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

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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 ORGANISEES EN 2010 DANS LE CADRE DE LA SUBVENTION ANNUELLE

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

ACTIVITIES CARRIED OUT IN 2010 WITHIN THE ANNUAL GRANT FRAMEWORK

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CRSTRA - CENTRE EURO-MÉDITERRANÉEN DE RECHERCHE SICENTIFIQUE ET TECHNIQUE RÉGIONS ARIDES/ EURO-MEDITERRANEAN CENTER ON SCIENTIFIC AND TECHNICAL RESEARCH IN ARID ZONES (BISKRA, ALGERIA)

❶ PROGRAMMES DE RECHERCHE

- L'optimisation de l'exploitation de la ressource hydrique en régions arides avec pour objectif majeur « *la préservation et la valorisation de l'eau* » ;
- L'agriculture saharienne dans une vision de développement durable avec prise en charge de la problématique de salinisation des sols irrigués et la lutte contre la lutte contre le risque d'ensablement ;
- La steppe et le risque majeur de désertification/ensablement en mettant l'accent sur l'étude de fonctionnement des écosystèmes steppiques et la possibilité de réhabilitation des espaces dégradés ;
- Les aspects socio-économiques avec pour objectif l'élaboration de modèles de développement adaptés aux conditions physiques, biologiques et socio-économiques pour les espaces steppiques et sahariens,

❷ SENSIBILISATION DE LA POPULATION

Semaine de la Recherche Scientifique (du 14 au 18 mars 2010)

Le CRSTRA a connu une intense activité scientifique notamment lors de la semaine de la Recherche Scientifiqueouverte au grand public, au cours de laquelle des conférences (débat consacrées aux risques majeurs) ont porté sur :

- La biodiversité et les stratégies d'adaptation face aux changements climatiques (siège central) ;
- La désertification en Afrique du Nord causes et conséquences (Station milieu Biophysique de Touggourt) ;
- Plan d'action pour la lutte contre le risque ensablement des oasis (résultats issus d'un projet du Centre)
- Au cours de cette semaine, la station des Bioressources d'El Outaya a ouvert ses portes aux différents acteurs de l'Agriculture afin de leurs faire connaitre les richesses locales en matières de Biodiversité, les bases d'une agriculture durable et leurs intérêts dans le contexte du changement climatique.

Le long de ces journées ont été distribués, aux institutions potentiellement utilisatrices et aussi aux agriculteurs, les éditions du centre portant le label EUROPA à savoir Désertification et Développement Durable, Impacts des changements climatiques et Aridoculture.

Nous avons saisi cette opportunité des portes ouvertes sur la recherche pour dupliquer et diffuser d'avantage l'ouvrage et/ou le CD-ROM de l'expérience pilote « Education et sensibilisation aux risques majeurs liés aux changements climatiques » (en trois langues) aux écoliers, lycéens, club verts . . . ., en raison de l'intérêt que le centre accorde à ce volet.

Sensibilisation des enfants

Comme à l'accoutumé le centre a reçu un groupe d'enfants au sein de sa station expérimentale Bioressources des Ziban pour les sensibiliser aux questions environnementales et notamment la préservation des bioressources locales dans ce contexte de Changements Climatiques.

Valorisation par des éditions des activités menées

- ARIDOCULTURE (02 Tomes)
- Les Risques Majeurs et les Catastrophes Naturelles (sous presse).
- Mise à jour des données du centre pour le site EUR-OPA.

❸ PARTICIPATION À L'INITIATIVE BE-SAFE.NET

Suivant les recommandations du coordinateur du groupe, le Centre a finalisé le travail relatif au « BE-SAFE.NET » concernant le risque Sécheresse, Désertification et impact des changements climatiques (en trois langues) dont il est chargé et ce pour le lancement du Site.

❹ BILAN DE L'ATELIER INTERNATIONAL SECHERESSE, ANALYSE ET STRATEGIES D'ADAPTATION

Les journées du 21 et 22 novembre 2010 ont été consacrées à **l'Atelier International sur le Risque Sécheresse (Analyse et Stratégies d'Adaptation)** au cours desquelles le risque sécheresse a été traité sur ses différents aspects (la connaissance du risque sécheresse, les indicateurs de la sécheresse et systèmes d'alerte et les stratégies d'adaptation dans le contexte du changement climatique). Outre leurs apports scientifiques et techniques, ces journées ont été une occasion de sensibilisation des partenaires socio-économiques et notamment les agriculteurs (en particulier les céréaliers pour l'intérêt spécifique de la culture et pour les possibilités d'assurance). A l'issue de table ronde sur les stratégies d'adaptation à la sécheresse un programme de veille écologique est décliné selon priorité thématique et spatiale.

Intervention de Mme Fattoum Lakhdari, Directrice du CRSTRA.

« La sécheresse est un risque majeur d'origine naturelle (anomalie météorologique) qui résulte d'un déficit pluviométrique aux impacts multiples :

- ✓ *Climatiques (augmentation de la T°C de l'insolation, des vents et de l'ETP).*
- ✓ *Hydrologiques (diminution de l'écoulement superficiel, assèchement des cours d'eau, des lacs, des chotts voire tarissement des sources et rabattement des nappes).*
- ✓ *Edaphiques (dessiccation des sols et augmentation de leur taux de salinité..).*
- ✓ *Agronomique (dessèchement des cultures voire perte des récoltes notamment celles des cultures menées en sec…).*

Ses effets dépressifs sont généralement d'abord perçus au niveau des biomes steppiques et forestiers à travers la repousse de la végétation spontanée (jaunissement et/ou brûlures foliaires, dépérissement, difficultés des remontées biologiques…).

Toutefois, différents mécanismes physiologiques confèrent à certaines espèces une tolérance et/ou une résistance au stress hydrique (régulation stomatique, régulation osmotique, réduction de la surface foliaire, développement du système racinaire), ce qui caractérise les plantes du milieu désertique (ou xérophytes).

L'impact de la sécheresse au niveau de la biosphère dépend aussi de la capacité de rétention en eau des sols et de la durée du déficit hydrique.

En effet, c'est au cours des grandes sécheresses, pluriannuelles que la désertification a gagné du terrain : la situation de la steppe Ouest comparée à celle de l'Est l'illustre bien. Dans les Aurès, le dépérissement du Cèdre de l'Atlas est bien corrélé avec la récurrence des sécheresses des dernières décennies au Maghreb.

Les domaines forestiers, de la rive méditerranéenne n'ont pas été épargnés : ils ont également Subi des dépérissements important à la suite d'épisodes successifs de sécheresse entre 1947 et 1976. Les sécheresses sont également à l'origine d'incendies de forêts en région méridionale (cas du midi de la France entre 1989-1992/ et en 2003, 2005 …).

La sécheresse historique des années 70 ayant frappé le sahel a sensibilisé l'opinion internationale en raison de ses effets dévastateurs (perte sèche des récoltes, décimation du cheptel, désertification, famine, migration des populations et enfin perte dramatique en vies humaines).

Bien que reconnue tardivement comme telle, la sécheresse est un risque majeur redoutable.

Des caractéristiques climatiques de plus en plus sévères associées à des demandes socio-économiques sans cesse croissantes, une certaine géographie de l'eau se dessine aujourd'hui. En méditerranée :

- ➢ *Des pays de la rive Sud, qui sont déjà en dessous du seuil de pénurie des 1000 m^3/hab/an avec risque d'accentuation d'ici 2025.*
- ➢ *Des pays de la rive Nord qui sont confrontés à une pénurie conjoncturelle due à la sécheresse comme l'Espagne, l'Italie, Malte et Chypre.*
- ➢ *Des pays confrontés plutôt à un problème de qualité de l'eau à cause des pollutions.*

Par ailleurs, les scénarios projetés dans le contexte du changement climatique ne sont pas à l'optimisme puisque l'on prévoit :

- *Une augmentation de la température ;*
- *Une diminution des précipitations ;*
- *Un déplacement des isohyètes bioclimatique*
- *Une accentuation des extrêmes (sécheresse inondations) ;*
- *Un déclin de la biodiversité.*

Si un tel scénario venait à se confirmer, un certain nombre de questions sont à l'ordre du jour :

- ✓ *Comment faire face à la réduction de la ressource hydrique sans nuire au développement socio-économique ?*
- ✓ *Quelle agriculture pour demain ?*
- ✓ *Quel calendrier agricole adopter ?*
- ✓ *Comment développer une culture du risque sécheresse pour mener tous les usagers de l'eau à promouvoir sa préservation ?*
- ✓ *Quelle recherche, privilégier sur ces questions ?*
- ✓ *Quelle stratégie pouvons-nous envisager de façon réaliste ?*
- ✓ *Quel programme de recherche prioritaire ?*
- ✓ *Quels types de profils à intégrer dans la formation ?*

Il nous faut tenter d'y répondre lors de cet Atelier. »

SESSION 1

- Mr. BOUCHREF Djamel (ONM-ALGER):

Il a présenté aux utilisateurs des données climatiques un ensemble de produits d'application climatologique à des fins d'aide à la décision. De l'analyse des données climatologiques traitées il ressort en Algérie :

- une diminution des précipitations ;
- un déplacement des isohyètes vers le nord ;
- un décalage des dates de début des pluies et des séquences sèches interannuelles importantes ;
- Prévision saisonnière comme outil d'aide à la décision.

- Mr. MEBTOUCHE Krimo- CRMA –Alger.

Face aux dégâts des aléas climatiques enregistrés dans le pays, il y a urgence de la mise en œuvre d'une assurance de sécheresses. Le produit d'assurance présenté permet de protéger les agriculteurs contre les effets de la sécheresse, d'assurer la pérennisation de leurs activités et une sécurité alimentaire. L'urgence de la mise en œuvre de ces produits (blé dur, blé tendre et orge) face à l'importance des dommages de ces deux dernières décennies représentant près de 14 milliards de dinars de dégâts et qui ont affecté 29 wilayas du nord à différentes fréquences.

- Mme. Annick DOUGUEDROIT (Université de Provence – France).

La présentatrice a commencé son intervention par rappeler l'existence d'une augmentation de la température depuis les années 70, à cause de l'importance de l'augmentation du taux du CO2 (qui représente plus de 60 % des gaz à effet de serre et dont la durée de vie de la molécule est l'ordre de 125 ans).
A partir des documents publiés par le GIEC et des publications récentes elle a démontré que :

- La région méditerranéenne est présentée comme très vulnérable aux changements climatiques en particulier en été.
- Les simulations proposées pour la fin de ce siècle montrent qu'il y a un accroissement de la sécheresse (durée, intensité et fréquence) due, en été, à la forte augmentation de la température de l'ordre de 4°C en moyenne et à la diminution des précipitations autour de30% mais variant selon les auteurs.

- Mr. BAHLOULI Larbi – ANRH –ALGER.

Les catastrophes naturelles les plus fréquentes en Algérie sont dues aux inondations.
Il a noté qu'il y a urgence de réaliser la cartographie des zones inondables à l'échelle communale et la protection des bassins versants contre l'érosion.

SESSION 2

- Y-a-il une arification du climat méditerranéen ? (A. Ahmed)

Une vingtaine de séries chronologiques (Pluviosité annuelle) a été analysée par l'utilisation du test Mann-Kendall et des régressions quantiles. Peu de cas de tendances significatives ont été montrés. Le débat a soulevé des questions techniques portant sur la signification de la pluviosité annuelle, sur les difficultés de comparaison entre des stations et sur l'intérêt des régressions quantiles.

- Evaluation de la sécheresse et leur changement dans les régions arides de Syrie durant la période 1958-2008 (M ; Shifa, ACSAD, Damas, Syrie)

L'indice standardisé des précipitations (ISP) est utilisé pour évaluer les sécheresses annuelles et saisonnières de 11 stations météorologiques localisées dans les régions semi-arides, arides de Syrie durant la période (1958-2008). Le test Mann-Kandall est utilisé pour détecter les tendances de l'ISP, alors que le « régime shift index » (RSI) est appliqué pour mettre en évidence les années de changement. Les résultats montrent une tendance négative, statistiquement significative pour seulement quelques stations. Ces changements peuvent avoir des répercussions sur l'agriculture pluviale, les ressources en eau et les écosystèmes.

- Sécheresse édaphique : le cas de la cédraie des Aurès (H. Amor, professeur à l'université de Batna)

Ce travail a été effectué suite à une grande vague de dépérissement du cèdre dans les Aurès avec des conséquences dramatiques sur le plan socio-économique et environnemental. Ce dépérissement coïncide avec des années successives de sécheresse. L'hypothèse avancée fut donc le déficit hydrique.
L'introduction de la réserve utile en eau du sol dans le bilan hydrique permet d'estimer les conditions réelles de l'alimentation hydrique des cédraies, c'est-à-dire, approcher la sécheresse édaphique.
Ce travail fait ressortir que le cèdre dans les Aurès est soumis certaines années successives à des conditions semi-arides auxquelles il n'est pas adapté.

Un débat s'en est suivi et a porté essentiellement sur la sécheresse, les tendances et la régénération.

SESSION 3

- La sécheresse et ses conséquences sur les écosystèmes forestiers et steppiques (B. Kadik)

Synthèse sur ces conséquences telles le déclin d'essences forestières et d'espèces steppiques mais en insistant sur le rôle des activités humaines dans la dégradation. Des mesures systémiques de prévention sont proposées.

- La réponse des écosystèmes steppiques aux sécheresses (A. Aidoud)

L'idée principale exprimée est que la sécheresse est la cause d'une baisse de la productivité. La dégradation de la végétation pérenne qui s'en suit est surtout due au surpâturage (à partir des années 1980). C'est le cas de l'alfa qui a disparu sur les glacis des Hautes Plaines.

- Conséquences de la sécheresse sur le développement végétatif des cultures et les mécanismes d'adaptation. Cas des céréales (A. Boulassel)

La régulation stomatique, l'osmorégulation, l'enroulement des feuilles…sont autant de stratégies d'adaptation développées par les plantes face au stress hydrique qui provoque cependant, directement ou indirectement et à des degrés variables, une chute de la production. Le recours à l'irrigation d'appoint est une stratégie à mettre en œuvre pour pallier le manque d'eau, améliorer et stabiliser la production.

Le débat qui s'en est suivi a porté essentiellement sur :

- Les effets très proches des stress hydrique et salin. Ce dernier s'installe graduellement.
- En zone aride, le déficit hydrique accentue le stress salin. Le développement racinaire est favorisé par le stress hydrique dont la provocation artificielle est préconisée.
- Intérêt de l'irrigation d'appoint qui devrait être appliquée dans les zones favorables.
- la question de la charge animale à appliquer en fonction de la production : l'évaluation de la charge optimale devrait être adaptée à l'extrême variabilité de la production (2,5 fois plus importante que cette de la pluviosité) et non sur une moyenne qui a peu de signification. Elle doit s'adapter à l'état du parcours qui devrait faire l'objet de surveillance permanente.
- L'ensablement de certaines steppes est une conséquence de la sécheresse et de la dégradation plus intense durant cette sécheresse. Il s'agit de « faire avec » et de ne pas essayer de reconstituer les écosystèmes préexistants (cas de l'alfa ou de l'armoise) car ils ne seraient plus adaptés aux nouvelles conditions. Ces milieux ensablés (cas des steppes à sparte) sont en revanche plus variables en matière de production et nécessitent une prudence accrue dans leur gestion pastorale.
- Une mise en défens expérimentale de faible dimension est à terme « contaminée » par une dégradation généralisée des espaces environnants. Celle de Rogassa a été dans ce cas. Celles du HCDS sont plus importantes (plusieurs milliers d'ha). Elles le sont temporairement dans un objectif de restauration passive. Ensuite elles sont gérées selon un mode contrôlé afin de ne pas dépasser le seuil permettant la reproduction de la ressource.
- La sécheresse des années 80 a été la plus efficiente dans la mesure d'une conjonction de facteurs climatiques mais surtout socio-économiques ayant concouru à la destruction des parcours alfatiers.
- Les sécheresses sévères « anciennes » étaient plus néfastes à l'homme et au cheptel (exemple celle des années 40) car l'homme et l'animal étaient intégrés dans la récurrence naturelle des sécheresses avec une régulation qui permettaient une régénération des ressources. Actuellement et surtout depuis les années 70, l'élevage passe outre les sécheresses puisqu'il a la capacité de disposer de compensations alimentaires durant ces périodes, compensations qui étaient traditionnellement utilisées mais seulement pour les brebis après l'agnelage.

SESSION 4

- Pratiques agricoles, changements climatiques et microévolution des populations d'oiseaux migrateurs et sédentaires (M. Belhamra, Université de Biskra)

M. Belhamra a montré les effets des changements climatiques et de l'intensification de l'agriculture sur les oiseaux migrateurs qui font partie du patrimoine faunistique national. Il a démontré de ce fait que cette population d'oiseaux est menacée de disparition au profit d'autres populations semi-migratrices et sédentaires beaucoup plus néfastes pour l'agriculture et le milieu.

- Enjeux du développement de l'élevage en zones arides et semi arides dans le contexte de la sécheresse (K. Abbas , INRAA)

Le deuxième communicant, Mr Abbas, a mis l'accent sur la situation de l'ensemble des éléments liés à l'élevage dans le contexte de la steppe et a précisé le danger que constituent les modèles de production de viande actuels sur la biodiversité animale et surtout sur l'état des parcours. L'orateur a fait aussi un bilan des recherches menées en la matière et a démontré l'utilité des travaux multi institutionnels et pluridisciplinaire dans des domaines prioritaires pouvant infléchir la dégradation des écosystèmes et garantir un développement durable et une meilleure diversité des activités d'élevage.

- Apports de la télédétection dans la lutte contre la sécheresse (K. Tichouiti, ASAL)

Cet intervenant a présenté l'ASAL et a énumérer l'ensemble des programmes à caractères environnementaux dans lesquelles est impliquée l'agence spatiale.

Le débat qui a suivi les communications a porté sur les points suivants :

- Les mécanismes à mettre en œuvre pour limiter et faire face à la disparition totale de certaines espèces menacées.
- Le déterminisme éthologique dans les changements de statut phénologique.
- Relation entre la conservation in situ à travers la création de parc nationaux et le problème du dépérissement du cèdre dans le parc national de Belazma.

Ces préoccupations ont été illustrées à travers des exemples concrets. L'intensification agricole notamment l'utilisation des produits phytosanitaire sur de vastes étendues ont contribué à l'effondrement des effectifs d'oiseaux au long court. La sécheresse en zone soudano-sahélienne aurait probablement entraîné de façon indirecte une mortalité anormale durant la période 1970-1990. Les aléas climatiques dans l'aire de reproduction tels que les coups de vent ou les pluies violentes, peuvent entraîner la destruction des nids, et influencer la survie des jeunes.
En ce qui concerne la réintroduction, les explications données retracent la métrologie en adéquation avec les critères énoncés par l'UICN, notamment les aspects de population viable à relâcher en milieu naturel.
Pour ce qui est du dépérissement du Cèdre des précisions ont été fournis mettant en avant que le parc national est crée conformément à une loi et par décret. L'institution gère un patrimoine soumis à des règles inscrites au plan de gestion que chaque réserve doit appliquer.
Concernant l'exposé sur l'élevage, 2 questions ont été posées :

- la première a porté sur la difficulté d'organisation des systèmes d'élevage devant le problème complexe du statut du foncier des territoires steppiques
- la seconde question avait trait à la conservation et l'amélioration de la diversité raciale animale étant donné le manque de connaissance sur ce matériel génétique

L'orateur a répondu en précisant que le problème du foncier pourrait être réglé par le zonage multicritère et l'organisation des paires de systèmes/territoires épousant un découpage dynamique qui relèverait de décisions politiques. Concernant la deuxième question, le communicant a précisé qu'il faut mettre en place un programme qui prendrait en charge les populations animales pour les préserver, évaluer et améliorer leurs aptitudes dans le cadre de systèmes d'élevage appropriés. A ce titre un premier PNR a été proposé par le CRSTRA en collaboration avec l'INRAA et concerne la race ovine Hamra menacée de disparition. Ce projet constitue un exemple pour les autres races animales de la steppe.

TABLE RONDE SUR LES STRATEGIES D'ADAPTATION A LA SECHERESSE

1. Caractérisation de la sécheresse *(indices, seuils, modèles* …)
   Sécheresse et changement climatique
2. Indicateurs physiques et biologiques de la sécheresse (les formes de dégradation du milieu physique : steppe, ensablement…)
3. Les impacts de la sécheresse sur :
   - Les ressources naturelles (végétation, eau et sols)
   - les activités socio économiques (exode rural, famines…)
4. Recueil des données et études climatiques existantes
   (Choix des données, stations, conventions, échange de données…)
5. Stratégies d'adaptation aux effets de la sécheresse
   - Approche systémique des recherches et des plans d'action sur la sécheresse
   - Observatoires
   - Gestion durable de l'eau et des sols
   - Gestion durable des forêts, des parcours et des troupeaux (rotation, mise en défens…)
   - Restauration et réhabilitation des terres dégradées
   - Rôle des assurances
   - Communication, formation et information
6. Stratégies de prévention des risques de sécheresse
   - Systèmes d'alerte précoce
   - Apports des outils de la télédétection
   - Surveillance des terres de parcours
   - Spatialisation de la réserve hydrique utile des sols
   - Apports des savoirs faire locaux, droit coutumier d'utilisation des parcours

PROPOSITIONS PRIORITAIRES

- Evolution et prospective des systèmes agro-pastoraux dans les régions steppiques (*1950-2100*)
- Evolution d'origine naturelle et socio-économique de la steppe dans le contexte du changement climatique
- Veille phénologique des espèces stratégiques et patrimoniales dans les oasis (*palmier dattier*)
- Conservation des populations animales menacées (ovins, caprins, camelins)
- Conservation des ressources phytogénétiques locales
- Suivi à long terme de la phénologie de la migration de la faune par entité écologique y compris les agrosystèmes
- Effets de la sécheresse sur la salinité des sols et des eaux

Compte tenu de l'importance des attendus de cette table ronde , la Direction du Centre a jugé nécessaire de la prolonger à la matinée du 23 NOV 2010 afin d'affiner et de traduire les perspectives prioritaires .
La lecture des conclusions de l'atelier a eu lieu en fin de matinée du 23 NOV 2010, suivie par la remise des attestations de participations (orale et affichée) , tout en remerciant la vive contribution de l'ensemble des invités et des chercheurs .

N.B. : Parmi les participants, on cite celle des agriculteurs et notamment les éleveurs et les céréaliers les plus touchés par l'impact de la sécheresse. Outre les stratégies d'adaptation pour faire face aux impacts de la sécheresse, ces agriculteurs se sont surtout préoccupés du système et modalités d'assurance devant être mis en place pour protéger leurs activités agricoles. Une première initiative a été lancée par rapport à une assurance des céréales. Elle a fait l'objet d'une conférence et d'un riche débat sur la flexibilité du dispositif par rapport aux spécificités régionales et climatiques.

ECRM- EUROPEAN INTERREGIONAL SCIENTIFIC AND EDUCATION CENTRE ON MAJOR RISKS MANAGEMENT / CENTRE EUROPÉEN INTERRÉGIONAL DE FORMATION SUR LA GESTION DES RISQUES (YEREVAN, ARMENIA)

INTRODUCTION

The activities, fulfilled by the European Interregional Scientific and Educational Centre on Major Risk Management (ECRM) in Yerevan in **2010**, as a representative of the Council of Europe's European and Mediterranean Major Hazards Agreement (EUR-OPA) in the Republic of Armenia, bore a diversified nature.
The Programs for **2010** activities followed the priorities for action in the field of disaster risk reduction in the European and Mediterranean space, set under political resolutions and recommendations adopted in the 11-th Ministerial Session of Agreement, in particular, those set in the Medium-term Plan (2006-2010), *the new priorities and requirements to the documents prepared and approved at the* 12-th Ministerial Session of the European and Mediterranean Major Hazards Agreement (EUR-OPA) on September 28, 2010 (Saint Petersburg), as well as the priorities set by other coordinating bodies of the Agreement:

- in the activities fulfilled by the Centre, the representatives of the state-members of the Council of Europe's EUR-OPA Major Hazards Agreement took part; the Center cooperated with relevant specialists from other centres, operating within the European Network of the Agreement, the International establishments, as well as with the Armenian Rescue Service and the State Crisis Management Academy under the Emergency Management Ministry of the Republic of Armenia), and other concerned Ministries, Departments and organizations of the Republic of Armenia;
- the activities of the Centre had multidisciplinary nature, programs have implemented within the framework of Horizontal programs: Training, Education; Comparative study of legislation; Communication, information and awareness raising; Scientific and technical co-operation; Researches, training; Preparation of the persons, intervening during a crisis situation at technical, medical and psychological level;
- the priority was given to the active methods of work, contributing to prevention, protection and relief in the emergency management related activities:
    - preparation and implementation of the Programs, targeted at awareness raising and human rights of the population and especially for the most vulnerable people (in particular children and people with disabilities), concerning disaster risk reduction and safe life activity,
    - initiatives for joint development and implementation of the regional programs, aimed at the trans-frontier disaster risk reduction,
    - activities, directed at perfecting and harmonizing of the legislation in the area of civil protection, disaster reduction and emergency response.

Cooperation with corresponding European Centres of country-participants of EUR-OPA Major Hazards Agreement and with Armenian national organizations was brought especially in following areas:

1. Harmonization of the legislations of the European Union (the secondary legislation), member – states of the European Union and the Republic of Armenia in the area of civil protection, prevention of emergencies and their response.
2. National and municipal Campaigns on informing and warning the population about emergencies at central and municipal levels: basis for a regional early warning system for Southern Caucasus countries and neighboring states in trans-frontier emergencies.
3. Preparing proposals on meeting strategic goals and choosing priority directions to act for the Government of the Republic of Armenia and Emergency Management Ministry in the field of disaster risk reduction and sustainable development for the next ten years within the policy pursued in the above area by the International Community **(primarily the continuation of preparing the proposals on establishing and further development of a National Platform on disaster risk reduction).**
4. "Human rights in disasters especially for most vulnerable people" (in particular for children and people with disabilities).
5. Developing corresponding documents, aimed to preparing the delegation of the Republic of Armenia for participation in the 12-th Ministerial Session of the European and Mediterranean Major Hazards Agreement on September 28, 2010 in Saint Petersburg.

❶ TRAINING IN FIRST AID SKILLS WITH ASSISTANCE OF THE ARMENIAN RESCUERS-INSTRUCTORS

OBJECTIVE OF THE PROJECT

Global objectives :

- Training population in first aid skills and elements of rescue operations according to the European methodic.
- Organization of training courses for training first aid specialists, as well as for training monitors (second grade instructors), for outmost, isolated, mountainous, not easily accessible regions of the Republic of Armenia, that in winter time and also in emergencies are often found to be isolated from the relevant Republic regional centres.
- Training in first aid for the guides, and primary for those, who take tourists to monuments of historical and cultural heritage, located in outmost, mountainous or other not easily accessible regions of Armenia.
- Organization of training courses for training first aid specialists, as well as for training monitors (second grade instructors) and the first grade instructors for training the monitors, from the students – members of the Alpine Club of Yerevan State Medical University.

The trained monitors (second grade instructors) and first grade instructors are assigned first of all to organize wide scale training of the students of State Medical University in practical skills of first aid and basis of rescue operations.
In this way we will manage to resolve two significant tasks:

- To have in the Republic a great number of specialists in administering first aid and moreover possessing the basis of rescue operations, who can be involved at major large scale emergencies, as well as who can show qualified first aid to victims at possible emergencies bearing everyday nature.
- They by mustering skills in first aid and being the first year students of State Medical University have an opportunity while studying at the University both to: strengthen their practical knowledge through acquisition of the practical ones in the disaster medicine area and extend and improve them at the course of being able to apply this knowledge on practice. More over those students, who will show the best grades, will be trained to the rang of monitors and first grade instructors, and already thereby will be included into a large scale process of training the various segments of population in the Republic in skills of administering first aid.
- Training in first aid and elements of rescue operations of the corresponding regular subdivisions of peacekeeping battalion of the Republic of Armenia.
- Organization training in first aid skills basing on the European methodic for the rescuers of special rescue detachments and the members of rescue associations of students and volunteers in close cooperation with the specialists of the Rescue Service of Armenia, preparing monitors, first and second grade instructors.

RESULTS OBTAINED PREVIOUSLY

In recent years within the framework of the present Program, special attention was focused on the organization of training courses for training first aid specialists as well as for training monitors (second grade instructors) for outmost, isolated, mountainous, not easily accessible regions of the Republic of Armenia, that in winter time and also in emergency situations are often found to be isolated from the relevant Republic regional centres.
If in 2006 special attention was focused on the organization of training courses in outmost, isolated, mountainous, not easily accessible regions of the Republic,
In 2007 the European Interregional Educational Centre for training rescuers concentrated its attention on organizing training in first aid skills basing on the European methodic for the rescuers of special rescue detachment, the members of rescue association of students and telephone operators, in particular:
In **2008** the training first aid courses as well as theoretical and practical training courses on rescue operations basis were also organized for the below other two civil groups.
The first trainees' group composed 18 members from the YMCA public organization (Union of young Christians, aimed at educational support to children) for ages 15-25, seven people from which had a university degree. The teaching course was organized from 16 June to 12 July.
The course participants, who showed good results at exams, were awarded the European Certificates with the right to administer first aid; the 6 best among them later will be trained for monitors (the second grade instructors with the right to train first aid to other people).
The children from the children Home "Nadejzda", the Gumry city composed the second group. The training was provided to 16 students for ages 14-18 (grades 8, 9 and 10). The 11 students, who successfully passed the exams were awarded the European certificates with the right to administer first aid. The teaching course was organized from 21 July to 16 August.
In **2009** (in April) the training first aid courses were also organized for the group of 8 students, which had a university degree. The teaching course was organized in Shirak region of Armenia by the financial support of the « KASA » Swiss Humanitarian Foundation.

RESULTS OBTAINED IN 2010

In February **2010** the three week first aid training courses were organized for two groups of tourist guides (15 people). These courses were incorporated into a wider spectrum of teaching courses, focused on safer life basis.
The teaching courses were organized in Shirak region of Armenia by the financial support of the « KASA » Swiss Humanitarian Foundation.

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❷ ENABLING COORDINATION OF ACTIVITIES IN A DISASTER RISK REDUCTION AREA IN ARMENIA.

The European Interregional Scientific and Educational Center on Major Risk Management as a representative of the European and Mediterranean Major Hazards Agreement in the Republic of Armenia has always been actively involved into coordination of the disaster risk reduction issues in the Republic of Armenia.

OBJECTIVE OF THE PROJECT

Global objectives :

- Acknowledging top officials, specialists and wide public in the Republic of Armenia with key priorities and most important documents available in the field of disaster risk reduction , civil protection and sustainable development being established and adopted by relevant international organizations in the most significant Conferences and Seminars, primarily by the relevant structures of the Council of Europe.
- Acknowledging top officials and specialists from relevant Ministries and Departments of Armenia, regional governments and local self-governmental bodies, along side with the school community officials and other educational, scientific, economical and cultural community leaders with basic documents and key priorities adopted in the EUR-OPA Major Hazards Agreement's Ministerial Meetings and meetings of the Committee of Permanent Correspondents
- Preparing proposals on meeting strategic goals and choosing priority directions to act for the Government of the Republic of Armenia and Emergency Management Ministry in the field of disaster risk reduction and sustainable development (within a common policy pursued by international communities in the above area
- Participating in the organization and holding in the Republic of Armenia of international and national, regional and local Conferences, Workshops, Round Tables, teaching and practical courses, in particular those held at a community level .

RESULTS OBTAINED PREVIOUSLY

Results, obtained in **2005-2008**, see in details in corresponding Activity Reports.
In **2009**

1. The draft variant of the proposals on meeting strategic goals and choosing priority directions to act for the Government of the Republic of Armenia and Emergency Management Ministry in the field of disaster risk reduction and sustainable development for the next ten years, within the policy pursued in the above area by the International Community (including preparing of the preliminary proposals on establishing a National Platform on disaster risk reduction) have been prepared.

In **2009** drawn on the analyses of the relevant internationals documents , related to the **National Platform** on disaster risk reduction, including these developed either individually or by support of the EUR-OPA Major Hazards Agreement, ECRM elaborated and submitted to the Minister of the Emergency Situation of RA a 15 page analytical document:

"A National Platform on disaster risk reduction- as an effective tool in reducing vulnerability of a society against natural, man-made, ecological, and other disasters and enhancing the sustainability of functioning of the Republic of Armenia".

The paper, incorporating five sections, analyses in depth the goals, objectives, mechanisms of creation, updating, functioning and interaction among National Platforms.
The paper promoted the decision about the creating in Armenia of a National Platform and its integration into the European network of National Platforms.
At the same time, ECRM active participated in holding relevant organizational events aimed at the setting up of a National Platform in Armenia.
(See in details in the "Proposed Activities 2010", Activity 2, section: "Results obtained previously", in 2009, about the several important steps, taken in this direction).
The director of ECRM as a representative of the Emergency Management Ministry was included into the group of experts of the Security Council under the President of the Republic of Armenia for building Technical safety concept.

The director of ECRM has participated in Task Force Group Meeting "To foster better radiological protection and information for populations living in areas that might be affected in the case of a nuclear or radiation accident" (2-4 September, 2009, Kiev, Ukraine) and Meeting of the Working Group "Role of local and regional authorities in Major Hazard Management" (11-12 June, Paris).

RESULTS OBTAINED IN 2010.

In **2010** as in previous years ECRM was actively involved into coordination of the disaster risk reduction issues in Armenia.

Our activity in the above direction in 2010 was aimed at the engagement in resolving two main tasks:

- the preparation of the delegation of the Republic of Armenia for participation in the 12-th Ministerial Session of the European and Mediterranean Major Hazards Agreement (EUR-OPA) on September 28, 2010 in Saint Petersburg.
- preparing the proposals for the creation of the National Platform on disaster risk reduction in Armenia.

Addressing the first direction, a comprehensive analytical- information kit, regards EUR-OPA Major Hazards Agreement in general and about the 12th Ministerial Session in detail for the Minister of Emergency Situation of Armenia, newly appointed for this position, was developed.

As for ECRM participation in the building of a National Platform on disaster risk reduction, than the efforts made in the above direction in 2009 were continued in **2010** (see in details in this above section "Results obtained previously", 2009).

In particular, ordered by the Minister of the Emergency Situations, dated August 4, 2010, a Commission on the creation of National Platform on disaster risk reduction was set up, that began developing suggestions connected to its establishment.

The Director of the European Interregional Scientific and Educational Centre on Major Risk management was included into the composition of the Commission. Drawn on the analyses of international experience gained in the creation of National Platforms, the materials of the Meetings dealing with the above issue organized under support of EUR-OPA in the office of UNESCO in Paris, an extensive paper was created:

"Building and strengthening of National Platform on disaster risk reduction as an effective tool for bi-, multilateral and regional cooperation (the case of Armenia)"

This document underlain the presentation of the Minister of Emergency Situations of the Republic of Armenia made at the 12-th Ministerial Session of the EUR-OPA on September 28, 2010 in Saint Petersburg.

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❸ HARMONIZATION OF LEGISLATIONS OF THE EUROPEAN UNION, MEMBER STATES OF THE EUROPEAN UNION AND ARMENIA IN THE AREA OF CIVIL PROTECTION, PREVENTION OF EMERGENCIES AND THEIR RESPONSE.

OBJECTIVE OF THE PROJECT

Global objectives :

- Harmonization (rapprochement) of the legislations of the European union (the secondary legislation), member – states of the European union and the Republic of Armenia in the area of civil protection, prevention of emergencies and their response.
- Evaluation of the extent, which the legislation of the Republic of Armenia in the above area conforms to the legislation of the European Union:
- Development of proposals referring to the harmonization of the legislations of the Republic of Armenia and the European Union in the area of Civil Protection under consideration through alleging the legislative Acts that is subject to alterations and additions and those that have to be newly adopted.
- Acknowledgement with legal tools and the best practices to apply effectively the provisions of relevant international documents in the field of awareness raising of the local communities about disaster risks, transparency and democracy in the decision making.

RESULTS OBTAINED PREVIOUSLY

Results, obtained in **2005-2008**, see in details in corresponding Activity Reports.

In **2009**

1. The Recommendation 1829 (2008) on "Trans-frontier Co-operation" of the Parliamentary Assembly of the Council of Europe in accordance with the Decision of the Committee of Permanent Correspondents (AP/CAT (2008) 12) of

the EUR-OPA Major Hazards Agreement regards the above document, has been translated into Armenian and presented to the Emergency Management Ministry.

2. The preliminary variant of Comparative analyses of the existence of provisions on responsibilities by local authorities for adequate informing the communities about disaster risks, for responding to disasters, and for communicating the operators of the installations at risk (on the pattern of France, Spain, Sweden, Belgium, Ukraine) has been fulfilled.

3. The Director of ECRM has participated in the Meeting of the Working Group on "Role of local and regional authorities in Major Hazard Management" (11-12 June, 2009, Paris).

4. There was analyzed the text of "The Standard Rules of the equalization of opportunities for people with disabilities" (adopted by the UN"s General Assembly) in Appendix to Resolution 48/96 on 20 December 1993 and there were given some suggestions to supplement the text of the Standard Rules addressing the above direction.

The analyses outcomes and some suggestions were included in the ECRM's presentation **:**

"Disaster risk reduction and protection of vulnerable people: preparedness and preventive measures" made at the Workshop :" Human rights and in disasters: search and rescue operations in disasters: especially for vulnerable people (5-6 November, 2009, Athens, Greece) organized in cooperation with the EUR-OPA and were shortly reflected in the "Activity Report 2009" for the Project under consideration: "National and Municipal "Campaigns" (Activity 4, "Results obtained in 2009, Introduction").

RESULTS OBTAINED IN 2010.

1. In **2010** the final updated variant of the paper : **"Constitution and safety"** targeted for the relevant authorities has been completed, developed, edited and submitted for publication.

Drawn on substantial analyses, some concrete proposals on altering and adding relevant Articles of the Constitution of Armenia were made. Both the analyses and proposals on making alterations and amendments were built on internationally accepted general principles and basic parameters, aiming to create an emergency management system and on managing the exercise of emergency powers within the existing Law .

The basic parameters, in their turn, are laid on the following general principles:

- Emergency Legislation must not contradict the principles and values of a democratic state, and
- Emergency Legislation must ensure flexible functioning and effective basis for emergency management(planning and response included)

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❹ DEVELOPING "SAFE LIFE ACTIVITIES BASIS IN EXTREME SITUATIONS" MANUAL FOR EXPERIMENTAL TEACHING IN SCHOOLS AND OTHER EDUCATIONAL ESTABLISHMENTS OF ARMENIA

OBJECTIVE OF THE PROJECT

Global objectives:

The developing, deepening and final creating a Manual: "Safe life activities basis", that will underlie the forming in students a reasoned and responsible attitude to their personal safety and safety of other people, to their ability to possess skills, enabling to safe their lives and health under unfavorable, threatening circumstances and to provide assistance to the others.

An ancient saying goes:" Be able to save yourself and the thousands around you will be saved"; in case you have failed to save yourself - try at least to improve the protection.

Forming a person, who is, first of all, safe for himself, surrounding people, the environment, and who is oriented towards kindness, creation and development and able to protect himself, a social community and the environment against external threats.

RESULTS OBTAINED PREVIOUSLY

Results, obtained in **2005-2008**, see in details in corresponding Activity Reports.

