

# OECD Studies in Risk Management

# Italy

INDUSTRIAL HAZARDS TRIGGERED BY FLOODS



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OECD STUDIES IN RISK MANAGEMENT

**Italy**

**INDUSTRIAL HAZARDS TRIGGERED BY FLOODS**



ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT



## Foreword

The OECD Futures Project on Risk Management Policies aims to assist OECD countries in identifying the challenges of managing risks in the 21st century, and contributing to their reflection on how best to address those challenges. Its focus is placed on the consistency of risk management policies and on their ability to deal with the challenges, present and future, created by systemic risks. It is designed in two phases. In Phase 1, the countries participating in the project propose specific themes as case studies of their risk management policies. For each proposal, the OECD Secretariat prepares an overview of the issue covering both recent international developments of interest and the national policy context. In addition, the Secretariat elaborates a tool for self-assessment and review, consisting of one or several questionnaires following the methodological framework of the project. This prepares the ground for Phase 2 in which an in-depth review of the risk management issues will be conducted by a team of experts for those countries that wish it. Self-assessments will be used as the basis of these reviews. At the end of phase 2, a cross-country report will bring together the lessons learned from the project, and identify opportunities for sharing best practices and improving risk management.

In the framework of the OECD Futures Project on Risk Management Policies, the Italian Ministry of the Environment and Land Protection has proposed a phase one case study on industrial accidents triggered by floods. More specifically, the Ministry wishes to examine the risk of accidents (fire, explosion, release of toxic substances) caused by a flood affecting industrial installations falling within the scope of the European Directive 96/82/EC (Seveso II Directive).

In March 2004, the Ministry organised a workshop in Rome, where it convened, in addition to the OECD Secretariat, a large number of actors involved in the management of floods or of industrial safety at the regional and national levels. These included in particular the National Fire Brigades, the Chemicals Industry Federation, the Oil industry Federation, the Basin Authority and the River Agency for the Po River. The workshop confirmed that there was strong interest for evaluating the effectiveness and consistency of the assessment of industrial risks induced by floods – an issue at the crossing between two well-developed risk management systems (safety in Seveso installations and flood risks), which might indeed be overlooked by both.

This study has been prepared by Reza Lahidji and Patrick Love, from the OECD International Futures Programme. The authors have benefited from the support of Andrea Santucci, Donato Di Matteo and Maria Grazia Cotta, together with Paolo Ceci, Leonardo Di Maggio at the Italian Ministry of the Environment

and Land Protection, and Francesco Tornatore, at the Po Basin Authority and from the guidance of the Steering Group to the OECD Futures Project (see the list of Steering Group members in Annex 4).

Loris Munaro and Ennio Aquilino (Ministry of Interior), Sandro Bologna and Massimo Sepielli (Ministry of Economy – ENEA), Manlio Maggi and Francesco Astorri (APAT), Domenico Danese (AIPO), Fausto Sini (Unione Petrolifera) and Giuseppe Astarita (Federchimica) have also given contribution to the project as members of the working group set up by the Italian Ministry of Environment and Land protection.

The study is issued under the responsibility of the Secretary General of the OECD.

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## **Introduction**

Floods and industrial accidents are two major sources of risk which have received renewed attention from the public and policy-makers in most OECD countries in recent years. Catastrophic flooding events have affected many countries, in particular in Europe, since the second half of the 1990s. Damage induced by floods is on the rise, and the influence of factors such as climate change, urbanisation and inappropriate land use in this trend is now widely discussed. Hazardous industrial activities, on the other hand, have caused several disasters very recently, as in Toulouse (France) in September 2001. This has called into question the adequacy of existing regulations and of their enforcement, and shed light on the vulnerability of inhabited areas which have developed in the vicinity of hazardous industrial installations.

While public debate and policy-making have started to address these issues, several events in different parts of the world have illustrated the potentially catastrophic interaction of hazards such as flooding and industrial accidents. These experiences and an emerging body of literature suggest that a compartmented approach to risk management can fail to handle effectively such combined hazards.

The aim of this case study is to document the current state of play regarding the risk of accidents triggered by floods, and to prepare the ground for a self-assessment and a review of the way these risks are assessed within existing risk management systems in Italy.

The study is organised in four parts. The first two parts provide a general overview of recent developments in industrial accidents and in flooding, respectively. They review major events, questions of risk acceptability by the public, principal legal and regulatory initiatives, and emphasise emerging issues. The third part focuses on the risk of industrial accidents triggered by floods. The fourth part describes the general context regarding floods and industrial safety in Italy, and the way the relevant risk management processes are organised. The study concludes with a proposal for a self-assessment and review of related risk management policies in Italy. Annex 1 to the study presents the Italian flood management and industrial management systems following the project's methodological framework. Annex 2 contains a comprehensive list of the laws of interest for the case study. Annex 3 proposes three questionnaires, designed as a tool for self-assessment and review, for the second phase of the project. Members of the Steering Group to the Project are presented in Annex 4.

## **Recent events and initiatives of interest for the safety of industrial installations**

### *A succession of devastating accidents in recent years*

Beyond their devastating impact in terms of human lives and casualties and social, economic and environmental costs, several accidents experienced in Europe over the recent years have highlighted issues related to the management of safety in hazardous industries. The most notable among these are the Baia Mare pollution (January 2000), the Enschede explosion (May 2000) and the Toulouse AZF factory accident (September 2001).

At Baia Mare, over 100 000 cubic metres of water heavily poisoned with cyanide and heavy metals polluted the Lepos and Somes rivers in Romania, the Tisza in Hungary and the Danube in Serbia and Bulgaria, i.e. the delta of the Danube, one of the most important wetlands in Europe, covering some 4 300 square kilometres. The concentrations of cyanide were over 700 times the normal levels, killing vast numbers of fish, birds and aquatic flora, contaminating food chains and drinking and agricultural water resources; the pollution will durably affect the life of all inhabitants of the region, especially fishermen and those involved in local tourism.

The Enschede fireworks explosion left 18 people dead and 900 injured. Damage is estimated at half a billion euros. In 2001, an independent committee, led by former Ombudsman Dr. Marten Oosting concluded that a small fire at the Enschede factory triggered several massive explosions (in August 2002, a man was convicted of deliberately starting the fire that caused the explosion). The committee also found that safety precautions had not been observed, e.g. the fireworks were not stored properly and had been put in sea containers offering insufficient fire retardant properties. The classification on the boxes of fireworks was incorrect, leading the authorities and the fire brigade to think they were dealing with consumer fireworks instead of professional explosives. This could also explain why the fireworks were stored in a residential area instead of a special site.

There is still no consensus on the chain of events leading to the explosion in the Grande Paroisse (AZF) plant at Toulouse on 21 September 2001. However, primary investigations showed that a considerable gap can exist between a formal body of laws and regulations and their actual implementation and enforcement. Like most other hazardous industrial installations, the AZF plant falls under the scope of the European Council Directive 96/82/EC, called Seveso II directive. France had already transposed the Directive into its national legislation at the time of the accident, and had made compliance mandatory for industrial plants since February 2001. But after the accident, it appeared that the new regulations were based on an

oversimplified interpretation of the Directive. The safety area defined by regulatory authorities was approximately six times smaller than the zone of severe damage due to the explosion. Land use planning inside the area had remained lax during the past years. Inspections had failed to detect and correct the eventual sources of safety failure. The first investigation report published by the French Ministry of the Environment notably brought under criticism the lack of resources of investigation services, which “forces them to make priority choices in the very installations that have priority”. The AZF accident killed 30 people, injured 2 400, destroyed 4 000 homes and caused 2.3 billion euros of damage.

#### *A deterioration in the public’s perception of risk*

These cases had a major impact on opinion, and public concern is well represented by a resolution voted by the European Parliament in October 2001. The resolution states that “these accidents (Toulouse, Seveso, Enschede, etc), owing to their scale, repeated occurrence and the feeling that they are inescapable, have broken the pact of trust between the public and the legislative and regulatory framework”.

The Parliament goes on to note the progress brought about by the Seveso I and II directives, but also points out that “... the Seveso directives have enhanced the safety of industrial sites ... but have also revealed, as accidents have occurred, their shortcomings and the limits to the protection which they can offer...”. The resolution then tackles the major difficulty facing law makers and planners, namely that zero risk is an impossibility when industrial complexes are in urban zones. The resolution then argues that “the current approach to ‘risk management’ ... has been overtaken by events and that it is now necessary and urgent to adopt an approach based on ‘risk removal’... [the Parliament] calls urgently on the Member States to initiate an in-depth review of policies on ... planning in the vicinity of [these] sites...” The resolution also notes the Parliament’s concern that “...not one of the 15 Member States had fully complied with the provisions of the Seveso II Directive by its transposition date...”.

Specifically, the Baia Mare, Enschede and Toulouse AZF events pinpointed three important shortcomings of the existing risk management systems:

- the inadequacy of safety systems in certain activities falling outside the scope of the Seveso II Directive such as mining and explosives;
- the proximity of hazardous industrial establishments to inhabited areas;
- less than sufficient implementation and enforcement of existing regulations, notably those deriving from the Seveso II Directive.

### *A more stringent regulatory framework*

In the wake of the disasters, governments took measures to address such inadequacies. The Dutch government drafted new guidelines for fireworks storage, stipulating that the distance to inhabited areas must be 800 meters and a maximum amount of 6 000 kilos of fireworks may be stored. The Toulouse accident, together with the extensive flooding in the southern part of France in 2002, led to the July 2003 French law on risk prevention and mitigation. The law encompasses both natural and industrial risks. It makes it compulsory for operators of hazardous plants and local authorities to better inform citizens regarding hazards and risks. Concerning major accident hazards, the guiding principles remained unchanged: the operator's responsibility and the importance of prevention and reduction of risk at source were confirmed and strengthened. Most notably, it creates the right, for all people living in the immediate vicinity of a hazardous installation, to leave their property and have it bought out by a special public fund.

