



**KULTURisk**  
 Knowledge-based approach to develop a cULTURE of Risk prevention  
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## Review of the existing EU, National and International policies in the field of risk prevention

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Short abstract	<p>This report will review the existing EU, national and international policies in the field of prevention. The objective is to provide an overview of prevention-related EU policies and legislations, taking into particular account the water related disasters and the Floods Directive targets and transnational issues. As an example, the national and regional legal framework for Italy is presented, as one of the transnational case studies of KULTURisk is shared between Italy and Slovenia. Deliverable 1.5 to be published by the end of 2011, will focus on the policy framework existing in all the case-studies contexts. This review will also take into consideration the key elements in the wider European water policy that may contribute to exposure to natural hazard. Specific aspects concerned with warning systems, risk mapping, land planning, risk transfer, and risk communication are presented in the respective deliverables.</p>		
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## 1 INTRODUCTION

This report will review the existing EU, national and international policies in the field of prevention. The objective is to provide an overview of prevention-related EU policies and legislations, taking into particular account the water related disasters and the Floods Directive targets and transnational issues. As an example, the national and regional legal framework for Italy is presented, as one of the transnational case studies of KULTURisk is shared between Italy and Slovenia. Deliverable 1.5 to be published by the end of 2011, will focus on the policy framework existing in all the case-studies contexts. This review will also take into consideration the key elements in the wider European water policy that may contribute to exposure to natural hazard. Specific aspects concerned with warning systems, risk mapping, land planning, risk transfer, and risk communication are presented in the respective deliverables.

## 2 THE CONCEPT OF PREVENTION

In order to give a comprehensive framework of the international and European policies and legislation on prevention for water-related hazards, it is essential to define which area of intervention should be considered as prevention.

The United Nations International Strategy for Disaster Reduction (UNISDR) is a strategic framework, adopted by United Nations Member States in 2000, aiming to guide and coordinate the efforts of a wide range of partners to achieve substantive reduction in disaster losses and build resilient nations and communities as an essential condition for sustainable development. At international level it is the most influential voice regarding disaster risk reduction, as its aim is to put together all the national governments of the United Nations and share a common vision and strategy for reducing disaster losses.

The UNISDR adopted a specific terminology on disaster reduction (UNISDR, 2009), which is updated periodically. It contains basic definitions in order to promote a common understanding on the subject. As we will see, the same expressions are used slightly differently in European and national documents, because either they were adopted before 2000 (when the UNISDR started) or they modified the definitions of the UNISDR to give them a more in-depth and coherent meaning referring to the European and national contexts. By the way the terms of the UNISDR terminology are defined by a single sentence and are expressly basic definitions in order to permit the adaptation to different contexts.

The term “risk prevention” could be considered not very accurate since risks cannot be prevented but only reduced. Most accepted terms are “risk reduction and management”: risk reduction, as the policy objective, and risk management, as the set of tools and mechanisms to achieve such objective, which encompasses 3 types of actions aiming at avoiding (prevention) or limiting (mitigation and preparedness) the negative impacts of natural hazards. However in many European and national documents, the term risk prevention is commonly used referring either to risk reduction or risk management.

Prevention is generally considered as a phase of the disaster risk management cycle. On the other hand, the emergency management encompasses also the post-disaster phases of response and recovery, which are not on the purpose of this review.

Upon these definitions the international strategy for disaster reduction has been built, and in particular the Hyogo Framework for Action (HFA) for building the resilience on nations and communities to disasters (UNISDR, 2007).

#### **DISASTER RISK MANAGEMENT PHASES in the UNISDR 2009 TERMINOLOGY**

- **Prevention:** The outright avoidance of adverse impacts of hazards and related disasters.

Comment: Prevention (i.e. disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts through action taken in advance. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high risk zones, and seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake. Very often the complete avoidance of losses is not feasible and the task transforms to that of mitigation. Partly for this reason, the terms prevention and mitigation are sometimes used interchangeably in casual use.

- **Mitigation:** The lessening or limitation of the adverse impacts of hazards and related disasters.

Comment: The adverse impacts of hazards often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures encompass engineering techniques and hazard-resistant construction as well as improved environmental policies and public awareness. It should be noted that in climate change policy, "mitigation" is defined differently, being the term used for the reduction of greenhouse gas emissions that are the source of climate change.

- **Preparedness:** The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Comment: Preparedness action is carried out within the context of disaster risk management and aims to build the capacities needed to efficiently manage all types of emergencies and achieve orderly transitions from response through to sustained recovery. Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems, and includes such activities as contingency planning, stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation and public information, and associated training and field exercises. These must be supported by formal institutional, legal and budgetary capacities. The related term "readiness" describes the ability to quickly and appropriately respond when required.

Source: UNISDR, 2009

In the European perspective the risk management cycle has been defined in the communication of the European Commission concerning flood risk management (COM(2004) 472 final). This communication constitutes the basis upon which the Floods Directive (Directive 2007/60/EC), was built. As in the UNISDR definition, the risk management aims at both avoiding/minimizing impacts

and reducing the probability of hazards. The European Commission states that the most effective approach in flood risk management is through the development of flood risk management programmes which encompass both pre- and post-disaster phases, classified as: Prevention, Protection, Preparedness, Emergency Response, Recover and lessons learnt. The Floods Directive states that “flood risk management plans should focus on prevention, protection and preparedness”.

#### **PREVENTION, PROTECTION AND PREPAREDNESS in European Flood Risk Management**

- Prevention: preventing damage caused by floods by avoiding construction of houses and industries in present and future flood-prone areas; by adapting future developments to the risk of flooding; and by promoting appropriate land-use, agricultural and forestry practices;
- Protection: taking measures, both structural and non-structural, to reduce the likelihood of floods and/or the impact of floods in a specific location;
- Preparedness: informing the population about flood risks and what to do in the event of a flood;

Source: (COM(2004) 472 final)

While the UNISDR separates mitigation from prevention, at European level the two concepts are included under the same umbrella of prevention. In line with the 2004 Communication, the Prevention Communication (COM(2009) 82 final) considers prevention as “where possible preventing disasters from happening, and where they are unavoidable taking steps to minimize their impacts”. On the other hand, in the UNISDR terminology the protection concept is not explicitly defined. However, structural and non-structural measures of protection – as defined by the UNISDR - are intended to reduce or avoid possible impacts of hazards and to reduce the likelihood of disasters. In this sense, protection can also be included within the concept of prevention.

In this context we will consider only prevention in its extended meaning given by the Prevention Communication, including also mitigation and protection concepts. A separate set of actions (or policies and measures) relate to response (emergency management) and recovery are not the purpose of our project.

Preparedness will be also taken into consideration, even if its border between prevention and response activities is very blurred (in the UNISDR terminology it is included both in disaster risk management and emergency management definitions). However, preparedness measures such as the establishment of early warning systems, public information, risk communication, and similar measures aimed to enhance preparedness should be considered as mitigation measures since they help lessening the effects of an hypothetical hazard, without reducing its likelihood.

### **3 THE INTERNATIONAL APPROACH ON PREVENTION**

The Hyogo Framework for Action (HFA) was adopted by 168 governments at the World Conference for Disaster Reduction in Kobe, Japan in January 2005 and represents the main international commitment to reduce vulnerabilities to natural hazards. The Kobe conference was organized to take stock of progress made on disaster risk reduction since the Yokohama conference of 1994. With their signatures to the HFA, the governments committed themselves towards a “substantial

reduction of disaster losses in lives and in the social, economic and environmental assets” by 2015 (UNISDR 2007).

The HFA identifies five priorities for action. For each priority a set of key activities are listed which should be implemented by policy makers at all levels, ensuring the involvement of the stakeholders and the cooperation between institutions.

**1. Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation.**

The HFA strategy claims for a better integration of disaster risk reduction considerations into national institutional and legislative frameworks. It also advocates the creation of national platforms, which should be multi-sectorial and multi-disciplinary, and the decentralization of responsibilities and resources to relevant sub-national or local authorities. Human and financial resources should be assessed, developed and allocated in such a way as they ensure the development and implementation of disaster risk reduction policies and programmes at all levels. The community participation shall be also ensured.

**2. Identify, assess and monitor disaster risks and enhance early warning**

National and local risks should be assessed, through the development and the updating at all levels of risk maps, indicators of disaster risk and vulnerability, statistical information.

Early warning systems should be developed and ameliorate to be timely and understandable, taking into consideration the characteristics of the target audience. They should be based on adequate information systems and well integrated into the emergency management systems.

HFA calls for support and development of those infrastructures, databases and capacities needed to monitor and forecast hazards and vulnerabilities, promoting a full and open exchange of data and the improvement of scientific and technical capacities through research and capacity building activities.

Identification, assessment and monitoring should be applied also to trans-boundary hazards, by enforcing cooperation and exchange of information regionally and internationally (e.g. arrangements relating to the management of river basins).

**3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels**

HFA calls for progress in information management and exchange, education and training activities, in research and in public awareness.

New technologies and mechanisms are to be adopted in order to improve the sharing of information among scientific communities, practitioners, experts, managers, planners and the public. These instruments include ICT, space-based technologies, directories and inventories, as well as the promotion of networks and cooperation between actors.

The culture of disaster prevention and resilience shall be promoted through specific programmes and activities in schools, training courses targeted at specific sectors, community-based training activities.

Progresses in research should be boosted in fields like multi-risk assessment, cost-benefit analysis and vulnerability assessment models.

#### **4. Reduce the underlying risk factors**

In order to reduce risk factors, progresses on environmental and natural resource management are required, through structural and non-structural measures, better land-use planning (urban and rural planning, planning procedures for infrastructure projects) and other technical measures (e.g. building codes) in which disaster risk assessment should be incorporated. Disaster risk considerations should also be included in social and economic development practices.