In 2009 the preliminary variant of the Methodology for teaching the course « Safe life activities basis» for secondary school teachers has been created.

The draft variants of the English translation of the following information materials for municipalities at special risk have been prepared:

- A manual for the population on how to act when *r a d i a t i o n p o l l u t i o n* is real or seems imminent (the priorities for action to be undertaken by the population)
- A manual for the population on how to act when *a f l o o d* is real or seems imminent (the priorities for action to be undertaken by the population)

- A manual for the population on how to act when *c h e m i c a l p o l l u t i o n* is real or seems imminent (the priorities for action to be undertaken by the population)
- A manual for the population on how to act when *a n e a r t h q u a k e* is real or seems imminent (the priorities for action to be undertaken by the population)

These materials intend to be included into the relevant chapters of the draft of fundamental teaching Manual (a Text book) for schools: **"The basis of survival in emergencies"**, created in 2006-2008.

RESULTS OBTAINED IN 2010.
In **2010** the preliminary variant of the Methodology for teaching the course « Safe life activities basis» for secondary school teachers was completed and sent for testing to the Refresher Training Faculty of the State Crisis Management Academy of the Emergency Management Ministry.
The themes developed earlier as brochures were enlarged, enrichied and included into the Manual as separate sections.

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❺ DEVELOPING SPECIAL TESTS TO ASSESS SAFETY OF EDUCATIONAL ESTABLISHMENTS

OBJECTIVE OF THE PROJECT
Global objectives :
Developing and implementing special tests for school administration, teachers and parents to assess the extent, to which their school is secure, to undertake preventive measures to reduce risks as well as to respond adequately to an imminent natural and a man-made disaster or to a terrorist attack or to a threat of such an attack.
The special Tests designed by us for school administration and teachers and tests and recommendations designed by us for parents are suggested as one of the effective mechanisms in ensuring preparedness of schools and other educational institutions for disaster risk reduction and awareness raising enabling the school staff, teachers, students and their parents to provide adequate response to any locally experienced emergency.
The Tests for school administration and teachers are targeted to identify the level to which their education establishment is ready to eliminate natural, man-made and other disaster risks and to respond adequately to them and also if it is threatened by a possible terrorist attack.
The Tests for parents enable them to highlight levels of a culture of safety, as well as of parents' preparedness to recognize a hazard and undertake preventive measures aiming to reduce risk of involving children into extreme situations and also to act rationally if an emergency incident occurred in their school.
Tests outcomes can serve a basis for designing recommendations on reducing vulnerability of schools, for improving preparedness of the school staff to act adequately in particular disaster and reviewing and updating the disaster preparedness Plans.

RESULTS OBTAINED PREVIOUSLY
The created in **2006-2007** "The Program of developing and instituting special tests for school administration, teachers and students' parents to assess safety of schools and of other educational establishments" *has been profoundly reworked out and updated in **2008.***
The translation of the paper into English has been completed. The work outcomes have been presented by the ECTR representative at the Euro-Mediterranean Workshop: "Disaster reduction at school-Building safer school communities" held on 29-30 October, 2007 in Paphos, Cyprus.
In **2009** the ECRM has reviewed and polished the basic tests and general recommendations for accessing and increasing safety for school administration and parents, developed in 2006-2008.
The final version of basic tests and general recommendations with the involvement of the State Academy of Crisis Management has discussed, agreed upon and approved.

RESULTS OBTAINED IN 2010
In **2010** the final version of basic tests and general recommendations with the involvement of the State Academy of Crisis Management has discussed, agreed upon and approved.

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❻ "EXTREME PSYCHOLOGY"

OBJECTIVE OF THE PROJECT
Global objectives :

Psychological impact of hazardous events manifests itself in different people differently; in some people a sense of danger can transform into a sense of doom, making him/her feel h**e**lpless, distressful and disable to act purposefully, including in ensuring one's active protection ; whilst in others an endangering situation can generate overall elevation of spiritual and physical forces, increasing thereby his /her coping capacities.
It is evident that human safety under extreme circumstances in many respects will depend on his/her ability to maintain self-control.
This work is challenged to:

- create a universal teaching Manual (for the begining in Armenian) to teach methods of emotional-will-self -regulation
- serve as a Manual to teach rescuers, peace keepers, other specialists, operating in extreme circumstances, as well vast lays of the population, including school - and higher institution students
- form and develop in people (be it a rescuer, an adult or a young man) an ability to maintain his/her self-control
- teach to assess correctly of what is going around and be able to make adequate decisions which is provided only if this condition (maintaining one' s self-control) is met.

Teaching the « Extreme psychology » is aimed at building a system, that will impart special knowledge, skills and capacity, needed for quick adjustment of oneself with new situation as well as for developing his/her inner readiness to deal with potentially most dangerous life activities.

RESULTS OBTAINED PREVIOUSLY
In 2006-2007 a preliminary variant of brochure: "Extreme psychology" was created.
In 2008 some sections of the brochure were expanded, the work was updated and enriched.
The brochure's brief contents

1. **Psychological basis (some recommendations):**
   - is it possible to learn to control oneself
   - correct self –evaluation
   - coping with failures
   - not to speed up the events (to stop for some time, but not to retreat in the face of difficulties)
   - proving protection against psychological trauma
   - ineffectiveness in pursuing a "Burning bridges" strategy
   - ability of responding negatively
   - ability of establishing easy and simple communication links.
2. **Psychology of human conduct in times of crisis.**
   - personal livelihood strategy
   - self -confident conduct
   - personal features required to dealing successfully with a critical situation
   - in other adequate circumstances- high spirits will increase your chances for success ("My spirits are my castle")
3. **Some recommendations on how to maintain one's self -control in a threatening situation.**
   - recommendations that are to be brought for consideration to disaster victims.
4. Basic conduct rules for hostages
5. A list of some books on self -defense aspects .

In **2009** the preliminary variant of brochure « Extreme psychology » has been completed and sent for testing to the Rescue Training Chair of the State Crisis Management Academy and to some other educational institutions of the Republic of Armenia.

RESULTS OBTAINED IN 2010
In **2010** a final variant of « Extreme psychology » brochure, drawn on the results of discussions, comments and recommendations of specialists, was prepared.

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❼ CREATING A MEMORANDUM FIRST AID POCKET BOOK.

OBJECTIVE OF THE PROJECT
Global objectives :
A Memorandum first aid pocket book is called to prevent the similar situations and to assist rescuers and volunteers if a need may arise to recollect the acquired knowledge. It is also likely to serve a guide for all those,

who, having this Manual at hand, can be found into a role of helpers in different emergency situations, ranging from natural disasters to other types of accidents and life traumas.
For achievement of the above mentioned the following objectives are to be realized :

- creating a Memorandum first aid pocket book, that could be helpful in recurrent repetition of the gained knowledge and the reinforcement of acquired skills
- specification of correct actions required if necessary to be fulfilled in a stress situation
- likely administration of first aid to a casualty, even by a non trained/ nonprofessional witness .

For the sake of convenience and for making showing first aid easier, it is necessary to create and institute a Memorandum first aid pocket book, whose challenge is to serve:

- a normative document, that will attach self confidence to act properly while rendering first aid through the precise identification of a human mandate, potentials, rights and duties, priority for action and consistency in decision making
- a teaching manual as a brief summery of lectures, convenient for usage at any free time
- a "crab" containing elements enabling immediate search for urgent information.

"The Memorandum first aid pocket book " intends to incorporate all the situations, where if first aid is lacking a human life might be at real risk .
The administering of first aid should be preceded by operative decision making. This first step will predetermine the achievement of success in preserving one's life.
It is here where accompanied by all necessary details one will find recommended the basis of effective actions undertaken by a witness, technology of assessment of a situation and a state of a casualty and his/her severity score scheme, imparting three successive stages:

- initial assessment of a state of an injured and a level of safety in a vicinity area (no more than 10 seconds)
- identification of signs putting a disaster victim's life at higher risk that may cause his/her rapid death should first aid is not provided in due time
- revealing wounds and signs of bone and joint injures (the length of this stage is not restricted ; what crucial - is to avoid causing pain to an injured).

While administering first aid, a hand-book's structure and form will enable a direct and rapid shifting from one theme to another, screening one situation after another even in that especially difficult situation where one has to assist a disaster victim failing to acquire basic fist aid skills and attend first aid classes , but having this memorial hand-book available at hand.

RESULTS OBTAINED PREVIOUSLY
2007. The relevant material for creating "The Memorandum first aid pocket book " has been compiled
2008. The preliminary variant of "The Memorandum first aid pocket book " was developed.
2009. The preliminary variant of «Memorandum first aid pocket book» has been completed and sent for testing to the Rescuers Training Chair of the State Crisis Management Academy and non-governmental rescue organizations.

RESULTS OBTAINED IN 2010
2010. A final variant of "Memorandum first aid pocket book" drawn on the results of discussions, comments and recommendations of specialists of the Rescue Training Chair of the State Crisis Management Academy and non-governmental rescue organizations was prepared.

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❽ CREATING AND EDITING THE "FIRST AID MANUAL" UNDERLYING THE ORGANIZATION OF TRAINING

OBJECTIVE OF THE PROJECT
Global objectives :
Speeding up a spread of knowledge and training practices to muster first aid skills in Armenia through teaching first aid basis and disseminating memorial hand-books:

- creating a **Universal teaching manual** (for the begining in Armenian) **to teach first aid skills**
- serving a Manual to train rescuers and other first aid providers, as well as the vast majority of population, including school students and residents of outmost, isolated, mauntainous, not easily accessible regions of Armenia .

The goal of teaching first aid through this Manual is to do the utmost to prevent a death of an injured on the scene, as well as to reduce the number of lethal outcomes before the professional helpers arrive.

Prior the witness must be taught not only how to avoid panic in an established emergency situation, but also how to mobilize all his/her potential to make most rational decisions in times of a crisis.
For achievement of the above mentioned the following objectives are to be realized:

- scrutiny of all available European, Russian "Atlases on administering first aid", manuals, text -books and brochures,
- making some comparison underlying the development and completing the improvement of the Manual itself, through including into it all the positive, that could be derived from other Atlases,
- organizing workshops and running training courses for the rescue services and for other organizations to teach first aid,
- training specialists to teach first aid , especially to residents of remote hard-to reach mountain regions of Armenia,
- training first- and second grade instructors,
- carrying out necessary training exercises to reinforce the acquired first aid skills,
- testing of a Manual at the Chair of the State Crisis Management Academy of the Emergency Management Ministry.

RESULTS OBTAINED PREVIOUSLY
Results, obtained in **2007-2008**, see in details in corresponding Activity Reports.
2009. The improoving preliminary variant of « First aid manual » has been completed and sent for testing to the Rescue Training Chair of the State Crisis Management Academy.

RESULTS OBTAINED IN 2010
2010. The final version of **"First aid manual",** drawn on the results of discussions, comments and recommendations of the specialists of the State Crisis Management Academy, was prepared.
As it has already been mentioned in Activity Report 2007, the Manual consists of 26 chapters and includes all likely situations, being not compatible with life(this incorporates clinical death, a coma, an unconsciousness state, a traumatic shock, wounds, fractures, burns ect.), the way out of which is directly linked to those in the surrounding who can administer first aid.
No less important is that this Manual includes only those first aid practices preventing the death of an injured before an ambulance brigade arrives, that actually can be made applicable by any citizen.
The most effective might be a training complex comprising:

- text-books for self-instruction , instructions, leaflets, posters and tables
- robot-training, computer programs and video films
- standard first aid kits.

The aim of this training complex is to

- run successfully classes for audience targets varying in age, education background and perception ability, as well as to involve also non professionals into a training process

The teachers mustering first aid skills to perfection are excel in this respect.
An accident witness must learn for sure, that it is better to undertake the least measures to save someone's life, than not to do anything at all.
Apart from life threatening situations listed above, the Manual provides some anatomical orientations required for the carrying out cardio-pulmonary resuscitation; identifies the traumas, that may result in traumatic shock; states in what cases one is to call for an ambulance brigade; gives a scheme of rapid identification of burns area ect.

ECMHT - EUROPEAN TRAINING INFORMATION CENTRE / CENTRE EUROPÉEN DE FORMATION ET D'INFORMATIONS (BAKU, AZERBAIJAN)

"Scientific and practical basics (rules) of preparation of educational programs and learning aids on the safety of life activity for comprehensive schools"

Participating agencies :

- Ministry of Education of Azerbaijan Republic
- Ministry of Emergency Situations of Azerbaijan Republic
- Baku City Education Department
- Azerbaijan State Pedagogical University
- Azerbaijan University of Architecture and Construction
- Institute of Education Problems
- Institute for professional development and retraining of pedagogical staff
- Republic Institute of Teachers

Scientific and practical conference was attended by well-known scientists, specialists, experts, pedagogues and experienced teachers of comprehensive schools of the country in the sphere of education, pedagogics, child psychology, and emergency situations. Plenary and divisional meetings of the two-day conference were attended by 60 persons, 12 lectures were listened.

MAIN LECTURES:

I. "Theoretical basics and educational standards of the subject of life safety"

II. "The state of the teaching of protection skills in comprehensive schools and opportunities of improvements within the education reforms carried out in the country"

III. "The necessity of improvement of text books and learning aids on the protection skills and their conformance to modern education standards, training of a new teacher staff"

V. "Realization perspectives of content standards established in the direction of life safety in the curriculum of the subject of "Knowledge of life", teaching of which began in junior schools in 2008".

During the lectures, the state of the teaching of protection skills in comprehensive schools of the country was discussed in details, advantages and disadvantages were analyzed, appropriate options for the teaching of the subject of "Safety of life" in accordance with the modern requirements were discussed.

The discussions of the lectures at the plenary and divisional meetings of the scientific and practical conference were attended by 22 persons. Recommendations on more perfect teaching of protection skills to pupils of comprehensive schools, learning aid meeting modern requirements, perfect provision of schools with a teacher staff of this sphere, and other issues in connection with the subject discussed at the conference were prepared and given to appropriate education authorities.

Recommendations of the Scientific and Practical Conference

During the conference, the state of the teaching of protection skills in comprehensive schools of the country was discussed in details, the importance of the application of the experience of countries members of the Agreement, as well as the Russian Federation and Turkey was stressed, a principle aim at the arrangement of teaching of life safety skills in schools was declared.

Participants of the conference considered it important to highlight it with a special concern that long-term education reforms carried out in our country, have covered almost all the spheres of teaching, and although there were achieved certain results, teaching of protection skills has covered so far just junior schools (1st to 4th forms). In 2008-2009 school year children began to be taught primary protection rules within the subject "Knowledge of life". Although, there are no changes in upper classes (V-IX). Mistakes pointed out for years: "Not inclusion of the subject "Basics of life safety" to educational programs as an independent subject, insufficiency of academic hours, inter-form intervals, not training of pedagogical staff in this sphere and other issues are still pendent.

According to the officials of the Ministry of Education, teaching of the "Basics of life safety" as an independent subject in upper schools is not expected for the present, the c o u r s e used at the level of junior schools will be applied in the system of secondary education.

Participants of the conference unambiguously noted that the continuation of direction in upper schools does not meet the modern requirements, and stressed the significance of the experience of the countries members of EUR-OPA, as well as the Russian Federation and other CIA countries in the teaching of protection skills in comprehensive schools.

It was noted, that teaching of children to the rules of risk management in schools years is a very serious i n v e s t m e n t, and that in future it will provide significant decrease in the number of losses and especially of human casualties during emergency situations.

Knowledge and experience gained by the children during school years remain in their memories forever, and help them to make proper decisions in the emergency situations.

It is from practical point of view. From social and political points of view, in the country that is in state of war it is important and necessary to teach basic military training, basics of medical skills, and "Basics of life safety" at the same level with other subjects.

Attitude of the European Council to this issue attracts attention also for the reason that unlike us, this organization recommends to start forming risk culture in children earlier, at preschool ages. From the point of view of ethical and moral education, it is quite right and shall be definitely e s t e e m e d . The feature that remains beyond our public attention shall be considered not only by families-parents, but also by the institutions engaged in education of children.

Conference participants definitely confirmed irreplaceable role of protection skills from early childhood and further uninterruptedly in all the stages of education in the formation of protection culture in society. During the discussions, it was especially noted, that unlike the European countries, our country has own specific problems in the putting of the teaching of protection skills to the level of global climate change. Lack of single concept in teaching of protection skills in our country, as well as in imparting of risk culture to the population, makes the backlog of problems even heavier.

Necessary actions to be taken in the direction of reduction of the scale of emergency situations under the conditions of global climate changes, constantly growing technogeneous and other incidents, minimization of their material and moral damages, prevention of human casualties depend on the works to be carried out in this sphere.

Given all the abovementioned, the participants offer:

1. Formation of knowledge, skills and abilities of life safety shall be considered one of the priority tasks of the comprehensive education system of the republic, shall have stable and solid place among the compulsory subjects of the education programs, cover all the stages of education and taught u n i n t e r r u p t e d l y.
2. Teaching of the rules of life safety shall be based on the proven pedagogical principles ad modern leading international experience. Experience of our country shows that the expectance of the tradition of teaching in junior schools (I-IV form), where all subjects are taught by one teacher, in the teaching of protection skills is reasonable from pedagogical and psychological points of view. In junior school the factor of the influence of a teacher prevailing even over the influence of parents shall be used rationally.
3. Unlike the junior classes (I-IV) of comprehensive schools, in upper classes (V-IX) teaching of protection skills shall be included into the education plans and schedule of classes under any name ("Basics of life safety", "Civil defense", or "Civil security" etc.).
4. 35 hours per year (only once a week) allotted for the subject "Knowledge of life" taught at present in out comprehensive schools is not sufficient at all, moreover, the structure of the subjects includes only 3-4 hours allotted for the issues of life safety, whereas, the experience of other countries, e.g. Russia or Turkey, is completely different. In the Russian Federation, "Basics of life safety" is an independent subject and taught at all stages of comprehensive education beginning from the first form. In the senior schools of Turkey, protection skills are taught within the subject "Knowledge of life". But, unlike us, in Turkey this subject is allotted 180 hours, of which 35 hour fall to the share of protection skills, and is taught as an independent subject in senior schools.
5. Education programs on the life protection and preparation of textbooks (learning aids) for pupils shall begin from the preparation of their concept. At this stage the c o n t e n t of the concept of life safety shall be determined in details, national values store in the course of centuries and modern leading international experience shall be properly coordinated, database and appropriate recommendations of Training-Information Centre of EUR - OPA in Baku shall be used rationally.
6. During the preparation of the program for life safety, its table of contents shall be approached differentially, natural-geographical conditions and economic and agricultural infrastructure of the territory of the country shall be considered.
7. Although, determination of the principle problems of the program and textbooks for the subject "Basics of life activity", concretization of this problems refers to the competence of the Ministry of Education of Azerbaijan Republic, it is important to involve representatives of the Ministry of Emergency Situations of the Republic of Azerbaijan and other respective public agencies, as well as public representatives and parents to this work. Such a collective work will increase vitality of the subject.
8. In the teaching of life safety skills pedagogic staff shall be trained, professional development system shall be established, the interactive environment shall be created during the classes, preference shall be given to the

competitive factor and game style of the classes in accordance with the dynamic nature of children. At all the stages of teaching this subject, modern technical means, capabilities of mass media shall be used more extensively and rationally.

9. Establishment of the teaching of protection skills at the level of modern requirements shall begin with the provision of our schools with well trained t e a c h e r s o f t h e s u b j e c t. Fir this purpose, it will be useful to use the experience of the Azerbaijan State pedagogic University in the preparation of military training teachers for comprehensive schools, as well as the facilities of the newly created training centre of the Ministry of Emergency Situations.
10. Given the vital and practical importance of the subject "Life safety", in the control over the quality of teaching of the subject not only pedagogical and methodical control, but also the form of p u b l i c c o n t r o l shall be used, it will improve the quality and rationality of teaching.
11. The organizer of the present conference shall be entrusted with the delivery of conference recommendations to the Ministries of Education of Emergency Situations of Azerbaijan Republic for practical use.

International symposium

Subject:

"Provision of the durability and safety of schools, hospitals and other child educational institutions in case of emergency situations"

Intermediate plan for 2007-2011 (III.3)

P a r t i c i p a t i n g a g e n c i e s :

- Ministries of Education, Health and Emergency Situations of Azerbaijan Republic
- Republic Committee for Architecture and City Building
- University of Architecture and Construction
- "FÖVQAL" Association
- Azerbaijan Red Crescent Society

Given the significance of the problem during the preparation to the event, at the suggestion of the participating organizations, representatives of foreign companies and international humanitationa agencies were invited to the symposium.

Lectures proposed for the discussion at the symposium:

- Prof. G.H. Mammadova - Head of the Azerbaijan University of Architecture and Construction: "International cooperation in the sphere of HYOQO program and risk management".
- Prof. H.O.Ojagov – Manager of ECMHT Training-Information Centre in Baku: **"**Minimization of emergency situations and risk assessment"
- Academician T.A.Aliyev – Director of the Cybernetics Institute: "Study of anomalous seismic processes by means of depth seismoacoustic system"
  Kh.M.Nacafov – head of the Main Construction Inspection of the State Construction Safety Agency of the Ministry of Emergency Situations - "Minimization of earthquake hazard on construction sites"
- Prof. Sobit Nematullayev (Tajikistan): "Minimization of risks in cities"
- Husan Tursunov (Uzbekistan): "Improvement of the durability of schools and hospitals"

Discussions about the lectures were attended by 27 persons.

World experience shows, that during the emergency situations (especially earthquakes) schools, child education institution and hospitals are more exposed to danger. Evacuation of children and patients from schools and hospitals in emergency situations is quite difficult and complex process. Discrepancies in the designing and construction of such building, ignorance of precautions create additional difficulties and make the situation desperate, in many-storied buildings it may become a tragedy. These problems were discussed in details during the symposium, the issues were clarified, appropriate recommendations were accepted. Based on the lectures of prof. G. Mammadova and prof. H. Ojagov, participants of the symposium expressed their view on two significant international documents:

The f i r s t: "International cooperation in the sphere of HYOQO program and risk management". Lecture of Doctor of Architecture, prof. G. Mammadova was about it.

The s e c o n d: Information of prof. H.Ojagov participant of the V Astana International Conference on the initiative of World campaign "Protection of cities and Millions of safe schools and hospitals".

It became clear from lectures and discussions, that the problem exists in all the countries of the world in a varying degree. The situations is even worse in post-soviet counties. The matter is that in the soviet period, in the buildings, including schools, hospitals and child education institutions built on the same projects without the consideration of local situations, under the "quick, cheap and quality" slogan that does not meet any logic, even common precautions were not considered.

It is natural that during emergency situations such constructions were exposed to destructions. For example, during Aghdash earthquake of 1999 that involved 8 regions (7-point) 3 schools, one hospital, one kindergarten were completely destroyed, 105 schools, 31 kindergartens, 23 hospitals were seriously damaged. 6 of the 10 countries – participants of V Astana International Conference were former Soviet republics. According to them, the situation in their country is the same. It was also confirmed by the lectures of the representatives of Uzbekistan and Tajikistan,.

According to the resolution of V International Astana Conference, in the countries of the region that are members of the Economic Union inspection of the physical state of schools and hospitals, as well as determination of the amount necessary for their restoration shall be completed till 2011, and the restoration and reconstruction of that buildings shall be completed till the end of 2015. Works carried out by Uzbekistan and Azerbaijan were appreciated at the symposium. According to the representative from Uzbekistan, they have completed repair works in this sphere. In the period of independence more than two thousand of new schools, hundreds of hospitals were constructed and set in operation, large scale reconstruction and overhaul works in old buildings are continued.

During the symposium there were adopted appropriate recommendations about the allocation of land for hospitals, schools and other child education institutions, accurate meeting of standards and rules during designing, construction of that buildings, as well as during repair and reconstruction of old buildings, and improvement of control over this sphere.

The recommendations also contain such issues as blocking or other reasons preventing from intended use of way, passages and doors considered for the purposes of security in hospitals, schools and other child education institutions, control over the removal of such negative cases as iron grating of windows at the first floors of buildings most of all used for evacuation during the emergency situations.

- According to the action plan for 2010, the book **"Management of emergency situations"** was written in the Azerbaijan language and translated into English. The book is ready for publishing in the both languages, they will be submitted to the publishing house after the settlement of financial problems.

ISPU - HIGHER INSTITUTE OF EMERGENCY PLANNING / INSTITUT SUPÉRIEUR DE PLANIFICATION D'URGENCE (FLORIVAL, BELGIUM)

La démarche de l'ISPU s'articule autour de 4 axes:

1. Recherche
2. Formations
3. Guides
4. Réseau d'experts

Elle consiste à professionnaliser l'approche de la planification et de la gestion de situations d'urgence en acquérant de l'expertise en la matière et en la mettant à disposition des acteurs de la gestion de crise. Cette démarche s'accompagne de l'indispensable analyse des risques et des vulnérabilités menée par le Centre gouvernemental de Coordination et de Crise dont fait partie l'ISPU.

Recherche

La démarche de recherche de l'ISPU consiste à faire appel aux équipes de chercheurs universitaires pour répondre à des questions essentielles en matière de planification et de gestion de situations d'urgence.

En 2010, l'ISPU a contribué aux réunions du comité d'accompagnement et aux ateliers d'échange de bonnes pratiques liés au projet ERGO[1] développé par l'Aston University (Birmingham –Uk). Ce projet vise à analyser la manière dont les Etats membres à l'UE planifient une évacuation de masse dans le but d'identifier et d'échanger de bonnes pratiques. En même temps l'ISPU a entamé la rédaction d'un guide d'évacuation pour la Belgique sur la base d'une recherche faite en 2009 par la Faculté universitaire Notre-Dame de la Paix de Namur.

Formation

L'ISPU identifie les offres de formation pour la mettre à disposition des acteurs de la gestion de crise et la complète par des journées d'(in)formation qu'il organise. Il développe sa propre expertise en participant à des colloques ou des formations en Belgique et à l'étranger.

En 2010*:*

Rédaction d'un catalogue des formations existantes en matière de planification d'urgence et de gestion de crises en Belgique

Ce catalogue sera prochainement disponible sur le site du Centre de Crise fédéral : http://www.crisis.ibz.be/

Journées d'information et de formations

2.1.1 Organisées par l'ISPU

- Journée d'information : Zones d'intervention nucléaire
- Journée d'information : Exercice nucléaire IRE Fleurus pour les intervenants
- Journée d'information : Exercice nucléaire IRE Fleurus pour la population
- Séances d'information dans le cadre de la campagne nationale nucléaire (Borssele, Mol-Dessel, Tihange, Fleurus, Chooz)
- Formation en communication de crise pour les responsables pour la communication de crise dans les provinces et les communes.

2.1.2 auxquelles l'ISPU a participé

- Afin d'acquérir de l'expertise :
  - Homeland Security : **Gestion de crise et situations d'urgence : Présent et futur** (organisé par le HCFDC) - Paris- HCFDC - Janvier 2010
    Etat des lieux des outils et structures de la gestion de crise au niveau national et territorial et évolutions depuis la parution du Livre blanc sur la défense et la sécurité nationale.
  - **Protection des populations et gestion des territoires en situation d'urgence nucléaire et post-accidentel** – Paris - Société Française de Radioprotection (SFRP)- Juin 2010
    Présentation des premiers résultats des travaux engagés dans ce domaine, partages d'expériences et dialogues sur cette thématique entre les différents acteurs de la radioprotection en France mais également avec d'autres pays.
  - **Gestion de crise communale** – Paris – HCFDC – Juin et novembre 2010

[1] http://astoncrisis.com/crisiscms/?q=node/50

Dans une philosophie d'échange d'expériences et de bonnes pratiques internationales, l'ISPU a invité deux agents du Centre de Crise du Service Public Fédéral Intérieur ainsi que six agents déconcentrés au niveau des provinces chargés d'accompagner les communes dans l'élaboration de leur planification d'urgence. Pour les provinces limitrophes avec la France, la formation "Gestion de crise communale" a en outre eu comme bénéfice de mieux faire connaître le système de gestion des risques dans les communes françaises voisines, point d'amélioration de la coopération transfrontalière.

• **Séminaire sur le développement et l'implantation des plans d'urgence externe dans le cadre de la Directive Seveso II** – Madrid – Présidence espagnole du Conseil de l'UE

Echange d'expertises et de bonnes pratiques internationales dans les domaines de : l'établissement des plans d'urgence externes, de l'implication de la population dans l'établissement des plans d'urgence externes, de l'information à la population (campagnes d'information), des systèmes d'alarme et de détection dans les entreprises , des Exercices Seveso. Exemples de bonnes pratiques : base de données constituée de fiches électroniques rassemblant les informations principales sur les entreprises dangereuses (état des lieux de l'inspection, approbation, données spécifiques, développement des scénarios d'accidents, zones de planification d'urgence) (Grèce) ; Adaptation de la campagne d'information sur l'alerte précoce en fonction de la typologie des populations concernées (écoles, entreprises, …) (Espagne, Pays-Basque), ….

• **Certificat en Gestion de Crise et Planification d'urgence** – Formation Planicom organisée par l'Université de Liège – Octobre 2010

Vue d'ensemble des principes, méthodes, acteurs et outils tant de gestion de crises que de planification d'urgence, dispensée par des formateurs issus de différents horizons (pompiers, médecins, psychologues, autorités publiques, experts …etc.)

• **Formation en Gestion de crise pour les officiers des services d'incendie** – Caserne des pompiers de Bruxelles (SIAMU) - Octobre 2009 à mai 2010

Formation destinée aux officiers des services d'incendie.
Divisée en quatre modules: réglementation, analyse des risques et gestion de crises, planification d'urgence et télécommunication.

…

- Afin de mettre son expertise à disposition :

  • Conférence « La **communication de crise au sein des pouvoirs locaux - Comment communiquer avec la presse en temps de crise ?»** - Salon des mandataires – Région Wallonne - Février 2010

  Conférence tenue en marge du « Salon des mandataires », organisé par la Région wallonne. Ce salon est le rendez-vous annuel entre le secteur privé et l'ensemble des responsables des communes, provinces, intercommunales, régies autonomes et autres organismes d'intérêt public. L'ISPU participa à la préparation de l'exposé sur la communication de crise, confié à la DEXIA Banque. L'exposé s'adressant en effet à tous ceux qui pourraient être appelés à gérer une crise au sens large, il était important, en ce qui concerne la gestion d'une situation d'urgence telle que définie dans le contexte de la protection civile, de veiller à sauvegarder la philosophie relative à l'information de la population en situation d'urgence telle que développée pour l'ensemble de la Belgique par le Ministre de l'Intérieur, compétent pour la coordination de la gestion de toutes situations d'urgence.

  - Colloque Police et Sécurité : **Gestion de Crise et planification d'Urgence au Niveau local. Quels enjeux ? Quels moyens d'action ?**
  - Plusieurs séances d'informations suite à la publication par l'ISPU du Guide « **Identification et analyse des risques au niveau local** »
  - Participation à l'atelier « **Host Nation Support** », sur demande du service Protection Civile
  - **Gestion des catastrophes** (organisé par le Campus Vesta)
  - Participation active au cours **Risques technologiques majeurs de l'industrie** (organisé par l'Université Catholique de Louvain)
  - Participation avec deux orateurs (sur identification de risque et communication de crise) à la **formation de base de la planification d'urgence**, organisée pour les fonctionnaires de planification d'urgence dans la province de Flandre Occidentale.
  - Contribution au **Certificat en gestion de crise et planification d'urgence** (organisé par L'université de Liège et l'équipe de recherche Spiral) : rôle du Centre de Crise et collaboration avec les autorités locales (public cible de cette formation).
  - Contribution (sous forme d'une présentation sur le rôle du Centre de Crise, le plan nucléaire et la communication de crise) au **cours Gestion de crise pour les officiers des services d'incendie**

- **…**

Guides

L'ISPU développe les *Guides de la Planification d'Urgence*, à l'attention des fonctionnaires chargés de la Planification d'Urgence auprès des autorités locales (Gouverneurs et Bourgmestres). Ils sont largement distribués et expliqués lors de diverses séances d'(in)formation.

En 2010,

Guide de Planification d'Urgence locale

Ce guide rassemble le matériel théorique indispensable pour comprendre les différents aspects de la réglementation ainsi que certaines réflexions et recommandations utiles à sa mise en œuvre concrète *(en cours d'impression).*

Principes directeurs de répartition des zones d'intervention en cas de situation d'urgence nucléaire

Ce guide reprend les conclusions adoptées par le groupe de travail « zones d'intervention nucléaires » qui s'est penché sur cette problématique en considérant le site de Tihange comme projet pilote. Ce groupe de travail était composé de représentants de la Direction Générale Centre de Crise, la Direction Générale de la Sécurité Civile, l'Agence Fédérale de Contrôle Nucléaire, l'organisme agréé Bel-V et du service chargé de la planification d'urgence en Province de Liège. Les activités du groupe de travail ont également été suivies par le service chargé de la planification d'urgence de Flandre orientale. Le Guide (et la mise en pratique de Liège) ont été présentés aux autorités riveraines des sites nucléaires pour qu'elles l'appliquent à leur site en 2011 (un workshop est prévu par site).

Réseau d'experts

Le domaine de la gestion des risques est pluridisciplinaire et demande régulièrement une expertise pointue. Le Centre de Crise axe son action autour de deux démarches:

- un appel ponctuel ou continu à des experts publics ou privés (dans les domaines des risques nucléaires, chimiques, MGM…);
- une identification des équipes de recherche dans les universités et les centres de recherche qui consacrent (une partie de) leurs activités aux thèmes traités par le Centre de Crise.

En 2010, l'ISPU a initié la mise en place d'une base de données d'experts dans différents domaines liés à l'identification et la gestion des risques et des situations d'urgence. Une tournée a été réalisée dans les universités néerlandophones du pays, cette démarche sera poursuivie en 2011.

ECRP - EUROPEAN CENTRE FOR RISK PREVENTION (SOFIA, BULGARIA)

PRIORITES IN 2010

The efforts of the Center were concentrating on the accomplishment of:
-The Conclusions of the Ministerial Sessions of the Agreement EUR-OPA;
-The Specific Programs of the Agreement EUR-OPA;
-Medium Term Plans 2007-2011;
-Participation in the project Be Safe Net;
-Project DRACE;
-University;
-Project-Regional Centre for Security.

❶ DRACE PROJECT

In 2010 the work on DRACE continued towards protection of the cultural heritage from the harmful effect of the waters along the Danube River. For this purpose, contacts were established and preliminary discussions were held with representatives of UNESCO.
The DRACE project was developed also through the improvement of DRACE portal. The portal's structure was changed. Changes were also made aiming at future development in the field of heritage protection from harmful effects of waters along the Danube River. (ADDENDUM 1)

❷ SCHOOL LEVEL EDUCATION

Be-Safe-Net
As a result of the center activity is the development of the joint project (Cyprus, Sofia, Ravello, Strasburg, Malta, and Kiev) for creation of WEB Side in relief of Risk prevention training at school level (Be-Safe-Net) of all languages of member state of the Agreement.
The Center in Sofia is working on the flood part. Every beginning of the development of a project like this is of course difficult, since there are already other INTERNET sites containing part of the topics or individual elements. We should of course take care and consider fairly the materials already existing in the INTERNET. Nevertheless we should not fear of what has been already published, since 80% of cases concern generally accepted standard definitions and terminology, which we should use in all cases.
In developing the section on floods for example, we used at first definitions and terminology adopted by international organizations, mainly from Europe. On the other hand we used the existing publications in this field. For example, one of the books we used was issued in 1991 (long before the introduction of INTERNET), of which I was one of the authors. Therefore I was puzzled by the criticisms towards the Centre that we have used an Australian site. If we have to be accurate, maybe they used, without making any efforts, many other papers and bravely published them - this is the globalization effect. Still, the fact that they have published them first in the INTERNET does not mean they are the authors we should not fear. Nevertheless, we made full editorial changes. I am not sure though whether our site will or will not resemble another site.
We must follow our time schedule and based on the initial development of the site we should begin its improvement so that it contents reflect the following themes – information, training and education of different age groups, training of trainers, pedagogical aspects, etc.

❸ UNIVERSITY EDUCATION.

Continue cooperation with New Bulgarian University (Sofia) - The Center for study of risks and security.
The European Center established and continued developing a fruitful cooperation with the New Bulgarian University, and on some occasions this cooperation included experts from France.
As a result of the effective measures taken by the University and the help from the European Centre in this regard, in 2009 and 2010 we witnessed some positive changes, namely more students were interested in the crisis management problems. The interest of the students stems from the emerging labor market demand for professionals in the field. There is interest towards education in the fields, broadly defined as: security policy, risk management and risk science, security systems in case of crises, crisis public relations. This makes necessary the development of

an educational system for such specialists. It is not possible to educate only narrow specialists, since the activities following crises of different nature are similar, but the prevention is radically different.
The Risks and Security Study Center at NBU introduced:

- Bachelor program "Civil and Corporate Security" – 4 courses, covering the above-mentioned fields.
- Four master programs:
  - Information security;
  - National and international security;
  - Anti-terrorist training;
  - Military and diplomatic protocol.

With the exception of the last program, all the other programs include to some extent directly or indirectly addressing the crisis problems, crisis management and risk management.

- Doctoral programs – PhD in various aspects of security.

The Risks and Security Study Center at NBU, in close cooperation with the European Center, continued offering during the reviewed period a permanent seminar called "Security Languages", where leaders from the professional and political circles working on crisis issues, risk management and prevention at various levels lectured and moderated discussions with the students and professors.

❹ BALKAN CONFERENCE "SECURITY STRATEGIES AND POLICIES

Held on 9 and 10 April 2010 at the Military Academy "G. S. Rakovski"

- 1st section: "Strategic views on security";
- 2nd section: "Military strategic doctrines";
- 3rd section: "Public peace and action in crisis";
- 4th section: "Media and security – crisis management".

The Conference was organized by New Bulgarian University, the European Center and the Balkan Security Forum under the auspices of the Ministry of Defense, the Ministry of Interior, the Ministry of Foreign Affairs and the Ministry of Health.
More than 70 reports and 150 presentations were made during the conference. During the same year the reports and presentations were published in two volumes of more than 800 pages and were distributed to the national book depositories and universities across the country.
The conference affirmed once again that the handling of various crisis should be addressed purposefully and that the preparation, organization and implementation is a complex activity, carried out by various institutions at national and in many cases supra-national level, where the good coordination becomes ever more important. The major disasters witnessed in 2010 (earthquakes, floods, volcano eruptions, etc.) proved the importance of this thesis.
The European Center, jointly with the Risk and Security Study Center at NBU, made preparation to publish a magazine called "Safety" (working title) – twice a year, on all Balkan languages.
The magazine will have a column called "Disasters, accidents and catastrophes".

❺ REGIONAL SECURITY CENTER

The European Center, jointly with the Risk and Security Study Center at NBU, developed a concept for project: **"Regional security center"** enabling 24-hour satellite monitoring of the situation and risk level for the emergence of forest fires, floods and other hazards.

The climate changes necessitate a new risk assessment for the emergence of forest fires and floods, which are a severe environmental, social and economic problem. The more frequent crises resulting from such natural disasters in the European countries call for the establishment a Regional Security Center.

The project we propose is an innovative and effective concept for prevention of crises of natural cause, fire extinguishing of forest fires using GPS coordinates, performing urgent rescue operations in cases of floods and fast draining of large areas.