The European Commission also proposed amendments to the Seveso II directive in December 2001. As well as the industrial accidents mentioned above, the Amendment Directive also reflects the results of studies on carcinogens and substances dangerous for the environment carried out by the Commission on request of the Council when Seveso II was adopted. The main provisions are:

- A broadening of scope in respect of mining/quarrying;
- On ammonium nitrate, a redefinition to cover lower percentage composition, and new classes covering self-sustaining decomposition and reject material;
- New thresholds for potassium nitrate fertilisers;
- The addition of seven new carcinogens, and raised threshold limits for all carcinogens;
- A new definition of petroleum products to include diesel and kerosene, with thresholds that have been halved;
- The redefinition of classes for explosives;
- Lower qualifying thresholds for substances dangerous for the environment, including reduced qualifying quantities for R50 substances (very toxic to aquatic organisms);
- A change to the aggregation rule to be applied to all substances classified as toxic, dangerous for the environment, flammable and oxidising; and
- Administrative provisions for establishments newly covered by the Directive, or which may move from lower to top tier, to have a period of time to comply.

As a result of these amendments, an increasing number of facilities are being concerned by the Seveso II Directive. In the UK, for example, the Government estimates that an extra 220 sites are expected to come within its scope for the first time or will move from the lower to the higher tier of control. The deadline for implementation of the amendment by Member Countries is 30 June 2005.

The Commission also recognises that despite the provisions of the Seveso II Directive, land use remains a challenging issue. In its introduction to the amendment proposal, the Commission states that “The new Article 12 on land-use planning in the Seveso II Directive aims - in the long term - at the separation of hazardous industrial establishments and inhabited areas or other locations frequented by the public.” Indeed, article 12 states requires:

- that the Member States shall ensure that the objectives of preventing major accidents and mitigating the consequences of such accidents are taken into account in their land use policy and especially through controls on the siting of new establishments, the modifications to existing ones, and new developments (residential areas, areas of public use, transport links, etc.) in the vicinity of existing establishments;
- that their land-use policy takes account of the need to establish and maintain appropriate separation distances between the establishments covered by the Directive and residential areas, areas of public use and areas of particular natural sensitivity or interest;
- that the land-use policy takes account of the need for additional technical measures in existing establishments so as not to increase the risk to people;
- that all competent authorities and planning authorities shall set up appropriate public consultation procedures to facilitate the implementation of the land-use policies mentioned above.

The Directive does not quantify the separation distances in detail, but allows the Member States and the competent authorities to specify them and to decide what distance would be appropriate for each establishment. The competent authorities of each Member State are also responsible for setting up procedures facilitating the implementation of the land-use planning policies.

#### *The extension of a strict liability regime*

While existing regulations have often become more restrictive in terms of scope (e.g. activities and threshold levels identified as hazardous), they have at the same time tended to be applied in less authoritarian forms, as traditional command-and-control procedures were deemed inadapted to the organisation of work and production in the industry. As a result of this shift, regulatory regimes nowadays

give a greater role to liability law, as a way of both defining roles and responsibilities in safety management<sup>1</sup> and providing incentives for accident prevention (OECD, 2003). A very important evolution in this regard is the application of a strict liability regime, according to which any damage to life, health and property caused by an installation is imputable to its operator, regardless of negligence (by opposition to a fault-based definition of liability).

In May 2003, 22 European countries agreed on a legally binding instrument for civil liability and compensation for damage caused by the transboundary effects of major industrial accidents involving hazardous substances on transboundary waters. This instrument was developed under the auspices of United Nations Economic Commission for Europe, as a Protocol to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, and the Convention on the Transboundary Effects of Industrial Accidents (1992). According to the Protocol, operators of industrial installations, including tailing dams and pipelines, are held liable for damage depending on the risk they pose, i.e. the quantity of hazardous substances present in the installation and their toxicity. The Protocol provides for strict liability unless the operator can prove the damage was the result of an act of armed conflict or the product of compliance with a compulsory public authorities' measure. The operator may also be exempt from strict liability if the damage was caused by force majeure.

Several EU Member States (including Italy) did not sign the Protocol, on the basis that the European Environmental Liability Directive published on April 1, 2004 would cover all or most relevant aspects, making a special liability precept for cases with transboundary effects unnecessary. The Directive defines environmental damage as damage to waters covered by the 2000 Water Framework Directive (all water resources in the EU) as well as land contamination that risks harming human health.

Duplication with international liability legislation that is effective in the EU has been avoided, and so have overlaps with the civil liability regimes that exist in Member States. The latter means that so-called "traditional damage" (personal injury and damage to goods and property) even if caused by "risky and potentially risky" activities covered by the Environmental Liability Directive, will be dealt with under national civil liability legislation. The Environmental Liability Directive only deals with damage to the wider environment. The Directive does not envisage compensation to members of the public. If environmental damage creates harm to members of the public or affects their goods and property, they can sue under national civil liability laws.

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<sup>1</sup> Between operators, sub-contractors, regulatory oversight authorities, local governments, users, etc.

It provides, in particular, for a specific liability regime applying to operators who professionally conduct risky or potentially risky activities, including the release of pollutants into water or into the air, and the production, storage, use and release of dangerous chemicals (Directive Annex III). An operator can be held liable even if he has not committed any fault, though there are exemptions, e.g. environmental damage caused by force majeure such as storms and armed conflicts. Member States may decide to exempt operators who have caused environmental damage if they demonstrate that the damage was caused by activities or emissions expressly authorised by the competent authorities and if they can also prove that they were not at fault or negligent. Member States can also decide on exemptions from liability if operators demonstrate that their activities or emissions were not considered likely to cause environmental damage according to the state of scientific and technical knowledge at the time when the emissions were released or the activity took place.

It is the duty of public authorities to identify liable polluters and ensure that they undertake themselves, or finance, the necessary preventive or remedial measures, which the Directive details. Public interest groups, such as NGOs, will be able to require public authorities to act, if this is necessary, and to challenge their decisions before the courts, if those decisions are deemed illegal.

## **Recent events and initiatives of interest for the management of floods**

### *Direct and indirect impacts of some recent flooding events*

Floods are the most common natural disaster in Europe and worldwide, and the most costly. Flood disasters represent half of the fatalities and a third of economic losses due to natural disasters in the world. In the European Union, over the period 1980-2002, the greatest number of floods occurred in France (22 % of EU total), Italy (17 %) and the UK (12 %). The highest number of fatalities occurred in Italy (38 %), followed by Spain (20 %) and France (17 %). The greatest economic losses occurred in Germany and Italy (both EUR 11 billion), followed by Spain and the UK (both around EUR 6 billion). In the last decade, the EU has launched around 50 research projects in this field, with a total budget of EUR 58 million, in areas such as flood risk assessment, flood hazard and risk mapping, flood forecasting and preventative land-use planning.

Media attention is rightly focused on the most dramatic economic or human costs of flooding, such as the 147 people who died in the 1998 in Sarno, Italy, when a river of mud rapidly destroyed an urban area, or the 86 people who died in the town of Biescas in Spain in 1996 when a campsite located near a canalised river was rapidly covered in water and mud.

However, indirect human and economic impacts should not be neglected. Secondary health effects are an example. In the Czech Republic, a small outbreak of leptospirosis occurred after the flooding in 1997. Finland reported 13 waterborne disease outbreaks with an estimated 7 300 cases during 1998–1999, associated with untreated groundwater from mostly flooded areas. Mental health problems are also a common consequence of disasters such as floods, due to the trauma caused by the event itself, geographical displacement, damage to the home or loss of familiar possessions, and often lack of insurance. They may continue for months or even years after the event itself. A survey conducted nine months after flooding in south-east England in October 2000 suggested that there remained few physical effects of the event but that anxiety and depression were significant and persistent. Data from the United States collected 36 months before a disaster and 48 months afterwards showed a statistically significant increase in suicide rates following floods, from 12.1 to 13.8 per 100 000 population.

### *More frequent and severe floods*

The frequency of major flooding events in Europe has increased in recent years and built-up areas are increasingly affected. For example, at Kehl on the German-French border, the Rhine rose over seven metres above flood level only four times between 1900 and 1977. From 1977 to 1996, that level was



reached 10 times. The flooding in Central Europe in 1997 was reported as the worst natural disaster to hit the region in centuries with around 100 deaths and up to USD 2 billion in damage, but even worse was to come in 2002 in both Central Europe and the Black Sea region of Russia where at least 111 people died, with hundreds of thousands evacuated. In Hungary, the Danube broke high-water marks along 170 km of its length. In Dresden, Germany, the Elbe reached 9.39 m, the highest level since records began in the 16th century. Floods in Prague were the worst for 175 years.

Although the regional and local consequences of the global warming are still poorly understood, it is considered likely that climate change is partly responsible for more frequent and severe floods in parts of Europe, and that its influence will only get stronger in the coming decades. According to available projections, the general pattern of future changes in annual precipitation over Europe will be characterised by widespread increases in rainfall in northern Europe and smaller decreases across southern Europe. There will be a marked contrast between winter and summer in terms of patterns of precipitation change. Episodes of intense precipitation will grow in frequency, especially in the winter, thus increasing the risk of flooding.

#### *Adapting flood management to changing conditions*

Many countries have taken measures to adapt their flood management systems to what is perceived as lasting changes in climatic conditions and flood patterns. These efforts are usually headed in two directions: learning lessons from recent disasters, and integrating forward-looking methods into flood management. The United Kingdom provides a good illustration of these policy shifts.

In 2000, after one of the worst floods the country had ever experienced (10 000 properties affected, USD 1.5 billion of damage), the UK Government's Environment Agency launched an enquiry into the lessons to be drawn from this disaster. In its report, it acknowledged that the event was a significant indicator of the likely impacts of climate change which, the agency estimated, could increase the risk of flooding in parts of the country over the next 75 years by up to 400%. It also acknowledged that in the future, flood risk management would have to consider the possibility of a repetition of similarly extreme events. Partly in response to these developments, the UK Government set in train a number of initiatives aimed, inter alia, at building a stronger, forward-looking dimension into flood prevention and at strengthening integration of flood management approaches.