#### **5. Strengthen disaster preparedness for effective response at all levels**

To achieve this priority it is called for a better coordination between early warning systems, response activities, communication systems among authorities and institutions also trans-boundary. Preparation, reviewing and updating of disaster preparedness and contingency plans and policy at all levels are necessary.

The implementation of and follow-up to the priorities for action outlined in the HFA, require strong commitments and cooperation among States, international and regional organizations as well as stakeholders involvement (Civil Society Organizations, scientific community, private sector).

For this purpose the UNISDR promotes actions, instruments and campaigns to be adopted at different levels.

At local level an important instruments supporting local governments in the HFA implementation is the Making Cities Resilient campaign. Cities which have joined the campaign (more than 700 in May 2011) committed themselves to a checklist of ten essential for making cities resilient, which includes –among others – assigning appropriate resources, investing in structural measures, maintaining up-to-date risk assessments, enhancing early warning systems. The checklist derives directly from the HFA priorities and the commitment to achieve the ten points will help cities to become more resilient. The campaign was launched in 2010 and will last until 2015.

At national level the establishment of national platform is strongly recommended (HFA, priority 1). National platforms consist in multi-stakeholder forums or committees which aim at advocating of Disaster Risk Reduction (DRR) at different levels and at providing coordination, analysis and advice in areas requiring concerted actions through coordinated and participatory processes. Up to now, several National Platforms have been established. In Europe 16 National Platforms were officially nominated by the UNISDR European Region, and 14 of those have submitted a national report on HFA (UNISDR Europe, 2011a). Some Regional Platforms have also been established to enhance inter-governmental collaboration for the implementation of disaster risk reduction activities, together with an exponential increasing in collaborative efforts and joint initiatives.

The HFA strategy has also led to a raise of political momentum at international level and to the development of tools supporting HFA implementation (e.g. the Global Facility for DRR at the World

Bank). The world's foremost forum on disaster risk reduction is the Global Platform for DRR, established in 2007 as a biennial forum and managed by the UNISDR. It involves representatives of Governments, UN agencies, regional organizations, and it aims to provide support to countries to implement the guidelines drawn up in Hyogo. The work of the platform are divided by subject areas, such as climate change, urban risk, the early warning and it is an important momentum to pool all the experiences and to share knowledge and information. The Third Global Platform, held in Geneva from 8 to 13 May 2011, tackled the overall theme of “invest today for a safer tomorrow: increased investment in local action”. Three main topics were discussed: recovering and reducing risk after disasters, understanding the economics of disaster risk reduction, strengthening alliances for climate change adaptation and development.

Reviews on progress towards HFA priorities are prepared periodically. An important milestone in the reviewing process is the mid-term review 2010-2011, launched in Rome the ninth of March 2011 (UNISDR, 2011b). It gives an overview of national, regional and international progress; it points out some strategic areas requiring further attention and provides suggestions for accelerating the implementation of the HFA strategy. The mid-term review of the HFA demonstrates that at national level several countries enacted risk management legislations, modelled on the HFA structure and principles and appreciates the increasing of national platforms using a multi-stakeholder approach. The mid-term review claims for further attention at local level for the implementation of HFA strategy, through a more efficient decentralization and multi-stakeholder consultative mechanisms.

Other initiatives on disaster risk reduction are carried out by different agencies of the United Nations. The UN-Development Programme has linked the Millennium Development Goals strategy with disaster risk, publishing a Global Report titled “reducing disaster risk: a challenge for development” (UNDP, 2004). The main assumption is that disasters put development at risk and that, on the other hand, development paths can generate new risks. For this reason development planning policies and disaster risk reduction strategies are closely interrelated and the latter should be incorporate in the former. The UNDP, thus, has been developing a “Disaster Risk Index (DRI)” in order to improve understanding of the relationship between development and disaster risk.

Another example of a international initiative related to disaster risk reduction is carried out by the UNESCO and refers in particular to the protection of world cultural heritage sites by improving disaster preparedness and mitigation (ICCROM, 1998) and in actions aiming at improving resilience through knowledge, education, information and public awareness (UNESCO, 2007).

All the initiatives related to the implementation of the HFA and managed by the UN agencies and other intergovernmental and non-governmental organizations should be interlinked, avoid duplications and benefit from mutual learning.

For what concerns water-related disasters, it is worth mentioning here the UNESCO's International Hydrological Programme (IHP). IHP is an intergovernmental scientific co-operative programme in water resources through which Member States can upgrade their knowledge of the water cycle and thereby increase their capacity to better manage and develop their water resources. IHP aims at the improvement of the scientific and technological basis for the development of methods for the rational management of water resources, including the protection of the environment. One of the focal areas of the current phase of IHP (VII;2008-2013) is about hydro-hazards, hydrological

extremes and water-related disasters. IHP indicates that extreme hydrological events should be considered as part of integrated water resources management at the catchment scale. Lastly, in January 2005 at the World Conference on Disaster Reduction in Kobe, the United Nations Education, Scientific and Cultural Organization (UNESCO) and the World Meteorological Organization (WMO), building on past cooperative successes, have launched the International Flood Initiative (IFI) to address existing management gaps through a holistic approach and to provide a platform for further collaborative efforts. The initiative will work in close cooperation with the United Nations University (UNU), the International Strategy for Disaster Reduction (ISDR), the International Association of Hydrological Sciences (IAHS) and the International Association for Hydro-Environment Engineering and Research (IAHR). The IFI secretariat is located in the International Centre for Water Hazard and Risk Management (ICHARM) in Tsukuba, Japan. UN agencies working on other aspects of flood management will also be invited to contribute to the initiative. The overall aim of IFI is to build capacity in countries to understand and better respond to floods by taking advantage of their benefits while at the same time minimizing their social, economic and environmental risks. IFI focuses on research, information networking, education and training, empowering communities and providing technical assistance and guidance ([www.ifi-home.info](http://www.ifi-home.info)).

## 4 THE COMMUNITY APPROACH ON PREVENTION

### 4.1 TOWARDS A COMMUNITY STRATEGY ON PREVENTION

The 2008 Commission Communication on reinforcing the Union's disaster response capacity (COM(2008) 130 final) argued that the EU should embark on an integrated approach to disasters. The European approach on risk prevention shows a lack of comprehensive approach. Several European policies areas are related to specific risks, e.g. the water policy has to deal with floods, nature and biodiversity policy with forest fires, while industry policy with chemical accidents, the protection of critical infrastructures with a variety of natural disasters, and so forth. Other European services and instruments contribute to risk management within the research and innovation policy, the regional development policy, the climate change action. Legislative provisions has been taken in relation to flood risk (directive 2007/60/EC, Floods Directive), technological disasters (directive 96/82/EC, Seveso II) and **the protection of European Critical Infrastructures** (Directive 2008/114/EC).

In order to give a comprehensive framework to these initiatives, a discussion about a common European strategy for disaster prevention has been initiated in 2009 with the EC Prevention Communication (COM(2009) 82 final). The objective of this communication is to identify measures which could be included in a community strategy for the prevention of natural and man-made disasters, building upon and linking existing measures. The need for a comprehensive approach on prevention arises from the acknowledge that a common approach in some areas is more effective than separate national approaches and that it can complement national actions aimed at the prevention of disasters.

The Prevention Communication proposes to focus actions at EU-level on three areas:

- Developing knowledge-based prevention policies: actions in this field should be aimed at pooling knowledge, by creating an inventory of information on disasters, spreading best practices, developing guidelines on hazard/risk mapping and encouraging research activities.
- Linking actors and policies throughout the disaster management cycle: this objective shall be achieved through the establishment of a programme of “lessons learnt”, training and awareness-raising activities, mechanisms that links actors involved in disaster prevention and actors active in different phases of disaster management, initiatives aimed at reinforcing early warning tools.
- Improving the effectiveness of existing financial and legislative instruments: this objective shall be achieved through a more efficient targeting of Community funding and by taking account of disaster prevention in existing Community legislation.

The communication does not propose new policies or legislations; it calls for actions that should be built on measures that have already been taken.

Following the 2009 Prevention Communication, the Council of the European Union adopted in November 2010 a conclusion on a community framework on disaster prevention within the EU (Council of EU, 2009) where it recognizes the 2009 prevention communication as an initial step towards a comprehensive and consistent community disaster prevention framework or strategy contributing to an integrated approach to the EU disaster management policy (conclusion 21). It underlines the usefulness of a multi-hazard approach to be complemented with hazard-specific measures, and the need to further developing knowledge-based disaster prevention policies (conclusions 22 and 26). It also emphasizes that hazard and risk identification and analysis, impact analysis, risk assessments and matrices, scenario development, risk management measures, and regular reviews are major components of the Community disaster prevention framework (conclusion 28). It calls on the Commission to develop a community guideline on risk mapping, assessments and analysis by 2010, to develop guidelines on minimum standards for hazard-specific disaster prevention by 2012 and to prepare a cross-sectorial overview of the major natural and man-made risk that the Community may face in the future by 2012. Member States are also invited, before the end of 2011, to make available to the Commission information on risks of relevance and to develop national approaches and procedure to risk management including risk analyses. The Council Conclusion makes references to the Hyogo Strategy for Action, to the European White Paper on adaptation to Climate Change (COM(2009) 147 final), and to the legislation concerning the European civil protection service and research funding, in order to ensure a strategic prevention approach linked with international and European existing initiatives.

In 2010 a Commission Staff Working Paper (SEC(2010) 1626 final) on risk assessment and mapping guidelines for disaster management was approved on the basis of the Council conclusions. The guidelines have been built on experience of national risk assessments and mapping by taking full account of existing EU legislation and research findings, and they aim at improving coherence, comparability and consistency on processes and methods among Member States.

## 4.2 EXISTING EUROPEAN POLICIES

### 4.2.1 REGIONAL POLICY

The purpose of EU regional policy is to reduce the significant economic, social and territorial disparities that still exist between Europe's regions.