The development of this project concept and the activities related to the acquaintance of the responsible institutions with it will be a preparation for the project implementation within the European Union and of interest for the country and the Balkan region.

CERG - EUROPEAN CENTRE FOR SEISMIC AND GEOMORPHOLOGICAL HAZARDS / CENTRE EUROPÉEN SUR LES RISQUES GÉOMORPHOLOGIQUES (STRASBOURG, FRANCE)

1. Research activity in 2010

❶ LANDSLIDE SUSCEPTIBILITY MAPPING AT THE EUROPEAN SCALE (2009-2010)

LOCAL COORDINATOR: Dr Jean-Philippe Malet, Researcher, IPGS, School and Observatory of Earth Sciences, Strasbourg (CERG Co-Executive Secretary) with Dr Javier Hervàs, JRC, Ispra (and possible others).

Global objectives:
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 to identify 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. Since a coherent landslide inventory map or geographical database does not exist at the European level, a pan-European landslide susceptibility map can only be prepared without inventory data, e.g. through heuristic modelling using European level landslide conditioning- and (optionally) triggering- data.
For the susceptibility model, a minimum set of landslide conditioning factors has been selected and consists in: (1) lithology and soil/parent material derived from geographical databases of the Geological Surveys; (2) slope angle (derived mainly from NASA SRTM DEM) and (3) landcover available from the Corine Land Cover dataset. A grid based mapping unit of 90 m has been selected for the calculation. The susceptibility model is heuristic and based on expert weighting (index-based evaluation) of the three types of input data.
***Specific objectives for 2010*:**
Within this CERG activity, it was envisaged to develop a model and to test its performance on some landslide inventory maps (density of landslides per administrative unit) available for France, Italy, Germany, Austria and some Spanish regions. This work was also part of the European Expert Group on 'Guidelines for Mapping Areas at Risk of Landslides in Europe' coordinated by the JRC since October 2007, and in which several CERG members are involved.

Description of results obtained in 2010

In the framework of the European Soil Thematic Strategy, and the associated preparation of a directive on the protection and sustainable use of soil, landslides were recognized as a soil threat requiring specific strategies for risk assessment and management. This contribution outlines the general specifications of Tier-based, nested geographical assessment schemes applicable for landslide susceptibility at European and national scales in accordance to common criteria formulated by the Soil Information Working Groups (ISWG) of the European Soil Bureau Network (ESBN). A heuristic assessment scheme exploiting a reduced set of landslide conditioning factors derived from common pan-European data sources and calibrated through bivariate parameter class analysis with available information on landslide locations is proposed for landslide susceptibility estimations at the 1:1 Mil. scale for the whole of Europe (Tier 1). Further improvements of Tier 1 regarding specific assessments for different landslide types and geomorphologic settings are discussed for exemplary areas in France. For quantitative assessment schemes in areas of higher landslide susceptibility as delineated by Tier 1, a quantitative multivariate landslide susceptibility assessment approach is proposed for higher resolution evaluations using additional information on landslide controlling- and triggering factors, together with multitemporal landslide inventories (Tier 2). The paper concludes with recommendations on further work to be carried out to conduct harmonized European landslide susceptibility assessments in the context of the European Soil Thematic Strategy.

→ European Landslide Susceptibility Map
In this section, a simple and straightforwardly applicable Tier 1 generic landslide susceptibility assessment scheme is presented that can be used at the continental scale with the reduced information on terrain conditioning factors and landslide locations as mentioned above. For the exemplary presentation and discussion of the proposed methodology, only common, freely available pan-European datasets already having or being easily transformable to a raster resolution of 1 km^2 were used. This was done since aspects on input data pre-processing and spatial aggregations are beyond the intention of this experiment, and have to be decided on when a final susceptibility estimate for the whole of Europe has to be prepared with higher resolution data, if required.

Data

There are numerous pan-European datasets available that can be used to derive classified spatial information on the three major terrain conditioning factors *slope angle*, *lithology* and *land cover.* Spatial information on *lithology* was obtained here exploiting the European Soil Geographical Database (SGDBE) 1:1Mil. which covers all European countries (Fig. 1 B, King et al., 1995; Heinike et al., 1998). The geometry of this database is provided by soil mapping units (SMU) that serve as spatial aggregates for soil typological units (STU) containing more than 20 attributes describing several properties of dominant and co-dominant soils. These properties have been estimated on the basis of national soil inventory data, while the country borders have been harmonized to a certain degree. However, the database is still a product of individual national maps compiled with different methodologies and data densities. The SGDBE is available through a WMS hosted by JRC Ispra at http://eusoils.jrc.it. For estimating lithological ground properties required in this analysis, the SGDBE attribute "dominant parential material" (STU MAT12) at level 2 was selected. This attribute provides 41 classes used for analysis that are aggregated into 9 classes at level 1 used for map display of the data as below (Fig. 1 B). The SMU polygon data attributed through STU MAT12 have been rasterized on a 1 km^2 grid cell basis for the analysis. The SGDBE does not provide spatial information on soil parameters for highly urbanized areas.

The spatial information on terrain *slope angle* was derived from the most common and easily available global digital elevation model GTOPO30 that is produced by the USGS EROS data centre (http://eros.usgs.gov/#/Find_Data/Products_and_ Data_Available/gtopo30_info). It was decided here to use this coarse resolution dataset for the following reasons: i) the dataset is already distributed with a regularly spaced resolution of 30 arc-seconds that approximates the 1 km analysis scale, thus requiring no resampling or aggregation of DEM-derivates, ii) the data covers the whole of Europe, iii) the data does not require any license. Furthermore, it seems important here to illustrate how a continental-scale Tier 1 assessment performs when using relatively coarse information on the most important terrain parameter controlling landslide susceptibility (slope). For the analysis, *slope angle* was derived from the GTOPO30 DEM using common nearest neighbour surface derivations according to Horn (1981) implemented in virtually all raster GIS applications. Due to the relatively low topographic gradient of GTOPO30, the slope raster was classified by expert opinion into 5 classes used for analysis (Fig. 1 A). This classification seems most appropriate to delineate flat terrains against increasingly sloping regions with the low-resolution information. For land cover, the PELCOM (Pan-European Land Cover Monitoring Project) database consisting of 1 km resolution land cover and land use information (LULC) covering the period 1996-1999 was used (http://www.geo-informatie.nl/projects/pelcom/). The freely available PELCOM data, produced using multi-temporal, multi-spectral NOAA-AVHRR satellite imagery and ancillary data, comprises 16 LULC classes and covers the whole of Europe (Fig.1 C). Three PELCOM land cover classes were excluded from the analysis (permanent ice and snow, sea, inland waters).

In this experiment, information on existing landslide locations were used for the three European countries United Kingdom, France, and Italy. Even though many EU and non-EU European countries maintain national-level landslide information, the data is often not easily accessible since it is held by different institutions for different purposes (e.g., geological/environmental surveys, research institutions, mining bureaus, civil defence organisations, construction departments, etc). Due to the proposed analysis scale and the fact that landslide databases throughout Europe contain different, not easily mergable and sometimes highly insecure information that is often poorly classified, it was decided to use the most important parameter from those databases that is always available: the locational information on historic events as point data. For a raster-based analysis employing a grid cell of 1 km^2, this information exclusively allows the identification of grid cells affected by landsliding regardless of landslide typology, size or number.

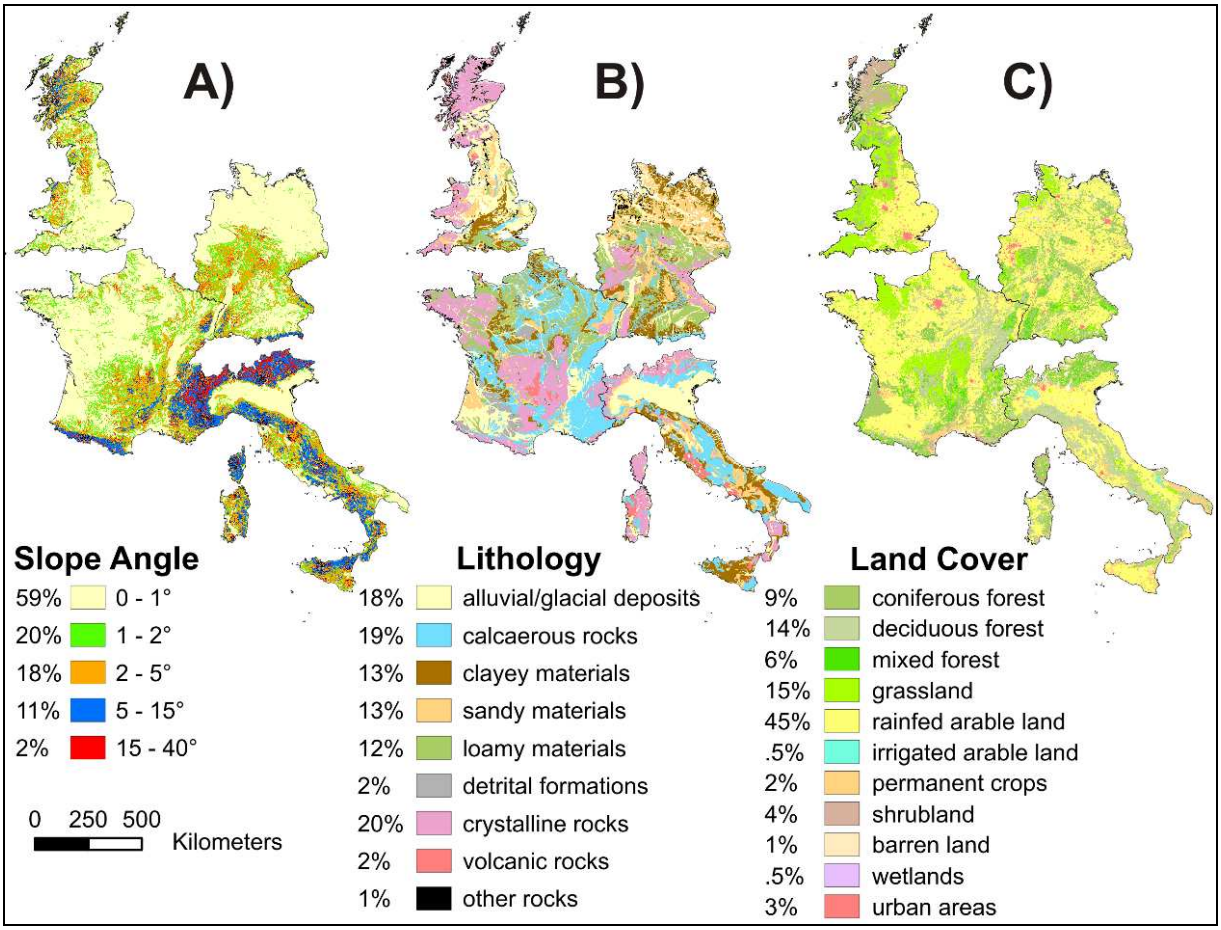

Figure 1: Data on basic ground condition parameters used for the continental level Tier 1 experiment. A): slope classes derived from GTOPO 30 DEM. B): Distribution of dominant soil parential material classes (level 1) of the SGDBE. C): PELCOM land cover classes.

Model

The common methodology suggested here for continental-level Tier 1 landslide susceptibility evaluations consist of the following steps:

1. Calculation of bivariate information values (Yin & Yan, 1988) for each input data parameter class for European countries having landslide information using the respective inventory (e.g., for UK, France Italy in this study) on a pixel base.
2. Calculation of raster parameter class information values for the total analysis area and assignment of those to parameter classes in "data-gap areas" (e.g., Germany in this study) using the total landslide inventory.
3. Spatial merging, summation and reclassification of the individual information value rasters to obtain a continuous 8-bit susceptibility image rendering 255 classes.
4. Calculation of the success-rate of the susceptibility image through a cross-tabulation proposed by Chung & Fabbri (2003) and spatial discretization of the continuous map into 5 susceptibility classes covering 50, 75, 90, 7, 3 cumulative percent of the total landslide locations.

When examining the susceptibility map shown in Fig. 2 A, it can be observed that the 5 susceptibility classes show relatively similar spatial extents over the analyzed area. This reflects the usefulness of the chosen susceptibility classification based on landslide frequency over the susceptibility classes, given the coarse resolution of the input data. However, if it can be achieved with higher quality / resolution data to produce a model with a better success-rate, the susceptibility level definition might be subject to future revisions. In any case, a final continuous susceptibility estimate should be classified through landslide occurrences.

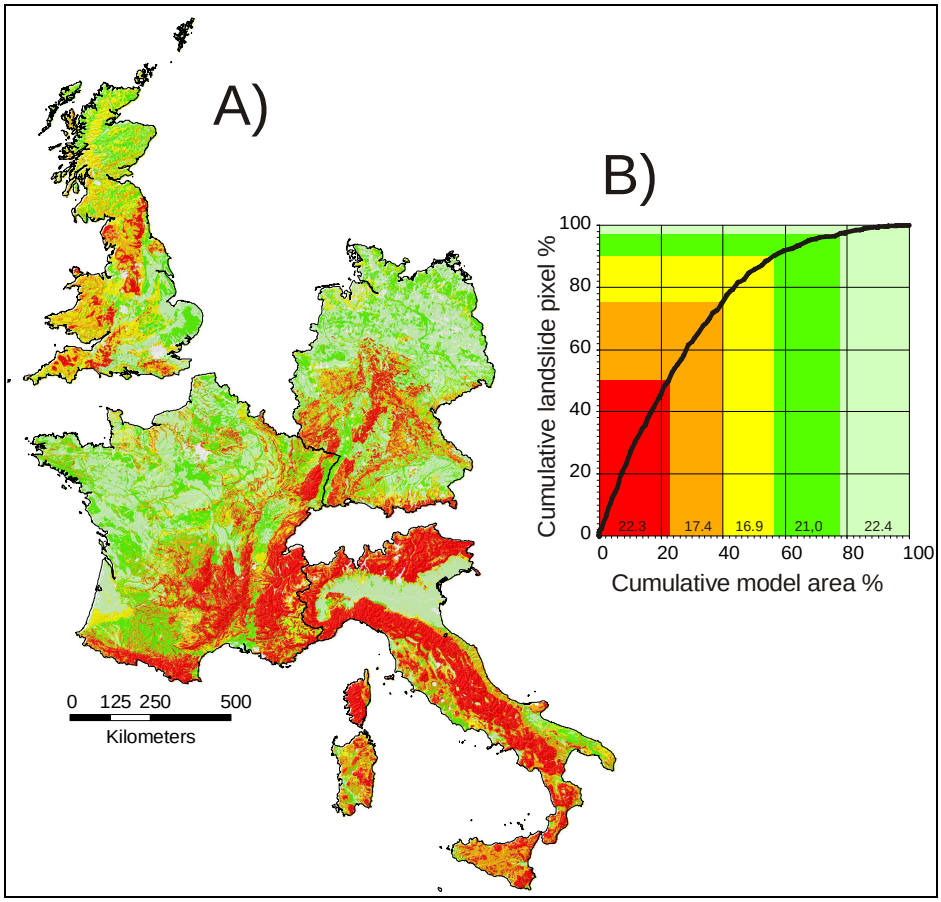

Figure 2. A): Compound landslide susceptibility map derived from spatial merging of parameter class information values. The map was classified through success-rate evaluation using the total gathered landslide inventory (B).

→ A differentiated 'Tier 1' assessment using Spatial Multi-Criteria Evaluation: application over France

Input data

The susceptibility model proposed for France is based on three types of conditioning factors as suggested by the European landslide experts group (e.g. slope angle, lithology and landcover). However, the corresponding dataset is somehow different than the one used for the European 'Tier 1' assessment in terms of scale and taxonomy and is summarized in Table 1. A more detailed description of the input dataset is available in Malet et al. (2009).

Table 1. Landslide conditioning factors used in the susceptibility model for France. The number of classes corresponds to an aggregation of some of the original classes of the thematic variables.

Factors	Source	Date	Usable scale	Resolution	Number of classes used in the analysis
Slope angle	IGN DEM (BD-Alti®)	2008	1:100.000	50m	13 classes of 5° interval
Lithology	BRGM geological map (BD-Million-Geol), 6th Edition	2005	1:1M	50m	24 classes of slope lithology
Land cover	Corine Land Cover - France	2006	1:100.000	50m	10 classes of landcover

The French landslide inventory (BDMvT; www.bdmvt.net) provided by the *French Geological Survey* (BRGM), the *Laboratoire des Ponts et Chaussées* (LCPC) and the *Restauration des Terrain en Montagne* (RTM) is used in order to validate the susceptibility model. This inventory records several characteristics (type, location, date, state of activity, damage) on observed landslides but is either incomplete, either with a low or unknown accuracy for some sub-regions.

Model and methodology

The susceptibility analysis for France has been carried out by applying a Spatial Multi-Criteria Evaluation technique (SMCE). The model is based on an analytical hierarchy process (AHP) which uses a tree-shaped structure to organize the thematic variables (e.g. the conditioning factors), and to associate a weighting factor for each class of variables (Fig. 3). The input data are a series of raster maps, sometimes with a different data format (e.g. a value for the slope angle, a class for the lithology and the landcover) which has required some conversions. The methodological framework is based on the approach proposed by Malet et al. (2009) and is structured in several steps (Fig. 3):

1. The division of the application domain of the susceptibility model in three physiographic sub-units. Plain and mountain areas are distinguished by using the Nordregio criteria (2004) while the coastal areas are defined by using a 1 km-buffer along the coastline;
2. The definition of a susceptibility model for three landslide types (e.g. slides, flows, rockfalls);
3. The transformation of the input data in boolean values for each data categories and classes;
4. The calibration of the weights attributed to each conditioning factors and to each classes. A pairwise method has been used for the three conditioning factors whereas a direct method using expert knowledge has been used for the classes of variables. According to the result obtained in the first experiment on 'Tier 1', more importance was given to the slope gradient, then to the lithology and finally to landcover. The direct weighting procedure has been performed by using the statistics of inventoried landslides observed in each class of variables for each landslide type and for the three domain area, and by ranking the classes from the more to the less prone to landslides.
5. The creation of several susceptibility models (with a pixel resolution of 50 m) for each landslide type by using a slicing procedure to provide four susceptibility classes (e.g. null, low, moderate, high). At the end, the susceptibility maps obtained for the plain, mountain and coastal areas are combined in one global map for each landslide type. In the association procedure, more importance is given to the highest susceptibility class observed for each cell.

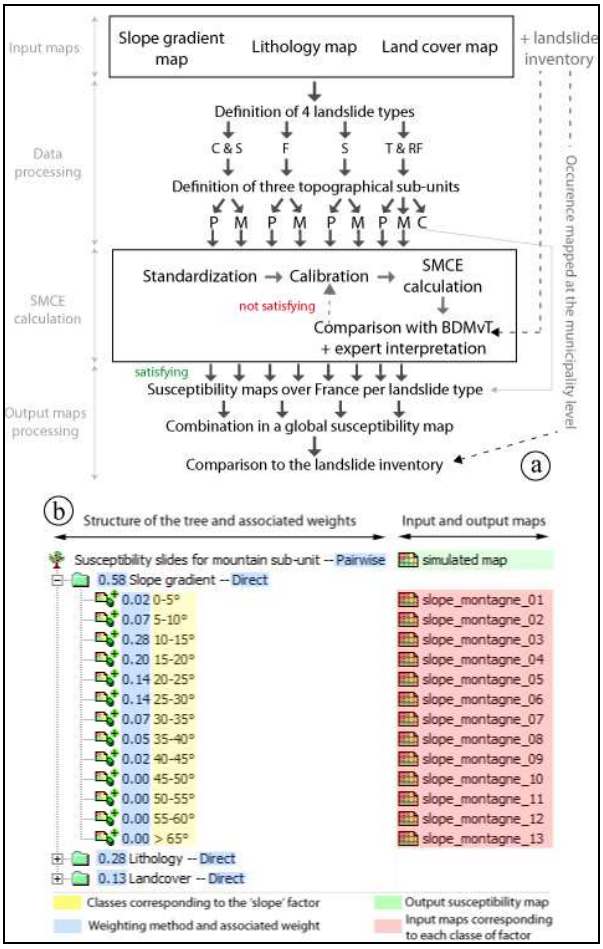

Figure 3. Methodological framework and criteria tree used for the SMCE calculations. S: slide, F: flow, RF: Rock fall, P: plain area, M: mountain area, C: coastal area.

Results and discussion

The global landslide susceptibility map is presented in Figure 4a; it corresponds to combination of the three susceptibility maps calculated for slides, flows and rockfalls (Fig. 4b) using the association procedure detailed in Figure 4c.

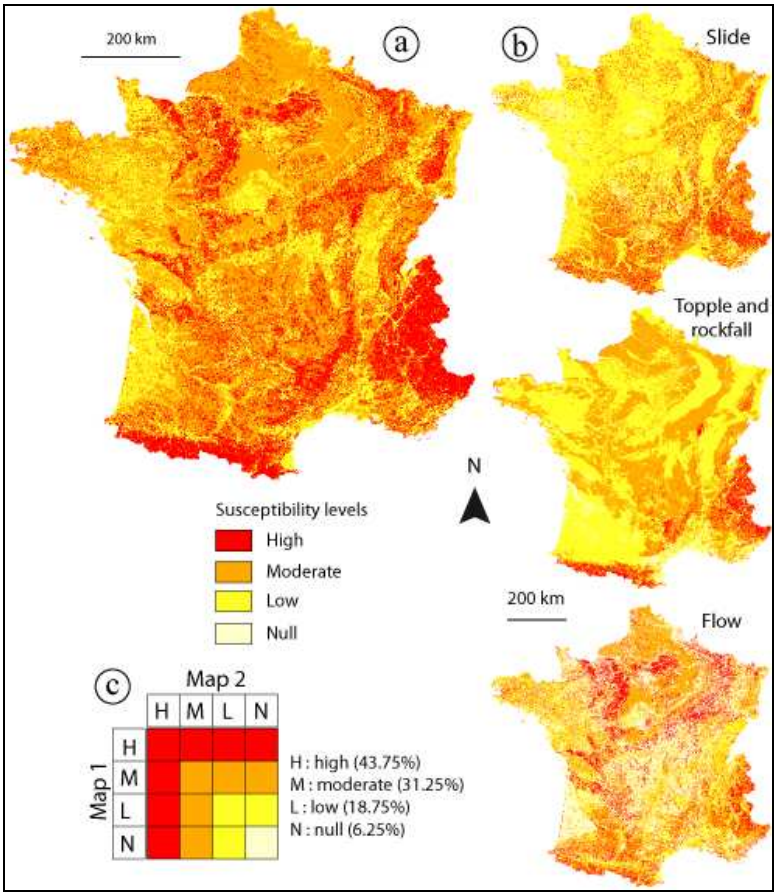

Figure 4 a. Global susceptibility map. b. Susceptibility maps obtained for each landslide type. c. Association method.

Some basic statistics have been calculated in order to characterize the distribution of susceptibility classes over the territory. The Figure 5 shows the distribution of susceptibility classes for the plain and mountain sub-units (e.g. the coastal sub-unit is not represented here as it covers only 0.15% of the French territory).

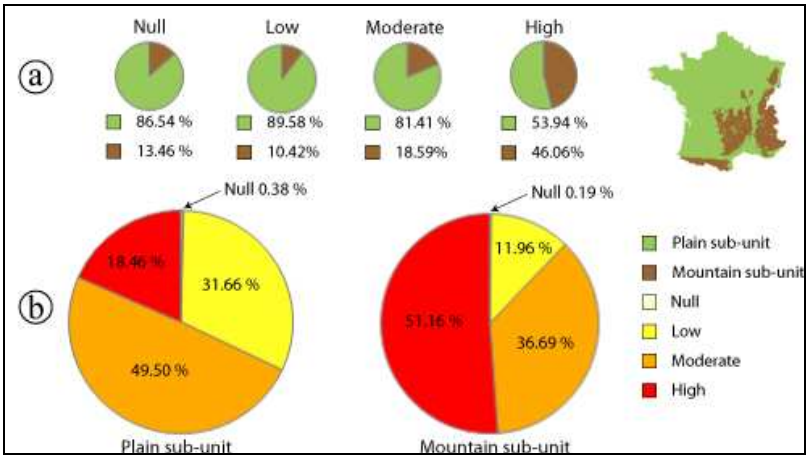

Figure 5. Distribution of susceptibility classes for the sub-units plain and mountain.

The association procedure used to combine the slide, fall and rockfall susceptibility maps gives higher possibilities of presence for the high and moderate susceptibility classes; almost 44% and 31 % of the territory are classified with a high and moderate susceptibility to landslide, whereas only 19 % and 6 % are classified with a low and null susceptibility. This association rule has been used in order to use the consideration of the *precautionary principle as it is implemented in the French regulatory law for natural hazard and risk assessment and the creation of risk prevention plans (MATE/METL, 1999).*

The highest susceptibility areas identified with the SMCE technique are in accordance with the major landslide-prone areas identified by the pan-European susceptibility map. According to the recommendations for an harmonized approach for landslide susceptibility assessment at the European scale (Hervás et al., 2007), a basic distinction between susceptible and not susceptible areas has been performed to identify the areas which could be analysed through further improvements in the next Tier approach. In this study, only the highest susceptibility area have been chosen because they provide a good assessment of the major areas known to be prone to landsliding. The resulting map is detailed in Figure 6, and a comparison with the information available in the French landslide inventory (e.g. a binary map representing the municipalities affected by at least one landslide whatever its type) is proposed.

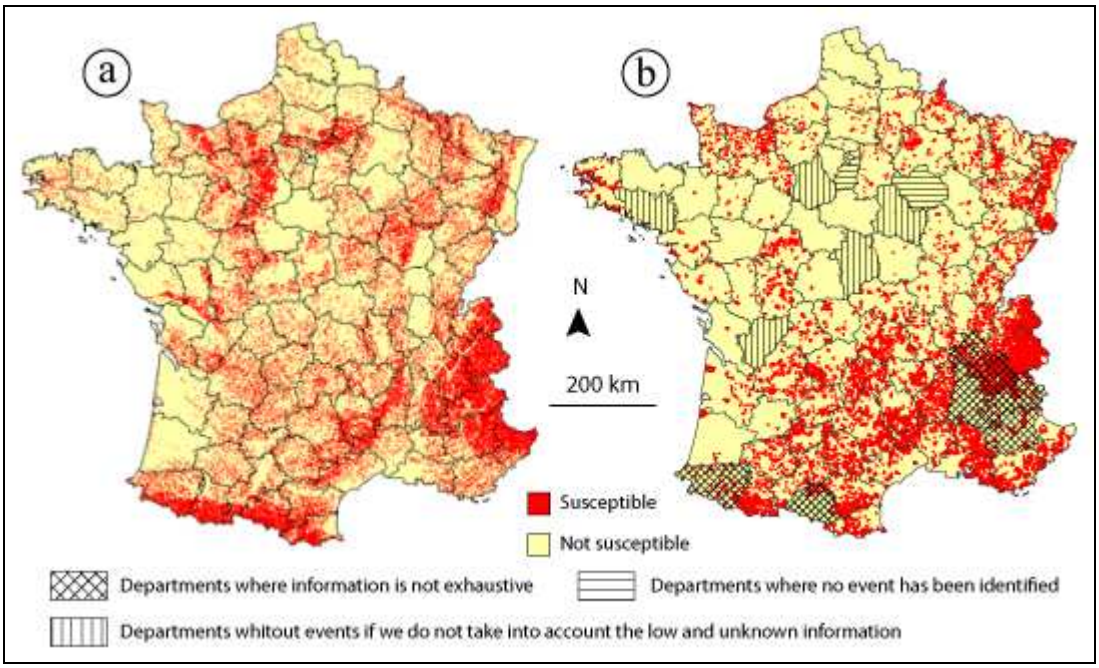

Figure 6. a. Global susceptibility map. b. Landslide inventory map.

Figure 6 indicates that the municipalities exposed to landslide events in the past are globally well predicted by the susceptibility model. However, for several departments, the SMCE approach highlights more possibility of landslides than the recorded events. This may be explained by:

i. The low accuracy of the BDMvT database in some departments (highlighted with dashed lines in Figure 6b) especially in terms of exact landslide location and type. This is particularly true for some departments located in the mountain areas which are known to be highly prone to landslides;
ii. The association rule used for the combination of the individual slide, flow and rockfall maps which keeps the highest susceptibility class observed for each calculation cell;
iii. The generalization of the input data in generic classes which does not allow to predict correctly specific environmental conditions.

A more detailed validation, including quantitative comparisons to other published local and regional susceptibility map is provided in Malet et al. (submitted).

This study highlights some possible improvements which could be included in the Tier 1 approach for the pan-European susceptibility assessment. The creation of distinct susceptibility maps for slides, flows and rockfalls and the sub-division of the computational domain in physiographic sub-units allow to increase the performance of the

model by taking into account different susceptibility conditions for each landslide type. However, this approach would require a detailed landslide inventory at the European scale to calibrate the model.

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Dissemination of project results :

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❷ IDENTIFICATION OF THRESHOLDS FOR LANDSLIDE CRISES, AND IMPLICATIONS FOR OPERATIVE EARLY WARNING SYSTEMS (2009-2010)

LOCAL COORDINATOR: Dr. Theo van Asch (Cerg executive member), Department of Physical Geography, Faculty of Geosciences, Utrecht University with Dr Alessandro Pasuto (Cerg executive member) and Dr. Guanluca Marcato, Consiglio Nazionale delle Ricerche, Padova .

Alexander. Daehne and Dr. Alessandro .Corsini: Department of Earth Sciences, University of Modena and Reggio Emilia, Modena, Italy

Dr. Anke. Spickermann, Julien. Travelletti and Dr.Jean-Philippe Malet, CNRS. University of Strasbourg, School and Observatory of Earth Sciences, Strasbourg, France:

Description of results obtained in 2010

Analyzing the kinematics of landslides in flume tests.

Flume tests carried out in the Laboratory of the Utrecht University were continued in 2010. Processes related to failure mechanisms and post failure movements could be analysed in detail. (Spickermann et al 2010). Numerical modelling simulating displacement in time, showed that failure could occur under unsaturated conditions by an increase in degree of saturation and decrease in cohesion. With respect to post failure motion it was assumed that this is controlled by an ongoing increase in the degree of saturation and hence an ongoing reduction of the apparent cohesion.

Further development of 1D-2D models for slow moving landslides. Testing their performances on field data.

We continued (Utrecht University, University of Modena and Reggio Emilia,University of Strasbourg) with the development of simple 1D and 2D mechanistic models of slow moving landslides (SLOWMOVE) to understand periods of crises. We focused in 2010 on the improvement of concepts about the generation of excess pore pressure by changing stress fields and on pore pressure dissipation. Also the effect of undrained loading on initiation of movement was simulated. Brainstorming sessions were organised during the EGU conference in the beginning of

May in Vienna and at the end of September in Strasbourg.
The models were tested at the Valoria landslide (Northern Apennines, Italy) and at the Super Sauze landslide South Western Alps, France), (Daehne et all 2010). The Valoria landslide is active since 2001. It can reach velocities of 10 m h^{-1} and shows repeated acceleration. The 1D version of SLOWMOVE was tested on this landslide on a representative longitudinal section from the main track zone down to the toe zone. Multi-temporal Lidar surveys in conjunction with a large set of surface displacement data obtained fro continuous monitoring since March 2008 was used to calibrate and evaluate the SLOWMOVE model. The model is able to simulate realistic velocities and displacements but failed to achieve the accurate topographic reconstruction of the geomorphologic changes between 2003 and 2007.(Daehne et al 2010)
The Super Sauze mudslide, which started to develop since 1960, has a complex paleo-topography consisting of a succession of longitudinal crest and gullies with distinct kinematical, mechanical and hydrological characteristics. The spatial kinematic pattern is heterogeneous, with velocities ranging from 0.01 to 0.40 m per day. The 2-D version of SLOWMOVE was applied on this mudslide to simulate the heterogeneous displacement field. The performance of the model was evaluated on multi-temporal and spatially distributed data sets of landslide displacements for the period of summer 2009. Globally the horizontal displacement pattern was coherent with the reality especially for the middle and lower part of the mudslide. However the divergence in observed and calculated velocity patterns were found in the upper part and in areas where the mudslide body is relatively thin. It showed that different rheological properties should be assigned to these mudslides. The same conclusions can be made for the Valoria landslide.
As a conclusion for our research on these slow moving landslides we can say that more spatially distributed information on the rheology is needed. Further the excess pore pressure dissipation function, which is the main controlling mechanism in the models needs to be improved. Finally we would like to point out that capabilities of the current set up of SLOWMOVE is limited to short term predictions. (Daehne et al 2010)

Identification of concepts and factors controlling landslide crises.
The concepts developed in the 1D and 2D modelling exercises were aimed to detect conditions where steady movements degenerate into accelerated rapid movements and (or) fluidisation. Van Asch & Malet (2009) highlighted the effect of changes in the stress field during initial failure, which is a potential factor for liquefaction. Fluidization during initial movement could not be simulated in our flume test only pore pressure changes
One important factor for accelerative movements could be the rate dependency of the viscosity, which we observed in varved clays landslides. (van Asch et al 2009, van Asch & Malet in press). The numerical 1D and 2D models simulate pore pressure generation due to differential movement and quasi undrained loading, which may initiate unexpected surges in slow moving landslides (Daehne et al 2010). The assessment of critical conditions and thresholds by means of these models is still in progress.

Monitoring and modeling activities on Tessina Landslide aiming at the definition of possible mitigation measures
During 2010 we continued to carry out slope stability analysis focused on the “Pian de Cice” area that has to be considered crucial for the stability of the entire landslide, since its collapse could lead to a rapid enlargement of the source area, (Marcato et al. 2009). The modelling activities, mainly performed adopting a visco-elasto-plastic medium, have been finalized to a designing of countermeasure works in order to stabilize this sector, which moved with approximately constant rate during the last few years.
The results of numerical simulation proved that highly unfavorable atmospheric conditions (high precipitation, melting of thick snow cover) could result in a substantial decreasing of rock mass mechanical properties. It could cause sudden acceleration of the movement and eventually the failure of the entire slope in a very short time (i.e. in few days or even hours). The moving material would reach the main flow channel, significantly increasing the flow rate if pore pressure rises by this rapid loading in the lower accumulation area.
In order to avoid such scenarios, we proposed an intervention mainly based on two different actions: (i) Slope reshaping by means of removal of about 45,000 m^3 and reduction of slope angle; (ii) insertion of a series of high resistance steel bars well anchored on the bedrock and fixed on the ground surface by means of reinforced concrete slabs. These steel bars are 28 to 34 m long and are characterized by a resistance to tensile stress of 265 kN The first action is mainly devoted to reduce the driving forces while the second to increase the resisting ones.
In order to evaluate the stabilizing effects of the proposed remedial measures a finite elements model able to analyse the mechanical behaviour of the unstable slope and of the reinforcing elements was applied to a longitudinal section of the “Pian de Cice” sector. The adopted model is an elasto-perfectly plastic model with a Mohr-Coulomb rupture criterion. This analysis highlighted the real stabilization of the present failure surface but there still remains a possibility of further failure processes close to the ground surface related to less dangerous risk scenarios.

The results so far achieved allowed us to update the Risk Mitigation Plan including new evolutionary scenarios related to the failure of "Pian de Cice". In case of sudden failure of such an area several millions of cubic meters of material might fall down the valley causing a really serious risk situation for the villages of Funes and Lamosano. Therefore the plan takes into consideration the possibility to remove the flow material filling the valley in order to make space available to stock further material within the valley and to avoid overflow.
The importance of the studies so far carried out is related to the possibility of designing structural measures to mitigate the risk, which can be derived from the new scenarios. This countermeasure proposal will be delivered to the Regional Authorities in charge of public safety.

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❸ REAL-TIME MANAGEMENT OF EMERGENCY PHASE IN THE AFTERMATH OF NATURAL DISASTERS (2010-2011)

LOCAL COORDINATOR: Dr. Simone Sterlacchini, Researcher, National Research Council of Italy, Institute for the Dynamic of Environmental Processes (CNR-IDPA), Milan (Italy); Dr. Andrea Taramelli, Researcher, Research Centre in Civil Protection Studies, Foligno (Itay), and Dr. Dr Jean-Philippe Malet, Researcher, IPGS, School and Observatory of Earth Sciences, Strasbourg (CERG Co-Executive Secretary) and possible others.

Global objectives:
The project purpose is to better protect people, their environment, property and cultural heritage in case of major natural or man-made disasters. The management of a critical event has precise goals: people safeguard, taking care of the injured, coordination of first aid activities, recovery of primary public services, management of personnel, organization of resources and communication with public and private institutions, government agencies, authorities and citizens. There are a large number of responses that must be considered. Each response depends upon the nature of the threat. Some of the broader categories of response for a variety of hazards include:

- evacuation procedures
- search and rescue
- security of affected areas
- assessment teams
- activating special installations (such as emergency hospital facilities)
- activating distribution systems
- preparing emergency reception centres and shelters
- activating emergency programs for airports, harbours and land transport

Once an effective disaster preparedness plan is in place, these response mechanisms should be familiar to potential beneficiaries or to those with the responsibilities of implementing such measures.

One emphasis of a disaster preparedness plan should be to anticipate the requirements for a disaster relief operation and the most effective ways of meeting those requirements.
The role of Civil Protection is carried out through three key modes of action: prevention, preparedness and response. Civil Protection operates on the base of a cooperation concept for providing assistance, in order to be as effective as possible on the site of disaster. Sharing information and best practice are fundamental issues without which the whole system would fail.
Specific objectives for 2010:
A methodology (procedures, actions, and communication systems) targeted to manage the aftermath of critical events will be developed. It will take advantage of Geographical Information Systems (GIS) tools, Decision Support Systems (DSS), and Information and Communication Technology (ICT) to prepare, apply, and coordinate Civil Protection Plans. The last aim is to identify and prepare in advance people in charge to take actions, and define the activities to perform in case that a damaging event occurs, on the base of available resources.

Description of results obtained in 2010
The management of a disaster event always follows the same specific goals as suggested by Cate (1994) (e.g. first aid activities, public safeguarding, recovery of primary services, communication with institutions or agencies, management of personnel and organization of resources). But historically disasters are inhomogeneous and as their critical state changed so does the populations' behaviours. In last decades different approaches provided attempts to standardize the emergency response, especially the ones triggered by natural disasters. As a matter of fact they actually could be hardly defined in a rigorous way (Crossland & al. 1995, Alexander 2006).

Civil Protection (CP hereafter) activity pursues at different aims in order to better protect people, their property environment and cultural heritage. A quick and operative reaction to an emergency based on available resources is a compulsory action to reduce chaos and improve resilience of a community.
The contribution of Disaster Prevention, Preparedness and Intervention programs at European level supports in last decades some strategic improvements such as:

1. Preventing the risks and damage to persons, properties and infrastructure.
2. Improving techniques and methods of response of emergencies.
3. Enhancing public information, education and awareness.
4. Granting the recovery phase.

As a consequence, different spatial and temporal risk scenarios have to be outlined, analysed, and integrated in advance in emergency plans. Thus the gap between community resilience and disaster variability can be seriously filled.
Recently, combining GIS and user-friendly visual interface and graphics has become a basis of Decision Support System (DSS hereafter) because GIS has the advantage to explore and analyze spatial database efficiently combining a widespread trend between web environment and GIS solution (Lazzari & Salvaneschi 1999; Junkhiaw & al., 2004; Chieh & al. 2007). The priority research problem is to make these solutions easier to use especially at local scale (Mark & al., 1999; Slocum & al., 2001; Muntz & al., 2003). To pursue these aims, the tools have to be simple enough, intuitive and user-friendly especially for people not accustomed to managing DSS and GIS techniques in their daily tasks.