Already in 1997, the Department of the Environment, Transport and the Regions (DETR) established the UK Climate Impacts Programme with the specific objectives of co-ordinating and integrating a stakeholder-led assessment of the impacts of climate change at the regional and national level, and helping

organisations plan for climate change. A key approach within the programme was to develop alternative climate change scenarios that set out different rates of global warming to 2080. In the framework of this programme, the Office of Science and Technology published a report on flooding in the UK in the 21st century in April 2004. The report finds that by 2080, if current levels of expenditure and approaches to flood management remain unchanged, river and coastal flood risk could increase between two and 20 times; risk of flooding from rainfall could increase between three and six times; and the number of people at high risk of river and coastal flooding could rise from 1.6 million today to between 2.3 and 3.6 million.

Current and future research is using these scenarios not only to evaluate impacts on the natural, commercial and social life in the United Kingdom, but also to identify possible adaptive measures in areas such as water resources, flooding, buildings and infrastructure, agriculture, and planning. For example:

- Building oversized culverts and bridges on relief channel schemes;
- Designing defence walls with provision for future raising;
- Avoiding the creation of new defended areas (e.g. by leaving recreational and other margins in urban areas outside defences so as to provide additional storage/flow capacities.

#### *A more integrated approach to flood management*

A common theme occurring in all recent disasters is the importance of land-use planning in mitigating or exacerbating flood impacts, and beyond this, the need for integrated management approaches. For example, in the Po river plain area in Italy, it has been shown that geomorphology, hydraulics and hydrogeology are seriously threatened by both heavy river training works (i.e. structural engineering works such as levees, weirs, channel straightening and lining, etc.) and numerous water abstractions for minor hydropower generation. In the last decade, two “extreme” flood events occurred, very heavily damaging settlements, crops and infrastructure and causing casualties (see illustration below). Subsequent structural restoration works have invariably proved inadequate to cope with the next flood.<sup>2</sup>

In response to such needs, the 1989 national law for soil protection and conservation<sup>3</sup> adopted an integrated approach to water management – ahead of the context of the EU water Directive 2000/60/CE – by seeking to integrate water management, ecosystem resources management and development in a common river basin framework. Basins were classified at national, interregional and regional level, and for all, Basin

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<sup>2</sup> See Po Basin Authority (n.a.), and also next section.

<sup>3</sup> The law adopts a comprehensive definition of soil including: land, soil, subsoil, built-up areas and infrastructures.

Authorities were created. Their responsibility includes planning and implementation of a series of actions aimed at protecting and exploiting the soil and wisely using water resources, taking into account the physical and environmental characteristics of the land concerned.

The October 2000 floods in Piemonte



source: Regione Piemonte, 2000.

The European Commission takes a similar stance in its July 2004 communication to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on flood risk management. The document proposes that the Member States and the Commission work together to develop and implement a coordinated flood prevention, protection and mitigation action programme, including:

- improving co-operation and coordination through the development and implementation of flood risk management plans for each river basin and coastal zone where human health, the environment, economic activities or the quality of life can be negatively affected by floods
- developing and implementing flood risk maps as a tool for planning and communication
- improving information exchange, sharing of experiences and the co-ordinated development and promotion of best practices

- developing stronger linkages between the research community and the authorities responsible for water management and flood protection
- improving co-ordination between the relevant Community policies
- increasing awareness of flood risks through wider stakeholder participation and more effective communication.

### *Improved information-sharing in Europe*

The European Union has also taken several initiatives to enhance communication on floods and flood management between Member Countries.

The Natural and Environmental Disaster Information Exchange System (NEDIES), for instance, is a Commission project developed in the framework of the DG Joint Research Centre Institutional Programme "Safety and Emergency Management for Man-Made and Natural Hazards". NEDIES is intended to support EU policies (mainly those of the Civil Protection and Environmental Emergencies Unit of DG Environment) in the area of prevention, mitigation and management of natural risks and technological accidents (other than those under the scope of the Seveso directive). NEDIES' main function is to centralise and disseminate information that might be useful in the prevention of natural disasters or in preparing for them.

The EU has also just launched the FLOODsite initiative, its biggest ever project on floods. The five-year project brings together managers, researchers and practitioners from a range of government, commercial and research organisations. The project covers the physical, environmental, ecological and socio-economic aspects of floods from rivers, estuaries and the sea. Its aim is to produce an integrated, European, methodology for flood risk analysis and management.

FLOODsite covers over 30 project tasks including pilot applications in Italy, as well as Belgium, the Czech Republic, France, Germany, Hungary, the Netherlands, Spain, and the UK. Italy features in particular in a case study on pre-flood measures (risk perception, community behaviour, and social resilience). Different types of communities in Italy, Germany and the UK will be compared and their preparedness to flood events will be characterised and the major driving forces of flood defence behaviour will be examined. The Adige River will be one of four sites from France, Spain, Italy and the Ardennes transborder area assessed in another pilot study on flash flood basins. The objective is to assess flash flood risk mitigation strategies in close collaboration with operational organisations, local communities and stakeholders.

Turning to early warning and mitigation tools, work on a European Flood Alert System (EFAS) started in 2003 with the building up of the data infrastructure and the set-up of the model on a European scale. At present the system runs in a qualitative mode twice a day using forecasting data from the German Weather Service (DWD). The spatial resolution of the system is 5 km. A high-resolution quantitative data base for meteorological and hydrological data is being constructed. The priority catchments at present are the Elbe and the Danube river catchments.

Other European projects on flood assessment and management include SPHERE, a database on floods that occurred up to 10,000 years ago, allowing better calculation of risks and hence improvement in the design of high-risk structures such as dams, bridges and power plants; EURAINSAT, the European contribution to a worldwide global initiative, the Global Precipitation Mission (GPM), which aims to show how satellite data can be combined to support improved rainfall predictions; finally, MUSIC analyses how the credibility of flood forecasts could be improved through model improvements, quantification of forecast uncertainties and user training.

## **The concern about industrial accidents triggered by floods**

While hazardous industrial installations and floods are two areas where risk and safety management policies are facing very serious challenges, and where responses are just starting to be elaborated, the combined risk of industrial accidents triggered by floods has so far received little attention. In fact, interactions between natural and industrial hazards are often poorly handled by existing risk management systems – and yet they have the potential to cause catastrophes, as demonstrated by a number of recent events.

The August 1999 earthquake in the Kocaeli region of Turkey offers an illustration of the possible knock-on effects of a large-scale natural disaster. The earthquake had a magnitude of 7.4 and struck a densely populated and highly industrialised region of Turkey. It resulted in more than 15 000 fatalities, and an overall economic damage estimated at USD 16 billion. It also caused a number of accidents in infrastructures and industrial facilities, which in turn impacted people, the environment, and other installations. Electrical power and communications were disrupted in many hazardous industrial sites, causing failures in refrigeration systems and emergency water systems. One result of this was the intentional release of 200 tons of anhydrous ammonia in the air to avoid over-pressurisation in a tank. 1 200 tons of cryogenic liquid oxygen leaked from two storage tanks supported by concrete columns which did not resist the earthquake. 6 500 tons of toxic acrylonitrile were released from ruptured tanks into the air, water and soil. A broken fuel loading arm spilled 50 tons of diesel into the Izmit bay. Finally, a huge fire and important oil spills occurred at the Tupsas refinery. Considerable resources (Turkish firefighters, foreign personnel, air support teams) had to be mobilised for four days to control the fire. Pollution by a layer of oil of up to 15 centimetres was reported in the Southern shore of the Izmit Bay. The long term impacts on human health and ecosystems in the region are likely to be dramatic.

Coming to floods, an illustrative case is the disasters which affected most of Europe during the summer 2002, as a result of extraordinary atmospheric conditions over a stretch of land going from Britain to Bulgaria. In Central Europe, during the first half of August, there were more than ten days of continuous heavy rainfall over large parts of the Danube and Elbe watersheds. In Germany and the Czech Republic alone, the resulting floods made 112 fatalities, forced to evacuate more than 300 000 people from their homes, and altogether affected more than 5 million people. This terrible toll was aggravated by several serious accidents. On 15 August 2002, a leak was found in a chlorine gas container in the Spolana chemical plant located 20 kilometres away from Prague, and substantial amounts of toxic gas started to

spread in the wind.<sup>4</sup> A third degree alert was issued in the surrounding area, including the town of Neratovice. In addition, about 80 tons of liquid chlorine leaked into the river Elbe. Although no fatalities were attributed to the accident, its environmental and economic costs were important. In particular, farmland in the Neratovice area was considered contaminated and unfit for agricultural use for many years. In addition, most sewage plants along the rivers Elbe and Vltava were put out of action, raising the prospect of environmental damage. At the same time, a dam on the river Mulde burst, threatening the nearby town of Bitterfeld (southeast Germany) and resulting in the evacuation of 16 000 people. The emergency was heightened by the flooding of the adjacent chemical complex, where a military operation was launched to stop chemicals flowing into the Mulde. This illustrates another aspect of the cost of interactions between natural and industrial hazards: even when accidents do not actually materialise, the threat that they represent due to the lack of preparedness can impose a major drain on rescue and emergency management resources, at a time when there are important needs for these.

Admittedly, *formal* provisions for the prevention of and response to such combined hazards are usually included in the safety management systems of hazardous industries *and* in flood management systems. In most European countries and in the United States, the management of both industrial and natural hazards is supposed to address interactions with other hazards. However, it is widely acknowledged that *actual* prevention efforts and response capabilities are often inadequate. The reason for this, as the EC's Joint Research Centre pointed out at its October 2003 workshop on natechs (natural disasters triggering technological accidents), is that natural and technological disasters have generally been studied as separate events until recently, and there is little information available on their interactions. For instance, even when local emergency response plans are designed for multiple hazards (natural, industrial, etc.), the latter are usually not expected to occur *simultaneously*.

One notable exception is the California Accidental Release Program, which is specifically aimed at preventing industrial accidents caused by earthquakes. The California Accidental Release Program requires off-site worst case analyses of potential chemical releases as well as planning for hazardous materials releases, but it also explicitly requires consideration of earthquake-caused releases of hazardous substances. Special seismic guidelines provide specific recommendations on seismic design at chemical facilities.

