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# Natural and industrial disasters- local authorities facing emergencies: 40 measures in dealing with natural hazards

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## EXPLANATORY MEMORANDUM

Earthquakes, volcanic eruptions, floods, landslides, storms and other phenomena often referred to as natural disasters have been around since the dawn of time.

Nowadays, the risks are heightened as a result of global warming and dependence on technology and dense transport networks, allied to the close proximity of some industrial sites to residential areas.

The number of potential casualties is enormous.

The damage and loss these disasters cause to communities, businesses, commerce, housing, the cultural heritage, transport, communications and the environment are considerable and may threaten the very survival of the affected communities.

They can also have appalling consequences for the environment: an accumulation of toxic substances in the food chain, the wiping out of tons of fish, plankton, etc., adverse effects on natural habitats, lasting contamination of soil, sediments and underground water and the destruction of self-purification capacity.

Action by local authorities is vital in order to understand and respond to these phenomena and take protective action.

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# A. The role of local authorities

## 1. Adopt an overall approach to managing natural hazards

When it comes to managing natural hazards, local authorities are in the front line, as they suffer the immediate impact and are often obliged to take rapid action.

Generally speaking, they have a role to play in regard to land use and the protection of people and assets, including cultural and environmental assets, in informing and educating the public on the risks, in promoting planning and mitigation operations, in contingency planning, in coordinating the emergency services in the event of an incident, in the reconstruction and rehabilitation of public places and property, in providing assistance to people in the wake of a disaster and, finally, in applying lessons learnt.

Hence, they must assume full or partial responsibility for gathering historical and geographical information on areas at risk, establishing hazard maps and hazard prevention plans, providing proper warnings for populations at risk, organising first aid provision in such a way as to avoid panic and maintaining and repairing damaged public infrastructure.

## 2. Be aware of the extent and causes of climate change

Even though there is legitimate debate about its causes, the extent of global warming and climate change is now well known: the earth is getting warmer. National and international conferences such as those held in Rio, Kyoto and Johannesburg have given much publicity to the question and sought to reduce offending industrial emissions and other greenhouse gases.

Temperatures could rise during the 21st century by as much as two degrees. This would inevitably increase periods of drought, accompanied by more frequent forest fires, while conversely increasing the amount of winter precipitation and causing flooding; this would be exacerbated by a rise in sea levels along parts of the European coastline.

There is still insufficient acceptance of climate change when it comes to housing and industrial development and the coherent management of natural and topographical features. This is aggravated in some countries by a lack of communication between scientists and planners.

### 3. Be fully aware of foreseeable threats to their communities

Local authorities should commission or undertake surveys and mapping of foreseeable risks and carry out comprehensive risk assessments.

Scientists and planners are now better able to assess risk thanks to advances in mapping and modelling.

In the case of avalanches, for instance, while the risks cannot be eliminated completely, corridors can be identified more effectively in order to prevent future development.

As regards earthquakes, although we still do not know how to predict them in the short term, more is known about active faults and site effects linked to geology.

With regard to flooding, hydrologists and meteorologists are now better able to pinpoint the areas under threat thanks to radar detection of rainfall.

Furthermore, economic and town planning surveys make it easier to assess the impact of such disasters on people and property. They should make it possible to assess extent and vulnerability and define better-targeted mitigation measures.

### 4. Have a risk prevention plan for known natural hazards

The increasing frequency of natural disasters has acted as a spur to the establishment of risk prevention plans and the incorporation of likely hazards into planning decisions.

The first task of a prevention plan is to work out, from a historical analysis of the principal events which have affected the region in question, the natural risks to which it is exposed (e.g. earthquakes, landslides, avalanches, flooding, etc.) and to mark out on a hazard map the zones directly or indirectly subject to such risks together with their impact on persons and property. Remaining in these areas and building or carrying out improvements to properties may be prohibited or permitted only subject to certain precautions, such as rules on earthquake-resistant design and construction.

This procedure makes it possible to study and evaluate the risks, control urban development and planning policy, expropriate the most vulnerable properties and carry out work to minimise and insure against damage.

Most European countries have long since enacted special legislation to remedy the damage caused by storms, flooding and, most recently, drought.

A number of local authorities have adopted a comprehensive risk management policy encompassing the technical, sociological, organisational, legal, economic and financial aspects and establishing safety and risk prevention directorates within their administrations.

## 5. Take measures to mitigate risk

The notion of risk prevention or avoidance is not yet sufficiently anchored in public policy. It is seen, wrongly, as being in conflict with economic imperatives, employment and rural and industrial development.

Local authorities should have a programme aimed at reducing the impact of foreseeable phenomena and making the people and property at risk less vulnerable. This involves coordinating legislation and technical measures at the different administrative levels, training the professionals concerned and providing simplified public access to information.

## 6. Protect vulnerable cultural assets

Cultural assets constitute our heritage and are by definition irreplaceable. Local authorities should therefore take all necessary measures to make them less vulnerable and enable them to be handed down to future generations.

## 7. Avoid dispersal of efforts and lack of coordination

Administrative compartmentalisation and lack of consultation sometimes prevent coordinated efforts between local authorities, the State and its regional/local offices. In many countries risk management involves too many administrative levels - local, regional and national - which have powers to act, but are not necessarily responsible for preventing situations from arising or alleviating their impact. People and property continue to be at risk as a result of the piecemeal approach to these problems.

The situation is exacerbated by a lack of inter-municipal agreements and by an unclear apportionment of responsibilities between the different levels of government, which encourages them to take preventive action in isolation.

The command of operations on the ground, with organisations with differing cultures and statuses working together, is a further source of difficulties. This can lead to a proliferation of centres of decision-making, resulting in vague or even conflicting orders being issued.

