normandie, Consiglio Nazionale delle Ricerche: Istituto di Scienze Marine; CNR-IRPI):
Description:
Outline of marine level variations since the LGM for selected coastal areas in Normandy and Malta;
Associated deliverables:

Normandy case study
An outline of sea-level variations since the Last Glacial Maximum (LGM) has been produced based on literature and recent researches (Figure 5). This has to contributed to reconstitute the general environmental conditions since Wurm period (- 30 000 year BP, maximum of Wurm), in the Channel, with periglacial conditions, and the estimated positions of sea level for several dates with a lower sea level ca. 130 metres lower than today.

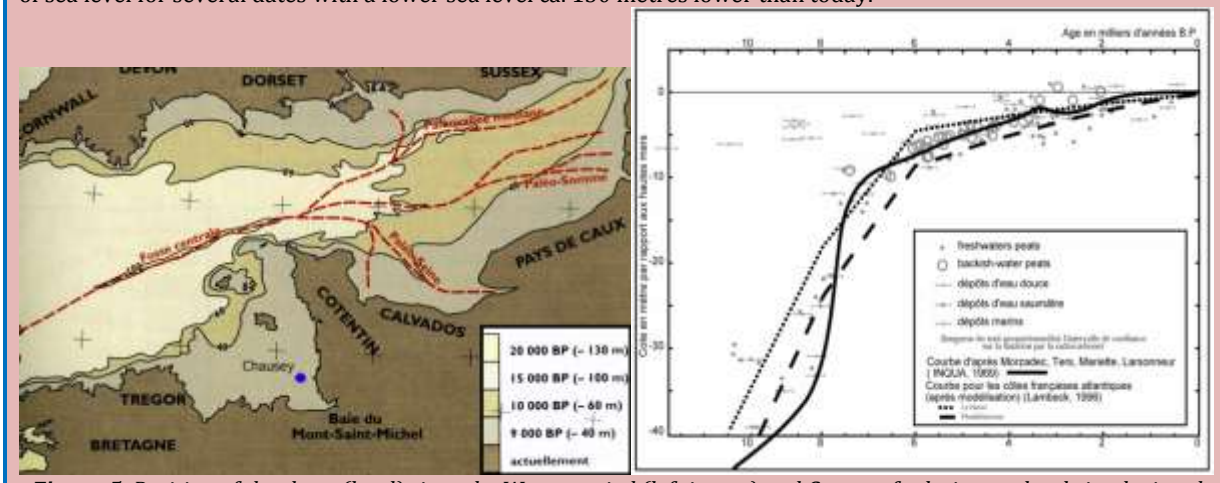


Figure 5. *Position of the shore (level) since the Wurm period (left image) and Curves of relative sea level rise during the Holocene for the N-W of France (right from Morzadec et al., 1969 & Lambeck, 1996).*

During the Holocene (last 10 000 years), after intensive increase of the sea level (between 10 000 to 8 000 year BP) with a rate of 6-7 cm per year, the rate decreased with a value of 3-4 cm per year, and at 5 000 year BP, the sea level reached more or less the actual sea level. It is not really well observed on Figure 5 (right), because the curve is an average for the N-W of France for tidal range different than tidal range observed in study sites (the Channel is a macrotidal and megatidal sea and it is very difficult to determine precisely the sea level). But for the Lower Norman study site, our observations and measures conducted during this project allowed to determine the position of the low tide cliff (at the altitude of -1 m NGF) which is the limit of the reef flat. This would correspond to the position of the shoreline at 6000-5000 year BP located at a distance of 290-330 m in front of the actual shoreline (Figure 6 & Figure 7).

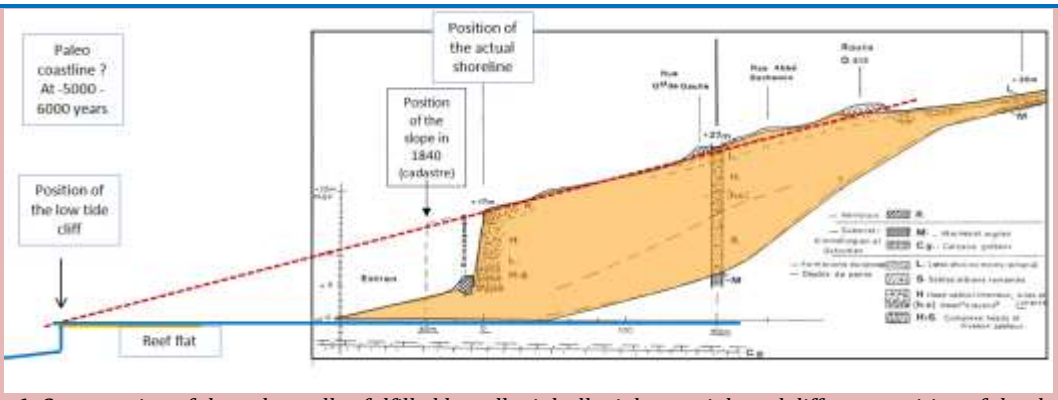


Figure 6: *Cross section of the paleo-valley fulfilled by colluvial-alluvial materials and different position of the shoreline during the last 6000 years at Villerville town, France*

Figure 7: *Position of the shoreline at 5000-6000 years BP in front of the Villerville-Cricquebeouf slope, France.*

The progressive sea erosion during the last 6000 years reach a value of 300 m: the rate of erosion is approx. 5 cm per year for this sea level. But for the future, we have to take into account the relative sea level evolution. On the base of monthly and annual mean sea level measured between 1950 to 2011 at the Dieppe harbor and Le Havre harbor located close to the study sites, the rate of Sea Level Rise (SLR) is respectively 0.53mm per year and 0.18 mm per year since 1960's (Figure 8).

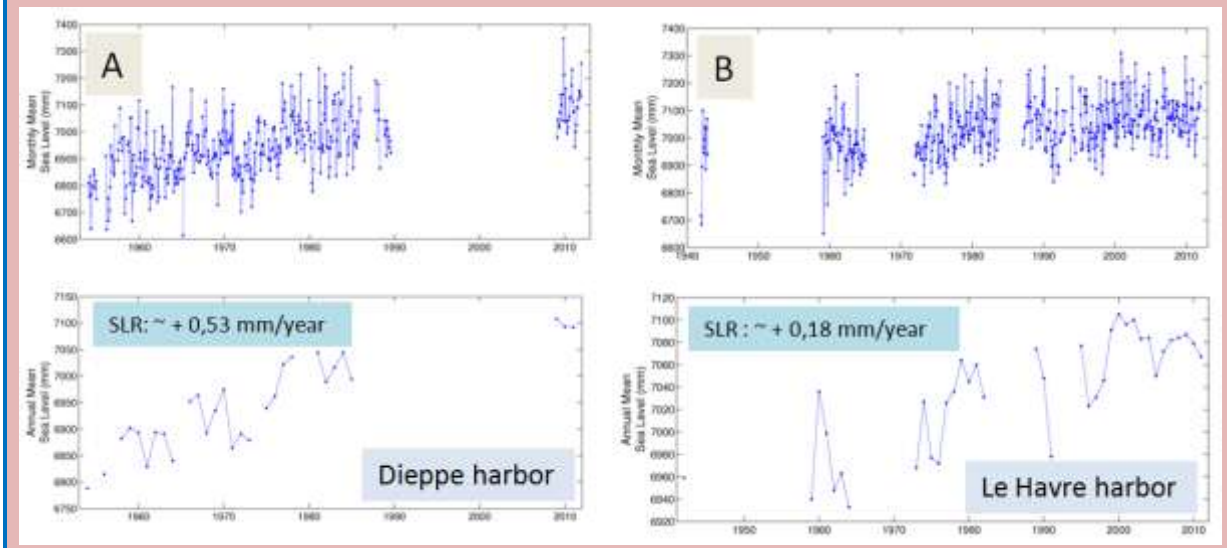


Figure 8: *Monthly and annual mean sea level measured and rate of Sea Level Rise (SLR) between 1950 to 2011 for the Dieppe harbor (A) and Le Havre harbor (B) (from Pirazzoli et al., 2002 and PSMSL, 2011).*

Malta case study

Based on recent literature (Lambeck et al., 2011; Carroll et al., 2012; Furlani et al., 2012; Marriner et al., 2012), an outline of sea-level variations since the Last Glacial Maximum (LGM) has been produced. This has contributed to confirm the hypothesis that the large-scale landslides located along the north-west coast of Malta were triggered in different morpho-climatic conditions, which foresaw more humid conditions and a sea level ca. 130 metres lower than

today (Figs. 2 and 3). This means that the onset of the numerous block slides at present observable along the coast probably affected valley slopes rather than coastline areas. The progressive increase of the sea level during the Holocene would have then caused the partial submersion of the lower parts of the landslide accumulations.

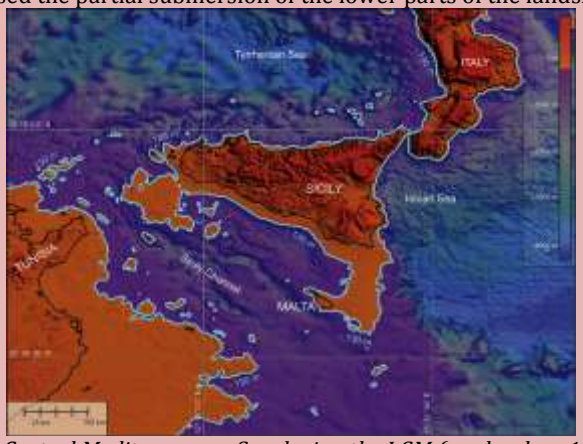


Fig. 2 – Paleogeography of the Central Mediterranean Sea during the LGM (sea level ca. 130 m below present level; after Furlani et al., 2012)

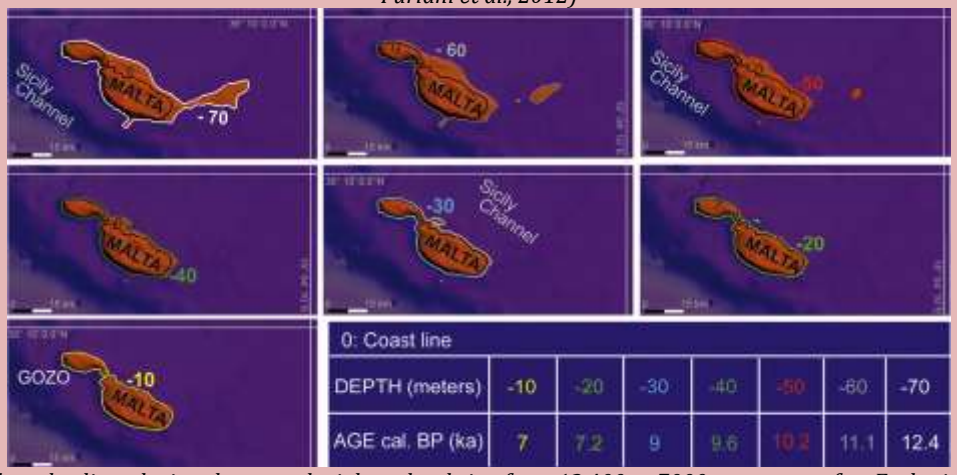


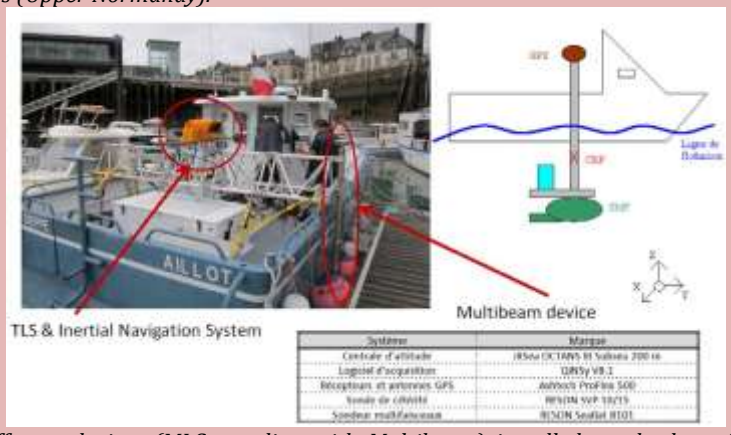
Fig. 3 - Palaeoshorlines during the post-glacial sea-level rise, from 12,400 to 7000 years ago; after Furlani et al., 2012

Work package 3 (prepared by CERG, IcoD, Università di Modena e Reggio Emilia, Université de Caen Basse-Normandie, Consiglio Nazionale delle Ricerche: Istituto di Scienze Marine; CNR-IRPI):
Description:
Multi-beam survey of selected Normandy and Malta coasts.
Associated deliverables:

Normandy case study
The selecting pilot area is located in Upper Normandy along the hard rock cliff subjected to landslides (cliff falls, debris fall and boulder and rock falls) and storm surges, in each part of Dieppe arbour from Cap d'Ailly (Pourville) at the west part to Puys at the East part of the study site.
For coastal hazard assessment, three issues coupling terrestrial and submarine datasets are requiring for:
• definition of the production of debris (flint) from cliff erosion which feeding intertidal sedimentary stock, gravel beach,
• definition of infratidal sandy inputs on gravel beach, which participate to the functioning of these accumulation,
• definition of the impacts of harbor jetty on infratidal sedimentary drift (onshore-off shore and longshore drift).
The different devices (MLS coupling with Multibeam) were installed on the boat:
• 1. Mobile Laser Scanning (MLS) is using the same principles than aerial devices. It is constituted by 2 GNSS (GPS) antennas in order to localize the laser source, 1 Inertial Measurement Unit (gyroscope to orientate the Line of Sight of the laser) and 1 TLS (Terrestrial Laser scan) that produces laser pulses and records the time of flight. Also, by this way, we could well know the laser's position, orientation and time of flight, and obtain spatial registration of points (cloud points).
• 2. Multibeam: Bathymetric measurements were acquired by the multibeam sounder high-resolution SeaBat 8101 manufacturer RESON. This system operates at frequency 240 kHz. The geometry of emission and reception antennas to get an opening angle (of the beam) transverse and longitudinal 1.5 by 1.5 ° °, and therefore a beam footprint well resolved on the bottom of the sea. The multibeam is also
associated with GPS antenna and to attitude station OCTANS Subsea manufactured by iXSea which is used to compensate the movement of the boat and provide the vessel's heading.

• One full day is required to well install all materials and to carry out all control operations (test and calibration).

Example of vessel trajectory during bathymetry and MLS acquisitions for one single day in September 2012 from Cap d'Ailly (Pourville) to Puys (Upper Normandy).

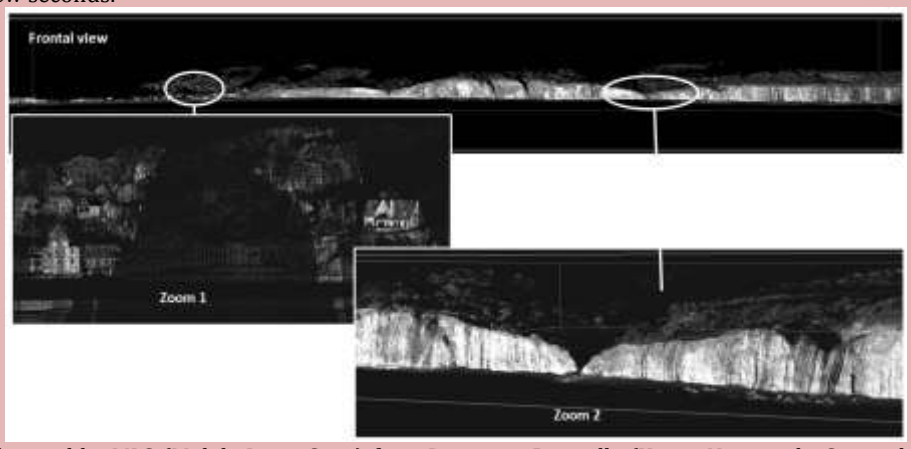


General view of the different devices (MLS coupling with Multibeam) installed on the boat for simultaneous survey (September, 2012). (by R. Cancouet, E. Augereau, C. Delacourt, IUEM-DO, Brest).

First results:

Once all instruments set up on board, topographic and bathymetric measurements can be done quickly. If weather conditions is good (not too windy and rainy), we could obtain information on approx two linear km per hour.

For the MLS (Figure xx.3), on the example of frontal view, we obtained a very good general aspect of the landforms. In high density areas (Zoom 1), the resolution is better than 10 cm (cf. house). The morphological parameters (Zoom 2) can be well observed, even on intertidal areas. Surfaces processes, such as collapse talus, can be observed and quantified in few seconds.



Cloud points obtained by MLS (Mobile Laser Scan) from Dieppe to Pourville (Upper Normandy, September 2012) (by C. Michoud, D. Carrea, M.-H. Derron, M. Jaboyedoff, UniL CRET)

For the multibeam survey, the preliminary results allow to well observe the bathymetry with a very good resolution (around 20 cm): In example, an important accumulation of blocks on the lower shore platform is well detected at the cape d'Ailly. These blocks of sandstone are in relation with the retreat of the cliff by large old rock falls (the blocks are arranged in the shape of crown or curved belt); also, near the jetty of Dieppe, an important sandy accumulation progress towards the tip of the jetty.

Malta case study

In the frame of this project a new marine survey along the north-west coast of the Island of Malta was commissioned to AquaBioTech Limited, which performed it in May 2012. It consisted of a Multi Beam and a Sub Bottom Profiler survey to obtain a high resolution bathymetry of the shallow water and to assess the internal structure of the submarine landslides. An inteferometric echosounder Swathplus was used which is made up by two transducers with a frequency of 117 kHz that can reach a depth of 350 m.
The survey carried out has investigated an area of about 7.5 km in length (north/south orientation) and a maximum distance from the shore of 1.6 km in width (east/west orientation). Preference has been be given to shallower areas, close to the coastline to better support the integration of terrestrial and marine datasets. The survey area extends from the south point of Cirkewwa to Ras il-Pellegrin point as seen on the map (Figs. 4 and 5).
The detailed bathymetry, achieved by means of analysis carried out in collaboration with CNRISMAR, has provided useful information on the seafloor morphology, including submerged landslide accumulations. The elaboration enabled the production of a DTM of the seafloor of the investigated area with a resolution of 2 m and a vertical exaggeration of 5x (Fig. 5). Worth of note are the profiles achieved for Anchor Bay, where extensive landslide monitoring is ongoing. The observation of the first metres under the seafloor enable to identify buried collapsed blocks related to the landslides affecting the north side of the bay.
The Sub Bottom Profiler analysis, to be carried out in the next year, will show the internal seafloor layers and a more in depth view of landslide deposits buried by marine sediments.

Long WGS84	Lat WGS84
14°18'40.0490''	35°54'15.7742''
14°18'37.9081''	35°58'22.3723''
14°20'47.2283''	35°58'23.0960''
14°20'49.2576''	35°54'16.4961''
14°18'40.0490''	35°54'15.7742''

Fig. 4 – Coordinates of the marine survey area along the NW coast of Malta

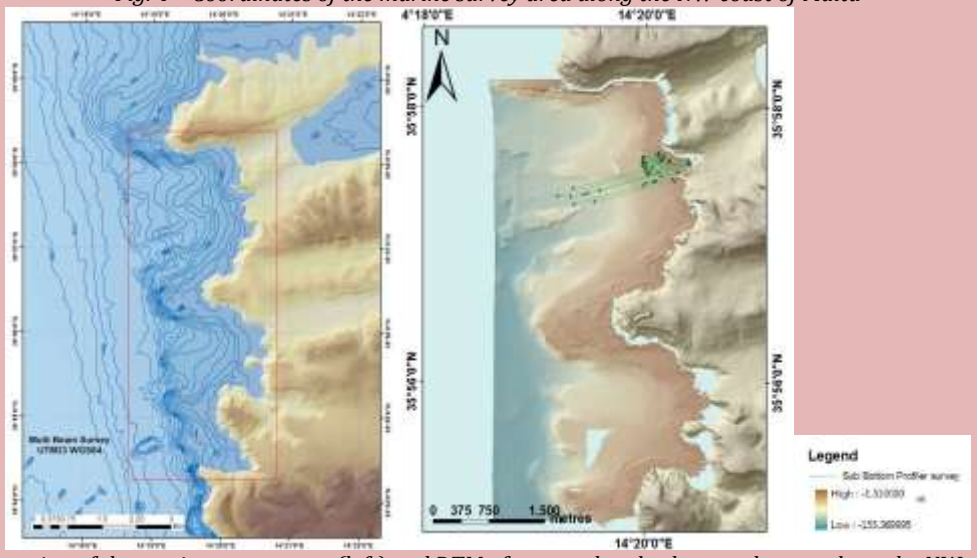


Fig. 5 – Extension of the marine survey area (left) and DTM of emerged and submerged areas along the NW coast of the Island of Malta (right)

Work package 4 (prepared by CERG, ICoD, Università di Modena e Reggio Emilia)
Description:
Monitoring of coastal processes initiated within the "Coastline at risk" Project.
Associated deliverables:

Normandy case study
As regards the Norman case study in France, the APO-CERG Project "Coastline at risk" focused on coastal instability phenomena occurring on the Lower Normandy where large active landslide occur in the Villerville-Cricqueboeuf municipalities (see description above). Monitoring of coastal landslides has been continued in the frame of this project. Several monitoring campaigns have carried out during 2012, in order to measure the superficial displacements, the water table variations and the climatic conditions. The results' analysis shows that the landslides continue to be active and show horizontal and vertical displacements in agreement with trend of movement shown during the last years of observation.

Maltese case study
As regards the Maltese case study, the APO-CERG Project "Coastline at risk" focused on coastal instability phenomena occurring on the north-western stretch of the Island of Malta where widespread active lateral spreading and block sliding occur due to the presence of rock masses showing different lithological and geomechanical characteristics (Soldati et al., 2011; Devoto et al., 2012). Integrated research methods and techniques were applied with special

reference to mapping and monitoring of coastal instability phenomena along the coastlines (Mantovani et al., 2012).
Monitoring of coastal landslides has been continued and strengthen along the north-west coastline of Malta, at Il-Prajjet (Anchor Bay) and Ghajn Tuffieha Bay (Fig. 6). Monitoring techniques include GPS, consisting in 2 reference stations and more than 20 benchmarks spread all over the unstable areas and wire extensometers which have shown that rock spreading phenomena are active with local displacements up to a few centimetres per year. In order to guarantee the repetitiveness of the surveys, this project is meant to continue the GPS measurements. Moreover, this has been accompanied by the installation of wire extensometers to monitor in continuous the displacements along the most active fractures. Additional benchmarks have been placed along the selected fractures and the first measures have been made manually by means of a wire extensometer.
Two monitoring campaigns have carried out during 2012, in April and November. The results' analysis shows that the landslides continue to be active and show horizontal and vertical displacements in agreement with trend of movement shown during the last years of observation. The total displacements recorded at the Anchor Bay site are shown in Fig. 7.

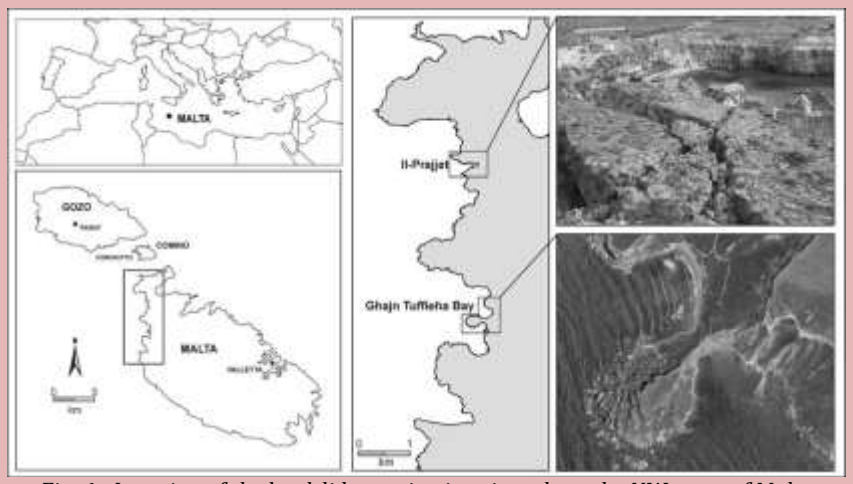


Fig. 6 - Location of the landslide monitoring sites along the NW coast of Malta

Fig. 7 – Displacements measured at the monitoring site of Anchor Bay, NW coast of Malta

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by CERG, IcoD, Università di Modena e Reggio Emilia, Université de Caen Basse-Normandie, Consiglio Nazionale delle Ricerche: Istituto di Scienze Marine; CNR-IRPI):

Description:

Improvement of existing hazard maps taking into account issues related to climate change (sea-level, more frequent extreme meteorological events etc.);

Associated deliverables:

Work package 2 (prepared by CERG, IcoD, Università di Modena e Reggio Emilia, Université de Caen Basse-

Normandie, Consiglio Nazionale delle Ricerche: Istituto di Scienze Marine; CNR-IRPI):
Description:
Acquisition of necessary knowledge to define methods to perform landslide monitoring offshore (on the seafloor);
Associated deliverables:
Work package 3 (prepared by CERG, IcoD, Università di Modena e Reggio Emilia, Université de Caen Basse-Normandie, Consiglio Nazionale delle Ricerche: Istituto di Scienze Marine; CNR-IRPI):
Description:
Definition of protocols which can be utilised in other coastal environments for risk reduction and resilience improvement.
Associated deliverables:
Work package 4 (prepared by CERG, ICoD, Università di Modena e Reggio Emilia):
Description:
Monitoring of coastal processes.
Associated deliverables:

FINANCING FOR 2013

EUR-OPA : € 15500
Split between partners : € 5000 for CERG Strasbourg, France
€ 5500 for ICoD La Valletta, Malta
€ 5000 for Università di Modena e Reggio Emilia

NEW GLOBAL CLIMATE CHALLENGES AS A RESULT OF INCREASED DEVELOPMENT OF THE ARCTIC TERRITORY

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.C. Impact of climate change and environment

TITLE OF THE PROJECT : New global climate challenges as a result of increased development of the Arctic territory

TARGET COUNTRIES : This activity has global significance because of the correlation between the Arctic development and climate change and is aimed at defining complex security measures in the region to provide safety of people not only living there but the citizens of any country appeared to be at the territory for business or tourism. North sea route opens new prospects for increased rate of human activity. And this demands creation of resilience potential.

PARTNERS INVOLVED :

COORDINATING CENTRE : ECNTRM Moscow, Russian Federation

OTHER CENTRES:

OTHER PARTNERS : Institute of Arctic and Antarctic in Saint Petersburg

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :
Guidelines and recommendations on global security measures in the Arctic.
Specific yearly objectives :
2012 :
The Arctic is an area of potential large-scale economic activities of production, processing and transportation of mineral raw materials conducted in a sensitive environment. Considerable risks of emergencies exist due to the natural and technical character of these activities. The situation becomes even more serious in the conditions of the climate change because the region is climate influencing.
The project is aimed at preparing the survey on the correlation between increased Arctic development and climate change. The research activity aimed at increasing the level of understanding the problem.
This issue is planed to be discussed at the Workshop "Emergencies preparedness and response in the Arctic" which is to be held in the city of Norilsk, Russian Federation, August 22-25, 2012.
2013 :
•To conduct natural and technogenic risks assessment.
•To indentify vulnerability.
•Elaborate specific proposals how to prepare for new opportunities and challenges as a result of a changing Arctic.
•To increase awareness among the general public as well as governments of the
Arctic and its importance, not only regionally but globally.

EXPECTED RESULTS

2012 : Analyses of the correlation between increased Arctic development and climate change
2013 : Finalizing the survey adding the analytical results and proposals

RESULTS OBTAINED PREVIOUSLY (if any)

ACTIVITIES PLANNED IN 2012 *(split by partner)*

FINANCING FOR 2012

EUR-OPA : € 15000
Split between partners : € 15000 for ECNTRM

Others contributors 20000 € from EMERCOM of Russia

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECNTRM, Russian Federation):
Description:
Together with the academic scientists specializing on the problems of the Artic collect and analyze the appropriate information and prepare the survey. To share the knowledge with the decision-making people and business community.

Associated deliverables:

THE ARCTIC AND WORLD CLIMATE

The Arctic plays a significant role in the global climate system mainly because it acts like an "air conditioner" in formation of the weather not only in the Northern hemisphere but worldwide through heat exchange, ocean water currents and carbon cycling. Thus, apart from significant effects of the Arctic, change in the Arctic cryosphere will affect in many ways the entire globe. Such feedbacks have far-reaching implications on the global climate system, sea level, and population outside Arctic. Besides, the Arctic is economically linked to the entire globe and increased access and activities may have effects locally and within the
global context.

Shifts in Arctic sea ice and increased heating will warm the lower atmosphere in the Arctic. This change will affect weather at lower latitudes, particularly in winter. Recent „outbreaks. of cold Arctic air masses over lower latitudes particularly in Eurasia appear to have resulted from weakening of the „polar vortex. which typically traps cold Arctic air near the pole. This variability may reflect an early shift toward altered Arctic, and perhaps northern hemispheric, climatic patterns.

In parallel with the lessening of the temperature gradient between the Arctic and more southerly latitudes, the capacity for northward transport of contaminants is reduced, and thus accumulation in southerly areas is likely to increase. Also, it is very likely that the stores of legacy contaminants within the Arctic are being mobilized by cryospheric degradation. Their release from ice, snow, permafrost, glaciers and ice caps and subsequent re-entry into ecosystems appears to be occurring.

INHABITANTS AND ECONOMIC DEVELOPMENT

The Arctic region occupies 11% of the global surface area. Demographic estimates vary due to Arctic geographical extent and seasonal migration. Population figures vary between 4 million and 9.9 million depending on the geographical definition. Estimation of indigenous population ranges from 400 000 to approximately 1.3 million. Seasonal variation due to work-related migration is particularly applicable in the Russian Federation, which accounts for roughly 75% of all Arctic inhabitants.

The Arctic is characterized by a dispersed settlement pattern with few large cities. About one-third of Arctic residents live in settlements with a population size of less than 5000 and one tenth of the Arctic population lives in one of the five largest cities. The Arctic region is an exporter of raw materials and energy and an importer of final goods and services.

Since their arrival in the Arctic, the indigenous peoples have lived from the renewable resources of the sea (fish, marine mammals), the land (land mammals, birds, berries), and freshwaters (fish). Although not considered in official Arctic gross regional product (GRP) assessments, the contributions from commercial and subsistence fishing, hunting, and herding activities are documented as playing a significant role in the mixed cash-subsistence economies.

The GRP is a measure of the total value of goods and services in a given territory. Comparing the contributions from the primary sector (exploitation of natural resources), the secondary sector (manufacturing and construction), and the tertiary sector (public and private services) to GRP, as well as to the overall Arctic GDP, the tertiary sector is the most dominant. Only in Arctic Russia is the primary sector more dominant. This means that, apart from the Russian Arctic, public services such as education, health, and social work account for a significant part of all economic activities. The largest economies in the Arctic belong to Alaska (United States) and Russia, mainly due to mining and gas- petroleum activity.

Regions where more traditional subsistence activities, such as hunting and fishing, play a more dominant role (e.g., Greenland and northern Canada) have much lower GRP. Similarly, reindeer herding in Russia and Scandinavia is of substantial importance to the livelihoods and lifestyles of reindeer herders but does not contribute greatly to GRP in these regions.

The abundance of renewable and non-renewable resources and the generated share of GDP, varies from region to region. For many Arctic indigenous peoples, the cryosphere is fundamental to their cultures and identities. The cryosphere has traditionally been used as a platform for travelling, and for livelihood activities such as herding, hunting, and fishing. The cryosphere also plays a fundamental role in the life and work of non-indigenous residents, through non-renewable resource extraction; hunting, fishing and recreational activities; and extensive use of seasonal ice roads across wet tundra, rivers, and lakes. These roads provide key transportation routes for relatively inexpensive transport of heavy equipment, foodstuffs, and other supplies for residents and industry. Accessibility afforded by these roads reduces the cost of living in the North.