In the absence of such specific provisions (i.e. in the general case), existing studies and expert opinion both suggest that interacting hazards could result in much more serious consequences than those arising from

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<sup>4</sup> It was estimated that several leaks caused by the floods released a total of several hundred kilograms of chlorine gas in the atmosphere.

each hazard in isolation. According to a US expert: “Vulnerability assessments to technological hazards have been left to industry to perform – it is difficult to verify the information provided and to determine if sufficient safeguards have been implemented. Furthermore, industry vulnerability assessments do not include natural hazard triggers and therefore preparedness, mitigation, and response plans do not consider special natech-related problems and obstacles. (...) Community mitigation and response plans do not incorporate simultaneous disasters. Similar to the planning and risk management by industry, local communities are generally planning only for either a natural or technological disaster, but not for a natech.”<sup>5</sup>

A number of trends aggravate such risks. Industrial activities or (often *and*) human settlements are increasingly located in zones exposed to natural hazards, notably to floods, creating a dual land-use problem. Many industrial structures in OECD countries are now approaching 30 years of age or more, and are based on design standards which might no longer be adequate.

In conclusion, recent harmful events and analysis illustrate the limits of risk management when practiced within the closed system of the industrial installation or the more open, but still circumscribed framework of an environmental system such as a river basin – and advocate for a more integrated approach.

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<sup>5</sup> Laura Steinberg, see <http://www.tulane.edu/~civil/hazards/page2.html>.



## Flood management and industrial safety management in Italy

### *General context*<sup>6</sup>

Land classified in Italy as being exposed to “high hydro-geological potential risk” covers 23 943 km<sup>2</sup>: 15 762 km<sup>2</sup> are concerned by landslides, and 8 180 km<sup>2</sup> by floods. This area represents 7.9% of the country’s surface, and comprises 74.2% of its municipalities. Remarkably, only 2.7% of the territory, but just over half of the municipalities, are considered highly exposed to floods.

A total of 1 109 industrial establishments are subject to the Seveso Directive 96/82/EC because of the presence of significant quantities of hazardous substances (see figure 1 below); these establishments are located in 670 municipalities, i.e. 8.3% of the total.

Figure 1 – Industrial establishments subject to law 334/99



The risk of industrial accidents triggered by (and combined with) floods is concentrated in plains such as the Po river plain, where major settlements are located and severe floods are possible. The Po basin –

<sup>6</sup> Data and graphs in this section are based on information kindly provided by the Italian Ministry of Environment and Land Protection and the Po Basin Authority in January 2004.

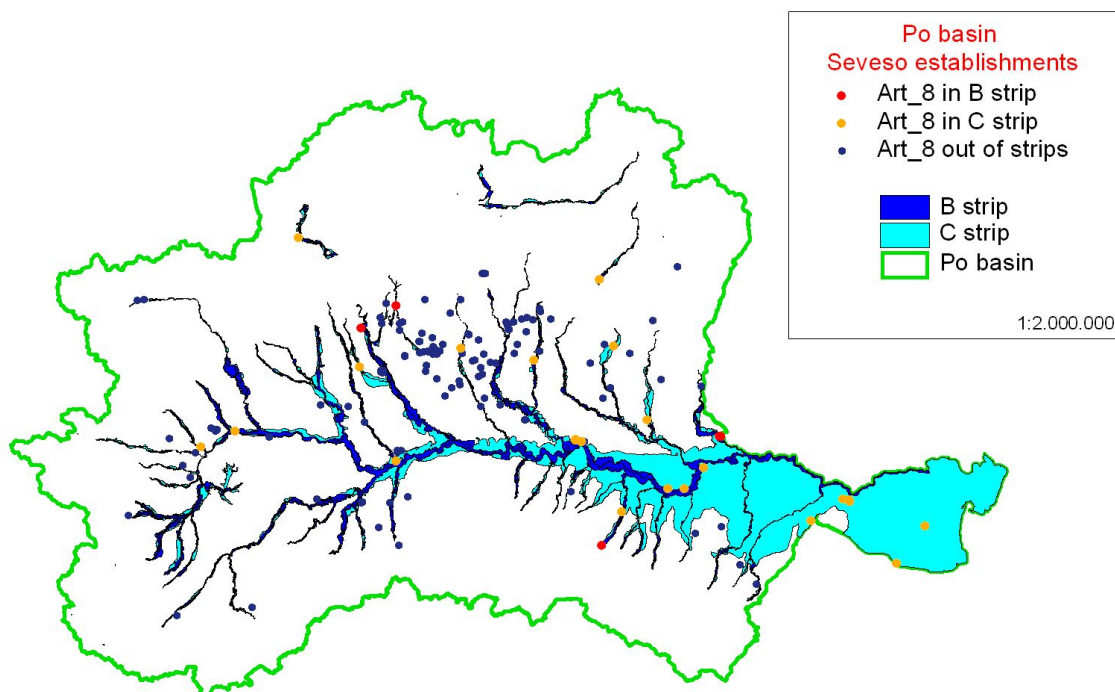
which extends to the regions of Emilia Romagna, Liguria, Lombardia, Piemonte, Valle d’Aosta and Veneto, and to the autonomous Province of Trento – includes the greatest concentration of built-up areas, infrastructures, industrial installations, and agriculture of the country.

The Po basin has a population of 16 million people, spread over 71 000 km<sup>2</sup>, with an average density of population of 225 inhabitants/km<sup>2</sup>. It includes a total of 3 875 areas considered significantly exposed to flood hazard, out of which 659 involve built-up zones and infrastructures.

The areas exposed to flood hazard have been classified by the Po Basin authority as the river’s “A strip”, corresponding to a floodplain, the “B strip”, which covers 2 630 km<sup>2</sup>, corresponding to a 200-year recurrence, and the C strip (500-year recurrence) covering 10 300 km<sup>2</sup>.

51% of the country’s Seveso establishments are located in the Po basin. 151 are highly hazardous sites, identified by “art. 8” of the national law transposing the Seveso Directive 96/82/EC. 25 of these are included in the C strip, and 6 in the B strip (see figure 3 below).

Figure 2 – Hazardous industrial establishments located in the Po basin



Ministry of Environment and Land Protection  
Directorate for Soil Defence - Directorate for Environmental Protection

As mentioned earlier, two “extreme” floods have occurred in the Po basin in recent years, and affected – among others – many industrial establishments:

- In 1994, a flood of the Po concerning principally the Piemonte region equalled, in terms of intensity, the historic flood of 1951 in Polesine, and caused considerable damage. This experience helped to better understand the natural phenomenon, elaborate the “Strip Plan of the Po River”, and gauge the hydraulic system of the basin.
- In 2000, a series of floods affected Valle d’Aosta, Piemonte and Lombardia (in October), as well as Liguria and Emilia Romagna (in December). The damage, although lesser than in 1994, was evaluated at EUR 5.7 billion. The flooded area comprised 1 454 municipalities, as well as numerous industrial installations and infrastructures. Authorities reassessed the “Strip Plan of the Po River”, the working of protections and the emergency interventions at the light of this event. Existing protections were deemed inadequate on that occasion, and it was estimated that a more intense event – which would have occurred, for instance, if the rainfall experienced between October and December had been concentrated in a shorter period of time – would have led to a disaster. A number of structural projects (in particular dykes on the banks of the Po) were decided.

#### The October 2000 floods in Piemonte



source: Regione Piemonte, 2000.

While the major floods of 1994 and 2000 did not cause any serious industrial accident, the number of hazardous installations which were affected (nuclear and chemical plants, contaminated sites, waste repositories, sewage treatment plants) was a source of great concern for Italian authorities. An important industrial accident (e.g. the spillage of a hazardous substance) or a disruption in the functioning of a critical infrastructure (e.g. a power plant) would generate considerable indirect costs to the economy and society. These would add up to the already high tribute paid to floods in terms of direct damage and of resources absorbed by post-disaster impact assessment, reconstruction and rehabilitation: in an average year, losses caused by hydro-geological hazards amount to EUR 3.6 billion in Italy, while resources devoted to protection measures from such hazards are close to EUR 0.5 billion.

#### *Legislative context*<sup>7</sup>

The main legislative measures on soil defence in Italy are Law 183 of 1989, Law by Decree 180 of 1998 and amendments thereof. These laws organise the mapping of the areas exposed to landslides, avalanches and floods, classified by level of risk; provides measures to limit land use; and identifies main protection actions to reduce or to remove hydro-geological risks. Law 183/89 divides the Italian territory into hydrographic basins, classified as being of national, interregional or regional importance. For the nationally significant basins the law sets up Basins Authorities, among which the largest is the Po Basin Authority.

Italy has implemented the “Seveso II” EU Directive 96/82/EC on “control of major-accident hazard involving dangerous substances”, by amending and integrating previous regulation, and promulgating the Legislative Decree 334 of 17 August 1999. In addition, some laws related to the Seveso I Directive, notably regarding technical regulations for risk analysis, are still in force.

The legislation applies to establishments where dangerous substances are present in quantities equal to or exceeding the levels listed in Annex 1 of Directive 96/82/EC. The operators of such establishments are bound to (1) submit to the Competent Authorities (both central and local) a notification containing useful information to characterise the establishment as possible source of major accident hazards; (2) ensure that the population exposed to such risk receives information on safety measures and on the adequate behaviour in the event of an accident; and (3) to elaborate a document setting out their major accident prevention policy and ensure that it is properly implemented, defining a Safety Management System. For the establishments where dangerous substances are present in quantities equal to or in excess of the levels listed in Annex I, Parts 1 and 2, Columns 3 of the Directive, operators are required to produce a Safety

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<sup>7</sup> see Annex 2 for a comprehensive list of the laws and regulations relevant to the case study.

Report which contains a detailed analysis of the potential accident scenarios and of their possible effects, both in extension and in impact. The Safety Report must in particular provide meteorological, geological and hydrological information of interest for major accident risks.

While the control of Seveso establishments is at present a joint responsibility of the Ministry of the Environment and Land Protection and the Technical Regional Committees, the ongoing process of devolution is transferring that role to the Regions. Devolution from national authorities to Regions has been carried out by legislative provisions and an amendment to the constitution, and concerns a variety of competencies, including on environmental issues and industrial risks (about the latter see in particular article 18 of the Legislative Decree 334/99, and article 72 of the Legislative Decree 112/98).