PETer (*Protection and Emergency of the Territory)* was the framework developed since 2006 as a tool to manage all the information available to perform a wide range of Civil Protection activities. It gathered advantages of GIS, DSS, and Information Technology to prepare, apply and coordinate Civil Protection plans. The main aim was to set up and manage contingency plans in advance, to identify and prepare people in charge to take action, to provide standard cluster of activities, to be aware of available resources and to optimize the communication system among the people involved. A Civil Protection Plan at local scale within Disaster Preparedness and Response framework in a Consortium of Mountain Municipalities (Valtellina di Tirano, Central Alps, Northern Italy) was the first test area of the architecture. A further approach at the large La Valette landslide in the Barcelonnette Basin (South French Alps) has been introduced to calibrate the platform, to compare available dataset, information details, laws in force in different countries, stakeholders' responsibility and end-users' background. Work in progress involves multi-task tools useful in emergency situation, to enforce open-communication devices, to tailor easy-to-use information with emergency management demand.

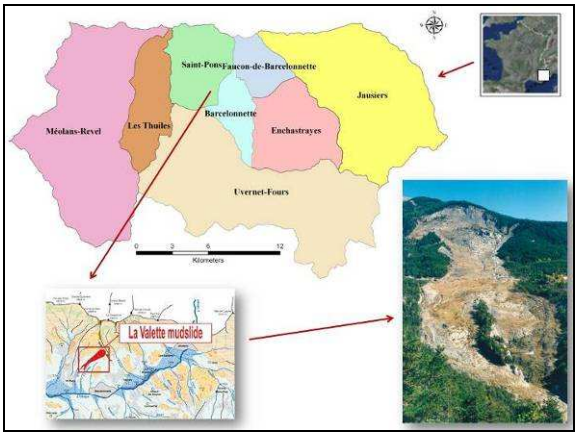

Figure 7 Barcelonnette Basin location and focus on La Valette mudslide (red countered shape). The picture represents a view of the landslide in 2000; its length is about 2.5 km and its width is about 0.3 km. The volume is estimated at 4 to 6 m3.

Study area

The methodology proposed herein was originally settled in the Consortium of Communes in Mountain Area Valtellina di Tirano located in Italy but actually data gathering and transfer of methodology is in the Barcelonnette Basin, Ubaye valley, France. Especially the La Valette area has been highlighted as local scale case study because of the important risk caused by this large landslide (Fig. 7.

The entire Barcelonnette Basin covers an area of about 280 km^2, located in the South French Alps. The territory is subdivided among 8 municipalities and has about 7,700 inhabitants, prevalently located on the valley floor. After massive deforestation in the 18th century, reforestation started around 1864 (under the responsibility of the RTM - *Service de Restauration des Terrains en Montagne*) as reaction to increasing debris flow activity; thus the forest cover is rising since that time (Remaître, 2006).

The study area experienced severe landsliding and flooding events in the past. It is very prone to several types of mass movements including, debris flows, several major mudslides (Poche, La Valette and Super Sauze), rockfall and shallow and deep seated landslides (Maquaire et al., 2003). Furthermore, especially torrential and river floods but also avalanches pose a considerable threat.

According to the French law, the municipalities at risk, marked out by the Prefect of the "*Département*", have to elaborate a risk prevention plan (*Plan de Prévention des Risques Naturels*). It is the case for the municipalities composing the Barcelonnette Basin and all of them have a risk prevention plan (either called PER or PPR). The resulting plans are integrated in the spatial planning process, e.g. excluding zones of high hazard for further constructions.

The catchment where the La Valette landslide is located comprises a serie of 100 houses directly located at the valley floor. Rapid mudflow events have been observed in 1982, 1988 and 1993 that did not threaten the residential building so far because of the low volume of sediment involved. The risk is however largely taken into account by the authorities and different mitigations measures have been set up, such as the development (1) of an Early-Warning System including optical and infra-red camera visualization and sediment heights monitoring, (2) of a sediment trap in order to deposit some sediments, (3) of a risk prevention plan with strict regulations for the authorization of new constructions, and (4) of a rescue plan indicating the hierarchy of decision in case of disaster management during a crisis. The application of PETer to the La Valette case study lies in this context.

Methodology

The framework proposed was tested in partnership between CNR-IDPA (*National Research Council, Institute for the Dynamic of Environmental Processes)* CNRS (*Centre National de la Recherche Scientifique*) and University of Strasbourg, with the collaboration of local stakeholders and risk managers such as ONF-RTM (*Restauration des Terrains en Montagne*) and the Préfecture of Alpes-de-Haute-Provence.

The requirement to protect people and to correctly manage resources during a crisis phase is strictly linked to the capability to profile the potential damaging event in advance. Specific hydrogeological hazard scenarios, based on statistical and deterministic models, historical records and expert knowledge (Fig. 8 were a compulsory starting point. Furthermore, information on vulnerable elements was collected, and field surveys carried out to integrate and

validate available data. A specific hydrogeological scenario was constructed in areas with presence of elements at risk.

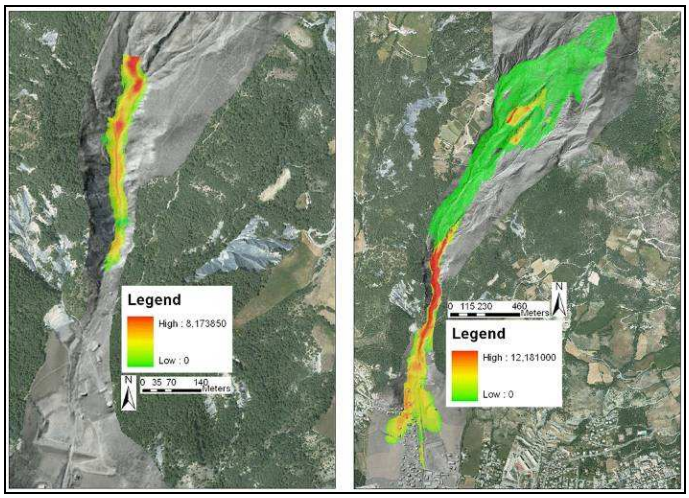

Figure 8 Exemple of runout distance calculations using the MASS-MOV model for different scenarios at La Valette landlside. The color scale indicates the height of the simulated deposits on the landslide and within the torrent (Mathieu, 2010).

On the basis of the knowledge on the hazard and the elements at risk, a draft of workflow based on decisional processes was built in the DSS (integrated in a GIS environment) to manage all the information afforded for the study area at high local scale (1:2000). A state of art of procedural steps is proposed, offering a visual work-block to control decisions during emergency and post-emergency phases. It includes:

1. The management of the available resources.
2. A logic flowchart of instructions to be sequentially executed (according to the laws in force).
3. The identification of individual or aggregated persons responsible for each time-step activity.
4. The list of the documents to be drawn up during or immediately after an occurrence.
5. The transfer of the procedures to people in charge of managing the event.

The current GIS techniques, even fostered at local scale, remain focused on support for individual work (Leung & al., 2005; MacEachren & al., 2005). Thus the priority is actually to find geospatial technologies easier to use for crisis phase. To pursue this aim some improvements are supplied in PETer in order:

1. To manage the entire life-cycle of a CPP in accordance with the French laws and "*Département*" directives. Within a CPP a digital management of data and resources during the crisis phase is guaranteed, ensuring the connectivity and interoperability of the expected CP tasks.
2. To accomplish a wide range of commands and coordination activities among actors during a crisis phase, by geo-data, workflows, and communication. The frame provided a set of functions allowing data import, store, editing and query accessible in bidirectional way (upgrading and sharing). Facilities (e.g. receptive, housing, sorting, connection), infrastructure (e.g. roads, railways), networks (e.g. electric, telephone, pipe, drainage), technical equipment (e.g. instruments, equipments, vehicles), and human resources (e.g. volunteers, agencies, companies, squads, teams, people in charge in each institution) were information planned in the central database (Fig. 3). Also all subjects directly or indirectly connected to each specific resource (owners, holders, responsible, technicians, etc.) had to be integrated and retrieved on-demand.
3. Provide the user with a Decision Support System, as a well-organized flow of procedures to be sequentially executed in case of disaster in a full-blown dataset considering the entities mentioned above (people, resources, structures and documents). The system had to perform a series of automatic controls to verify the coherence of the actions uploaded and, on completion of the procedural scheme, print operational manuals to be used directly on the field.
4. Afford the users quick tools in the field of communication. The emergency planners and disaster managers could take advantage of these kinds of devices and the real possibility to share information directly in the field in the least costly and the most helpful safety keeping. The communication system had to allow the "actors" involved in emergency to be continuously in touch in a simple and efficient way.

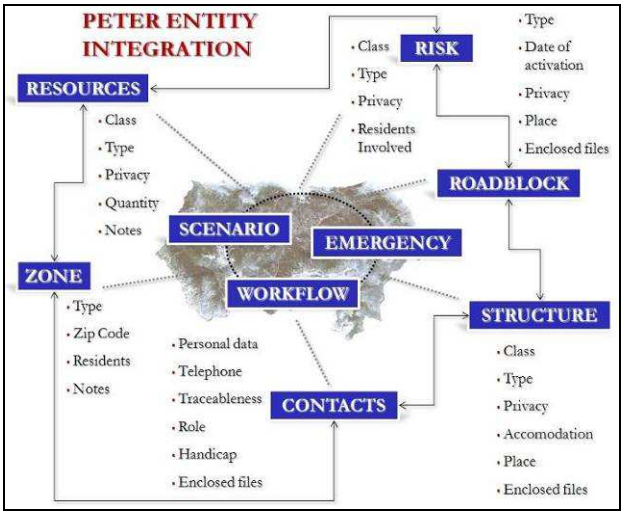

Figure 9. PETer entities built by a migration of external dataset inside the platform. All the records are related in a one-to-one or one-to-many relations.

Application to the La Valette dataset as beta test

La Valette dataset, whose contents are part of the entire Barcelonnette Basin data collection, was created as test site for PETer application. The aim was to collect, store, integrate, manage, and analyze available data for emergency response and support at local scale. All the information available was collected but new upgrades are on course to fill the information lack (e.g. volunteers contact information, type of resources for CP). The physical structure of the database was designed to exploit the data processing capabilities of Geographic Information Systems (GIS) and the usefulness of the Relational Database Management Systems (RDBMS). The information gathered is fixed inside PETer framework.

Maps carrying information about hydrogeological hazard/risk, cadastral maps, and aerial photographs background were collected by an existing dataset performed by University of Strasbourg and CNRS in the previous years (Frigerio et al., 2010, this issue) From the ONF-RTM Service and local authorities other information was gathered for buildings and available resources. The database is actually incomplete to fix a definitive Preparedness Plan, but a homogeneous and smooth methodology for data collection and organisation has been set up.

The data collection was structured following logical issue for emergency management. The clusters of information are fixed as following:

1. Data on infrastructure: roads, power lines, pipelines, water lines, telephone system and sewers.
2. Data on buildings: use (residential, industrial, commercial, tourist), geometric and structural characteristics (number of floors, areas, volumes, building materials), number of residents and occupancy rates.
3. Data on population: inhabitants (gender, age, disabled people, phone numbers) linked to buildings by geo-coding (address, street number).
4. Data on instructions: flowcharts composed by sequence of graphical blocks related to all available resources and law in force.

The Figure 10 describes the “entities and instructions” dataset towards “exploring data” interface inside the framework. All the information listed was integrated within PETer architecture and thus able to be included in multi-query and spatial analysis. All geo-referenced information was stored as vector or raster format and the related tables are available on-demand. Data can be available before the occurrence of a damaging event (prevention and preparedness phase) or in the aftermath of critical situations (response phase). A high number of structures was included. 607 spatially located records offer information about class and typology of vulnerable elements (residential, rural or public buildings like types of vulnerable elements class). A basic dataset of people directly involved is provided but a strong lack of information actually regards resources for emergency management, scenario definitions and potential emergency block or alternative paths.

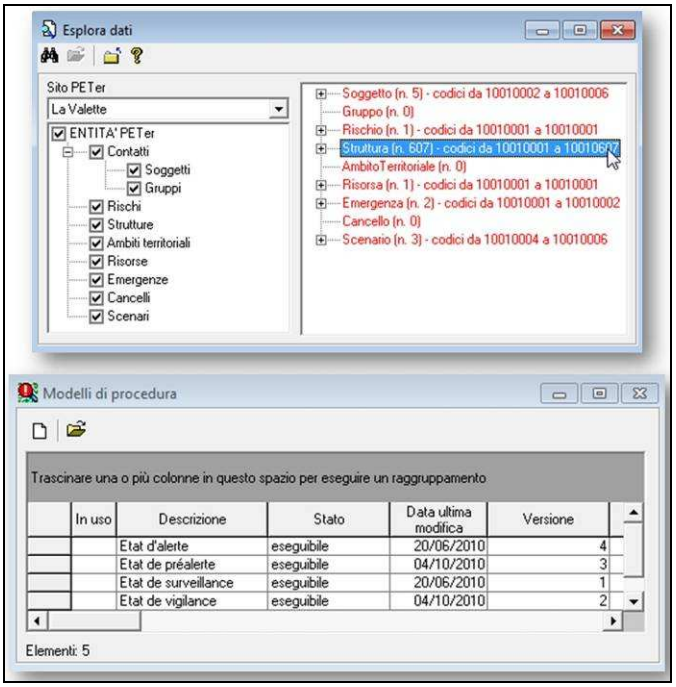

Figure 10. PETer exploring data screenshot. For the La Valette site, in the above part all data clusters are showed and the blue line highlights 607 records presents for "Structures". Only few other essential entities like "Contacts", "Resources" and "Scenarios" are actually present. In the lower part, 4 flowcharts are listed.

Towards dictionary function new technical words in French have been introduced. The aim is to offer a user-friendly quick form, based on local language. For experience performed in other study areas, the requisite of a direct communication with local stakeholder justify the choice of multi-language setting (Fig. 11).

Inside the frame, the users have a complete set of functions allowing data import, storage, navigation, selection, editing and query. The goal is to supply directly the need of emergency management with graphical and easy-to-use instruments.
To purse this aim each object is handled as an "entity" and linked to the following information:

1. A geographical location.
2. Descriptive documents (e.g. texts, hypertexts, images, movies, reports).
3. Relations with owners, holders, responsibles (directly or indirectly linked to each specific "object").

The user can gain advantage by filters queries based on geographical or multi-criteria parameters (e.g. numbers of buildings and people affected by a damaging event, number, location, and traceableness of people in charge and contents of a given CP warehouse fitted for managing particular types of threats). The result of a specific query can also be saved in a so called "geographical bookmark" by which a lot of strategic "objects" can be stored and then made available to the end users (Fig. 12).

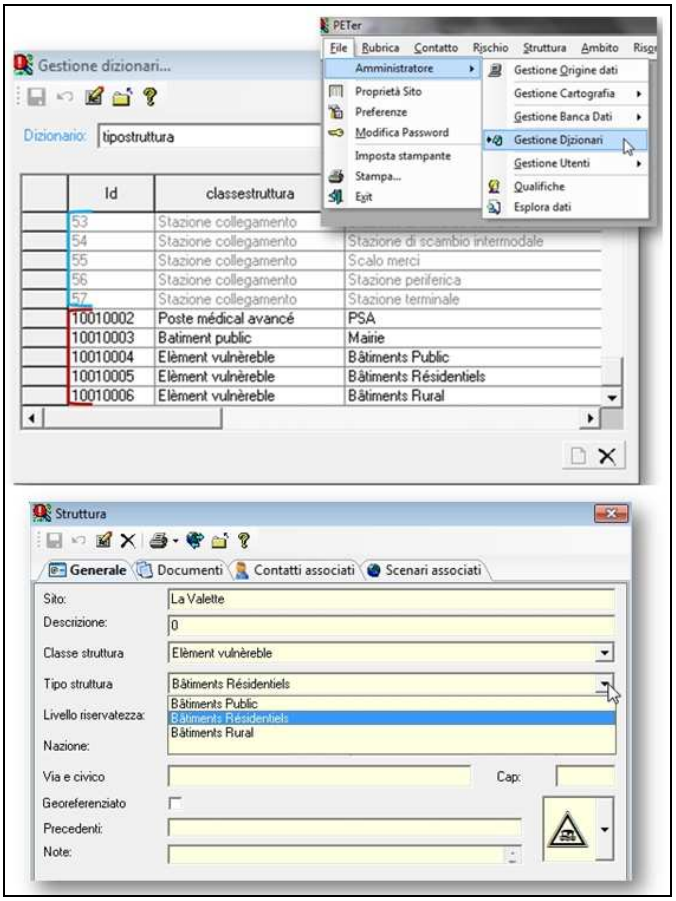

Figure 11. PETer Dictionary management command. Administration users have records of standard words (Italian language within blue square bracket) but they can add a series of new records (French language within red square bracket). As shown in the second screen, new records are available for every quick-form.

Different flowchart based on visual vector graphics (blocks and connectors) were planned to create sequences of instructions and allow an easy connection between the blocks and a number of data sources. Each step of the procedure was linked with the actions that have to be performed (according to the laws in force). People in charge can benefit from these tasks:

1. Specific aims in relation to the critical state showed by clear guide.
2. The personnel linked to each action and the degree of collaboration planned among these.
3. The required documents at the beginning or at the end of each procedural step.
4. The resources necessary for overcoming each specific step of the emergency.

Thus the workflows can contribute to a Decision Support System; they are designed during “peace time” and later performed in running simulations or during an emergency. The system performs a series of automatic controls (log records) to verify the coherence of each action, the data integrity and the quality of procedural scheme. This check allows a post-emergency analysis and reflections on the efficacy of the operational procedures by which the emergency is addressed.

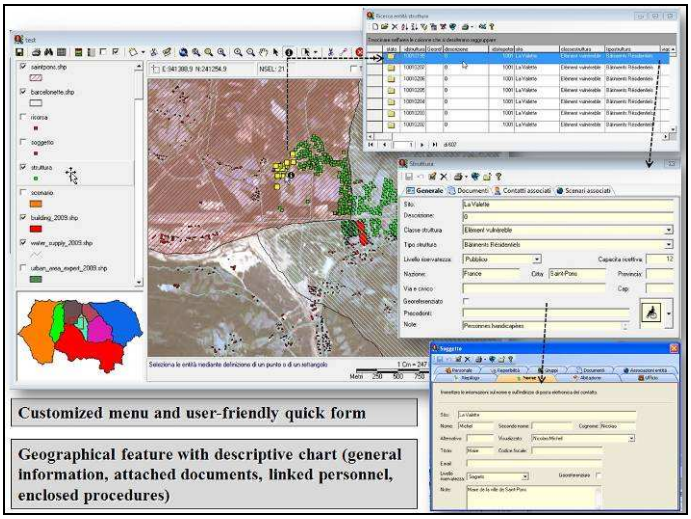

Figure 12. Selection within the database performed by spatial query. The same function can be approached by filter criteria on the database. A list of records directly provides specific user-friendly masks for each entity and thus a direct access to all related information.

Different laws in force define several criteria for emergency management, different for scale and location. Four flowcharts planned the instructions for emergency steps. Similar to Italian national and regional directives, they are explained as following in order of criticality level:

1. *Etat de Vigilance* - State of Vigilance.
2. *Etat de Surveillance* - State of Monitoring.
3. *Etat de Préalerte* - State of Early Warning.
4. *Etat d'Alerte* - State of Alert.

In Figure 13, the *Etat d'Alerte* is showed as a full-blown example of the diagrams proposed. Different shapes, colours, connectors and symbols can offer a large tool system to mark out the steps involved. Each block has a mask of information visualized and link to other entities, cartographical features and documents. A step can start automatically if it is planned by administrator (e.g. a connector split in two different solutions) and the time checking can guarantee fixed deadline.
Customized reports required by laws and stakeholders can be drawn out by the use of simple office automation tools and the database collected. Standard models of communications (e.g. messages of pre-alarm, request of equipments) are already available and can be directly linked to the entities.

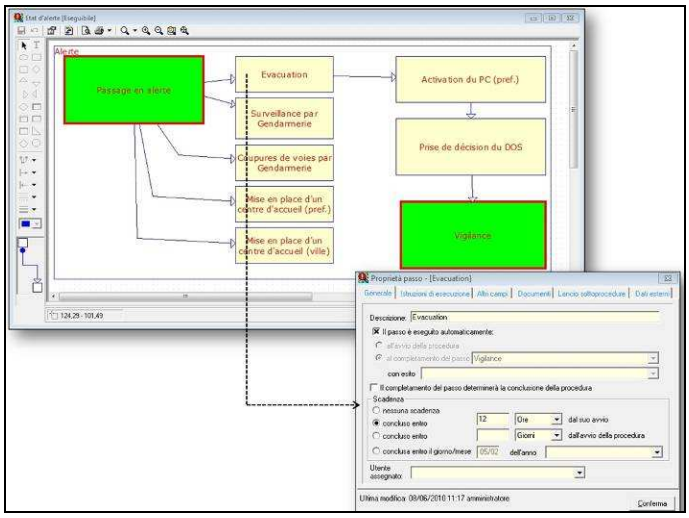

Figure 13. Example of flowchart (*Etat d'Alerte)* with highlight on block tab. The information can be showed manually or automatically (administration setting) and offer a complete list of action, entities connected and fixed aims.

Conclusion

The framework proposed relied on capacity to manage data from different sources and at different scale, offering practical GIS-tools for a technical and practical use during crisis state. After critical on-field analysis and a direct proof on La Valette area, the approach tried to consider the quick variability of many parameters involved and uncertainty among decision makers during emergency. The presented work showed the overall concept and architecture of a DSS, displaying the aims of emergency management. The frame can be useful both in the case of emergency, when the time factor plays crucial role, and for the execution of routine operations during "peace time", when the system allows managing the standard documents, modifying them in relation to any new directives.

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Dissemination of project results :

Frigerio, S., Sterlacchini, S., Malet, J.-P., Glade, T., 2011. Emergency Management Support with Geo-Information Technology. A common methodology in different European contexts. Abstract submitted at Workshop Géorisque "Plans communaux de sauvegarde: expériences, outils, premiers bilans », Montpellier, 25□26 janvier 2011.

Frigerio, S., Sterlacchini, S., Puissant, A., Malet, J.-P., Wehrle, M., Guiter, G. 2010. Integration of a GIS-based Decision Support System in the context of French civil defence. The La Valette case study in the South French Alps. In: Malet, J.-P., Glade, T., Casagli, N. (Eds): 'Mountain Risks: Bringing Science to Society. Proceedings of the International Conference', Florence, 24-26th November 2010. CERG Editions, Strasbourg, France, ISBN 2-95183317-1-5, pp. 447-452.

2. Education activities in 2010

❹ BE-SAFE-NET" PROJECT

The "*BE-SAFE-NET*" Project is a web-portal on Disaster Awareness with the use of the internet, developed in the framework of the FORM-OSE programme (European Training Programme for South, East and West) of the EUR-OPA Major Hazards Agreement hosted by the European Center for Disaster Awareness with the use of the internet "Be Safe Net", Nicosia Cyprus. The aim of the "*BE-SAFE-NET*" website is to become an educational tool in the hands of teachers, focusing at risk prevention preparedness, immediate reaction and rehabilitation.

The Project Coordinators are M. Papadopoulos, Deputy Director, Cyprus Civil Defence, Paphos/Cyprus, and F. Pla, Executive Secretariat of the EUR-OPA Major Hazards Agreement, Council of Europe, Strasbourg/France.

Several CERG members actively contributed and will continue to contribute to the "*BE-SAFE-NET*" Project. For instance they prepared the pilot section on "landslides" hazard which represented the guidelines for preparing material related to all hazards

The first version of the website in English has been proposed by the EUR-OPA Centre of Cyprus in 2004. During several meetings of the partners, held in different part of Europe, the look and the structure of the *BE-SAFE-NET* portal has been discussed and changed to better fit the objectives and the users' requirements.

The "old" version of the website is at http://besafenet.org while the "new" *BE-SAFE-NET* portal is at http://www.besafenet.net/9.0.0.0.2-Home.aspx. In the website all hazards are classified in three main categories: "Natural", "Technological" and "Specific". The Natural hazards are distinguished in Geological (Volcanic Eruptions, Earthquakes, Tsunamis, and Landslides) and Hydro-Meteorological hazards (Floods, Drought and Desertification, Storms, Extreme Temperatures Waves, Avalanches, Hurricanes and Storm Surges). The "Technological" hazards are subdivided into Chemical Emergency and Radiological Emergency; the "Specific" hazards are Coastal Specific Hazards, Wildfires, Dam failure, Sea Level Rise, Climate Change. The common structure for each X hazard (X is an example of threat) is as:

1. What is X?;
2. What types of X are there?
3. Why do X occur?
4. Where do X occur?
5. What could be the consequences of X?
6. Can the causes of X be influenced by human behaviour?
7. Can the consequences of X be influenced by human behaviour?
8. Can X be predicted?
9. Is there any way to prevent X?
10. Is there any way to mitigate X consequences?
11. What should be done in case of X?
12. What type of maps on X exists?

Each answer may have from 1 up to 4 levels depth and for every question additional available material (such as the description of case studies, examples of lessons learnt, relevant images, videos and web links) have to be provided.

In June 2010 a BesafeNet Meeting has been held in Modena organized by the CERG member D. Castaldini from the Modena and Reggio Emilia University. Besides the meeting, a half day excursion was organized to visit the Natural Reserve of Salse di Nirano and the Civil Protection Center of Modena Province. During the meeting has been verified the uploaded "*BE-SAFE-NET*" material looking the European Meeting at Ministry level which has been held in September 2010 in St. Peterburg. Moreover, the "*BE-SAFE-NET*" Project has been oral presented at the International Conference "Mountain risks: Bringing Science to Society" held in November 2010 in Florence, Italy.

The "*BE-SAFE-NET*" website works are still in progress. Some sections are practically finished (e.g. Landslides, Chemical and Radiological Emergencies), some have to be improved (e.g. Earthquakes, Drougth and Desertification) and some are Under Construction (e.g. Storms, Extreme temperature waves, Wildfires).

In 2011 CERG members will participate to the improving of the website material (e.g. D. Castaldini, in occasion of the Modena Meeting, has been indicated as coordinator of the Natural Hazards section) and also participate to the translation in several languages of the web site template.

A next BesafeNet Meeting will be held in Kiev (Ukraine) in 2011; it will be organized by V. Poiarkov, Executive Director of the European Centre of Technological Safety *(TESEC).* The meeting aim is to examin the uploaded website material and to discuss the future steps of the "*BE-SAFE-NET*" Project.

❺ INTERNATIONAL WORKSHOP ON EUROPEAN GUIDELINES FOR LANDSLIDE QUANTITATIVE RISK ASSESSMENT AND ZONING. BARCELONA NOVEMBER 4TH-5TH, 2010

LOCAL COORDINATOR: Professor Jordi Corominas, Department of Geotechnical Engineering and Geosciences, Tecnical University of Catalonia in Barcelona - UPC (CERG President)

This workshop has been organized within the frame of the European Commission funded research project SAFELAND (grant agreement 226479). Members of the CERG participate actively in the organization, the discussion working groups and in the preparation of the Guidelines.

Global objectives:
The goal of the workshop has been to discuss and summarize available methods for Quantitative Risk Assessment (QRA). Las years QRA has become an indispensable tool for the management of landslide hazard and for planning risk mitigation measures. QRA for landslide involves a wide range of methodologies and techniques and different scales of work (from european to site specific scale). In practice, the quantitative evaluation of the different components of risk is often a challenge and its development in different European countries has followed specific ways. Unfortunately, even within any one country there is seldom uniformity in terminology and there is a lack of uniformity of approach.
The goal of the workshop has been to put in common all the progress made in the recent years and to provide guidance to geocientists and engineers in performing QRA. More specifically, experts were invited to:

(a) Critically review the steps and components for the quantitative hazard and risk assessment and how to integrate them into hazard and risk zoning schemes.
(b) Agree on terminology to be used in an International Guideline.
(d) Consider the levels (of detail) of landslide hazard and risk assessment and their application.
(e) Consider appropriate methods for landslide hazard and risk assessment, and references to good examples.
(g) Consider the particular needs for assessing for different landslide mechanisms – e.g. rockfalls, debris flows, large slow moving landslides.
(h) Review procedures for quality control and validation of landslide hazard and risk assessment methodologies and products.

Development of the workshop:
A draft of the Guidelines for Landslide Quantitative Risk Assessment and Zoning, based on the existing European experience, was discussed during the workshop. For practical reasons and the smooth development of the discussions, the contents of the QRA were split in different review sessions: methods for quantitative susceptibility assessment, methods for quantitative assessment of landslide runout, methods for quantitative assessment of landslide hazard (magnitude/intensity – frequency), methods for quantitative assessment of vulnerability, methods for quantitative assessment of risk, methods for reliability assessment and validation, and finally, Data required for different scales of work. The agreements reached were recorded in the minutes of the workshop.
A total of 55 researchers and technicians attended to the workshop. Beside the members of the Safeland project, in which 25 European research institutions are involved, other landslide specialists and CERG members not involved in the Safeland project, and end users also attended and actively participated in the discussions.

Results of the workshop:
A draft of the Guidelines for Landslide Quantitative Risk Assessment and Zoning is now under revision among the participants. A definitive version will be prepared and made available to the scientific community by May 2011.

CSEM – EUROPEAN MEDITERRANEAN SEISMOLOGICAL CENTRE / CENTRE SISMOLOGIQUE EURO-MEDITERRANEEN (BRUYERES-LE-CHATEL, FRANCE)

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Executive summary
The EMSC has been providing real time earthquake information services for several years. Over the last few years, the performance and success of these services have improved significantly. Since 2004, the number of events published each year on the EMSC web site has almost doubled, with nearly 20,000 events published in 2010. The Earthquake Notification Service has remained fully operational thanks to the operational and technical support of the LDG and of the IGN. In 2010, the median dissemination time for Euro-Med events has been reduced to 18 minutes and the operating rate of EMSC web site reached 99.85%[2], with the offline period due to technical problems or maintenance activity outside the EMSC premises, e.g. Internet Service Provider.
The new EMSC web site, online since July, 2010, aims to be faster and more reliable, to facilitate the collection of in-situ observations (macroseismic questionnaires, pictures), and to better credit the stations' operating agencies.
The new web site significantly increased the web traffic. Despite only a small number of significant earthquakes in the Euro-Med region in 2010 compared to previous years, the 2010 EMSC web site traffic doubled compared to 2009 traffic, with an average of 1 million unique visitors (10 million page loads) per month.
The number of collected pictures has increased to 162, with 80 having been received after the M5.4 earthquake in Central Serbia on 03/11/2010, which caused moderate damage in the region of Kraljevo (Figure 1).
The detection of felt earthquakes through surges of web traffic (Bossu et al.; 2008) has been reduced to 90 seconds. Earthquakes down to magnitude 2.4 have generated large surges of web traffic.
Traffic surges and quick qualitative impact assessments are used to identify potentially damaging earthquakes which are now automatically highlighted on the web site in a specific frame.
The authoritative location procedure has been implemented in November. The locations of the macroseismic questionnaires are now collected via a Google Map interface, and the individual questionnaires are grouped in clusters through a dynamic clustering technique.

In 2011, the planned developments include the following topics:
- An Email/SMS notification service based on the expected level of damage: The results of the Earthquake Qualitative Impact Assessment (EQIA) tool will be used to develop an email and SMS notification service for EMSC Members, based on the a priori qualitative impact of an earthquake.
- Phasing out email-based data exchanges: Implement real time, robust and quality assured data exchange (QWIDS) to both collect and disseminate earthquake information.

Figure 1: Damage in the city of Kraljevo following the M5.4 earthquake that struck Central Serbia on 03/11/2010

- Improving the web infrastructure: Carry on the efforts to further improve the web infrastructure to better cope with surges of web traffic.
- Web site for smart phones: A web site dedicated to smart phones will be put online early 2011. The macroseismic questionnaire will be replaced by thumbnails describing the different levels of EMS-98 macroseismic scale.
- An application to collect geo-tagged pictures of earthquake damage: RICHTER, the application for Android mobile phones developed by Ansur (www.ansur.no), will be made available to web users after potentially damaging earthquakes.
- Felt earthquakes: Publication of a temporary moving banner on the EMSC web site in the very first minutes after the earthquake (i.e. before the seismological data are available), in order to provide information and to invite the eye-witnesses to fill in the macroseismic questionnaire. In parallel, the detections will also be published on Twitter.
- Automatic detection of widespread damage: Detection of widespread damage through the loss of web connections from the damaged areas.

[2] When the EMSC web site is offline, the real time seismicity is available via IGN (Madrid) web site

Finally, the EMSC would like to thank the IGN and the LDG for their constant support with a special thanks to the seismologists on call for their dedicated work. A special thank to Christian Mendelewski from the LDG who spend a lot of efforts in the improvement of the web infrastructure.
We also remind the reader that the real time services only exist thanks to the real time data kindly provided by the network operators and we take this opportunity to express to them our thanks.

I. INTRODUCTION

The European Mediterranean Seismological Centre (EMSC), hosted by the LDG (*Laboratoire de Détection et de Géophysique*, Bruyères-le-Châtel, France), is a non-profit scientific international NGO which provides rapid earthquake information in coordination with the national seismological institutes in the Euro-Med region. Currently, 84 seismological institutes are members from 55 countries spanning over the whole Euro-Med region. The main scientific activities of the EMSC are the real time information services and the production of the Euro-Med Bulletin (Godey et al.; 2007).
The real time information services are operated, thanks to the operational and technical support of the LDG, by compiling the real time parametric data provided by 64 seismological networks. The EMSC web site (http://emsc-csem.org) provides lists and maps of the latest earthquakes as well as additional information including location maps, moment tensors solutions or past regional seismicity. The EMSC also provides information on the current seismic activity through other media like Imode, WAP and RSS feeds.
This report presents the status of the 2010 real time activities in terms of data received, published/disseminated earthquake information, performance and success of the different services, and on information collected from the public (including macroseismic questionnaires, the pictures and the generated *felt maps*).
The second part is dedicated to the presentation of the new web site and the associated latest developments.

II. STATUS AND PERFORMANCE OF THE REAL TIME SERVICES

To assess the status and the performances of the real time activities, we present the evolutions in the real time services since 2004 in terms of:
- Amount of time the EMSC real time services are operational
- Quantity of data received and the number of earthquakes published by the EMSC
- Accuracy of the information published and disseminated by the EMSC
- Status of questionnaire and picture collection, as well as generated *felt maps*

II.1 Operating rate

To determine the operating rate of the real time services, we use the 3 following metrics (Figure 2):
1. The number of hours that the EMSC has been offline (i.e. web site unavailable or not updated) for maintenance or due to technical problems.
2. Of the total offline period, for how many hours is the EMSC responsible? (i.e. by excluding the maintenance and technical problems related to the backbone firewall and/or the hosting building).
3. How many hours has the IGN (Instituto Geografico Nacional, Madrid, Spain) been on duty? As a reminder, the IGN operates a back-up of the Earthquake Notification Service, when the EMSC is not able to operate it for maintenance reasons for example.

Since 2004, the operating rate of the EMSC real time services has improved significantly reaching 99.85%[3] online period for 2010 (i.e. 0.15% of offline time). The clear improvement since 2007 is explained by 2 facts: the installation of more powerful and redundant hardware at the EMSC (redundant web servers, load balancer …), and an important effort made by the LDG (EMSC hosting institute) to improve the robustness of its infrastructure by implementing redundant switches/routers and electric power devices.
In 2010, the IGN has been on duty for a total of 37 hours. The difference between the time period when the IGN has been on duty (green curve on Figure 2) and the time period during which the EMSC has been offline (blue curve on Figure 2) is explained by the fact that the IGN can be on duty even if the EMSC is online. This can occur for example when the EMSC backbone firewall announces a maintenance intervention that is likely to affect the EMSC internet access but ultimately does not.

Figure 2: Evolution of the offline time periods since 2005.
In green: IGN on duty; In blue: Total offline period; In red: Offline period due to EMSC

[3] When the EMSC web site is offline, the real time seismicity is available via IGN (Madrid) web site

II.2 Data reception and earthquake publication

In 2010, the EMSC has received real time parametric data (i.e. source parameters and phase picks) from 64 data contributors (i.e. seismological networks). Since 2004, the number of messages received has tripled (Table 1; Figure 3) due to the increasing number of data contributors and the number of seismic stations that provide data in real time (Table 1; Figure 3).

Consequently, the number of worldwide earthquakes published each year on the EMSC web site has almost doubled since 2005 (Table 1; Figure 4)). In 2010, 53 earthquakes are published everyday on the EMSC web site on average.

Finally, the number of quick moment tensors received has slightly increased since 2004 with a little decrease in 2009. In 2010, 13 agencies have provided quick moment tensors solutions to the EMSC (Annex III).

Table 1: Change in the amount of data received and the number of earthquakes published by the EMSC since 2004. NA: *Not applicable*

Figure 3: Change in the number of messages sent to the EMSC by the data contributors (in red) and the number of stations which provided picks in real time (in blue) since 2004

Figure 4: Change in the number of worldwide (in red) and Euro-Med (in blue) earthquakes published on the EMSC web site per year since 2005

II.3 Special web pages

When an event raises a particular interest and/or produces significant damage, a special web page is created which gathers additional information such as aftershocks distributions, field observations, damage reports, pictures, intensities, moment tensors, preliminary source studies, etc.

In 2010, 7 special web pages were opened:

- Mw 6.3 Granada region, Southern Spain 11/04/2010 at 22:08 UTC
- Mw 7.2 Baja California, Mexico on 04/04/2010 at 22:40 UTC
- Mw 6.0 Basyurt-Karakocan (Eastern Turkey) on 08/03/2010 at 02:32 UTC
- Mw 8.8 Off Shore Maule, Chile on 27/02/2010 at 06:34 UTC
- ML 4.6 Off west coast of Denmark on February 19th 2010 at 21:08 UTC
- Seismic activity in Corinth Gulf (Greece) in January 2010
- Mw 7.1 HAITI on January 12th 2010 at 21:53 UTC

II.4 Location accuracy and timeliness of the information published and disseminated by the EMSC

In order to assess the accuracy of a location provided by the EMSC, we compare it with the reference location. We consider as the reference location, the location provided by the local network in its manually revised bulletin for the same earthquake, when available. Otherwise, we do not perform any comparison of location.

As for the timeliness, we present the evolution, over the last several years, in the delay between the earthquake occurrence and the publication of the location of the EMSC web site.

Only Euro-Med earthquakes are considered because this is where the results are relevant as it is where the EMSC real time information system is focused.

We consider separately:

- The preliminary locations (i.e. the very first source parameters that are published on the web site for a given earthquake)
- The locations disseminated within the framework of the Earthquake Notification Service

II.4.1 Preliminary information

Since 2006, the accuracy of the location of the preliminary information has improved significantly (Figure 5) with an average accuracy of 13.2 km in 2010 for Euro-Med earthquakes.

In terms of time performance, the delay between earthquake occurrence and publication of the preliminary information has continually decreased since 2004 with an average value of 9.1 minutes in 2010 for Euro-Med earthquakes. This improvement is mainly due to the improvement of the speed in which the data contributors provide real time information.