Arctic residents rely on their extensive traditional and local knowledge, and on their observations of the environment and weather when making decisions on: when, where, and how to build, travel, or harvest. The documentation and incorporation of traditional and local knowledge is currently central to research on community adaptation to climate change.

PERMAFROST IMPACT ON THE INFRASTRUCTURE

Most settlements in the Arctic are relatively small communities and the majority are located on the coast where permafrost is commonly present. With the expansion of resources development the Arctic population is set to increase, especially in northern Russia where large cities with over 100 000 inhabitants are located in permafrost areas.

Most developments in the Arctic have taken place with an awareness of current permafrost conditions, but projected climate-driven changes in permafrost are likely to affect these and future developments beyond current planning and

engineering provisions and can pose a significant challenge to infrastructure, environment, and health in the Arctic.
Coastal Arctic regions have concentrations of industrial facilities associated with oil and gas such as the Pechora Basin in Russia. Damage to pipelines may have dramatic environmental effects, especially when oil or gas is released at the coast or at sea. About 500 pipeline failures are registered annually along the 350 000-km network of pipelines in western Siberia. Over 20% are probably due to deformations and weakening of foundations induced by permafrost thaw.
Infrastructure includes physical facilities with permanent foundations or the essential elements of a community. It includes schools, hospitals, various types of buildings and structures, and facilities such as roads, railways, airports, harbors, power stations, communication systems, and power, water, and sewage lines. Infrastructure forms the basis for local, regional, and national communication and for economic.

SEA ICE AND COASTAL INFRASTRUCTURE
Sea ice is a significant factor influencing the coastal situation. It can both prevent and cause erosion of coast and infrastructure, and plays an important role as a regulating element in coastal sediment dynamics. Sea ice protects the coast from the erosive action of storms and preserves the thermal state of subsea permafrost, the coastal erosion rates along the Arctic coast have increased over the past 30 years. Low-lying coastal plains, which are not tectonically active, are especially vulnerable to coastal erosion. Although rocky coasts predominate in the European and western Russian Arctic and in parts of the Canadian Arctic Archipelago, human settlements are often associated with stony sectors of the coast because these provide more suitable locations for human activities.
Coastal erosion rates vary considerably between and within regions and over time, and erosion presents a significant problem for communities, infrastructure of various types, cultural heritage sites, and in some cases protective coastal landforms. The complex interactions between declining sea ice and other consequences of climate change (rising sea level, shifting river discharges, run-off, altered sedimentation rates in coastal areas, permafrost degradation) will increasingly affect Arctic coasts, coastal infrastructure and coastal marine ecosystems and potentially human resource use. Major forcing parameters are waves, currents and water levels, and, especially for the Arctic, sea surface temperature, salinity, decreasing sea ice and increasing open water fetch, ground temperatures, and excess ground-ice content. With sea ice forming later in the season, the coast is more exposed to a projected increased number of autumn storms, and to storms with longer fetch. Even a small increase in the intensity of storms and coastal surges is likely to increase infrastructure substantial damage and costs. In addition, a decrease in landfast ice increasingly exposes coastal permafrost to wave action and increased temperatures, leading to thaw. This can have serious consequences for existing infrastructure (e.g., structures or buildings depending on ice-bonded surface for strength could be at risk over the decadal time scale). Although new coastal permafrost may form when sea ice freezes to newly aggraded sediments, it is likely that this permafrost will be unstable because of increased temperatures of the seabed. Rising ground temperatures will increase seasonal thaw depth and enhance coastal erosion processes.
Other hazards involve ice ride-up, ice pile-up and the formation of near shore pressure ridges, primarily as a result of wind action, which may provide a mechanism for near shore scour and landward sediment transport. While the effects are often superficial, they include an example of damaging ride-up of 0.4 m of ice that knocked a lighthouse off its foundation and destroyed standing infrastructure on fishing harbor pier.
Because of the highly episodic and rare occurrence of damaging ice motion, such as ice ride-up and pile-up, little effort has been devoted to mitigate and forecast such hazards and many communities where damage has occurred may not have anticipated the event before it happened. While engineering solutions are available for shore protection, these measures may address one problem but create another by altering the dynamics of erosion and deposition processes.

HUMAN ACTIVITY AND COASTAL CHANGES
Substantial increase of human activity in the Arctic region may impact sea ice which can be considered as a social-ecological system with a variety of processes coupling the physical, biological, and social components. Reduction in sea ice will lead to increased accessibility in the Arctic and, thus, affect in various directions the sea-ice services derived from the ice cover.
Local effects have often been examined in greater detail in the context of environmental impact statements that are part of proposed industrial development in Arctic regions. At the local level, feedbacks are mostly expected in the context of modifications of the coastline that are conducive to enhanced entrainment of sediments into sea ice. Both seasonal ice formation and ice melt at the local and regional level are strongly impacted by the influx of freshwater from terrestrial runoff. Moreover, large-scale river discharge and potential modifications, such as through damming of large rivers can impact stratification and hence impact ice production rates. River discharge was affected by human activities in several areas of the Arctic and dams or water withdrawal for irrigation may significantly change river discharge and thereby have significant impacts on the sea-ice regime.
Modification of freshwater discharge and its impact on ice formation could promote enhanced ice formation in the Arctic with impacts that might reverberate at the global level if, for example, discharge from the large Siberian rivers was reduced substantially.
The distribution of shoals and shallow areas is also a key constraint in stabilizing the land fast ice cover. Hence, coastal development such as dredging of harbors or other areas to mitigate the effects of coastal retreat, or the construction of artificial gravel or ice islands in the context of offshore oil and gas development, can have major impacts on the ice cover in the coastal zone. It may also greatly reduce primary production in the sea ice by increasing the amount of sediment entrained into sea ice, either through enhanced resuspension as a direct or indirect result of offshore activities or through reduction in ice stability enhancing sediment entrainment in a mobile coastal ice environment.

While these impacts are only likely to be important on a very confined, local scale in the immediate vicinity of coastal development sites, they can significantly affect use of the ice cover at this scale, both by industry and by coastal communities.
While local effects such as coastal change and river discharge affect land fast ice, human emissions of greenhouse gases, dust and black carbon may result in further reductions in albedo affecting the ice cover on a much wider scale. Hydrocarbon exploration, production and transportation cause considerable emissions to air and are important variables in regional Arctic emission inventories of greenhouse gases used in climate scenarios. The geographic location of emissions of CO2 has no impact on the warming potential. For particles (black carbon) on the other hand, the location of the emissions is important and increased activity in the Arctic results in an increase in local emissions, with concurrent effects on the surface albedo. Sea-ice retreat will also lead to a shift in patterns and timing of shipping and icebreaker activity. There will be a general increase in ship traffic in new areas, and Arctic marine shipping may adversely impact sea ice through operational discharges and emissions and navigation impacts on sea ice.
However, it is possible that changing ice type sand a reduced ice-cover season will limit icebreaking needs. With activities in the Arctic increasing and adding to global impacts on sea ice, feedback effects are likely to play an increasingly important role in the further reduction of sea ice, especially on the local-scale at the Arctic coasts.

OTHER ASPECTS OF CHANGE
Apart from cryospheric changes there also many other factors that shape vulnerability and adaptation to changes in Arctic communities and sectors. Such factors include resource accessibility, allocation, and extraction policies; limited economic opportunities and markets; access constraints; demographics; attitudes and perceptions of change; bidirectional local-to-global linkages; infrastructure; threats to cultural identity and well-being; transfer of local and traditional knowledge; economic and livelihood flexibility; and enabling institutions. These aspects are rarely independent of each other and frequently combine across scales and sectors. In many cases, socio-economic changes are likely to have greater immediate significance than cryospheric changes, which in turn will affect the ability to adapt.
Increased industrial activity challenges migration and grazing on traditional pastures, leading to areas of unused and underused grazing areas. Avoidance of certain reindeer pastures can lead to a reduction in optimal range use, leading to complications with herding, increased costs, and reduced production.
Another example is the projected increase in tourism. While there are potential economic benefits for local communities from increased tourism, such an increase may also negatively affect those communities. Given international pressure for sustainable management of wildlife, indigenous communities that depend on hunting, for example, polar bears (for tourism or subsistence) may have to adopt alternative livelihood. Further expansion of tourist seasons may result in extended use of infrastructure and longer duration of employment and income benefits. Human activities can greatly amplify the effects of climatic variability and change on Arctic societies.

ARCTIC REGION AND GLOBAL WORLD
Arctic cryosphere is closely linked to the rest of the world. These linkages include physical (e.g., Arctic climate system feedbacks globally), chemical (e.g., pollutant transport to the Arctic), biological (e.g., migratory biota and ecosystem connections), and social (e.g., tourism, resource extraction, management, politics).
Global climate changes are influencing on the Arctic cryosphere; at the same time these changes will in turn respond to far-reaching subsequent effects of global consequence.
The cold Arctic region typically acts as a sink for heat, greenhouse gases, particulate aerosols, and contaminants and performs fundamental regulatory functions for global climate systems. Degraded cryospheric components will increasingly act less so with highly uncertain consequences; however, hemispheric and global scale effects are likely. In some cases, these will be responses to Arctic change that affect the globe (i.e., simple outputs), whereas in others they will constitute feedback effects which may further alter global processes (e.g., climate system change, weather pattern change, shifting from sink to source for some greenhouse gases, possibly both CO2 and methane). Such changes are very likely to affect human society beyond the Arctic.
Cumulative effects with consequences for society on a broader scale include the feedback from changing snow conditions and surface albedo and the release of methane by thawing terrestrial and sub-sea permafrost to the climate system leading to accelerated global warming. Such amplification needs to be included when developing mitigation efforts and in updated models projecting future climate change. In contrast, the increased period of open water on lakes and increased growing season for vegetation will lead to increased evaporation and transpiration, drying of the landscape, and a negative feedback to climate, especially when combined with drainage of tundra water bodies fostered by permafrost degradation, although the balance between these two processes is highly uncertain.
Changes in the Arctic cryosphere coupled with other climate-driven changes have hemispheric and global-scale social effects, which may include the following:

- Enhanced ice outflow (icebergs and ice export) leading to shipping hazards in the North Atlantic.
- Alteration of ocean and river heat and freshwater transport to Arctic environments and alteration of oceanic circulation patterns, affecting ecosystems and impacting fisheries and hunting activities.
- Alteration of the structure and functional relationships within and services received from terrestrial, freshwater, and marine Arctic and sub-Arctic ecosystems, including possible loss of iconic species and altered biodiversity.
- Increased activities in the Arctic leading to increased risk of pollution and increased shipping bringing noise pollution and ballast water that contains contaminants and invasive species.

- Uptake of pollutants via microorganisms into the Arctic food web (e.g., fisheries) that have local and global health impacts.
- Economic opportunities that may provide impetus to national and global economies but must be developed in a sustainable manner.
- Significant contribution to global sea level rise and thus follow-on effects for low-lying coastal regions throughout the world.

CLIMATE CHANGE AND MARINE ASPECTS

Climate change may result in the fluctuation of sea level at local and global scales and represents one of the more serious consequences of climate change, mostly due to the scale of potential effects. Possible rise of sea level is a complex phenomenon resulting from many factors. Climate change affects sea level primarily through water mass changes and through density changes due to changes in temperature and salinity. Global sea levels are also affected by mass losses from non-Arctic glaciers and the Antarctic ice masses. Present mass losses from Arctic glaciers and the Greenland Ice Sheet contribute a total increase of 1.3 mm per year to the rise in global mean sea level. Increasing contributions from the Greenland Ice Sheet and other Arctic glaciers have occurred since 1995. Contributions from other sources (Antarctic Ice Sheet, non-Arctic glaciers) are added to these.

High regional variation in sea-level rise will result from concurrent changes in other factors that include gravity fields, ocean temperatures, freshening, tidal effects and local isostatic rebound or subsidence of land. Rates will also differ, thus impacts may be highly regionalized and realized over varying time scales.

Mean sea-level rise increases possibilities of coastal flooding, erosion, infrastructure damage, environmental impacts on ecosystems, and saltwater intrusions into groundwater. Such effects may be accompanied or exacerbated by local additional effects. Ultimate global effects realized at the century scale and beyond include significant inundation of low-lying coasts and possibly complete submergence of small islands in some areas of the globe, although growth of coral atolls may offset this to some degree.

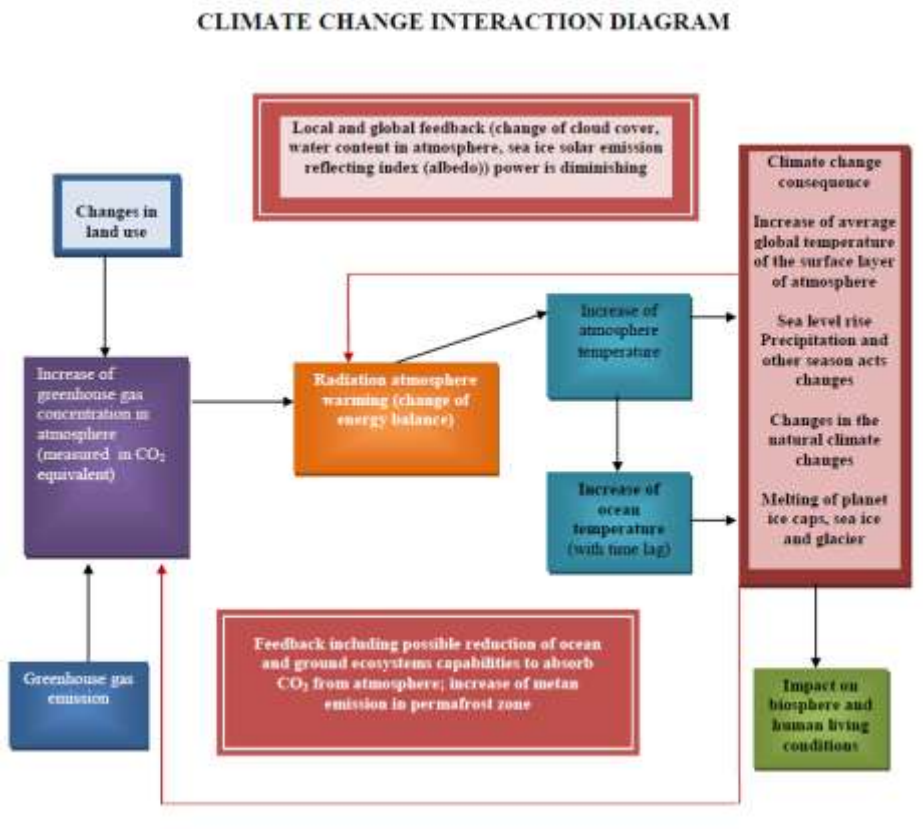
Ocean circulation is a global phenomenon by which heat and water are transported between the polar and equatorial regions. This circulation is powered in part by density differences among water masses due to differences in temperature and salinity. Inflows to the Arctic resulting from this phenomenon consist of surface (lower salinity, warmer) waters entering from the Pacific via the Bering Strait, and surface (warmer) waters entering from the North Atlantic.

These inflows are counterbalanced by the outflow of Arctic waters primarily through the Canadian Archipelago and along eastern Greenland, mostly as lower salinity, cold and freshened surface flows. Additional deeper outflows of Arctic Ocean water (high salinity, cold) occur in the northeastern area of the Atlantic. The North Atlantic thus has several mixing zones where warm surface currents from the south interact with cold surface and sub-surface currents originating from the north.

Several changes in the Arctic cryosphere are anticipated to increase freshwater inputs to the Arctic Ocean, thus reducing its salinity (at least in surface waters). These include: increased direct precipitation, possibly increased inputs of low salinity Pacific waters, increased runoff from large Arctic rivers, reduction of ice stores on land, and degradation of perennial sea ice. The increased input of freshwater will have local effects within the Arctic primarily on coastal shelves, many of which are largely associated with increased stratification.

FEEDBACKS AND IMPLICATIONS

The atmosphere, ocean, and individual components are the major factors affecting the Arctic cryosphere. Many aspects of Arctic climate change are simple responses to a driving force, for example, higher (or lower) air temperatures will alter the ice balance in a particular area. Other changes may involve a feedback whereby a change in one component of the system drives a change in another, which ultimately induces additional change in the original component. Such feedbacks can be positive (i.e., induced change reinforces and exacerbates the original change), whereas others can be negative (i.e., induced change dampens, cancels or reverses the original change).



Feedbacks are important because they may alter rates of change, magnitudes of change, or even directions of change. Owing to their unpredictable effects and their variable scales (spatial and temporal) of operation, feedbacks also add to the uncertainties of outcomes especially for higher-order consequences of climate and cryospheric change.

Work package 2 (prepared by ECNTRM, Russian Federation):
Description:
Organize the workshop "Emergencies, preparedness and response in the Arctic" with the participation of representatives from high level legislation, Russian State government bodies, Ministries, Coastguard of Russian Federation, state-private companies, scientific community, local government bodies and search and rescue detachments.
Associated deliverables: Discuss the issue and collect proposals and recommendations for the survey

Russian Federation hosted a 2-days conference on "Emergencies preparedness and response in the Arctic" in the city of Norilsk, Russian Federation on August 23-25, 2012.
Conference participants were more than 90 representatives from different institutions of the Russian Federation: Emercom of Russia, Ministry of Transport of the Russian Federation, Russian Federation Coast Guard Directorate, Federal security service, research institutes, Administration of Krasnoyarsk region and business community of the Russian Federation.
Among foreign delegates were the representatives of USA, Canada, Norway, Denmark and Finland.

There were three plenary sessions:

- Emergency situations in the Arctic. Preparedness and response;
- Economic development of the Arctic regions and the industrial development security problems including mining works security provision.
- Transport security in the Arctic.

More than 20 presentations were made stating the importance of the issues because the number of emergencies and the complexities of emergencies in the Arctic will increase in the near future as a result of continuing climate change and increased development in the Arctic.

Delegates called for the new researches in all the spheres of emergencies preparedness and response both scientific and technological for arctic conditions, shearing the knowledge; implementation of the modern systems of emergencies monitoring and management in the Arctic.

It was acknowledged that the amount of means and forces in the Arctic aimed at protection of people and territories, search and rescue, oil and other hazardous liquid substances spills elimination is not adequate.

Shortage of response forces in some states and necessity of search-and-rescue activity coordination of different countries necessitates strengthening of international collaboration.

As an important step in response improvement Russian Federation is working at the program of establishing Complex Search and Rescue Centers in the Arctic region of the Russian Federation The purpose of establishing a system of Complex Search and Rescue centers is to provide comprehensive operational assistance to persons in distress in the Arctic regions of the Russian Federation, along the Northern Sea Route and in the adjacent territories of foreign states in accordance with international agreements.

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by ECNTRM):

Description:

Associated deliverables:

FINANCING FOR 2013

EUR-OPA : € 13500

Split between partners : € 13500 for ECNTRM

Other contributors: € 25000 from ……

2.D. High level courses on risk issues

TRAINING ON CLIMATIC RISKS MANAGEMENT

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 2.D. High-level courses on risk issues

TITLE OF THE PROJECT: Training on Climatic Risks Management (floods, draughts, storms, desertification)

TARGET COUNTRIES: Countries affected by climatic risks

PARTNERS INVOLVED:

COORDINATING CENTRE : CRSTRA Biskra, Algeria

OTHER CENTRES: ECRM Yerevan, Armenia , CUEBC Ravello, Italy

OTHER PARTNERS : Université de Blida, Université de Constantine, Université de Biskra, Université de Batna, Université de Rouen, Institut Français de Formation de Formateurs Risques Majeurs et Protection de L'environnement, Agence Spatiale Algérienne, Institut des Haute Formation de Recherche Météorologique Oran.

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

Réduction de la vulnérabilité des établissements humains et des écosystèmes

Specific yearly objectives :

2012 :

Cours sur la compréhension des changements climatiques et des risques climatiques.

-Maitrise des outils d'analyse et d'évaluation (SIG, cartographie, géostatistique, télédétection, expérimentation, identification, prospection, modélisation)

-Travaux d'application

-Etude de cas concrets et analyse de quelques situations vécues

-Montage des systèmes de veille et d'alerte précoces

Il convient de préciser que cette formation portera plus sur des aspects pratiques et prend en charge les impacts des risques climatiques sur les écosystèmes dans leur dimension physique, biologique et socio-économique.

2013 :

Reproduire le cycle de formation par les bénéficiaires en 2013

EXPECTED RESULTS

2012 :

Formation d'un groupe de 25 à 30 personnes dans les risques climatiques devant reproduire la formation au bénéfice d'un 2ème groupe de formateurs en 2013 avec un objectif à long terme

2013 :

Pérenniser la formation sur les risques climatiques en ciblant selon les besoins des partenaires socio-économiques (Protection civile, Education, Bâtiment, Agriculture, Hydraulique, . . .) ce qui est en adéquation d'une part avec nos activités dans le cadre de l'accord:

-Education (Be Safe Net);

-Groupes Législation (recherche/gestion des risques);

-Veille phénologiques par rapport aux changements climatiques (dimension participation des populations concernées);

et d'autre part avec les missions du Centre qui concerne essentiellement les risques climatiques.

RESULTS OBTAINED PREVIOUSLY (if any)

Le CRSTRA a organisé un cours International sur les inondations et les crues en 2005, dispensés à l'intention des universitaires (enseignants, chercheurs et étudiants).

Le CRSTRA a aussi organisé un Atelier International de formation sur les catastrophes naturelles et les risques majeurs, en 2009, et dont ont bénéficié des acteurs et des techniciens exerçant en régions arides et semi arides et impliqués dans la gestion des catastrophes (notamment le corps de la protection civile, des climatologues, des hydrauliciens et des agronomes). En outre, l'ouvrage qui en résulte est un outil utile aussi bien pour les scientifiques que les praticiens sur terrain. Une large diffusion est en cours à l'échelle nationale et internationale.

L'Atelier Sécheresse et stratégie d'adaptation aux changements climatiques a permis de mettre l'accent sur les zones les plus vulnérables au Méditerranée, ce qui a conduit à la mise en place d'un système de veille phénologique par rapport au changement climatique en milieu Oasien abritant les ressources naturelles utiles, et des savoirs faire locaux ancestraux. (en matière d'Hydraulique, d'Agriculture, d'Habitation . . .).

Une fiche de suivi a été élaborée, traduite en plusieurs langues (Arabe, Anglais, Français) pour faciliter son renseignement par les partenaires socio-économiques (les agriculteurs étant impliqués pleinement à l'atelier

méthodologique en novembre 2011) et lancée en Février 2012 selon un transect Nord-Sud.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by CRSTRA):

Description:

Définition de la formation de 25 à 30 personnes dans le domaine des Risques Climatiques.

Diffusion et promotion de la formation sur les risques climatiques

Associated deliverables:

Programme de formation (programme et liste des intervenants)

Horaire	11 Novembre	12 Novembre	13 Novembre	14 Novembre	15 Novembre
8.00-10.00	Accueil des participants + inscription **Ouverture officielle**	Etude de cas des pluies exceptionnelles de 1969 sur Biskra et ses environs **MATARI A *(IHFR Oran)***	Désertification des parcours pastoraux. Sensibilité/vulnérabilité et indications d'alerte. **AIDOUD A. *(Uni Reine France)***	Risques Incendies de Forêt en Méditerranée. Expérience algérienne **ABBAS M. *(D. G Forêts Alger)***	Le quantificateur multidirectionnel du sable en transit éolien. Réalisation et Exploitation. **MESSEN N. *(CRSTRA/CRNB)*** Collecteur d'aérosols pour un environnement tropical. **MESSEN N. *(CRSTRA/CRNB)*** Film Documentaire
10.30-12.00	Problématique des changements climatiques **BOUCHEREF D. *(ONM Alger)***	Prévisions climatiques **BOUCHEREF D. *(ONM Alger)***		Caractéristiques des inondations et leurs conséquences sur l'aménagement du territoire **BENAZZOUZ M.T. (*Uni. Constantine/CRSTRA)***	**Clôture Officielle**
14.00-15.30	Les Risques Climatiques **BOUCHEREF D. *(ONM Alger)***	Présentation/démonstration sur matériel météorologique **BOUCHEREF D. *(ONM Alger)***	Impact des changements climatiques sur la biodiversité Postures et gestion du risque d'extinction des taxons/étude de cas. **BELHAMRA M. *(Uni. Biskra/CRSTRA)***	Maitrise et économie de l'énergie dans le bâtiment et impact sur le phénomène des changements climatiques. **MAOUDJ Y. *(CNERIB Alger)***	
15.30-17.00	Impact des sécheresses sur les productions agricoles **HALITIM A. *(Uni. Batna)***	Sécheresses climatologiques et météorologiques **MATARI A *(IHFR Oran)***		Préparation et sensibilisation des populations aux Risques Climatiques : cas Pratiques : Inondation / Sécheresse **BOULAASSEL A. *(INRAA Alger)***	

Work package 2 (prepared by CRSTRA, ECRM):
Description:
Cours international intensif « Gestion des risques climatiques » d'une durée de 7 jours de formation
Associated deliverables:
Programme de formation, documentation, préparation des formations.

Le CRSTRA a organisé un cours international intensif sur la gestion des risques climatiques du 11 au 15 Novembre 2012 dont l'ouverture officielle a été assurée par Monsieur le Secrétaire Exécutif de l'Accord.

LE CARREFOUR D'ALGÉRIE / MERCREDI 14 NOVEMBRE 2012
www.lecarrefour-algerie.com
Centre-Est | 09

Gestion des risques climatiques majeurs

De nombreux pays méditerranéens, parmi lesquels l'Algérie sont, actuellement, confrontés à divers risques climatiques majeurs liés au réchauffement climatique, avec à la clé des conséquences néfastes d'abord sur l'environnement, ensuite sur les populations et enfin sur les activités socio-économiques de ces pays. «C'est dans le but d'appréhender la problématique de la réduction de la vulnérabilité des écosystèmes et de la protection du patrimoine humain des pays du pourtour méditerranéen que le Centre de Recherche Scientifique et Technique sur les Régions Arides (CRSTRA) de Biskra que je dirige, a initié, 4 jours durant, à partir du 11 /11/ 2012 un Cours International intitulé «Gestion des risques climatiques :stratégie d'adaptation» avec la collaboration de l'instance internationale European and Méditerranéen Major Hazards Agreement (EUR-OPA Risques Majeurs), a confié à la presse Dr Fattoum Lakhdari l'organisatrice de ce colloque. Pour sa part, M Eladio Fernandez-Galiano, le secrétaire exécutif de l'Accord EUR-OPA s'est félicité dans l'allocution inaugurale de ce cours, de la participation active de l'Algérie à ces travaux. Il précisera en outre que l'Accord EUR-OPA créé en 1986 est une plateforme de coopération qui réunit 25 états. Sa grande force a été de mettre les représentants de ces pays autour d'une même table, pour des échanges profitables à tous, non seulement pour les pays de l'Union Européenne, mais aussi pour ceux de l'Europe de l'Est et du Maghreb. Toujours à propos de cet accord M Eladio nous confiera qu'il a pour objectif prioritaire d'améliorer la prévention des risques majeurs et qu'il favorise, tout en essayant d'intégrer au mieux les compétences des autorités locales, la mise en œuvre de plans de prévention et de réseaux de coopération sur de nombreux thèmes. Enfin l'accord assiste également les services nationaux de protection civile en matière de préparation à la gestion de crises. Cette série de cours donnés par d'éminents spécialistes étrangers et algériens visent, entre autres, à former, une trentaine de cadres: de la protection civile, des hydrauliciens, des ingénieurs forestiers, des météorologistes et autres scientifiques algériens, à l'analyse des risques majeurs, à leur cartographie et partant, à la maîtrise de leurs impacts sur l'environnement. «C'est à partir d'études de cas concrets et de quelques situations vécues et répertoriées à l'instar de la canicule insupportable qui a sévi cette été dans notre pays avec comme corollaire une hyper consommation d'énergie électrique et les délestages et autres coupures de courant décidés pour éviter le black-out total que le centre de recherche s'est impliqué dans la lutte contre les effets dévastateurs du réchauffement climatique», nous a précisé la directrice du CRSTRA de Biskra. Elle ajoutera que la problématique du climat telle qu'elle se pose aujourd'hui «interpelle les chercheurs du CRSTRA sur 3 domaines essentiels à la vie à savoir: l'eau, l'énergie et surtout la sécurité alimentaire...Ce qui nécessite une amélioration des compétences de nos cadres, via la formation et l'échange d'expériences avec les sommités internationales que nous avons invitées à notre colloque».

EL OKIR

Ce cours a été ouvert à tous les partenaires (en tant que candidat ou formateurs) impliqués dans la gestion du risque majeur et les catastrophes naturelles (Protection Civile, hydraulique, forêts, Mines, Environnement, Urbanisme, Chemin de Fer ….), aux pays membres de l'Accord et aux chercheurs CRSTRA affiliés aux équipes « Risques Majeurs » (Inondation, Surveillances de la désertification, Ensablement, Changements Climatiques). Il convient de signaler l'adhésion des Centres spécialisés du réseau EUR-OPA : CUEBC - Centre Européen universitaire sur les biens culturels Ravello, Italie et ECRM - Centre Européen inter-régional scientifique de formation sur la gestion des risques majeurs Arménie.

Compte tenu des objectifs fixés par rapport à cette activité, le cours est assuré par des formateurs venant aussi de différents secteurs et ayant la double casquette (académique et pratique du terrain), ce qui a permis de faire bénéficier les candidats sur les différents volets relatifs à la question du risque climatique à savoir :

- Etat des connaissances en climatologies/météorologie (tendances, prévisions) soutenu par une démonstration pratique sur station météorologique automatique placée à cet effet et une documentation météorologique illustrant les prévisions météorologiques du jour et du mois (bulletin météo-spécial).
- Les sécheresses et leurs impacts sur les systèmes de production agricole.
- La désertification indices de sensibilité et d'alerte précoce.
- Les feux de forêts en méditerranée en s'appuyant sur l'expérience Algérienne.
- L'ensablement et sa quantification soutenue par une présentation de quantificateur spécifique aux sables mobiles mis au point dans le cadre d'un projet CRSTRA-CNRNB et d'un quantificateur pour les particules aérosols notamment les polluants tels que les pesticides.
- Un film documentaire dédié au risque désertification ensablement vient appuyer cette problématique.
- Les aspects énergétiques sont traités surtout par rapport à l'habitat et les économies potentielles en matière d'énergie à ce niveau.
- Enfin, un cours éminemment didactique traite la ou les manières d'aborder une population pour la sensibiliser sur ces questions de risques en mettant l'accent sur l'intérêt d'impliquer tous les partenaires à travers des exemples pertinents.

Par ailleurs, il convient de signaler que chaque séance est suivie d'un débat sous forme de (question/réponse) entre

candidats et formateurs.

Démonstration sur Station Météorologique par groupe

Comme prévu au programme, la clôture officielle est assurée (à 11 heures) par la Directrice du Centre et le président du Conseil Scientifique après remerciement de l'ensemble des participants ayant contribué à ce cours et distribution des attestations aux candidats ainsi qu'aux formateurs.
Il faut noter que le cours a coïncidé avec des événements extrêmes (inondations) à l'Ouest et au Centre de l'Algérie ainsi que d'autres pays du pourtour méditerranéen.

Cf. tableau 1 ci-joint des participants.