Equally of importance, the Ministerial Decree of 9 May 2001 related to the Legislative Decree 334/99 addresses minimum safety requirements for town and land use planning in areas involving major accident hazard establishments. The decree establishes the obligation to produce a technical assessment of territorial vulnerability related to hazardous industries in certain circumstances: siting of new hazardous facilities, modification of existing facilities, and other developments which affect the risk (hazard or consequences) of a major accident (e.g. new uses of land in the vicinity of an installation, etc.). The technical document has to identify the elements of territorial and environmental vulnerability, to determine the potential damage area, and to evaluate the consequences of the proposed developments. It is provided to the city's Mayor as an element of land use planning. When territorial vulnerability is deemed unacceptable, both the Seveso II directive and the Legislative decree 334/99 impose additional technical measures of risk reduction using best available technologies, without, however, defining such measures.

#### *Administrative context*<sup>8</sup>

The management of flood risk and industrial safety involves a web of national, local and technical authorities.

##### 1. Central Authorities

a. The Ministry of Environment and Land Protection (MATT) determines (with the cooperation of the Council of Ministers, the Presidency of Council of Ministers, and the Interior Ministry) the trends and policies of soil defence in Italy, notably by allocating financial resources; in particular the Ministry finances research on land management and development, sets up policy guidelines, and coordinates

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<sup>8</sup> The most important Authorities among these are included in a description of the existing risk management system in Annex 1, according to their specific role in the system, following the Project's methodological framework.

activities on soil defence among Basin Authorities and among Regions (see the roles of these organs below).

The MATT also carries out the control of Seveso establishments and is responsible for the information system and the exchanges with the European Commission, the other Member States and with the international organisations. Its main tool is the national inventory of Seveso establishments and related information (position, hazardous substances and their quantities, reference persons in the plants, status of authorisations, accidents that occurred, etc.), developed with the co-operation of the National Agency for Environmental Protection and Technical Services (APAT).

The MATT coordinates also the activities of the other central and local authorities regarding the Italian National Digital Mapping Portal, a project which aims at providing wide access to environmental and geographic data.

b. The Ministry of Interior is competent for public security, and operates through Police, Prefectures and National and Regional Fire Brigades. It provides methodological rules for the technical activities of the Fire brigades.

c. The Presidency of the Council – National Department of Civil Protection has a function of coordination of civil protection measures, in close co-operation with the Ministry of Interior's Department of Fire Brigades. The legislative decree 334/99 gives the Department the responsibility of establishing guidelines for the industrial installation's external emergency plans and information to the public.

d. The Ministry of Health is competent for public health, and operates through the National Health Service, the National Institute of Occupational Safety and Prevention (ISPESL), and the National Institute of Health (ISS). It provides methodological regulations for the technical activities of its institutes.

e. The Ministry of Infrastructure and Transport is responsible for setting up major civil infrastructures and carrying out national transport plans. It addresses the general choices and provides the criteria for land use planning, as far as the national infrastructures network, public works, cities and urban area systems are concerned.

f. The Ministry of Productive Activities is competent for the national policies of industrial development, and for authorising the construction and operation of specific plants (i.e. oil or LPG warehouses) – without, however, being directly involved in risk assessment for these sites.

## 2. Local Authorities

a. The Regions are the local governments in charge of land management and soil protection. They contribute to risk evaluations together with basin authorities and can directly implement protection measures which are relevant at their level. As explained earlier, at the end of the ongoing devolution process; they will also be in charge of controlling the Seveso establishments. The Regions are moreover responsible for land management, and take part in the control procedures of land use planning where Seveso establishments are involved.

b. The Basin Authorities were introduced by the Law 183/89, as a collegiate body in which both State and Regional authorities in charge of environmental policy and territorial policy were represented.<sup>9</sup> They carry out activities in all sectors of soil defence, water resource management and environmental conservation. They have technical and administrative relations with the MATT and the interested Regions. The main responsibility of the Basin Authorities is to draft and implement the Basin Plans, covering soil defence and integrated water and land use. The Basin Plan has a pivotal role in laying down policies and measures for the river basin, while responsibility for their implementation is assigned to regional and local administrative bodies, according to their areas of competence.

c. Provinces are local governmental agencies covering an intermediate area between Municipalities and Regions, with their own administration and elective representation. They are bodies responsible for land management and for carrying out soil protection in the province. They act according to regional criteria, and draw up specific land use plans. They contribute to risk evaluation together with basin authorities and directly implement relevant measures.

d. The Municipalities are responsible for land management according to the Regional and Provincial rules and programmes; they also carry out soil protection measures. They contribute to risk evaluation together with basin authorities and directly implement relevant measures. Regarding Seveso establishments, Municipalities ensure that information on safety measures and on appropriate behaviours in the event of an accident is supplied to the public (art. 22 D.Lgs. 334/99). With the contribution of all interested parties, Municipalities draw up a checklist in which impact areas and vulnerable points in the vicinity of Seveso establishments are identified. They evaluate the consequences of the siting of a Seveso establishment for a territory, in agreement with the technical conclusions of the CTR, for the delivery of construction permits.

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<sup>9</sup> It should be noted that the main responsibilities in these two areas were assigned to distinct central administrations. Some of these responsibilities are currently being transferred to regions as a result of the devolution process.

### 3. Technical bodies

a. The National Fire Brigade (CNVVF), placed under the authority of the Ministry of Interior, coordinates a network of Public Emergency Services (Regional Fire Departments and Provincial Commands).

b. The Regional Technical Committees (CTR) are the technical authorities regarding hazardous industries at the regional level. They are composed of members of the Regional Fire Departments and of other local authorities, such as the Regional Agency for Environmental protection (ARPA). They assess Safety Reports containing the risk analysis elaborated by the operators of Seveso establishments, and ensure that Safety Management Systems have been elaborated. Available tools for CTRs include technical guidelines from the competent Ministries, notably the fire prevention and major accident hazards guidelines which propose – among others – specific criteria for the reduction of the potential impacts of floods and other events on industrial plants. After the transfer of competencies about Seveso establishments, the role of the CTR will be played by technical authorities under the control of each Region.

c. The network of Agencies for Environmental Protection (APAT/ARPA) consists of the National Agency for Environment Protection and Technical Services (APAT), under the control of MATT, and the Regional Agencies (ARPA), controlled by the Regions. The Regional Agencies carry out technical-scientific functions concerning environmental protection and the prevention of industrial risks, and provide their own evaluations. The National Agency:

- provides technical support to MATT, among others, in updating the national inventory of Seveso establishments;
- promotes and coordinates the technical activities of the Regional Agencies, including a national GIS database containing information on the risks associated with Seveso establishments;
- contributes to risk evaluation when requested;
- together with a network including other subjects feeds the information base of the SINA (National Environmental Information System - Sistema Informativo Nazionale Ambientale). APAT is the National Focal Point (NFP) for the European Environment Information and Observation Network (EIONET).

d. The River Authorities operate on the main branches of rivers. They programme and build protections, and develop flood monitoring and control tools with the collaboration of interested regions. They have technical and administrative relations with MATT and the interested regions.



e. The National Institute for Labour Safety and Prevention (ISPESL) is a technical-scientific body of the National Health Service, under the authority of the Minister of the Health. Following an agreement between ISPESL and the National Department of Civil Protection, ISPESL has developed a GIS database positioning all major industrial plants in the country, and is currently completing it with data on the inventory of dangerous substances in the installations and the vulnerability of the plants to natural hazards. ISPESL is also elaborating a study of the interactions between natural risks and industrial hazards. Finally, ISPESL is involved in the supervision of safety in Seveso installations, notably in the assessment of safety reports and in inspections.

f. The National Institute of Health (ISS) is a technical-scientific body of the National Health Service which carries out research, experimentation, control, advising, and other activities in matters of public health.

## **Conclusion and proposal regarding the second phase of the Project**

Flood management and industrial safety management are two areas of risk governance where major evolutions are underway. In both areas, disasters have affected several OECD and non-OECD countries in recent years, generating considerable human, economic and environmental costs. This has raised a number of policy issues, regarding in particular the capacity of land-use policies to avoid increased exposure of parts of the territory to natural and man-made hazards. One of the important facets of territorial vulnerability is potentially catastrophic interactions between natural and industrial hazards. Such combined hazards represent a particular challenge for risk management systems in OECD countries, which are usually organised according to hazard types. Italy is not an exception in this regard.

Italy has well-developed systems of assessment, prevention, preparedness and response for risks related to floods on one hand, to hazardous industrial activities on the other. Both systems involve all levels of government, from central to municipal, as well as specialised agencies and research bodies. The major political, administrative and technical actors involved in assessing and organising the prevention of flood risks are naturally different from those engaged in industrial safety; so are also the main laws, regulations, and risk management tools applied to flood hazards and to industrial safety. This makes it possible – in Italy as well as in other OECD countries – that interactions with potentially serious consequences be overlooked by risk managers in both systems.

The risk of a flood triggering an industrial accident cannot be ruled out *a priori* in Italy. As shown in this study, this is particularly true in the Po basin, where half of the country's hazardous industrial installations are located and where important floods have happened twice in the past ten years.

This short overview therefore confirms, in the first place, the relevance of a self-assessment and review of current risk management policies addressing the issue of industrial accidents triggered by floods. Secondly, the study advocates that the focus of such an investigation should be placed on the capacity of the management systems dealing with floods on one hand and industrial safety on the other, to identify and address specifically the potential interactions between flood and industrial hazards, beyond the formal acknowledgement of the possibility of such interactions. In other words, particular attention should be devoted to the assessment of such interactions by both systems, and to the use of these assessments in all relevant fields of policy, from accident prevention and flood mitigation to emergency response, through land-use. A crucial issue will be to identify gaps between the two systems when it comes to dealing with combined hazards, and information-sharing channels as an effective way of bridging those gaps. Thirdly,

as there will be a trade-off between the geographic scope of the review process and its depth, the study suggests to scrutinise the situation in the Po basin, where the issue is probably the most pressing.

Based on these conclusions, a description of risk management systems and three questionnaires are presented as an annex to this study as tools for conducting a self-assessment of risk management policies in Italy in relation with industrial accidents triggered by floods.