Figure 5: Improvement in the average accuracy of the preliminary information (in blue) and of the average time delay between the earthquake occurrence and the publication of the preliminary information (in red) since 2006 for Euro-Med earthquakes

II.4.2 Earthquake Notification Service

The total number of users registered to the Earthquake Notification Service has been steadily increasing since 2004, with a total of 8,644 users on 01/01/2010. This corresponds to more than 1,100 new registrations in 1 year.

The performance of the Earthquake Notification Service in terms of time elapsed between earthquake occurrence and the dissemination of the notification (by email, SMS or fax) to the registered users, has clearly improved since 2004, with a median value of 18 minutes for Euro-Med earthquakes in 2010 (Table 2; Figure 6).

The median alert triggering time (time elapsed between the earthquake occurrence and the triggering of the alert system) is now stabilized since 2008 with a value of 7.5 minutes (Figure 6). This value is closely linked to the time performances of the data contributors and we do not think it can be significantly improved in the future with the current system.

Concerning the accuracy of the locations disseminated within the Earthquake Notification Service for Euro-Med earthquakes, it shows a rather stable median value of 10-12 km since 2004.

Table 2: Evolution since 2004 of the performance of the Earthquake Notification Service

Figure 6: Evolution since 2004 of the Alert Triggering time (in blue) and Dissemination time (in red) for Euro-Med earthquakes

II.4.3 EUR-OPA Alerts

In 2010, five of the notifications disseminated by the Earthquake Notification Service were EUR-OPA Alerts. They concern:

- One earthquake in Eastern Turkey
- One earthquake in Southern Spain
- One earthquake on China-Russia-North Korea border
- Two in far Eastern Russia (Kuril Islands, Kamchatka peninsula …).

II.5 Web traffic and *felt maps*

To measure the traffic on the EMSC web site, the same software (*StatCounter)* has been used since 2004.

Despite a small number of significant earthquakes in Euro-Med in 2010 compared to previous years, the average traffic on EMSC web site has almost doubled over the last 12 months with 1 million unique visitors (10 millions pages loads) per month on average in 2010 (Table 3; Figure 7).

This dramatic increase is mostly explained by the implementation of a new web site in July, 2010. On the one hand, this web site provides several features to better identify the earthquake that an eye-witness has felt. One the other hand, we have improved significantly the robustness and the power of our web servers which made the new web site much faster.

On November, 3rd, 2010, an earthquake of magnitude 5.4 hit Southern Serbia, causing moderate damage in the region of Kraljevo. This earthquake was widely felt in Serbia as well as in Bulgaria, Montenegro and Bosnia. The main shock has been followed by a large number of aftershocks and many of these aftershocks were also felt by the population. As a consequence, the number of pages loads in a single day has exceeded the previous record (set after the L'Aquila earthquake in 2009) on 03/11/2010 with 1,057,635 pages loads. On the same day, the number of unique IP's reached 119,332. However, the current record remains the one set after the M6.3 L'Aquila earthquake with 134,276 unique IP's on 06/04/2009.

Finally, as the EMSC web site has clearly been increasing its visibility on the internet since 2004, the number of traffic surges detected, and consequently the number of associated *felt maps* (Bossu et al; 2008) has increased significantly. In 2010, we have been able to plot *felt maps* for 128 felt events (Table 3).

Table 3: Average daily web traffic and number of generated *felt maps* since 2004

Figure 7: Average number of unique daily visitors on EMSC web site since 2004

Figure 8: Changes in the daily number of unique IP visiting EMSC web site in 2009 and 2010

According to Alexa (www.alexa.com) the average load time for EMSC web site has been divided by 2 in one year with a value of 1.8 seconds in 2010. This value, which integrates all EMSC web users, whatever their own bandwidth, confirms that the new EMSC web site now provides much better performances than the previous one. As for the geographic distribution, our web users represent 219 different countries in 2010 (Figure 9).

Figure 9: Geographic distribution of web visitors in 2010

II.6 Usage of other information services

The EMSC provides other media for earthquake information publication including RSS feed, Imode, and WAP pages for cell phones which success has increased significantly since 2007 (Table 4).

Table 4: Daily use rate of Imode, WAP and RSS services

II.7 Questionnaires, comments and pictures

II.7.1 Questionnaires collected

Since 2004, the number of questionnaires completed by web users has dramatically increased. The change is correlated with the increase in web traffic on the EMSC web site and its visibility on the internet and among search engines. In 2010, a total of 2,400 questionnaires have been collected for 693 earthquakes (Table 5).

The total number of collected questionnaires has decreased since 2008 (4,725 in 2008; 3,716 in 2009 and 2,400 in 2010). But it is important to notice that the earthquakes for which the EMSC collects a large number of questionnaires generally correspond to widely felt or rare earthquakes in the Euro-Mediterranean region. Indeed, if we list the earthquakes for which more than 100 questionnaires were collected in the last 2 years, we get:

- In 2008,
  - o Four M6+ earthquakes occurring in Greece (06/01/2008, 14/02/2008, 06/06/2008 and 15/07/2008)
  - o Two small but widely felt earthquakes in Bulgaria (15/11/2008 and 16/11/2008)
  - o Two rare and widely felt earthquakes in Sweden on 16/12/2008 and in United Kingdom (Market Rasen) on 27/02/2008
  - o One M5.2 earthquake in Northern Italy on 23/12/2008
- In 2009,
  - o One large and destructive earthquake in L'Aquila, Italy on 06/04/2009
  - o A M5.3 widely felt earthquake in Romania on 25/04/2009 and a M4.8 in Black Sea region (Romania/Bulgaria border region) on 05/08/2009
  - o A relatively rare earthquake in Gibraltar region on 17/12/2009 with 562 questionnaires collected
- In 2010,
  - o One M5.4 widely felt and slightly damaging earthquake in Southern Serbia on 03/11/2010

Table 5: Change of the number of questionnaires filled and of the number of pictures provided by eye-witnesses since 2004

Concerning the languages used by the web users to fill their questionnaires, we see that a third of them are filled in English on average but other languages like Spanish, Italian and Greek are also used but in lower proportion, between 5% and 8% of the cases (Figure 10).

Figure 10: Languages in which questionnaires were answered in 2010

II.7.2 Comments collected

Via the questionnaires, the EMSC collects comments from the eye-witnesses that, if validated, are made available on the web site as a list and as an interactive Google Map.

Due to the decreasing number of questionnaires collected in 2010, the number of questionnaires with comments has also decreased (Table 6). However, the proportion of questionnaires with comments has increased since 2008 (Table 6). This indicates that witnesses now tend to use this option to express their feeling after having felt an earthquake.

Table 6: Evolution of the number of comments posted by the witnesses

II.7.3 Pictures collected

The EMSC also allows eye-witnesses to post their pictures of earthquake damage on the web site.

As for the dramatic increase of the web traffic over the last 12 months, we observe a important increase of number of pictures collected since the implementation of the new site and the enhancement of the web servers. 162 pictures have been collected in 2010 (Table 7) and 80 pictures for the M5.4 earthquake in Central Serbia on 03/11/2010 which caused moderate damage in the region of Kraljevo (Figure 12).

This result also shows that this way of providing eye-witness reports is quite popular. This is partly due to the growing number of cell phones with embedded cameras that allow eye-witnesses to easily take pictures.
In 2010, we received pictures for five earthquakes:

- M7.1 Haiti on 12/01/2010
- M8.8 Chili, Bio-Bio on 27/02/2010 (Figure 11)
- M3.5 Bulgaria on 10/09/2010
- M7.7 Sumatra, Indonesia on 25/10/2010
- M5.4 Serbia on 03/11/2010 (Figure 12)

Table 7: Evolution of the number of pictures posted by the witnesses.
Only pictures whose content has been manually validated by the EMSC are considered

Figure 11: Damage caused by the M8.8 earthquake in Chile on 27/02/2010

Figure 12: Damage in the city of Kraljevo, Serbia caused by the M5.4 earthquake on 03/11/2010

III. NEW EMSC WEB SITE AND RECENT DEVELOPMENTS

In order to improve the clarity of the information published by the EMSC, a new EMSC web site has been online since July, 2010. It provides new features that help people who just felt an earthquake to easily identify the correct earthquake in the catalogue of latest earthquakes. The idea is also to encourage more people to fill out the questionnaire and post pictures of damage.

III.1 Automatic moving banner

In 2010, the EMSC has implemented a new algorithm to detect traffic surges based on the number of new visitors to the web site. The new algorithm monitors the number of new visitors within the last minute that were not present during the last 20 or 30 minutes. Compared to the previous method based on a STA/LTA ratio, this new method allowed us to significantly decrease the time delay to detect felt earthquakes which is now very often below 2 minutes.
However, the time delay between earthquake occurrence and the publication of the first parametric information on the web site is 9 minutes on average (see §II.3.1) due to the delay in receiving the locations from the data providers. Therefore, these surges of web traffic are used to publish very early information on a felt earthquake via a moving banner on the top of the web site. The goal is to provide some information for users on the web site before the first seismological data are available. Example:

Unconfirmed reports of a felt event in SERBIA app. 3 minutes ago. Were you there? Tell us!

This moving banner also allows the web users to fill a questionnaire. As a result, we avoid having people leave the web site because they can not find any information about the earthquake they have just felt.
Finally, when the earthquake is confirmed by the first seismological data, the content of the banner is modified as in the example below:

Felt earthquake in SERBIA 12 minutes ago. More info.

After a given delay, the moving manner is removed.

III.2 Improvement of the algorithm for detection of felt earthquake

The detection of felt earthquakes through peaks in web traffic (Bossu et al.; 2008) has been improved. It is now based on the number of new visitors in the last minute that were not present during the last 20 minutes. This new method allowed us to significantly decrease the time delay to detect a felt earthquake, which is now 90 seconds on average (Figure 13). The detection algorithm is not restricted only to large earthquakes with the tool having detected felt earthquakes down to magnitude 2.4 in Serbia (Figure 14).

Figure 13: Triggering times vs. magnitude for detected felt earthquake

Figure 14: Changes in triggering times vs. magnitude for the November 2010 sequence in Serbia

III.3 Highlights on Significant and Felt Earthquakes

In order to help EMSC web users to more easily identify the earthquake they have just felt, a short list of "*Significant and Felt Earthquakes*" is now available on the web site (Figure 15).

The goal is to highlight not only the large earthquakes but also the small or moderate but widely felt earthquakes. Indeed, on average, more than 50 earthquakes are reported each day on the EMSC web site which can make it difficult for the user to identify which event he/she felt. With this tool, we expect to avoid the situation in which the web users associate a questionnaire to the wrong earthquake (e.g. for an aftershock instead of the main shock) or they leave the web site because they can not find the event they have felt.

Figure 15: Example of highlight on significant and felt earthquakes on the new EMSC web site

III.4 Earthquakes near you

Another way to help web users to identify the event they have just felt is to give an easy access to the latest events that occurred close to their geographic location. For this, web users are automatically geolocated in the same manner as for the *felt maps* (i.e. via their IP address) and will have access to a map and list of earthquakes that have occurred nearby during the last 7 days (Figure 16).

In case the location given by the IP database is erroneous, the user will have the option to reassign a location to his IP address. The location will be saved in a cookie so that his web browser will remember this location during future visits.

Figure 16: Extract of the "*Earthquakes Near You*" page from the new EMSC web site

III.5 Eye-witness location and dynamic clustering

When an eye-witness fills a questionnaire, he now has the possibility to set his location via a Google search bar (Figure 17) by typing his country, locality and address (optional). The Google Maps is immediately centred on the associated location. If several locations are found, a list of possible locations is proposed.

Then, in order to be able to compute intensities in more places, we now use a clustering algorithm that allows us to plot more relevant macroseismic intensity maps than before (Figures 18 and 19).

Figure 17: Eye-witness location using Google Maps

Figure 18: Intensity map without dynamic clustering

Figure 19: Intensity map using dynamic clustering

III.6 RICHTER: an application for android mobiles

The EMSC is experimenting with an application called RICHTER (Rapid geo-Images for Collaborative Help Targeting Earthquake Response) for Android mobile phones developed by AnsuR Technologies (www.ansur.no) in Norway and that allows earthquake eye-witnesses to easily and freely share their pictures of resulting damage with the EMSC. The goal is to quickly characterize the impact of an earthquake and provide a portal for rapid visual assessment.

RICHTER can automatically geo- and time- reference the photos you take. Geo-reference can be via built-in GPS, or via the mobile networks directly, even many places inside. Once location is automatically determined, it will be embedded with exact time into the picture file. The user only has to press one button to send both the picture and the geo-referencing information (time and position) to the EMSC. After validation, the collected pictures are then published on EMSC web site.

III.7 Credit of the station operating agency

The new web site also provides, for each reporting station, the associated operating agency code (Figure 20):

- As from the International Registry of Seismic Stations (IRSS) maintained jointly by International Seismological Centre (www.isc.ac.uk) and by the World Data Centre for Seismology, Denver (http://neic.usgs.gov)
- As from the Federation of Digital Seismic Networks (FDSN) (www.fdsn.org)

Figure 20: Automatic display of IRSS and FDSN operating agency codes

IV. DETECTION OF DAMAGE THROUGH LOSS OF WEB CONNECTIONS

On 14/03/2010, a major electricity blackout affected Chile when a key transformer failed.
According to BBC international, the failure occurred at 23:50 GMT (Figure 15). We detected the failure by plotting loss of web connections as a function of time and were able to estimate the time of the failure at 23:43 GMT. By locating the corresponding IP's, we were able to determine the region affected by this electricity blackout (Figures 22).

Figures 21: Loss of web connections with respect to time.

Figures 22: Loss of web connections with respect to time.
Top: Worldwide connections; Bottom: Connections from Santiago, Chile only

V. AUTHORITATIVE LOCATIONS SCHEME

According to what has been approved during the 2010 EMSC General Assembly, the Authoritative location procedure has been implemented in November 2010.
The idea is based on the principle that **the EMSC should not relocate a reliable and accurate location**. We consider a location reliable if it is reproducible using the same dataset and we consider a location accurate if it fits geophysical criteria derived from the Ground Truth (GT) criteria of Engdahl et al. (2001) and Bondar et al. (2009). These locations present several advantages as they have been independently determined and are based on the geometry of the reporting stations.
Among the 61,145 locations provided by the 64 network operators in 2010, 9.78% of them are authoritative and 70% of them are located either in Turkey, Greece, or in the Balkan region (Figure 23). This corresponds to the regions where the seismic networks are the more densely distributed.

Figure 23: Authoritative locations provided by the data contributors in 2010

VI. CONCLUSIONS

- Over the last few years, the performance and success of the real time earthquake information services have improved significantly. Since 2004, the number of events published each year on the EMSC web site has almost doubled, with nearly 20,000 events published in 2010.
- The Earthquake Notification Service has remained fully operational thanks to the operational and technical support of the LDG and of the IGN. In 2010, the median dissemination time for Euro-Med events has been reduced to 18 minutes and the operating rate of EMSC web site reached 99.85%[4].
- The new EMSC web site, which aims to be faster and more reliable, to facilitate the collection of in-situ observations (macroseismic questionnaires, pictures), and to better credit the stations' operating agencies, allowed us to significantly increase the web traffic. Despite only a small number of significant earthquakes in the Euro-Med region in 2010 compared to previous years, the 2010 EMSC web site traffic doubled compared to 2009 traffic, with an average of 1 million unique visitors (10 million page loads) per month
- The number of collected pictures has increased to 162, with 80 having been received after the M5.4 earthquake in Central Serbia on 03/11/2010, which caused moderate damage in the region of Kraljevo.
- The detection of felt earthquakes through surges of web traffic (Bossu et al.; 2008) has been reduced to 90 seconds. Earthquakes down to magnitude 2.4 have generated large surges of web traffic.
- Traffic surges and quick qualitative impact assessments are used to identify potentially damaging earthquakes which are now automatically highlighted on the web site in a specific frame.
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When the EMSC web site is offline, the real time seismicity is available via IGN (Madrid) web site

VII. PERSPECTIVES

In 2011, the planned developments include the following topics:

[4] When the EMSC web site is offline, the real time seismicity is available via IGN (Madrid) web site

- An Email/SMS notification service based on the expected level of damage: The results of the Earthquake Qualitative Impact Assessment (EQIA) tool will be used to develop an email and SMS notification service for EMSC Members, based on the a priori qualitative impact of an earthquake.
- Phasing out email-based data exchanges: Implement real time, robust and quality assured data exchange (QWIDS) to both collect and disseminate earthquake information.
- Improving the web infrastructure: Carry on the efforts to further improve the web infrastructure to better cope with surges of web traffic.
- Web site for smart phones: A web site dedicated to smart phones will be put online early 2011. The macroseismic questionnaire will be replaced by thumbnails describing the different levels of EMS-98 macroseismic scale.
- An application to collect geo-tagged pictures of earthquake damage: RICHTER, the application for Android mobile phones developed by Ansur (www.ansur.no), will be made available to web users after potentially damaging earthquakes.
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- Automatic detection of widespread damage: Detection of widespread damage through the loss of web connections from the damaged areas.

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IX. ANNEX I: RECENT PUBLICATIONS

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Toward the determination of an authoritative location at EMSC. G. Mazet-Roux, R. Bossu
Performances and recent evolutions of EMSC Real Time Information services. G. Mazet-Roux, R. Bossu
The new EMSC website – New services to improve earthquake information. F. Roussel, S. Gilles, G. Mazet-Roux, R. Bossu
An EMSC website for the mobile users. F. Roussel, B. Sauveton, R. Bossu, M. Carol
Online macroseismic questionnaires at EMSC. S. Gilles, F. Roussel, R. Bossu
A tool for automatic Earthquake Qualitative Impact Assessment. S. Gilles, S. Merrer, G. Mazet-Roux, R. Bossu
Creating a unique catalogue of seismicity for the NERIES seismic data portal. Outcomes and lessons. S. Merrer, S. Godey, G. Mazet-Roux, R. Bossu
How to better discard non tectonic events from seismicity catalogues?. S. Godey, R. Bossu
An educational seismicity map for the French schools. S. Godey, M.-L. Nottin, R. Bossu
Image of the seismicity from the Euro-Med Bulletin. S; Godey, R. Bossu, J. Guilbert
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SHERPA: An archiving and sharing tools for field trips pictures. Y. Theo, E. Semo, G. Mazet-Roux, R. Bossu, L. Bollinger

X. ANNEX II: CONCLUSIONS OF THE AUDIT OF THE COUNCIL OF EUROPE

Conclusion of the Audit for the Council of Europe: OPEN PARTIAL AGREEMENT FOR THE PREVENTION OF, PROTECTION AGAINST, AND ORGANISATION OF RELIEF IN MAJOR NATURAL AND TECHNOLOGICAL DISASTERS
By *Jean-Mathias Goerens, doctor of law, chair of the Audit Sub-Committee and Stefano Tinti, professor of Geophysics at the University of Bologna, Italy March 2010*

The activities of the EMSC are at the top level in Europe and also when viewed in the international global frame, as regards the services provided. These are adequate for the today technology and it is quite appreciable that EMSC is making continuous efforts to exploit new technological tools as soon as they are available, with the aim to extend the range of information provided and to enlarge the number of the potential end-users and to reduce the time delay for the dissemination. It is also worth of consideration that EMSC services could not be provided without the contribution of a network of national and international seismological organisations ensuring a stable flow of data to the EMSC data base. Therefore it is not surprising that one of the EMSC priorities was first the creation of such a network and is today the maintenance and the extension of the network, which is very valuable and unique and which is the result of intense collaborations and of fruitful and accepted coordination. It is further worth of appreciation that EMSC has established close links with the most important seismological research and operational centres in Europe and is partner of projects financed by the European Union. This has the double advantage to provide support to research activities undertaken in the EMSC and to improve the EMSC knowhow in terms of scientific achievements and methods and in terms of up-to-date technology and next future applications.

XI. ANNEX III: REAL TIME DATA PROVIDERS IN 2010

BEO	Seismological Survey of Serbia, Beograd	OP	Serbia
BER	University of Bergen, Bergen	OP	Norway
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover & Erlangen	OPA	Germany
BGS	British Geological Survey, Edinburgh	OPA	United-Kingdom
BGSG	British Geological Survey, Global network (*EarlyBird* system), Edinburgh	OP	United-Kingdom
BRA	Seismology Division, Slovak Academy of Sciences, Bratislava	OPA	Slovakia
BUC	National Institute for Earth Physics, Bucharest	OP	Romania
CNRM	Centre National de la Recherche Scientifique et Technique, Geophysics Laboratory, Rabat	OP	Morocco
CRAA	Centre de Recherche en Astronomie, Astrophysique et Géophysique, Algiers	OP	Algeria
CYP	Geological Survey Department, Nicosia	OP	Cyprus
DDA	Earthquake Research Department, Ministry of Public Works and Settlement, Ankara	OP	Turkey
DHMR	National Seismological Observatory Centre, Dhamar	OPA	Yemen
DJI	Observatoire Géophysique d'Arta, Arta	OP	Djibouti
GFU	Geophysical Institute of Academy of Sciences, Prague	OP	Czech Republic
GFZ	GeoForschungsZentrum (GEOFON), Potsdam	OPA	Germany
GII	Seismology Division, Geophysical Institute of Israel, Tel Aviv	OP	Israel
GRAL	National Center for Geophysical Research, Beirut	OP	Lebanon
GSRC	Geophysical Survey, Russian Academy of Sciences, Obninsk	OP	Russia
HSNC	Technological Educational Institute of Crete, Seismological Network of Crete	P	Greece
ICC	Instituto Cartografico de Catalunya, Barcelona	OP	Spain
IGUT	Institute of Geophysics, University of Tehran, Tehran	OPA	Iran
IMO	Department of Geophysics, Icelandic Meteorological Office, Reykjavik	OP	Iceland
IMP	Instituto de Meteorologia, Seismologia, Lisbon	OPA	Portugal
INGV	Italian National Seismic Network, Roma	OPA	Italy
INMT	Institut National de la Météorologie, Tunis	OP	Tunisia
IRSA	Romanian Institute for Applied Seismology, Bucharest	OP	Romania
ISN	Iraqi Meteorological Organization and Seismology, Bagdad	OP	Iraq
KAN	Kandilli Observatory and Earthquake Research Institute, Istanbul	OP	Turkey
LDG	Laboratoire de Détection et de Géophysique, Bruyères-le-Châtel	OPA	France
LED	Landsamt für Geologie, Rohstoffe und Bergbau, Baden Württemberg	OP	Germany
LJU	Environmental Agency of the Republic of Slovenia, Seismological Office, Ljubljana	OP	Slovenia
LVV	Carpathian Seismological Dept., Ukraine Academy of Science, Lviv	P	Ukraine
MAD	Instituto Geografico Nacional, Madrid	OPA	Spain
MCSM	Ukrainian NDC, Main Center of Special Monitoring, Kiev	P	Ukraine
MOLD	Institute of Geophysics and Geology, Chisinau	P	Moldova
MON	Direction de l'Environnement, de l'Urbanisme et de la Construction	P	Monaco
MSO	Montenegro Seismological Observatory, Podgorica	OPA	Montenegro
NEIR	USGS/NEIC, Denver	OPA	USA
NEWS	Norwegian Seismic Array, Kjeller	OPA	Norway
NNC	Kazakhstan National Data Center, Institute of Geophysical Research, Almaty	OP	Kazakhstan
NOA	National Observatory of Athens, Geodynamic Institute, Athens	OPA	Greece
NOR	Norwegian Seismic Array, Kjeller	OPA	Norway
NRIA	National Research Institute of Astronomy and Geophysics, Cairo	OP	Egypt
NSSP	National Survey of Seismic Protection, Yerevan	OP	Armenia
ODC	Observatories and Research Facilities for EUropean Seismology, De Bilt	OP	The Netherlands
OGS	Osservatorio Geofisico Sperimentale, Trieste	OP	Italy
PDA	Instituto de Meteorologia, Azores University, Ponta Delgada, Azores	OP	Portugal
RNS	Réseau National de Surveillance Sismique, Strasbourg	OP	France
RSSC	Azerbaijan National Academy of Sciences, Baku	OP	Azerbaijan
SASN	South African Seismological Network, Pretoria	OP	South Africa
SIK	Seismological Institute of Kosovo	OP	UNMIK-Kosovo
SED	Swiss Seismological Service, Zurich	OP	Switzerland
SKO	Seismological Observatory of Skopje, Skopje	OPA	FYROM

SOF	Bulgarian Academy of Science, Bulgarian Academy of Sciences, Sofia	OP	Bulgaria
SNSN	Swedish National Seismological Network, Uppsala	OP	Sweden
THE	Department of Geophysics, University of Thessaloniki, Thessaloniki	OP	Greece
THR	International Institute of Earthquake Engineering and Seismology, Tehran	OP	Iran
TIF	Georgian National Survey of Seismic Defense, Tbilisi	OP	Georgia
TIR	Institute of Seismology, Academy of Sciences, Tirana	OP	Albania
UCC	Royal Observatory of Belgium, Brussels	OP	Belgium
UPSL	University of Patras, Seismological Laboratory, Patras	OP	Greece
WAR	Institute of Geophysics, Polish Academy of Sciences	OPA	Poland
ZAG	Seismological Survey, University of Zagreb, Zagreb	OP	Croatia
ZAMG	ZentralAnstalt für Meteorologie und Geodynamik, Vienna	OP	Austria

Table 8: Real time data providers in 2010. Seismological networks that have provided real time parametric data to EMSC in 2010. Legends: Data type: O: Source parameters; P: Phase pickings; A: Amplitudes

XII. ANNEX IV: AGENCIES PROVIDING QUICK MOMENT TENSORS TO THE EMSC

The following agencies have been providing quick moment tensors to the EMSC in 2010:

AUTH: Department of Geophysics, University of Thessaloniki, Thessaloniki, Greece
CPPT: Centre Polynésien de Prévention des Tsunamis, French Polynesia
ERD: Earthquake Research Department, Ankara, Turkey
ETH: Swiss Federal Institute of Technology, Zurich, Switzerland
HARVARD: Seismological group of Harvard University.
IGN: Instituto Geografico Nacional, Madrid, Spain
INGV: Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italy
IPGP: Institut de Physique du Globe de Paris, Paris, France
KOERI: Kandilli Observatory and Earthquake Research Institute, Istanbul, Turkey
NOA: National Observatory of Athens, Geodynamic Institute, Athens, Greece
UOA: University of Athens, Athens, Greece
UPSL: University of Patras. Seismological Laboratory, Patras, Greece
USGS: U.S. Geological Survey, Denver, USA

XIII. ANNEX X: EVENTS PROCESSED BY THE EARTHQUAKE NOTIFICATION SERVICE IN 2010

Date	Time	Magtype	Mag	Lat	Lon	Depth	Region
03/01/2010	22:36	Mw	7.1	-8.89	157.39	19	SOLOMON ISLANDS
05/01/2010	12:15	Mw	6.8	-9.05	157.48	32	SOLOMON ISLANDS
12/01/2010	21:53	Mw	7.1	18.47	-72.55	10	HAITI REGION
17/01/2010	20:16	mb	5.0	35.20	27.71	52	DODECANESE ISLANDS, GREECE
18/01/2010	01:02	Mw	5.7	46.56	153.25	33	KURIL ISLANDS
18/01/2010	15:56	Mw	5.3	38.39	21.95	5	GREECE
22/01/2010	00:46	mb	5.3	38.43	22.04	2	GREECE
22/01/2010	00:50	mb	4.8	38.38	21.98	2	GREECE
24/01/2010	22:43	mb	5.2	16.00	-60.95	60	GUADELOUPE REGION, LEEWARD ISL.
30/01/2010	13:47	mb	4.8	38.30	22.45	10	GREECE
06/02/2010	04:45	Mw	6.0	46.98	152.78	60	KURIL ISLANDS
06/02/2010	04:55	mb	4.9	51.45	16.11	2	POLAND
11/02/2010	02:25	mb	4.5	42.29	19.43	20	ALBANIA
11/02/2010	21:56	Mw	5.3	33.98	25.42	10	EASTERN MEDITERRANEAN SEA
18/02/2010	01:13	Mw	6.9	42.61	130.54	566	CHINA-RUSSIA-NORTH KOREA BORDER
23/02/2010	10:25	mb	5.1	32.56	48.26	10	WESTERN IRAN
26/02/2010	20:31	Mw	7.2	25.93	128.50	2	RYUKYU ISLANDS, JAPAN
27/02/2010	06:34	Mw	8.8	-35.89	-73.04	30	OFFSHORE MAULE, CHILE
27/02/2010	08:01	mb	6.9	-37.84	-75.14	30	OFF COAST OF BIO-BIO, CHILE
27/02/2010	23:21	mb	5.8	35.96	70.07	100	HINDU KUSH REGION, AFGHANISTAN

04/03/2010	14:02	Mw	6.4	-13.61	167.20	200	VANUATU
08/03/2010	02:32	Mw	6.0	38.84	40.00	10	EASTERN TURKEY
08/03/2010	07:47	mb	5.5	38.73	40.20	2	EASTERN TURKEY
08/03/2010	09:00	ML	4.8	38.74	40.13	15	EASTERN TURKEY
08/03/2010	10:14	mb	4.9	38.78	40.19	2	EASTERN TURKEY
08/03/2010	11:12	mb	4.9	38.77	40.14	2	EASTERN TURKEY
10/03/2010	13:38	mb	4.8	42.75	20.62	2	SERBIA
11/03/2010	14:39	Mw	7.2	-34.18	-71.90	2	LIBERTADOR O'HIGGINS, CHILE
11/03/2010	14:55	Mw	6.9	-34.31	-72.02	10	OFFSHORE O'HIGGINS, CHILE
16/03/2010	02:22	Mw	6.7	-36.16	-73.18	35	OFFSHORE BIO-BIO, CHILE
24/03/2010	14:11	mb	5.0	38.69	40.27	15	EASTERN TURKEY
26/03/2010	18:35	mb	4.8	38.15	26.31	15	NEAR THE COAST OF WESTERN TURKEY
02/04/2010	07:37	ML	4.5	40.51	35.03	2	CENTRAL TURKEY
04/04/2010	22:40	Mw	7.2	32.30	-115.08	10	BAJA CALIFORNIA, MEXICO
06/04/2010	22:15	Mw	7.7	2.30	97.12	40	NORTHERN SUMATRA, INDONESIA
11/04/2010	09:40	Mw	6.8	-10.88	161.13	60	SOLOMON ISLANDS
11/04/2010	22:08	Mw	6.3	37.07	-3.51	623	SPAIN
12/04/2010	07:57	mb	5.1	77.13	19.25	2	SVALBARD REGION
13/04/2010	23:49	Mw	6.9	33.23	96.65	33	SOUTHERN QINGHAI, CHINA
14/04/2010	01:25	mb	5.8	33.31	96.54	10	SOUTHERN QINGHAI, CHINA
18/04/2010	20:28	Mw	5.6	35.71	67.71	10	CENTRAL AFGHANISTAN
24/04/2010	15:01	mb	5.2	34.20	26.04	30	CRETE, GREECE
30/04/2010	23:11	Mw	6.5	60.56	-177.91	10	BERING SEA
02/05/2010	12:24	mb	4.5	35.61	24.69	89	CRETE, GREECE
07/05/2010	23:12	Mw	5.2	16.44	-61.08	60	GUADELOUPE REGION, LEEWARD ISL.
09/05/2010	05:59	Mw	7.2	3.75	96.05	48	NORTHERN SUMATRA, INDONESIA
14/05/2010	12:29	mb	5.2	35.90	4.12	2	NORTHERN ALGERIA
14/05/2010	13:25	mb	4.9	39.36	-29.66	20	AZORES ISLANDS, PORTUGAL
14/05/2010	18:49	mb	5.1	29.35	51.59	18	SOUTHERN IRAN
16/05/2010	06:52	Mw	5.0	35.85	4.05	2	NORTHERN ALGERIA
17/05/2010	22:03	Mw	5.3	46.33	152.06	74	KURIL ISLANDS
23/05/2010	13:28	Mw	5.0	35.86	4.10	10	NORTHERN ALGERIA
25/05/2010	10:09	Mw	6.3	35.41	-35.97	10	NORTHERN MID-ATLANTIC RIDGE
27/05/2010	17:14	Mw	7.2	-13.64	166.56	51	VANUATU
06/06/2010	12:21	ML	4.5	35.41	24.75	69	CRETE, GREECE
08/06/2010	15:16	ML	4.5	45.57	26.42	110	ROMANIA
12/06/2010	19:26	Mw	7.5	7.78	91.89	10	NICOBAR ISLANDS, INDIA REGION
16/06/2010	03:16	Mw	7.0	-2.13	136.53	10	NEAR N COAST OF PAPUA, INDONESIA
18/06/2010	02:23	Mw	6.1	44.57	148.63	47	KURIL ISLANDS
26/06/2010	05:30	Mw	6.7	-10.57	161.46	40	SOLOMON ISLANDS
09/07/2010	22:15	mb	4.8	41.17	19.85	12	ALBANIA
13/07/2010	03:18	mb	4.7	36.23	21.81	30	SOUTHERN GREECE
16/07/2010	08:11	Mw	5.1	36.79	26.84	168	DODECANESE ISLANDS, GREECE
16/07/2010	18:53	mb	5.1	39.31	23.99	10	AEGEAN SEA
18/07/2010	13:03	mb	5.2	24.13	122.45	31	TAIWAN REGION
20/07/2010	19:38	Mw	5.8	27.09	53.87	10	SOUTHERN IRAN
20/07/2010	19:50	mb	5.1	27.11	53.86	30	SOUTHERN IRAN
23/07/2010	22:08	Mw	7.3	6.72	123.49	600	MORO GULF, MINDANAO, PHILIPPINES
23/07/2010	22:51	Mw	7.4	6.51	123.54	589	MORO GULF, MINDANAO, PHILIPPINES
23/07/2010	23:15	Mw	7.4	6.83	123.27	639	MORO GULF, MINDANAO, PHILIPPINES
25/07/2010	12:57	Mw	5.6	49.72	154.69	131	KURIL ISLANDS
30/07/2010	03:56	Mw	6.4	52.48	159.96	40	OFF EAST COAST OF KAMCHATKA
30/07/2010	13:50	mb	5.5	35.24	59.38	11	NORTHEASTERN IRAN
31/07/2010	06:52	mb	5.3	29.48	56.84	10	SOUTHERN IRAN
04/08/2010	22:01	Mw	7.0	-5.75	150.75	37	NEW BRITAIN REGION, P.N.G.
04/08/2010	23:48	mb	5.9	46.00	153.27	33	KURIL ISLANDS
06/08/2010	02:37	mb	4.8	34.23	25.03	28	CRETE, GREECE

08/08/2010	04:06	mb	4.8	34.67	24.47	12	CRETE, GREECE
10/08/2010	05:23	Mw	7.3	-17.57	168.00	80	VANUATU
12/08/2010	11:54	Mw	7.1	-1.24	-77.28	200	ECUADOR
13/08/2010	21:19	Mw	6.9	12.59	141.52	10	MARIANA ISLANDS REGION
15/08/2010	12:11	mb	4.7	37.22	20.89	15	IONIAN SEA
22/08/2010	10:23	mb	5.4	37.42	20.21	10	IONIAN SEA
27/08/2010	19:23	Mw	5.7	35.49	54.55	10	NORTHERN IRAN
03/09/2010	16:35	Mw	7.0	-43.29	172.00	5	SOUTH ISLAND OF NEW ZEALAND
07/09/2010	02:11	mb	5.3	27.14	54.60	30	SOUTHERN IRAN
07/09/2010	12:48	mb	5.4	-14.37	-176.14	10	FIJI REGION
17/09/2010	10:17	mb	4.7	38.08	39.04	2	EASTERN TURKEY
17/09/2010	19:21	Mw	6.3	36.61	70.91	187	HINDU KUSH REGION, AFGHANISTAN
27/09/2010	11:22	mb	5.8	29.64	51.63	10	SOUTHERN IRAN
29/09/2010	17:10	mb	6.2	-4.89	133.80	10	NEAR S COAST OF PAPUA, INDONESIA
03/10/2010	15:21	mb	5.0	34.93	26.45	40	CRETE, GREECE
17/10/2010	17:55	mb	4.7	39.39	20.49	10	GREECE
21/10/2010	17:53	Mw	6.7	24.82	-109.21	10	GULF OF CALIFORNIA
25/10/2010	07:40	mb	4.7	34.64	23.53	2	CRETE, GREECE
25/10/2010	14:42	Mw	7.7	-3.47	100.12	10	KEP. MENTAWAI REGION, INDONESIA
03/11/2010	00:56	Mw	5.4	43.74	20.69	2	SERBIA
03/11/2010	02:51	Mw	5.3	40.43	26.30	10	WESTERN TURKEY
03/11/2010	18:13	mb	5.1	40.03	13.20	468	TYRRHENIAN SEA
10/11/2010	13:49	mb	5.1	27.77	57.11	15	SOUTHERN IRAN
11/11/2010	20:08	Mw	4.9	37.85	27.41	10	WESTERN TURKEY
13/11/2010	18:24	ML	4.6	35.08	9.42	10	TUNISIA
14/11/2010	15:06	mb	5.1	12.12	43.89	2	NEAR THE COAST OF YEMEN
14/11/2010	17:02	Mw	5.5	11.97	43.72	10	NEAR THE COAST OF DJIBOUTI
14/11/2010	23:08	ML	4.9	36.58	36.02	1	TURKEY-SYRIA BORDER REGION
16/11/2010	10:10	mb	5.8	51.76	159.22	10	OFF EAST COAST OF KAMCHATKA
26/11/2010	12:33	Mw	5.6	28.09	52.51	10	SOUTHERN IRAN
30/11/2010	03:24	Mw	6.8	28.45	139.11	493	BONIN ISLANDS, JAPAN REGION
30/11/2010	17:54	Mw	5.5	48.94	155.00	60	KURIL ISLANDS
01/12/2010	19:55	mb	5.2	30.15	51.58	10	SOUTHERN IRAN
02/12/2010	03:12	Mw	6.7	-6.02	150.00	39	NEW BRITAIN REGION, P.N.G.
04/12/2010	03:49	mb	4.8	36.39	26.34	130	DODECANESE ISLANDS, GREECE
05/12/2010	23:20	mb	4.5	35.33	28.58	48	EASTERN MEDITERRANEAN SEA
07/12/2010	18:17	mb	5.9	54.36	169.21	10	KOMANDORSKIYE OSTROVA REGION
17/12/2010	09:37	mb	4.9	36.95	24.00	104	SOUTHERN GREECE
18/12/2010	06:05	mb	4.9	37.38	20.30	40	IONIAN SEA
20/12/2010	18:41	Mw	6.5	28.49	59.25	4	SOUTHEASTERN IRAN
21/12/2010	17:19	Mw	7.4	26.93	143.71	20	BONIN ISLANDS, JAPAN REGION
22/12/2010	21:49	Mw	6.5	26.80	143.65	40	BONIN ISLANDS, JAPAN REGION
25/12/2010	13:16	Mw	7.3	-19.79	167.99	10	VANUATU REGION
29/12/2010	06:54	Mw	6.4	-19.69	168.17	40	VANUATU
30/12/2010	08:56	ML	4.8	51.57	16.11	1	POLAND

Table 9: Earthquakes processed in the framework of the Earthquake Notification Service in 2010. 1: Eur-OPA Alerts

GHHD - GEODYNAMICAL HAZARDS OF HIGH DAMS (TBILISSI, GEORGIA)

❶ GEODYNAMICAL MONITORING AT INGOURI DAM INTERNATIONAL TEST AREA (IDITA)

During 2010 the process of geodynamical monitoring at the Enguri Dam International Test Area (at dam foundation and its body) was continued. At the present there are 10 high precision tiltmeter stations (701-2A model tiltmeter stations are manufactured in USA by Applied Geomechanics inc.) Seven stations are situated in the body of dam and 3 tiltmeters are in the dam's foundation (tail water).