Reducing disparities requires a cohesion policy promoting constant improvements in competitiveness and employment. The cohesion policy is carried out by the Directorate General for Regional Policy by co-financing infrastructure projects, developing the information society, accelerating the transfer of know-how, supporting investments in people and stimulating cross-border cooperation. The Directorate General manages three major Funds: the European Regional Development Fund (ERDF), the European Social Fund, and the Cohesion Fund.

The regional policy for the period 2007-2013 (Council Regulation 1083/2006) focuses on three objectives: convergence, regional competitiveness and employment, and European territorial cooperation. In the last Cohesion Programme the theme "environment and risk prevention" has been included in all the three objectives of the cohesion policy, and it is supported especially through the mean of the ERDF. ERDF is an instrument intended to help redress the main regional imbalances in the Community and it covers programmes involving general infrastructure, innovation, and investments. In the ERDF regulation for the period 2007-2013 (Regulation (EC) No 1080/2006) risk prevention theme is present in the following priorities:

- In regions covered by the convergence objective, ERDF focuses its intervention on modernising and diversifying economic structures as well as safeguarding or creating sustainable jobs, with action in several areas, including risk prevention.
- Within the regional competitiveness and employment objective, regional actions in environment and risk prevention represent one of the main priorities. Among the specific actions that can be funded, there is the development of plans and measures to prevent and cope with natural and technological risks.
- Under the European territorial cooperation objective, the ERDF focuses its assistance in the development of cross-border activities encouraging also the joint prevention of natural and technological risks. In particular it supports the establishment and development of transnational cooperation between maritime regions, financing networks and activities concentrating, among the others, in the environment area, including fire, drought and flood prevention and the promotion of maritime security and protection against natural and technological risks

The Cohesion Fund (Council Regulation 1084/2006) is aimed at Member States whose Gross National Income (GNI) per inhabitant is less than 90% of the Community average. It serves to reduce their economic and social shortfall, as well as to stabilize their economy. It supports actions in the framework of the convergence objective and covers environmental and transport infrastructure projects.

The European regional policy recognizes the necessity to adopt prevention measures, considering them as an instrument that could allow overcoming the regional imbalances within the community. Each region covered by the cohesion or development funds can propose the most suitable project to cope with local needs aimed at preventing disaster risk and protecting people and assets from their

impacts. The regional policy can finance both structural measures, cooperation activities among regions, and non-structural measures.

Some €50 billion has been allocated to environmental protection of which almost €6 billion for risk prevention over the 2007-2013 period under the ERDF and the Cohesion Fund (European Union, 2010)

Two macro-projects have been financed under the Cohesion Fund in the prevention of water-related risks for the construction of flood-control systems in Hungary (Tisza Valley) while other projects concerning flood risk prevention have been funded under the ERDF (e.g. *Turning back the tide in flood-threatened regions, natural risk prevention in the county of la Garrotxa, Prevention of flash floods in Torredembarra*).

Furthermore, the European Union created the European Union Solidarity Fund (EUSF) after the large-scale flooding occurred in the Central Europe in 2002. The purpose of the EUSF is “to enable the Community to respond in a rapid, efficient and flexible manner to emergency situations”. (Council Regulation 2012/2002). The EUSF intervenes mainly in cases of major disasters that cause damages above €3 billion (in 2002 prices) or more than 0.6% of the affected country's Gross National Income. It can address also disasters that do not meet these criteria if they have an impact on living conditions and the economic stability of a given region, involving the majority of its population, with serious and lasting repercussions on living conditions and the economic stability of the region. The EUSF complements the efforts of the States for the following essential emergency operations:

- a) immediate restoration to working order of infrastructure and plant in the fields of energy, water and waste water, telecommunications, transport, health and education;
- b) providing temporary accommodation and funding rescue services to meet the immediate needs of the population concerned;
- c) immediate securing of preventive infrastructures and measures of immediate protection of the cultural heritage;
- d) immediate cleaning up of disaster-stricken areas, including natural zones.

Between the creation of the EUSF in 2002 and the end of 2010, 42 applications were approved with financial aid totalling more than EUR 2,4 billion (COM(2011) 613 final).

#### **4.2.2 RESEARCH AND INNOVATION POLICY**

Research and development (R&D) contributes at creating the conditions for the development of knowledge based disaster prevention policies. Research activities help to better understand risks and to develop new technology and models to cope with them.

The EU has supported multi-national and interdisciplinary research in the field of natural hazards since the late 1980s addressing mainly climate- and geological-related hazards such as floods, landslides, avalanches, forest fires, earthquakes and volcanic eruptions. EU research has enabled methods and technologies to be developed for improved hazard assessment, forecasting and monitoring, management and mitigation.

##### **The Framework Programmes**

Among the instruments adopted by the European Union within the research and innovation policy the framework programmes have probably been the most concrete.

The Sixth Framework Programme (FP6, 2003–2006) focused on a holistic approach in which hazard-vulnerability-risk assessment were addressed in an integrated manner with the aim of mitigating the environmental, social and economic effects of natural disasters. Where relevant, in particular for floods, research took into account policy developments (Water Framework Directive, Floods Directive) as well as the overall climate variability and potential impacts in the development of new management concepts.

**LIST OF NATURAL HAZARDS PROJECTS FINANCED UNDER THE SIXTH FRAMEWORK PROGRAMME**

3HAZ CORINTH – Earthquakes, tsunamis and landslides in the Corinth rift, Greece: A multi disciplinary approach for measuring, modelling, and predicting their triggering mode and their effects

ARMONIA – Applied multi Risk Mapping of Natural Hazards for Impact Assessment

ERA-NET CRUE - a European Research Area Network aiming to consolidate existing European flood research programs and projects, promote best practice and identify gaps and opportunities for collaboration

EU-MEDIN COMPANIONS - Supporting publications on Natural Hazards Research

FIRE PARADOX and FIRE PARADOX TTC - An Innovative approach of Integrated Wildland Fire Management Regulating the Wildfire Problem by the Wise Use of Fire: Solving the Fire Paradox and Extension

FLASH - Observations, analysis and modelling of lightning activity in thunderstorms, for use in short term forecasting of flash floods

FLOODSITE - Integrated Flood Risk Analysis and Management Methodologies

FORESIGHT - Frequent Observation-driven Realistic Evaluation and Simulation of Interaction of Geophysical Hazard Triggers

GALAHAD - Advanced Remote Monitoring Techniques for Glaciers, Avalanches and Landslides Hazard Mitigation

HYDRATE - Hydrometeorological data resources and technologies for effective flash flood forecasting

IRASMOS - Integral Risk Management of Extremely Rapid Mass Movements

LESSLOSS - Risk Mitigation for Earthquakes and Landslides

MEDIGRID - Mediterranean Grid of Multi-Risk Data and Models

NA.R.AS - Natural risks assessment harmonisation of procedures, quantification and information

NEAREST - Integrated Observations from Near Shore Sources of Tsunamis: Towards an Early Warning System

NOVAC and NOVAC TTC - Network for Observation of Volcanic and Atmospheric Change and Extension

SAFER - Seismic Early warning for Europe

SCENARIO - Support on Common European Strategy for sustainable natural and induced technological hazards mitigation

SEAHELLARC - Seismic and Tsunami risk Assessment and mitigation scenarios in the western Hellenic Arc

TRANSFER - Tsunami Risk and Strategies for the European Region

VOLUME and VOLUME TTC - Volcanoes: Understanding sub-surface mass movement and Extension

Under the FP7 Cooperation Programme (FP7, 2007-2013), research activities regarding risk prevention are funded under the theme "environment (including climate change)". However, relevant findings can be obtained also in other fields, such as the space research. FP7 natural hazards research considers a robust and comprehensive framework that supports individual hazards and multi-hazards research and the integration of the risk-reduction chain. This includes: research on individual hazards, on exposure and vulnerability assessment and on a thorough risk-analysis assessment. Particular attention is also given to the multi-risk dimension. This approach is necessary for risk management as well as for developing prevention and mitigation strategies.

Four priorities areas have been identified and represent the reference basis in the yearly calls: hazard assessment, triggering factors and forecasting, vulnerability assessment and societal impacts, risk assessment and management, multi-risk evaluation and mitigation strategies. Up to the 2010 work programme, more than €50 million have been allocated on collaborative and coordinating projects dealing with risk prevention.

**LIST OF NATURAL HAZARDS PROJECTS FINANCED UNDER THE SEVENTH FRAMEWORK PROGRAMME**

CapHaz-Net - Social capacity building for natural hazards: Toward more resilient societies (€910,000)  
ConHaz – Costs of Natural Hazards (€899,487)  
CORFU – Collaborative research on flood resilience in urban areas (€3.49 million)  
DEWFORA - Improved Drought Early Warning and FORecasting to strengthen preparedness and adaptation to droughts in Africa (€3.49 million)  
ENSURE – enhancing resilience of communities and territories facing natural and na-tech hazards (€1.39 million)  
FUME – Forest fires under climate, social and economic changes in Europe, the Mediterranean and other fire-affected areas of the world (€6.18 million)  
IMPRINTS – Improving Preparedness and Risk Management for Flash Floods and debris flow events (€3.28 million)  
KULTURISK - Knowledge-based approach to develop a cULTUre of Risk prevention (€3.23 million)  
MATRIX - New Multi-HAZard and MuTi-RisK Assessment MethodS for Europe (€3.4 million)  
MIAVITA – Mitigate and Assess risk from Volcanic Impact on Terrain and human Activities (€3.5 million)  
MICORE – Morphological Impacts and Coastal Risks induced by Extreme storm events (€3.5 million)  
MOVE – Methods for the Improvement of Vulnerability Assessment in Europe (€2.08 million)  
SAVELAND – Living with landslide risk in Europe: Assessment, effects of global change and risk management strategies (€6.61 million)  
SHARE – Seismic Hazard Harmonization in Europe (€3.2 million)  
SMARTTEST - Smart resilience technology, systems and tools (€3.49 million)  
SYNER-G – Systemic Seismic Vulnerability and Risk Analysis for Building, Lifeline Networks and Infrastructures Safety Gain (€3.5 million)  
XEROCHORE – An Exercise to Assess Research Needs and Policy Choices in Areas of Drought (€1.5 million)

**The activities of the Joint Research Centre**

The European Commission's Joint Research Centre (JRC) is a department (Directorate-General, DG) of the European Commission providing independent scientific and technological support for EU policy-making. It works closely on the development of EU legislation with the relevant Commission services, such as the Agricultural, Enterprise, Environment, and Health and Consumer Protection DGs. The JRC is since many years active in all areas related to risk prevention of natural hazards, such as hazard and consequence analysis, risk assessment, coping measures and education. It furthermore acts as a knowledge exchange platform and intends to harmonize the large variety of information and research for an improved coordination and cooperation amongst member and non-member states of the EU before, during and after the occurrence of natural hazards. The most prominent examples of these activities include the European Forest Fire Information System (EFFIS), the European Flood Alert System (EFAS) described in the Deliverable 2.1, the Tsunami alert system, the Global Disaster Alert and Coordination System (GDACS), the support provided to DG

Development of the European Commission, the UNCCD and FAO with respect to research in droughts and desertification as well as the harmonization of seismic hazard maps in Europe.