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by CRSTRA):
Description:
Formation de 25 à 30 personnes dans le domaine des Risques Climatiques
Associated deliverables:
Programme de formation (programme et liste des participants)
Work package 2 (prepared by CRSTRA, CUEBC):
Description:
Diffusion et promotion de la formation sur les risques climatiques
Associated deliverables:
Work package 3 (prepared by CRSTRA, ECRM):
Description:
Gestion des risques climatiques » une durée de 15 jours de Formation
Associated deliverables:
Programme de formation-documentation-préparation des formations
Work package 4 (prepared by CRSTRA, ECRM, CUEBC):
Description:
Rapport Financier et rapport Scientifique
Associated deliverables:
Publication des résultats

FINANCING FOR 2013

EUR-OPA : € 12000
Split between partners : € 12000 for CRSTRA Biskra, Algeria

CLIMATE CHANGE AND CULTURAL HERITAGE

DUREE : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LIGNE D'ACTION: 2D1: soutien aux modules de niveau master organisés par les centres spécialisés

TITRE DU PROJET: CLIMATE CHANGE AND CULTURAL HERITAGE. 2012 : Global Change and Risk to Heritage. 2013: Smart cities in the future and Cultural Heritage

PAYS VISES: Tout les pays

PARTENAIRES IMPLIQUES:

CENTRE COORDINATEUR : CUEBC, Ravello, Italie

AUTRES CENTRES: C.R.S.T.R.A, Biskra, Algérie

AUTRES PARTENAIRES : Université de Cergy-Pontoise (France), Centre de Recherche et Restauration des Musées de France (Palais du Louvre)

OBJECTIFS DU PROJET

Objectif global pour 2012-2013:
Exposé des connaissances actuelles sur les impacts du changement climatique et du changement global sur le patrimoine culturel bâti (monuments, musées, bibliothèques, archives et réserves), sur les villes et le tourisme urbain, par une approche scientifique, politique, technique, économique et managériale.

Objectifs spécifiques :

2012:
Les points suivants seront détaillés: modèles climatiques et nouveaux scénarios du GIECC, climatologie du patrimoine, impacts sur le patrimoine bâti et les villes, utilisation raisonnée de l'énergie, impact du tourisme sur les sites du patrimoine mondial.

2013:
idem

RESULTATS ESPERES

2012:
Formation de haut niveau sur cette thématique pour des étudiants en sciences, urbanisme, ingénierie, architecture, conservation du patrimoine.

2013:
Idem

RESULTATS OBTENUS PRECEDEMMENT (si pertinent)

Le Conseil de l'Europe a participé à l'organisation et au financement de 4 manifestations importantes entre 2009 et 2011 sur la même thématique :
1- Un Colloque international « Climate Change and Cultural Heritage » tenu à Ravello du 14 au 16 mai 2009. Il a réuni 42 participants de 17 pays et organismes internationaux.
2- Un 1er Cours de niveau Master-Doctorat « Vulnerability of Cultural Heritage to Climate Change » tenu à Strasbourg du 7 au 11 septembre 2009. Il a réuni 36 étudiants de 13 pays et 17 professeurs de 7 pays.
Ces deux premières manifestations ont donné lieu à l'édition des Actes du Colloque et des Textes des Cours en un volume de 201 p. illustrées : « Climate Change and Cultural Heritage » (R.-A. Lefèvre and C. Sabbioni, ed., Edipuglia, Publ., Bari).
3- Un 2ème Cours de niveau Master-Doctorat « Management and Protection of Cultural Heritage facing Climate Change » tenu du 4 au 9 octobre 2010 à Ravello. Il a réuni 22 étudiants de 7 pays et 16 professeurs de 8 pays.
4- Un 3ème cours de niveau Master-Doctorat "Climate Change, Cultural Heritage and Risk. Energy, Mobility and Access" donné du 3 au 7 octobre 2011 à Ravello pour 24 étudiants de 8 pays par 13 professeurs de 4 pays.

RESULTS OBTAINED IN 2012

Work package 1 (prepared by CUEBC):
Description:
Training planning (contacts with the lecturers, distribution of lectures, etc) - C all for application, announcement
Associated deliverables:
Programme of the course and list of applicants

September 2012	Monday 10	Tuesday 11	Wednesday 12	Thursday 13	Friday 14

9.30-10.45	- Welcome adress *M. Lavandier/M. Menu, C2RMF* - Introduction *C. Sabbioni, co-Director of the Course, CNR-Bologna, Italy* *E. Apicella, Secretary General, CUEBC, Ravello, Italy* *B. Menendez, Cergy-Pontoise University* -From Climate Change to Global Change *R.A. Lefèvre*	-Global Change and Heritage Climatology *A. Bonazza*	-Climate Change and Indoor Environments *D. Camuffo*	-Energy requirements of indoor heritage *A. Bernardi*	-The risk of flooding in Paris and the museums storages *S. Colinart* *-Closing of the Course. Certificate of Attendance* *E. Fernandez-Galiano, Council of Europe, Strasbourg*
11.00-12.15	- Impact of Climate Change on Built Heritage and Urban Landscape, *C. Sabbioni*	-Salts Climatology applied to Built Cultural Heritage, *B. Menendez*	-Impact of Global Change on Urban Heritage *M. Cassar*	-Energy-Natural resources, trends and opportunities *C. Iwaszkiewicz*	-11.00-13.00: Visit of the C2RMF Laboratory
14.00-15.15	-Climate modelling and uncertainties *M. Déqué*	-"Climate Myths" (Practical exercise) *M. Cassar* *C. Sabbioni* *A. Bonazza*	-Managing climate risks *F. Lakhdari*	- A material in a Changing Environment: Glass and Stained Glass *A. Ionescu*	-Cruise on the Seine: the UNESCO List in Paris.
15.30-17.00	-Presentation of the practical exercise "Climate Myths" *C. Sabbioni* *A. Bonazza*		-Managing tourism pressure on World Heritage *M. Rossler*	-Built Heritage and Museums Collections facing Climate Change *E. Doehne*	

Liste des intervenants
Eugenia APICELLA, European University Centre for Cultural Heritage, Ravello, Italy
Adriana BERNARDI, ISAC-CNR Padova, Italy
Alessandra BONAZZA, Institute of Atmospheric Sciences and Climate (ISAC) of the Italian National Research Council (CNR) , Bologna-Italy
Dario CAMUFFO, ISAC-CNR Padova, Italy
May CASSAR, Director Centre for Sustainable Heritage, University College London (UCL) , UK
Michel DEQUE, Météo-France-CNRM
Eric DOEHNE, Université Cergy-Pontoise, France
Eladio FERNANDEZ-GALIANO, EUR-OPA Major Hazards Agreement, Council of Europe, Strasbourg, France
Casimir IWASZKIEWICZ, RES Inbuilt, Kings Langley-UK
Fattoum LAKHDARI, Scientific and Technical Research Centre on Arid Regions, Biskra-Algeria
Roger-Alexandre LEFEVRE, Professeur émérite à l'Université Paris XII, France
Cristina SABBIONI, Institute of Atmospheric Sciences and Climate (ISAC) of the Italian National Research Council (CNR) , Bologna-Italy

Work package 2 (prepared by CUEBC, CRSTRA):
Description:
A 5-days course will be held in Paris at Université de Cergy-Pointoise
Associated deliverables:
Training course - documentation (Powerpoint) prepared by lecturers.

Le *changement climatique* n'est qu'un des aspects du *changement global* qui affecte notre planète depuis plus de deux siècles. Ce changement résulte de l'action de l'Homme sur son environnement, au point même que la création d'une nouvelle époque géologique, l'Anthropocène, a été proposée, tant l'Homme a modifié la Planète depuis qu'il a su en

utiliser à grande échelle les ressources énergétiques.
Ce changement global affecte non seulement le système Terre, y compris le climat, mais aussi la Société elle-même à grande échelle, par le biais de sa population et de son utilisation des ressources matérielles et énergétiques.
Le patrimoine culturel est concerné par le changement climatique non seulement du fait de l'évolution lente des paramètres climatiques et de pollution (température, humidité de l'air, pluie, vent, gaz à effet de serre...) et, en zone littorale, de la montée du niveau des océans. Il pourrait de plus être affecté par l'augmentation du nombre et de l'intensité d'évènements dévastateurs, violents et relativement brefs, tels que les tempêtes, les ouragans, les inondations, les canicules, les sécheresses, le gel...
Les changements globaux dans la société affectent le patrimoine culturel par le biais de l'urbanisation massive, du tourisme, culturel ou de masse, par l'utilisation des matériaux, par la raréfaction des ressources en eau, par la pollution de ces eaux et par celle de l'air.
Ces problématiques étaient au programme du cours doctoral européen organisé conjointement par le Centre Universitaire Européen pour les Biens Culturels, par l'Accord sur les Risques Majeurs du Conseil de l'Europe et par l'Université de Cergy-Pontoise, du 10 au 14 septembre 2012, au Centre de Recherche et de Restauration des Musées de France, dans le Palais du Louvre. Il a réuni 35 étudiants de 9 pays devant 14 professeurs de 6 pays.

Un premier groupe de cours a concerné les aspects purement scientifiques des changements climatique et global: modèles climatiques, climatologie du patrimoine (avec un exercice pratique concernant des villes "mythiques", c'est-à-dire théoriques, situées dans des contextes variés), impacts sur le patrimoine urbain bâti (dont l'action des sels sur les milieux poreux et celle du climat et de la pollution sur le verre et les vitraux), impacts sur le patrimoine intérieur (musées, bibliothèques, collections, archives…). Un second groupe de cours a traité des problèmes d'utilisation de l'énergie pour le chauffage, l'éclairage et la climatisation des mêmes environnements culturels intérieurs. Un accent spécial a été mis sur la pression qu'exerce le tourisme sur le patrimoine mondial.

Enfin, profitant de ce que le lieu du cours, le Palais du Louvre, est au cœur de la partie de Paris inscrite sur la Liste du Patrimoine mondial de l'UNESCO, les risques potentiels que font courir les inondations de la Seine aux nombreux monuments et aux nombreux musées (surtout leurs réserves) ont été évalués, ainsi que les stratégies élaborées pour leur sauvegarde.

Le secrétariat du CUEBC, déplacé par l'occasion à Paris, a assuré l'organisation matérielle et le bon déroulement de ce cours, ainsi que la fourniture à chacun des participants des présentations faites par les professeurs.
Il est certain qu'en plus de l'intérêt, de l'actualité du thème et de la qualité de ce cours, l'attribution de bourses par le Conseil de l'Europe, jointe à la contribution financière du CUEBC et à quelle de l'Université Cergy-Pontoise, a été pour beaucoup dans le succès rencontré auprès des jeunes étudiants de nationalités très diverses.

Liste des participants

Alexander ALEXANDROV, Bulgarian Academy of Sciencs
Tanya ALEXANDROVA, University of Plovdid, Bulgaria
Riccardo BERRIOLA, Soprintendenza Speciale per i beni Archeologici di Napoli e Pompei
Umberto CICCARELLI, Rimini, Italia
Mara D'AVINO, Somma Vesuviana, Napoli
Mélanie DENECKER, Universitè de Cergy Pontoise, France
Maria Concetta DI TUCCIO, University of Milano - CNR-ISAC, Padova, Italy
Monica DI TULLIO, Soprintendenza Speciale per i beni Archeologici di Napoli e Pompei
Alessandra FIASCO, University of Bologna
Stefania GATTO, Napoli, Italia
Josep GRAU-BOVE', London, UK
Vigen HARUTYUNYAN, Wester Survey for Seismic Protection RA; Yerevan State University, Armenia
Vardan HAYRAPETYAN, Wester Survey for Seismic Protection, Ministry of Emergency Situations of the Republic of Armenia
Varsik HAYRAPETYAN, Yerevan State University
Angela LUPPINO, Soprintendenza Speciale per i beni Archeologici di Napoli e Pompei
Irene NATALI, ISAC-CNR
Ivana OSWALDOVA, Faculty of Mechanical Engineering, Czech Technical University in Prague)
Lala RAHMANOVA, Baku - Oxford School
Mandana SAHEB, LISA, UPEC
Dimitra-Makrina SALMANIDOU, Aristotle University of Thessaloniki
Silvia SAVINI, University of Torino
Olga SHASHKINA, Ministry of Environment Protection of Republic of Georgia
Paolo SIANO, Paris, France
Sonya SPASOVA, State University of Library Studies and Information Technologies, Sofia, Bulgaria
Emma TURVEY, University of Lincon, UK
Giovanna VISINTIN, AlmaMater Studiorium, Faculty of mathematical, Bologna, Ita
Nadya VLADIMIROVA, State University of Library Studies and Information Technologies, Sofia, Bulgaria
Gillian WALKER, The University of Reading

Gergana ZAEMDZHIKOVA, Bulgarian Academy of sciences – Forest research institute, Sofia, Bulgaria

Work package 3 (prepared by CUEBC, CRSTRA):
Description:
Promotion and dissemination of results
Associated deliverables:
Newspapers and on-line articles - online publication of proceedings

L'esnsemble des présentations ont été transmises au Secrétariat Exécutif.

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by CUEBC):
Description:
Training planning (contacts with the lecturers, distribution of lectures, etc) - Call for application, announcement
Associated deliverables:
Programme of the course and List of applicants
Work package 2 (prepared by CUEBC, CRSTRA):
Description:
A 5-days course to be held in Ravello
Associated deliverables:
Training course - documentation (Powerpoint) prepared by lecturers
Work package 3 (prepared by CUEBC):
Description:
Reports
Associated deliverables:
Financial statement and scientific report
Work package 4 (prepared by CUEBC, CRSTRA):
Description:
Promotion and dissemination of results
Associated deliverables:
Newspapers and on-line articles - online publication of proceedings

FINANCING FOR 2013

EUR-OPA : € 13500
Split between partners : € 13500 for CUEBC
Other contributors: € 10000 from CUEBC Ravello, CRSTRA Biskra Algeria

3. PLACING PEOPLE AT THE HEART OF DISASTER RISK REDUCTION

3.A. Policy studies

ANALYSIS OF THE LOCAL AUTHORITIES INVOLMENT IN MAJOR HAZARDS MANAGEMENT

DUREE : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LIGNE D'ACTION: 3.A. Etudes concernant les politiques

TITRE DU PROJET: Analyse de l'implication des autorités locales dans la gestion des risques majeurs

PAYS VISES: Algérie, Arménie, Azerbaïdjan, Belgique, Chypre, Croatie, Grèce, France, Luxembourg, Monaco, Maroc, …

PARTENAIRES IMPLIQUES :

CENTRE COORDINATEUR : ISPU Florival, Belgium

AUTRES CENTRES: CRSTRA Biskra, Algeria , ECRM Yerevan, Armenia , ECMHT Baku, Azerbaijan ,

AUTRES PARTENAIRES : Service public Fédéral Intérieur, DG Centre de Crise

OBJECTIFS DU PROJET

Objectif global pour 2012-2013 :
Renforcer la complémentarité des actions nationales, régionales et locales dans la réduction des risques de catastrophes

Objectifs spécifiques :

2012:
Elargir l'enquête à d'autres pays, actualiser les résultats antérieurs et échanger les bonnes pratiques (activité continue).

2013:
Organiser un atelier.

RESULTATS ESPERES

2012 :
Nouvelles contributions (au minimum l'Azerbaïdjan et le Maroc+ Bonnes pratiques).

2013 :
Atelier d'analyse.

RESULTATS OBTENUS PRECEDEMMENT (si pertinent)

Site www.ispu.eu met en ligne les résultats de l'enquête par questionnaire menée auprès de 9 pays, les bonnes pratiques identifiées ainsi que les différents documents de travail. Le site permet également de remplir en ligne le questionnaire d'enquête ainsi que la fiche "bonnes pratiques". Trois ateliers ont également été organisés.

ACTIVITIES PLANNED IN 2012 (split by partner)

FINANCING FOR 2012

EUR-OPA : € 4 000

Split between partners : € 4 000 for ISPU

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ISPU)*:*
Description:
Analyse des nouvelles contributions.
Livrables associés:
Identification de bonnes pratiques additionnelles.

Les contacts avec divers pays ne s'étant pas matérialisé, l'analyse de nouvelles contributions n'a pas été possible.

Work package 2 (prepared by ISPU)*:*
Description:
Actualisation des données collectées.
Livrables associés:

Site web actualisé.

Pour les même raisons, il n'y a pas eu d'actualisation.

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Work package 1 (prepared by ISPU)*:*

Description:

Atelier.

Livrables associés:

Rapport final.

FINANCING FOR 2013

EUR-OPA : € 5000 for ISPU

Split between partners : € 5000 for ISPU

3.B. Awareness initiatives

BE SAFE NET. PROTECT YOURSELF BY HAZARD

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 3.C. Awareness initiatives

TITLE OF THE PROJECT: BeSaNet protect yourself by hazard

TARGET COUNTRIES: Global

PARTNERS INVOLVED:

COORDINATING CENTRE : BE-SAFE-NET Nicosia, Cyprus

OTHER CENTRES: CERG Strasbourg, France , ICoD La Valletta, Malta

OTHER PARTNERS: The TESEC - European Centre of Technological Safety (Kiev, Ukraine) is member of the Be Safe Net Editorial Board but it is not listed in the " OTHER CENTRES". The following Centres contributed to the implementation of sections of Be Safe Net: AFEM - European Natural Disasters Training Centre (Ankara, Turkey), CUEBC - European University for the Cultural Heritage (Ravello, Italy), CRSTRA - Scientific and Technical Research Centre on Arid Regions (Biskra, Algeria), ECRP - European Centre for Risk Prevention (Sofia, Bulgaria), GHHD - European Centre on Geodynamical Risks of High Dams (Tbilisi, Georgia)

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

Be Safe Net project was created under the umbrella of Europa Major Hazard Agreement of Council of Europe (27 mainly Euro-Mediterranean Countries).

The Be Safe Net initiative wishes to achieve three main goals:

1. Promote a culture of safety among a new generation of people
• Raising awareness on implications of their actions and their way of thinking on emergency
• Replacing fear with a culture of preparedness
2. Disseminate knowledge to multilingual societies
• Create a common knowledge base of best experience
• Disseminate it in several languages to benefit a wider society
3. Become a interactive tool
• Open our website to other users and organisations for their benefit and comments
• Enrich its content by contributions based on external experiences

The target is general public especially for the school teachers and students.

The global objectives for 2012-13 are:

1) The website launch during EUR-OPA 25th Anniversary (April, May 2012).

2) To Promote the web-site through the following activities:

-2a) in the "short term" (for the launching), Editorial board will design a leaflet;

-2b) in the "medium term", the editorial board + secretariat will design set of Posters for distribution to Ministries of Education/Civil Protection departments for subsequent circulation in secondary schools (e.g. travelling exhibits);

-2c) in the "long-term", the Editorial Board suggests the setting up of an 'on-line based Olympiad' which will test the knowledge gained from theBeSafeNet website. This will reflect the effectiveness of the website in terms of awareness raising, promoting a culture of safety, disseminating knowledge to a multi lingual society, and acting as an interactive tool.

Specific objectives :

2012 :

1) The website launch during EUR-OPA 25th Anniversary (April - May 2012) will concern into the launch of the general section and of the first level of the twelve question answers of the several kind of hazards.

2) The implementation of a leaflet on BE Safe Net Project and web-site.

3) to start to design set of Posters for distribution to Ministries of Education/Civil Protection departments for subsequent circulation in secondary schools

4) to start the organisation of an 'on-line based Olympiad' among teachers from different countries. The teachers will be asked to answer a questionaire based on the material of the website. To organize this Olympiad competition will be usefull the experience gained by the Editorial Board in the partecipation to the International Earth Science Olympiad (IESO 2011) held in Modena (Italy) in September 2011.

2013 :

1) to finish to design set of Posters for distribution to Ministries of Education / Civil Protection departments for their circulation in secondary schools.

2) the setting up of the 'on-line based Olympiad' which will test the knowledge gained from the BeSafeNet website.

EXPECTED RESULTS

2012 :

Completion of the web-site in a minimum of 5 main languages (English, Italian, French, Greek and Russian). To develope the knowledge of the Be Safe Net at least at an European Level.

2013 :

To reach the aim of the website which is to become an educational tool in the hands of teachers, focusing at risk prevention, preparedness, immediate reaction and rehabilitation.

RESULTS OBTAINED PREVIOUSLY (if any)

The first Be Safe Net website (still available at http://www.besafenet.org/main/default.aspx?tabid=9) has been deeply modified in the contents as well as in the look. The changes have been carried out following decisions taken in occasion of meetings held in Strasbourg (2006), Cyprus (2007 and 2009), Ravello (2008), Lisbon (2008), Malta (2010), Modena (2010), Paris (2011) and Kiev (2011). The new website is available at www.besafenet.net. It has been presented at the International Conference Mountain Risks: Bringing Science to Society held in Firenze (Italy) from 24 to 26 November 2010 and at the 5th edition of the International Earth Science Olympiad (IESO 2011), for secondary school students, held in Modena (Italy) from 5 to 14 September 2011. To the IESO 2001 attended 115 students and 97 mentors/teachers/observers coming from 34 countries from all over the world.

ACTIVITIES PLANNED IN 2012 (split by partner)

RESULTS OBTAINED IN 2012

Work package 1 (prepared by Besafenet, ICoD, CERG, TESEC)*:*

Description:

Website launching in as many languages during EUR-OPA 25th Anniversary with all the completed material. Web-site promotion through the implementation of a leaflet and of a set of Poster for distribution to Ministries of Education / Civil Protection departments for subsequent circulation in secondary schools.

Associated deliverables:

Availability of 5 languages (English, Italian, French, Greek and Russian) versions. Leaflet of information for diffusion among potentially interested entities.

The dissemination of the BE-SAFE-NET Project in 2012 consisted in the website launch, made by the Editorial Board members, during the EUR-OPA 25th Anniversary Major Hazards Agreement, which has been held on 26-27/04/2012 at the headquarters of Council of Europe in STRASBOURG.

The launch did concern into an oral presentation of the general section and of the first level of the twelve question and answers of the several kind of hazards and in the distribution of a 22 pages leaflet on BE-SAFE-NET Project (Alexandrou et al., 2012).

Front page of the leaflet on "BE-SAFE-NET" Project

The leaflet, written in the five languages of the website, contains a synthetic description of the "goals" and the "objectives", of the "Natural" and "Technological" hazards and of the authors of the Project.

In 2012 leaflet of website has been developed and presented for the meeting of EUR-OPA Permanent correspondents.

The key information of website has been translated from English to Russian and published on website.

ALEXANDROU A., GEROSIMOU G., PAPADOPOULOS M., CASTALDINI D., MICALLEF A., POYARKOV V. & PLA F. (2012) -

Be Safe Net. www.Besafenet.net. EUR OPA Major Hazards Agreement. Council of Europe. European Centre for Disaster Awareness with the use of internet, Nicosia, Cyprus, 22 pp.

Work package 2 (prepared by CERG, TESEC, ICoD)*:*
Description:
Assessment and resetting of the existing Natural Hazards and Technological Hazards material and search contributors for the first level material on hazards not yet completed who had been just hidden from the site.
Associated deliverables:
Revised versions of the existing material and addition of new contributions.

According to the decision of the Editorial Board members, the BE-SAFE-NET website was modified and, after another recent relooking, nowadays the hazards are classified in two main categories: "Natural" and "Technological". In particular, the Natural hazards are distinguished in Geological (Volcanic Eruptions, Earthquakes, Tsunamis, and Landslides) and Hydro-Meteorological hazards (Floods, Drought and Desertification, Avalanches, Hurricanes, Storm Surges and Sea Level Rise). The "Technological" hazards are subdivided into Chemical Emergency, Radiological Emergency and Dam Failure. Moreover the "introductory" page of each hazard has been translated in Italian, French and Russian; the greek translation has to be done for some of the Natural hazards.

Work package 3 (prepared by Besafenet, ICoD, CERG, TESEC)*:*
Description:
Define procedures for the setting up of an 'on-line based Olympiad' which will test the knowledge gained from theBeSafeNet website.
Associated deliverables:
Draft of the questions and of the organizational needs of the event.

A further way for the dissemination of the "BE-SAFE-NET" Project will be the organization of an 'on-line based Olympiad' among teachers from different countries. The teachers should be asked to answer a questionnaire based on the material of the BE-SAFE-NET website. At the Paris meeting in December, the general structure of the Olympiad and the preparatory work (in particular the technical requirements) were discussed and adopted.

Work package 4 (prepared by Besafenet, ICoD)*:*
Description:
Two meetings (one in Cyprus and one in Malta) to discuss and manage the activities.
Associated deliverables:
Content of the brochure and edition of new material submitted.

The Editorial Board of the BE-SAFE-NET Project had a first meeting in Paphos (Cyprus) on 28-29/03/2012 in order to evaluate the existing material of the BE-SAFE-NET website and to prepare a printed leaflet for the launching of the Project in occasion of the 25th Anniversary of the EUR-OPA.
A second meeting of the Editorial Board members was held on 6-7/12/2012 in Paris during which the 2013 project activity was discussed and planned. The 2013 activity will concern some technical issues, the improvement of English texts of some natural hazards, the translation in each contributor language (Italian, French, Russian and Greek) of the first level of the 12 Questions and Anwers, the introduction of new hazards and the definition of concrete procedures for the organisation of an 'on-line based Olympiad'. The 2013 ongoing activity will be examined in occasion of two meetings which will be held in Strasbourg, or Kiev (first week of June 2013) and Paris (first week of December 2013)

ACTIVITIES PLANNED IN 2013 *(split by partner)*

Work package 1 (prepared by Besafenet, ICoD, CERG, TESEC)*:*
Description:
Finish the implementation of the set of Poster and their distribution to Ministries of Education/Civil Protection departments for subsequent circulation in secondary schools
Associated deliverables:
Posters.
Work package 2 (prepared by Besafenet, ICoD, CERG, TESEC)*:*
Description:
The setting up of an 'on-line based Olympiad' which will test the knowledge gained from theBeSafeNet website. Addressed to teachers of secondary schools, it will give awards to the winners in occasion of a ceremony which will be held in Cyprus.
Associated deliverables:
Preparation plan of the Olympiad and the award ceremony.
Work package 3 (prepared by Besafenet, ICoD, CERG, TESEC)*:*
Description:
Two meetings (one in Kiev and one in Paris) to discuss and manage the activities.
Associated deliverables:

Final version of Olympiad procedures.

FINANCING FOR 2013

EUR-OPA : € 19 000

Split between partners : € 11000 for BeSafeNet
€ 2000 for CERG
€ 3000 for ICoD
€ 3000 for TESEC

EDUCATIONAL MATERIALS TO RAISE AWARENESS AND IMPROVE PREPAREDNESS TO DISASTERS

DURATION : ☐ 2012 ☐ 2013 ☐ 2012 – 2013

LINE OF ACTION: 3.C. Awareness initiatives

TITLE OF THE PROJECT: Development of additional educational materials, aimed to raise awareness and improve preparedness to disasters and their pilot adoption in schools and other educational institutions

TARGET COUNTRIES: Armenia, the Southern Caucasian and neighboring states, other concerned member-states of the Council of Europe's EUR-OPA Major Hazards Agreement , other countries

PARTNERS INVOLVED:

COORDINATING CENTRE : ECRM Yerevan, Armenia

OTHER CENTRES

OTHER PARTNERS : .

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

Developing of additional educational materials, aimed to raise awareness and improve preparedness to disasters and their pilot adoption in schools and other educational institutions

Specific yearly objectives :

2012 :

1. Creation of the "Basic knowledge on safe life activities in extreme situations" pilot Manual for schools and other academic institutions.

Development of a final version of the" Methodology" for teaching the course :" "Basic knowledge on safe life activities in extreme situations" for public school teachers drawn on the outcomes of the round table discussions and feedback from the specialists of the Refresher Training Faculty of the State Crisis Management Academy in Armenia

2. Selection of pilot schools . Duplication and dissemination of a preliminary vaient of the "Special Tests assigned for school administration, teachers and students' parents to assess safety of schools and other educational establishments " for selected schools for comments, questions and proposals from specialists, school administration, teachers and students' parents with an aim to use these "Special Tests" in line with the General Recommendations as a basis for more and better studying and further development of the Tests and Recommendations, assigned for each particular pilot school, by given its specifics and location characteristics.

Preparation of a final version of the "Special Tests assigned for school administration, teachers and students' parents to assess safety of schools and other educational establishments".

Submission of the final English version of the "Special Tests" as a contribution to implement of the corresponding Section of "Be Safe Net".

3. Presentation of an preliminary version of the "Extreme psychology " brochure created by ECRM for further discussions and feedback from the specialists.

The brochure will present some psychological aspects for survival in emergencies. This brochure is mainly targeted towards cultivating in people, especially children, some personal performances required to successfully combat critical situations: raising faith and developing skills, enabling the maximum use of opportunities in times of a temporal lack of help in order to overcome any severe handicaps and emergency related dangers.

It also can serve a manual, assigned for the use of teachers, students and their parents, rescuers, peacekeepers, volunteers, involved into rendering first psychological aid in communities; as well as for the specialists, engaged into emergency response, for all those who wish to improve their psychological abilities in order to survive in emergencies

4. Presentation of a preliminary variant of a universal teaching "First Aid Manual" and a "Memorandum first aid pocket book" created by ECRM for further discussions and feedback from the specialists of the State Crisis Management Academy

2013 :

1. Creation of final version of the "Basic knowledge on safe life activities in extreme situations" pilot Manual for schools and other academic institutions

Offering courses of lectures, organization of a round table discussion and seminars with the involvement of the specialists from the Refresher Training Faculty of the State Crisis Management Academy" , in order to bring the meaning of the key provisions and fundamentals of the "Methodology" for teaching of the above course: "Basic knowledge on safe life activities in extreme situations" to the sense of the staff, administration authorities , school principals, Heads of the Civil Protection and Emergency Chairs of the Higher academic institutions.

2. Preparation of particular Tests and Recommendations, assigned for each defined pilot school as well designing "Plans and Guidelines" on increasing security of school institutions; primarily actions undertaken in a case of a

specific emergency incident, brawn on the basic Tests and General Recommendations developed under methodological support provided by ECRM and the State Crisis Management Academy with the involvement of some relevant security structures within local and territorial governance.
3.Preparation of a final version of the "Extreme psychology" brochure for publishing , based on the results of the held discussions and feedback received from the specialists.
Submition of the final English version of the "Extreme Psychology" as a contribution to implement of the corresponding Section of "Be Safe Net".
4.Preparation of a final version of a universal teaching "First Aid Manual and a "Memorandum first aid pocket book for publishing drawn on the discussions outcomes and feedback from the specialists"

EXPECTED RESULTS

2012 :
1. Preliminary version of the "Basic knowledge on safe life activities in extreme situations" pilot Manual for schools and other educational institutions.
A final version of the" Methodology" for teaching the course :" "Basic knowledge on safe life activities in extreme situations" for public school teachers. "
2.A final version of the "Special Tests, assigned for school administration, teachers and students' parents to assess safety of schools and other educational institutions".
Submission of the final English version of the "Special Tests" as a contribution to implement of the corresponding Section of "Be Safe Net".
3. Preliminary version of the "Extreme psychology" brochure.
Feedback from the specialists for preparing a final version of the "Extreme psychology" brochure.
4. Preliminary versions of a universal teaching "First Aid Manual" and "Memorandum first aid pocket book"
Feedback from the specialists for preparing a final version of a universal teaching "First Aid Manual and a "Memorandum first aid pocket book"
2013 :
1.Final version of the "Basic knowledge on safe life activities in extreme situations" pilot Manual for schools and other educational institutions
Bringing the meaning of the key provisions and fundamentals of the "Methodology" for teaching drawn on the above pilot "Manual" to the sense of the public school teachers
2. Particular Tests and Recommendations, assigned for each defined pilot school.
"Plans and Guidelines" on increasing security of school institutions; primarily actions undertaken in a case of a specific emergency incident.
3.A final version of the "Extreme psychology" brochure
Submission of the final English version of the "Extreme Psychology" as a contribution to implement of the corresponding Section of "Be Safe Net".
4. A final version of a universal teaching "First Aid Manual" and a "Memorandum first aid pocket book"

RESULTS OBTAINED PREVIOUSLY (if any)

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECRM):
Description:
Creation of the "Basic knowledge on safe life activities in extreme situations" pilot Manual for schools and other academic institutions. Development of a final version of the" Methodology" for teaching the course :" "Basic knowledge on safe life activities in extreme situations" for public school teachers drawn on the outcomes of the round table discussions and feedback from the specialists of the Refresher Training Faculty of the State Crisis Management Academy in Armenia.
Associated deliverables:
A final version of the Methodology for teaching the course "Basic knowledge on safe life activities in extreme situations" for public school teachers

A draft version of the "Basic knowledge on safe life activities basis in extreme situations", as a pilot "Manual" for schools and other educational institutions;
A final version of the universal "Methodology" for teaching the course "Basic knowledge on safe life activities basis in extreme situations" for public school teachers.
There is a need to note here, that there are an array of educational training manuals, addressing the above venue that contain the brief methodological guidelines on teaching the particular course, partially included into the "Introduction" of the correspondent concrete (local) courses. However, a "Methodology", as a universal scientific educational manual on teaching the above wide spectrum course in general, aimed to offer fundamental retraining to teachers, doesn't exist and our universal "Methodology" is called to fill that gap.