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## **Annex 1: The policy context in Italy**

The following annex briefly describes the layers of the Italian flood and industrial safety management systems that are concerned by the self-assessment: risk and vulnerability assessment; policy-decision making in areas such as land-use, flood mitigation, accident prevention and emergency response; the framework conditions (laws, regulations, etc.) presiding over the implementation of those policies; and information of the public, including early warnings. The description follows the project's methodology for analysing risk management systems.<sup>10</sup> The principal actors are indicated in bold.

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<sup>10</sup> See *A methodological framework for evaluating risk management policies*, background document , first meeting of the Steering Group of the Project, 3 November 2003.

Flood risk management system	Layer	Industrial safety management system
<p>A systematic assessment of flood risks is performed by <b>Basin Authorities</b> (Secretariat, with inputs from the Technical Committee). Local authorities also participate in the process.</p> <p>Additional elements of assessment are provided on an ad-hoc basis by <b>APAT/ARPA</b> and University research centres, according to specific requests.</p>	Assessment	<p>Operators of industrial establishments falling within the scope of the European Directive 96/82/EC have to produce Safety Reports which are evaluated by <b>Regional Technical Committees</b>. In addition to this systematic assessment, APAT manages databases concerning hazardous industries. The National Inventory of Seveso Establishments and the Industrial Accident Database are managed by <b>MATT</b> in cooperation with APAT.</p>
<p>Regarding soil protection, <b>MATT</b> determines trends and policies, allocates financial resources, and coordinates the action of <b>Basin Authorities</b>. The latter produce basin plans defining flood prevention, mitigation and communication policies in the basin area. Land-use planning criteria are provided in regulatory acts enacted by the Presidency of the Council,, under the coordination of MATT with the agreement of the Ministries of Infrastructures and Transport, Agriculture and Forestry Policy, Cultural and Environmental Heritage, the Department of Civil Protection, and of Regions.</p> <p>The <b>Department of Civil Protection</b> (Presidency of the Council) coordinates the Government's actions relative to forecasting, early warning and rescue. <b>Regions, Provinces and Municipalities</b> provide programmes for risk forecasting and prevention. At local level contingency plans and emergency responses are co-ordinated by the <b>Prefectures</b>, and implemented by the local <b>Fire Brigades</b> (Ministry of the Interior), together with the <b>local Civil Protection services (Region, Province, Municipality)</b>. Some of these responsibilities will be transferred to <b>Regions</b> as a result of the devolution process.</p>	Policy decision-making	<p><b>MATT</b> coordinates the Government's actions relative to prevention of major accidents. Some of these responsibilities will be transferred to <b>Regions</b> as a result of the devolution process.</p> <p>The <b>Ministry of Infrastructures and Transport</b> provides the land-use planning general criteria as far as national infrastructures, public works, cities and urban systems are concerned.</p> <p>The <b>Department of Civil Protection</b> (Presidency of the Council) coordinates the Government's actions relative to early warning and rescue. At local level contingency plans and emergency responses are co-ordinated by the <b>Prefectures</b>, and implemented by the local <b>Fire Brigades</b> (Ministry of the Interior), together with the <b>local Civil Protection services (Region, Province, Municipality)</b> Some of these responsibilities will be transferred to <b>Regions</b> as a result of the ongoing devolution process.</p>



Flood risk management system	Layer	Industrial safety management system
<p><b>MATT</b> checks the adoption of the basin plans by the Basin Authorities. <b>Basin Authorities</b>, through their Institutional Committee, supervise the implementation of basin plans, which create binding obligations for central and local administrations.</p> <p><b>Regions, Provinces and Municipalities</b> are responsible for the enforcement of land-use planning, and for the implementation of measures, according to Basin Plans.</p>	Framework conditions	<p><b>MATT</b> enforces the Legislative Decree 334/99 (and other laws transposing European Directive 96/82/EC) by inspecting the relevant industrial installations.</p> <p>The <b>Ministry of the Interior</b> enacts the Fire Prevention Technical Guidelines, which comprise measures to mitigate the impact of floods on industrial establishments. Other technical guidelines are produced by various Ministries.</p> <p>Regions, Provinces and Municipalities are responsible for the enforcement of land-use planning.</p>
<p><b>Prefectures</b> provide general information to the public to improve risk awareness and preparedness. <b>Municipalities</b> are in charge of communication regarding appropriate measures and behaviours during emergencies, and of early warnings, in conformity with the basin plan and the crisis management plan.</p>	Information	<p><b>Municipalities</b> provide general information to the public to improve risk awareness, on the basis of the specific information provided by the industrial operators with the “Information document to the workers and the population”. The document contains also general information on measures and actions in case of emergencies. <b>Prefectures and Municipalities</b> are in charge of communication regarding appropriate measures and behaviours during emergencies, and of early warnings, in conformity with the European Directive 96/82/EC. The <b>Regions</b> make arrangements to provide the involved population with the Safety Reports elaborated by the industrial operators.</p>



## **Annex 2: The legal and regulatory framework**

### A. Laws and regulations concerning flood risk assessment:

- Legislative decree 279/2000 “*Interventi urgenti per le aree a rischio idrogeologico molto elevato e in materia di protezione civile, nonché a favore di zone colpite da calamità naturali*” and Law n.365 of 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*”. Gazzetta Ufficiale n.288, 11 December 2000.
- Legislative decree 180/1998 and with subsequent modifications and additions (legislative decree 132/1999 and Law n.226 of 13 July 1999), “*Misure urgenti per la prevenzione del rischio idrogeologico ed a favore delle zone colpite da disastri franosi nella regione Campania*” and Law n.267 of 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*”. Gazzetta Ufficiale n.183, 7 August 1998.
- Decree of the President of the Council of Ministers of 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*”.
- Ministerial Decree of 14 February 1997, “*Direttive tecniche per l'individuazione e la perimetrazione, da parte delle Regioni, delle aree a rischio idrogeologico*”.
- Presidential Decree of 18 July 1995 “*Atto di indirizzo e coordinamento per determinare i criteri di integrazione e di coordinamento tra le attività conoscitive dello Stato, delle autorità di bacino e delle regioni per la redazione dei piani di bacino di cui alla legge 18 maggio 1989, n. 183, recante norme per il riassetto organizzativo e funzionale della difesa del suolo*”.
- Presidential Decree of 14 April 1994 “*Atto di indirizzo e coordinamento in ordine alle procedure ed ai criteri per la delimitazione dei bacini idrografici*”.
- Law 37/1994 “*Norme per la tutela ambientale delle aree demaniali dei fiumi, dei torrenti, dei laghi e delle altre acque pubbliche*”.

- Presidential Decree of 14 April 1993 *“Atto di indirizzo e coordinamento alle regioni recante criteri e modalità per la redazione dei programmi di manutenzione idraulica e forestale”*.
- Presidential Decree of 7 January 1992 *“Atto di indirizzo e coordinamento per determinare i criteri di integrazione e di coordinamento tra le attività conoscitive dello Stato, delle autorità di bacino e delle regioni per la redazione dei piani di bacino”*.
- Law 225/1992 *“Istituzione del Servizio nazionale della protezione civile”*.
- Law 183/1989 *“Norme per il riassetto organizzativo e funzionale della difesa del suolo”*.
- Royal Decree n.215, 1933 *“Norme sulla bonifica integrale”*.
- Royal Decree n. 3267, 1923 *“Provvedimenti per la difesa idraulico-forestale dei territori montani”*.
- Decree of the President of the Council of Ministers of 23 March 1990 *“Indirizzi per la redazione degli schemi revisionali e programmatici”* (implementation of article 31 of Law 183/89).

## B. Laws and regulations concerning the assessment of safety in hazardous industrial installations

- Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances. Official Journal of the European Communities n.10, 14 January 1997.
- European Commission Decision 98/433/EC of 26 June 1998 on harmonised criteria for dispensations according to Article 9 of Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances. Official Journal of the European Communities n.192, 8 July 1998.
- Directive 2003/105/EC of the European Parliament and of the Council of 16 December 2003 amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances Official Journal of the European Communities n.345, 31 December 2003.
- Legislative Decree of 17 August 1999, n. 334 *“Attuazione della direttiva 96/82/CE relativa al controllo dei pericoli di incidenti rilevanti connessi con determinate sostanze pericolose”*. Supplemento Ordinario alla Gazzetta Ufficiale n.228, 28 September 1999.
- Ministerial Decree of 9 August 2000 *“Linee guida per l’attuazione del sistema di gestione della sicurezza”*. Gazzetta Ufficiale n.195, 22 August 2000.
- Ministerial Decree of 9 August 2000 *“Individuazione delle modificazioni di impianti e di depositi, di processi industriali, della natura o dei quantitativi di sostanze pericolose che potrebbero costituire aggravio del preesistente livello di rischio”*. Gazzetta Ufficiale n.196, 23 August 2000.
- Ministerial Decree of 19 March 2001 *“Procedure di prevenzione incendi relative ad attività a rischio di incidente rilevante”*. Gazzetta Ufficiale n.80, 05 April 2001.
- Ministerial Decree of 9 May 2001 *“Requisiti minimi di sicurezza in materia di pianificazione urbanistica e territoriale per le zone interessate da stabilimenti a rischio di incidente rilevante”*. Supplemento Ordinario alla Gazzetta Ufficiale n.138, 16 June 2001.
- Ministerial Decree of 16 May 2001 *“Regolamento di attuazione della direttiva 96/82/CE, relativa al controllo dei pericoli di incidenti rilevanti connessi con determinate sostanze pericolose”*. Gazzetta Ufficiale n.165, 18 July 2001.