### 4.2.3 ENVIRONMENTAL POLICY

The Sixth Environment Action Programme (Decision No 1600/2002/EC) sets out four priorities which are the objectives of the environmental policy for the period 2002-2012. These are: climate change, nature and biodiversity, environment and health, and natural resources and wastes.

These objectives are to be pursued by new community legislation, amendment of existing legislation, encouraging and effective implementation by member states, integrating environmental protection issues in other EU policy areas and other measures to be taken at EU level.

The risk prevention is a cross-cutting topic, which can be found more or less explicitly in each priority set out on the Environment Action Programme, in particular in climate change.

Climate change is directly involved in the increasing of extreme weather events and in the sea level rising, causing more frequent and more intense extreme events like floods. The priority for the European policy is, thus, bi-directional: combating climate change (through the European strategy on climate change and the commitment to the Kyoto protocol) and developing a strategy for adapting to the impacts of climate change (COM(2009) 147, the "white paper"), such as the preparation of regional adaptation measures for flood prevention.

The European strategy for reducing climate change and the commitment to the Kyoto protocol, in some sense, helps the prevention of natural disaster risks, even if they are not explicitly committed to this purpose.

The adaptation strategy, which is explained in the White Paper, is also related to the disaster risk prevention. Some regions are more vulnerable than the other to the consequences of climate change. For this reason most of the measures shall be adopted at regional or national level, however such measures should be supported and strengthened by a coordinated and integrated approach at European level.

The White Paper launches the need of increasing the resilience to climate change of the sectors who are more affected (such as health, property, and the productive functions of the land). The White Paper proposes a phased approach: the first phase (2009-2012) will lay the ground work for preparing a comprehensive EU adaptation strategy to be implemented in the second phase, commencing in 2013.

The European framework for the adaptation to climate change, claims for improved non-structural measures such as methods, models, data sets and prediction tools for forecasting climate impacts and assessing vulnerabilities, including cost-benefit analysis of adaptation measures. It also calls for mainstreaming adaptation needs into EU policies: for each policy area specific efforts should be done to improve understanding of the impact of climate change, assess appropriate responses and secure the necessary funding.

The European Commission has established in 2010 a specific Directorate General for Climate Action (DG CLIMA), separating the climate change topic from the DG Environment. The policies of the DG

CLIMA intend to ensure that the climate dimension is appropriately present in all community policies and that adaptation measures will reduce the European Union's vulnerability to the impacts of climate change.

In some of the topics which refer to the environmental policy area of the European Commission, prevention measures are considered referring to the specific risks each topic is facing:

- Soil: the Thematic Strategy for Soil Protection (COM(2006)231 final) explains why further action is needed to ensure a high level of soil protection, and it defines what kind of measures must be taken. The European Commission in 2006 proposed a "Soil Directive" to be adopted by the European Parliament and Council setting out common principles for protecting soils across the EU (COM(2006) 232 final). The proposed soil directive would include the identification of risk areas by member states on the basis of common elements (particularly landslides and floods), the settlement of risk reduction targets and the establishment of programmes and measures of risk reduction to achieve them. Within this common framework, the EU Member States will be in a position to decide how best to protect soil and how use it in a sustainable way on their own territory.
- Forests: the European Commission recognizes the need for a more coherent approach to preventing the risk of forest fires. For the period 1992-2002 the Council Regulation 2158/92 provided the legal framework for specific measures devoted to forest fire prevention. From 2003 until 2006 the Regulation 2152/2003 establishing the "Forest Focus" scheme, supported the implementation of forest fire prevention measures in Member States. Thanks to the Forest Focus scheme and to the expert group of forest fires established in 2008 by the Commission, the European Forest Fire Information System (EFFIS) was created and its activities are continuing under the joint management of the Commission joint Research Centre and the DG Environment. A March 2008 Commission Communication (COM(2008) 130 final) on reinforcing the Union's capacity to respond to disasters looks into the challenge of dealing with disaster prevention, mitigation and response. It covers the work of EFFIS in this area and includes an annex on forest fires, which studies how best to synchronise prevention, preparedness, response and recovery activities to be ready to deal with disasters of magnitude equal to the forest fires that struck Europe in the summer of 2007.
- Industry: in 1996 the Council Directive 96/82/EC, so-called Seveso II was adopted to prevent and control chemical accidents. The Seveso II Directive applies to some thousands of industrial establishments where dangerous substances are present in quantities exceeding the thresholds in the directive. The aim of this legislation framework is two-fold. Firstly, the directive aims at the prevention of major-accident hazards involving dangerous substances. Secondly, as accidents do continue to occur, the directive aims at the limitation of the consequences of such accidents not only for man (safety and health aspects) but also for the environment (environmental aspect). Both aims should be followed with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.
- Water (see chapter 5)

#### **4.2.4 EUROPEAN CIVIL PROTECTION**

There are two main pieces of legislation that cover European civil protection, these being Council Decision establishing a community Civil Protection mechanism (2007/779/EC, Euratom), and Council Decision establishing a Civil Protection financial instrument (2007/162/EC, Euratom).

The Community Civil Protection mechanism and the civil protection financial instrument together cover three of the main aspects of the disaster management cycle – prevention, preparedness and response.

##### **The Civil Protection Mechanism**

The establishment of the civil protection mechanism is intended to facilitate reinforced cooperation between the Community and Member States in civil protection assistance intervention in the event of major emergencies (article 1), and therefore, it is focused on response and preparedness fields. It is based upon the principle of solidarity between Member States (by complementing the response capability of the affected country) and between the Community and third countries (by intervening also in emergencies occurring outside the Community). The response capability is based on the civil protection modules, which consist in the resources of Member States for assistance intervention which are mobilized in case of emergency in interoperability. In the preparedness field, the Community is engaged in the management of the Monitoring and Information Centre (MIC) and of the Common Emergency and Information System (CECIS) (Article 5).

The MIC is the operational instrument of the Mechanism. It gives countries 24h/7days access to the Community Civil Protection platform where it is possible to exchange requests and offers of assistance and to share among participating countries information about the available resources for intervention. Through the MIC early warning alarms and updates on ongoing emergencies are disseminated.

The CECIS is a web-based alert and notification application aimed at facilitating communication and sharing of information between the MIC and the contact points of the Member States.

The Community contributes to the development of detection and early warning systems and promotes their linkage to the MIC and the CECIS. It is also in charge for the development of a training programme and for mobilizing and dispatching expert teams responsible for assessing the needs of States requiring assistance and for facilitating coordination of assistance operations on site (article 5).

Concerning Member States, in the framework of the Civil Protection mechanisms for preparedness activities, they shall identify intervention, assessment and coordination teams, develop modules on a voluntary basis, and provide relevant general information on the teams, experts, modules and other intervention support and (facultative) information about relevant military assets. Finally they shall designate the contact points (article 4).

##### **The Civil Protection Financial Instrument**

The CP financial instrument (the Instrument) has been established to support and complement the efforts of the Member States for the protection of people, environment, property, cultural heritage, in the event of natural and man-made disasters. Financial assistance may be given for actions in the

field of the Community Mechanism, for measures to prevent or reduce the effects of an emergency, and for actions designed to enhance the Community's state of preparedness (article 1).

In particular, in the field of prevention and preparedness, the actions eligible for financial assistance are (article 4 (1)): studies, surveys, modelling and scenario building, training, exercises, workshops, exchange of experts, creation of networks, demonstration projects and technology transfer, public information, education and awareness raising and associate dissemination actions, maintenance of the functions provided by the MIC, development of detection and early warning systems; establishment and maintenance of the CECIS, monitoring, assessment and evaluation activities, establishment of a programme of lessons learnt.

The financial envelope allocated to the instrument under the EU's 2007-13 financial framework amounts to €189.8 million. Indicative annual amounts of €20 million are available for actions within the EU and €8 million for actions in third countries.

In the 2011 annual Work Programme for Civil Protection (Commission Decision (2010) 8762 final) preparedness activities are funded for €10.7 million in the field of training (€4.9 million), exercises (€2 million), exercises on modules and technical assistance and support team (€2.2 million), and for specific preparedness projects (€1.6 million). Prevention projects, plans, studies and meeting are funded for €2,580 million. Dissemination and awareness-raising activities, early warning systems related projects, are also eligible for funds (€2 million available).

#### **ITALIAN CIVIL PROTECTION NATIONAL SERVICE**

The Civil Protection National Service (established by Law 225/1992) aims at "protecting the integrity of life, the heritage, the settlements and the environment from damage or from the danger of damage deriving from natural calamities, from catastrophes and other calamitous events".