Work package 2 (prepared by ECRM):
Description:
Selection of pilot schools. Duplication and dissemination of a preliminary variant of the "Special Tests assigned for

school administration, teachers and students' parents to assess safety of schools and other educational establishments" for selected schools for comments, questions and proposals from specialists, school administration, teachers and students' parents with an aim to use these "Special Tests" in line with the General Recommendations as a basis for more and better studying and further development of the Tests and Recommendations, assigned for each particular pilot school, by given its specifics and location characteristics.
Preparation of a final version of the "Special Tests assigned for school administration, teachers and students' parents to assess safety of schools and other educational establishments". Submission of the final English version of the "Special Tests" as a contribution to implement of the corresponding Section of "Be Safe Net".
Associated deliverables:
A final version of the "Special Tests assigned for school administration, teachers and students' parents to assess safety of schools and other educational establishments".

A final version of the "Special tests assigned for school administration, teachers and students' parents to assess safety of schools and other educational institutions" was prepared and the final version in English was submitted to the EUR-OPA Secretariat also as a contribution if a need may arise in a corresponding section of "Be Safe Net".
Among the 40 Tests for school administration and teachers cited below, tests 1-8 addressing the first, second and third directions in the developed basic Tests need to be specially highlighted. Tests 9-18 are assigned to assess a preparedness level of school staff to respond adequately in case of a particular disaster, endangering the school. Test 19-27 enable to assess a state of an inner school organizational progress of ensuring safety and reducing vulnerability. 12 Tests, quoted within the framework of Clause 28, refer to the assessment of a progress of practical teaching and training organized in the school with an aim to improve school preparedness to prevent and liquidate hazards that could arise in the school itself, as well as to update and strengthen school staff skills to act adequately in emergencies.
Among the 12 Tests for the student's parents, tests 1-3 intend to assess a level of awareness of the student's parents, concerning the provision of safety and preparedness of the school to respond to disasters and also to assess a level of preparedness of the parents themselves to act rationally in case of an emergency in the school. Tests 4-12 intend to assess a level of awareness of the student's parents concerning the knowledge that the children have acquired on safe survival basis, and also to assess a level of parents' preparedness to recognize risks of involving children into extreme situations.
These "Special Tests", designed for school administration and teaching staff and the Tests and Recommendations designed for parents are suggested as one of the effective mechanisms in ensuring their preparedness to recognize and reduce disaster risks, enabling to provide adequate response to any locally experienced emergency.
The aim of the Tests for school administration and teachers is to identify the level to which their educational institution is ready to eliminate natural, man-made and other disaster risks and to respond to disasters.
The Tests for parents enable them to highlight levels of a culture of safety, as well as of the parent's preparedness to recognize a hazard and undertake preventive measures to reduce risk of involving children into extreme situations and also to act rationally if an emergency incident occurred.
The Tests' outcomes can serve a basis for designing Recommendations on reducing vulnerability of schools, improving preparedness of the school staff to act adequately in a particular disaster and to review and upgrade the disaster preparedness Plans, as well as to prepare parents to recognize a hazard and undertake preventive measures to reduce risks for children.

Work package 3 (prepared by ECRM):
Description:
Presentation of an preliminary version of the "Extreme psychology" brochure created by ECRM for further discussions and feedback from the specialists.
The brochure will present some psychological aspects for survival in emergencies. This brochure is mainly targeted towards cultivating in people, especially children, some personal performances required to successfully combat critical situations: raising faith and developing skills, enabling the maximum use of opportunities in times of a temporal lack of help in order to overcome any severe handicaps and emergency related dangers.
It also can serve a manual, assigned for the use of teachers, students and their parents, rescuers, peacekeepers, volunteers, involved into rendering first psychological aid in communities; as well as for the specialists, engaged into emergency response, for all those who wish to improve their psychological abilities in order to survive in emergencies.
Associated deliverables:
Preliminary version of the "Extreme psychology" brochure. Feedback from the specialists for preparing a final version of the "Extreme psychology" brochure.

A draft version of the "Extreme psychology" brochure was prepared. Drawn on the feedback from the specialists, a final version of the "Extreme psychology" brochure will be prepared. The brochure will present some psychological aspects for survival in emergencies. The main aim of the brochure is to cultivate in people, especially children some personal performances required to successfully combat critical situations: raising faith and developing skills enabling the rescuers, peacekeepers, volunteers involved into rendering fist psychological help in communities, as well as for the specialists, engaged into emergency response, for all those who wish to improve the psychological abilities in order to survive in emergencies.

Work package 4 (prepared by ECRM):

Description:

Presentation of a universal teaching "First Aid Manual" and a "Memorandum first aid pocket book" created in ECRM for further discussions and feed back from the specialists of the State Crisis Management Academy.

Associated deliverables:

Preliminary versions of a universal teaching tool "First Aid Manual" and "Memorandum first aid pocket book". Feedback from the specialists for preparing a final version of a universal teaching "First Aid Manual and a "Memorandum first aid pocket book

Acknowledgement with a draft version of the above educational materials, created by ECRM, holding round table discussions, preparation by specialists from the State Crisis Management Academy" of a feedback aimed to their updating, involvement into preparation of their final versions

Draft versions of a universal teaching "First Aid Manual" and a "Memorandum first aid pocket book" were prepared. Drawn on the feedback from the specialists, final versions of both will be prepared.

ACTIVITIES PLANNED IN 2013 *(split by partner)*

Working package 1 (prepared by ECRM):

Description:

Creation of final version of the "Basic knowledge on safe life activities in extreme situations" pilot Manual for schools and other academic institutions

Offering courses of lectures, organization of a round table discussion and seminars with the involvement of the specialists from the Refresher Training Faculty of the State Crisis Management Academy" , in order to bring the meaning of the key provisions and fundamentals of the "Methodology" for teaching of the above course :"Basic knowledge on safe life activities in extreme situations" to the sense of the staff, administration authorities , school principals, Heads of the Civil Protection and Emergency Chairs of the Higher academic institutions.

Submission of the final English version of the "Methodology" as a contribution to implement of the corresponding Section of "Be Safe Net".

Associated deliverables:

Preliminary version of the "Basic knowledge on safe life activities in extreme situations" pilot Manual for schools and other educational institutions. Final version of the Methodology for teaching the course "Basic knowledge on safe life activities in extreme situations" for public school teachers.

Work package 2 (prepared by ECRM):

Description:

Preparation of particular Tests and Recommendations, assigned for each defined pilot school as well designing "Plans and Guidelines" on increasing security of school institutions; primarily actions undertaken in a case of a specific emergency incident, brawn on the basic Tests and General Recommendations developed under methodological support provided by ECRM and the State Crisis Management Academy with the involvement of some relevant security structures within local and territorial governance.

Associated deliverables:

Particular Tests and Recommendations, assigned for each defined pilot school. "Plans and Guidelines" on increasing security of school institutions; primarily actions undertaken in a case of a specific emergency incident.

Work package 3 (prepared by ECRM):

Description:

Preparation of a final version of the "Extreme psychology" brochure for publishing, based on the results of the held discussions and feedback received from the specialists. Submission of the final English version of the "Extreme Psychology" as a contribution to implement of the corresponding Section of "Be Safe Net".

Associated deliverables:

A final version of the "Extreme psychology" brochure. Submission of the final English version of the "Extreme Psychology" as a contribution to implement of the corresponding Section of "Be Safe Net".

Work package 4 (prepared by ECRM):

Description:

Preparation of a final version of a universal teaching "First Aid Manual and a "Memorandum first aid pocket book for publishing drawn on the discussions outcomes and feedback from the specialists".

Associated deliverables:

A final version of a universal teaching "First Aid Manual" and a "Memorandum first aid pocket book"

Offering courses of lectures, organization of a round table discussion and seminars with the involvement of the specialists from the Refresher Training Faculty of the State Crisis Management Academy" in order to bring the meaning of the key provisions and fundamentals of the methodological and educational materials to the sense of the potential teachers, running training courses, drawn on these materials .

Selection of pilot schools, engagement into the development of the "Plans and Guidelines on increasing security of school institutions and primarily actions, undertaken in a case of a specific emergency incident"

Running some relevant training programmes and organization of activities, aimed to be prepared, in the established order, to make correspondent decisions about adoption of the above teaching courses, drawn on the pilot educational materials, into the school and other educational institutions' curriculum.

FINANCING FOR 2013

EUR-OPA : € 7000

Split between partners : € 7000 for ECRM

NUCLEAR HAZARD. CHERNOBYL AND FUKUSHIMA: LESSONS FOR PUBLIC AWARENESS

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 3.C. Awareness initiatives

TITLE OF THE PROJECT : Nuclear Hazard. Chernobyl and Fukushima: Lessons for Public Awareness

TARGET COUNTRIES : Armenia, Azerbaijan, Belgium, Bulgaria, Georgia, Moldova, Morocco, Russia, San-Marino, Turkey, Ukraine

PARTNERS INVOLVED :

COORDINATING CENTRE : TESEC Kiev, Ukraine

OTHER CENTRES: ECRM Yerevan, Armenia , CEMEC San Marino , ISPU Florival, Belgium , CEPRIS Rabat, Morocco

OTHER PARTNERS : Azerbaijan, Georgia, Moldova, Bulgaria, Russia, Turkey, UNESCO, IAEA, UNDP

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

Better public awareness on nuclear and radiological hazard

Specific yearly objectives :

2012 :

Developing of first draft of Booklet BASIC KNOWLEDGE OF NUCLEAR HAZARDS: LESSONS FROM CHERNOBYL AND FUKUSHIMA in English and Russian; translate Booklet in national languages; distribute to national institutions (national authorities, public organization, communities, schools, etc.) for comments, questions and proposals from different categories of public: journalists, decision makers, teachers, students, and others ; editing of Booklet on national level; sending to TESEC for compilation and merging of proposals from different countries; organizing national Workshops for discussion of final texts.

2013 :

Developing of final text in 12 languages; publishing Booklets in national languages and English; distribute it on national and international levels; organizing of national training course for teacher and promotion of Booklet on national and international levels

EXPECTED RESULTS

2012 :

Draft of Booklet BASIC KNOWLEDGE OF NUCLEAR HAZARDS: LESSONS FROM CHERNOBYL AND FUKUSHIMA in 12 languages, with contribution of journalists, decision makers, teachers, students, and others; discussion of Booklet on national levels in 11 countries

2013 :

Booklet BASIC KNOWLEDGE OF NUCLEAR HAZARDS: LESSONS FROM CHERNOBYL AND FUKUSHIMA in 12 languages, with contribution of journalists, decision makers, teachers, students, and others; dissemination of Booklets in 11 countries, training course for teachers in 11 countries

RESULTS OBTAINED PREVIOUSLY (if any)

The primary text of Booklet BASIC KNOWLEDGE OF NUCLEAR HAZARDS: LESSONS FROM CHERNOBYL AND FUKUSHIMA in English has been prepared and discussed on international meetings, seminars and workshops

RESULTS OBTAINED IN 2012

Work package 1 (prepared by TESEC)*:*

Description:

Develop first draft of Booklet BASIC KNOWLEDGE OF NUCLEAR HAZARDS: LESSONS FROM CHERNOBYL AND FUKUSHIMA in English and Russian, distribute it to partners, coordination of project

Associated deliverables:

The revised draft of Booklet in English and Russian

In the meeting of held in Strasbourg on the 14th of April 2011, after a presentation on "Nuclear Hazard - Chernobyl and Fukushima lessons concerning population awareness" and following the proposal of the Belgian representative, The Permanent correspondents authorised TESEC to develop a booklet on "Basic Knowledge of Nuclear Hazards: Lessons

from Chernobyl and Fukushima" which will be understandable for teachers, journalists, decision makers, etc.
A first draft of Booklet was presented on the 4th of November 2011 at a meeting with various international organization (UNDP, UNESCO, IAEA, Parliamentary Assembly the Council of Europe, EUR-OPA Executive Secretariat) and member states representatives (Université du Luxemburg) and some French professional organizations (Institute of Nuclear and Radiation Safety; Direction Générale de la Sécurité civile et de la Gestion des Crises; Paris Fire Department). The necessity of such Booklet, its technical aspects and the adequacy of the material presented has been discussed and all representatives underline that such Booklet is needed to better inform general public (such teachers, journalists, decision maker) on nature of nuclear and radiological risk and that its content is sufficient for understanding the nature of nuclear hazards.
Taking account of the remarks of the participants, and in particular that not all types of reactors have containment and that some case studies of radiological accidents have to be presented, a revised draft of Booklet (both in English and in Russian) was prepared in January 2012 and widely distributed to many countries for comments and proposals from different categories of population (teachers, journalists, decision maker, students, etc.).

Work package 2 (prepared by TESEC, ECRM, ISPU, CEMEC, centres in Azerbaijan, Georgia, Moldova, Bulgaria, Morocco, Turkey):
Description:
Translate Booklet in national languages and to distribute it to national institutions (national authorities, public organization, communities, schools, etc.)
Associated deliverables:
Draft of Booklet in 12 languages, with contribution of journalists, decision makers, teachers, students and others

The booklet was translated into the national languages of Armenia, Azerbaijan, Bulgaria, Georgia, Moldova, Russia, San-Marino and Morocco.
The Booklet was translated into Armenian **(ՄԻՋՈՒԿԱՅԻՆ ՎՏԱՆԳԻ ՎԵՐԱԲԵՐՅԱԼ ՀԻՄԱՆԱԿԱՆ ԳԻՏԵԼԻՔՆԵՐԸ ՉԵՌՆՈԲԻԼԻ ԵՎ ՖՈՒԿՈՒՇԻՄԱՅԻ ԴԱՍԵՐԸ)** by highly qualified professionals in this area and disseminated for feedback to correspondent national institutions.
The booklet has been translated into Azerbaijani (**NÜVƏ TƏHLÜKƏSI HAQQINDA ƏSAS BILIKLƏR: ÇERNOBIL VƏ FUKUSIMANIN DƏRSLƏRI**) and has been sent to 20 organizations,ministries and 5 corresponding specialists.
The Russian version of the booklet has been translated into Georgian (**ძირითადი ცოდნა ბირთვული საფრთხეების შესახებ: ჩერნობილისა და ფუკუშიმას გაკვეთილები**) and suggested for vide circle of scientists, school teachers, students, NGO-s etc. Many remarks and suggestion have been received and introduced into initial version.
The Chisinau Centre has translated the booklet into the official language (**CUNOŞTINŢE DE BAZĂ DESPRE PERICOLUL NUCLEAR: LECŢIILE CERNOBÎLULUI ŞI FUKUSHIMEI**) and has distributed it to different social strata, experts from different fields, decision-making authorities, student environment, pupils, etc. for identifying constructive proposals able to contribute to book's quality improvement and availability.
The San Marino Centre staff produced the translation of the book in Italian (**CONOSCENZE DI BASE SUL RISCHIO NUCLEARE: QUELLO CHE ABBIAMO IMPARATO DA CHERNOBYL AND FUKUSHIMA**). It was not only a "passive" translation job as specific and knowledge based competencies on nuclear sciences were needed.
The Rabat Centre has also prepared an Arabic version (من تشيرنوبيل و فوكوشيما المعارف الأساسية للخطر النووي الدروس المستفادة) of the booklet.

Work package 3 (prepared by TESEC, ECRM, ISPU, CEMEC, centres in Azerbaijan, Georgia, Moldova, Bulgaria, Morocco, Turkey):
Description:
Organize national workshops for discussion of national texts and collection of comments, questions and proposals from different categories of public (journalists, decision makers, teachers, students, and others) at national level, sending them to TESEC for compilation and merging of proposals from different countries.
Associated deliverables:
National and international comments and proposals to final version of Booklet in 12 languages, with contribution of journalists, decision makers, teachers, students, and others.

The TESEC received comments and proposals from Ukraine, Armenia, Azerbaijan, Bulgaria, Georgia, Moldova, Russia, San-Marino, Turkey and USA.
All counterparts underlined that:
1. people need such book
2. Book is understandable for the majority of people

There were also some proposals to correct the text:
- To change symbols of elements to names
- To shift some tables to Attachments
- To add more about radioactive waste
- To add about different types of reactors
- More details about causes of Chernobyl accident
- To shift to attachment some details about structure of matter

- To add about decontamination
- To add more examples of radiological accidents

Some proposals will be reflected in the corrected text and published in TESEC website http://www.tesec-int.org/English1.htm

Armenia

The existence of a Nuclear Power Plant in the country explains a great interest of Armenian partners to participate in the the Project in order to benefit from valuable international practices by the other states participating and of course by the Coordinating centre, TESEC. Different stakeholders (Head and specialists of the Protection of population Department of the Ministry of Emergency Situations, the specialist in charge of the Armenian Nuclear Power Plant , the IAEA national expert , teachers and students of the State Academy of Crisis Management, journalists, etc.) provided comments, suggestions and questions concerning the booklet. A part of comments was prepared, drawn on the results of discussions held with relevant groups of users, in particular, the students attending the Refresher Course for senior staff and specialists, organized by the State Crisis Management Academy.

All the comments and proposals received were discussed with their authors in order to clarify them before sending to TESEC for compilation and merging with proposals made by other countries. ECRM also prepared more detailed proposals and comments drawn on the detailed analyses of the Booklet, which were also send to TESEC.

It must also be pointed out that some other work addressing the above venue are carried out in Armenia and some relevant developments and rather interesting experiences to share with other partners have been collected. In particular, ECRM is developing a "Manual for the population on how to act when a radiation pollution is real or seems imminent: priorities for action", with some of the clauses of its final variant in English (available in 2013) can serve as additional material to the "Booklet", in particular for sections 8 and 9.

Azerbaidjan

A round table on the topic was held on September 24, 2012 after collecting all responses of the result of discussion and classification of opinions,suggestions, comments and sortcomings by the special commision of experts. The well-known experts and scholars on radiation problems were invited to take part in the discussion. The round table was opened by the Director of the Center H.Ocaqov. He clarified why the EUR-OPA Major Hazards Agreement of the Council pays special attention to this problem. He also noted that the nuclear danger in the background of events happening in the atom objects has increased and that some countries make serious efforts to produce atomic weapons. In such situation, it is necessary that population especially in areas close to nuclear power stations must be ready to struggle and defence. Then he said his opinion to the result of discussions. He noted the majority of participants have highly appreciated efforts of EUR-OPA for financing and Kiev Center for preparation of such important book.

A number of opinions, amendments and additions to the booklet "Nuclear Hazard. Chernobyl and Fukushima: Lessons for public awareness" were proposed by the specialists of the Ministry of Emergency Situations of Azerbaijan Republic, Academy of Ministry of Emergency Situations, Azerbaijan National Aviation Academy, Institute of Geography of the National Academy of Sciences, Agency of Radiation, Isotopes Training Center , Institute of Radiation Problems of the National Academy of Sciences that participated in the discussions. All these proposals and additions were sent to the author of the booklet.

Moldova

The ECMNR collected several reviews from various social categories attesting the importance of the booklet and various concrete proposals to make the book more explicit, more interesting were sent to the Coordinating Centre TESEC.

The ECMNR also organized and held a Scientific and Practical Conference on the topic "LESSONS FROM CHERNOBYL AND FUKUSHIMA"on 28th of November 2012 within "Alexei Mateevici" Pedagogical College from Chisinau. The main goal of the conference was to determine priorities and tools for improving population training, information and defense against the nuclear hazards. This is going to be achieved by the promotion of the best European practices of measure planning in risk situations, of successful cooperation between state authorities, local public administration authorities, NGOs, the general public, following the early information procedure, the iodine prophylaxis and other defense measures.

The participants in the conference (representatives of the Civil Protection and Exceptional Situations Service, local public administration authorities, medical practitioners and other decision-making authorities, didactical staff, students) have discussed and analyzed the content of the booklet.

The rapporteurs have mentioned that practical measures oriented towards the minimization of consequences related to the life and health of the human being and of the environment must be prepared according to the best international practices. The Chernobyl and Fukushima catastrophes have shown that this type of accidents does not recognize any state boundaries. In this regard, an effective solidarity ready to react anytime is needed.

The participants in the conference recommend:

1. To publish and distribute the booklet as soon as possible.
2. To organize training courses for family physicians on the topic Medicine of Radioactive Accidents.
3. To organize the preparation of the most modern and advanced materials for educational institutions and to train the didactical staff for teaching lessons on the "Radiation Hazard" in educational institutions.

ACTIVITIES PLANNED IN 2013 (split by partner)

Working package 1 (prepared by TESEC):

Description:

Compilation and merging of final proposals and comments from different countries and international organizations, developing final text in English and Russian.

Associated deliverables:

Final text in English and Russian

Work package 2 (prepared by TESEC, ECRM, ISPU, CEMEC, centres in Azerbaijan, Georgia, Moldova, Bulgaria, Morocco, Turkey)*:*

Description:

To develop final texts in 10 languages.

Associated deliverables:

Final versions of Booklet in 12 languages, with contribution of journalists, decision makers, teachers, students, and others.

Work package 3 (prepared by TESEC, ECRM, ISPU, CEMEC, centres in Azerbaijan, Georgia, Moldova, Bulgaria, Morocco, Turkey)*:*

Description:

Publishing of final version of Booklet in 12 languages, with contribution of journalists, decision makers, teachers, students, and others.

Associated deliverables:

Booklets in 12 languages.

Work package 4 (prepared by TESEC, ECRM, ISPU, CEMEC, centres in Azerbaijan, Georgia, Moldova, Bulgaria, Morocco, Turkey)*:*

Description:

Dissemination of Booklets in 11 countries, organizing of training course for teachers in 11 countries

Associated deliverables:

Better public awareness on nuclear and radiological hazard in 11 countries.

FINANCING FOR 2013

EUR-OPA : € 26000

Split between partners : € 8000 for TESEC
€ 1500 for ECRM
€ 2500 for ISPU
€ 1500 for CEMEC
€ 1500 for ECNTRM
€ 2500 for AFEM
€ 1500 for each one (Azerbaijan, Georgia, Moldova, Bulgaria, Morocco)

COASTAL AREAS MANAGEMENT AGAINST SEISMIC AND TSUNAMI RISKS: SOCIO-ECONOMICAL IMPACT

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 3.C. Awareness initiatives

TITLE OF THE PROJECT: VULRESADA: Coastal Areas Management against Seismic and Tsunami Risks: Socio-Economical Impact. Vulnerability and resilience evaluation and adaptation of the cities of Cascais and Lagos (Algarve) in Portugal, Tanger and M'dieq in Morocco.

TARGET COUNTRIES: Portugal, Morocco and Agreement countries ith coastal areas

PARTNERS INVOLVED:

COORDINATING CENTRE : CERU Lisbon, Portugal

OTHER CENTRES: CEPRIS Rabat, Morocco,

OTHER PARTNERS : IDL, PORTUGAL

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :

• Mise en forme des connaissances scientifiques des aléas pour les besoins de prévention, en intégrant les composantes prise de décision, éducation et sensibilisation;
• Développement de modèles numériques pour la génération du tsunami, la propagation et l'amplification côtière;
• Préparation de cartes d'inondation pour les zones sélectionnées pour comprendre des effets possibles sur ces régions;
• En utilisant le modèle de la vulnérabilité, les catastrophes enregistrées, l'identification de leurs caractéristiques et de la capacité à récupérer des individus en relation avec le concept de résilience, nous serons en mesure de démontrer la variation géographique de la composante sociale de la vulnérabilité ainsi que le spectre des causes relatives ;
• Publication de manuels et de dépliants.

Specific yearly objectives:

2012 :

2013 :

WP 1 : Séminaire : Présentation de l'Etat d'avancement des travaux et planification des travaux pour la seconde année
WP 2 : Plans d'action pour améliorer l'adaptation des villes aux aléas géologique, sismique et tsunamique.
WP 3 : Diffusion des résultats de l'étude et les présenter sous forme pratiques à l'utilisation pour engager les parties prenantes dans la prise de décisions
WP 4 : Séminaire itinérant de présentation publique des résultats du Projet

EXPECTED RESULTS

2012:

Sensibilisation et lancement du Projet auprès de la communauté scientifique, des autorités et de la population cible.
Synthèses géosciences: Tavaux scientifiques multidisciplinaires relatifs au Projet.

2013:

Engager la coopération avec les autorités locales pour des campagnes d'information et éducation publique. Engager la coopération avec les autorités locales et régionales pour développer des plans d'adaptation des villes aux aléa sismique et de tsunami et pour réduire les risques associés. Publication de dépliants.

RESULTS OBTAINED PREVIOUSLY (if any)

Il y a déjà quelques années que l'IDL (Université de Lisbonne) collabore avec le CNRST au sujet d'études de tsunami. Deux thèses de doctorat ont été présentées à l'Université de Ibn Tofail (Maroc) avec la co-supervision d'un chercheur du Portugal:
Omira, Rachid (2010) "Modelling tsunami impact in NW Marocco and SW Iberia"
Kaabouben, Fatima (2010) "L'impact des tsunamis sur les côtes du Maroc"

RESULTS OBTAINED IN 2012

Work package 1 (prepared by CERU, CEPRIS)

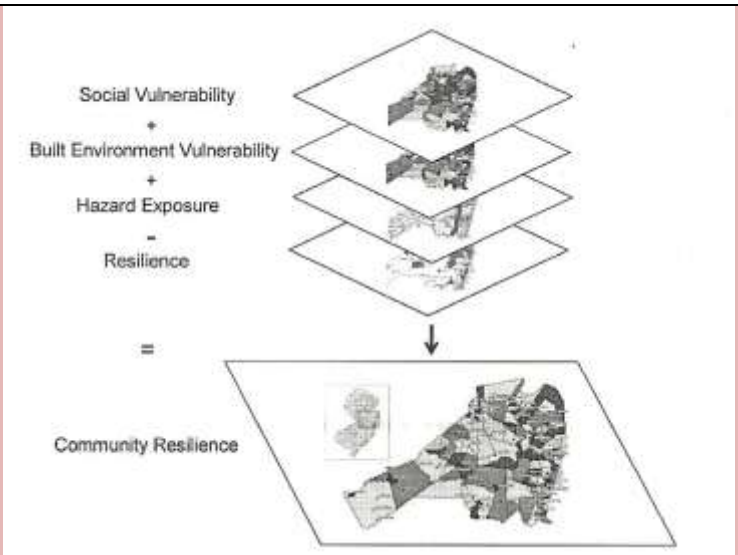
Description:

Présentation du programme de travail pour les deux centres, méthodologies et approches des participants ;
Adoption d'une approche commune pour l'évaluation de la vulnérabilité ;
Lancement des travaux autour des quatre villes.

Elaboration de Brochure du Projet
Proposition du lieu : Cascais ou Lagos (Portugal)
Frais d'organisation pour le CERU
Prise en charge des Intervenants du Maroc
Livrables associés:
Rapport sur les principales décisions prises pendant le séminaire. Draft de la brochure du projet

The kick-off meeting of the project (Vulresada Seminar) took place in Cascais (Portugal), from 18 to 20 of June 2012, with the support of Cascais Municipality. During this seminar the main objectives of the VULRESADA project were addressed and the major issues discussed. The seminar was attended by 20 persons among researchers (geophysics, geologists, engineers, sociologists, etc.), officers and stakeholders that have an active role in the many aspects of risk mitigation in costal zones, 17 from Portugal and 3 from Morocco. The Portuguese participants belong to 7 different institutions from Lisbon, Coimbra, Cascais and Lagos, and the Moroccan participants belong to the CEPRIS (2) and the University Mohamed V – Rabat (1). Twenty-five presentations were performed (10 from Morocco and 15 from Portugal), according to the established program.
Portugal and Morocco share a common source of destructive earthquakes and tsunamis: the Gulf of Cadiz, where the 1st November 1755 event was generated. The state-of-art from the evaluation of the seismic hazard and tsunami hazard for both countries was presented and discussed. The methodologies and the approaches proposed by both participants concerning the estimation of the building and infrastructure vulnerability, as well as the social vulnerability were presented.
The use of geographic information systems (GIS), with all associated tools, on the management of natural risks and aid to decision, the actual operational technologies of information, the vulnerability and resilience of the physical phenomena and social factors, and the urban and heritage vulnerability of the historical centres were also discussed.
The seminar ended with the discussion on the way to implement this project in the 4 selected towns: Cascais and Lagos (Portugal), Tanger and M'Dieq (Morroco)
During this first year of the project the main objective was to compile all the available information, to analyse it and to get complementary information, in order to perform the necessary geophysical studies concerning mainly tsunami impact (inundation maps). Vulnerability studies (urban, heritage and social) were also initiated, as well as contact with the local authorities in order to get their support on the field experiments and for the purposes of prevention, education and awareness of the local population.
A first draft of the project brochure was prepared.

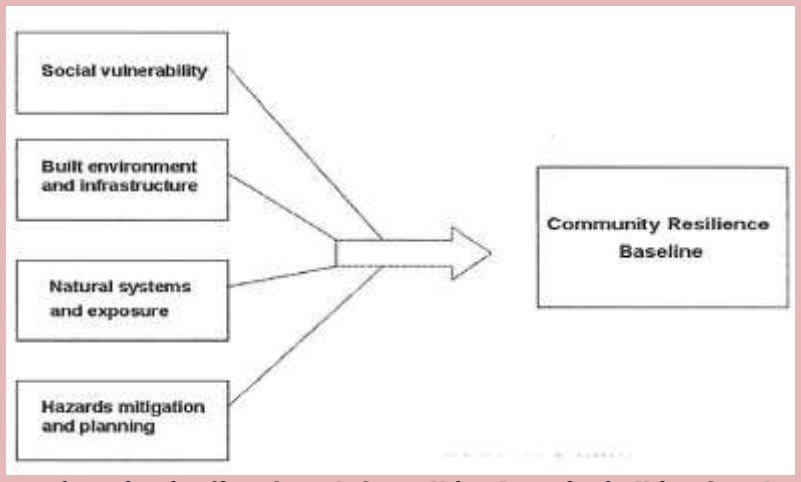
Vulnerability and resilience methodology
Understanding resilience as the capacity of socio-ecological systems to support disturbances and reorganize, the relationship between resilience and planning is very relevant. The development of a set of core indicators that measure social vulnerability is the key to the improvement of resilience and sustainability of coastal communities. The development of coastal resilience indicators is in its infancy and at present is no standard methodology or framework for conducting baseline assessments of resilience.
The identification of metrics and standards for measuring resilience is still a challenge. This project aims at exploring the replication of a methodology developed in Hazard and Vulnerability Research Institute (HVRI), University of South Carolina - USA for a set of indicators to measure characteristics of community based on their potential resilience. By setting the basic conditions, it becomes possible to monitor changes in resilience from time to time in certain locations, allowing a comparison between different places. We will apply the model as a proof test for two Portuguese coastal cities: Lagos and Cascais. The impacts of natural disasters within this region are widespread and vary extensively: different natural hazards can be identified to these cities but this project only concerns the characterization of geological hazards taking into consideration past occurrences and the probability of future events due to the regional geologic and geophysical conditions.
Cutter and colleagues (Hazard and Vulnerability Research Institute - HVRI, University of South Carolina) using the model of disaster places (DROP model – Disaster Resilience of Place), suggests that social vulnerability is a multidimensional concept that helps to identify those characteristics and experiences of communities (and individuals) that allow them to respond and recover from natural disasters, and in this sense it is not disconnected from the concept of resilience:



Community resilience

Since it is often difficult to measure resilience in absolute terms, we use a comparative approach and employ variables as proxies for resilience. Two considerations for variable selection:
1) justification based on the extent literature on its relevance to resilience; and
2) availability of consistent quality data from national data sources.