Up to now it is discovered that the results conducted by tiltmeters observations show that there is general regularity between the dam and its foundation's movement, particularly in connection with the regulation of water in reservoir. In the case of decrease of water level from its maximum to minimum the dam bends to the tail water, otherwise during its filling, the dam bends to its head water. During its movement it circumscribes hysteresis curves, the configuration of which is coordinated by the velocity of recharge-discharge of reservoir, the cessation of process and the difference in the reservoir minimum level in different years. The mentioned hysteresis curves include information of the whole system's (the dam and the foundation) rheology.

CREATION OF THE REAL TIME TELEMETRIC MONITORING SYSTEMS OF DAMS (DAMWATCH)

Due to financial support of joint project (# 5016) of Georgian National Scientific Foundation (GNSF) and Science and Technology Center of Ukraine (STCU), the M. Nodia Institute of Geophysics (MNIG) and Georgian-European Centre "Geodynamical Hazards of High Dams" operating in the frame of Open Partial Agreement on Major Disasters at the Council of Europe are developing the real time geotechnical telemetric monitoring system of large dams (DAMWATCH). This low-cost early warning system designed by MNIG and the company LTD "ALGO" (Tbilisi) consists of sensors (tiltmeters, APPLIED GEOMECHANICS Model 701-2) connected to terminal and central controllers and by the GSM/GPRS Modem - to the diagnostic center. The innovation in comparison with similar systems (say at Coolidge dam: Holzhausen, 1991) is implementation of new methodology (nonlinear dynamics) for processing geotechnical time series and assessment/prediction of the dam behavior. Data acquisition and transfer system of Enguri dam has been installed by firm Ltd. "ALGO".

GENERAL INFORMATION

The stability of dam structure can be tested by its long-term and short-term response to stress, here to water loading. The visco-elastic dam structure as a whole or its individual elements may respond to certain loading conditions through time-dependent inelastic deformations. For each load there is a corresponding safe (theoretical) limit which must not be exceeded. At larger loading values or accumulation of critical value of damage the extensive strains may occur, which are beyond the safe limit and which may lead to damage and possibly to failure.

The 271 m high Enguri arch dam, the highest (in its class) dam in the world, was built in the canyon of Enguri river (West Georgia) in 1970s. It is located in a zone of high seismicity (MSK intensity IX) and close to the Ingirishi active fault. The high seismic and geodynamical activities together with a high population density of the adjoining region made the Enguri dam a potential source of a major technological catastrophe in Georgia. THE FIRST RESULTS OF MONITORING

Several effects were observed: tilt oscillations with a period of one to several minutes or "low frequency (LF) dam tremble", sudden variations of dam tremble amplitudes, strong solitary peaks with relaxation period of several tens of minutes, stepwise change of tilts, daily variations and slow variations lasting months/years.

❷ COMPILATION OF MONITORING DATABASE AT ENGOURI DAM INTERNATIONAL TEST AREA (EDITA)

During 2010 the filling of data base was continued with the received data from Inguri. The daily data of extensometer has formed the base but the data from tiltmeters at the foundation was entered in daily form and the data from the dam –in hour and minute values.

❸ SEISMIC MONITORING AT INGOURI DAM INTERNATIONAL TEST AREA (IDITA)

The configuration of local seismic network around Enguri reservoir remains the same as was in 2007. Network consists of 5 short period seismic stations: Gentsvishi, Becho, Khaishi, Chale, Chqvaleri. No anomalous seismic activity has been observed.

❹ METHODICAL ASPECTS OF RISK ASSESSMENT (NONLINEAR ANALYSIS OF TIME SERIES

We have investigated dynamics of Earth tilt process at the Enguri Dam International Test Area. It was found, that Earth tilt dynamics is characterized by linear and nonlinear patterns typical for the low dimensional dynamics. Such low dimensional processes, though are much more complex than quasiperiodic processes, still are non random due to their internal dynamical structure. Moreover, it was demonstrated that (relatively) small changes of anthropogenic origin are detectable in the dynamics of Earth tilt process. This provides a basis to assume that we

would be able to detect and evaluate supposedly highdimensional changes in Enguri dam behaviour caused by various processes.

❺ TRAINING AND EDUCATION IN RISK SCIENCES

The staff of GHHD took part in following conferences:

- Annual Meeting of the Directors of Centres, 1-3 February 2010, Paris
- EAPC SEMINAR ON "ENERGY SECURITY AND CRITICAL ENERGYINFRASTRUCTURE PROTECTION", TBILISI, 5-6 MAY 2010
- Earthquake Model of the Middle East region, 27–29 May, 2010, Tbilisi
- Advanced conference on seismic mitigation and sustainable development";10-14 May 2010; International Centre for Theoretical Physics (ICTP), Italy (Trieste);
- 32-th General Assembly of European Seismological Commission, Montpellier, France, 6-10 September 2010;
- Workshop: Exploitation of Groundwater and Thermal Water Systems in Georgia, 27-28 September 2010, Tbilisi,
- UNDP workshop – "Tbilisi Seismic Scenario", 1 Nov 2010, Tbilisi
- Earthquake Model of the Middle East region, 9-11 November, 2010, Istanbul

❻ PUBLICATIONS

T. Chelidze, T. Matcharashvili, **Nonlinear Dynamics as a Tool for Revealing Synchronization and Ordering in Geophysical Time Series: Application to Caucasus Seismicity.** In: Synchronization and Triggering: from Fracture to Earthquake Processes, Eds.V.de Rubeis, Z. Czechowski, R. Teisseyre, Springer, 2010, pp. 3-21.

T. Chelidze and N. Varamashvili. **Models of Stick-Slip Motion: Impact of Forcing.** ibid, pp. 23-33.

T. Chelidze, T. Matcharashvili, O. Lursmanashvili, N. Varamashvili, N. Zhukova, E. Meparidze.
Triggering and Synchronization of Stick-Slip: Spring-Slider System. Ibid,pp.123-164.

R.Teisseyre, T.Chelidze and K. Teisseyre. **Phase-Shifted Fields** Ibid.pp.213-220

T. Matcharashvili, T. Chelidze, V. Abashidze, N. Zhukova and E. Meparidze. **Changes in Dynamics of Seismic Processes Around Enguri High Dam Reservoir .** ibid pp.273-286

*T. Chelidze, T. Matcharashvili and G. Melikadze.***Earthquakes' Signatures in Dynamics of Water Level Variations in Boreholes.** Ibid, pp.287-303

T. Chelidze, V. de Rubeis, T. Matcharashvili and P. Tosi. **Dynamical Changes Induced by Strong Electromagnetic Discharges in Earthquakes' Waiting Time Distribution. ibid** , 2010, pp.

T. Chelidze, O. Lursmanashvili, T. Matcharashvili, N.Varamashvili N. Zhukova, E. Mepharidze. **High order synchronization of stick-slip process: experiments on spring-slider system.** Nonlinear Dynamics, DOI 10.1007/s11071-009-9536-6; 2010.

T. Matcharashvili, T. Chelidze, N. Zhukova, E. Meparidze, A. Sborschikovi. **Investigation of Dynamics of Temporal Distribution of Acoustic Waves Caused by Stick-Slip Process.** Bull. of the Georgian National Academy of Sciences, v.4, 53-55. 2010.

T. Matcharashvili, T. Chelidze, V.Abashidze, N. Zhukova, E. Mepharidze, T. Kobakhidze.
Influence of Large Water Reservoirs Construction and Filling on Dynamics of Earth Crust Local Tilts. Hydrocomplexity: New Tools for Solving Wicked Water Problems. IAHS Publications 338. pp. 268-269. 2010.

V. Abashidze, T. Chelidze, I. Jibladze, T. Tsaguria. **Installation and Utilization of Automatic Data Collecting and Transmitting System of the Tiltmetric Network of the Enguri Dam.** Bull. of the Georgian National Academy of Sciences, (in press), 2010

T. Matcharashvili, T.Chelidze, V. Abashidze, N.Zhukova, E. Mepharidze, U. Fra Paleo.
Evidence for changes in the dynamics of earth crust tilts caused by the large dam construction and reservoir filling at the Enguri dam international test area (Georgia). Nonlinear Dynamics (in press)

Activity on Coordinated Program:

Dam related risks in Europe and the Mediterranean: threats and prevention

Activities of GHHD, related to EUR-OPA Major Disasters Agreement.

In 2010 the staff of the centre participated in following international projects:

- Seismic hazard and risk assessment for Southern Caucasus-Eastern Turkey energy corridor. NATO – SFP 983038
- EMME - Earthquake Model of the Middle East Region: Hazard, Risk Assessment, Economics & Mitigation
- The first step to creation of real time telemetric monitoring system of large dams: the case of the Enguri Dam International Test area (STCU&GNSF #5016)
- Seismic Risk Assessment for Tbilisi (UNDP)

ECFF – EUROPEAN CENTER FOR FOREST FIRES (ATHENS, GREECE)

❶ INTERNATIONAL VIDEO-CONFERENCE ENTITLED "RECENT DEVELOPMENTS AND NEEDS FOR GROUND METHODS AND TOOLS FOR FOREST FIRE SUPPRESSION"

ECFF, in collaboration with the National Technical University of Athens (NTUA) and the FP7 project "Fire Retardant Hoses Lines for Forestry Fire-Fighting Applications- FIRELI (No 222152)" have joint efforts together with the Global Fire Monitoring Center (GFMC) and the United Nations University and co-organized an International video-conference entitled **"Recent developments and needs for ground methods and tools for forest fire suppression"** that took place on the 10th of June 2010.
This videoconference was broadcasted through internet at *rtsp://147.102.221.130:5554/broadcast/groundmeans.rm* and attended by a significant number of interested parties from different EU countries (CY,CH, DE, ES, FI, FR, GR, IT, NO, SE, UA, UK); firefighters associations, fire specialists, civil protection representatives, fire hose manufacturers, representatives from the International Association of Fire and Rescue Services (CTIF), experts from the Forest Fires Commission, the Fire Management Competency Standards developed through support by EU Leonardo da Vinci (EUROFIRE), as well as UNECE / FAO Team of Specialists on Forest Fire and Council of Europe representatives.
Main topics of the teleconference agenda were tactics and training in ground forest fire suppression in regard to safety of the fire-fighters, technologies and ground means used, as well as end-users requirements. All presentations, together with the agenda of the videoconference and proceedings are available at GFMC (conference chair) website: (http://www.fire.unifreiburg.de/programmes/europeorg/Videoconference20100610.html)

❷ UPDATE AND UPGRADE OF THE WEBSITE OF THE ECFF

During 2010, update and upgrade of the Website of the ECFF took place including the announcement of the videoconference "Recent developments and needs for ground methods and tools for forest fire suppression" as well as all relevant material.

❸ COOPERATION WITH GFMC

In the framework of networking with other Centers, ECFF continued collaboration with the Global Fire Monitoring Center (GFMC) and also extended cooperation with other relevant Organizations, such as International Association of Fire and Rescue Services (CTIF), experts from the Forest Fires Commission, the Fire Management Competency Standards developed through support by EU Leonardo da Vinci (EUROFIRE), as well as the UNECE / FAO Team of Specialists on Forest Fire.

ECGS - EUROPEAN CENTRE FOR GEODYNAMICS AND SEISMOLOGY / CENTRE EUROPEEN DE GEODYNAMIQUE ET DE SISMOLOGIE (WALFERDANGE, LUXEMBURG)

Projects and research in seismology (Dr Adrien Oth, ECGS)

❶ EVALUATION AND OPTIMIZATION OF SEISMIC NETWORKS AND ALGORITHMS FOR EARTHQUAKE EARLY WARNING

This project originally started in the framework of the European FP6 program SAFER (Seismic eArly warning For EuRope) and aimed at developing a methodology for designing an optimum seismic network and determining the optimal algorithm and its parameters for effective earthquake early warning (EEW). In the framework of this project, ECGS collaborated with scientists from the California Institute of Technology, the Karlsruhe Institute of Technology as well as the Kandilli Observatory in Istanbul.

EEW represents an important tool for seismic risk mitigation. EEW systems operate during the co-seismic stage (i.e. immediately after earthquake occurrence and while the rupture may still be ongoing) of an earthquake by providing short-term (in the order of a few to several tens of seconds) warnings of impending strong ground shaking at a given user site, thus in particular allowing for automated protective measures such as cutting gas pipeline flows.

While considerable efforts have been spent in recent years to develop appropriate algorithms to tackle this problem, only little attention has been paid on the question of the optimum seismic network design. Indeed, efficient EEW aiming at both fast and accurate warnings requires an optimally designed seismic network and the best set of algorithm parameters. These issues are not straightforward since they strongly depend on the seismotectonic setting, funding availability and other constraints.

Therefore, based on the example of Istanbul, we developed a novel approach for evaluating and optimizing seismic networks for EEW. We showed that, while the current station locations of the existing Istanbul EEW system are well chosen, modifying the parameters governing the declaration of warnings could enhance its performance. Furthermore, unless using ocean bottom seismometers or modifying the current EEW algorithm, additional stations might not lead to any significant performance increase. The methodology developed in the framework of this project is portable to any other region of interest and has been the subject of a recent publication in Journal of Geophysical Research.

❷ THE GENERATION OF EARTHQUAKE GROUND MOTIONS: FROM EARTHQUAKE SOURCE PHYSICS TO SITE AMPLIFICATION EFFECTS USING K-NET AND KIK-NET DATA IN JAPAN

The generation of earthquake strong ground motions is a complex physical process. Seismic waves are generated at the earthquake source, and it has been shown that the radiation strength of these, determining the potential for strong ground motions at the Earth's Surface, can significantly vary, and the reasons of these variations are still the subject of ongoing research. On their way from the source to the observation site, the waves are attenuated, but may also experience other effects such as focusing and conversions between different wave types, significantly complicating the situation. Finally, to make things even worse, the structural characteristics of the near-surface layers can cause severe amplification of ground motions, such that at soft sedimentary sites, much stronger ground motions are often observed as compared with rock sites.

This project aims at gaining a better understanding of the relative importance of these different effects, using the vast databases made available by the National Research Institute for Earth Science and Disaster Prevention (NIED) in Japan following the devastating Kobe earthquake in 1995.

In a first stage, we used spectral inversion to separate source, path and site amplification effects. The results of these analyses showed for instance strong indications for self-similar earthquake source scaling, elucidating this highly debated topic. Furthermore, we were able to systematically characterize seismic attenuation and site response throughout the entirety of Japan, showing for instance that amplification of up to a factor 100 have to be expected due to near surface site response.
This project is currently ongoing and is performed in collaboration with the GFZ German Research Centre for Geosciences in Potsdam, Germany. Our next efforts will be devoted towards gaining insights into the lateral

variability of ground motions and it's correlation between different sites, factors that are of utmost importance for ground motion prediction from future large earthquakes.

❸ STRUCTURAL MONITORING OF CRITITCAL CIVIL INFRASTRUCTURE: THE EXAMPLE OF THE ADOLPHE BRIDGE IN LUXEMBOURG CITY

Major threats to bridges consist primarily in structural elements aging, earthquakes, and standing waves from windstorms. Structural health monitoring (SHM) systems allow mitigating the risks associated to the different threats by the provision of both information necessary to control the health state of structures in real-time, and timely warnings in case of damaging natural events.

In this collaborative project between ECGS and the GFZ German Research Centre for Geosciences, we carried out a short-time experiment with low-cost wireless instruments with the purpose of monitoring the vibration characteristics and dynamic properties of a strategic civil infrastructure, the Adolphe Bridge in Luxembourg City. Such a system, once deployed on the bridge, can continuously calculate important parameters characterizing the bridge's behavior in real-time without the necessity of intervening in traffic flow or other disturbing measures. The results of this experiment are intended to verify the suitability of the wireless network for SHM purposes (and in particular the suitability of this approach for masonry arch bridges – many historical bridges being part
of the cultural heritage portfolio in European countries belong to this category) as well as to provide information of support for structural engineers.

We were able to clearly identify the fundamental modes of resonance as well as several higher modes. Furthermore, using the data provided by such a monitoring system, the deformation patterns of the bridge for each of these modes can be calculated. The outcome of the experiment clearly shows that SHM using such low-cost wireless systems seems to be a good option for such a masonry arch bridge.Further applications in particular considering the Adolphe bridge (which will undergo major renovation works in the coming years – especially during and after this period, SHM using such awireless system would be very attractive) are under discussion.

❹ LUXBB: A TEMPORARY BROADBAND SEISMIC NETWORK FOR LUXEMBOURG

So far, only few efforts have been committed to systematic seismic hazard assessment in Luxembourg, and apart from one broadband (belonging to the GEOFON network of GFZ Potsdam) and one short-period (incorporated into the Belgian seismic network) station in the Walferdange Underground Laboratory for Geodynamics and two short-period sensors (Belgian network) in the North of the country, Luxembourg is lacking a permanent seismic network for reliably monitoring seismicity on its territory and compiling a database of recorded ground motions from local and regional events.

Yet the Roermond earthquake in 1992, which took place close to the border of the Netherlands and Germany and had a magnitude of 5.4, was also widely felt in Luxembourg, even though the Grand-Duchy is located at a distance of about 150 km away from the epicenter. Although the Luxembourgish territory itself does not show any significant seismic activity (at least no major seismic events with magnitudes above the detection threshold of regional seismic networks in Belgium and Germany), this event is a clear reminder that even though small, the seismic hazard of Luxembourg is not entirely null. An event such as the one in the Belgian Ardennes in 1692 with an estimated magnitude of 6 – 6.2 would nowadays certainly cause significant losses on Luxembourgish territory.

In order to get insights into potential local small-scale seismicity and the general seismic noise characteristics in Luxembourg, five (later six) broadband seismic stations have been temporarily deployed in Luxembourg in cooperation with the Karlsruhe Institute of Technology. This temporary deployment, even though currently struggeling with some technical problems, represents an important step towards the potential deployment of a permanent network in the future. This project will allow studying in more detail the seismic noise level and sources in Luxembourg, collecting information on potential local earthquakes smaller than the detection threshold of the networks in neighboring countries etc.

❺ ETUDES GRAVIMETRIQUES (PROF. OLIVIER FRANCIS. UNIVERSITE DU LUXEMBOURG)

Gravimétrie

- Campagne de mesures absolues de la pesanteur en Tanzanie en mars 2010
- Mesures absolues de la pesanteur au Limperstberg (Université du Luxembourg) sur le point de référence du Grand-Duché de Luxembourg en juin 2010
- Campagne de mesures absolues de la pesanteur au Groenland en juillet 2010
- Campagne de mesures absolues de la pesanteur au Yellowstone en août-septembre 2010 dans le cadre d'un projet de recherche soutenu par l'ECGS
- Mesures absolues de la pesanteur à Membach (Belgique) en novembre 2010 pour comparer avec le gravimètre absolu de l'Observatoire royal de Belgique

Observations

Nous reprenons ci-dessous les observations de type "observatoire":

- Mesures continues de la pesanteur avec le gravimètre à supraconductivité dans le Laboratoire Souterrain de Géodynamique de Walferdange
- Mesures continues de la pluviomètrie à Walferdange
- Station de marées gravimétriques avec les gravimètres à ressort Scintrex Walferdange
- Mesures absolues mensuelles de la pesanteur dans le laboratoire souterrain de géodynamique à Walferdange

ECMNR - EUROPEAN CENTRE FOR MITIGATION OF NATURAL RISKS (CHISINAU, MOLDOVA)

Priorities in 2010

The Activity of European Centre for Mitigation of Natural Risks has been directed to achieving the following aim highlighted in:

1. Conclusions made on the Meeting of Directors of the Specialized Centre of EUR-OPA Major Hazards Agreement of February 1-3, 2010, at Paris
2. Medium-term plan for 2011-2015 adopted by the 12th Ministerial Session of the European and Mediterranean Major Hazards Agreement (EUR-OPA), Saint Petersburg, Russian Federation, September 28, 2010

These priorities have been realized on the basis of some special activities:

School level education

The possible ways of efficient training in the sphere of civil protection and planning of activities concerning life safety in case of natural disasters have been further studied. The educational principles, general objectives and principal directions for promoting the culture of hazards prevention have been identified and the competences and capacities necessary in the emergency situations of high risk have been determined.

University level education

In the course of a round table meeting organized with the participation of specialists in this sphere some suggestions have been elaborated and methodological assistance in population training and development of abilities for forming an adequate behavior in hazardous situations has been rendered.

Risk and communication

In the course of a round table meeting named ***What We Know of an Adequate Behavior in the Hazardous Situations*** the lacks have been revealed and the problems concerning the level of knowledge of protection measures in case of natural disasters have been discussed. Not only the specialists in the sphere of education have taken part in this activity, but the future teachers of Pedagogical College have been also actively engaged and have made speeches on this issue.

Management

The national instruments and mechanisms of natural and man-made disasters prevention and management have been identified and analyzed on performing the research of ***Public Authorities Role in Natural and Man-Made Disasters Prevention and Management***, there also has been highlighted the role of public authorities at the central, local and regional level. A source of inspiration on developing this study has served for us the message of Mr. Ban Ki-Moon, the United Nations Secretary General, on the International Day for Natural Disaster Reduction – October 14, 2009, when he said the following: "The more we know about the causes and consequences of natural hazards, the more we are able to be better prepared to reduce risks. Bringing the scientific community and policy makers together allows them to contribute to and complement each other's work".

In this context we have analyzed and stated that it is necessary to ensure as quickly as possible the formation of a modern legal framework and some improved managerial mechanisms aimed at ensuring in a united and professional way the life safety and protection of population health, environment, important material and cultural values in case of an emergency situation.

The risks, vulnerability and hazards management at the level of national security of the Republic of Moldova and not only, will certainly constitute a major concern for all decision-making authorities, the concern resulting from the necessity of establishing and developing a law-governed state. The management of a set of efforts made for mitigating the natural and man-made hazards involves the nation-wide participation, i.e. foundation of a real national platform, which is finally aimed at reduction of disasters of any type. Therefore, our scientific appeal suggests revealing the urgent need for the Republic of Moldova, Romania and other European Union states of assimilating e a new security culture, which is very important and which will stand among the priorities of the process of social mentality reform. **"To know means to prevent"** – this is a general valid slogan and its realization means getting every individual aquatinted with the existing major hazards. The context is revealed by a variety of

proposals *de lege ferenda* in the specialized sphere of emergency situation and risk prevention and management, some of them have been already placed at the authorities' disposal.

We have identified that the management of an emergency situation consists of a range of activities performed and procedures used by decision-making authorities, public institutions and services empowered to identify and monitor the risk sources, to evaluate information and analyze situation, to make forecasts, establish the action variants and implement them for restoring the normal situation.

The security status cannot be determined without establishing the threats, perils, risks and vulnerabilities determining or able to influence upon this status.

Thus we have stated that new development of secure environment makes necessary redefining, reconfiguring and reconstructing of right to individual, national and collective security on new basis and regulating new forms of cooperation. Though the right to security seems to be an inherent right, contained in all international treaties and agreements, the world is developing and the reality shows that the yesterday regulations are not valid today anymore, and may become even inappropriate tomorrow.

This approach to studying the problems of civil security is focused on the humanity, in its double image both of natural development beneficiary and principal perturbating factor, aggressor of planet order and resources at the level of life, assets and environment as well.

The work highlights a large range of risks, hazards and vulnerabilities at the beginning of the 21st century. The reality has shown to us that the anomalies taking place are a part of the world we live in, therefore the community reaction should be prompt, it should be aimed at non-admission by complex actions directed to hazards prevention and reduction and at permanent search of some safe solutions and ways of resistance.

From the analyzed prospective the degree of society readiness to face not only extreme natural phenomena but some other types of hazards as well is very varied, such aspects as **education, culture, traditions and customs, infrastructure, state organization, etc.** reveal specific problems and different difficulties in managing the various crises.

Moldova, even if it is not subject to some serious hazards now and in the future, cannot remain outside these problems. The risk globalization, joining the universal values of human rights and civilized world, we are a part of, obliges us not only to identify the own vulnerabilities and risks at the level of national security but to manage efficiently these risks so that we remain a security supplier for the international community.

In this sense, starting out from the specific nature of secure environment in the field of geostrategic interest we have stated an increase and accentuated extension of risk range, consolidation of some old vulnerabilities and occurrence of some new vulnerabilities, which can seriously affect the national security and generate interdependent, diffuse and multidirectional effects in the absence of a proper strategy of protection against disasters.

Analyzing the events at the beginning of the millennium we have demonstrated that there are no states invulnerable to the nature, the Republic of Moldova is even less vulnerable as we have everything except for active volcanoes from the range of natural disasters.

In this context, it is evident that the response on risks internationalization and on globalization of their consequences shall include consolidation of world countries cooperation in crisis management, especially in its prevention by development and explicit application of international public law standards.

The idea brought up for scientific discussion under the research theme "THE ROLE OF THE STATE IN NATURAL AND MAN-MADE DISASTERS PREVENTION AND MANAGEMENT" is that treatment of such a subject represents a true challenge.

The justified grounds in evaluating the complex character of issues subject to research include equally the variety of hazards, risks and vulnerabilities at the national, regional and global security level, consideration of urgent necessity of finding some new ideas for their reduction and prevention, as well as emphasis on the necessity of international cooperation for ensuring a natural balance and normal state of advantageous human evolution and societies on the equal basis, pursuant to the standards and principles of international public law.

There has been also revealed the necessity to furnish a scientific instrument able to represent a rich source of theoretical knowledge and substantial support for exact understanding of possibilities of acting for ensuring a healthy and durable natural environment.

We have structured the thesis in such a way that the analysis of content elements has been introduced in a regular sequence and the graduality of approaches from the general aspects, such as various typologies and characteristics, to the most widely used in practice approaches, such as necessity of regulation, institutional structure, urgent need of forming a security culture by continuous and adequate education, resulting from conscious conduct, has been ensured.

As a consequence the work has been structured into 9 chapters, divided into subchapters according to the necessity of presenting the approaches content. To be as useful as possible the work includes a more detailed study of civil security in the European Union at this stage of institutional structure.

The actual geostrategic context, increase and growth of non-military hazards degree of severity at the level of national security have led to development of management of activities for emergency situations prevention and management, of a consolidated institutional system, which ensures an adequate response to new challenges at the level of national security.

The improvement of decision making quality in the activities directed to disaster effects elimination presupposes that all information describing the measures to be taken, forces and means of intervention to be used should be available for decision-making authorities within a short period of time and in a usable form.

We consider that this research can make a useful contribution to enriching the doctrine, risks management or national security and at the same time to opening new horizons of study and even to developing policies of risk management as a sphere of public policy.

At the end of the work we have proposed to highlight the main problems, which the European Commission pays attention to, concerning consolidation of ability to respond to disasters basing on the achievements already existing. These actions are the first step on the way to global response for integrating the common efforts of the EU countries and provide the consolidation and creation of interaction between the instruments already existing as well as improvement of their coordination.

The study topic has awakened a special interest not only in the scientific community but among the practitioners and public officers as well.

As a result of this research and for mobilizing the theoreticians and practitioners in this sphere we organized the scientific-practical seminar named *The Role of Public Authorities in Promoting the Culture of Hazards Prevention* on December 15, 2010, and the specialists of the Service of Civil Protection and Emergency Situations of the Ministry of Internal Affairs, of the State Hydrometeorological Service, of the Inspectorate of Emergency Situations of Brasov County, Romania, of the Academy of Sciences of Moldova, of the University of European Studies of Moldova, etc, took active part in the seminar.

Different specialists made interesting speeches during the seminar, which took place in the conference hall of the Academy of Sciences of Moldova, among these specialists were:

Alexandru Oprea, Lieutenant Colonel, Deputy Head of Service of Civil Protection and Emergency Situations of the Ministry of Internal Affairs, Lectures Taught as a Result of Emergency Situations during the Last Period of Time;

Anatolie Bantus, Doctor, University Professor, Director of ECMNR, Conceptual Marks of Natural Risk Management;

Victor Mirza, Deputy Head of Republican Training Centre, Efficiency of Actual System of Training of the Local Public Authorities in Prevention and Elimination of Emergency Situations Consequences. Problems and Proposals;

Elena Plesca, First Deputy Director of State Hydrometeorological Service, Color Warning Codes for Dangerous Phenomena;

Arcadie Popa, Head of Medico-Biological Protection Department of the CPD, Advantages and Disadvantages of National Network of Monitoring and Laboratory Control over Environment Contamination (Pollution) with Radioactive, Toxic Substances and Biologic Agents;

Veaceslav Pavlov, Head of Engineering Protection Department of the ESD, Management of System of Readiness to Disasters at the Local Level, etc.

As a result of scientific-practical seminar, after having made analysis of speeches and discussions for improving the process of intervention in case of emergency situations, operative management of forces and means of central and local public authorities and for improving the capacity of reacting both at the national and international level it has been proposed to the Service of Civil Protection and Emergency Situations of the Ministry of Internal Affairs to:

- Found the National Anti-Crisis Centre (National Centre for Management in Emergency Situations) with all necessary operational capacities;
- Examine the possibility of creating integrated emergency services (creation of a unique intervention service) in case of emergency situations;
- Create an operative subdivision for reacting on emergency situations, for international rescue operations with autonomous operation.

Main achievements of Centre

1. We have organized the activities for popularizing the knowledge of natural hazards and have rendered methodological assistance in training the population during the meetings organized at different institutions, round tables and seminars organized by the Centre.
2. As a result of activities carried out we have managed to consolidate the scientific potential of the Academy of Sciences of Moldova, Universities interested in the themes highlighted and the practitioners of the State Hydrometeorological Service, the Service of Civil Protection and Emergency Situations of the Ministry of Internal Affairs, the Ministry of Environment, the ministry of Territory Improvement and Regional

Development, Ministry of Education and other public institutions in highlighting the role of public authorities in managing and preventing the natural and man-made disasters and developing complex measures in hazardous situations contributing actively to cooperation and interaction among central and local public authorities, non-governmental organizations and other competent organizations.

3. We have identified the educational principles, general objectives and main directions concerning promotion of culture of risks prevention and modeling an adequate behavior in emergency situations. We have got the didactical staff acquainted with the educational principles in the sphere of protection in case of natural disasters:

- performance of educational process within the background of cooperation between pupil and teacher;
- orientation of anti-risk education to child personality;
- transparence and timely information of all people (pupils, parents, teaching staff, students, officials of different ranks, technical personnel. etc.) about risks in case of natural disasters;
- use of different didactic strategies and techniques for forming an adequate behavior of pupils, students in case of natural calamities;
- formation of capacities of automatic behavior: before, during and after a natural calamity;

To achieve these objectives we have studied the experience of other European Union countries in the sphere of natural hazards. The students of higher educational institutions and vocational schools have been engaged in this activity.

The studies and contests of essays and didactical projects concerning the risk situations and measures of protection have been carried out.

A plan of educational activity concerning life safety in case of natural calamities has been elaborated.

The Centre has taken an active part in monitoring the risk management during the disastrous floods in summer 2010 in the Republic of Moldova.

CEPRIS – CENTRE EURO-MEDITERRANEEN POUR L'EVALUATION ET LA PREVENTION DU RISQUE SISMIQUE (RABAT, MAROC)

❶ SURVEILLANCE ET ALERTE SISMIQUE 24 HEURES / 24 – 7 JOURS/7 : ACTIVITE SISMIQUE DU TERRITOIRE NATIONAL ET DES ZONES LIMITROPHES

Durant l'année 2010, le réseau national de surveillance sismique et d'alerte sismique a enregistré 2245 événements sismiques. Ces événements se répartissent en 4 catégories : 319 séismes déterminés enregistrés au moins par 3 stations sismiques ; 319 séismes indéterminés enregistrés par une ou deux stations sismiques ; 361 événements lointains, environ de 1246 événements liés à l'activité minière et aux exploitations de carrières.

Evénements	Jan.	Fév.	Mars	Avr.	Mai	Juin	Juil.	Août	Sep.	Oct.	Nov.	Déc.	An 2010
Evénements Déterminés	15	26	33	17	34	24	32	29	45	19	26	19	**319**
Evénements Indéterminés	22	15	50	10	23	49	25	17	55	25	12	16	**319**
Evénements Lointains	21	41	37	21	17	18	39	39	42	28	27	31	**361**
Activité minière et exploitations de carrières	38	30	49	70	79	73	73	77	64	84	58	67	**1246**
TOTAL	**132**	**145**	**203**	**180**	**203**	**205**	**203**	**208**	**233**	**203**	**153**	**177**	**2245**

Principaux événements sismiques déterminés, classés par ordre chronologique

EVENT N°	JOUR	MOIS	ANNEE	H.	M.	SEC.	LAT.	LONG.	MAG.	LOCALITE
008	21	01	2010	16	57	06.57	34.733	-05.644	4.2	SIDI KACEM (BNIOUAL) Ressentii
013	23	01	2010	00	29	07.69	32.309	-02.682	3.7	FIGUIG (BOUANANE)
017	05	02	2010	15	10	04.09	28.436	-16.261	3.5	ILES CANARIES
027	09	02	2010	05	21	06.12	35.078	-05.575	3.3	LARACHE (SOUK L'QOLLA) Ressenti
033	13	02	2010	20	32	19.88	31.355	-07.322	3.5	OUARZAZATE (TELOUET)
034	14	02	2010	22	14	33.15	34.972	-05.511	4.2	CHEFCHAOUEN (BRIKCHA)) Ressenti
037	20	02	2010	21	29	17.10	35.203	-02.087	3.8	AU LARGE DE SAIDIA
045	11	03	2010	12	40	26.71	35.307	-05.626	3.3	LARACHE (BNI AROUSS)
058	20	03	2010	14	49	04.41	32.076	-06.18	3.1	AZILAL (AIT MAZIGH) RESSENTI

								0		
067	27	03	2010	13	37	53.04	38.884	-07.733	3.9	PORTUGAL
077	11	04	2010	22	08	02.29	36.543	-03.769	5.4	ESPAGNE RESSENTI
085	22	04	2010	01	24	01.24	35.165	-06.214	4.1	AU LARGE DE LARACHE RESSENTI
110	20	05	2010	10	03	12.35	32.396	-05.313	3.3	KHENIFRA (SIDI YAHYA OU YOUSSEF)
111	23	05	2010	13	28	18.68	35.271	04.471	5.1	ALGERIE
113	24	05	2010	19	11	05.14	31.295	-08.169	2.7	MARRAKECH (OUAZGUITE)
116	26	05	2010	17	29	05.89	30.420	-09.337	3.8	TAROUDANNT (SIDI MOUSSA LHAMRI) Ressenti
120	28	05	2010	15	55	03.48	35.278	-02.062	4.0	MER D'ALBORAN
126	02	06	2010	03	22	17.36	35.163	-03.817	3.6	AL HOCEIMA (IMRABTE)
151	04	07	2010	20	55	32.00	30.272	-09.976	2.8	AU LARGE D'AGADIR
162	09	07	2010	15	49	03.16	35.001	-05.763	3.2	LARACHE (TATOFT)
179	26	07	2010	15	20	49.04	29.886	-9.807	3.5	TIZNIT (ARBAA RASMOUKA)
180	26	07	2010	22	38	43.78	34.408	-4.336	3.4	TAZA (RBAA FOUKI)
185	05	08	2010	18	54	14.84	32.164	-05.757	4.7	AZILAL (ANERGUI)
216	05	09	2010	03	33	45.75	35.171	-02.625	4.1	NADOR (AREKMANE)
224	08	09	2010	10	32	53.63	32.104	-03.749	4.5	ERRACHIDIA (OUED NAAM)
225	08	09	2010	11	58	23.22	34.133	-04.993	3.3	FES (AIN BOU ALI)
244	20	09	2010	22	25	44.41	31.383	-07.707	3.2	AL HAOUZ (STI FADMA)
280	06	11	2010	18	21	39.87	34.515	-06.970	3.2	LARGE DE KENITRA
306	14	12	2010	17	45	17.6	35.37	-	3.4	LARGE D'AL HOCEIMA

						9	3	04.140		
307	16	12	2010	06	51	00.62	39.047	-14.267	4.3	OCEAN ATLANTIQUE

Légende : H: Heure, Min: Minutes, Sec. : Secondes, Mag. : Magnitude de durée, Prof. : Profondeur de la source sismique en Kilomètres

Nombre des événements par intervalle de magnitude pour les séismes déterminés en 2010
Le réseau national a enregistré 319 événements en 2010 parmi, lesquels 163 séismes ont des magnitudes comprises entre 3.0 et 4.0 ; 25 évènements ont des magnitudes comprises entre 4.0 et 5.0 et 04 événements ressentis ont des magnitudes comprises entre 5.0 et 6.0, 127 événements sismiques ont des magnitudes inférieures à 3.0.

Classes de Magnitudes	Jan.	Fév.	Mars	Avr.	Mai	Juin	Juil.	Août	Sep.	Oct.	Nov.	Déc.	Total année
2.0 < Mag. < 3.0	08	03	10	04	13	12	09	18	21	06	13	10	**127**
3.0 < Mag. < 4.0	06	21	21	10	11	12	18	09	21	13	13	08	**163**
4.0 < Mag. < 5.0	01	02	02	02	07	00	05	02	03	00	00	01	**25**
5.0 <Mag. < 6.0	00	00	00	01	03	00	00	00	00	00	00	00	**04**
TOTAL D'EVENEMENTS/MOIS	**15**	**26**	**33**	**17**	**34**	**24**	**32**	**29**	**45**	**19**	**26**	**19**	**319**

Nombre total des événements par région pour les séismes déterminés durant l'année 2010
Durant l'année 2010, le réseau national de surveillance sismique a enregistré soixante-et-un séismes au large de l'Océan Atlantique, seize séismes en Mer d'Alboran, six séismes en Algérie, cinq séismes en Espagne, un séisme au Portugal et un séisme dans les Iles de Canaries.
Le réseau national de surveillance sismique a enregistré principalement vingt événements dans la région d'Azilal, dix neuf dans la région d'Ouarzazate, dix huit événements dans la région de Sidi Kacem, dix sept événements dans la région de Nador, seize événements dans la région d'Al Hoceima.