The National Service's Components are state administrations and ministries, regions, provinces, municipalities, mountain communities together with other public and private organizations, scientific research centres and civil volunteers. It is also composed by Operative Structures (the organised State corps like the Fire Brigade, Armed Forces, the Forestry Service, Mountain Rescue Teams, the Red Cross and the Health Service structures, together with the voluntary organisations of the civil protection). The Prime Minister provides for the coordination of the National Service and the promotion of civil protection activities through the Civil Protection Department.

The National Service can count on the technical-scientific support of the National Commission Great Risks (Law 225 /1992, Prime Minister's Decree dated 3 April 2006) which links the National Service and the scientific community and on the coordination capacity of the Operative Committee (Law 225 /1992, Prime Minister's Decree dated 21 November 2006, Prime Minister's Decree dated 2 July 2010).

The National Alerting and Monitoring System (Prime Minister's Directive dated 27 February 2004) carries out monitoring, prevision and alerting activities (Fig.1).

The system that has been set up is based on the principle of subsidiarity. According to this principle the nearest administration to the citizens intervenes first, while the superior administrative levels – Provincial council, Regional Council, Central Government - intervene if the administration is incapable of coping with the event with its own means. To give applicability to the subsidiarity

principle, Law 225/92 classified three type of events relevant for CP activities:

- a-type: Events that can be dealt by single administrations
- b-type: Events that can be dealt through the coordination among more administrations
- c-type: Disasters and calamities whose extent and intensity must be dealt through extraordinary means and powers

At central level the responsibilities in CP's matters are performed through the CP Department. The Department is responsible for national emergency planning (Law 225/92) which has the objective to define and coordinate rescue operations and assistance to people facing an event classified as c - type. It is Council of Ministers' duty to deliberate (and revoke) the Emergency Status for c- type events and to approve ordinances (in agreement with the Regions) for the realization of emergency interventions (Legislative Decree 112/1998). The Department also provides general policies and principles to lower administrative levels for implementing forecast, prevention plans, as well as emergency plans for a- b-types events.

The Regions adopt forecast and prevention regional plans (respecting the national basic principles), put in act urgent interventions in case of b-type events, and provide a set of principles for the arrangement of provincial (b-type events) and municipal (a-type events) emergency plans.

The municipalities put in act regional forecast and prevention plans. They adopt the provisions needed to guarantee first aid, adopt municipal and inter-municipal emergency plans (according with national and regional principles and guidelines) and supervise the action of local PC structures in case of a-type events. In case of emergency the Major is in charge for the direction and coordination of assistance and aid services to the population affected by the event, and inform the Prefect, i.e. the local representative of the national Government, or the President of the Region. The mobilization of national resources at territorial level is guaranteed by the Prefects.



### **Civil Protection's Prevision and Alerting activities**

Prevision activities are developed by means of a close linking system between civil protection and the scientific community, adopting new technological systems for collecting and processing data. This area of activities enables the civil protection, at all levels, to assess situations of possible risk, to send timely alerts, and to provide the competent authorities with the necessary elements to make opportune decisions.

Prevision activities are carried out by the National Monitoring and Alert System (Prime Minister's Directive 27/02/2004). Its tasks concern prevision activities (assessment of weather events and development of prediction about their nature and intensity and their effects) as well as monitoring and surveillance activities (qualitative and quantitative observation, direct and instrumental, of hydrological and hydrogeological weather event and short-time forecast of its effects through the meteorological nowcasting and / or models inflows-outflows initialized by measures collected in real time). The national radar network (Law 365 /2000), hydro-meteorological monitoring and satellite tracking techniques are the main tools for monitoring and surveillance.

The National Monitoring and Alert System consists in a network Functional Centres made of:

- the Central Functional Centre managed by the CP Department and divided in four specific units dealing with different risk categories;
- the network of Regional Functional Centres active 24h/7days for collecting, integrating and sharing data
- the Centres of Competence that consist in central administrations, universities and research

institutes that provide technical-scientific services and information in specific fields.

The information collected by the Monitoring and Alert National System arrive in the National Operational Room (Sala Situazione Italia), an active coordination centre called "Sistema" (Prime Minister Directive 3/12/2008) which guarantees the collection, verification and dissemination of information with the objective of alerting the various components and structures responsible for emergency management. The System operates 24h/7days, all year round, with the presence of personnel from the Department and from the operating units of the Civil Protection National Service.

#### **Civil Protection's Prevention activities**

Prevention activities range from the identification of risk areas to the implementation of systems to reduce risk. The members of the Civil Protection Department are responsible, at the various levels, for determining and indicating the interventions useful for lessening the probability of disastrous events occurring or at least to limiting the possible damage.

One of the main instruments used in prevention field is the Forecast and Prevention Planning. Forecast and Prevention Plans (Law 152/2005, Legislative Decree 112/ 1998) are the means to identify priorities and intervention measures, according to the categories of risk, vulnerabilities and financial resources available.

There are three planning levels: national, regional and provincial/municipal. The Civil Protection Department provides guidelines for the preparation of Regional forecast and prevention plans, while local authorities put them into practice with forecasting and prevention interventions. The Forecast and Prevention Plans are also essential as they represent a source of information for people.

Another instrument is the Emergency Planning. Emergency plans are defined on the basis of the Forecast and Prevention Plans and contain the operational procedures to be applied in case of an emergency. National Emergency Plans are adopted and updated in relation to c-type events by the CP Department in agreement with the Regions, and they are divided by type of risk related to specific areas of Italian territory. The CP Department is responsible for adopting basic principles to be applied in the emergency planning activities at lower levels. Along with the national basic principles, the Regions prepare specific guidelines addressed to local authorities, in order to support them in the approval of provincial, inter-provincial and municipal emergency plans.

Prevention activities are also carried out through training courses on civil protection, awareness-raising campaigns, and emergency drills to be implemented at all levels.

## **5 FLOOD RISK PREVENTION**

### **5.1 THE INTEGRATED FLOOD MANAGEMENT AND THE UNECE WATER CONVENTION**

The Integrated Water Resource Management (IWRM) is a key priority to climate change adaptation, as recognized in the United Nations Framework Convention on climate change (UN, 1992) and in particular to cope with flood risk as highlighted in the UN-Water Paper on Water Hazard Risks (UN-

Water, 2005) and in the International Flood Initiative (IFI) of the World Meteorological Organization (WMO) and the UNESCO. The Associate Programme on Flood Management (APFM), a joint initiative of the WMO and the Global Water Partnership (GWP), is the responsible body for the promotion of the concept of Integrated Flood Management (IFM) as part of the IWRM, by establishing the main principles and supporting actions at all levels and the implementation of effective policies and strategies worldwide.

IFM is considered as a robust and adaptive approach to cope with Flood risk and it is defined by the WMO and the GWP, as the process promoting an integrated –rather than fragmented - approach to flood management. It integrates land and water resources development in a river basin, within the context of IWRM. The objective is not only to reduce the losses from floods but also to maximize the efficient use of flood plains – particularly where land resources are limited and improve the quality of life while mitigating the risks. In turn, increases in flood losses can be consistent with an increase in the efficient use of flood plains in particular and the basin in general. A revised concept paper on IFM was published in 2009 by the APFM (APFM, WMO 2009), presenting the new challenges of flood management (such as the rapid urbanization and climate change) and the necessary conditions enabling its effective implementation in terms of policy, legislation, clear institutional roles and functions, and management instruments for effective regulation, monitoring and enforcing. It also set out the essential components of an effective IFM, these being:

- manage the water cycle as a whole,
- integrate land and water management,
- manage risks and uncertainty,
- adopt a best-mix of strategies,
- ensure a participatory approach,
- adopt integrated hazards approach.

International principles of flood risk management and coordination between countries bordering the same transboundary water are developed under the United Nation Convention on the Protection and use of Transboundary Watercourses and International Lakes (UNECE Water Convention, 1992) which was ratified by the European Community (with the Council Decision 95/308/EC) and by other 36 UNECE countries.

The United Nations Economic Commission for Europe (UNECE) is one of five regional commissions of the United Nations whose major aim is to promote pan-European economic integration by bringing together 56 countries located in the European Union, non-EU Western and Eastern Europe, South-East Europe and Commonwealth of Independent States (CIS) and North America.

In 2003, the Water Convention was amended to allow accession by countries outside the UNECE region, thus inviting the rest of the world to use the Convention's legal framework and to benefit from its experience.

The purpose of the Convention is to help solving not only quality but also quantity water problems, such as floods. To cope with these problems an appropriate management of transboundary water is required and cooperation between countries is thus necessary.

The Convention envisages general obligations for all parties and more specific provisions for parties sharing transboundary waters, i.e. the riparian parties.

General obligations required all parties to take all appropriate measures to prevent, control and reduce any transboundary impact and to ensure that transboundary waters are managed in a ecologically sound and rational way, are preserved and protected, and their use is reasonable and equitable. Transboundary impacts, in flood risk management, can be caused in case of protection measures that, while protecting a specific area, can transfer the risk of flooding to other countries.

The Convention foresees the development of contingency plans and the expects parties to minimize the risk of accidental water pollution and calls for bilateral and multilateral cooperation between the riparian parties, through the definition of catchment areas subjected to cooperation and the establishment of joint bodies (principle which has been adopted at European level through the Water Framework Directive). The Convention listed the competencies and tasks the joint bodies shall have (data collection and analysis, monitoring programmes, elaborate emission limits, set water-quality objectives, develop action programmes, establishing warning systems, exchanging knowledge and information, participation on the environmental impact assessments). In the joint management of transboundary water, the riparian Parties shall establish and implement joint monitoring and assessment programmes, including floods monitoring, undertake common research and development activities, exchange data and information, set up warning and alarm systems, and provide mutual assistance.

The implementation of the Water Convention is managed by the meeting of the parties which takes place once every three years to set their three-year work programme. It also shares information on experience gained in concluding and implementing bilateral and multilateral agreements. It is organized in working groups namely the working group on integrated water resources management, working group on monitoring and assessment and working group on water and health.