The DROP model presented the relationship between vulnerability and resilience in a manner that is theoretically grounded and amenable to empirical testing.
There are four key set metrics that are necessary to build profile or baseline of community resilience:



Community resilience baseline(from Susan L. Cutter, Urban Paper for the Urban Coast Institute, s.d.)

DROP framework explicitly focused on antecedent conditions, specifically those related to inherent resilience.
Disaster impacts may be reduced through improved social and organizational factors such as increased wealth, the widespread provision of disaster insurance, the improvement of social networks, increased community engagement and participation, and the local understanding of risk as well as through improvements in resilience within natural systems.
There is consensus within the research community that resilience is a multifaceted concept, which includes social, economic, institutional, infrastructural, ecological, and community elements.
Based on these findings, our index comprises these subcomponents that were then further defined for analytic and comparative purposes. The systematic development of such locally-based vulnerability assessments provides the basic understanding of the risk and its likely impacts and is the starting point.
Once we know where and how communities are vulnerable, strategies for improving their resilience can be targeted more effectively.
It would be of great interest to use and test the DROP model in Cascais and Lagos to provide an approach for establishing a hazard resilience measurement baseline that could serve as a benchmark for monitoring progress towards disaster reduction.
To achieve these objectives, it is necessary to develop a methodology for historical reconstruction of socio-

demographic variables used for the Census. Thus, it is necessary to monitor changes in levels of social vulnerability (total) and dimensions that contribute to it (longitudinal analysis).
In addition, the analysis should be planned for the future, using analog data to develop realistic scenarios for the future of social vulnerabilities to reduce the risk. This methodology may also be useful to compare the levels of vulnerability of several coastal (and urban) areas elsewhere.

Work package 2 (prepared by CERU, CEPRIS):
Description:
• Analyse exhaustive de la nature géologique et topographique des quatre sites dans le contexte géodynamique régional ;
• Évaluation de l'aléa tsunami : localisation des principales sources sismiques tsunamigènes relatives aux quatre villes. Elaboration d'études de scénario et d'aléa tsunami ;
• Analyse/détermination de la bathymétrie des 4 villes
• Cartes d'inondation ;
• Evaluation de l'extension urbaine actuelle et de la vulnérabilité des infrastructures urbaines et sociales présentes sur les sites face aux tsunamis;
• Elaboration des cartes de vulnérabilité sous format SIG ;
• Présentation de la situation aux institutions nationales et locales dans les domaines de l'urbanisme, de l'aménagement d'infrastructures, et de la prévention des désastres naturels.
Livrables associés:
Rapport des activités avec les principaux résultats: cartographies géologique, cartes d'inondation et cartes de vulnérabilité pour les 4 villes

As the state of research progress is not the same in the two countries, different actions were undertaken to develop and implement the project in the four towns. Detailed description can be found in the technical report of both Centres.
Cascais
- Geological analysis in the context of the geodynamic environment
- Evaluation of tsunami risk – definition of the main tsunami sources
- Elaboration of tsunami scenarios and estimation of potential inundation maps

Lagos
- Revision of the geologic and geophysical studies performed some years ago
- Revision of the tsunami risk and the inundation maps performed for some selected scenarios

Tanger
- Acquisition of numeric data concerning the topography and hydrography
- Acquisition of numeric orthophotomaps and aerial photos
- Acquisition of recent bathymetric data with 10cm of resolution
- Elaboration of a new digital terrain model (DTM)
- Building surveys on the coastal areas and inside the two port zones
- Building digitalization and preliminary classification

For M'Dieq no field survey was performed up to now, but the project was already promoted by the local and regional authorities.
All the work was developed in collaboration and with the support of the municipalities of the four towns.
Collaboration between the two Centres, concerning tsunami propagation and elaboration of inundation maps, was performed in terms of a short stage of one Moroccan researcher in Portugal (Instituto Dom Luiz – IDL collaboration)

ACTIVITIES PLANNED IN 2013 *(split by partner)*
Working package 1 (prepared by CERU, CEPRIS):
Description:
Organisation de Séminaire pour la présentation de l'Etat d'Avancement des travaux à Tanger (Maroc): Frais d'organisation pour le CEPRIS. Prise en charge des Intervenants du Portugal.
Livrables associés:
Rapport sur l´Etat d'avancement des travaux
Work package 2 (prepared by CERU, CEPRIS):
Description:
• Evaluation de l'extension urbaine actuelle et de la vulnérabilité des immeubles présents sur les sites face aux séismes;
• Campagnes d'information publique et d'éducation à lancer au niveau local ;
Identification comparative des caractéristiques sociodémographiques des lieux d'étude, qui contribuent à l'identification de la vulnérabilité sociale, inhérente au risque. Ainsi que l'identification des facteurs de protection et résilience des populations des lieux d'étude.
• Développer une méthodologie de reconstruction historique des variables sociodémographiques utilisées pour les recensements.
• Surveiller les changements des niveaux de vulnérabilité sociale (totale) ainsi que les dimensions qui contribuent pour

cela (analyse longitudinale).
• Caractérisation du Patrimoine (typologies/co-existantes, des systèmes structurelles altimétrie/volume ; états de préservation/détection des fragilités des immeubles traditionnels ; usage) exposé aux séismes
Livrables associés:
Rapport sur les activités développées et principaux résultats
Work package 3 (prepared by CERU, CEPRIS):
Description:
• Coopération avec les autorités nationales et locales responsables pour l'aménagement et le développement des quatre sites ;
• Organisation d'événements locaux et régionaux de validation et de dissémination des résultats de l'étude.
• Établissement des normes génériques pour assurer la résilience des éléments du Patrimoine.
Livrables associés:
Manuels et dépliants publiés. Rapport sur les principales conclusions du projet
Work package 4 (prepared by CERU Lisbon, Portugal, CEPRIS Rabat, Morocco):
Description:
Séminaire itinérant de présentation publique des résultats du Projet entre les 4 villes (Portugal et Maroc)
Livrables associés:
Rapport sur les séminaires présentés autour des 4 villes

FINANCING FOR 2013

EUR-OPA : € 27000
Split between partners : € 9000 for CERU Lisbon, Portugal
€ 18000 for CEPRIS Rabat, Morocco
Other contributors: € 5000 from Lagos Municipality

EARTHQUAKE PREPAREDNESS OF SCHOOL STUDENTS AND POPULATION USING SCIENTIFIC KNOWLEDGE FOR PUBLIC MULTIMEDIA INFORMATION

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 3.C. Impact of climate change and environment issues

TITLE OF THE PROJECT: Earthquake preparedness of school students and population using scientific knowledge for public multimedia information in areas shaken by Vrancea, Romania, intermediate seismogenic source. case studies of specific vulnerability and damage in Romania and transboundary impacts on buildings in Moldova, Ukraine and Bulgaria.

TARGET COUNTRIES: ROMANIA, R. MOLDOVA, UKRAINE, BULGARIA

PARTNERS INVOLVED:

COORDINATING CENTRE : ECBR Bucharest, Romania

OTHER CENTRES: ECMNR Chisinau, Moldova , ECRP Sofia, Bulgaria , TESEC Kiev, Ukraine

OTHER PARTNERS : ECPFE Athens, BE-SAFE-NET Cyprus

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013:

DISSEMINATION OF EARTHQUAKE PREPAREDNESS KNOWLEDGE FOR SCHOOL STUDENTS AND POPULATION USING PUBLIC MULTIMEDIA INFORMATION IN AREAS SHAKEN BY VRANCEA, ROMANIA, INTERMEDIATE SEISMOGENIC SOURCE.

Specific yearly objectives:

2012:

Gathering knowledge on specific damage and vulnerability of buildings after past great Vrancea earthquakes and lessons for earthquake protection of students and citizens. Comparison with the experience of Greece and Cyprus.

2013:

Study of contents and dissemination means required for earthquake preparedness and education materials, to take into account the local conditions of each country affected by Vrancea source and validation according to experience of Greece and Cyprus.

EXPECTED RESULTS

2012:

Reports about damage and vulnerability of buildings and population in Romania, Moldova, Ukraine and Bulgaria

2013:

Preparation of materials for earthquake education od students and citizens, to be posted on websites of EUR-OPA Specialized Centers of partner countries and dissemination of other materials. Evaluation and improvement based on experience of Greece and Cyprus.

RESULTS OBTAINED PREVIOUSLY (if any)

Research and dissemination activities in support of rehabilitation programs, earthquake education seminars and courses in Romania, R. Moldova, Bulgaria and Ukraine

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECBR, ECMNR, ECRP, TESEC)*:*

Description:

Organize a working committee with experts from partner countries and set-up a content for a preliminary report on the scientific, technical and management issues and tasks of each center. The Committee works by INTERNET.

Associated deliverables:

D1-Committee tasks and content of a report with scientific, technical and management issues.

D2 Kick-off Meeting of all partners at ECBR Bucharest to discuss the tasks

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Work package 2 (prepared by ECBR, ECMNR, ECRP, TESEC):

Description:

Gathering data on specific damage and vulnerability of buildings after past great Vrancea earthquakes and lessons for earthquake protection of students and citizens in Romania, R. Moldova, Bulgaria and Ukraine.

Associated deliverables:

Report with scientific, technical and management issues from Romania, R. Moldova, Bulgaria and Ukraine.

ECBR

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ECMNR

For project fulfillment for the period of the year 2012 we laid stress on:

- short-term objectives ;
- promotion of the project involving Centres, (more frequently CSLT Sofia, Bulgaria) and other central and local authorities from the Republic of Moldova;
- development of a policy of active communication

During activity fulfillment, taking into account the common aim, we have carried out these activities in a way that would allow us collecting as many as possible ideas, ensuring communication and an exchange of experience in this respect as to scientific and technical information about hazards and vulnerability, the identification of solutions for improving society's survivability against earthquakes.
In this respect, the selected information related to risk mitigation has been analyzed and developed with the participation of the scientists from this field, of the experts and of the central and local decision-making authorities.
In result of the earthquakes with the epicentrum in Vrancea in 1977, 1986 and 1990 and with the amplitude of 9 on the Richter scale the most affected buildings were those from Chisinau. We contributed to risk area identification and map elaboration according to the mutual consent of the municipal authorities. We worked upon concrete proposals and measures for mitigating the vulnerability of these areas of risk. In result of the polls made at different social levels, we found out that both the population and the persons in charge had scanty knowledge about this. In regard thereto, we sensitized the improvement of comprehension of the seismic risk by people and society, pursuing the aim of focusing the political attention on risk control. We proceeded to training improvement through a correct and attentive examination of the social and ethical aspects, paying attention to the vulnerable population from Chisinau and from the republic. With this object in mind, we organized and fulfilled training courses related to risk management within university classes for students. Considering the fact that we planned to use the knowledge with the aim of mitigating vulnerability, we proceeded to gathering information and to carrying out a round table. We should mention that Centre's initiatives sensitized both municipal authorities and a great part of the public opinion.
The Centre gathered as well information connected to the effects and damages provoked to the Republic of Moldova in the past by the earthquakes from Vrancea region.
The Centre has investigated the reports on the damages caused to the Republic of Moldova by the earthquakes from Vrancea region in the past and the current state of knowledge, training classes and needs concerning population's preparedness to an earthquake as well.

Round Table: ANTI-RISK EDUCATION IN THE EVENT OF AN EARTHQUAKE
Chisinau, Moldova, 26-27 December 2012
Conclusions
The round table was fulfilled with the aim of performing the project *„Earthquake preparedness of school students+population using scientific knowledge for public multimedia information in areas shaken by Vrancea, Romania, intermediate seismogenic source (case studies on buildings in Moldova, Ukraine, Bulgaria)"* regarding the promotion of the earthquake risk prevention culture and the application of anti-risk education activities in schools. The earthquakes with the epicentrum in Vrancea are still a situation of risk. The analysis of the earthquakes from 1977, 1986 and 1990 with the amplitude of 9 on the Richter scale, with the epicentrum in Vrancea, shows that they destroyed in a catastrophic way the buildings form Chisinau. In this regard, Centre's contribution made it possible for the local public authorities and scientific institutions to make common efforts for mitigating the seismic risk in Chisinau city.
Alexandru Boldesco, Chief Engineer of the General Department of Architecture, Urbanism and Land Relations of Chisinau Municipal Council, who was present at the round table, mentioned that the concept of a durable development determines a permanent reassessment of the relation between the human being and nature and asserted that the solidarity between generations is the only viable option for a long-term development.
For implementing this concept at a local level, the following researches have been developed through the common efforts of Chisinau Municipal Council, Chisinau City Hall, General Department of Architecture, Urbanism and Land Relations of Chisinau Municipal Council in collaboration with the Institute of Geology and Seismology at the Academy of Sciences of Moldova and the European Centre for Mitigation of Natural Risks:
1. Feasibility Study: „ Elaboration of engineering and technical protection measures for increasing seismic security of building territories and sites from Chisinau Municipium" (under the action of penetration of water into the basement and seismic actions)
The territory of Chisinau city has at present the total area of about 130.0 km^2, the maximal length of about 14 km., width -12 km. Chisinau is situated in the meadow of Bic River, on its left and right banks. The maximum pluvial precipitations with the probability of 1% attain 220 mm per day. The city is located on a territory with complicated geological and hydrogeological conditions and is in **the range of coverage of Vrancea seismic region.** The dwelling stock constitutes about 14,0 mln. m ^{2} (about 70% from country's stock). The most intensive building period was from 1966 up to 1989. For instance, at the end of the 80's, residential houses/blocks with the area of about 400 thousand m^2

(total area) were put in commission yearly.
This building dynamics had a negative influence on the natural and geological environment in result of the deterioration of the natural equilibrium of groundwater and of the conditions of its circulation. The greatest part of flooded territories from 1966 up to 2020 (forecasted year) amounts to 1803,1 ha. The period from 1966 until 1985 is the most intensive building period and represents 72,5% of the surface of flooded territories. The maximum increase in Botanica Sector constitutes 704,6 ha (39,1%), and the minimum increase is in Centru Sector - 174,5 ha (9,6%), where the built-up areas were minimal, fact confirmed by the priority thesis of anthropogenic loads for the flooding processes of the urban built-up territories and of the need for forecasting and engineering preparation of territories for their distribution for building aims.

The increase of flooded territories (groundwater level up to 5,0 m), ha			Total
1966-1985	1986-2002	2002-2020	
1308,3 (72,5%)	408,2 (22,7%)	86,2 (4,8%)	1803,1 (100%)

We have made an extensive analysis within the abovementioned study as to the area of the territory of the city that was flooded in the period from 1965 up to 2002. We have elaborated the groundwater pattern and the forecast of groundwater level dynamics up to 2020.
We have developed the groundwater pattern for Chisinau city and we have made the evolution forecast for 2020, which can present an insignificant increase, and namely 0,42-0,65 m or 2,3-3,6 cm per year; in general, the statistical interval of groundwater level rise "F" changes from 0,0 up to 1 m in 15 years. The temporary and local flooding can happen only within the boundaries of small territories during the creation of a temporary horizon, especially when there are intensive precipitations. We have made the geotechnical zonation of the territory. The outlined geotechnical regions differ according to their composition and properties of the quaternary soils, as well as according to the presence of some unfavourable factors as landslips, etc. We have developed a modern database describing the geologic and hydrogeologic environment of Chisinau city. The database contains information about 2376 wells drilled in the territory of Chisinau city recently. For the operational administration of the database, we have developed the "GEOTECH" program.
On the grounds of the results of a complex analysis and of the generalization of geological, geotechnical, instrumental and calculation data, we have developed the seismic microzonation map of the territory Chisinau city at a scale of 1:10000 for an area of 122,3 sq.km. depending on the value of the forecasted seismic oscillation intensity, the studied territory being divided in two areas: of 7 and 8 degrees MSK, and namely:
The 8-degree area constitutes 37% (45,3 km) out of the total area of the city.
The 7-degree area constitutes 63%, being associated with territories having a level of more than 80-120 m.
The seismically unfavourable sectors for buildings are indicated as well on the seismic microzonation map of Chisinau city. The study concerning the seismic microzonation of the territory of Chisinau city was fulfilled through the common efforts of Chisinau Municipal Council, Chisinau City Hall, General Department of Architecture, Urbanism and Land Relations, the Institute of Geology and Seismology and the European Centre for Mitigation of Natural Risks.
2. The development and monitoring of the geological and geotechnical database of Chisinau city.
As shown before by the feasibility study „Elaboration of engineering and technical protection measures for increasing seismic security of building territories and sites from Chisinau Municipium" (under the action of penetration of water into the basement and seismic actions), information about 2376 wells was introduced in the database.
Within the abovementioned study, the database that had been created previously was considerably developed. Currently, this database contains data about circa 12 thousand wells and all this information is processed through Geotech program. The geological database of Chisinau city with a set of special maps represents already the data that are necessary for the development of design works in the field of urbanism and land improvements; this database allows creating a modern geotechnical service and continuous monitoring. The operation of this service has other social and economic effects, too.
As a result of the efforts made for the initiation and fulfilment of the abovementioned projects, the elaboration and approval of new normative acts in the building field was possible:
- "Geophysics of hazardous natural processes"
- Safety technique of the territory, buildings and structures against hazardous geological processes. General information
- Buildings in seismic areas. General guidance
This study contains as well the compartment "**Seismic risk assessment of the territory of Chisinau city**".
This kind of project was developed for the first time in Chisinau city.
The roundtable participants laid stress on the decreased competency level of the population, including that of the didactic staff as to the safety rules and organization of urgent actions for saving and protecting children in the event of an earthquake. Currently, the popularization of knowledge about the nature of the earthquakes and the provision with methodical support for didactic staff training and for skill development for the creation of an appropriate behaviour during an earthquake and in the period that follows it have a particular importance.
The subject ANTI-RISK EDUCATION IN THE EVENT OF AN EARTHQUAKE excited a vivid interest during the roundtable at which representatives of the central public administration, of the preschool, school, university and academic environment took part (41 participants).
According to the roundtable agenda, the following reports have been listened to: -

- The opportunity of realizing what is the seismic risk (rapporteur: A. Bantuş, Dr., University Lecturer, Director of the ECMNR*)*
- Lessons learned from the earthquakes from the recent period (rapporteur: Alexandru Oprea, Head of the Civil

Protection Department of the Ministry of Internal Affairs)

- The common efforts of the local public and scientific authorities for the mitigation of the seismic risk in Chisinau city. (rapporteur: Alexandru Boldesco, Chief Engineer of the General Department of Architecture, Urbanism and Land Relations of Chisinau Municipal Council)
- Efficient solutions for organizing training classes in educational institutions for earthquake risk mitigation (rapporteur: Vladimir Guţu, PhD, University Lecturer at Moldova State University)
- The experience of the Republic of Moldova in protecting population against earthquakes (rapporteur: Vitali Mutaf**,** lieutenant colonel of the s/s, Deputy Head of the Civil Protection Department)
- Anti-risk training of pupils in schools – a solution for improving their resistance against potential earthquakes (rapporteur: Kolio P. Kolev, Director of the European Centre for Risk Prevention, Sofia, Bulgaria).
- The efficiency of the current system of training local public administration authorities on issues of prevention and liquidation of earthquake consequences. Issues and proposals. (Rapporteur: Victor Mirza, Major of the s/s, Deputy Head of the Republican Training Center)
- Enhancement of the earthquake resistance capacity through training, education and knowledge - (Rapporteur: Dimitar Yonchev, Professor, Director of the Center for Security, New Bulgarian University)
- Training system administration for local earthquakes-(rapporteur: Veaceslav Pavlov, Academy of Sciences of Moldova)
- Psychological involvement in the educational process of preventing consequences of the earthquakes-(Rapporteur: Angela Potâng, Dr., Associate Professor)
- Implementation of educational activities in schools as to seismic risk mitigation. (Rapporteur: Larisa Bantuş, Dr., Associate Professor)

debates, the exchange of opinions and analysis, the following objectives were fulfilled and proposed:

- The development of an active communication policy.
- The promotion of the seismic risk prevention culture by implementing educational activities on seismic risk management in schools.
- To disseminate knowledge about the nature of earthquakes and to provide methodical support for didactic staff training and development of skills for the creation of an appropriate behavior in situations of seismic risk.

In result of a thorough analysis and exchange of views, the following conclusions took shape:

1. It is appropriate to improve the comprehension of the seismic risk by pupils, students and the society as a whole in order to focus the political attention on its management, too.
2. The inclusion of anti-stress skills and of an appropriate behavior in the event of an earthquake as an optional or extracurricular subject.
3. Introducing a unit at the Moldova State University- the education in emergency situations - at the Faculty of Psychology and Sciences of Education, the graduates/representatives of which could then go into schools to inform and prepare children and didactic staff.
4. The collaboration between psychologists and specialists from SPC and Emergencies Situations in order to improve the psychological methods of prevention and mitigation of earthquake consequences.
5. To contribute to the development of an active communication policy between European states regarding the preparation of students and people who use scientific knowledge about earthquakes in the shaken areas from Vrancea.
6. To contribute to changing population and especially teachers' attitude towards the need to know and create correct behavioral skills of automated type: before earthquake, during and after the earthquake and the combination with child-centered education.
7. To organize trainings in educational institutions, drawing contests, information, national and international competitions, to organize exhibitions about earthquakes and encouraging participants more frequently.
8. As well, in result of the debates, it was concluded that the introduction of new subjects in the school curriculum is not appropriate because the school program is overloaded, but new objectives and skills might be introduced in other subjects related to the Education for a Healthy Lifestyle, Civil Protection, Safety Management in Emergencies, Life Skills, and especially within educative classes. Practical lessons and periodic seminars for teachers with the organization of simulations can be organized in collaboration with the Civil Protection Department.

The roundtable participants considered that this type of work with the financial support of the Council of Europe is especially useful, important and efficient and they supported unanimously:

1. Making suggestions for conducting studies in the field of highly qualified didactic staff training for natural risk management.
2. The popularization of the safety rules in case of earthquakes.
3. The development of conceptual reference points concerning the education strategy in the field of protection against earthquakes in educational institutions.
4. The development of educational principles in the field of protection in the event of earthquakes:
   - The adjustment of anti-risk education to pupil's personality.
   - Carrying out the educational process against the background of the collaboration relations between the pupil and the teacher.
   - The timely transparency and notification of all the persons concerned (pupils, parents, teachers, students, technical staff, etc.) concerning the seismic risks.
   - The use of different strategies and technologies concerning the development of an appropriate behaviour to pupils, students, teachers, technical staff in the event of an earthquake.

- The creation of a behavioural skill of automated type: before the earthquake, during the earthquake and immediately after the earthquake.

The roundtable participants have highly appreciated this activity organized by the European Centre for Mitigation of Natural Risks, qualifying it as a successful and efficient one, having a long-term effect in the mobilization and bringing together of the persons interested in opening up, participating and collaborating in the field of seismic risk prevention culture.

TESEC

In the western areas of Ukraine (from the XVII centuries up to our time) earthquakes are generally characterised by the depths of fires (h) 2-10 km and magnitudes (M) <5.5. Due to the small depth these earthquakes cause local vibrations of soil surfaces with intensity of 7-7.5 points. The same vibrations are felt in Zakarpattya due to the earthquakes deeper (h=35 km) and bigger in size (M=6.8) with fires located in Romania (Pishkolz) at the distance of about 60 km from the Ukrainian borders. In Prykarpattya the biggest authentically described earthquake took place in 1875 near the region Velyki Mosty (in the Lvov region). It was characterised by the magnitude M=5.3, fire's depth of h=19 km and was felt in the epicentral zone with the intensity of 6 points.

A considerable part of the Ukrainian territory is under influence of the undercrust earthquakes, which take place in the Vranch zone in Romania (area of the joint between the Eastern and Southern Carpathians). Fires of the earthquakes, which are capable to become the reason of macroseismic manifestations on the territory of Ukraine, are located in the mantle at depths ranging from 80 to 190 km. Maximum magnitudes of earthquakes in this zone reached 7.6 points. Due to the big depths and magnitudes, earthquakes of the Vranch zone become apperent on the huge territory: from the South of Greece to the North of Finland.

On the epicentres' map the earthquakes' fires in the Vranch zone are presented since XI century with magnitudes over 3.5 points. Isoseists of the strongest earthquakes in the Vranch zone are reliably established for the last two centuries. For the construction of isoseists the published materials were used, and for the earthquakes of 1977-1990 - authors' data.

Seismicity of the Crimean-Black Sea region is defined by the epicentres of the earthquakes located in the water area of the Black sea, near the Southern coast of Crimea which are characterised by the highest indicators throughout the Ukrainian territory: magnitudes up to 6.8. On the epicentres' map the Crimean earthquakes are presented with magnitudes, exceeding 2.0, during supervision period between the I century BC up to the present time. On the flat part of Crimea and the Sea of Azov fires of earthquakes with magnitudes over 1.0 are shown.

It is possible to consider the delta of Danube as separate seismic area. Here throughout the historical times earthquakes with maximum magnitude of about 7 points took place, which together with Vranch earthquakes' zone represent serious danger to the territory of Odessa region.

In the central part of Ukraine, in particular within the Ukrainian board, for the last centuries only several earthquakes with small depths (5-10 km) and low magnitudes (M = 3) were authentically fixed. These earthquakes had local character of seismic influence. The strongest earthquake in the Eastern part of Ukraine is considered to be the one in 1913 near Kupyansk (magnitude 3.5, local vibrations with the intensity up to 5-6 points). In the western part of Ukraine, near urban village Mykulynzi in the Ternopil region, earthquake with magnitude of 4 took place on January 3rd, 2002, and had intensity of 6 points in the epicentre with 7 points' effects on the weakened soils. Heretofore the specified territory had indicator of 5 points.

In Ukraine the national network of seismic supervision was created, with 18 seismic and 14 complex geophysical stations. The oldest is the seismic station "Lviv" which was founded in 1899. Digital seismic station "Kiev" was created in 1994 and it is a part of the Global seismic network.

The knowledge on specific damage and vulnerability of buildings in Ukraine after past great Vrancea earthquakes has been collected.

ECPR

After the destructive earthquake in Southern Bulgaria on 14th and 18th April 1928 the next 50 years are relatively quiet with regard to seismic activity. This creates the impression that the seismic danger has disappeared and it is no longer necessary to spend resources in this regard. Even in 1975 scientists started to research the foreign experience in a neighboring country for reduction by 30% of the steel consumption in reinforced concrete construction.

In this atmosphere of relief on March 4, 1977 comes the destructive earthquake with epicenter Vrancea, Romania. The earthquake causes a mass psychological impact on the population in Bulgaria, especially the citizens of the town of Svishtov who have witnessed how just in a few seconds an eight-storey residential flat rotates around its axis and with a terrible bang goes down, covered in clouds of dust /more than 100 people died/. Mass psychosis of fear and insecurity spreads around many towns in Southern Bulgaria and in Sofia.

A Central Scientific-Technical Committee was immediately founded with the task to document and research the earthquake. The committee publishes a preliminary report on the destructions and damages in Romania and Bulgaria. A complex target program was developed for long-term fundamental and applied surveys in the field of seismotectonics, engineering geology, hydrogeology, seismology, seismic mechanics and anti-seismic construction and the related socially-economical problems.

The Bulgarian Academy of Sciences developed a program on seismology and anti-seismic construction, which was to be implemented by 1990. The program was not realized.

The earthquakes in Vrancea and later in Velingrad were followed by urgent tasks for the construction of a network of seismic stations for signalization in case of earthquakes.

1. Tectonics, engineering geology and hydrogeology

After the earthquake from March 4, 1977 the sector of geo-tectonics at the Geological Institute of the Bulgarian Academy of Sciences and the Geological-Geographical Faculty of the Sofia University, together with the specialists from the sector of engineering geology and hydrogeology at the Geological Institute of the Bulgarian Academy of Sciences, examined the connection of the seismic effects with the geological composition of Northern Bulgaria.

Brief data about the effect of center Vrancea in Bulgaria until March 4, 1977. The most significant manifestations of the Vrancea center regularly affect the territory of our country. Almost in every case there are strips of maximum seismic impact with orientation SW – NE. One of them, the steeper direction, is within the range 30-45º (direction Tvarditsa), and the other one is with orientation approximately 70º (direction Yablanitsa). The strips in these directions are well differentiated in Northern Bulgaria. The depth of the earthquake-shaken layers of the upper mantle does not affect the selection of one of the abovementioned directions. During the earthquake from March 4, 1977 in North-Eastern Bulgaria there were also several not wide zones of more substantial damages on the buildings in orientation SE (120º).

By intensity of the earthquake impact of the Vrancea center, documented values close to the values from March 4, 1977 were achieved on November 10, 1940 with the strongest (VIII degree) impact by Forel-Mercalli in Nikopol and VII-VIII degree in Svishtov and Tetovo. Significant VII degree effects were noted along the entire Danube coast from Silistra to Vidin, to the south of Nikopol, Svishtov, Ruse, in the districts of Razgrad and Tarnovo. Weaker, but still significant is the VI degree impact in G. Oryahovitsa, Pleven, Mihaylovgrad, Shipka, the district of Kazanlak, Dalboki (district of Stara Zagora), Starosel (district of Plovdiv) and Letnitsa (district of Godech). Effects of V degree (as per Forel-Mercalli) were noted in Sevlievo, Tvarditsa, between Kazanlak and Karlovo, Koprivshtitsa, Hisar, St. Zagora, Septemvri, Brezovo (district of Plovdiv), Velingrad, Hvoyna, Devin, Ihtiman, Vakarel, Novoseltsi, Sofia, Cherni Vrah, Musala, Dragalevtsi, Pancherevo, Breznik, St. Dimitrov, Razlog, Yakoruda. The abovementioned increased values are probably the result of remobilization of seismic lines in relation to fault disruptions in a northeastern and southwestern direction, as well as in lines with sub-meridian orientation.

1.1. Seismotectonics conclusions

The deformations of the terrain and of the constructions caused by the earthquakes on March 4, 1977 are allocated too unevenly on the area of Northern Bulgaria. Besides in the Danube region, there are also damages far to the south of it. They form strips with various widths, mainly with elongation to SW and SE. Thus, for example, significant effects are characteristics even for the village of Polski Senovets, which is located to the north of Gorna Oryahovitsa, for Razgrad and the district of Razgrad, for the villages Chernolik, Bradvari, Dulovo, etc., each of them located at least dozens of kilometers to the south of the Danube coast. In several cases under analogous engineering-geological and hydrogeological conditions in the same or in different settlements the seismic effects are not the same. With almost the same type of buildings and relatively identical quality of performance it should be assumed that in the allocation of the seismic energy there was a tectonic factor – mainly the fault structures. Together with the southwestern and the southeastern direction in the allocation of the density of the flow of seismic energy, there are also strips with maximum intensities with sub-equatorial orientation. These directions and especially the first two are directions with the largest saturation of faults in the regmatic network of Northern Bulgaria. The southeastern (Berkovsko) direction is particularly characteristic of North-Eastern Bulgaria, where it is represented by several first-rate faults established by a geophysical method. The southwestern direction is covered mainly by the so called Tvardishka fault system (35-45º). But as a whole in our country, as well as in the plan of the entire Southeastern Europe, the isoseistic map of the quake from March 4, 1977 marks a clear elongation with orientation WSW, i.e. along the so called Yablanitsa direction.