The following laws, linked to the first Seveso directive, are also still in force:

- Presidential Decree n.577 of 29 July 1982 “*Approvazione del regolamento concernente l’espletamento dei servizi di prevenzione e di vigilanza antincendio*” . Gazzetta Ufficiale n.229, 20 August 1982.
- Decree of the President of the Council of Ministers of 31 March 1989 “*Applicazione dell’art. 12 del DPR 17/05/1988, n. 175, concernente rischi rilevanti connessi a determinate attività industriali*”. Supplemento Ordinario alla Gazzetta Ufficiale n.93, 21 April 1989.
- Ministerial Decree of 13 October 1994 “*Approvazione della regola tecnica di prevenzione incendi per la progettazione, la costruzione, l’installazione e l’esercizio dei depositi di GPL in serbatoi fissi di capacità complessiva superiore a 5 mc e/o in recipienti mobili di capacità complessiva superiore a 5.000 Kg*”. Supplemento Ordinario alla Gazzetta Ufficiale n.265, 12 November 1994.
- Ministerial Decree of 15 May 1996 “*Criteri di analisi e valutazione dei rapporti di sicurezza relativi ai depositi di gas di petrolio liquefatto (GPL)*”. Supplemento Ordinario alla Gazzetta Ufficiale n.159, 09 July 1996.
- Ministerial Decree of 05 November 1997 “*Modalità di presentazione e di valutazione dei rapporti di sicurezza degli scali merci terminali di ferrovia*”. Gazzetta Ufficiale n.18, 23 January 1998.
- Ministerial Decree of 20 October 1998 “*Misure di sicurezza per gli scali merci terminali di ferrovia non ricompresi nel campo di applicazione del decreto ministeriale 5 novembre 1997*”. Gazzetta Ufficiale n.261, 07 November 1998.
- Ministerial Decree of 20 October 1998 “*Criteri di analisi e valutazione dei rapporti di sicurezza relativi ai depositi di liquidi facilmente infiammabili e/o tossici*”. Supplemento Ordinario alla Gazzetta Ufficiale n.262, 09 November 1998.

### **Annex 3: Self-assessment questionnaires**

Three questionnaires are proposed in the following pages for Italian public administrations to self-assess and take stock of their practices in the management of risks of industrial accidents triggered by floods:

A. A general questionnaire addresses the overall management of those risks, emphasizing questions such as the effectiveness of risk assessments, their use in policy decision-making, how policy decisions are implemented and enforced, the linkages between risk assessment, early warning and rescue, and the management of change.

B. A specific questionnaire is designed for the Po Basin Authority, as the main actor of flood risk assessment in the Po plain. It focuses on the assessment methods, ways to deal with changing risk conditions (due to global warming, urbanisation, etc.), and handling of the specific risk of industrial accidents triggered by floods.

C. Similarly, a specific questionnaire is elaborated for the Regional Technical Committees of the Po plain, as the main actors of industrial risk assessment, paying particular attention to their methods of evaluation of Safety Reports, ways to deal with changing risk conditions (due to economic conditions, new techniques, etc.), and handling of the specific risk of industrial accidents triggered by floods.

## A. General questionnaire

Please provide details and illustrations wherever possible. Section A.1. refers specifically to the assessment of the “combined” risk (industrial accidents triggered by floods). The following sections refer to assessment of flood risks and assessment of industrial safety separately.

### *A.1. Assessment of risks of industrial accidents being triggered by floods*

A.1.a. Does your national legislation and regulations include any provisions relative to the identification or evaluation of such risks? If yes, please

- i. refer specifically to the laws, decrees and regulations applicable to flooding (annex 2.A. of the present report) or to hazardous industries (annex 2.B.), and if relevant, to case law
- ii. describe legal responsibilities regarding (1) elaboration (2) control and (3) communication of such assessments
- iii. identify authorities responsible for disseminating relevant information on natural disasters to users in charge of industrial safety assessment (e.g. flood maps at appropriate scale and indications of potential floods)
- iv. provide supporting documentation.

A.1.b. To what extent and how are such risks assessed in practice? Please

- i. provide details regarding the methods of assessment of such risks by (1) Basin Authorities, (2) APAT/ARPA, (3) industrial operators, (4) Regional Technical Committees, (5) Municipalities (in the context of territorial vulnerability assessments) and (6) others. Distinguish, wherever possible: hazard identification, elaboration of accident scenarios, consequence assessment, and risk quantification.
- ii. describe any institutional link between the organs involved in the assessment of flood risks (Ministry of the Environment, Basin Authorities, APAT/ARPA, etc.) and those involved in the evaluation of industrial safety (Ministry of the Environment, industrial operators, Technical Regional Committees, APAT/ARPA, etc.) regarding the issue of industrial accidents triggered by floods.



iii. evaluate the percentage of the national territory (or of exposed areas) where actual assessments are elaborated.

iv. Provide details regarding the initiatives to promote the availability of spatial environmental and geographic data and tools to the organs involved in the assessment procedures.

*A.2. How are risk assessments integrated into policy decision-making?*

*A.2.a. Soil defence policy*

i. How are hydro-geological risk assessments by Basin Authorities used in the soil defence guidelines elaborated by MATT?

ii. In which cases and on which topics is APAT/ARPA asked to produce complementary studies?

iii. What are the information-sharing channels between MATT and actors involved in industrial accident prevention (Ministry of Infrastructures and Transport, CTRs, etc.)?

iv. Do the guidelines make a specific case for vulnerable areas such as hospitals, schools, infrastructures and hazardous industrial installations?

v. How are the costs and benefits of various courses of action estimated?

vi. How are priorities defined and resources allocated?

*A.2.b. Accident prevention policy*

i. What are the Government's actions to prevent major industrial accidents? In each case, please explain which body (Ministerial Department, Agency, etc.) has responsibility for design and implementation of the measures.

ii. What are the information-sharing channels between these bodies and actors involved in flood management (e.g. Basin Authorities)?

iii. Do the various types of measures relate to assessments of major accident risks? If yes, how are these assessments elaborated, and by whom?

iv. What does the co-ordination role of MATT in major-accident prevention consist of?

- v. How are the costs and benefits of various courses of action estimated?
- vi. How are priorities defined and resources allocated?
- vii. Does accident prevention policy account for risks related to natural hazards, in particular floods?  
If yes, in what way?

#### A.2.c. Land use policy

- i. Which are the land use planning criteria defined by MATT and others, in relation with flood risks? Please provide details.
- ii. Do these criteria explicitly refer to risk assessments elaborated by Basin Authorities or other sources? Do these criteria encompass the explicit consideration of costs and benefits of land use? the involvement of local stakeholders in a formal process of consultation?
- iii. Which are the land use planning criteria defined by MATT, the Ministry of Infrastructures and Transport, and others, in relation with industrial risks? Please provide details.
- iv. Who determines the safety area around Seveso sites, and how? Do these criteria explicitly refer to Safety Reports provided by the operators of hazardous installations, or to risk assessments elaborated by the Technical Regional Committees or other sources? Do these criteria encompass the explicit consideration of costs and benefits of land use? the involvement of local stakeholders in a formal process of consultation?
- v. Which body has the responsibility of co-ordinating the various land-use policies (i.e. with relation to floods, with relation to industrial risks, etc.) ? Does it account for cumulative risks in a given area, or for interactions between natural and industrial hazards?

#### A.2.d. Civil protection policy

- i. How do contingency plans and emergency response procedures co-ordinated by the Department of Civil Protection use information on flood risks? Which are the sources for that information?
- ii. How do contingency plans and emergency response procedures co-ordinated by the Department of Civil Protection use information on industrial risks? Which are the sources for that information?

iii. Do contingency plans and emergency response procedures related to natural disasters contain particular measures regarding vulnerable areas such as hospitals, schools, infrastructures and hazardous industrial installations?

iv. Do contingency plans and emergency response procedures account for multiple hazards (e.g. industrial accidents, floods)? for interactions between those hazards (e.g. industrial accidents triggered by a flood)?

v. If yes, please evaluate the percentage of the national territory (or of municipalities) where such plans are effectively in place.

### *A.3. How are the ensuing laws, regulations and policy decisions implemented and enforced?*

#### A.3.a. Soil defence policies

i. How are MATT's soil defence guidelines translated in the basin plans?

ii. In what consists the Ministry's co-ordination and control role vis-à-vis Basin Authorities?

iii. To what extent are basin plans prescriptive (by opposition to indicative)?

iv. Which organs are responsible for implementing and enforcing measures included in the plans?

v. What are the average delays of effective implementation of the various types of measures?

vi. What are the types of preventive measures directly implemented by Regions? Provinces? Municipalities? In each case, please describe the existing disparities between various parts of the territory.

#### A.3.b. Accident prevention policy and inspection of Seveso sites

i. How are the Ministry of Interior's technical guidelines for fire prevention implemented and enforced?

ii. What are the resources (budget, number of inspectors, external expertise) available at MATT for the inspection of industrial installations falling within the scope of the Decree 334/99?

iii. How many inspections does the Ministry operate in an average year? How often is a Seveso installation inspected, on average?

- iv. Are the inspections related to the assessment of Safety Reports and control of safety conditions by the CTRs (e.g. assessments can trigger inspections, and conversely inspections can inform assessments)?
- v. Do the inspections often raise the issue of provisions related to the advent of a natural disaster, in particular floods?
- vi. Do inspections involve co-operation and co-ordination with other administrations? If yes, which?
- vii. What are the reporting mechanisms for inspection results?
- viii. When operators are required to modify their Safety Management Systems and/or Emergency Plans, what are the enforcement mechanisms for these requests? Please provide illustrations and a record of enforced changes in the past years.

#### A.3.c. Land use policies

- i. How are MATT's land use criteria in relation with flood risks translated into the basin plans?
- ii. What are the available legal and financial tools for enforcing the land use dispositions of basin plans, notably for inhabited areas or existing constructions which are highly exposed to floods?
- iii. How are the Ministry of Infrastructures and Transport's land use criteria in relation with industrial risks used by local governments (regions, provinces, municipalities)?
- iv. What are the available legal and financial tools for enforcing the decisions of local governments with regard to land use, notably for inhabited areas or existing constructions which are highly exposed to industrial hazards?

#### A.3.d. Tort law

- i. What is the civil and penal liability of industrial operators in case of an accident causing human, economic or environmental damage, as defined by the legislation and case law?
- ii. In which cases do strict liability rules apply (i.e. liability regardless of negligence or fault by the operator)?
- iii. How is the European Environmental Liability Directive implemented in Italy? Please provide details, including the implementation agenda.