The Danube River Protection Convention in 1994 and the Rhine Convention in 1999, are examples of multilateral agreements based on the principles and provisions of the UNECE Water Convention. The Water Framework Directive of the European Union is also an example of its implementation.

## 5.2 THE WATER FRAMEWORK DIRECTIVE

The European Union (EC) has established a framework for the protection of inland surface waters, groundwater, transitional waters, and coastal waters by adopting the Water Framework Directive (Directive 2000/60/EC).

The objectives of the Water Framework Directive (WFD) are preventing and reducing pollution, promoting sustainable water usage, environmental protection, improving aquatic ecosystems and mitigating the effects of floods and droughts, with the ultimate objective of achieving the “good ecological and chemical status” for all Community waters by 2015.

Part of the purpose of the WFD, as set out in Article 1(e), is to “contribute to mitigate the effects of floods”. Therefore, achieving the good ecological status means also developing ecological flood controls. However risk prevention is not one of the principal objectives of the directive. Nonetheless the WFD contributes to mitigating the effects of floods and it put the basis for the implementation of

the 2007 Floods Directive, by foreseeing water analysis, river basin management plans and competent authorities at basin district level.

The WFD foresees a phased approach to reach its objective. As first step, Member States have to identify all the river basins lying within their national territory and to assign them to individual river basin districts. River basins covering the territory of more than one Member State will be assigned to an international river basin district. Competent authorities are to be designated by Member States and are in charge for the application of the rules provided in the WFD.

By 2004 member states should have produced water analysis to be revised in 2013 and every six years thereafter, including the characteristics of each river basin district, the impact of human activity, economic analysis of water use, and the identification of areas requiring special protection.

By 2009, river basin management plans were to be produced for each river basin district, taking account of the results of the analyses and studies carried out. These plans cover the period 2009-2015. They shall be revised in 2015 and then every six years thereafter.

The river basin management plans must be implemented in 2012. They aim to:

- prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water by 2015 at the latest and to reduce pollution from discharges and emissions of hazardous substances;
- protect, enhance and restore the status of all bodies of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment;
- preserve protected areas.

Member States shall encourage participation by all stakeholders in the implementation of the WFD, specifically with regard to the river basin management plans for river basin districts. Projects from the river basin management plans must be submitted to public consultation for at least 6 months.

### 5.3 THE FLOODS DIRECTIVE

Following the adoption of the WFD, the need for a European legislation on the management of flood risks was expressed in the 2004 EC Communication on flood risk management (COM(2004)472 final), on the basis of the likelihood of an increasing of floods frequency and severity due to climate change and on the awareness that a coordination at European level can bring important added value to the efforts of individual Member States.

The 2004 Communication states that flood risk management programmes should incorporate elements that encompass the whole risk management cycle: prevention, protection, preparedness, emergency response, and recovery and lessons learned.

It proposes to Member States and the Commission to work together to develop and implement a co-ordinated action programme on floods, focusing on three distinct but closely linked components:

- improving information exchange: facilitating information exchange on topics such as flood forecasting and flood risk mapping, between researchers and practitioners on flooding

- making best use of EU funds: also entails information exchange, for example via the Common Agricultural Policy, the new Cohesion Policy, and the European Union Solidarity Fund
- development of a proposal for a legal instrument on flood risk management.

In 2006 the European Commission addressed to the European Parliament and the Council a proposal for a directive on the assessment and management of floods (COM(2006) 15) as a component of the action programme proposed in the 2004 communication. The proposal for the Floods Directive followed a participative phase of consultations involving interested parties and expertise.

Finally, on 23 October 2007 the European Parliament and the Council adopted the Directive 2007/60 on the assessment and management of flood risks.

The proposed prevention and management measures are organised by river basin districts (which may cover several river basins), as established by the WFD. The measures include the preliminary assessment of risks and the establishment of flood hazard and flood risk maps of areas at risk and flood risk management plan.

#### **Preliminary flood risk assessment**

By 22 December 2011 Member States must carry out a preliminary assessment of risks for each river basin district (or unit of management) and in case of international river basin districts Member States shall ensure exchange of relevant information among competent authorities. Flood risk assessments shall include:

- maps of the river basin district,
- description of the floods which have occurred in the past and for which the likelihood of similar future events is still relevant,
- the description of the floods which have occurred in the past, where significant adverse consequences of similar future events might be envisaged,
- an assessment of the potential adverse consequences of future floods for human health, the environment, cultural heritage and economic activity.

On the basis of the assessment Member States shall identify those areas for which they conclude that potential significant flood risks exist or might be considered likely to occur, according to whether or not they have a significant potential flood risk. This assessment and the resulting categories assigned to river basins must be reviewed every six years.

#### **Flood hazard and flood risk maps**

By 22 December 2013 Member States must draw up flood hazard maps and flood risk maps for all the areas posing a risk of flooding and indicate the probability of flooding and the potential damage.

The flood hazard maps contain the perimeter of areas likely to be affected by the flooding according to the following scenarios:

- floods with a low probability, or extreme event scenarios;
- floods with a medium probability (likely return period  $\geq 100$  years)
- floods with a high probability

For each of the above scenarios the following elements shall be shown:

- the flood extent;
- water depths or water level, as appropriate;
- where appropriate, the flow velocity or the relevant water flow.

For each scenario the flood risk maps contain the potential adverse consequences in terms of:

- indicative number of inhabitants potentially affected
- type of economic activity of the area potentially affected
- installations which can cause accidental pollution in case of flooding and potentially affected protected areas
- other useful information

### **Flood risk management plans**

By 22 December 2015 Member States must prepare and implement flood risk management plans for each river basin district, on the basis of the maps described above. Where the area concerned extends into several countries, the Member States must cooperate in preparing, as far as is possible, a single flood risk management plan. In its preparation appropriate levels of protection must be established for each river basin, sub-basin and stretch of coastline and measures must be drawn up to achieve those levels of protection. They must be reviewed every six years.

Flood risk management plans shall include:

- the objectives, focusing on the reduction of potential adverse consequences of flooding for human health, the environment, cultural heritage and economic activity, and, if appropriate, on non-structural initiatives and/or on the reduction of the likelihood of flooding
- the measures for achieving the objectives

Flood risk management plans shall take into account: costs and benefits, flood extent and flood conveyance routes and areas which have the potential to retain flood water, the environmental objectives, soil and water management, spatial planning, land use, nature conservation, navigation and port infrastructures. They shall address all aspects of flood risk management focusing on prevention, protection and preparedness, including flood forecasts and early warning systems.

These measures must not increase flood risks in neighbouring countries unless these measures have been coordinated and a solution has been found among the Member States concerned.

Each flood risk management plan must contain certain components, including the level of protection, the measures planned, flood risk maps, and, in subsequent plans, an assessment of the progress made since the last plan was implemented.

Flood risk management plans must be coordinated with the WFD, particularly as regards the characterisation of river basins, river basin management plans, public consultation and information procedures.

All the parties concerned must be allowed to participate in an appropriate manner in preparing flood risk management plans.

## 5.4 IMPLEMENTING THE EU WATER FRAMEWORK DIRECTIVE & THE FLOODS DIRECTIVE

### Implementation Tools

In order to facilitate a coordinated and coherent implementation of the WFD the Member States, Norway and the Commission agreed on a Common Implementation Strategy (CIS) and a strategic document was produced containing the elements of the common strategy:

- The necessity to share information between Member States and the European Commission
- The need to inform and involve the public and stakeholders and promote public awareness
- The need to ensure coherence between the implementation of the WFD and other sectorial and structural policies and other water directives
- The need to integrate activities on different horizontal issues
- The need for capacity building in Member States
- The need to establish working groups and develop informal guiding and supporting documents on key aspects of the WFD

It also includes the key activities related to different phases of the implementation process determined by the deadlines laid down in the WFD.

- Information sharing
- Develop guidance on technical issues
- Information and data management
- Application, testing and validation

The Common Implementation Strategy, therefore, also supports the implementation of the Floods Directive, through a specific working group on floods with the following objectives:

- Support the Floods Directive implementation with development of reporting formats for the purpose of processing and transmission of data. As for the WFD the reporting should take place via WISE, the Water Information System for Europe.
- Ensure coordination with the WFD which contains a number of important related flood risk management requirements contained in the river basin management plans.
- Flood risk management information exchange taking place in the form of workshops organized by Member States.

The implementation of the European Directive requires a huge pool of available knowledge on water related research; in order to improve the accessibility to the existing scientific and technical knowledge the WISE, a partnership between the European Commission (DG Environment, Joint Research Centre and Eurostat) and the European Environment Agency, was launched for public use as a web-based service on 22 March (World Water Day) 2007 providing a web-portal (<http://water.europa.eu/>) entry to water related information. It comprises a wide range of data and

information collected by EU institutions and presented at European, National and Regional level as well as for river (sub-) basins.