The preliminary work map, prepared by us, of the more significant disruptions in Northern Bulgaria there is a series of strips with SE direction. One of them is too wide and long and is followed along the line Tutrakan – Tolbuhin – Balchik (110º). Here we should note the disruptions on the terrain and the buildings, which however are not the same along the entire length of the strip. The seismic impacts sharply decrease from NW to SE. According to information from the population here the initial impact was felt, as if coming from NE. The strip Tutrakan – Balchik is largely covered by the hidden fault Tolbuhin – Dulovo, which in the foundation of the Moesia platform runs into the demarcating zone between the North Bulgarian protuberance and the Tutrakan depression. In the eastern part of the strip, more exactly to the east of the place, where it crosses the Tolbuhin sub-meridian fault, the earthquake impact weakens relatively quickly. A certain shielding role of this fault can be assumed. In the limits of this strip there were seismic lines noted on March 31, 1901, on November 8, 1911 and on August 9, 1912.

To the southeast of the Tutrakan – Balchik strip and almost parallel to it is the Vetovo – Razgrad strip (130-140º). It is relatively shorter, with quite similar degree of destruction, and it's relatively straightforward. The deformations in it are significant. According to information from the population, a strong rocking was felt there in direction NNE – SSW. This strip coincides too well with a depth fault along the foundation, as well as with a photo lineament 140º. This strip has been activated numerous times during other quakes – on September 13, 1903 and during the Razgrad earthquakes from 1913 and 1942.

Further to the southwest there is the next strip between the village of G. Ablanovo and the village of Opaka (120-130º). It is also marked well on the grounds of solid damages of the buildings. They are particularly severe in the crossing of the strip with another northeaster strip – the G. Ablanovo strip. This is in the region of Dve Mogili and the villages Ekzarh Yosif, G. Ablanovo and Trastenik. Within the limits of Dve Mogili there are strips of substantially damages construction sites, which are with the direction of the strip between G. Ablanovo and Opaka. This strip also covers well a fault established in depth with the same orientation. Only its southeastern outskirts coincide with the analogously oriented seismic line in relation to the Razgrad quakes from 1942.

Next is the Yantra strip (150-160º). It is formed along the lower stream of the Yantra River from its mouth up to Gara Byala. The deformations caused by the earthquake to areas of the terrain with various sizes and to the settlements lead to the conclusion that there is a possible hidden fault with direction towards 150º, which contributed to the

transmission of more significant seismic energy. Here there are many manifestations of sand volcanism in the mixed terrace of the Danube River and the Yantra River.

Further to the west there are the Osam (150-160º) and the Gulyantsi – Brashlqnsko (approximately 160º) strips. The first one is along the lower stream of the Osam River. In a series of settlements the damages from the quake are somewhat allocated in girdles with various width, which are identical to the orientation of the strip. In these areas it is assumed that there is a fault with similar orientation. The second strip is mapped according to scarce information, within a very limited length. It is the shortest of all NW – SE strips.

A series of strips with increased disruptions are with SW direction. They are characteristic mainly of the western and partly the middle part of Northern Bulgaria. It refers to the directions, which in a general aspect coincide with the overall elongation of the flow of diffusion of the seismic energy, which is characteristic of the impact of the Vrancea center. There are several such strips: G. Ablanovsko strip (30-40º) in the district of Ruse, coinciding at least partially with the Danube fault and the quite representative wide and long photo lineament bundle G. Ablanovo; the Vitsko strip (approximately 40º), which is covered by the famous Etropole line in these areas; the Koshavo-Vidin strip (45º), well folded in with the Oltensko crypto-fault line. All three strips mark increased seismic impacts. It is characteristic that they are monitored even further in the limits of the country, and in specific cases (for example the Vitsko strip) they even reach Middle Bulgaria.

There are also strips in WSW direction. They lie mainly in the middle part of Bulgaria. The Marten – Tutrakan strip (approximately 80º) is near the Danube coast. Its presence can be related to a fault, for which there is information from the decryption of cosmic photographs.

Besides the abovementioned main strips with directions SW and SE, there are also some secondary strips with sub-equatorial and sub-meridian orientation. Amongst them noteworthy is the sub-equatorial Danube strip. It is monitored from Oryahovo and Nikopol, through Svishtov to the east, up to Dve Mogili. Here there are severe damages of the buildings in the settlements (for example in Svishtov, the village of Krivina), often in areas with analogous direction to the strip, but also an entire series of newly formed cracks and faults with predominant sub-equatorial direction. Many of them are related to landslides activated along the coast. With regard to its orientation and location the Danube strip is well covered by a hidden fault line.

Another sub-equatorial strip with more limited linear dimensions is the Ruse – Tetovo strip. It is highly likely that it is conditioned by a fault with the same orientation, for which there is information in the section Chervena Voda – Tetovo. It is possible that it is also related to the line, which coincides with the strip and which manifested during the quake in Northeastern Bulgaria in 1940.

The Popintsi - Dulovo strip has sub-meridian orientation. It is quite wide and the damages in it are substantial. On Bulgarian territory we do not have information about such a fault, but in Romania there is an analogous one, which could spread south to the Danube River.

The presence of significant seismic impacts in Bulgaria, quite close to the most significant ones in Romania, shows that in the Moesia platform there are substantial fault lines, which contribute to the absorption of the flow of seismic energy. This, of course, is contributed mainly by the fault structures in NE direction. However, it is worth noting that in the western half of Northern Bulgaria, where the density of such oriented fault lines is greater, the impact of the Vrancea quake is relatively weaker than in its eastern half, where, on the contrary, the fault lines with NW direction are predominant. The reasons for these differences in the seismic impact should probably be searched for elsewhere. It is possible that the tectonic behavior of the North Bulgarian protuberance, which - still raising nowadays - is in the course of a process of tectonic disintegration, has a decisive role. Furthermore, the relatively weakened seismic impact to the west of the Iskar River could be viewed as a result of the tectonic behavior of the Lom depression, which is an area of sustainable sinking and respectively loading with a thick platform superstructure (up to 10-12 km).

In the end we will pay attention to several sections with limited area from Northern Bulgaria, where the damages are relatively greater. In most cases they coincide with the position of fault junctions, i.e. they are located in such areas, where established fault lines cross. Such are the Gulyantsi junction, the Somovit – Nikopol junction, the Novgrad junction, the Dve Mogili junction and the Sredna Kula junction, located at the crossings of faults with sub-equatorial and diagonal direction. Other junctions, such as the Razgrad and the Opaka junctions, lie on crossings of diagonal faults, and the Chernolika junction is located on crossings of diagonal and sub-meridian faults.

1.2. Ingineering-geological conditions and their impact of the effects of the earthquake.

The Vrancea earthquake from March 4, 1977, which caused severe damages on the territory of Romania, also affected the central parts of Northern Bulgaria. Here we summarize the performed observations and researches of the impact of the engineering-geological conditions on the effects of this earthquake. Together with the confirmation of known regularities and the establishment of new ones, there are results and facts, which are difficult to explain at this stage and need additional examinations.

The earthquake from March 4 was one of the deepest earthquakes on the globe in 1977. It was registered by all seismic stations in the world. According to data from the International Seismology Center it was registered by 560 seismic stations within the range of epicentral distances 0 – 157º. The earthquake caused great material damages in Romania and on the territories of Bulgaria and Moldova. The seismic movement of the ground caused by the earthquake is characterized by an unusual allocation of the intensities. There is a certain tendency of focusing around the macro epicenter and islands of high intensity at large distances from the central area.

Felt in the epicentral area – northwest from Foksani, and in the area of the Romanian capital at VIII degree, the earthquake created effects close to the ones caused by the maximum intensity in the district of Iasi (Northern Romania), in a wide area around the macro-seismic epicenter and in Southern Romania (district of Craiova) and a not small area along the Danube coast, covering regions from Romania, as well as from Northern Bulgaria. The field of high intensities (VIII and VII – VIII degree) is non-symmetric and torn. The cover of the discrete fields of intensity VII – VIII

degree is obviously drawn in direction northeast – southwest, outlined convincingly by the isoline at VII degree. We should note the considerably weaker fading of the intensity from the macro epicenter to the southwest. This effect is coordinated with the main direction of the tearing in the center. The steep sinking of the plain of tearing to the northwest most probably conditions the non-symmetric allocation in direction northwest-southeast towards the epicenter of the field of intensity VII degree. In the areas with intensity not lower than VII degree, as expected, the effect from the central process is too dim. In the overall macro-seismic field there is unevenness – faster, followed by slower fading of the intensity between subsequent isolines. It is difficult to reach a quality conclusion about the course of fading of the intensity under V degree – a significant gradient to the southwest, south, southeast, relatively smaller to the northwest and north, and minimal to the northeast from the epicenter.

2. Seismology.

The center in the region of Vrancea has the following significant peculiarities: relatively large depth (80 – 120 km) of the strong earthquakes with magnitude M => 7; large area of the macro-seismic impact; approximate constancy of the interval between two strong earthquakes; specificity in the azimuth allocation of the density of the flow of seismic energy; relative long-period transmission of seismic waves, etc.

2.1. Seismic impact in Bulgaria

The seismic impact of the earthquake from March 4, 1977 on our territory is assessed on the grounds of an analysis of the effects in the towns and villages, information on which is gathered through inquiries and personal observations.

From March 5 to March 11, 1977 there was a macro-seismic survey in 106 settlements in the middle and eastern part of Northern Bulgaria by a group of seismologists – collaborators of the Geophysical Institute at the Bulgarian Academy of Sciences. They visited places, where the earthquake had caused an impact of at least V – VI degree in the form of residual effect on the buildings, which allows for increasing the objectivity of the assessment. The inclusion of several other settlements with manifestations, characteristic of lower intensities, constitutes an exception.

Upon the impact of VI degree most of the residents have gone out of their homes, there are cracks in the plaster, single demolished and 10-20% cracked chimneys, and seldom there are cracks in the walls between windows. In Shabla some very old and worn out houses have become uninhabitable, in Balchik there are very few damaged architectural decorations, and in Kochmar – isolated chimneys shifted to the east or with chipped-off parts.

Upon intensity of VI – VIII degree the observations show 40-50% damaged and a lot of fallen chimneys (masoned with mud and seldom with cement), isolated cracks in the carrying walls of brick houses, cracks and shifts of bricks around beams above windows and doors. In Gorsko Slivovo there were also demolished parts of walls in old houses, in Milkovitsa mainly the northwestern walls were damaged, and in Byala Voda there were cracks in the carrying southern and southwestern walls. The northwestern region of Gigen looked more affected than the southeastern and the damages were mainly in the southeastern walls. In Slivo Pole there were horizontal cracks under roofs, which had occurred due to the weight of the top slabs. In the walls of buildings in Dekov there were opened old cracks – an indicator of unfavorable padding; the new cracks were mainly in the southeastern walls. The damages in the northwestern and the southeastern walls of the buildings were caused by the highly-energetic transverse wave, while in Byala Voda and Dekov they were caused by more high-speed transverse waves.

The consequences from quakes VII degree were over 50% damages chimneys, multiple cracks around the openings in walls, broken eaves, in many old houses there were severe disruptions and damages in the carrying parts and some demolished filler walls, and in residential flats – only internal disruptions. In Dolni Vit there were vertical cracks almost along the entire height of the buildings and around the corners. In Levski approximately 30 houses with wooden beams had damages in the carrying construction, and in the 4-5-floor massive flats the most damaged were the second floors. In Gorna Oryahovitsa there were third-degree damages in 8 residential flats, all with stores on the ground floor; heavy damages were observed in 14 public buildings. In Lyubenovo there were cracks mainly in southern and southeastern walls (again the impact of the transverse wave). In Barin there was a different impact on the buildings located along the eastern-southeastern and along the western-northwestern slope of the gully. In Brest in the semi-massive one- and two-floor buildings as a result of old sagging of the foundation there were slanting and vertical cracks from the windows to the roofs.

The information received from the municipality of Oryahovo contained the following figures (added to the conclusions from the survey, they gave the impact in the town an assessment of VII – VII degree): total cracked buildings or only with fallen chimneys – approximately 700; completely uninhabitable due to damages in the carrying construction – 138. In old and newer semi-massive houses there were severely cracked and even demolished walls, with predominant cracks in the eastern corners.

The reference made on March 9 in the district gave information about the affected buildings in the district of Razgrad – 76 agricultural buildings, 26 schools (3 unusable and 23 for light repairs), 34 kindergartens (3 unusable, 23 for major repairs and 8 for light repairs), 208 residential buildings (48 completely demolished, 160 uninhabitable), 1600 buildings damaged in various degrees. In Razgrad approximately 166 buildings with various designations are uninhabitable, and 750 are affected in various degrees. Seriously damaged were some industrial and public buildings: MOK D. Blagoev – damaged roof (factory No 1), demolished building and partially demolished washing line, damaged hearing grid (factory No 2), damaged boiler (factory No 5), and severely damaged rope line. The cooling installation in the poultry slaughterhouse was damaged. The second floor of the spare parts factory was sagging. The antibiotics factory there was a damaged steam pipe and a damaged boiler. In the veterinary clinic – a monolithic two-floor building, completed 4 years ago and located to the north of the town, the southern corner was chipped-off (the cross-beam was 5 m away from the corner) and the building was cracked under the first floor slab. The county hospital had three buildings subject to demolition, as well as a four-floor building with two additional floors (from which 190 hospital beds were removed). Under the weight of the additional floors in the lower two floors all integrated pipes

were damaged, and the wide vertical cracks in the walls were continuing to spread open. The kindergarten located 300 m away from the county hospital was first dimensioned for small rooms, but later the intermediate walls were taken down. The ceiling of the ground floor had an old crack across the entire slab, and due to the earthquake the external walls had separated. Completed only three months ago, the children's institution in quarter Buzludzha had a cracked corner and a cracked wall. The bus station had a cracked under-roof blind wall and a cracked staircase. In quarter Buzludzha, built-up with brick two-floor houses, there were external cracks mainly between the openings in southern and southwest-

3. Impact of the earthquake on the buildings and installations.

In order to analyze the deformed and stressed state of a construction during an earthquake, it is necessary to:

1) know the nature, power and duration of the seismic impact for the site in question;
2) know the geometric, strength and deformation characteristics of the construction in question;
3) use sufficiently accurate methods for examination of the response of the constructive systems in a non-elastic stage upon a specific seismic impact.

At this stage of development of the scientific examinations these three conditions have not yet found a simple and complete solution due to their extreme complexity. Each of these conditions is related to a series of prerequisites, assumptions and simplifications with the purpose of obtaining a final solution with the available scarce information about the earthquake, its impact on the construction and the methods for examination. The adoption of one or another method of examination amongst the popular ones up to now depends on the available information about the earthquake and the construction.

The proposed analysis of the damages and destruction in the buildings from the earthquake in Vrancea (March 4, 1977) uses methods with the necessary experimental data, recordings and the observed deformations in the constructions. On account of the use of methods, which do not offer a simple solution, often times several methods are applied, in order to assess their reliability. Where possible, the calculated characteristics are compared to the experimental data and recordings, which are accepted as criteria for assessment of the obtained results.

The main factors, which the impact of the earthquake on the buildings and installations depends on, are: the mechanism of the earthquake and the nature of the generated seismic waves; the dynamic and spectral characteristics of the seismic waves (accelerations, velocities, shifts, predominant frequencies (periods), response spectrums, spectral density, etc.); the geological conditions from the epicenter to the site in question, the local engineering-geological and hydrogeological conditions, the relation of the dynamic characteristics of the buildings and installations and the characteristics of the received seismic waves; the resistance capacity of the buildings and installations and their capacity to re-allocate the forces between the carrying elements with development of non-elastic deformations, smaller than the limit ones, etc.

The specific mechanism of the earthquake in Vrancea generates seismic waves with comparatively not high seismic accelerations, but large shifts with predominant period 1 to 2,5 s. The analysis of the behavior of buildings and installations upon seismic impacts must take into consideration that for the low and hard buildings with periods of inherent oscillations up to 0,4 s, determinative are the dimensions of the seismic accelerations and the high frequencies (low periods) of the seismic waves. For averagely flexible buildings with periods up to 1,0 s determinative are the velocities of the seismic waves, and for the flexible and tall buildings and installations – the shifts in the foundation and the periods of the seismic waves over 1 s.

3.1. Impact of the earthquake of the buildings and installations of the territory of Bulgaria.

3.1.1. Residential and public buildings

Masonry constructions. The masonry constructions, particularly the ones built more than 50 years ago without security against earthquakes, are characterized by a low resistance capacity to earthquake impacts. This type of buildings are usually built with wooden floor and roof constructions with a weak connection of the wooden beams with the brick masonry. The non-homogeneity of the floor constructions, their low hardness and the poor connection with the walls does not allow for re-allocation of the seismic forces between the walls. The brittleness of the brick masonry and its breaking down upon alternating loading prevent the masonry constructions from developing substantial non-elastic deformations and re-allocating the forces between the carrying elements.

Despite these disadvantages of the masonry constructions, they did not suffer serious damages during the earthquake in Vrancea mainly because of its specific spectral composition. As mentioned above, the earthquake manifested on our territory with long-period waves – T over 1 s. The masonry buildings are with period from 0,1 to 0,25 s and the earthquake had a weak impact on them Thus for example the two-floor brick building in Svishtov, located 100 m away from the completely demolished hostel of the factory "Sviloza", did not suffer serious damages despite the poor state of the building prior to the earthquake. Other similar buildings also have minimal damages. Even the single-floor building in the village of Batin, built of stone masonry and sun-dried bricks masoned with a mud solution, suffered less damages than a series of reinforced concrete buildings with a higher period of inherent oscillations. While the churches with stone and brick masonry were destroyed in mass numbers during the Plovdiv earthquakes, the church of one of the villages near Danube has more significant damages mainly in the bell tower, which has a higher period of inherent oscillations.

Some masonry buildings, for example in the village of Ekzarh Yosifovo and elsewhere, have significant destruction despite the low period of the buildings. In these cases we should note that the local geological conditions amplify the short-period seismic waves, on account of which the earthquake Vrancea from March 4, 1977 also demolished masonry buildings. Over 160 masonry single-floor buildings in Nikopol were severely damaged not only because of amplification of the short-period seismic waves, but also because of the extremely poor construction – sub-dried bricks, masoned with mud solution without connection between the brick walls at the corners, poor connection of the

roof wooden constructions and the sun-dried brick walls, etc.

The masonry constructions usually serve as benchmark for determining the intensity of the earthquakes. The Vrancea earthquake, due to its specific mechanism, is an exception to this rule – it spared a large number of old masonry buildings, but inflicted more serious damages to the flexible buildings with higher periods.

The power of the seismic impact in Svishtov can be assessed by the more detailed analysis of the destruction in some of the larger masonry buildings.

District court. The building has two floors, with carrying brick walls 50 cm think on the first floor and 38 cm on the second. The foundations are made of stone masonry. The floor constructions are made of wooden beams, which do not establish a good connection between the walls. The roof construction is classic, wooden with cover of roof-tiles on mud over a plank liner.

The destruction on the façade walls is mainly in the beams above the windows, performed as arches. In this case the destruction is also in the area of the openings as a result of development of vertical shearing stresses. The destruction in the interior of the building is significantly greater as a result of the poor connection between the wooden floor constructions and the brick masonry. The lack of steel anchoring parts is the reason for more severe destruction.

Due to the impossibility for reconstruction, the building was demolished.

Reinforced concrete monolithic frame buildings. A large part of this type of buildings demonstrated good behavior during the earthquake on March 4, 1977. In regions with increased seismic activity, adverse engineering-geological conditions, a combination of inexpedient architectural and constructive decisions and mainly due to the poor quality of performance of the construction works, some buildings suffered substantial damages and destruction.

The reasons for the adverse response of some of the monolithic frame buildings during the earthquake can be systemized, as follows:

1. The seismic activity of some regions manifested in a higher degree as foreseen in the operative maps for seismic division into districts. This refers particularly to regions, which were envisaged in the maps with intensity VI degree, but actually manifested with activity up to VII and VIII degree. In these regions the buildings have not been calculated for impact of seismic forces, however experience shows that buildings, which were properly designed and performed in good quality, can withstand earthquakes of VII and partially VIII degree.

2. The lack of micro-seismic survey in responsible buildings and installations, as well as the failure to consider the local geological and hydrological conditions.

3. Low quality of performance of the construction works, contaminated additive materials, unsorted concrete and strengths, which have not reached the design strengths, frozen concrete during work in winter conditions. Poorly performed reinforcement works, insufficient anchoring of the reinforcement, incorrect bending, congesting of the reinforcement, lack of concrete cover, lack of stirrups, often congested or separated without reason.

4. Incorrect architectural-planning decisions with complicated forms, non-symmetric planning, removal of brick walls in ground floors, poor solutions for anti-earthquake joints, etc. led to unfavorable consequences for this type of buildings.

5. Constructively the buildings are not secured against earthquakes (they have not been calculated for this), and in some cases no constructive undertakings have been conducted for horizontal loading. In some of the cases an inexpedient constructive solution has been adopted, which decreases the horizontal carrying capacity of the buildings. In many cases the recommendations for constructive measures for buildings in regions with VII or higher degree of seismicity have not been observed.

6. Unfavorable construction of flexible buildings over weak soils, often with high ground water.

The earthquake from March 4, 1977 in Vrancea also caused significant damages in monolithic frame buildings. The damages can be systematized depending on the constructive elements, in which they have manifested.

a) Damages in the brick walls. In many cases they are non-constructive – cracking of the plaster with oriented and non-oriented directions, and its coming off the walls. Another group of damages in the walls is the manifestation of cracks along the entire thickness of the brick masonry. There are horizontal cracks in the brick walls under the beams and on the floor, which means a disruption of the connection with the brick wall, and vertical cracks between the wall and the column. In most cases there are simultaneous horizontal and vertical cracks. These damages in the walls are characteristic of buildings without a monolithic connection between the brick walls and the reinforced concrete frame, which is characteristic of the system with lift-slabs. When the brick walls have monolithic connection with the frame construction, there are cases of single or crossed diagonal destructive cracks.

b) Damages in the columns. Usually they are in the junction column – beam and beam – column, or in the upper and lower end of the columns. They constitute crushing of the concrete in the pressure zone, especially in the case of poor quality unsorted concrete with insufficient strength, falling or dragging of the longitudinal reinforcement, lack of or insufficient stirrups – separated or performed in poor quality.

c) Damages in the beams. Usually they are in the junction beam – column. They constitute crushing of the pressure zone of the concrete due to poor execution, unsorted state or insufficient strength, congested, drawn-out or dragging reinforcement, insufficient or poorly executed stirrups, in most cases separated.

d) General damages and destruction in buildings. When the deformation joints between the blocks are not well constructed or their place is not properly envisaged, damages occur around them. There are damages in the foundations – cracking of the soil around them. In several cases, where all of the abovementioned adverse conditions are combined under poor engineering-geological conditions and increased seismic intensity, entire buildings are destroyed.

Damages in residential and public buildings. A residential flat in quarter 188 in Svishtov, designed in 1966 by the District Design Organization – V. Tarnovo, invested by ONS – Svishtov, has a monolithic frame reinforced concrete construction, based on single foundations over loess. The flat consists of a basement, stores with clear height of 6 m

and 9 residential floors with 36 apartments. In plan the building consists of 2 separate rectangular bodies connected with a common staircase cell. The staircase flights are anchored in the two bodies, and the short sides of the staircase cell are fully glazed. The building has a flexible first floor due to the presence of stores, as a result of which the hardness of the floor is very low compared to the others.

A characteristic feature of the frame construction is the shifting by half a floor of the floor constructions of both bodies of the building, and the connection between them is realized only through the platforms of the staircase cell. The carrying frame of the individual bodies consists of 18 columns placed at not big distances, connected with beams in two directions. Most of the columns are rectangular with dimensions from 25x25 to 40x50 cm. Only three columns are circular. The beams are 25x12 cm wide and comparatively low heights. All columns are on separate foundations, some of which overlap. The round walls in the basement of the building are performed as concrete continuous walls, 35 cm thick.

The non-symmetric connection of the two bodies of the building through the staircase cell causes non-coinciding of the tracks of the resultants of the horizontal wind and earthquake forces, acting on the two bodies. On account of this there are torsion moments in a horizontal direction with particularly adverse consequences upon non-synchronous oscillation of both bodies. The connection of the columns at the staircase cell with the slabs in the middle of the floor height is also not favorable.

Large-panel buildings. The large-panel construction takes up a substantial place in the overall volume of residential construction in seismic regions. On the grounds of the features of this constructive system, some experimental data and the experience from the earthquake on March 4, 1977 we have reached the conclusion that the use of this type of construction in seismic regions is completely justified. This constructive system survived the seismic impact from March 4, 1977 in comparatively the best state. The surveyed constructions are residential flats, which had cracks and insignificant damages along the connecting joints. We will track the state of the large-panel construction only in Northern Bulgaria and Sofia, since the data about Southern Bulgaria is scarce or completely lacking.

In the residential complexes Tsarevets and Mladost in Svishtov there are large-panel buildings. The panels are made in the home-construction factory in V. Tarnovo according to the nomenclature for construction in regions with seismicity of VIII degree. The inspection and the conversations with the inhabitants show that the buildings have survived the earthquake in a good condition.

The eight-floor flats in Ruse in general have no serious damages. An exception is flat Vezhen with the following defects: cracks in the deformation joint up to 0,5 mm along the façade, vertical cracks on the northern blind wall between the two panels from the second to the fourth floor. In the panels of the zero cycle and the treenail connections there are no cracks. On all floors of the fourth entrance there are slight cracks along the ceilings between the wall and floor panels in the entrance halls, slight cracks between the staircase flights and the staircase platforms.

In the county of Silistra there is no information about damages except for the 8-floor flat Druzhba in Silistra, where there are superficial cracks in the connections between the panels and above the doors.

In the county of Tolbuhin only in some of the large-panel buildings there are insignificant hairline cracks above openings (windows and doors).

In the county of Vratsa the large-panel buildings have not been calculated against earthquake impacts, and the connections between the individual wall panels are performed by welding two iron rods with Ø16. In one of the sites additional horizontal rods are used for connections between the two panels from the zero cycle and the first floor. Performed in this way the connection is not able to withstand the shearing and torsion forces. Such poor quality performance of the connections is found in many sites in the country.

The experimental hysteresis loops of tested connections between floor and wall panels show that this type of connection has great resistance capacity and capacity to absorb energy, as well as to admit non-elastic deformation to a certain extent. Its incorrect performance however eliminates this good possibility for increased carrying capacity.

A large-panel residential flat in Kozloduy (No. 33), as well as others in Oryahovo (residential flat Dunav), have received horizontal cracks between the individual wall panels and in some of the treenails. There are also cracks in the panels above doors and windows.

The performed inspection of 9 sites in the county of Vidin shows that 6 are in operation and 3 are under construction. The sites in operation are according to the nomenclature of Glavproekt. In isolated places on the first floors there are cracks along the monolith concrete at the treenails and along the ground coat at horizontal and vertical joints. There are chimneys detached from the panels and faience tiles detached from the chimneys in the service rooms. The sites under construction are 8-floor according to nomenclature Bn-IV-VIII, H = 2.80 m. They have cracks along the ground coat at vertical and horizontal joints. The chimneys, which are of siphon type, were masoned prior to the earthquake, but have not been plastered and fastened to the ceilings, and as a result they have been demolished, whereas the plastered ones have detached with a gap of 0,5 cm from the panels. There are also cracks on the connections at the staircase flights and the floor panels at the treenails on the first floors. Cracks on walls and floor panels as a result of the earthquake have not been ascertained.

In the first experimental large-panel building in Sofia (192 N. Tsankov Str.), built in 1958, there are no cracks or damages. The performed inspection of the first residential complex with large-panel buildings “Tolstoy” shows that the panels prepared on site have no cracks or damages, except for slight cracks in the staircases. In some buildings there are slight cracks in the places of the connections.

The good behavior of the large-panel construction during the earthquake from March 4, 1977 led to the idea of serial panel construction with increased number of floors. This however should not happen without the necessary experimental examinations of reinforced connections and treenails, as well as natural examinations following an approved program in 2 – 3 test buildings.

Buildings with lift-slabs (LS). Immediately after the earthquake specialists from the Bulgarian Academy of Sciences

visited the affected regions. They surveyed buildings executed with the LS method, and here we note the sites, which have received the most severe defects. The buildings are divided in to two groups. The first group includes the buildings in towns and settlements, which according to the Rules of construction in earthquake regions of 1964 are in non-seismic regions and have not been calculated against earthquakes (Svishtov, Dulovo, Dve Mogili, Pleven, Ruse, Sevlievo, Knezha, Kozloduy, etc.).

The seismic intensity in Svishtov is up to VII and partially up to VIII degree. To the east of the completely demolished 11-floor monolithic building there is a complex of four 8-floor and five 5-floor buildings with LS. The distance of these flats to the demolished buildings is from 100 to 500 m.

The 8-floor buildings have a reinforced concrete staircase cell executed with a creeping casing. The floors are shifted in height at 1/2 floor in both ends of the staircase flights. The reinforced concrete slabs do not cover the staircase, but are pushed against it. The buildings have not been calculated for earthquake impacts.

One of the 8-floor flats has severely cracked 25-centimeter exterior joints, opened by several centimeters, along the diagonal of the barrier walls. Some of the bricks, mainly of effective ceramics (fours), are completely demolished. The reinforced concrete cell has horizontal cracks under the platforms (where the technological joints of the creeping casing were probably located), as well as cracked beams above the doors of the cell. There is no disruption of the connection column – slab. A substantial part of the energy of the earthquake impact was absorbed by the 25-centimeter brick walls between the columns, which have served as vertical discs. The joints between the slabs and the staircase cell have hairline cracks. One of the facades has cracks going through the console formation of the slabs. The frame of the building is not damaged. The staircase cell is fit for operation. Such cracks, but with smaller sizes and less in number, can be found in another 8-floor building. The other three buildings have survived the earthquake without significant damages.

At approximately 100 m from the demolished monolithic building there is an 8-floor building under construction. Its architectural-planning solution is similar to the other 8-floor buildings. The entrances of the apartments are from the two platforms of the staircase. The construction has a reinforced concrete cell executed with a creeping casing and reinforced concrete discs between the columns.

3.1.2. Technological equipment

The security of the technological equipment during earthquakes constitutes a serious problem in view of the normal operation of the large-scale industrial enterprises (TPP, NPP, chemical plants, etc.). The damage and destruction of steam, gas and electricity plants can lead to fires, explosions and poisonings.

As a result of incorrect connection of the steam boilers with the carrying construction in some TPP the freight elevator shafts at the boilers are demolished. The adjacent reinforced concrete columns of the carrying construction are also damaged.

The earthquake inflicted severe damages to the equipment of the electricity substations. In substation Moesia, G. Oryahovitsa, Ruse-Center, Alfatar, Tutrakan, Ruse-1 and Svishtov there are broken isolators for voltage 110 and 220 kV, and cathode drain lines. One transformer in substation Moesia has turned around due to insufficient anchoring, and another one in substation Polski Trambesh has tilted and damaged the adjacent installations.

The earthquake has not inflicted any damages to distribution lines of all voltage ratings, as well as in the cable power lines. This is explained by the great elasticity of the distribution lines and the good dimensioning of the top of the columns. Damages are inflicted only to the high voltage grids. In most cases there are torn conductors due to mechanical tension and sometimes due to short circuit caused by their asynchronous swinging.