Région\ Nb d'événements	Jan.	Fév.	Mars	Avr.	Mai	Juin	Juil.	Août	Sep.	Oct.	Nov.	Déc.	TOTAL d'évènements par ville/région
AGADIR					06								**06**
AL HAOUZ									01				**01**
AL HOCEIMA	02	01				02			05	01	04	01	**16**
ALGERIE				01		01	03		01				**06**
AZILAL		02	01	01	01	02	02	06	01	03		01	**20**
BENI MELLAL			02		01	02	01					02	**08**
BOULMANE		01			02				02				**05**
CHEFCHAOUEN		06	01				01					01	**09**
CHICHAOUA			01										**01**
EL HAJEB		01	01		01								**03**
ERRACHIDIA		01	01	01		01		01	04	01			**10**
ESPAGNE				01				01			01	02	**05**
FES							02	01	01				**04**
FIGUIG	01	01						02				01	**05**
IFRANE			01		02			01	01				**05**
ILES CANARIES		01											**01**
KENITRA			01										**01**
KHEMISSET					01			02	02	01	02		**08**

KHENIFRA				02	02	02		03	01	02			**12**
KHOURIBGA						01			01		01		**03**
LARACHE		01	01				01						**03**
LARGE D'AGADIR							01						**01**
LARGE D'AL HOCEIMA									01			01	**02**
LARGE D'ESPAGNE										01			**01**
LARGE DE LARACHE				02									**02**
LARGE DE MOHAMMADIA					01								**01**
LARGE DE KENITRA											01		**01**
LARGE DE NADOR									01				**01**
LARGE DE SAIDIA		01											**01**
MARRAKECH	02		02		02		01	01	01		02		**11**
MER D'ALBORAN	01		01	01	02	01	04	02	02	01	01		**16**
NADOR	02		02				01	02	09			01	**17**
OCEAN ATLANTIQUE		04	05	02	09	06	09	05	04	06	07	04	**61**
OUARZAZATE	01	01		02		05	01	02	03		01	03	**19**
OUJDA						01			01				**02**
PORTUGAL			01										**01**
SEFROU			06							01			**07**
SETTAT											02		**02**
SIDI KACEM	05	04	01	04	02				01		01		**18**
TAOUNATE		01					02					01	**04**
TAROUDANNT	01				01					01	02		**05**
TATA			01						01		01		**03**
TAZA			03		01		02		01	01		01	**09**
TIZNIT			01				01						**02**
TOTAL EVENEMENTS/MOIS	**15**	**26**	**33**	**17**	**34**	**24**	**32**	**29**	**45**	**19**	**26**	**19**	**319**

Sismogrammes des principaux événements déterminés pour l'année 2010

Le réseau national de surveillance sismique a enregistré, durant le mois d'Août 2010, six secousses sismiques dans la région d'Azilal de magnitudes allant de 2.4 à 4.7. Le séisme de magnitude 4.7 s'est produit le 05 Août 2010 à 18H 54Mn 14.84Sec.

Le réseau national de surveillance sismique a enregistré quatre secousses sismiques dans la région d' Errachidia de magnitudes allant de 2.7 à 4.5. Le séisme de magnitude 4.5 s'est produit le 08 Septembre 2010 à 10H 32Mn 53.63Sec.

Répartition de la sismicité à travers le territoire national pour l'année 2010

Durant l'année 2010, le réseau national marocain a enregistré des événements plus ou moins importants. A l'Ouest du Maroc, de nombreuses secousses sismiques dans l'Océan Atlantique sont enregistrées dont les magnitudes sont comprises entre 3.0 et 4.0. Quelques séismes ont des magnitudes comprises entre 4.0 et 5.0. En Mer d'Alboran, quelques événements sont enregistrés de magnitudes comprises entre 3.0 et 4.0.

Au Nord du Maroc, le réseau national de surveillance sismique a enregistré des séismes en l'Espagne et au Portugal, la majorité des magnitudes de ces secousses sont comprises entre 3.0 et 4.0 sur l'échelle de Richter. A l'Est du Maroc, quelques séismes de magnitudes comprises entre 3.0 et 5.0 ont été enregistrés en l'Algérie.

Dans la chaîne du Rif, plusieurs secousses sismiques ont été enregistrées de magnitudes comprises entre 3.4 et 4.0, et quelques secousses ont des magnitudes comprises entre 4.0 et 5.0. Dans les chaînes des Atlas (Haut Atlas, Moyen Atlas et Anti Atlas) des événements plus ou moins importants ont été enregistrés. Certains épicentres sont concentrés localement. La majorité de ces séismes présentent des magnitudes comprises entre 2.0 et 4.0 à l'exception de deux séismes dont les magnitudes sont comprises entre 4 et 5.

❷ RAPPORT SUR 15 ANNEES D'ACTIVITE SISMIQUE ENREGISTREE AU MAROC : 1993-2008

Durant la période allant du 14 juillet **1993** au **31** décembre **2008**, le Réseau National de Surveillance et d'Alerte sismique (RESAS) a enregistré **39.594** événements sismiques. Ces événements se répartissent en quatre catégories.

- **5.531** Evénements sismiques déterminés : séismes captés au moins par trois stations d'enregistrement et pour lesquels l'hypocentre a été déterminé;
- **9.864** Evénements sismiques indéterminés : séismes de faibles magnitudes captés par une à deux stations et pour lequel l'hypocentre reste indéterminé;
- **19.967** Evénements sismiques dus à l'exploitation minière et l'activité et de carrières;
- **4.232** Evénements sismiques lointains (téléséismes) : séismes enregistrés à travers le Globe et qui sont détectés par le Réseau National de Surveillance Sismique.

Durant la période considérée 1993 – 2008, une moyenne de **460 séismes a été enregistrée annuellement** y compris durant les périodes de crises sismique qu'a connu le Maroc notamment durant les années 1994, 2004, 2007. Cependant, en dehors des périodes des crises sismiques, cette moyenne est de seulement **150 par années.**

Localité	nombre de séismes	Secousse la plus forte pour la région considérée									
		Année	Mois	Jour	H.	Min	Sec.	Latitude N	Longitude W	Mag.	Prof. Km
Al Hoceima	**1546**	2004	2	24	2	27	44	35.901	-3.901	**6.3**	**7**
Alboran	**1152**	2004	12	2	17	50	38.27	35.426	-2.471	**4.9**	**17**
Nador	**470**	2004	12	4	10	29	58.65	34.850	-2.822	**5.0**	**12**
Atlantique	**446**	2007	2	12	10	35	31	35.449	-9.742	**5.4**	**96**
Figuig	**232**	2007	1	30	4	38	42.23	32.584	-3.522	**4.8**	**2**
Taza	**155**	2005	3	22	8	31	18	34.731	-3.960	**3.9**	**17**
Pays limitrophes	**198**	2005	3	21	17	55	24	37.250	-16.190	**4.7**	**30**
Khénifra	**125**	1998	6	18	19	45	3.4.76	32.704	-5.368	**4.4**	**0**
Taounate	**96**	1994	11	25	5	33	17.5	34.655	-4.519	**4.1**	**16**
Meknès	**94**	2004	12	26	6	30	19.28	33.926	-5.405	**3.7**	**2**
Ouarzazate	**90**	2000	11	14	5	48	48	31.123	-6.742	**4.2**	**3**
Sidi Kacem	**76**	2007	6	23	11	5	45	34.316	-5.575	**4.2**	**15**
Fès	**73**	2006	1	16	12	19	54	34.204	-4.810	**4.0**	**0**
Azilal	**67**	2007	10	9	19	5	30	31.864	-6.456	**4.1**	**2**
Béni Mellal	**65**	1997	8	4	14	23	37.71	32.233	-5.724	**4.1**	**0**
Khémisset	**63**	2008	9	28	2	11	20	33.552	-5.863	**4.1**	**3**
Errachidia	**61**	2002	10	19	8	55	45	31.845	-3.265	**4.0**	**30**
Chafchaoune	**52**	2007	9	4	2	56	52	3.4.862	-5.332	**3.8**	**17**
Ifrane	**42**	2007	8	11	20	46	0	33.104	-5.149	**5.0**	**2**
Boulmane	**32**	2006	5	11	14	40	50	33.220	-3.266	**3.9**	**24**
Marrakech	**32**	2004	1	15	7	32	30	30.963	-8.499	**4.5**	**22**
Taroudant	**27**	2006	1	18	22	7	27	30.273	-8.196	**3.6**	**15**
Larache	**26**	2004	8	3	6	55	47	34.992	-5.875	**3.8**	**31**
Sefrou	**22**	2000	9	27	3	10	41	34.123	-5.080	**4.3**	**4**
Tata	**18**	2000	3	3	1	59	12	29.573	-7.402	**4.1**	**30**
Al Hajeb	**15**	2006	12	18	13	51	51	34.019	-5.147	**3.2**	**31**
Kenitra (Mnasra)	**15**	2001	6	28	15	21	17	34.185	-6.542	**4.9**	**-**
Oujda	**14**	2008	7	28	21	36	20	34.739	-1.892	**3.5**	**30**
Talsint	**10**	2007	9	28	3	43	38	32.479	-3.407	**3.2**	**20**
Safi	**8**	2000	9	3	9	40	23	32.201	-8.519	**3.9**	**8**
Chichaoua	**7**	2007	10	27	8	37	47	31.055	-9.258	**3.4**	**16**
El Jadida	**6**	1994	12	12	13	52	45.94	32.878	-8.851	**3.0**	**30**
Tétouan	**6**	1998	8	3	15	25	2	34.720	-4.918	**4.2**	**22**
Agadir	**5**	2008	3	9	16	2	46	30.226	-9.700	**3.1**	**0**
Kelaat	**4**	2005	4	13	8	39	25	31.797	-7.175	**3.0**	**7**

Sraghna											
Khouribga	**3**	2006	3	3	23	44	56	32.500	-6.260	**3.8**	**30**
Rabat	**2**	2006	10	2	15	10	24	3.4.093	-6.777	**3.2**	**19**
Settat	**2**	2001	8	22	5	7	18	32.526	-7.077	**3.1**	**21**
Tiznit	**2**	2001	10	8	16	27	50	29.488	-9.688	**3.1**	**30**
Azrou	**1**	2008	5	7	12	0	33	33.417	-5.145	**2.5**	**14**
Ben Slimane	**1**	1995	4	3	23	30	55.99	33.474	-7.262	**3.2**	**30**
Essaouira	**1**	1994	1	27	23	18	6.73	31.710	-9.457	**3.7**	**22**
Labouirat	**1**	2008	7	12	19	15	32.59	27.333	-9.611	**3.9**	**-**
Nouacer	**1**	2005	1	3	11	34	15	33,386	-7,524	**3,9**	**14**
Tan Tan	**1**	2008	6	12	15	27	09.84	27.963	-11.096	**3.7**	**-**
Tanger	**1**	2003	3	19	6	37	33	35.364	-6.070	**3.0**	**16**

Légende : H: Heure, Min: Minutes, Sec. : Secondes, Mag. : Magnitude de durée, Prof. : Profondeur de la source sismique en Kilomètres

Durant la période du 14 juillet 1993 au 31 décembre 2008, le Réseau National de surveillance et d'Alerte sismique, installé et exploité par l'Institut National de Géophysique, du CNRST a enregistré durant une période de plus de15 années, depuis la mise en place d'une permanence sismique 24H/24, le territoire national a connu 5531 secousses enregistrées et déterminées dont 1645 ont été localisés uniquement dans la région d'Al Hoceima. La plus forte secousse, avait une magnitude de 6.3 sur l'échelle de Richter, survenue le 24 Février 2004 à 02 H 27 Min.
Au large des côtes méditerranéennes marocaines, 1101 séismes ont été enregistrés, la plus forte secousse a été enregistrée le 2 décembre 2004 à 01 H 50 Min, avec une magnitude de 4,9 sur l'échelle de Richter.
Au large des côtes atlantiques marocaines, 350 séismes ont été enregistrés. Le plus fort avait une magnitude de 5,4 survenu le 4 décembre 2009 à 10 H 35 Min.
Une partie de l'activité sismique des pays limitrophes (Algérie, Espagne, Iles des Canaries), a été enregistrée et déterminée par le réseau National de surveillance d'alerte sismique.
Durant ces 15 années 14% des secousses présentaient des magnitudes inférieures à 2, 82% des séismes ont des magnitudes comprises entre 2 et 4 sur l'échelle de Richter. Seulement 4% présentent des magnitudes supérieures à 4. 16 secousses sismiques ont présenté des magnitudes supérieures à 5.
Durant cette période (1993 – 2008), différentes régions du territoire national ont connu une activité sismique plus ou moins importante. Les régions les plus secouées sont : la région d'Al Hoceima avec 1645 secousses**,** Nador avec 519, Figuig 225, Taza 156, Khénifra 126, Taounate 101, Meknès 100, Ouarzazate 94 secousses telluriques…

Diffusion du rapport

Au cours de l'année 2010, le CEPRIS a contribué à l'élaboration et à l'édition du rapport sur l'activité sismique durant quinze années d'activité sismique du territoire national durant la période 1993-2008. Ce rapport a connu une large diffusion auprès des autorités centrales et locales chargées de la gestion du risque sismique.

❸ RECENTE ACTIVITE SISMIQUE ENREGISTREE DANS LES REGIONS DE SIDI KACEM ET DE CHEFCHAOUEN

Durant le mois de janvier et jusqu'au 14 février 2010, le réseau national de surveillance sismique a enregistré 16 secousses sismiques dans la région de Sidi Kacem et de Chefchaouen, de magnitudes allant de 2.7 à 4.3.
Les plus forts séismes, de magnitude 4.2 et 4,3, se sont produits le 21 janvier et le 14 février 2010 respectivement. Ces séismes ont été localisés dans la région de Sidi Kacem et de Chefchaouen. Il ont été ressenti dans ces villes et également dans d'autres villes : Taza, Ouazzane.
L'activité sismique qui a commencé dans ces deux régions depuis le 19 novembre 2009. Le Dimanche 14 février 2010, ces deux régions ont de nouveau connu des secousses dont la plus forte est celle proche de Chefchaouene, le même jour à 22H 14 Min, avec une magnitude de 4,3 sur l'échelle de Richter. On note que l'activité sismique durant la dernière semaine, du 07 au 14 février 2010 s'est concentré le long d'un alignement NE-SW (cf. figure ci-dessus).
La projection des séismes enregistrés depuis l'avènement de cette activité sismique récente et jusqu'au 14 février courant, sur un extrait de la carte néotectonique (Figure ci-dessous) montre que l'activité sismique présente maintenant deux alignements quasi perpendiculaires. Il s'agit d'un alignement NW-SE qui longe principalement le front des nappes rifaines et d'un alignement NE-SW qui s'étend de Had Kourt au SW jusqu'à Chefchaouen au NE.

❹ RENOUVELLEMENT ET EXTENSION DU RESEAU DE SURVEILLANCE ET D'ALERTE SISMIQUE MAROCAIN

Dans le cadre du renouvellement du réseau national de surveillance et d'alerte sismique, le CNRST a sollicité le soutien du Ministère de l'Intérieur de l'Etat Major Général de la Gendarmerie Royale et de l'Etat Major Général des Forces Armées Royales pour la prospection, la qualification de sites potentiels et la construction d'abris en vue de la mise en place de stations sismiques de nouvelle génération, utilisant les moyens de transmission satellitaire.
Le CNRST a établi un programme de plusieurs missions de terrain pour la prospection de nouveaux sites à travers le Royaume, en collaboration avec les autorités centrales et locales. 112 sites potentiels ont été prospectés dont 32 sites ont été sélectionnés jusqu'à présent pour lé construction de nouveaux locaux.
Les missions de terrain sont organisés en plusieurs types : mission de prospection, missions de lancement des travaux, missions de suivi, mission de réception de l'ouvrage et mission de l'installation des équipements.
Durant cette année 2010, le CEPRIS a poursuivi sa participation dans la mise en place du nouveau réseau sismique qui repose sur l'utilisation de la transmission satellitaire, au moyen de deux satellites couvrant le Maroc.

Liste des nouvelles stations programmées pour la première phase du renouvellement

Au cours de l'année 2010, les opérations de reconnaissance de terrain pour la qualification de nouveaux sites de stations sismiques se sont poursuivies. Des sites potentiels ont été repérés à travers le territoire marocain. La configuration adoptée, observe une couverture sismique plus large du pays.
Le CNRST a démarré en suite le déploiement des nouvelles stations travers le territoire national y compris de nouvelles régions non encore couvertes jusqu'à présent avec une extension vers les provinces sud du Royaume.
En 2009, les premières stations ont été installées et mise en service au moyen de la location de deux segments satellitaires couvrant le Maroc. Ainsi, cinq stations de la nouvelle génération sont maintenant opérationnelles.

Un nouveau réseau sismique au Maroc : une dynamisation de la surveillance sismique dans la Méditerranée occidentale.

Dès l'installation des premières nouvelles stations sismiques au Maroc, un échange en temps réel des signaux sismiques entre les réseaux portugais et espagnol a été mis en place, et incessamment avec l'Algérie. Les signaux de stations sismiques BB marocaines sont reçus au Portugal et en Espagne actuellement, des stations portugaises et espagnoles sont utilisées dans la surveillance sismique au Maroc.

Observation sismique de l'Espace Euro-Méditerranéen (Réseau Mednet)

Cette année, le Maroc a poursuivi sa participation à l'observation sismique de l'espace euro-méditerranéen à travers sa coopération au sein du réseau méditerranéen Mednet. La maintenance de la station VBB de Rabat a permis aux différents partenaires la réception des données sismiques de haute qualité à travers une liaison internet. Cette station constitue depuis 2002, l'une des premières stations sismiques de cette qualité à communiquer en temps réel des données sismiques du sud de la Méditerranée.

❺ PARTICIPATION A DES PROJETS AVEC LES AUTORITES MAROCAINES

RISQUE D'EAU : SURVEILLANCE SISMIQUE DES GRANDS OUVRAGES (AUSCULTATIONS DES BARRAGES)

Depuis 1990, le CNRST s'est vu confié par la Direction des Aménagements Hydrauliques (DAH) l'auscultation sismique des grands barrages. Cette mission comprend l'entretien et l'exploitation du réseau sismique installé par DAH et le Centre National pour la Recherche Scientifique et Technique, dans les principaux barrages du Royaume, nous procédons régulièrement à la réalisation de deux opérations importantes :

- Entretien des équipements d'auscultation sismique au sein des barrages;
- Exploitation et traitement des données.

L'exécution de ces deux prestations nécessite des missions de terrain aux différents barrages par le staff technique du CNRST (3 visites par barrage et par an) pour l'entretien des équipements installés aux barrages et la collecte des données enregistrées par ces équipements.
Les lieux d'installation sont indiqués dans les barrages et sites suivants:
Mohamed V (Oujda); Oued Al Makhazine (Larache), Smir (Tétouan), Med Ben Abdelkrim Al Khattabi (Al Hoceima), Idriss 1er (Taounat), Al Wahda (Sidi Kacem), Sidi Med Ben Abdellah (Rabat), Abdelmoumen (Taroudante), Youssef Ben Tachfine (Tiznit), Aoulouz (Taroudante), Mansour Dahbi (Ouarzazate), Hassan Dakhil (Er Rachidia), Hassan Ii (Taourirt), Garde Sebou (Kénitra), Neuf Avril 1947 (Tanger), Iben Baouta (Tanger), Sidi Echahed (Meknès), Asfalou (Taounat), Prince Moulay Abdallah (Agadir), My El Hassan Ben El Mahdi (Tétouan), Sidi Said (Khenifra), Station de Faculté des Sciences (Oujda) et Station Bab Merzouga (Taza).
Lors de ces missions , nous procédons à la collecte des données : les instruments sont questionnés pour récupérer les données accélérométriques éventuellement enregistrées par ceux-ci lors de la période écoulée. Les données ainsi collectées sont analysées à Rabat, pour faire l'objet des traitements plus poussés notamment :

- le dépouillement, l'interprétation des enregistrements et l'édition des résultats sous forme de rapports ;
- la recherche spectrale pour des séismes présentant un intérêt particulier et sur demande de la DAH ;

- la réalisation de rapports semestriels de l'entretien du matériel sismologique;

Cette année 2010, cette action s'est poursuivie en collaboration avec l'Administration de l'Hydraulique en sélectionnant certains grands barrages pour les équiper en stations sismiques nouvelle génération dans le cadre du renouvellement et de l'extension du réseau sismique marocain.

COOPERATION AVEC LE MINISTERE DE L'HABITAT

Cette coopération a été formalisée par la signature d'une convention cadre dont l'objectif est le développement de la recherche, des études, de l'expertise et de la formation dans le domaine de l'habitat et de l'urbanisme. Cette convention a également pour objectif de répondre aux besoins et aux attentes du secteur de l'habitat et de réaliser des activités s'inscrivant dans le cadre des préoccupations communes, selon les missions et attributions des deux parties. Les clauses de cette convention sont considérées comme des principes généraux pouvant être adaptés pour l'élaboration d'autres conventions ponctuelles pour traiter d'autres sujets spécifiques. Ces opérations spécifiques concernent en général les investigations suivantes :

a) Cartographie géologique : Il s'agit de réaliser une campagne de cartographie de la géologie de surface afin de caractériser les formations superficielles pouvant générer un effet sismique de site ;
b) Campagne de mesures sismique réfraction (tomographie sismique) : La méthode est basée sur l'enregistrement de la propagation des ondes sismiques dans le sous-sol. Elle permet la détermination des vitesses d'ondes de cisaillement. Elle permet également d'obtenir des profils sismiques en 2-dimensions ;
c) Campagne de mesures H/V (bruit sismique de fond) : Cette méthode H/V, est basée sur l'enregistrement des composantes horizontales et verticales du bruit de fond sur un site ponctuel. La réalisation d'une campagne de mesures ponctuelles H/V permet en première approche de déterminer en chaque point la fréquence propre du sol (à laquelle l'amplification de l'accélération sera maximale) et de comparer entre eux les points en terme d'amplitude.

Dans ce cadre, le CEPRIS a contribué au lancement d'une nouvelle opération de microzonage sismique en 2010 :

Microzonage sismique de l'une des nouvelles villes satellites de Tanger (la nouvelle de Chrafate). L'objet de cette étude est de cartographier les zones dont la réponse sismique est homogène en prenant en compte les effets géologiques de site, c'est à dire la modification du signal sismique au rocher par les conditions lithologiques locales. Cette action a une incidence directe sur la génération des cartes d'aptitude à l'urbanisation qui doivent prendre en compte les effets d'amplification sismique de sites.

Etude des spectres accélérométriques marocains : Cette coopération porte sur l'exploitation des accélérogrammes enregistrés jusqu'à ce jour au Maroc le calcul des accélérations maximales et les lois d'atténuation. Au cours de l'année 2010, cette opération s'est poursuivi en collaboration avec le CEPRIS.

REALISATION D'UNE ETUDE SISMIQUE DE LA CENTRAL ELECTRIQUE DE TAN TAN AU PROFIT DE L'OFFICE NATIONAL DE L'ELECTRICITE

Le présent travail est consacré à l'étude sismique du site d'El Ouatia (Tan Tan) localisée sur le littoral atlantique à environ 3 Km au sud de la ville d'El Ouatia (Tan Tan plage).

De point de vue géologique, la zone d'El Ouatia appartient au bassin de Tarfaya-Layoun qui est un bassin atlantique mésozoïque ouvert sur la marge passive. Le secteur entre Tan Tan - ville et Tan Tan - plage est caractérisé par des affleurements du Crétacé inférieur, du Miocène, du Plioquaternaire et du Quaternaire récent.

L'étude a permis :

- la quantification des paramètres sismiques permettant d'évaluer l'aléa sismique par une synthèse sismotectonique et l'utilisation des approches déterministe et probabiliste pour l'évaluation des accélérations maximales sur le site ;
- l'évaluation des effets de site dans le site offshore d'El Ouatia ;
- l'étude structurale et sismotectonique des zones à terre limitrophes du site d'El Ouatia en vue, d'y vérifier la présence d'éventuelles failles locales actives.

❻ PARTICIPATION AU PROGRAMME DE LUTTE CONTRE LES TSUNAMI (COMMISSION EUROPEENNE)

PROJET NEAREST : Observations des sources tsunamigènes proches aux larges des côtes : vers un système de détection précoce

NEAREST a pour objectif l'identification et la caractérisation des sources potentielles de tsunami près des rivages autour du Golfe de Cadiz notamment près des côtes marocaines. La caractérisation des sources potentielles tsunamigéniques pouvant être employé dans le développement d'un prototype du système de détection précoce dans la région. Dans ce cadre, le CEPRIS a réalisé plusieurs opérations, dans le domaine de la surveillance du niveau marin au Maroc, de la coopération, avec les départements ministériels au Maroc et avec des partenaires étrangers.

Actuellement deux institutions sont impliquées dans la surveillance du niveau de la mer : la Direction des Ports et du Domaine Public maritime (DPDPM) relevant du Ministère de l'Equipement et du Transport et de l'Agence Nationale de la Conservation foncière, du Cadastre et de la Cartographie (ANCFCC), relevant du Ministère de l'Agriculture.
Dans le cadre de la contribution marocaine au Projet de la Commission Européenne NEAREST, le CEPRST et le CEPRIS ont contribué au WP5, par l'acquisition, l'installation et l'exploitation de données d'un marégraphe radar télémétré récemment installée au Port de Casablanca. Ce marégraphe permettra après une période d'essai, d'assurer une surveillance du niveau de la mer en temps réel pour les bénéficiaires locaux et étrangers.
Au cours de cette année, les opérations la liaison modem vers un serveur du CNRST ont été réalisées pour le marégraphe de Casablanca. Des discussions sont en cours pour mettre à disposition et échanger les données dans un premier temps avec les réseaux de marégraphes portugais, espagnole et de celui de la Commission Océanographique intergouvernementale de l'UNESCO

Coopération avec l'Université de Lisbonne

Dans le cadre de la coopération scientifique en matière de recherche scientifique dans le domaine de la réduction de l'aléa sismique et de tsunamis. Le CEPRIS a invité et pris partiellement en charge deux experts portugais pour discuter et mettre en place les opérations scientifiques dans le domaine. Il s'agit des professeurs :

- Prof. Maria Ana de Carvalho Viana Baptista de l'INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA;
- Prof. JORGE MIGUEL ALBERTO DE MIRANDA de FACULDADE DE CIENCIAS DA UNIVERISDADE DE LISBOA.

❼ ORGANISATION ET PARTICIPATION A DES MANIFESTATIONS SCIENTIFIQUES

Rencontre internationale sur les aléas séismiques : Agadir SISMO 2010

En 2010 le Centre Euro-Méditerranéen pour l'Evaluation et la Prévention du Risque Sismique (CEPRIS) a co-organisé avec l'Université Ibn Zohr d'Agadir une manifestation scientifique à l'occasion du 50ème anniversaire du séisme d'Agadir 1960**. Il s'agit de la Rencontre internationale sur les aléas Séismiques : Agadir SISMO 2010**, qui s'est déroulé du 26 au 28 Février **2010** à Agadir. Dans ce cadres le CEPRIS a pris en charge trois experts étranger pour participer à l'animation de cette rencontre. Il s'agit de MM :

- Professeur **Mustapha MEGHRAOUI :** EOST-Institut de Physique du Globe de Strasbourg (UMR 7516). Strasbourg
- Professeur **Jean BONNIN.** c/o IPG/UdS, Strasbourg
- Professeur **Eric GILLI, :** Département de géographie, Université Paris 8 & UMR ESPACE 6012 Nice

Dans le cadre de cette co-organisation le CEPRIS a également prise en charge des frais d'inscription de chercheurs et d'étudiants qui ont présenté des travaux lors de ladite manifestation.

Participation Europeen Seismological Commission, 32nd General Assembly, Montpellier (France) 6-9 septembre 2010

Dans le cadre du suivi des derniers développements internationaux en matière de surveillance et de prévention sismique. Le CEPRIS a proposé des communications scientifiques sur les développements récents du Maroc dans le domaine de la séismologie au 32nd General Assembly de l'European Seismological Commission, qui s'est tenue à Montpellier (France) entre le 6 et le 10 septembre 2010.

La première communication

Seismic monitoring and warning in Morocco: Recent Developments

Cette présentation a visé la présentation des développements en matière de système de surveillance sismiques et de tsunamis. Sachant que le Maroc est permis les pays les plus exposé au risque de tsunamis dans la région de l'Afrique du Nord. Les discussion du fonctionnent du système de surveillance et d'alerte sismique marocain avec les experts internationaux constitue une valeur ajoutée aux efforts du Maroc dans le domaine.

La seconde présentation

Moho Depth and Crustal Velocity Structure Beneath The RTC (Morocco) and TAM (Algeria) Stations, From Teleseismic Receiver Functions Analysis.

Cette présentation vise la communication des résultats de traitements des données sismiques relative à la région. Les discussions de ces résultats avec des experts d'autres pays permettront d'améliorer les connaissances sur les modélisations et par conséquent une actualisation de l'évaluation de l'aléa sismique dans la région.

La troisième présentation

Spatial distribution of aftershocks of the Al Hoceima 2004 earthquake; Implications for the identification of new active faults.

Cette troisième communication a permis la présentation des résultats de la compagne microsismique de terrain que le CNRST a réalisée suite au séisme d'Al Hoceima 2004, la répartition spatiale de ces secousses répliques a permis de mette en évidences des accidents tectoniques qui affectent les formations géologiques de la région. La discussion de ces nouveaux résultats permettra d'améliorer les connaissances du risque sismique dans le Nord du Maroc.

Participation au Advanced Workshop on Geophysics, Geodesy and Tectonics of the North Africa Plate Boundary for Better Earthquake and Tsunami Hazard Assessments 15-21 May 2010 Algeria.

Sous l'égide de l'UNESCO-ICTP, de l'AIEA des autorités algériennes, le CEPRIS a été invité pour participer à cette importante par la présentation de plusieurs communications sur les développements récents dans le domaine de la surveillance et alerte sismique au Maroc.

Participation au Workshop d'Ankara

Le CEPRIS a été invité à participer au Workshop sur Seismicity and Earthquake Engineering in the Extended Mediterranean, Ankara 21-24 June 2010, organisé par l'UNESCO, l'USGS et the Middle East Technical University.

❽ TRAVAUX ET PUBLICATIONS

Résumés-Abstracts

EL MOURAOUAH A., BIROUK A., IBEN BRAHIM A., KASMI M., BENAMMI M., HAFID M., TOTO E. A., EL BASRI M. et EL MOURAOUAH H. S. (2010) : Etude géologique des formations superficielles et récentes pour l'évaluation de l'effet de site sismique et de l'aptitude à l'urbanisation de la ville d'Al Hoceima, Rencontre internationale sur les aléas sismiques «Sismo2010-Agadir », Le risque sismique : Gestion et impact sur l'environnement, Agadir 26-28 Février 2010, p. 18.

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EL MOURAOUAH A., IBEN BRAHIM A., BIROUK A., KASMI M., JABOUR N., DASSER L. et EL MOURAOUAH H. Sanaa (2010) : Activité sismique enregistrée à travers les régions du Royaume du Maroc par le Réseau National de Surveillance et d'alerte sismique 24/24, période 1993-2008. Rencontre internationale sur les aléas sismiques «Sismo2010-Agadir », Le risque sismique : Gestion et impact sur l'environnement, Agadir 26-28 Février 2010, p. 28.

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Poster

EL BASRI M, EL MOURAOUAH H. S., EL MILOUDI A., EL FILALI Y., HAFID M., TOTO E. A., BENAMMI M., EL MOURAOUAH A., BIROUK A., IBEN BRAHIM A. et KASMI M ., (2010) : Application des méthodes géophysiques dans le domaine de Géni-civil, de l'aléa sismique, de l'urbanisation et des ressources en eau, Rencontre internationale sur les aléas sismiques «Sismo2010-Agadir », Le risque sismique :Gestion et impact sur l'environnement, Agadir 26-28 Février 2010, p. 77-78.

Articles

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TALHAOUI A., JORDAN E., LINDER W., IBEN BRAHIM A., ABERKAN M. et EL MOURAOUAH A. Generation of anorthophoto by digital photogrammetry: an approach for monitoring the evolution of landslides triggered by earthquakes in the Al Hoceima region, Morocco (en préparation)

TALHAOUI A., IBENBRAHIM A., M´HAMED A., EL MOURAOUAH A., KASMI M. AND BIROUK A. Current seismicity recorded in northern Morocoo and generated neotectonic avtivity (en préparation)

Edition

BELCADI S., EL MOURAOUAH A., IBEN BRAHIM A., KASMI M., BIROUK A., JABOUR N., DASSER L., et EL MOURAOUAH H. S., (2010) : Quinze année d'activité sismique enregistrée à travers les régions du Royaume (Période 1993-2008). Edition ING-CNRST, 135 p., ISBN 978 – 9954 – 30 – 006 - 0

CERU – CENTRE EUROPEEEN SUR LES RISQUES URBAINS (LISBON, PORTUGAL)

1. The CERU was involved in the assessment of the Seismic Hazard, maintenance and rehabilitation of the heritage in the City of Lagos (Algarve-Portugal).
2. Participation, Publications and Communications presented in the following Meetings:
    1. 14ECEE Fourteenth European Conference on Earthquake Engineering, 30 August-3 September, Ohrid, Republic of Macedonia.
    2. Seminar Organized in the Sociedade de Geografia de Lisboa, DIA INTERNACIONAL PARA A REDUÇÃO DAS CATÁSTROFES NATURAIS, 11 October 2010 (Annnex I).
    3. 2010 Congresso Nacional de Sismologia e Engenharia Sísmica, 20-23 de Outubro (Annex II).
    4. SISMOS, Academia das Ciências de Lisboa, 8 de Novembro de 2010 (Annex III).
    5. Gestão de Situações de Emergência – Risco Sísmico, Lagos, Setembro, 2010 (Annex IV)

ECBR – EUROPEAN CENTRE FOR BUILDINGS REHABILITATION (BUCHAREST, ROMANIA)

❶ ACTIVITIES IN SUPPORT OF THE ENFORCEMENT OF THE STRATEGIC PROGRAMS FOR BUILDING REHABILITATION COORDINATED BY THE ROMANIAN GOVERNMENT AND CONCERNED MINISTRIES

FIELD OF ACTIVITY: Support to code enforcement
TARGET COUNTRIES
- Romania and countries that can be affected by the shaking of Vrancea intermediate depth earthquakes (R. Moldova, Bulgaria, Ukraine, Greece, Turkey, Serbia, etc) may have access to the materials on such activities
- Other interested countries, member of the EUROPA Agreement.

LOCAL COORDINATOR: ECBR
OTHER PARTICIPANTS
- *National Authorities:*
  - Ministry of Regional Development and Tourism
  - *Associations*: Association of Structural Design Engineers of Romania - AICPS

OBJECTIVE OF THE PROJECT
***Global objectives*:**
- Facilitation of the application of the new codes and standards by the community of structural design engineers in Romania, taking into account the objectives of the EUROPA Major Hazards Agrrement for the period 2009-2011.
- Fostering research, regulations and development programs for thermal and energy rehabilitation of buildings, according to EPBD-European Performance of Building Directive.

***Specific achievments in 2010*:**
- members of ECBR ensured consulting for design engineers related to enforcement of the new Romanian Code for the seismic rehabilitation of existing buildings, correlated with the enforcement, starting with 2010, of Part 3 of Eurocode 8
- participation of ECBR Director in TV Antena 3 technical debate on earthquake strengthening of buildings (March 2010);
- presentation of a paper and key-lecture on „Building Damage in Chile Earthquake of February 27, 2010 and Lessons for Romania", National Conference of Romanian Association of Structural Design Engineers – AICPS, May 28, 2010

RESULTS IN 2010
An easier transition process to the effective application of the new codes and standards.

RESULTS OBTAINED PREVIOUSLY
Knowledge transfer concerning the impact of past earthquakes and the need to rehabilitate buildings

ASSOCIATED ACTIVITIES IN 2010
This activity was correlated within the national framework of earthquake protection and adoption of EU codes and standards, as well as with other research programs of URBAN-INCERC.

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❷ DISSEMINATION ACTIVITIES USING EARTHQUAKE EDUCATION MATERIALS, SEMINARS AND DEMONSTRATIONS, CONCERNING EARTHQUAKE PROTECTION (BEFORE, DURING AND AFTER AN EARTHQUAKE) BY INNOVATIVE TOOLS (WEBSITE INFORISX, JAPANESE EARTHQUAKE SIMULATORS ETC)

FIELD OF ACTIVITY: Education, Dissemination
TARGET COUNTRIES:
- Countries that can be affected by the shaking of Vrancea intermediate depth earthquakes (R. Moldova, Bulgaria, Ukraine, Greece, Turkey, Serbia, etc), other interested seismic countries, member of the EUROPA Agreement may have access to the materials on such activities

LOCAL COORDINATOR: ECBR
OTHER PARTICIPANTS

National Authorities: Ministry of Regional Development and Tourism

OBJECTIVE OF THE PROJECT

Global objectives:

- Developing the national and regional capability of Romania within EUR-OPA Agreement on prevention, preparedness and response;
- Co-operation with other institutions;

***Specific achievements in 2010*:**

- a broader dissemination, for citizens that are living in seismic zones of Romania by members of ECBR;
- Seminars for providing knowledge to students of Interior Design Department in University of Architecture and Urbanism „Ion Mincu" Bucharest:
    - A number of 3 seminars on „Hazard, vulnerability and seismic risk in Romania", „Learning from Earthquake Disasters", „Earthquake of LAquila, Italy of April 6, 2009, damage on buildings and nonstructural members". (October 21, 28 and November 4, 2010)

RESULTS OBTAINED PREVIOUSLY

- The Romanian version of INFORISX Website is already hosted by INCERC Branch Website;
- Seminars for school students have been held

ASSOCIATED ACTIVITIES IN 2010

The activity was correlated with other dissemination programs of URBAN-INCERC.

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❸ PARTICIPATION OF ECBR MEMBERS IN WORKSOPS, SEMINARS, CONFERENCES AND UNIVERSITY COURSES

FIELD OF ACTIVITY: Knowledge gathering and dissemination

TARGET COUNTRIES:

- Countries that can be affected by the shaking of Vrancea intermediate depth earthquakes (R. Moldova, Bulgaria, Ukraine, Greece, Turkey, Serbia, etc), other interested seismic countries, member of the EUROPA Agreement may have access to the materials on such activities

LOCAL COORDINATOR: ECBR

OTHER PARTICIPANTS

National Authorities: Ministry of Regional Development and Tourism

OBJECTIVE OF THE PROJECT

***Global objectives*:**

- Enhancing knowledge transfer for seismic disaster prevention
- Inncreasing the visibility of ECBR activities

***Specific achievements in 2010*:**

- presentations in University of Architecture and Urbanism „Ion Mincu" Bucharest, Master course „Sustainable development – the integrated concept of built space", on topics as: „Evaluation of natural and man-made risks. Strategies for risk reduction in exposed zones". (A number of 5 conferences - October-December 2010).
- presentation on LAquila 2009, Italy and Maule-Chile 2010 earthquakes. Lessons on public strategies for disaster management, February 25, 2010, PROTCIV 2010 Workshop of General Inspectorate for Emergency Situations, at Snagov, Romania
- members of ECBR made presentations on Maule-Chile 2010 Earthquake Buildings Damage, CNCISC Conference September 24, 2010, Bucharest.

ASSOCIATED ACTIVITIES IN 2010

This activity was correlated with other activities of URBAN-INCERC and professional associations, in Romania and EU, with activities of UNO agencies as UNESCO, OCHA, ISDR etc.

CEMEC- EUROPEAN CENTER FOR DISASTER MEDICINE/ CENTRE EUROPEEN POUR LA MEDECINE DE CATASTROPHE (SAN MARINO)

Teaching strategies and learning outcomes

All CEMEC courses are in the framework of modern teaching and learning criteria for adult candidates.
Active participation to sessions is an indispensable point to guarantee motivation and attendance.
Variety of teaching tools is assured by different types of sessions:

- lectures
- skill stations
- closed discussions and workshops
- open discussions
- simulation and role play
- plenary demonstrations

Pre-course study and pre-test make candidates aware of contents largely in advance.
Sommative and formative assessment is performed to test candidates.