### Outcome

In accordance with WFD, river basin management plans for each river basin district should be published by 2009 and exported to the Commission by 2010; currently many member states have adopted river basin management plans, following extensive consultations at basin district level which involved several stakeholders. There are however serious delays in some parts of the EU, and in several countries consultations are still ongoing or the river basin management plans have not yet been established.(Fig 2)

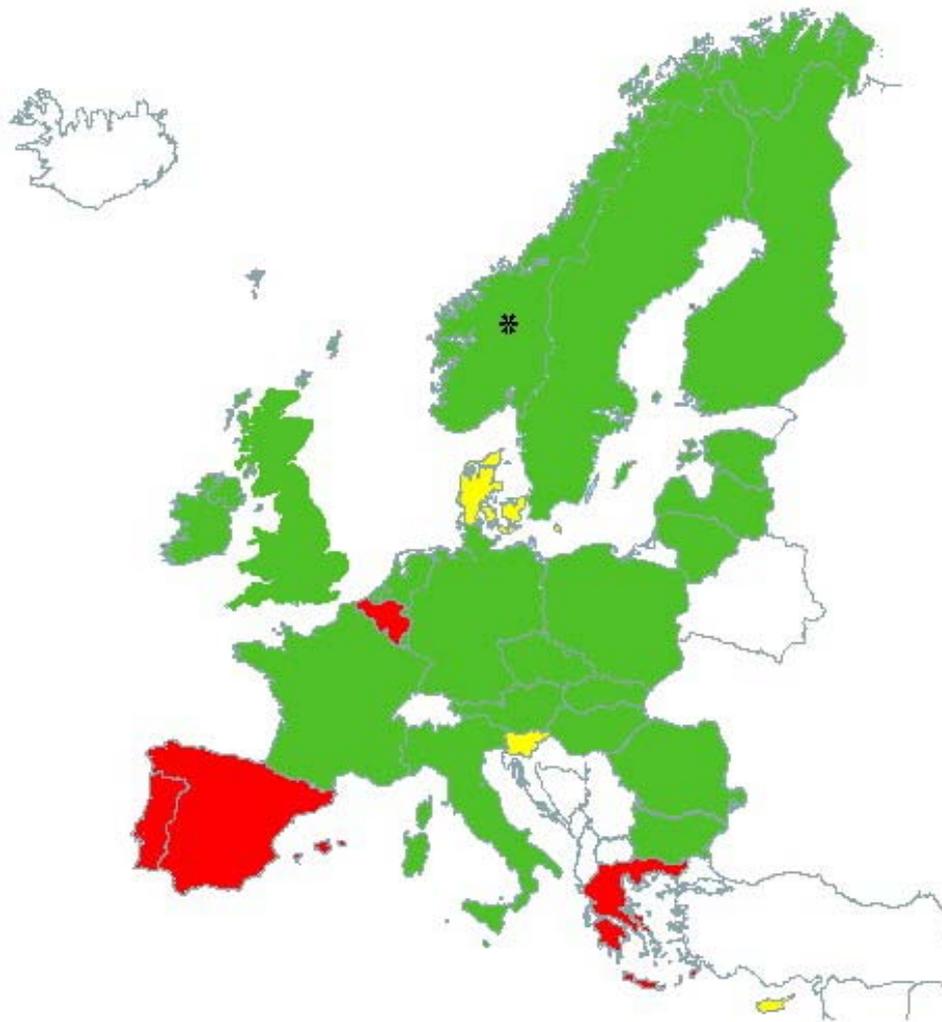


Figure 2: River Basin Management Plans available and status of consultations in the different EU Member States (Updated 11/04/2011)

GREEN-River Basin Management Plans adopted.

YELLOW-Consultations finalised, but awaiting adoption.

RED - Consultation have not started or ongoing.

Source: [http://ec.europa.eu/environment/water/participation/map\\_mc/map.htm](http://ec.europa.eu/environment/water/participation/map_mc/map.htm)

Data and interactive maps (for example about ecological and chemical status, levels about hazard substance, states of bathing water) can be found in WISE web-portal.

With regard to the Floods Directive the first deadline is 22 December 2011, therefore at present there are no results.

## **THE ITALIAN CASE**

### **Planning**

National Law 183/1989 on soil protection reorganized the responsibilities among central and local governments on soil conservation and identified river basins of three territorial levels: national, interregional and regional levels.

For each basin a Basin Authority was established with the task of ensuring the soil conservation, the water reclamation, the use and management of water resources, the protection of environmental issues within the river basin ecosystem and the development of the river basin plan. Basin plans shall contain the following elements: water defence, conservation, protection and enhancement of the soil, protection of the quality of surface water and groundwater, and their de-pollution, environmental sustainability of production systems, protection of the natural environment, the acquisition and dissemination of data to the public. Previous sectorial and spatial plans (as reported on article 17(4) of Law 183/1989, i.e. land use plans and regional programs, water action plans, plans for the disposal of waste, clean-up plans, reclamation plans, etc..) must be adapted to the river basin plan. Concerning the flood risk management, the Law 183/1989 foresees the approval of Watershed Hydrogeological Plan (PAI, Piano stralcio per l' Assetto Idreologico) as a part of the river basin plan. PAI shall identify and delimitate the areas subjected to hydrogeological risk and assess for each of them the risk level (moderate, average, or high), following criteria and principles set out by law. Each PAI includes Special Plans (Decree Law 180/1998, Law 226/1999, Legislative Decree 152/2006) whose purpose is to reduce the risk level in the high risk areas (including also those areas where the state of emergency has been declared, as foreseen in the national law on civil protection). Specific Safeguarding Measures shall be adopted by Regions or Basin Authorities for the areas identified by the PAI as subjected to hydrogeological risk (they can be adopted before the approval of PAI or river basin plans, in this case they will remain in force until the approval of the latter). In the areas subjected to hydrogeological risk (with priority given to those whose vulnerabilities increase risks for persons, property and environmental heritage) specific Emergency Plans (Decree Law 180/1998, Law 226/1999, Legislative Decree 152/2006) are also adopted by the Civil Protection competent Authority. The emergency plans contain provisions on early warnings, response and rescue procedures to be activated in case of emergency.

The European Water Framework Directive (Directive 2000/60/EC – WFD) has been ratified in Italy through Legislative Decree 152/2006 which identified eight river basin districts and provided them with the competent District Authorities responsible for the preparation of the river basin management plan foreseen by the Directive. The new District Authorities include the existing Basin Authorities established with the Law No.183/1989. The river basin management plan are to be integrated with sub-basin or sectorial programs and plans.

The responsibility for the adoption of the river basin management plan can be assigned to special institutional committees of Basin Authorities (National Law 13/2009) while the process for the effective establishment of District Authorities is ongoing. Each institutional committee includes members nominated by the Regions where the basin district is located. Currently, each authority has adopted the river basin management plan according to the provisions set by the Water Framework Directive.

The process for the adoption of the river basin management plan starts from the existing district and sub-district plans, in particular the Regional Water Protection Plans (Piano di Tutela delle Acque, Legislative Decree 152/2006), concerning water resources protection and management, and the PAI (Law 183/1989), concerning flood risk management and river protection.

The Legislative Decree 49/2010, in ratification of the Floods Directive (Directive 2007/60/EC) assigns to the District Authorities the competence for the preliminary assessments of flood risk and for the identification of potential flood risk areas where drawing up “hazard maps”, “risk flood maps” and the “flood risk management plans”. Flood risk management plans will include a section dedicated to national and regional alert systems for hydrological risk, according to Civil Protection provisions concerning floods management services (RD 2669/1937) and contingency plans. The regulation on the assessment and management of flood risks is to be implemented within the framework foreseen by Legislative Decree 152/2006 on basin district planning. At local level, urban policies to be adopted by competent local authorities, shall respect the provisions adopted at district level.

#### **Non-structural measures**

Residual risks shall be managed by floods management service to be adopted by the Regions with the assistance, where appropriate, of the National Department of Civil Protection, the Basin Authority and the Italian Register of Dams (Prime Minister Directive of 27 February 2004). Floods management service include the following activities:

- Forecasting, monitoring and surveillance carried out by the network of Functional Centres by issuing a weather conditions bulletin and a notice of criticism in case of weather phenomena that may create effects of moderate or high risk.
- Establishment of appropriate territorial (regional or provincial) structures which are responsible for the management of all the categories of rivers and surface waters that can cause medium or high risk for the surrounded areas (unless they are already regulated by the Regions). In these contexts, the competent structures shall undertake the activities foreseen by the floods management services in accordance with the RD 2669/1937 (water level detection, embankments monitoring, and critical hydraulic structures surveillance) and by the emergency hydraulic interventions in accordance with the RD 523/1904 (including removal of obstacles that may obstruct the water drainage and safety restoration of damaged structures). These activities are organized according to guidelines prepared by the Region, the regional programs of prediction and prevention, river basin plans, plans for water conservation, PAI, spatial plans of provincial coordination, provincial and municipal emergency plans.
- Regulation of the outflows of reservoirs within the basin, in order to contribute to limit the

effects of flood, ensuring that runoff is not dangerous for the downstream rivers. Specific plans are prepared aiming at safeguarding human life, properties, settlements and environment safety, while considering downstream effects, infrastructures security, and water uses.

## 6 CONCLUSIONS

This review has analysed the main international (UN especially) and European policies and legislations concerning risk reduction and water management, giving the Italian case as an example of national framework.

On the basis of the principle of subsidiarity decisions are taken as closely as possible to the citizen (art.5 Treaty on European Union). Upper administrative levels shall take action where it is more effective than action taken at national, regional or local level. In the field of risk reduction and water management, international and European policies and legislations are required to harmonize the existing national provisions, especially regarding the management of transboundary themes. Generally at the upper level general principles and main objectives are fixed (e.g. Hyogo Framework for Action, the Water Convention) and guidelines and roadmaps are provided to help lower levels in the implementation. European directives also give Member States the room for manoeuvre in the achievement of the end results laid down by the directives. However, as the Italian case shows, national legislations were already in place when European directives and international conventions were approved. The existing national and regional laws and instruments shall be revised and updated on the basis of European and international provisions. This shall arise problems on the allocation of responsibilities and competencies among institutions and existing structures and instruments which can create misunderstandings and complications in the ratification and implementation processes. The KULTURisk project in the next six months will analyse the legislative and policy framework related to the case studies, highlighting the differences between local legislations in transboundary basins, the need of harmonization of existing tools and the need of cooperation among institutions.

At European level, existing measures and instruments for reducing risks are often not adequately linked. Each policy area deals with the specific risks related to it, giving as results a lack of multi-hazard approach and the multiplication of instruments and tools that can be more effective when coordinated. The European Commission has already recognized the need of a more comprehensive and strategic approach on disaster prevention and suggested, through the Prevention Communication (COM(2009) 82 final), a community approach on the prevention of natural and man-made disasters. The goal set by the European Commission can be effectively reach through the development of better linked, more effective, and knowledge based policies and measures on disaster prevention.