4. Social and mental consequences from the earthquake.

4.1. Behavior of the population

The earthquake from March 4, 1977 with epicenter in Vrancea had an effect on a very large ground area. The strong seismic effect inflicted quite a lot of material and moral damages. They attract the interest of specialists and become the reason for a search for means of preservation of the modern material and spiritual culture of mankind against future earthquakes. While the damages in the field of material culture are subject to restoration, reconstruction and renovation, the damages in the field of human mentality are hard to heal and still not too well examined. The atmosphere of insecurity established after the earthquake showed that anti-seismic preparation in our country was not conducted, regardless of the fact that Bulgaria is located in one of the active seismic girdles of the Earth.

Since during the earthquake the seismic devices in Bulgaria have gone out of order, the earthquake is practically left without a “seismic biography” in the annals of the scientific specialists. Its power and destructive effect in the material and spiritual field can be judged by practical observations, conclusions and summarizations on the grounds of the collected oral and written information from the population, as well as the opinions of specialists who have visited the affected places in the country.

The interviews with workers and specialists from NPP Kozloduy and the town on March 8, 1977 show the conscientious, even heroic behavior of the on-duty teams during the earthquake.

An opinion of one of the engineers: “There was no panic in the plant. But it’s good that we forget about these natural disasters! Otherwise we would live with the terrible memories, when the ground was shaking.” One of the workers shared: “We felt a very strong quake. We pulled ourselves together after the shaking, we ran outside, we left the women and children on the street and ran towards NPP. Our coast is on a rock. We were shaking together with the ground, but it’s good that the plant and the nuclear reactor did not suffer damages. I think that if the three buildings in Svishtov had not gone down, the damages from the earthquake everywhere in the country would have been similar, without human lives lost.”

The people have calmed down after the disaster they experienced. They talk with concern about NPP, where they work. The main equipment of the plant is in a stable condition. The reactor and the pipelines are in a good working

condition. The rescue works are also running well, the state of the citizens of Kozloduy and the workers at the plant is getting better. The damages inflicted on the residential buildings and the industrial plants in the town and the county are being repaired. The chimney of the plant has a deviation of approximately 2,60 m along the ellipse. Only a few minutes after the beginning of the quake all people were back at their workstations. The on-duty teams, which did not leave their workstations at all, ensured the stable operation of the devices and did not deprive the country of lighting and energy in this critical moment.

An opinion of the chief engineer of NPP: "The behavior of the on-duty teams during the quake was really heroic. These are people who overcame the initial fear of the unexpected disaster, did not run outside, but stayed at the electronic panels and continued their work in the interest of the order, which was needed in this situation."

Liliya G. Furlinska from the Production-Technical department shared: "After the quake we arrived at the plant. Those who were on duty had turned off one of the reactors and the other one was intentionally left on, in order to provide electricity and lighting in the country. During the next half hour absolutely all Bulgarian and Russian specialists arrived at their workstations."

Vladimir Berov, senior engineer, operator of the reactor: "I was on duty on Friday night. I've been working here since 1972. I was sitting and suddenly I felt as if I was kicked in the back. Then I felt a very strong earthquake. During the next few seconds the four workers on duty in the room waited to see if the ground will continue to shake. My thought was – I hope we can save some of the equipment! I am responsible for the reactor and its operation!"

Ivan Petrashev: "I was the on-duty engineer that night. When the quake began, I decided that the instructions say – if we cannot control the reactor, we must stop it."

A collective opinion of residents of Kozloduy (March 7, 1977): "During the quake due to the fear we were united. But after some time these feelings will fade away. It is very important what place in this process will be taken by the leader – as an authority, a personality and a public figure. During disasters people need a leader to give them courage, to unite them and to show them how to overcome the disaster."

On March 7 eng. Yanka Yankova from department "Construction and Architecture" of ONS – Svishtov shared: "The restoration of the material damages caused by the earthquake requires a lot of funds. All residents living in flats built according to the lift-slab method have moved out. The chairman of ONS issued an order against the dissemination of harmful rumors. The horror personally for me was greater when I realized that there are demolished flats around us and that we could have been among the deceased."

In the center of Svishtov there are posters – a call to fight against the harmful rumor that on March 7 as a result of a failure in the pipeline network of the chemical plant "Sviloza" a poisonous gas has been released and is nearing the town. The residents are in panic – this leads to a mass withdrawal of over 3000 people beyond the limits of the town. There are injured and distressed people.

According to the opinion of witnesses passing through a hostel of the chemical plant on March 4, 1977 at about 21:23 hrs it began to turn around its axis, it sunk and then was demolished. The evening of March 7, when we visited the place, the clearing was still ongoing. It was expected that the next day there would be many victims found, because only the ruins of the lowest floors were left, where most of the running people had reached.

4.2. Mentality in the moments of the quake.

The effect of the earthquake on the mentality of the people is not comparable to any material damages. It is too difficult to determine the amplitude of the mental manifestations in the conditions of the earthquake and especially after it. The question arises – why during an earthquake, which sometimes may not occur even once in the lifetime of a person, the horror of death is greater than its everyday presence in road accidents, which only for a few months take the lives of much more people than in an earthquake, and it's interesting why in the moment of the quake a person reacts decisively and quickly regardless of the surprise of the disaster, in order to save the life of his relatives and his own life, and after the fading of the natural disaster some of the people are obsessed with feelings of doom, anxiety and insecurity. How long do these psychological phenomena leave a mark in the soul of a person, is he protected from the surprise of a new psychological intervention, from the consequences of the mental distress suffered during the quake? What is the interaction of the personality and of the social groups in their behavior during and after the extreme situation?

The general thing in the behavior of an individual person and of a group of people during an earthquake is that the personality falls under the impact of strong and unexpected irritants, with regard to which there is no gathered experience. The unclear, unusual, tense psychological situation, filled with horror, uncertainty and fear of death, causes a total influence on the person. Not everyone could orientate properly, take a decision and find the successful outcome of the disaster. In such a dramatic situation, in which nature unexpectedly attacks the personality, there is a verification of the specific social roles, a revaluation of the values. The situation, which arises upon an earthquake, is most significant in an existential sense for the person – for a brief period of time, surprisingly and dramatically the personality can be attacked by various disasters, death being the greatest among them. The earthquake as a mental notion in the soul of a person is sometimes even scarier than in reality. In this case nature plays the role of a powerful, unknown and monstrous extreme, in the clutches of which the human life loses its meaning. The only means of fighting against this feeling is the overall experience of the person, the scientific knowledge and the social experience.

The common mental stress in our country after the quake on March 4, 1977 is also due to the fact that after 1928 there is a relatively quiet period with regard to the seismicity of the region. The shock was incredibly powerful in the affected areas around the Danube River, where the earthquake has occurred at VII and VIII degree as per the MSK scale, and particularly in regions with demolished buildings and victims. The reason for this shock objectively are the considerable movements of the earth, the big deformations and movements of the buildings, the occurrence of rumbling, creaking, alarming sounds and roll, the observed shining in the atmosphere, the interruption of the electricity, the lightings from short circuits in the grid, the falling of heavy objects, the difficulty to retain balance, the

outburst of fires, the cracking of walls, the falling of chimneys, etc. The people, who at this moment were on the higher floors, have experienced the quake in a more severe psychological degree. These people (particularly in the new complexes) get the illusion that the buildings are shaking with amplitude of about 1 m. The instinct for self-preservation and protection of the kids forces the people to go out in their underwear, barefoot, others take their cars and go outside of town, others start walking towards their villas or stop near the field. In public places (cinema, theater, holiday halls) the sense of responsibility towards yourself has contributed to the establishment of a calmer atmosphere for quick evacuation without panic.

The earthquake brings up questions related to the pathopsychology of a man. The quake inflicts transitory changes in the human brain and consciousness, on account of which we can talk about the onset of stress. Such moments are marked by the question of the power of the human will, the freedom to act, the overcoming of external and internal obstacles, which have occurred suddenly. This is a significant problem for the personal, as well as for the collective will and for the interaction between them. The tragedy brings out the respect in people, but this is passing respect. In Svishtov most of the victims were found on the stairs, while they were running. The mass multi-floor construction, the alienation of the man from the earth causes a progression of the fear. During an earthquake the fear is all-consuming and thus practically uncontrollable. It is in the basis of all mental phenomena related to the moment of the earthquake and after it – the fear before the unknown. All other phenomena in the soul of every individual person and of the social groups related to the earthquake depend on the mutual relation of the fear and the will of the person. Since the earthquake is over in just a few seconds, people are not able to make sense of the event, to gather experience in the struggle with it and to take a decision. Therefore the idea of the disaster comes after, when the actual danger has passed. The idea of the disaster is usually an illusion, greatly exaggerated, close to the dimensions of science fiction. The tragedy has passed through the mentality of all people and therefore it is common, but everyone wants to be understood, heard and calmed by the others. That's why the personal problem of the stress becomes public. Through the pathological idea of the disaster people are relieved of the horror they have experienced, they allocate their fear, their anxieties and their insecurity to the others. The duration of this process depends of the personal characteristics of the individual people. The more sensitive ones need more time, and the people with a more rational mind undertake the line of stable behavior in a shorter period of time.

After such a natural shock the mentality does not change in an obvious manner for a long period of time, because the upbringing, the intelligence and the culture play a decisive role. The tragedy fades away, but the idea of the instincts manifested during the earthquake remains alive for a long time. As the disaster is mass and individual, so the reassessment of the values is mass and individual. The reassessment of the values is the closest phenomenon, which occurs after the stress fades away. The experience from the twenty or thirty seconds of the earthquake is equal in power to hundreds of read pages and hundreds of days lived. There arises a pseudo-new idea of the meaning of life, of its purposes. Under the effect of the natural shock and the feat of the unknown (the fear of this event happening again) the personality tries to cope with negative emotions, which underline the senselessness of human life and the helplessness before nature.

4.3. Personal behavior in the common misfortune.

Reflection in the consciousness. Upon the perception of the earthquake for every person there are common mental regularities acting through the common property of each living matter – sensuousness. Through the sensuousness the external energy of the earthquake has become a fact for the consciousness. Regardless of whether the earthquake has been perceived by different people in a different manner – some perceive it first with their hearing organs, others have first felt the shaking of the ground or the floor under their feet, others have observed the falling of objects or the vibrations of the walls, etc. Sometimes the first impressions of the disaster are "underground rumbling", "a sense of sinking", "passing of waves through the streets", "blue light", etc. The reflection of the earthquake is a prejudiced, subjective reflection of a specific person. For example a villager from Gorna Studena, county of Veliko Tarnovo, tells this story: "As if a big tractor was ploughing outside. At first I thought that it is passing through the street. Then the ground under my feet started to shake. I called my wife and we ran to the courtyard. I was telling her – get away from there, it's an earthquake! I lost balance and fell to the ground. At this moment the chimney of the house also fell." A four-year-old girl in the embrace of her grandmother cried: "Granny, are we dying?" Therefore it is necessary to consider the specific satiation of perception of the earthquake. The main question, which people were asking after the earthquake on March 4, was: "Where were you during the earthquake?" The question is not a random one, because on the grounds of the known activity from the human experience the personality is trying to orientate in the arising extreme situation. A group of viewers in a dark cinema hall are telling this story: "Somebody shouted "What is this?", and we all listened. Suddenly the people in the hall started to look around. There were exclamations "Something is happening!" and we all jumped out of our chairs." In the moment of the earthquake the personality is looking for a symptom of definiteness, which could give information on what is happening. Two young people in the street are asking the questions: "Who is playing with the trees? Who is playing with the house?"

The next mental stage of perception of the reception of a signal, some information about the natural disaster, which depends on the specific occupation of the personality in that moment. A 24-year-old man is relating: "Suddenly the house started shaking, the windows started banging. I thought that someone is banging outside, but then the house started rocking. In the next moment I noticed that the chandelier was swinging, the walls were moving and the pictures started falling down one by one. I heard a whizzing from the outside, as if airplanes were passing by." After the reception of information about the disaster the personality comes out of the state of indefiniteness and starts to make unusual ascertainments about the disaster. For the specific situation everything is particular – the rumble, the noise, the loss of balance, the squeaking of the panels, the walls, the falling of objects. In the situation of the earthquake the bearers of the same information have different characteristics – from the slight shaking of the bed to the demolition of an entire residential flat. The final answer of the question "What is this?" in the moment of the earthquake is a complex

intellectual activity of the personality. After the person experiences and assesses the situation, he asks the question "What should I do?" in the onset disaster. The extreme of the earthquake determines a very high intellectual and emotional tension in the course of the time needed to take a decision. The moment of assessment, which the fateful decision depends on, determines the behavior after that. Many people "do not know", "ask themselves" or "do not remember" how they found themselves amongst a group of running people. These cases can be explained by the great power of the energetic impact of the quake and the minimum term for taking a deliberate decision.

The behavior. As one of the most unexpected and unusual in its complexity and power irritants the earthquakes brings the nervous system of the personality to the ultimate level of excitation. Increased sensitivity accompanies the person for a long time after the disaster has faded. Any noise similar to the banging of windows, the cracking of walls or the noise of an airplane, the slightest loss of balance is enough to bring the nervous system in a state of anxiousness and excitation. Another peculiarity of the need to transfer information, sometimes even false information, which creates panic. For example the situation of mass panic, which spread in Svishtov on March 7 in relation to the false rumor about the release of a poisonous gas from the chemical plant. The information about the false danger spreads with a lightning speed. Random residents warn by phone kindergartens, hospitals, schools. Random drivers alarm the neighboring villages and the region around Svishtov. This is not an ordinary need for communication; this is a need of very complex social dimensions – the sense of duty, of responsibility to the family, to the public. The amplitudes of response during this extreme situation are too complicated – from the fear and horror to the heroism, from the complete desperation to the mobilization of the will of the personality.

The human actions during the earthquake are multiform, but nevertheless they have common characteristics, which are the most widespread and therefore the most impressive for the human behavior. The quake in the labyrinths of mentality assumes very interesting and varied reflections. The personality in a non-standard situation – the choice of behavior, the taking of a decision and the actions during the natural extreme – create a basis for psychological variety, for stimulation of the moral values, for reassessment of life. Not for nothing some of the people inquired told that this was a "man-quake", not an earthquake. Therefore during the quake there were individual and group forms of behavior with great variety. Adequate is that, which corresponds to the requirements, established by the extreme situation before the personality or before the group of people. The inadequate behavior is related to passive, panic characteristics, in some cases unexplainable even by the person who performs them.

It is not a coincidence that panic together with fear is the most characteristic moment in the behavior of the personality or the group of people during natural disasters. It is not always the most widespread phenomenon, but it is the most impressively related to the experienced horror. The mass panic during the quake was too weak compared to the panic created just after the disaster (the rumor of a poisonous gas in Svishtov). During the disaster there are almost no registered cases of breaking-up of interpersonal relations.

The mental states of anxious tension are very favorable for the lightning spreading of rumors and panic. In this situation the mass media plays a very important role, the value of its authenticity and the range of its influence increase. During the quake and six months after that the most current and valued information was related to the earthquake. The panic stress states cover people in an instant, they spread with a lightning speed and sometimes there are even cases of self-suggestion of false danger. An employee of the Ministry of Interior – Svishtov stated: "Most of the people were holding a handkerchief in front of their noses, because they thought they smelled gas. But on this date the wind was blowing in the other direction of the plant and none of the residents noticed that. Many people requested first aid because they thought they were gassed…" The case of the mass panic in Svishtov on March 7 is related mostly with the illusory perception of the situation. The mass panic during an earthquake poses a series of problems related to the regulation of the behavior of groups of people under the conditions of a critical situation and the period of its fading.

During the earthquake on March 4 the adaptive, adequate behavior was the most observed. Its description includes the following elements: "I saw a movement, I heard noises, I felt shaking, I understood what was happening, I quickly went outside." In these cases there is hardly any horror or fear, because most of the people have had previous experience (mainly older people who have memories from previous earthquakes).

One of the most stable and mass reactions during the quake is the initiative behavior. The initiative person first identifies the disaster amongst the overall silence, which not always expresses misunderstanding, but rather fear and horror; he calls for action, coordinated, instructs, commands, and when necessary, intervenes physically. The greatest manifestations of initiative behavior are related to immediate rendering of help during the quake and after it, sometimes with the risk of your own health and security. These cases are widespread and present the personality not only as emotionally stable, but most of all as a socialistic personality with a high sense of responsibility.

Dominating mental states of the spirit. They are directly dependant on the degree of tension and the domination of one or another component of the critical situation. One of the characteristic manifestations during and after the earthquake is the disorganization of the personality. Here's the story of a man who lives in the immediate vicinity of one of the completely demolished residential flats in Svishtov: "I live on the sixth floor, I was standing at the window and saw the sinking of the adjacent flat into the ground. I immediately understood what was happening, I took the kids and decided to go out of the apartment. At this moment my neighbors from the opposite apartment tried to grab my kids by force. After I defended myself, they still managed to grab something – my coat, and immediately ran outside." The mass fear is a predominant mental reaction amongst people during the quake. The strong phase of fear dominates: "I could not move"; "I was running without direction"; "I was afraid of a second earthquake", etc. The elimination of this state from the spirit of the person takes a short or a longer period of time. Hours after the quake people were still sharing that they felt as if the ground beneath them was shaking. Sometimes the fear effect transforms into anger and aggressiveness – pushing away the people who are trying to calm you down, not believing that the danger has passed. The apprehension is a dominating mental state for the individual person, as well as for a group of people after the

fading of the quake. Despite the scientific forecasts that the quake will not be repeated, the dissemination of the rumor that on March 11 there will be another earthquake was accepted as true. On March 11 in the evening the streets of some towns were again filled with people who feared a second earthquake.

The various negative mental states are also characteristic of the post-critical situation. Anxiety, which transitions into increased contact between the people as a peculiar form of relief of internal stress. The mass behavior in the various cases shows that the interpersonal relations in the period after the earthquake were extremely dynamic. The earthquake was a reason and topic of discussion – you could talk to anybody, knock on every door, in a private home or in a public institution. As a clearly expressed socially-psychological phenomenon the anxiety was the most widespread dominant in the state of the individual person and of the masses. The anxiety was defense against the last attacks of the experienced fear. The common disaster had monopoly over the feelings of the people who were facing the danger. Philosophic concepts were dominating the conversations about the perception of the event. Some of these summarizing opinions are: "I still cannot believe that a person can be so helpless. I am 20 years old and just now I understood the value of life. I feel an unusual goodness inside me. I started to look inside myself. Now I understand that I should not pay attention to the small problems and conflicts", etc.

The mental state of mass grief was too clearly distinguished. The death and misfortune, which overtook us during the earthquake, are too different from the death by illness, old age or car accident. The natural disaster is perceived as a chance, uncontrollable by humans and therefore the death caused by it is perceived as unfair, especially for the children. The equal possibility for everyone to be among the dead also causes strongly negative mental states.

As a form of danger, which comes very unexpectedly, the quake "unmasked" the spirit of the individual personality or of the mass mentality. In the ordinary, everyday life a person can mask some of his negative qualities. This however is very difficult in extreme situations, as was the earthquake. In such situations the instinct for self-preservation acts first and the personality sometimes does things it should not be doing (chaotic and disorderly action), and in other cases it acts in the most reasonable and expedient manner. In this sense the earthquake can be viewed as one of the most certain, truthful and deep indicators for examination of the unmasked human spirit. After such a violent natural experiment the strong personalities rethink the experience, and quickly go back to their normal life. From a psychological point of view the effect of the earthquake on the spirit also has a positive effect – a reason for regulation, mastering your personal behavior, tempering the character and the strength of the will.

4.4. Intimate behavior in the common misfortune.

The intimacy of every person includes the relation to the deeply personal, valuable and known things. In this sense the earthquake from March 4, 1977 can be defined as a monstrous intervention in the deepest, most intimate layers of the mentality of a person. The strongest impact was on the marital-family relations.

More than 85% of the people examined in Svishtov indicated the saving of the children as the first reaction during the disaster. A tragic confirmation of this is the pose of the bodies of the fathers who were found in the ruins of the two demolished residential flats in Svishtov. The bodies of the parents were disfigured, while the bodies of the children – comparatively preserved. Particularly tragic is the case with M.P. who died while covering his child with his body, while it was sleeping in bed. A series of signs (still wet and matted hair and body covered by dust) show that the father has run from the bathroom, in order to save his child.

The love towards our children and our readiness to sacrifice ourselves in the event of a natural disaster are marked very strongly. Moreover – the known fetishizaiton of children's things found in the ruins (toys, clothes, shoes) has a shocking effect on most of the people present at the clearing of the demolished flats in Svishtov. Usually the mothers identify the body of the child the quickest with external expressions of mental emotions, the fathers try not to show their feeling of tragedy, but their state is usually accompanied by the tense and dramatic silence, which sometimes ends with feeling unwell or fainting.

The intimate relation of the children towards the parents during the disaster is also a mental feature of the experienced tragedy. A series of cases of intimate relation between parents and children uncover an extremely complex spectrum of moral and mental manifestations of the personality of our contemporary. The symbolic place occupied by the children in the life of their parents is so deep and strong that the loss of your own life loses ground to the idea of losing the life of the children.

The self-sacrifice of the parents, the particular feeling of guilt when they have been away from their children during the disaster, and the self-approval of the parental personality are interrelated mental phenomena in the intimate spectrum of the experiences of the parents. A series of examples during the earthquake prove that the actual value of the loving relation towards the children, towards the friends, towards the people who have been affected by the accident is the striving for hope, wellbeing, and happiness for those who we love. In essence love is always a positive and active motive of the human mentality. It manifests not only as a desire, but also as readiness, and often as self-sacrifice for the people closest to us. Therefore in the night after the earthquake there were mass manifestations of risk for your own life directed mainly at the good of the people. Exceptional examples of this behavior, a combination between the human and the official duty, with bright humane feelings were observed everywhere in the country, particularly in Svishtov. The behavior of the employees of the Ministry of Interior, Civil Defense, the municipality and especially the behavior of the medical personnel of the district hospital in Svishtov was led by high moral and ethical motives. In the first minutes after the earthquake an Operative Staff is established, which constantly, day and night struggles and coordinates the operations on rescuing the victims. One of the bulletins of the Operative Staff says: "Without being called, all medical personnel arrived at the hospital. Only five were missing – they were buried under the ruins."

Besides between parents and children, strong mental feelings of affection, love, self-sacrifice were manifested between the spouses during the disaster. In one of those cases a father, the only survivor of a family of four, develops a severe mental reaction with a marked tendency towards suicide. Particularly tragic are those cases of unbearable grief

when the marital relations in a family have been normal. And in cases of marital depressions and conflicts the quake affects the stability or the final break-up between man and woman. The loss of the wide, with who the man has been in unbearable relations, many times subjected to experiments for living together and with several divorce cases, causes the man to feel an incredible feeling of guilt and manifestation of a guilty conscience for the unhappy marital life before the disaster. The man is mentally broken by the loss of his wife.

The psychology of intimate relations during a disaster also includes the relations between grown-up sons and daughters and elderly parents. In the first hours after the quake the telephone network in the country was flooded by an information wave – children were interested how their parents were feeling; they wanted to hear their voices. The telephone network was overloaded and was unable to overcome the communication boom related to the thesis "I want to hear their voice, this means they are alive and well!" But there are also cases of negative relation towards elderly people – while running to the outside some of them were forgotten in the homes.

During the earthquake and after it the people represented a very large family with identical thoughts and feelings, and readiness for mutual support. But in the conditions after the earthquake the social measure between the moral duty, conscience and honor in several cases was overtaken by a certain form of fanaticism.

But the predominant positive manifestations and behavior during the disaster of individual persons or of groups of people show the social maturity and the moral responsibility of the personality of a socialistic type.

The earthquake was also a strong indicator of manifestations of negative nature, of primitive, amoral conduct. The most significant mark of these manifestations related to unceremonious selfishness was the marauding. Therefore the analysis of the conditions and the opportunity for marauding during a mass disaster are an important indicator of the moral of a society. The level of their manifestation is a very important social criterion for moral purity of the people. Therefore the reaction of the residents in Svishtov to the individual cases of marauding in the night after the earthquake is too symptomatic and characteristic. On the background of the mass suffering the public was ready to lynch, to get physical with the marauders. Only thanks to the call for discipline on behalf of the employees of the Ministry of Interior the marauders were saved from public judgment and physical retribution.

4.5. Mental phenomena after the disaster.

The connection between the physical characteristics of the earthquake and the scales of its mental consequences is obvious. The mental stress in the post-critical situation is caused and maintained by the objective consequences of the natural shock that affected a wide range of values in the personal and public life. Usually the number of the victims or the amount of destruction could not characterize the actual destructive power of the earthquake. In the situation of the earthquake the tragedy of the victims is perceived much more strongly because it is the result of an inevitable, sudden, uncontrollable natural disaster. The experience in the moment of the earthquake leaves reflections and accumulation of mental shock in the mentality after the disaster. The fading of the mental stress takes a much longer period, sometimes months, even years. Some people shared their feeling that "mankind is dying". The mental stress during the quake is characterized by high emotional amplitude, but in a mental aspect its power is greatly reduced.

Under the effect of the realized fear the mental ideas of the disaster and the memory of the earthquake in the post-critical situation a process of inadequate and unstable behavior develops, which often changes its characteristics – from strong emotional expression to depression, indifference, grief. In such a state a person is demoralized, expecting a new unknown danger of an earthquake. The memory of the disaster clears up, takes up a predominant part of the conscientious action, the relations with other people are subjected to the total topic "do you remember how it was, I don't feel like doing anything, what's the point now!" The tension after the earthquake is a permanent mental state up to the moment when the personality gradually starts to lose interest in its own memories, insinuations and ideas of the disaster. A woman at the age of 25 shared: "I live in constant terror and this is preventing me from thinking normally during the whole day."

The extremely powerful stress agents of the quake determinate in the post-critical situation mainly through the ideas in the mind of the person. He begins to search, to orientate towards the physical and social parameters of the living environment. A woman at the age of 36 says: "Now I think that in the town, with its tall buildings, the chances for survival upon a new earthquake are very small." A person may think that the flat, where he lives, is too tall, the stairs are too narrow, when the tram passes by the walls start to shake, etc. The people felt a mass desire to live "closer to the ground". Under the effect of the fearful tension a series of conditions of the environment, where a person lives, become symbols of a new danger. "I feel terror every time I have to go home on the sixth floor" – says a middle-aged woman.

In the post-critical situation there is a particularly strong feeling of anxious expectation. It is a result of the shifted and incorrect assessment of the objective reality in the mind of a person. The roles of fantasy and insinuation prevail. A person does not fear reality anymore, he fears the expected dangers of the future in hyperbolized fantastical images. A woman at the age of 32 shared: "I frequently imagined how the town would look like after a strong earthquake. Sometimes I even dream of this picture and after that I feel depressed the whole day." The fear is shifted by the immediate danger in the moment of the disaster towards the threat of the unknown nature of the future. The fear transitions into anxiety with regard to the perspectives, which arise on the grounds of the fantasy and the insinuation from the experienced event. Particularly characteristic in these cases is the decreased critical attitude of thinking, as a result of which there is a serious vacuum in the actual assessments and choices of behavior of the person. In the situation of anxiety the papers published a certain amount of information about small earthquakes in various countries near Bulgaria – Greece, Turkey, Iran, etc. In other cases this information would have been perceived as something normal, but then the comments were that "something is going to happen!".

After the disaster the personality enriches and rationalizes itself and its life much more deeply and forms a new behavior for protection of its values. The anxiety in many cases becomes the reason for searching of an exit from the critical situation. Furthermore, the state of the post-critical situation broadens the range of personal experiences. The changes in relations between people, the created mental vacuum in the minds of the person, the lack of personal

experience in emergency situations are reasons for dissemination of various rumors.

The rumor is a phenomenon, which includes in itself complex mental components. It may become the reason for panic behavior and negative human manifestations. They also constitute an interest for the social psychology, because in the conditions of an extreme situation and especially after it they could overtake the function of the official sources of information, to decrease the "conjuncture" of the communications and the sense of trust towards the media. The rumor is most of all a piece of news which must fill the mental vacuum in the mind of the person after the quake, and as a fabrication it disorganizes the social life, maintains the fearful tension.

Rumors can be various, but during the quake they were predominantly two types – some ascertained what had happened, others forecasted what could happen in the future. For example: "The entire town of Svishtov is destroyed! On March 11 there will be another earthquake – exactly at 9:20 hrs!" The first type of rumors "supplement" the content of the emotional experience, the second type of rumors amplify the anxiety, the sense of doom. The rumor is started by somebody, supplemented by various carriers and is designated for mass consumption. The rumor does not have a specific author, but it is always presented as coming from a specific source.

In the conditions of information "hunger" in the post-critical situation many people directed their interests exactly towards the topic of earthquakes. Our newspapers and magazines published a series of materials in this field. The Bulgarian television also presented some information. But the overall impression was that the mass media covered the matters, which interested the people in the country, in a restrained manner and sometimes with great delay. Therefore in post-critical situations the problem for regulation of the social behavior is particularly serious. The personal and social responsibility of the individual person and of the community in such a situation enhances its role. A good example of high virtue in such cases is the assumption of personal responsibility and risk without looking for social recognition. Such an example is the struggle for saving the lives of D.L. buried beneath the ruins in Svishtov – more than ten hours eng. Velchev, corporal Kazanov and private Todorov were working under a concrete slab, which could crumble over them at any moment.

4.6. Conclusions and deduction.

The mass media played a very important role for the mental state of the population during and after the earthquake. The disadvantage of this information was that it gave hastened conclusions and incorrect statements. The tragedy of entire countries was concisely suppressed and the mass heroism manifested on that day was announced just as a campaign, without personification of the participants. If the press and the television had competent and timely reports, information from the place of the event, photographs from the restorative works, interviews and opinions of more specialists, the "anti-seismic" feeling among the people would have been more stable despite the stress after the quake.

It is not impossible to be surprised again by analogous or similar natural disasters in the future. Therefore it is necessary to think about preparation, information and training of the population. At every spontaneous natural disaster the citizens need to remain calm, not to panic and to act with organization. Upon feeling the first signs of the earthquake the citizens must not leave the building in panic, but rather stay in the safest place, which is presumed to be near one of the interior walls of the construction or in an interior corridor, away from windows and exterior walls. After the passing of the first quake, all heaters, lighting fixtures, television sets and gas installations must be switched off; just take the most important things and personal documents and immediately leave the buildings. The home must be locked, the exit should be through the stairs (not the elevator) and the people must go to a safe distance away from the buildings. You must avoid standing under power lines, tram and trolley lines, and the movement should be along the middle of the streets. People in public places (cinemas, theaters, saloons) must remain calm and leave the buildings without panic. Priority must be given to the women and children. Specialists – physicians, engineers, workers, materially liable persons and others, who are on duty, must leave their workstations only upon instruction. During the earthquake the personal vehicles must not be left on the road lane, in order not to congest the road arteries. After the fading of the earthquake the return to the workstations and the homes may resume only after an announcement by the competent bodies. In order to prevent epidemics water from water sources can be consumed after permission from the competent bodies. The entry in buildings must be done with extreme care due to the danger of collapsing. Do not go in with torches, lanterns or lit cigarettes in gasified buildings. After the fading of the disaster the citizens should inform their relatives of their state.

The most important thing is to remain calm and to manifest the necessary moral and life qualities of the citizens and the control bodies, in order to prevent the direct, as well as the consequential damages from the spontaneous natural disasters.

Special thought could be given to the organization of joint courses or groups in qualification for anti-seismic preparation of the citizens. The public organizations in our country together with Civil Protection and other bodies are bound to undertake the necessary measures for that. The earthquake from march 4, 1977 must be used for overall information activity amongst the community, for establishment of "anti-seismic confidence" and education of the people, in order to manifest greater stability of the mind and enhanced readiness in case of future earthquakes.

5.0. Earthquake training of the students and the population in Bulgaria

Since the main goal of the project of the European Center (ECRB), Bucharest, Romania is the dissemination of earthquake training amongst the students and the population, it is expedient to present data about the state in this field in Bulgaria and the connection with the earthquake from March 3, 1997 with epicenter Vrancea.