#### *A.4. Communication*

##### A.4.a. In normal conditions

- i. What information do the public and other stakeholders (in particular industrial operators) receive regarding flood risks in normal conditions (i.e. not during flooding events)?
- ii. Which are the available channels for providing that information?
- iii. Is provision of that information compulsory for Municipalities and Prefectures?
- iv. What information do the public and other stakeholders (in particular industrial operators) receive regarding industrial risks in normal conditions (i.e. not during incidents and accidents)?
- v. Which are the available channels for providing that information?
- vi. Is provision of that information compulsory for Municipalities and Prefectures?

##### A.4.b. During emergencies

- i. What are the channels of early warning for floods?
- ii. How is the public informed about appropriate behaviours when receiving a flood warning or during flood emergencies?
- iii. What are the channels of early warning for industrial accidents?
- iv. How is the public informed about appropriate behaviours when receiving an accident warning or during accident-related emergencies?

#### *A.5. Implications of recent and future evolutions in the risk management system*

##### A.5.a. Are lessons learned from national and international experience?

- i. What is known about past industrial accidents, incidents and near-misses caused by natural disasters, in particular floods, in Italy?
- ii. What feedback mechanisms ensure that lessons are learned and improvements are made after such events? In which conditions are administrative and legal investigations decided? Which bodies

can prescribe additional safety measures to industrial operators, local authorities and/or governmental agencies following an accident, incident or near-miss? How are these prescriptions enforced?

iii. Is data about such events systematically collected and analysed?

iv. Is Italy engaged in any international research or experience-sharing programme regarding interactions between natural and industrial hazards?

#### A.5.b. The impact of ongoing reforms

i. Which responsibilities will be affected by the ongoing process of devolution decided by the legislative provisions?

ii. Are transfers of responsibility matched by transfers of resources (funding, expertise)?

iii. What are the expected consequences of the devolution process (benefits, risks)? Does the law allow for a monitoring of its effects, and for possible corrective measures?

iv. What other reforms are expected to influence the management of flood risks and industrial safety? How?

## B. Questionnaire to the Po Basin Authority concerning flood risk assessment

### *B.1. Organisation of the Po Basin Authority*

B.1.a. Please provide detailed descriptions of:

- i. The institutional status and competencies of the Authority
- ii. Its size and budget

B.1.b. Please explain the respective roles and responsibilities of

- i. The Secretariat
- ii. The Technical Committee
- iii. The Institutional Committee.

### *B.2. How are flood risks assessed?*

B.2.a. Please provide a detailed description (including maps) of:

- i. The hydro-geological characteristics of the basin
- ii. The scope and influence of existing river management structures such as dams, dykes, relief channels, etc.
- iii. The characteristics of the industrial activities located in the basin area, in particular hazardous installations
- iv. Major flood events of the past and their impacts; typology of floods; principal inhabited and industrial activity areas exposed to floods.

B.2.b. Please explain to what extent and how the Authority uses the following tools to elaborate and communicate flood risk assessments

- i. Mathematical modelling
- ii. Hydro-geomorphological methods

iii. Historical analysis

iv. Geographical Information Systems incorporating socioeconomic data, (indicate also if they are used as a River Basin Plan communication tool through the Internet)

v. Flood maps.

vi. Spatial environmental and geographic data available through the web and related tools (Examples: Cartographic National Portal by Ministry of Environment and Land Protection, SigmaTer, SiTeR etc. ).

B.2.c. Flood risks are influenced by a range of underlying factors; assessment therefore needs to be adapted to changes in those factors. Please explain to what extent and how the Authority monitors the following trends and accordingly adjusts its assessment of flood risks:

i. Climate change and changing precipitation patterns

ii. Decay in existing structures and rehabilitation needs

iii. Urbanisation and the evolving geography of human settlements, agricultural and industrial activity, and infrastructures (roads, rainwater treatment systems, etc.)

iv. More generally, factors of territorial vulnerability.

B.2.d. Please describe the formal procedures used by the Authority to involve stakeholders (citizens, corporations, NGOs, etc.) in the assessment of flood risks.

### *B.3. Accounting for interactions between floods and industrial hazards*

B.3.a. Access to information on hazardous industrial installations

i. What competencies does the Authority have in collecting information on hazardous industries in the basin area? Please distinguish external data (location and size of installations) and internal data (hazardous substances used and stocked, safety procedures, etc.)

ii. Which information does the Authority actually possess on hazardous industries located in the basin area? Please distinguish external and internal data.



B.3.b. Please describe the institutional links between the Authority and actors in charge of safety management in hazardous industries; please explain if and how information on flood-related risks for industrial installations is exchanged through these links:

- i. Ministry of the Environment (department in charge of the inspection of Seveso sites)
- ii. Industrial operators
- iii. Regional Technical Committees
- iv. Local and National Fire Brigades

#### *B.4. The basin plan*

##### B.4.a. Elaboration of the basin plan

- i. What are the various types of prevention, mitigation and communication measures included in the plan? Please distinguish public actors (Municipalities, State agencies, etc.) and private actors (businesses, individuals)
- ii. How do these measures relate to estimated levels of risk?
- iii. How are their costs and benefits estimated? How are priorities defined?
- iv. Does the plan consider particularly vulnerable areas inside a given flood zone (e.g. hospitals, schools, infrastructures, hazardous industrial installations)?
- v. If yes, how are vulnerabilities assessed, and what types of specific measures are decided?

##### B.4.a. Implementation of the basin plan

- i. What is the implementation schedule for the various types of measures included in the plans? Are there delays and gaps in implementation? Please describe.
- ii. What type of mechanisms can the Authority use to enforce the plan? What are the most common enforcement issues?
- iii. Does the current basin plan comprise provisions with regard to industrial sites exposed to flood risks? Did the previous plans comprise such provisions? Please provide details.

iv. If yes, have such provisions been adequately implemented? If no, what are the shortcomings?

C. Questionnaire to Regional Technical Committees (CTR) concerning Safety Reports in Seveso-type industrial installations

*C.1. Organisation of the Regional Technical Committees*

C.1.a. Please provide detailed descriptions of:

- i. The institutional status and competencies of the Committee
- ii. Its size and budget
- iii. Its internal organisation

C.1.b. Please explain the respective roles and responsibilities of the various institutions represented in the Committee

*C.2. How are safety reports evaluated?*

C.2.a. Please provide a detailed description (including maps) of:

- i. Industrial activities located in the region
- ii. Geographical concentrations of hazardous installations, housing structures, collective buildings and infrastructures
- iii. Exposure to natural disasters in the region
- iv. A typology and record of major industrial accidents in the region over the past decades.

C.2.b. Evaluation procedure

- i. In which circumstances are operators of industrial installations falling within the scope of the Decree 334/99 bound to produce a Safety Report?
- ii. How many Safety Reports does the Committee evaluate in an average year? What is the average frequency at which installations located in the region undergo evaluations?
- iii. Please explain in detail how the Committee evaluates Safety Reports

iv. Does the Committee control specifically Safety Report provisions related to the advent of a natural disaster, in particular floods?

v. Does the Committee uses spatial environmental and geographic data available through the web and related tools (Examples: Cartographic National Portal by Ministry of Environment and Land Protection, SigmaTer, SiTeR, etc.)?

C.2.c. Industrial risks are influenced by a range of underlying factors; assessment therefore needs to be adapted to changes in those factors. Please explain to what extent and how the Committee monitors the following trends and accordingly adjusts its assessment of industrial risks:

i. Changing economic and technical conditions in industrial activities, such as technological change, increase use of outsourcing, etc.

ii. Urbanisation and the evolving geography of human settlements and infrastructures

iii. The frequency of occurrence of natural hazards, in particular floods

C.2.d. Please describe the formal procedures used by the Committee to involve stakeholders (citizens, corporations, NGOs, etc.) in the evaluation of Safety Report and the assessment of industrial risks.

### *C.3. Accounting for flood risks and their interaction with industrial hazards*

C.3.a. Access to information on flood risks in the region

i. What competencies does the Committee have in collecting information on flood risks for hazardous industries located in the region?

ii. Which information does the Authority actually possess on flood risks for hazardous industries located in the region?

C.3.b. Please describe the institutional links between the Committee and actors in charge of safety management in hazardous industries; please explain if and how information on flood-related risks for industrial installations is exchanged through these links:

i. Ministry of the Environment (department in charge of soil protection)

ii. Basin Authorities

iii. Fluvial Authorities

iv. Local and National Fire Brigades

*C.4. Monitoring safety*

i. Please describe the follow-up procedures to the evaluation of Safety Reports

ii. How does the Committee control safety conditions inside industrial installations?

iii. Does the Committee control specifically safety conditions related to the advent of a natural disaster, in particular floods? If yes, how?

iv. Communication with MATT regarding the inspection of Seveso sites: Are the Safety Reports used to plan, prioritise and orient inspections? Are findings from inspections used in the assessment of Safety Reports?



## **Annex 4: Members of the Steering Group**

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# OECD Studies in Risk Management

## Italy

### INDUSTRIAL HAZARDS TRIGGERED BY FLOODS

Looking back on the disasters of recent years alone (the Indian Ocean tsunami disaster, Hurricane Katrina, terrorist attacks in New York, Madrid and London, avian flu, the 2003 heat wave in Europe), one could be forgiven for thinking that we live in an increasingly dangerous world. A variety of forces are helping to shape the risks that affect us, from demographic evolutions to climate change, through the development of mega-cities and the rise of information technology. These changes are clearly a major challenge for risk management systems in OECD countries, which have occasionally proved unable to protect the life and welfare of citizens or the continuity of economic activity.

The OECD Futures Project on Risk Management Policies was launched in 2003 in order to assist OECD countries in identifying the challenges of managing risks in the 21st century, and help them reflect on how best to address those challenges. The focus is on the consistency of risk management policies and on their ability to deal with the challenges, present and future, created by systemic risks. The Project covers a range of risk management issues which were proposed by the participating countries and together form three thematic clusters: natural disasters, risks to critical infrastructures, and the protection of vulnerable population groups. In the first phase of the Project, the OECD Secretariat prepared a case study for each issue. The studies cover both recent international developments of interest and the national policy context, and come with a tool for self-assessment to be used later in the Project in order to review the national policies in question.

This work is now published as the OECD Studies in Risk Management.

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