A particular area for further work in Europe is the risk governance issue. Most of the institutions managing these processes at national level are still the civil protection entities with some involvement from other agencies, mainly water agencies in the case of floods. As clearly stated in the HFA it is imperative to address hazard risk with a multi-hazard approach that facilities greater

policy impact and awareness-raising. Such a wider perspective requires institutional mechanisms that bring together various ministries and other stakeholders, hence the national platforms for DRR, and, most importantly, it requires greater involvement of high-level authorities at all levels to motivate greater awareness and involvement of the wider public.

## 7 BIBLIOGRAPHY

APFM, WMO, GWP *Integrated Flood Management Concept Paper*, 2009

Constitutional Law no. 3 18 October 2001 *"Modifiche al titolo V della parte seconda della Costituzione"*

Council Conclusions of 30 November 2009 *On a Community Framework on Disaster Prevention within the EU*

Council Decision 95/308/EC of 24 July 1995 *On the conclusion, on behalf of the Community, of the Convention on the protection and use of transboundary watercourses and international lakes*

Council Decision 2007/162/EC, Euratom of 5 March 2007 *Establishing a Civil Protection Financial Instrument*

Council Decision 2007/779/EC, Euratom of 8 November 2007 *Establishing a Community Civil Protection Mechanism (recast)*

Council Directive 96/82/EC of 9 December 1996 *On the control of major-accident hazards*

Council Regulation (EEC) 2158/92 of 23 July 1992 *On protection of the Community's forests against fire*

Council Regulation (EC) No 2012/2002 of 11 November 2002, *Establishing the European Union Solidarity Fund*

Council Regulation (EC) No 1083/2006 of 11 July 2006 *Laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999*

Council Regulation (EC) 1084/2006 of 11 July 2006 *Establishing a Cohesion Fund and repealing Regulation (EC) No 1164/94*

European Commission Decision (2010) 8762 final, of 10 December 2010, *Concerning the adoption of a financing decision for 2011 in the framework of Council Decision 2007/162/EC, Euratom establishing a Civil Protection Financial Instrument*

European Commission, Commission Staff Working Paper, SEC(2010) 1626 final, *Risk Assessment and Mapping Guidelines for Disaster Management*

European Commission, Communication of the European Commission, COM(2004) 472 final, *Flood Risk Management. Flood Prevention, Protection and Mitigation*

European Commission, Communication of the European Commission, COM(2006) 15 final, *Proposal for a directive of the European Parliament and of the Council on the assessment and management of floods*

European Commission, Communication of the European Commission, COM(2006)231 final, *Thematic Strategy for Soil Protection*

European Commission, Communication of the European Commission, COM(2006) 232 final, *Proposal for a Directive of the European Parliament and of the Council Establishing a framework for the protection of soil and amending Directive 2004/35/EC*

European Commission, Communication of the European Commission, COM(2008) 130 final, *Reinforcing the Union's Disaster Response Capacity*

European Commission, Communication of the European Commission, COM(2009) 82 final, *A Community approach on the prevention of natural and man-made disasters*

European Commission, Communication of the European Commission, COM(2009) 147 final, *White Paper. Adapting to climate change: Towards a European framework for action*

European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 613 final, *The Future of the European Union Solidarity Fund*

European Parliament and Council Decision 1600/2002/EC of 22 July 2002 *Laying down the Sixth Community Environment Action Programme*

European Parliament and Council Directive 2000/60/EC of 23 October 2000 *Establishing a framework for Community action in the field of water policy*

European Parliament and Council Directive 2007/60/EC of 23 October 2007 *On the Assessment and Management of Flood Risks*

European Parliament and Council Directive *2008/114/EC of 8 December 2008 on the identification and designation of European Critical Infrastructures (ECI) and the assessment of the need to improve their protection*. European Parliament and Council Regulation (EC) No 2152/2003 of 17 November 2003 *on the monitoring of forests and environmental interactions in the European Union (Forest Focus)*

European Parliament and Council Regulation (EC) No 1080/2006 of 5 July 2006 *on the European Regional Development Fund and repealing Regulation (EC) No 1783/1999*

European Union, *Investing in Europe's future. Fifth Report on Economic, Social and Territorial Cohesion*, Belgium, November 2010

ICCROM, UNESCO, ICOMOS, WMO, *Risk Preparedness: a management manual for world cultural heritage*, Rome 1998

Law no. 996, 8 December 1970, *Norme sul soccorso e l'assistenza in caso di calamità. Protezione civile*

Law no. 938, 23 December 1982, *Conversione in legge, con modificazioni, del decreto-legge 12 novembre 1982, n. 829, concernente interventi urgenti in favore delle popolazioni colpite da calamità naturali o eventi eccezionali*

Law no. 183, 18 May 1989, *Norme per il riassetto organizzativo e funzionale della difesa del suolo*

Law no. 225, 24 February 1992, *Istituzione del Servizio nazionale della protezione civile*

Law Decree n. 180, 11 December 1998, *"Misure urgenti per la prevenzione del rischio idrogeologico ed a favore delle zone colpite da disastri franosi nella regione Campania"*

Law no. 267, 3 August 1998, *Conversione in legge, con modificazioni, del decreto-legge 11 giugno 1998, n. 180, recante misure urgenti per la prevenzione del rischio idrogeologico ed a favore delle zone colpite da disastri franosi nella regione Campania*

Law no. 226, 13 July 1999, *Conversione in legge, con modificazioni, del decreto-legge 13 maggio 1999, n. 132, recante interventi urgenti in materia di protezione civile.*

Law no. 365, 11 December 2000, *Conversione in legge, con modificazioni, del decreto-legge 12 ottobre 2000, n. 279, recante interventi urgenti per le aree a rischio idrogeologico molto elevato ed in materia di protezione civile, nonché a favore delle zone della regione Calabria danneggiate dalle calamità idrogeologiche di settembre ed ottobre 2000*

Law no. 401, 9 November 2001 *Conversione in legge, con modificazioni, del D.L. 7 settembre 2001, n. 343, recante disposizioni urgenti per assicurare il coordinamento operativo delle strutture preposte alle attività di protezione civile*

Law no. 286, 27 December 2002, *Conversione in legge, con modificazioni, del decreto-legge 4 novembre 2002, n. 245, recante interventi urgenti a favore delle popolazioni colpite dalle calamità naturali nelle regioni Molise e Sicilia, nonché ulteriori disposizioni in materia di protezione civile*

Law no. 152, 26 July 2005, *Conversione in legge, con modificazioni, del D.L. 31 maggio 2005, n. 90, recante disposizioni urgenti in materia di protezione civile*

Law Decree n. 208, 30 dicembre 2008, *Misure straordinarie in materia di risorse idriche e di protezione dell'ambiente*

Law no. 13, 27 February 2009, *Conversione in legge, con modificazioni, del decreto-legge 30 dicembre 2008, n. 208, recante misure straordinarie in materia di risorse idriche e di protezione dell'ambiente.*

Legislative Decree no. 112, 31 March 1998, *Conferimento di funzioni e compiti amministrativi dello stato alle regioni ed agli enti locali, in attuazione del capo I della legge 15 Marzo 1997, n59*

Legislative Decree no. 152, 3 April 2006, *Norme in materia ambientale*

Legislative Decree no. 49, 23 February 2010, *Attuazione della direttiva 2007/60/CE relativa alla valutazione e alla gestione dei rischi di alluvioni*

Ministerial Order no. 3134, 10 May 2001, *Misure urgenti per il completamento del programma di potenziamento delle reti di monitoraggio meteo-idropluviometrico elaborato ai sensi dell'art. 2, comma 7, della legge 3 agosto 1998, n. 267, nonché per il programma di copertura di radar meteorologici del territorio nazionale ai sensi dell'art. 1, comma 7, della legge 11 dicembre 2000, n. 365*

Prime Minister's Decree, 29 September 1998, *Atto di indirizzo e coordinamento per l'individuazione dei criteri relativi agli adempimenti di cui all'art. 1, commi 1 e 2, del decreto-legge 11 giugno 1998, n.180*

Prime Minister's Decree, 15 December 1998, *Approvazione del programma di potenziamento delle reti di monitoraggio meteoidropluviometrico*

Prime Minister's Decree, 3 April 2006, *La Commissione Nazionale dei Grandi Rischi*

Prime Minister's Decree ,2 July 2010, *Proroga costituzione e funzionamento del Comitato operativo*

Prime Minister's Decree, 21 November 2006 ,*Costituzione e modalita' di funzionamento del Comitato operativo della protezione civile*

Prime Minister's Directive, 27 February 2004, *Indirizzi operativi per la gestione organizzativa e funzionale del sistema di allertamento nazionale, statale e regionale per il rischio idrogeologico ed idraulico ai fini di protezione civile*

Prime Minister's Directive , 3 December 2008, *Indirizzi operativi per la gestione delle emergenze*

Royal Decree no.523, 25 July 1904, *Testo unico delle disposizioni di legge intorno alle opere idrauliche delle diverse categorie*

Royal Decree no.2669, 9 December 1937, *Regolamento sulla tutela delle opere idrauliche di prima e seconda categoria e delle opere di bonifica*

UNDP, *Reducing disaster risk: a challenge for development*, New York, 2004

UNECE, *Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)*, Helsinki, 17 March 1992

UNISDR, *Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters*, 2007

UNISDR, *2009 UNISDR Terminology on Disaster Risk Reduction*, Geneva, May 2009

UNISDR Europe, *Overview of National Platforms in Europe*, 2011a

UNISDR, *Hyogo Framework for Action 2005-2015: Mid-term review*, 2011b

United Nations, *United Nations Framework Convention on Climate Change*, FCCC/INFORMAL/84, 1992

UNSECO, *Disaster Preparedness and Mitigation. UNESCO's role*, 2007

UN-WATER, *Water Hazard Risks*, UN-Water Series, Vol.1, 2005