The first part of this report indicates the impact of the earthquake with epicenter Vrancea from March 3, 1997 on the territory of Bulgaria and the effect, which it had on the crisis management system, and particularly on the training in risk prevention.

Until 1977 the Bulgarian schools did not offer training in prevention of natural and technological risks. There was only training for military times – protection against nuclear weapons. The subject was called "Primary military training" and had regular classes in 2nd, 3rd, 4th, 8th, 9th and 10th grade. The teachers were officers from the army reserve.

After the earthquake in Vrancea in 1977 the programs of this subject were changed and included classes in prevention of natural risks in 4th, 8th and 9th grade. The preparation of the population was implemented by workplace and residence following a special program of Civil Defense, which in practice was not implemented at all and was just accounted for.

Later the European Center in Sofia conducted an international survey and it turned out that there was hardly any experience in the field of training at a school level in the other countries around the world, with the exception of West Germany. On account of that Bulgaria was following the path of the regular classes, traditional for the Bulgarian education. Textbooks and materials in Bulgaria and from abroad were scarce. People had to develop everything independently and, of course, it was based on military practice.

Immediately after the earthquake in Vrancea in 1977 the Council of Ministers of Bulgaria established a Permanent Committee on protection of the population in case of disasters and failures with the task to eliminate the consequences. This was a new original form of management in case of extraordinary situations, which had the purpose of uniting all efforts – state, civil of science and culture. Such committees were later established in all "socialistic countries" and USSR. This practice was also transferred to the USA, state of California. Now similar structures with different names exist in almost all European countries.

The map of seismic division into districts in Bulgaria was immediately improved, which led to a change in the design, construction and control for almost the entire territory of the country.

Immediately after the earthquake in Vrancea in 1977 the Permanent Committee activated promptly and then maintained constantly all activities in Bulgaria related to the protection of the population and the prevention, on account of which several political decisions were taken with regard to the implementation of training of the population in protection in case of disasters and failures. Together with the introduction of the respective classes in the schools and with the purpose of covering the entire population with the training in the municipalities in 1978, people started to establish "Training centers on risk prevention", which were constantly operational. Some of these centers still exist. This is an expedient form of preparation of the population, especially in districts, which could be affected by an earthquake with epicenter Vrancea or other epicenters.

Of course, it is normal that after the initial stress due to the earthquake many activities are activated, but then the enthusiasm gradually starts to fade because of the fact that prevention activities are very expensive. 10 years after the earthquake in Vrancea, in Bulgaria there was another destructive earthquake in 1986 in Strazhitsa, which not only accelerated, but also restarted many of the activities, which were started in 1977. At that time almost every major municipality had a Training Center for risk prevention, specialized depending on the existing danger in the district.

The two earthquakes in Vrancea in 1977 and in Strazhitsa in 1986 caused a lot of serious changes in the rules of anti-seismic construction in Bulgaria. The quality control of construction works was improved. This construction was actually testes and successfully passed the inspection in several districts after the earthquake in Pernik in June, 2012. After this last earthquake people came to the conclusion that the combination between good anti-seismic construction and good earthquake training leads to a significant decrease in losses, especially the loss of human lives. Therefore our work and the results of this project are extremely important, because it can summarize all good practices and disseminate them in the region.

Immediately after the major political changes in Bulgaria (1989), based on the experience from the earthquake in 1977 in Vrancea the Bulgarian schools (in 1992) introduced a new subject "Protection in case of disasters" from 1st to 10th grade (total of 47 classes). For this purpose however it was necessary to have a decision of the National Assembly. The new subject also included classes in earthquake training. In time this subject was thematically enriched and modified. It should be noted that Russia, for example, started its training in this field mainly on the grounds of the experience in this subject in the Bulgarian schools; of course, now Russia is so far ahead of us and now it's our turn to acquire all good practices.

Based on the experience, which Bulgaria had gathered after the earthquake in Vrancea (1977), the European Centre for Risk Prevention Training at School Level (CSLT) was established within the Open Partial Agreement (EUR-OPA) in 1997 in Sofia, the successor of which is today's European Center for Risk Prevention (ECRP). It should be noted that the establishment of the European Centre for Risk Prevention Training at School Level in 1997 was based on a political decision of EUR-OPA, since Italy, France and Spain were against the establishment of such a center with such tasks. At that time these countries considered that such training was not necessary and that it was a consequence of the totalitarian way of thinking.

The European Centre for Risk Prevention Training at School Level (CSLT) actually initiated this activity within the framework of the Open Partial Agreement EUR-OPA. The most significant international activities of this center, from the results of which we can also obtain a lot of positive practices, are:

- 1997 Sofia – "International Conference on Training in the field of Risk Sciences at School Level" with the participation of 14 countries and 3 international organizations;
- 1998 Plovdiv – Second European Conference – "Risk Prevention Education at School and Pre-school Level" with the participation of 14 countries and 2 international organizations;
- 2000 Sofia – "The school communities and risk management" with the participation of 12 countries;
- 2000 International Workshop "Safety of Education Process and at the Workplace in the school building";
- 2002 Sofia – Work meeting "Risk Prevention Education at School Level" (Bulgaria, Italy, Cyprus) – BEGINNING OF PROJECT "BESAFENET" with first name: eur-opabesafeschool.net;
- 2003 Sofia – Seminar "Disaster Awareness with the use internet" and specially BeSafeNet and registration European center with this name in Cyprus.

The European Center in Sofia from 1997 to 2004 conducted many activities within the then existing program FORM-OSE, with which it summarized the entire experience of the member-countries of EUR-OPA in the field of training at

school level; the best practices were also summarized, which initiated the training in risk prevention at school and pre-school level in Europe, which up to that moment was not accepted.

The abovementioned information aims at indicating that within the agreement a lot of work has been done in the field of "culture of prevention against risks", but that work is scattered across the different centers, for example: a set of 10 textbooks published in Russia; a series of games issued by the Ministry of Interior of Spain; a pedagogical briefcase of the Ministry of Environment of France; the practice of annual national campaigns in Finland; rendering first aid, including by children, in San Marino, Armenia, Bulgaria; the results of the project of EUR-OPA, MODEM-Risks based on the implementation of the concept "Campus Virtuel"; the development of the French Institute IFFO-RME, together with the European Center CERP, of preventive measures in case of an earthquake, the establishment and introduction of two pedagogical means of primary and secondary education and of a training module based on the adapted model of the French National Plan for aid in a school building in case of a major disaster, etc.

Based on this experience I propose that the end result of this project finds its way into the development of a national campaign, specific for every country affected by an earthquake with epicenter Vrancea – Romania, Bulgaria, Moldova, Ukraine, as well as Greece and Cyprus.

A national campaign in the field of prevention of an earthquake with epicenter Vrancea can include the following package:

- General brief leaflet about the consequences of the earthquakes with epicenter Vrancea and their impact in the affected countries, rules of conduct and action in case of an earthquake (the initial text of this leaflet can be developed by the center in Bucharest based on the summaries from 2012 and in 2013 the text can be sent for opinions of students, journalists and specialists, after which it will be disseminated through the European Centers in each country – just like the work that the center in Kiev is doing now with regard to radiation);
- Directions for the use of BeSafenet in its part about earthquakes;
- Directions and pedagogical advices for the use of children's training simulators for earthquakes (Romania);
- Development of a scenario for radio transmission about the earthquakes in Vrancea and the impact in other countries with educational elements and inclusion of the opinions of people from affected regions in the respective country – with the option to use this scenario in each of the affected countries;
- Optional use of parts of the textbook "Earthquake Safety Programs for Schools" of the state of California (USA), issued by FEMA, with compulsory mentioning of the manners of fastening of furniture and other objects at home in the regions endangered by earthquakes, etc.;
- Summary and translation of various lessons and lectures on prevention of the risk of an earthquake for various age groups – from kindergarten to 10th grade;
- Explanatory material for the Training Centers for risk prevention in the Bulgarian municipalities.

The abovementioned example of a package is of course open for discussion and may be clarified in the course of our work.

Based on our work now within the framework of this project, the European Center in Bucharest can make a list of the most important multimedia materials existing in the field of prevention of an earthquake (epicenter Vrancea). Further thought can be given to holding a festival of films on the subject of prevention of an earthquake, initially only for epicenter Vrancea.

Used literature:

- Vrancea earthquake in 1977. It's after effects in the people's republic of Bulgaria , Publishing House of the Bulgarian Academy of Sciences, Sofia 1983
- Conclusions of European Activities of EUR-OPA
- Training-methodical teacher's guide on protection and self-defense in case of disasters, failures and catastrophes

ACTIVITIES PLANNED IN 2013 ***(split by partner)***

Working package 1 (prepared by ECBR):

Description:

Study of contents and dissemination means required for earthquake preparedness and education materials, to take into account the local conditions of Romania and comparison with experience of Greece and Cyprus.

Associated deliverables:

D 1 - Materials for earthquake education od students and citizens, to be posted on website of ECBR and and dissemination of other materials.

D 2- Seminar with partners at ECBR Bucharest, validation and improvement according to experience of Greece and Cyprus.

Work package 2 (prepared by ECMNR*):*

Description:

D 1 -Study of contents and dissemination means required for earthquake preparedness and education materials, to take into account the local conditions of Moldova and comparison with experience of Greece and Cyprus.

Associated deliverables:

Materials for earthquake education od students and citizens, to be posted on website of ECMNR and dissemination of other materials

Work package 3 (prepared by ECRP):

Description:

D 1 -Study of contents and dissemination means required for earthquake preparedness and education materials, to take into account the local conditions of Bulgaria and comparison with experience of Greece and Cyprus.
Associated deliverables:
Materials for earthquake education od students and citizens, to be posted on website of ECRP and dissemination of other materials

Work package 4 (prepared by TESEC):

Description:
D 1 -Study of contents and dissemination means required for earthquake preparedness and education materials, to take into account the local conditions of Ukraine and comparison with experience of Greece and Cyprus.
Associated deliverables:
Materials for earthquake education od students and citizens, to be posted on website of TESEC and dissemination of other materials

FINANCING FOR 2013

EUR-OPA : € 12500
Split between partners : € 5000 for ECBR
€ 2500 for ECMNR
€ 2500 for ECRP
€ 2500 for TESEC
Other contributors: € 4000 from partner countries

3.C. Ethic and social values

INFORMATION-EDUCATIONAL MATERIALS ON AWARENESS AND PREPAREDNESS TO EARTHQUAKE

DURATION : ☐ 2012 ☐ 2013 ☒ 2012 – 2013

LINE OF ACTION: 3.D. Ethic and social values

TITLE OF THE PROJECT: Development of information-educational materials on awareness and preparedness to an earthquake and on rules of behavior for people with disabilities, especially children

TARGET COUNTRIES: Armenia, the Southern Caucasian and neighboring states, other concerned member-states of the Council of Europe's EUR-OPA Major Hazards Agreement , other countries

PARTNERS INVOLVED:

COORDINATING CENTRE : ECRM Yerevan, Armenia

OTHER CENTRES

OTHER PARTNERS : "Republic Children's Rehabilitation Centre" (Yerevan, Armenia), the Disaster Medicine Department of the Ministry of Emergency Situations of Armenia

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013:

Development of information-educational materials, aimed to raise awareness and improve preparedness to an earthquake of administration and personnel of specialized educational and other types institutions, where the children with disabilities are provided care as well to prepare the children themselves and their family members to act adequately in a case of the earthquake and following it.

Specific yearly objectives:

2012:

Acknowledgement of administration and personnel (physicians, teachers, all those who are involved into administering care to the children with disabilities) of the "Republican Children's Rehabilitation Centre" with the contents and key provisions of the "Manual on preparedness and behavior rules for people with disabilities , especially children, if an earthquake is real or seems imminent(the priorities for action)", developed by ECRM in 2011. Bringing the meaning of the "Manual" to the sense of the children with disabilities, given care in the above institution. alongside with their family members.

In order to identify some approaches and venues, while creating a more detailed information-educational materials, drawn on the above "Manual" and assigned for the specialized education and other types institutions, where the children with disabilities are provided care, to consider and jointly analyze within this aspect the specifics of the "Republican Children's Rehabilitation Centre".

Based on the collected and discussed proposals to develop a final version of the above "Manual" with a focus on a section: " Plan for a specialized institution, where the people with disabilities, especially children, are given care".

Submission of the final English version of the "Manual on preparedness and behavior rules for people with disabilities, especially children, if an earthquake is real or seems imminent" as a contribution to implement of the corresponding Section of "Be Safe Net".

2013:

By factoring the results of analyses of specifics and the discussed proposals to create Basic Provisions for more detailed information –educational materials, assigned for specialized and other types institutions, where the children with disabilities are cared (the case of the "Republican Children's Rehabilitation Centre")

To develop information –educational materials ("Manual" or/and "Plan for action") on awareness and preparedness raising to an earthquake, assigned for the specialized and other types institutions where the children with disabilities are cared, as well on behavior rules for the children with disabilities, when an earthquake is real or seems imminent.

Organization of a training course for administration and personnel of specialized educational and other types institutions, where the children with disabilities are given care.

EXPECTED RESULTS

2012 :

A final English variant of the "Manual on preparedness and behavior rules for people with disabilities, especially children, if an earthquake is real or seems imminent (the priorities for action)".

Submission of the final English version of the "Manual on preparedness and behavior rules for people with disabilities, especially children, if an earthquake is real or seems imminent" as a contribution to implement of the corresponding Section of "Be Safe Net".

2013 :

"Manual"(or/and "Plan for action") on awareness and preparedness raising to an earthquake, assigned for the specialized and other types institutions where the children with disabilities are cared, as well on behavior rules for the children with disabilities, when an earthquake is real or seems imminent
Training course for administration and personnel of specialized educational and other types institutions, where the children with disabilities are provided care.

RESULTS OBTAINED PREVIOUSLY (if any)

The "Methodology and Plan for action, aiming to develop and hold of National and Municipal "Campaigns" on informing and warning the population about emergencies at central and municipal levels" has been developed.
Within a Project on the "National and Municipal Campaigns... the below information materials (including for the most vulnerable people) were developed :

- The basic (national) information materials for the population assigned for distribution in each family (the priorities for action to be undertaken by the population when warned on an imminent disaster or in case of disasters, which are likely to occur in Armenia)
- The information materials assigned for municipalities under special risks (one for the municipalities at a likelihood of a radiological risk; another for the municipalities in whose territories some hazardous substances are being produced, used or stored and the third one for the municipalities, located in flood-prone vicinities adjacent to high pressure dams;
- "Manual for the population on how to act when an earthquake is real or seems imminent" (the priorities for actions to be undertaken by the population.

From an information kit assigned for the most vulnerable population, as it has already been mentioned, as an initial step there was created a "Manual on preparedness and behavior rules for people with disabilities, if an earthquake is real or seems imminent".

ACTIVITIES PLANNED IN 2012 *(split by partner)*

FINANCING FOR 2012

EUR-OPA : € 6000
Split between partners : € 6000 for ECRM

RESULTS OBTAINED IN 2012

Work package 1 (prepared by ECRM)*:*
Description:
Acknowledgement of administration and personnel (physicians, teachers, all those who are involved into administering care to the children with disabilities) of the "Republican Children's Rehabilitation Centre" with the contents and key provisions of the "Manual on preparedness and behavior rules for people with disabilities, especially children, if an earthquake is real or seems imminent (the priorities for action)", developed by ECRM and updated in 2011. Bringing the meaning of the "Manual" to the sense of the children with disabilities, cared in the above institution alongside with their family members.
Associated deliverables:
Study by the Republican Children's Rehabilitation Centre's administration and personnel of the above "Manual", developed in 2011 by ECRM; participation of a feedback jointly with ECRM experts and drafting of proposals to improve it by given the specifics of the "Republican Children's Rehabilitation Centre".

By analyzing the information concerning the specifics of the Republican Children's Rehabilitation Centre in Yerevan, the creation of more detailed information materials assigned for specialized institutions where children with disabilities are treated requires taking into account:

- The basic venues of activities performed by such specialized institutions
- Knowledge of contingent of the cared children; their mustering of skills in every day live and a kind of social-psychological work delivered to them
- Basic principle and approaches applied to rehabilitate these children with an aim to prepare them to act independently in every day circumstances
- Composition and qualification of rehabilitation team assembled for each child: physicians (including rehabilitation physician , psychologist and ect.) , teachers, rehabilitation nurseries
- An extent and a form of the engagement of parents and family members of the treated children into the rehabilitation team
- Basic construction performances of a specialized establishment where these children live, are taught and given rehabilitation courses
- Practice of giving integrated teaching and rehabilitation courses when the treated disabled children study and have an access to the institutional facilities together with their healthy class mates (for instance, an integration kinder garden model)
- Type of a given care, applied rehabilitation and teaching methods :
- round- the -clock in - patient, day in- patient and out- patient treatment options

- Availability of plans on interaction with enterprises, organizations, academic institutions etc., located in the close proximity) regards the likelihood of showing prime assistance to the most vulnerable children (children with disabilities) in case of a disaster.

Work package 2 (prepared by ECRM)*:*
Description:
In order to identify some approaches and venues, while creating a more detailed information-educational materials, drawn on the above "Manual" and assigned for the specialized education and other types institutions, where the children with disabilities are provided care, to consider and jointly analyze within this aspect the specifics of the "Republican Children's Rehabilitation Centre".
Associated deliverables:
The analyses results , the specifics of the "Republican Children's Rehabilitation Centre"

During creation of the above "Manual" also the provisions of the underlying basic international documents, addressing the above venue were taken into account:

- The " Standard Rules on the equalization of opportunities for people with disabilities' (adopted by the UN's General Assembly in the Appendix to Resolution 48/96 of 20 December 1993)
- Recommendation Rec (2006) 5 of the Committee of Ministers to member-states of the Council of Europe "Action Plan to promote the rights and full participation of people with disabilities in a society: improving the quality of life of people with disabilities in Europe 2006-2015" (adopted by the Committee of Ministers on 5 April 2006 at the 961-st meeting of the Minister's Deputies")

Simultaneously to eliminate some shortcomings in the text of the Standard Rules, concerning the restricted access to education, information and warning (awareness raising) and relevant public services by people with disabilities of all ages regards the observation of their rights and the provision of equal opportunities to meeting their needs in the field of disaster risk reduction and reducing vulnerability, the protection of life and health against emergencies, there have been designed some suggestions to supplement the "Standard Rules" text.

Work package 3 (prepared by ECRM)*:*
Description:
Based on the collected and discussed proposals to develop a final version of the "Manual" with a focus on a section: "Plan for a specialized institution, where the people with disabilities, especially children, are given care"
Associated deliverables:
A final version of the "Manual on preparedness and behavior rules for people with disabilities, especially children, if an earthquake is real or seems imminent" with a focus on a section: "Plan for a specialized institution, where the people with disabilities, especially children, are given care"

Based on the collected and discussed proposals, there was created a final version of the above "Manual" with a focus on a section: "Plan for a specialized institution where the people with disabilities, especially children, are given care".
The "Manual" is designed for three categories of people with disabilities, especially children:

- People with impaired mobility
- People who are blind or have impaired vision and
- People who are deaf or have impaired hearing

At the same time the "Manual" is assigned also to their family members, guidance, neighbors, administration and staff of the specialized educational and other types of institutions, where they are provided care.
The final version in English of the above "Manual" has been submitted to the EUR-OPA Secretariat.

Work package 4 (prepared by ECRM):
Description:
Submission of the final English version of the "Manual on preparedness and behavior rules for people with disabilities, especially children, if an earthquake is real or seems imminent" as a contribution to implement of the corresponding Section of "Be Safe Net".
Associated deliverables:
Implementation of the corresponding Section of "Be Safe Net"

The final version in English is submitted as a contribution to implement (if a need may arise for) a corresponding section in the "Be Safe Net" website.

ACTIVITIES PLANNED IN 2013 *(split by partner)*

Working package 1 (prepared by ECRM)*:*
Description:
By factoring the results of analyses of specifics and the discussed proposals to create Basic Provisions for the above more detailed information –educational materials, assigned for specialized and other types institutions, where the children with disabilities are cared (the case of the "Republican Children's Rehabilitation Centre").

Associated deliverables:
Basic Provisions for the above more detailed information –educational materials, assigned for specialized and other types institutions, where the children with disabilities are cared (the case of the "Republican Children's Rehabilitation Centre")

Working package 2 (prepared by ECRM)*:*
Description:
To develop information –educational materials ("Manual" or/and "Plan for action") on awareness and preparedness raising to an earthquake, assigned for the specialized and other types institutions where the children with disabilities are cared, as well on behavior rules for the children with disabilities, when an earthquake is real or seems imminent
Associated deliverables:
"Manual"(or/and "Plan for action") on awareness and preparedness raising to an earthquake, assigned for the specialized and other types institutions where the children with disabilities are cared, as well on behavior rules for the children with disabilities, when an earthquake is real or seems imminent

Working package 3 (prepared by ECRM)*:*
Description:
Organization of a training course for administration and personnel of specialized educational and other types institutions, where the children with disabilities are provided care
Associated deliverables:
Training course for administration and personnel of specialized educational and other types institutions, where the children with disabilities are provided care

FINANCING FOR 2013

EUR-OPA : € 5 000
Split between partners : € 5000 for ECRM

PREPARING COMMUNITY TO EMERGENCY SITUATIONS THROUGH RISK CULTURE AND SUSTAINABILITY

DURATION : ☒ **2012** ☐ **2013** ☐ **2012 – 2013**

LINE OF ACTION: 3.C. Awareness initiatives

TITLE OF THE PROJECT :

TARGET COUNTRIES : Turkey, Russian Federation, Kazakhstan

PARTNERS INVOLVED :

COORDINATING CENTRE : *ECMHT Baku, Azerbaijan*

OTHER CENTRES:

OTHER PARTNERS : *Scientific-Research Institute of the Ministry of Ecology and Natural Resources, Academy of Emergency Situations, Seismological Service Center of Azerbaijan National Academy of Sciences of Azerbaijan, Azerbaijan Architecture and Construction University, "Fovgal" Association*

OBJECTIVES OF THE PROJECT

Global objective for 2012-2013 :
Intensified activity of the communities against emergency situations according to Hyogo program.
Specific objectives :
2012:

EXPECTED RESULTS

2012: *To prevent and liquidate the results of the emergency situations that intensified year by year, to intensify responsibility of the population, local institutions and communities.*

ASSOCIATED ACTIVITIES

2012: *International scientific-practical conference "Increasing sustainability in the most affected regions by natural disasters, preparation the community to the emergency situations and increasing risk culture among the population".*

RESULTS OBTAINED PREVIOUSLY (if any)

The report of the previous International scientific-practical conference was submitted to the Agreement on November 23, 2011.

RESULTS OBTAINED IN 2012

I. "Round table" (May 10, 2012) with the organizers of the project and experts and scholars of this sphere
During the meeting, the preparation of scientific-practical conference was discussed:
- Collection of necessary information related to the conference, specifying the conference hall for the plenary session and sections of the conference, preparation of technical equipment and organization of services to participants;
- Selection and confirmation of the plenary lectures and lecturers;
- Determination of the direction of sections and section's leaders;
- Approval of the preparation and publication of conference materials;
- Implementation of the conference through a committee (5 members) chaired by ECMHT director, prof. H.O.Ojagov.

Work rules of scientific-practical conference: Plenary reports of conference from 10:00 to 16:00 on November 13; Section meetings on November 13, from 10:00 to 16:00.
Plenary reports:
1. Prof. H.O. Ojagov, Director of the Center: "The role of management and development of disaster risk reduction"
2. Prof. G. Yetirmishli – Director of Seismological Service Center of Azerbaijan National Academy of Sciences of Azerbaijan: "The increase of seismic activity and its features"
3. Prof. N. Babakhanov – Chief of the Department of Geography, Baku State University : "Development of the risk culture and preparation of communities to possible natural disasters"

Plenary meeting of scientific-practical conference "Increasing sustainability in the most affected regions by natural disasters, preparation the community to the emergency situations and increasing risk culture among the population" (12-13 November2012)
The meeting was opened by H.Ojagov who noted that increasing major hazards are the product of world civilization. Beginning from last century, this process had taken such a scale that the organization of the analysis of these reasons and the struggle against it internationally in each country became reality and demand of our time. Massive need for a

quiet life, healthy food, pure water, clean air and clear sky are increased in social concerns day by day not only in the largest industrial centers but in the remote mountain villages too. There is no country in the world that will not face emergency situations and human losses from time to time.

The Republic of Azerbaijan is not an exception as the country is surrounded by Greater and Lesser Caucasus and considered to be the most complex regions of the world according to the intensity of the endogenous or exogenous situations. Almost the whole area of Azerbaijan is a very active seismic area. Earthquakes of magnitude 7-9, large-scale landslides, heavy streams, floods, volcanoes, etc. cover a wide range of areas in our republic and cause great harm to the economy and losses of people. The intensity of the emergency situations is increasing year by year according to global climate change.

An increasing of seismic activity, its duration, and dramatically expanding of the coverage of it, incredibly high scale of economic damages have caused serious trouble in the country during the last decades, especially in 2012 .Taking into account we have invited well-known scientists and specialists in these areas, the representatives of the relevant ministries and other government agencies . The aim is to discuss and analyze the situations together with the reasons which depend on the nature and direct us, to elaborate appropriate recommendations, to eliminate our shortcomings in against to emergency situations, instructing of the people and to define our opportunities to prevent all these.

In the report of prof. G. Yetirmishli, the director of Seismological Service Center of Azerbaijan National Academy of Sciences of Azerbaijan was noted that an increase of seismic activity on Earth is connected with globalization in the world and he added that the human factor plays an important role in global climate changes.

The seismic processes in the world differ with the covering of wide areas. For example, the earthquake measuring 7.0 on the Richter scale, occurred in Agdash region ,on June 4, 2009 was covered large area - Oguz, Gabala, Kurdamir, Zardab, Goychay, Ujar and Yevlakh regions (6 magnitude) and 5.0-magnitude covered the cities of Ganja and Mingechevir.

The earthquake occurred on May 7, 2012 started from Zagatala, north-west region of Azerbaijan and covered Balakan, Gakh, Sheki, Tovuz, Ismayilli and Gabala regions with various intervals and was lasted more than 10 days. Residential houses, social facilities and a number of schools damaged as a result of the earthquake. Only in Zagatala region over 500 residential buildings were destroyed, 5807 houses and 166 social facilities seriously damaged and suffered heavy losses in the neighborhood of Balaken and Gakh regions. Only for people who have lost its properties in Zagatala, 20 million manats (€) were allocated for the construction and rehabilitation of buildings in there.

Such earthquakes covering an area of 100 km are the abnormal events of globalization. The main reason of the destruction scale of earthquakes is the human factor. There is no need to apply experience of the world to compare. It is enough to look at the results of the earthquake occurred of same magnitude (7.0 magnitude) in Baku in 2012. There were no serious damages and no losses, only cracks in some of the old buildings.

The reporter noted that 9 seismic stations and one geophysical station was installed in the Zagatala region to determine seismic process and to evaluate the changes of the intensity state of geomagnetic fields. These systems are the most advanced devices made in the USA. The exact observed information transferred to Seismological Service Center of Azerbaijan in Baku within few seconds.

At the conference, it was noted that, importance of evaluation of the human factor should not be forgotten as the reasons of the damage besides occurrence reasons of the emergency situations. The human factor can be divided into 2 parts.

I. Human nature: the general development of society as a result of the rapid increase in world population and the urbanization, global climate change, etc.

II. Neglected in our daily life, negligence: not taking into account the sustainability of buildings and facilities during construction, not paying attention to the rules of normal use of land and water,not taken preventive measures against natural disasters and so on.

Neron Babakhanov, the professor of the Geography Department of Baku State University gave a critical analysis of natural disasters and struggle against them in our country and in the world in recent years. He was noted that the human factor plays great role in occurrence of floods, streams, landslides, forest- field fires, especially in large-scale destruction.

In this case, the anomalous warming in 2010, at the same time strong floods and landslides as a result of heavy rains in the mountainous areas, overflow of the country's largest rivers Kur and Araz basin committed an unprecedented destruction.

In conclusion, southern areas of Kura River ,especially in Sabirabat, Saatli, Imishli, Salyan districts, the areas where Kura receives with the Araz river was a great destruction dozens of towns, villages remained under the water,7500 families become homeless and lost all their properties.

Large-scale floods, landslides and soil flooding caused major losses of the population and inflict damages to the economy of the country. It is impossible to determine the exact extent of this damage.

It is enough one fact that 100 million state funds were spent for the restoration of the destructions in the large areas, construction of new settlements and providing people who lost all their properties with all residential means, foods and water. This process is still going on.

Following natural events happened in the country on decades, scientist came to the conclusion that such claims can be expressed in compact form:

1. Not taken into account suspected natural events on the construction of the building and all other construction work.
2. Indifferent attitude to the necessary preventive measures in disaster zones.
3. The lack of strict control on the implementation of rules centralized by the government on use of the soil, water, forests and selection of settlements

Scientific-practical conference materials were systematized, edited and published. Books (conference materials) after publishing will be first distributed to the emergency commissions and municipal organizations of the more affected regions by natural disasters.
13 November 2012.
Scientific-practical conference continued its work on the 4 sections from10:00 to 16:00
Sections and section leaders
I Section - "Improvement of the management of disaster risk reduction"
Chair of the Section: senior lecturer G.Hacımatov
II Section - "Preparation to the suspected natural disasters- improvement of the risk culture"
Chair of the Section: senior lecturer Sh. Danyalov
III Section - " Migration of population from destroyed places as the result of natural disaster to hazardous areas as the permanent residences"
Head of the Section : the expert of the Ministry of Emergency Situations, K. Bagirov
18 representatives took part in discussions on the reports and a recommendation was unanimously adopted.
Recommendation of the scientific-practical conference
Strengthening material and potential base of the struggle system with emergency situations in our country the last decade, an exemplary observation and timely warning organization, reconstruction of Seismological Service Center of Azerbaijan National Science Academy in accordance with modern technical standards, measures, such as widening The Ministry of Ecology and Natural Resources' metrological center network, starting from the peaks and covering all the territory was highly appreciated by the participants. They noticed minimization of human loss as a result of natural disasters and appropriate offers put forward for realization of necessary measures in this direction:
- Analysis of destruction left behind during emergency situations shows that, the great deal of them occurs mainly due to the human factor. Not taking into account probable natural disasters, not redeeming construction rules, disruption of regulatory rules in construction and use of water, gas, heating, and ventilation systems became common in activity of corresponding organizations. Participants noticed importance of state control on this field.
- The state care to the struggle against intensified natural disasters year by year was highly appreciated. They noticed the importance of involvement of municipalities, private business owners, farmers, business people to the struggle and its legalization by appropriate state orders. One of the points of concern was the non-recognized reconstruction of individual and social buildings at the expense of the state collapsed during the emergency situations and spending millions of manat on it. Although we expressed our comments during our scientific-practical conference last year, the situation remains th same. 20 million has been allocated from the president's reserve fund for reconstruction and removal the results of the Zaqatala earthquake in May of 2012. If continue so we will not be able to achieve insurance of individual properties widely used in the world practice, liability of organizations or persons responsible for sustainability of the facilities for public buildings destruction.
- One of the most important and discussed problem in the conference was the preparation of population to the struggle against the emergency situations and protection from them. Failure to comply with safety regulations brings to damages and losses during emergency situations even human losses. All this requires an increased attention to the development of preparation population to the safety. For this purpose short-term training courses must be organized to train people in regions, free guide books must be prepared and spread, mass media, especially opportunities of TV programs must be used. The active participation of Academy of MES and "Emergency" Association must be noticed especially.
- There were large discussions around the links between global climate changes and emergency situations in lectures and speeches. The involvement of qualified scientists and relevant scientific research institutes for detailed study of the main reasons of these events, and was stressed the allocation of sufficient resources effectiveness to this area.