Report of 2010 Courses

- **Infectious diseases epidemiology as a way to control epidemics and pandemics (7-8-9 October 2010)**

Learning outcomes: At the end of the course candidates will be able to know the update epidemiological instruments to prevent and to control epidemics and pandemics
Target Audience: Public Health and Infectious Diseases Physicians, General Practitioners, Military Physicians,
Candidates: 30

- **ALS - Advanced Life Support** (Provider Course) **(27-28-29 September 2010)**

European Resuscitation Council, Italian Resuscitation Council
Learning outcomes: At the end of the course candidates will be able to manage cardiac arrest and peri-arrest situations in adults
Target Audience: Physicians, Nurses
Candidates: 30

- **Education for veterinary management of catastrophes (30 September 2010)**

Learning outcomes: At the end of the course candidates will be able to know the basics of veterinary management of catastrophes
Target audience: Veterinary physicians, public health officers
Candidates: 25

- **PTC – Pre-Hospital Trauma Care** (Basic) **(27 October 2010)**

Italian Resuscitation Council
Learning outcomes: At the end of the course candidates will know and will be able to apply the basic management of trauma patients in the pre-Hospital Phase
Target Audience: Health care professionals and personnel duty to respond with particular reference to the Emergency Medical System
Candidates: 24

- **PTC – Pre-Hospital Trauma Care** (Advanced) **(28-29-30 October 2010)**

Italian Resuscitation Council
Learning outcomes: At the end of the course candidates will know and will be able to apply the advanced management of trauma patients in the pre-Hospital Phase
Target Audience: Physicians, Nurses
Candidates: 24

- **AHLS – Advanced Hazmat Life Support** (Provider Course)

Arizona Emergency Medicine Research Center, American Academy of Clinical Toxicology
Learning outcomes: At the end of the course candidates will have factual and procedural knowledge about hazardous materials incidents in humans
Target Audience: Physicians, Nurses
Candidates: 50

- **TBST – Toxicological Basic Support and Therapy**

Poison Center, University Hospital "A. Gemelli", Rome; Poison Center, University Hospital "Careggi", Florence

Learning outcomes: At the end of the course candidates will have factual and procedural knowledge about acute poisonings in humans
Target Audience: Physicians, Nurses
Candidates: 50

- **Pre-Hospital Mass Casualties Care (Advanced) (11-12 October 2010)**

Learning outcomes: At the end of the course candidates will have factual and procedural knowledge about pre-hospital management of catastrophes.
Target Audience: Physicians, Nurses
Candidates: 20

- **Psychology of emergency and disaster medicine (16-17 October 2010)**

Learning outcomes: At the end of the course candidates will have factual and procedural knowledge for the psychological management of personnel involved in victims care.
Target Audience: Physicians, Nurses, Physchologists
Candidates: 20

- **NBCRe emergencies (13-14 October 2010)**

Learning outcomes: At the end of the course candidates will have factual and procedural knowledge for the management victims of NBCR incidents including skill for using PPE.
Target Audience: Physicians, Nurses
Candidates: 20

- **Management of maxi-emergencies (25 september 2010)**

Learning outcomes: At the end of the course candidates will have factual and procedural knowledge for the management victims of maxiemergiences
Target Audience: Physicians, Nurses
Candidates: 20

Report of 2010 Meetings

The Aquila Earthquake: which lessons for disaster medicine experts ? (19 June 2010)
Participants: 150

ECNTRM- EUROPEAN CENTER FOR NEW TECHNOLOGIES IN RISK MANAGEMENT / CENTRE EUROPEEN DES NOUVELLES TECHNOLOGIES POUR LA GESTION DES RISQUES (MOSCOW, RUSSIAN FEDERATION)

In 2010 there were two main directions of the Center activity:
1. Methodic for Distance automatic on-line monitoring of buildings engineering construction frames (within coordinated programs).
2. Operative duty Extremum program

❶ METHODIC FOR DISTANCE AUTOMATIC ON-LINE MONITORING OF BUILDINGS ENGINEERING CONSTRUCTION FRAMES

In 2010 the Methodic for Distance Automatic on-line Monitoring of Buildings Engineering Construction Frames successfully went through the expertise of the Interagency Coordination Scientific Council on the Problems of Civil Defense and Emergency Situations and was certified by the Government Commission on prevention and elimination of emergency situations and providing fire safety It was recommended to implement the methodic and provide the buildings and constructions with the on-line monitoring systems.
The number of buildings is growing and today we have the tendency of constructing skyscrapers, huge trade, entertaining and business centers. Speed of construction leaves behind the quality control. It is also known that during the exploitation buildings wear out and lose their strength. The most vulnerable the buildings are to seismic and vibration pressure. It is understood that the source of seismic pressure is not only the earthquake but industrial explosions (during the mining works). The sources of vibration are huge industrial machines, ground and underground transport. Because of constant or periodical influence of such pressure construction may accumulate this destructive force and it can result in strong and disastrous destructions.
Existing approach to the periodical diagnostics of buildings and constructions is based on the local principal of visual stability and is connected with the examination of samples of material and foundation research. It is clear that being concentrated on details it is impossible to realize the main mechanism and reasons of object vulnerability to the mechanical pressure. Presented **Hard warily bundled software complex** allows in real time to monitor and estimate technical condition of different types of constructions and materials – simple one-story buildings, multistoried buildings and constructions of difficult configuration both civil and industrial.
The Methodic was developed for the unified scientific approach to creating and providing activity of automatic on-line monitoring of buildings engineering construction frames, for the purpose of hazards elimination.
The Methodic defines general regulations and contents of scientific provision of creating and operating automatic on-line monitoring of buildings engineering construction frames.
Presented technology of distance automatic on-line monitoring of buildings engineering construction frames allows to predict sudden destruction of objects under control and thus save lives of people and radically reduce material damage. Suggested model of on-line estimation of conformity of evaluated criteria of changes in engineering construction frames with those received in the process of monitoring can be used for taking decision on:
people security;
transfer of buildings and constructions to the accident type of exploitation;
taking anti hazard measures to minimize possible consequences;
strengthening buildings engineering construction frames.

There was developed hard ware and soft ware complex aimed at estimation of buildings and constructions seism stability on the basis of constant analyses of spring constant and geometrical parameters of ground-building system.

Before setting up the complex, technical observation of the object should be completed to define original parameters of the building. Complex is a multi channel system and measurements could be done through 32 channels at a time. Dynamic parameters are taken by means of dynamic energizing of ground with massive impulse device.

In order to get required data, cable is to be put between the indicators and controller. In case of emergency information is transferred both to the operator on duty and rescue service of the city for preventing emergency situation and taking measures for saving people.
The soft ware dialogue with the user is providing very low rate of mistaken actions. Dialogue is done in interactive mode by means of working with screen forms with the CAS usage. The main working window of the program reflects on the left two columns of the list of installed sensors with the graphic reflection of their condition. At the bottom of the screen there is a status line reflecting time of the last request of the construction state. By mouse click to the

status line the user gets the system operation protocol. Basic field of the program form shows the graphic description of the object with the sensors location. Image is interactive thus by clicking to the sensor the user can get the current status. Developed data goes both to the operator terminal and special internet site. Thanks to this the owner of the object can control the technical condition of the building being at any place of the world. In case of emergency information is transferred to the operator of the object and emergency services of the city for immediate response.

Hard warily bundled software complex has already been implemented in the Russian Federation during the construction of Ice Palace in Moscow.

Operation and maintenance of the complex is done by the supervisory service personal of the Palace.
Mode of the dialogue with the user embodied in the hard warily bundled software complex provides low probability of accidental false actions of the operator on duty.
Complex provides twenty-four-hour functioning with the necessary reliability behavior (availability rate, average renewal time). It has means of reserve information copy, data restoration and software.
Complex allows monitoring of various constructions: skyscrapers, ground deepened constructions, trunk lines, waterworks etc.

For today about 100 projects already applied for the Methodic.

❷ OPERATIVE DUTY EXTREMUM PROGRAM

During the period from 01.11.2009 to 01.11.2010 there were registered 7096 seismic events at the average 19 events a day. Among them 43 were disastrous. Statements on the consequences of strong earthquakes were analyzed in the ECNTRM and sent to the consignees addresses connected with forecasting, prevention and mitigation of emergency situations of natural and technological origin.
The GIS Extremum system provides possibility of estimation possible Consequences of earthquake. Calculation of the earthquake consequences is done within the period 0,5-2 hours. Data received allows making estimation of individual risk for the people and the territory. Results are given in the Supplement.
Based on this data of seismic events consequences estimation EUR-OPA states-members planned and carried our humanitarian aid and assistance in conducting rescue works in the states suffered from the earthquake.
Using data of earthquake short-term and long-term forecasting as well as up-to-date information concerning earthquake parameters allows accomplishing forecasts of possible losses that provide rational planning of preventive and rescuing works.
The most catastrophic earthquakes of the year 2010 were:
Haiti – 311000 suffered, 222570 lost,
Chile – 1200 suffered, 802 lost,
Turkey – about 100 suffered, 57 lost,
China – 12135 suffered, 2220 lost.

Rescue people data analyses shows that after earthquake up to 47% of blocked people die within twenty-four hours. Amount of loses within the next seventy two hours gets 60%, after 6 days the number of loses can reach 85%.
For improving estimation of strong earthquake consequences algorithm, development of effective response scenario and increasing estimation accuracy constant renewal of information on buildings and territory is needed.

Statements on the consequences of strong earthquakes

№	Date	Time	Longitude	Latitude	Intensity	Depth Км	Place
1.	31.10.2009	00:14:07.5	120,67	1,09	9,1	5	Minakhasa Peninsula, Sulawesi
2.	03.11.2009	05:25:08.2	20,66	37,74	5,7	10	Ionian Sea
3.	08.11.2009	19:41:42.0	118,6	-8,24	6,7	20	Sumbava, Indonesia

4.	13.11.2009	03:05:54.3	-70,34	-19,36	6,6	10	Near the Northern coast of Chile
5.	14.11.2009	04:46:59.9	29,78	-6,94	5,5	10	Tanganyika Lake
6.	27.11.2009	08:15:52.2	-69,8	10,38	5,7	10	Venezuela
7.	06.12.2009	17:36:34.9	33,87	-10,06	5,6	10	Malawi
8.	08.12.2009	03:08:56.0	33,99	-9,79	5,9	10	Tanzania
9.	12.12.2009	02:27:03.3	33,87	-9,57	5,5	10	Tanzania
10.	30.12.2009	18:48:57.0	-115,23	32,56	5,9	10	California, boarder regon
11.	03.01.2010	22:36:28.5	157,41	-8,78	7,3	33	Solomon Islands
12.	05.01.2010	12:15:31.5	157,48	-8,97	6,7	20	Solomon Islands

№	Date	Time	Longitude	Latitude	Intensity	Depth	№
13.	12.01.2010	21:53:08.9	-72,6	18,61	7,1	10	Haiti
14.	13.01.2010	17:18:06.3	133,26	-0,68	5,8	10	Irian Djaya, Indonesia
15.	15.01.2010	18:00:46.1	-63,52	10,51	5,5	10	Near the coast of Venezuela
16.	20.01.2010	11:03:43.0	-73,18	18,49	6,1	10	Haiti
17.	26.02.2010	04:42:26.7	86,74	28,19	5,8	10	Ksizang
18.	27.02.2010	06:34:16.1	-72,8	-36,05	8,7	60	Near the coast of cenral Chile
19.	05.03.2010	11:47:09.2	-73,21	-36,5	6,9	33	Near the coast of central Chile
20.	08.03.2010	02:32:33.1	39,99	38,94	6	10	Turkey
21.	11.03.2010	14:39:48.0	-71,88	-34,42	7,1	33	Near the coast of

							central Chile
22.	26.03.2010	14:52:06.9	-70,9	-28,08	6,2	33	Central Chile
23.	04.04.2010	22:40:44.9	-115,14	32,25	7,2	10	California, boarder regon

№	Date	Time	Longitude	Latitude	Intensity	Depth км	Place
24.	06.04.2010	22:15:00.0	97,22	2,33	7,8	33	Northern Sumatra, Indonesia
25.	11.04.2010	09:40:28.0	161,17	-10,74	7,1	50	Solomon Islands
26.	13.04.2010	23:49:38.5	96,67	33,11	6,9	33	Tsinkhaj, China
27.	14.04.2010	01:25:14.6	96,54	33,2	6,1	10	Tsinkhaj, China
28.	02.05.2010	14:52:38.8	-72,13	-34,34	5,9	10	Near the coast of the central Chile
29.	03.05.2010	23:09:44.2	-73,72	-38,15	6,4	20	Near the coast of central Chile
30.	06.05.2010	02:42:46.9	-70,74	-18,14	6,7	33	Near the Northen coast of Chile
31.	09.05.2010	05:59:40.1	96,09	3,79	7,3	40	Northern Sumatra, Indonesia
32.	27.05.2010	17:14:45.2	166,52	-13,63	7,1	33	Vanuatu Islands
33.	03.06.2010	05:35:42.5	96,23	33,4	5,5	10	Tsinkhaj, China
34.	30.06.2010	07:22:24.2	-97,75	16,48	6,3	10	Okhaka, Mexico
35.	14.07.2010	08:32:22.8	-73,38	-37,98	6,7	33	Near the coast of the central Chile

№	Date	Time	Longitude	Latitude	Intensity	Depth км	Place
36.	18.07.2010	13:04:09.2	150,59	-6	7,1	40	New Britain, Papua New Guinea
37.	20.07.2010	19:38:09.4	53,93	26,91	6	25	Southern Iran
38.	03.08.2010	16:26:25.3	69,56	38,63	5,7	33	Tajikistan
39.	03.08.2010	19:42:12.3	39,09	-9,29	5,6	10	Tanzania
	04.08.2010	22:01:42.8	150,71	-5,69	6,5	50	New Britain,

40.							Papua New Guinea
41.	10.08.2010	05:23:44.4	168,06	-17,45	7,1	33	Vanuatu Islands
42.	27.08.2010	19:23:46.4	54,56	35,49	5,7	10	Northern and central Iran
43.	03.09.2010	16:35:44.6	171,68	-43,61	7	15	Southen Island, New Zealand

TESEC - EUROPEAN CENTRE OF TECHNOLOGICAL SAFETY / CENTRE EUROPEEN DE SECURITE TECHNOLOGIQUE (KIEV, UKRAINE)

GENERAL INFORMATION

Main objectives:

- to join and concentrate efforts and scientific potential of the world scientific, research, technological centres and laboratories in designing technical means and technologies (including conversion), to define approach to the potentially dangerous activities risk assessment and to conduct activities on prevention and effective response to the consequences of extraordinary technological situations and natural disasters, especially the consequences of Chernobyl catastrophe;
- to establish reliable mechanism of attraction of the world community for conduction of scientific-technological research works at the enterprises with high industrial risk level in Ukraine;
- to use in Ukraine a world experience in technological safety problems solving;
- to establish the partners and business contacts among the Ukrainian scientist and scientific research institutions and leading world scientific research centers and laboratories;
- to create a reliable integration mechanism of Ukraine applied science in the field of technological safety into the world scientific community;
- to coordinate methodological, technical and financial help in the field of technological safety;
- to increase the effectiveness of international help, realization of long term projects;
- to provide effective realization of international cooperation and help programs in the field of prediction and response to the extraordinary situations, minimization of the Chernobyl disaster consequences.

❶ TRAINING COURSE ON RADIOLOGICAL MONITORING IN CHERNOBYL EXCLUSION ZONE

The Chernobyl accident has provided a unique opportunity for research and training on radiological emergency response and post-accidental radiation monitoring. It is one of only a few places in the world where effective training and experience in internal and external dose assessment, radioactive sample collection and preparation, contamination mapping and decision making can be provided in real contaminated area. It is important to expand such experience for upgrading of post-accident radiation monitoring techniques and decision making in a case of nuclear or radiological accident.

The TESEC has the laboratory facilities and faculty needed to provide advanced international seminars and group training. There are laboratories and equipment for sampling and sample preparation, portable dose and dose rate meters, alpha and gamma spectroscopy and beta particle detection, In-Situ measurement technique, etc.

The curriculum of the course consists of classroom instruction, practical field exercises and data analysis at the TESEC training facility, and exercises in contaminated areas of the Chernobyl Exclusion Zone.

The main purpose is to give opportunity for the participants, who are interested in providing of measurements, to apply their knowledge in "real" conditions and to be trained as emergency monitoring team. The purpose of the course is also to give opportunity for the participants to realize what action should be done during different phases of the accident, to participate in real measurement with the aim of emergency monitoring and to apply their knowledge in decision making using real results of measurements.

A distinguishing feature of the Training Course is practical aspects. The international group of participants is dividing into teams to perform gamma and beta surveys, In-Situ gamma spectrometry, vegetation and soil sampling in contaminated field and forest locations, data acquisition and assessment.

The schedules for lectures and laboratory exercises are developed by an international panel of experts. It is based on current international standards and methodologies. The training materials of IAEA train-the-trainers course "Regional Train-the-Trainers Course on Monitoring Strategies, Procedures, Reporting and Transmission of Data" are used during the Training Course development.

Organizers:	**European Centre of Technological Safety (TESEC), Kyiv, Ukraine** **Atom Komplex Prylad, Kyiv, Ukraine** **Radioenvironmental Scientific Centre, Kyiv, Ukraine** **Thermo Fisher Scientific, Environmental Instruments Division, Radiation Measurement & Security, USA**
Host Country:	Ukraine

Host Institute: European Centre of Technological Safety (TESEC)
www.tesec-int.org

Executive organization RPE Atom Komplex Prylad, Kyiv, Ukraine

Workshop director: Dr. Victor Poyarkov, Director of European Centre of Technological Safety

Workshop executive director: Ms. Galyna Kazymyrova, General Director Deputy, Research and Production Enterprise "Atom Komplex Prylad"
1, st. Murmanska, Kyiv-94, 02660, Ukraine

Workshop dates: **13/06 – 19/06/2010**

Workshop duration: 7 days

Workshop language: English

Workshop location: TESEC training facility in Lutej, Kyiv Region, about 35 km from Kyiv

Field Exercise location: Exclusion Zone of Chornobyl NPP

The nearest international airport Boryspil, Kyiv

WORKSHOP PROGRAM

June 13: Sunday

18^{00} - 19^{00}	Arrival at TESEC Training Centre; Forming team; Appointment of Team Leader; Distribution of identity badges; Accommodation and registration
19^{30} – 20^{30}	Dinner

June 14: Monday		Name of lecturer
08^{15} – 09^{00}	Breakfast	
09^{00} – 09^{30}	Introduction to Course	V. Poyarkov
09^{30} – 09^{40}	Break	
9^{40} – 11^{00}	Module 1, Emergency monitoring overview, Lecture	V. Poyarkov
11^{00} – 11^{15}	Break	
11^{15} – 13^{00}	Module 2, Field radiation and contamination monitoring, Lecture	S. Iievliev
13^{00} – 14^{30}	Lunch	
14^{30} – 15^{30}	Module 3, Field sampling, Lecture	V. Poyarkov
15^{30} – 15^{45}	Break	
15^{45} – 17^{30}	Module 5, Radiation protection of monitoring team	S. Iievliev
17^{30} – 18^{00}	Break	
18^{00} – 18^{30}	**Official Workshop opening**	V. Poyarkov
18^{30} – 20^{30}	Official dinner	G. Kazymyrova
June 15: Tuesday		
08^{15} – 09^{00}	Breakfast	
09^{00} – 10^{30}	Module 5, Spectroscopy – Beta-spectroscopy of native samples	G. Kazymyrova
10^{30} – 10^{45}	Break	
10^{45} – 11^{45}	Module 4 Spectroscopy - Part 1 - Laboratory gamma spectrometry	S. Iievliev
11^{45} – 12^{00}	Break	
12^{00} – 13^{00}	Module 4 Spectroscopy - Part 2 - **in situ** gamma spectrometry	S. Iievliev
13^{00} – 14^{30}	Lunch	
14^{30} – 15^{45}	Module 6, BASIC DATA EVALUATION	S. Iievliev
15^{45} – 16^{00}	Break	

$16^{00} – 18^{00}$	*Session 3:* Laboratory gamma spectrometer calibration i. Demonstration of NaI spectrometers ii. Demonstration of energy and efficiency calibration of spectrometer iii. Demonstration of measurements and spectra evaluation iv. Drill on data reporting	S. Iievliev S. Gryshyn
$18^{00} – 18^{15}$	Break	
$18^{15} – 19^{00}$	*Session 4:* In situ gamma spectrometer calibration v. Demonstration of NaI spectrometers vi. Demonstration of energy and efficiency calibration of spectrometer vii. Demonstration of measurements and spectra evaluation viii. Drill on data reporting	S. Iievliev S. Gryshyn
$19^{00} – 19^{30}$	Break	
$19^{30} – 20^{30}$	Dinner	
June 16: Wednesday		
$08^{15} – 09^{00}$	Breakfast	
$09^{00} – 10^{30}$	*Session 2:*Sampling equipment and techniques i. Demonstration of sampling equipment and techniques ii. Drill on sampling techniques Drill on data reporting	D. Hordynsky
$10^{30} – 10^{45}$	Break	
$10^{45} – 11^{45}$	*Session 1:*Radiation instruments i. Demonstration of survey and contamination monitors ii. Drill with survey and contamination monitors ▪ survey grid deploying (See LogBook , results of 2001) ▪ mapping (GPS&grid) iii. Drill on pre-operational and QC checks Drill on data reporting	D. Hordynsky
$11^{45} – 12^{00}$	Break	
$12^{00} – 13^{00}$	*Continue of Session 1 and 2*	
$13^{00} – 14^{30}$	Lunch	
$14^{30} – 16^{00}$	*Session 5:* Personal and equipment contamination check i. Demonstration of contamination control instruments ii. Demonstration of electronic dosimeter; drill on using it iii. Demonstration of contamination control techniques iv. Drill on personal contamination control techniques v. Drill on equipment and vehicle contamination control techniques vi. Drill on data reporting	D. Hordynsky
$16^{00} – 16^{15}$	Break	
$16^{15} – 17^{15}$	*Special lecture* Chernobyl accident and lessons learned	V. Poyarkov

17^{15} – 19^{00}	*Exercise No.1, 2, 3, 5* *Exercise No.1:* Field and contamination monitoring (task for environmental survey team) Objectives: Exercising the tasks of Environmental Survey Team i. Briefing on personal protective guides during exercise ii. Briefing on Exercise No.1 iii. Collection of equipment using appropriate Equipment Checklists iv. QC checks of equipment v. Ground deposition survey vi. Personal and equipment contamination control vii. Preliminary evaluation of results ***Exercise No.2*:** Sampling (task for sampling team) Objectives: Exercising the tasks of sampling teams i. Briefing on personal protective guides during exercise ii. Briefing on Exercise No.2 iii. Collection of equipment using appropriate Equipment Checklists iv. QC checks of equipment v. Surface contamination survey vi. Soil sampling vii. Pasture sampling viii. Personal and equipment contamination control ***Exercise No.3:*** In-situ gamma spectrometry (task for in-situ gamma spectrometry team) Objectives: Exercising the tasks of In-situ Gamma Spectrometry Team i. Briefing on personal protective guides during exercise ii. Briefing on Exercise No.3 iii. Collecting equipment using appropriate Equipment Checklists iv. QC checks of equipment v. Measurements with NaI detector in-situ spectrometer vi. Personal and equipment contamination control vii. Evaluation of results ***Exercise No.5:*** Personal and equipment contamination check i Briefing on personal protective guides during exercise ii Briefing on Exercise No. 5 iii Personal contamination check iv Equipment and vehicle contamination check Data reporting	D. Hordynsky
19^{00} – 19^{30}	Break	
19^{30} – 20^{30}	Dinner	
June 17, Thursday		
07^{15} – 07^{45}	Breakfast	
07^{45} – 08^{15}	Collection of equipment, QC checks	D. Hordynsky
08^{15} – 10^{00}	Departure and travel to the Exclusion Zone; exercise briefing; changing to personal protective clothing	O. Kazymyrov S. Iievliev
10^{00} – 15^{00}	Exercise 1, 2, 3 in site of Chornobyl Zone	O. Kazymyrov S. Iievliev

15^{00} – 16^{00}	Visit to Sarcophagus and Prypyat, Changing personal protective clothing , Lanch	O. Kazymyrov S. Iievliev
16^{00} – 18^{00}	Return to TESEC Training Centre	
18^{00} – 19^{00}	Exercise 5 Personal and equipment contamination check	D. Hordynsky
June 18, Friday		
08^{15} – 09^{00}	Breakfast	
09^{00} – 11^{00}	*Exercise No.4:* Laboratory measurements (all teams) i. Briefing on Exercise No.4 ii. Sample preparation of collected samples iii. Beta measurements iv. Gamma spectrometry measurements v. Evaluation of results	S. Iievliev S. Gryshyn
11^{00} – 11^{15}	Break	
11^{15} – 13^{15}	Treatment of In-situ spectra	S. Iievliev S. Gryshyn
13^{15} – 14^{30}	Lunch	
14^{30} – 16^{30}	Session 6, Evaluation session (a) Evaluation of dose rate and contamination survey (b) Data Mapping (c) Operational intervention levels and dose assessment (d) Preparation of Team Leader report	V. Poyarkov Team members
16^{30} – 16^{45}	Break	
16^{45} – 19^{00}	Report presentation, discussion, School closing	V. Poyarkov Team members
19^{00} – 19^{30}	Break	
19^{30} – 20^{30}	Dinner	
June 19, Saturday		
08^{15} – 09^{00}	Breakfast	
09-00	Departure	

OBJECTIVES OF THE TRAINING COURSE

To provide the students with the latest guidance on environmental, source, personal and equipment monitoring in case of a nuclear or radiological emergency;

To practice and learn the monitoring procedures under "real" conditions (Chornobyl Exclusion Zone);

To practice teamwork - students will be grouped into teams and they drill and exercise as a team.

PLACE OF MEASUREMENT

The field exercises on radiation monitoring at the area nearby Chornobyl NPP in 30-km Exclusion zone.

RADIATION SAFETY

The risks for teams working within the Exclusion Zone are low yet all the necessary worker protective actions and guides have to be exercised. Estimated effective dose per participant per duration of the workshop will most likely not exceed 100 μSv.

TRAINING COURSE ADMINISTRATION

Forming of teams

Appointment of Team Leaders

Accommodation

OPENING

Opening ceremony

LECTURES

Module M 1: Emergency monitoring overview

Objectives of emergency monitoring
Generic monitoring organization
Emergency monitoring strategy
Small and large scale accidents
Instrumentation
Basic survey methods
Quality assurance and quality control objectives

Module M 2: Field radiation and contamination monitoring

Objectives
Basic methods and techniques:
Plume survey
Ground deposition survey
Environmental dosimetry
Source monitoring
Surface contamination survey
Aerial survey

Module M 3: Field sampling

Sampling objectives and strategy
Sampling methods and techniques:
Air sampling
Soil sampling
Water sampling
Milk sampling
Human food sampling
Pasture sampling
Sediment sampling

Module M 4: Gamma spectrometry

Introduction to gamma spectrometry techniques and equipment
Laboratory gamma spectrometry
Equipment
Energy calibration
Efficiency calibration
Spectrometer QC checks
Sample preparation
Measurement and analysis, uncertainties
In-situ gamma spectrometry
Equipment
Spectrometer calibration for in-situ measurements
Measurement techniques, analysis and uncertainties

Module M 5: Radiation protection of monitoring teams

Radiation protection objectives
Personal protection guides
Personal monitoring:
Personal dosimetry
Thyroid monitoring
Personal contamination monitoring
Simple decontamination techniques

Module M 6: Basic data evaluation

Basic evaluation methods
Field monitoring data evaluation
Radionuclide concentration data evaluation
Mapping
Link to the operational intervention levels

Special lecture

Chernobyl accident and lessons learned

DEMONSTRATIONS AND DRILLS

Session 1: Radiation instruments
Demonstration of survey and contamination monitors
Drill with survey and contamination monitors
Drill on pre-operational and QC checks
Drill on data reporting

Session 2: Sampling equipment and techniques
Demonstration of sampling equipment and techniques
Drill on sampling techniques
Drill on data reporting

Session 3: Laboratory gamma spectrometer calibration
Demonstration of NaI gamma-spectrometers and scintillation beta-spectrometers
Demonstration of energy and efficiency calibration of spectrometer
Demonstration of measurements and spectra evaluation
Drill on data reporting

Session 4: In-Situ gamma spectrometer calibration
Demonstration of NaI spectrometers
Demonstration of energy and efficiency calibration of spectrometer
Demonstration of measurements and spectra evaluation
Drill on data reporting

Session 5: Personal and equipment contamination check
Demonstration of contamination control instruments
Demonstration of electronic dosimeter; drill on using it
Demonstration of contamination control techniques
Drill on personal contamination control techniques
Drill on equipment and vehicle contamination control techniques
Drill on data reporting

Session 6: Evaluation session
Evaluation of dose rate and contamination survey
Data Mapping
Operational intervention levels and dose assessment
Preparation of Team Leader report

FIELD AND LABORATORY EXERCISES

Exercise No.1: Field and contamination monitoring (task for environmental survey team)

Objectives: Exercising the tasks of Environmental Survey Team

- Briefing on personal protective guides during exercise
- Briefing on Exercise No.1
- Collection of equipment using appropriate Equipment Checklists
- QC checks of equipment
- Ground deposition survey
- Personal and equipment contamination control
- Preliminary evaluation of results

Exercise No.2: Sampling (task for sampling team)

Objectives: Exercising the tasks of sampling teams

- Briefing on personal protective guides during exercise
- Briefing on Exercise No.2
- Collection of equipment using appropriate Equipment Checklists
- QC checks of equipment
- Surface contamination survey
- Soil sampling
- Pasture sampling
- Personal and equipment contamination control

Exercise No.3: In-situ gamma spectrometry (task for in-situ gamma spectrometry team)

Objectives: Exercising the tasks of In-situ Gamma Spectrometry Team

- Briefing on personal protective guides during exercise
- Briefing on Exercise No.3
- Collecting equipment using appropriate Equipment Checklists
- QC checks of equipment
- Measurements with NaI detector in-situ spectrometer
- Personal and equipment contamination control
- Evaluation of results

Exercise No.4: Laboratory measurements (all teams)

- Briefing on Exercise No.4
- Sample preparation of collected samples
- Gross alpha/beta measurements
- Gamma spectrometry measurements
- Evaluation of results

Exercise No.5: Personal and equipment contamination check

- Briefing on personal protective guides during exercise
- Briefing on Exercise No. 5
- Personal contamination check
- Equipment and vehicle contamination check
- Data reporting

Adapted generic procedures, worksheets and equipment checklists from IAEA document *Generic procedures for monitoring during a nuclear or radiological emergency* will be used.

DISCUSSIONS

At the end of each exercise results of the measurements are compared and discussed.

VISIT

To Sarcophagus object of Chernobyl NPP and Prypyat' city

LECTURERS

Dr. Victor POYARKOV, European Centre of Technological Safety,
Mr. Sergii IIEVLIEV, AKP Research and Production Enterprise
Mrs. Galyna KAZYMYROVA, AKP Research and Production Enterprise

INSTRUCTORS

Mr. Alexandr KAZYMYROV, AKP Research and Production Enterprise
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LIST OF PARTICIPANTS

Toshikazu Suzuki	Section Chief	National Institute of Radiological Sciences, Japan
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Serge Perrault	Sergeant	Canadian Joint Incident Response Unit
Michael Kinsey	Master Corporal	Canadian Joint Incident Response Unit
Derek Gurman	Corporal	Canadian Joint Incident Response Unit
Chris Nadon	Sergeant	Canadian Joint Incident Response Unit
Sean Kovacic	Corporal	Canadian Joint Incident Response Unit
Sean Brady	Corporal	Canadian Joint Incident Response Unit

❷ UPDATING OF TESEC WEB SITE

European Centre of Technological Safety (TESEC) is an international research and educational organization created in according to the decision of Founders (the Ministry of Ukraine of Emergencies and Affairs of Population Protection from the Consequences of Chernobyl Catastrophe from Ukraine and Open Partial Agreement from Council of Europe, protocol # 1 of 24.05.97).
TESEC acts in according to its Statute, in its activity it is guided by international regulations, decisions of Supreme Soviet of Ukraine, decrees of the President of Ukraine, decisions and orders of Cabinet of Ministers of Ukraine, decisions of Council of Founders of the Centre.
The main research area of TESEC is environment protection, emergency prevention, response and relief.
TESEC has web site linked with main web site of EUR-OPA major Hazard Agreement. It containing information about TESEC activities and annually updating.

❸ PARTICIPATION IN EUR-OPA JOINT PROJECTS AND ACTIVITIES. INVOLVEMENT IN ACTIVITIES OF UKRAINIAN MINISTRY OF EMERGENCY MANAGEMENT.

TESEC received from Ministry of Foreign Affairs of Ukraine letter with request to inform the EUR-OPA Committee of Permanent Correspondents regarding the consequences of an ecological emergency situation in Ivano-Frankivsk region.
According to the Decree of President of Ukraine from February 10, 2010 № 145 "On the announcement of the city of Kalush and villages Kropyvnyk and Sivko-Kalushskaya, Kalush district, Ivano-Frankivsk region a zone of ecological emergency situation", Ministry of Foreign Affairs of Ukraine held talks with different international organizations on that subject. They also expected some good advice and assistance from EUR-OPA.
The main problem that exists in Ivano-Frankivsk region is the elimination of the consequences of industrial production of potash fertilizers in Kalush, which carried out the State Enterprise "potash plant" JSC "Oriana".

Potash fertilizer plant was commissioned in 1967 to develop Kalush-Golinskii deposits of potassium salts and complex processing. Raw material base for the production of potash is potash ore deposit, which developed the open and underground ways, followed by enrichment of sulphate factory.

The composition of the main facilities of the plant potassium include: 3 mines and quarry Dombrowski, 2 dumps of saline soils, tailings and slurry storage 2, which is potentially dangerous and can cause surface subsidence, formation failure, karsts, groundwater pollution and surface water.

Dombrowski mine put into operation in 1967, the first time in world practice, potassium salt developed the open ways. The accumulation of brine in the career made impossible in 2007 to conduct mining operation. Currently, mine actually cast their fate and put it actively collapse of karsts processes. In fact, the process of its flooding is starting. Every year career as a result of dissolution of salt deposits precipitation 1.2 - 1.3 million m^3 of brine are creating.

When developing in open dumps Dombrowski career accumulated 26 million m^3 of pop-rock, of which more than 14 million m^3 is saline clay. In most careers were about 8.7 million m^3 of highly mineralized brines of the total 350 grams per liter. Nearby (at a distance of approximately 200 m) river Sivko, water is charged with depression career, so real is the threat of flooding career in a short period of time. Consequently, the brine will fall in the underground aquifer and the river itself, which would lead to environmental disaster.

Given that the currently existing gaps mine Novo-Golina "may still hold about 1.8 million m^3 brine, whereas 500 thousand m^3 of brine tailing number 2, the actual amount of pumping from the quarry will be 1.3 million m^3 brine. Therefore, to prevent the penetration of brine into aquifers to perform waterproofing career. Tail number 2 was built in 1984. Area 48 ha, the total capacity of 9.7 million m^3. Filled waste: solid phase - 8 million m^3 liquid - 1.7 million m^3. For 2008 cells used for favorites of mine, Novo Golina with tail number 2 done dumping brine in the volume of 530,000 m^3, thereby substantially reduce the brine, as of 01.01.09 it was 327.80 m at an acceptable design required level of 328.0

According to geophysical studies conducted in 2008 around the perimeter of tailing dam number 2 revealed several potential areas from which the future can develop brine penetration beyond tail.

In 1973 in Kalush in the former Kalushske chemical-metallurgical plant (KHMK) was put in place the technological line for production of tetrachloride carbon (CHHV) and perchlorethylene (PHE), whose owner is now Ltd. Ariana-heddle. Manufacturing CHHV / PHE was based on known technology firm Shtauffer (Germany), which included the direct chlorination of industrial carbon materials (mostly methane). In the process of production arising solid waste, which is classified as first class of danger in the amounts of 540 tons per year, containing hexachlorobenzene (HCB) over 90%, emissions of gaseous HCB in the atmosphere will reach 0.12 tons per year.

Design and production documentation CHHV / PHE anticipated two disposal options for HCB as a by-product - a burning and burial. Due to the fact that physical and chemical properties of these wastes do not meet the specifications of combustion process, it has not been developed. Therefore, technological regulations were provided accommodation for HCB solid ground of toxic waste, which is located approximately 5 km from the main production CHHV / PHE, 1.5 kilometers. Upper and 1.35 kilometers north west of the village. Mostysche allocated to the plane plot 5.15 ha. The relief area equal to the slope of the irrelevant, the Sapohiv, which flows at a distance of 50 m from the site. River Sapohiv Kropyvnyk flows in the river, which flows in the river Sivko, Sivko empties into the river Dniester. Basin Sapohiv located on land with meadow vegetation, wetlands. Rica Sivko related to fishery water. Vantage point on the river available.

Ground water ranges from two horizons. First Horizon is located at a depth of 2.8 ... 6.0 m, the thickness of the horizon reaches 1 m. The second horizon located at a depth of 7.8 ... 9.3 m thick horizon of 3.3 -4.2 m. onset of groundwater varies from 0.5 ... 8.5 m.

In fact, fencing is not firing, but has been repaired. Near the entrance to the ground set barrier, built residential building for guards. Health is in the daytime.

Technology of waste disposal was as follows: waste, bagged in steel barrels capacity 200 l, closed at the top layer of clay soil, collected in part on the ground, hard ground of toxic waste. If 1000 tons of waste were placed in the prepared locations in two layers and were covered by insulating layer of soil 1 m thick, closed top plastic sheeting 0.2 mm thick layer of vegetation and soil thickness of 0.2 m .

Last HCB waste disposal in the locations 9, 10 held in August 2000 .

According Passports place solid waste management of toxic wastes issued LLP in 2001 on the site are buried 11,352.5 tons of waste, including:

- 11,087.6 tons of HCB (first class of danger);
- 250.7 tons of solid residues from cleaning equipment (third class of danger);
-14.2 tons of solids from centrifuge (third class of danger).

This information have been reported on the Permanent Correspondent Meeting April 8, 2010. TESEC proposal have been presened to Ministry of Emergency management of Ukraine.

April 26, 2011 marks 25 anniversary of the Chernobyl accident. In many countries nuclear technology is seen as one of the increasingly important solutions for meeting rising energy demands, reducing greenhouse gas emissions, mitigating climate change, counterbalancing fluctuating prices of fossil energy sources. At the same time lessons learned from the Chernobyl accident should be carefully taken into account.

How to use Chernobyl lessons for the safety of nuclear power and other hazardous technologies to protect people and the environment from emergency - this is the main objective of the international conference "Twenty-five Years after Chernobyl Accident. Safety for the Future ", Kiev, April 2011.

The conference will address the following key issues:

- nuclear and radiological risks - cooperation of governments and communities;
- strategy for radioactive waste, spent nuclear fuel management;
- development of prevention and response to nuclear and other man-made disasters, emergency planning, public awareness and involvement population in the emergency planning, post-accident radiation monitoring, modelling of radioactive contamination;
- effects of nuclear and radiological accidents to human health and the environment, the experience of Chernobyl;
- social and economic development of Chernobyl-affected areas: successful models of development, overcoming of stereotypes and enhancing investment attractiveness of regions;
- scientific achievements and new technologies for the safety of the future.

Ministry of Emergency Management of Ukraine is key organizer of conference with participation of TESEC.
TESEC participated in the EUR-OPA project BeSafeNet.