## 8. Possess resources commensurate with their responsibilities

For this to be effective, national governments, which often give local authorities responsibility for risk management, must also provide them with the resources and structures that are necessary for formulating a collective response.

Local authorities do not always have the necessary resources. In small municipalities the technical services are extremely limited in terms of capacity and staffing. The requisite means of action and even the upkeep of protection systems often exceed their capabilities. Rural municipalities may find themselves completely dependent on central government services.

This familiar picture of the relationship between central government and local authorities is liable to have devastating consequences in the event of a disaster or emergency where the local authorities have a role to play. It is important that they should be encouraged and empowered to work in tandem with the other agencies and levels of government concerned.

## B. In the face of natural hazards, local authorities should:

***. As regards flooding:***

### 9. Ensure coherent management of watercourses

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The first step should be to protect, restore or recreate flood plains, restore and reforest natural areas by such means as promoting biodiversity and developing nature reserves, reduce building density along river banks and flood plains, promote rainwater seepage and ensure that sewers and public and private agricultural and domestic drainage facilities are suitable for the task and in good repair.

Building projects involving the ubiquitous use of tarmac and concrete should also be avoided, as they mean that the soil can no longer act as a sponge, thus further increasing surface water flow.

### 10. Discourage the siting of services, housing and industrial plant in areas prone to flooding

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Such an approach will necessarily involve adapting planning and urban development schemes, adjusting or amending the fiscal rules and providing transparent information to the public, and will lead to inter-municipal co-operation in the management of natural hazards.

### 11. Strengthen flood surveillance and defence systems

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This will involve careful planning of embankments, dams, reinforced construction techniques, reforestation, sediment traps, etc., and ensuring the availability of personnel, volunteers, equipment and machinery to respond in the event of an emergency. Property owners should also be encouraged to comply with measures to protect their property and surroundings, or take their own steps.

***. Storms***

### 12. Co-operate with key agencies and the emergency services

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This includes the burying of electricity and telephone cables, ensuring adequate reserves of generators to guarantee supplies of water and electricity and establishing intervention units in fire stations.

**13. Consider diversifying forest use where there is heavy reliance on forestry**

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It may be necessary to replant damaged forests with diversified species, encourage planting at different heights to suit local environmental conditions, consider reallocation of forest land in areas of multiple ownership in the interests of more coherent and sustainable management, or leave some timber on the ground in order to protect the soil from frost and erosion and encourage natural seeding.

***. Earthquakes***

**14. Prepare a full-scale programme, where necessary in co-operation with specialist agencies**

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This will involve identifying the most sensitive areas, training professionals and putting in place the necessary fiscal, financial and supervisory measures to encourage the siting, design and construction of housing and other buildings which are as resistant as possible to earthquakes. It will also mean encouraging residents to take simple precautions to prevent objects from falling and strengthen networks, and forming specialist teams with knowledge of the area ready to act rapidly using emergency equipment located at strategic points. Finally, residents and the population as a whole will need training on how to respond in an emergency and on community rescue.

***. Mass earth movements***

**15. Establish a long-term programme of active management for mass earth movements**

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A programme of this kind will cover improved understanding of instability issues, monitoring of problem sites, interpreting results and implementing effective planning measures. Prevention of mass earth movements cannot be left just to government departments and agencies. If it is to succeed, all sectors of the community must be involved as part of a comprehensive management strategy.

New developments should be steered towards suitable locations. If necessary, provision should be made for filling in sites and restricting access and development.

**16. Focus on mapping**

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This would cover landslides, soil collapse, marl pits, quarries and mines in particular. A landslide survey will include a review of existing literature, geological and other hazard maps, past technical reports and aerial photographs and satellite images. Local authorities should encourage citizens to forward any information they may have in order to build up a local atlas.

***. Avalanches***

**17. Survey areas at risk**

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The nature of the risk depends on topography and climatic conditions. Assessing the risk requires detailed information on past events in addition to the use of modelling techniques, which have become increasingly sophisticated in recent times. Avalanche risk is often determined by means of a colour code based on the estimated return period for a particular event. Likely avalanche sites and maximum foreseeable avalanches should be incorporated in geographical information systems and in spatial planning.

**18. Have an avalanche warning system**

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Avalanche forecasting has also become much more accurate in recent years. Many resorts and towns publish daily bulletins through the regional and local media. Local authorities can mark out risk areas and, in the event of a warning, should discourage or even prohibit skiers and ramblers from going "off-piste". In high-risk areas, mitigation measures such as triggering artificial avalanches and installing avalanche walls or diversionary barriers should be considered.

***. Clay shrinkage and swelling***

**19. Have appropriate prevention plans in place**

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The predicted rise in summer temperatures as a result of climate change will have far-reaching consequences in terms of clay shrinkage, subsidence, drought and insurance claims.

Measures will be needed to map the most sensitive areas, reiterate and enforce building regulations on land liable to subsidence in times of drought and manage water use in a rational manner through, for example, differentiated treatment and pricing of drinking water and water for use by industry; steps will also need to be taken to ensure that pipes and reservoirs are properly sealed.

. *Coastal erosion and flooding by the sea*

**20. Plan and put in place effective defence mechanisms against erosion and flooding, without damaging the environment in coastal areas**

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Most of the European coastline is vulnerable to both coastal erosion and flooding by the sea, and has been intensively developed. Despite substantial improvements in coastal management over the past fifty years, including warning systems, there are still significant problems that need to be addressed.

The danger from flooding by the sea and coastal erosion is not always recognised by the public or by local politicians. However, coastal erosion leads to significant costs for local authorities and the community in general. The key role of coastal defence mechanisms is to reduce the level of risk to people, property and the environment through the implementation of sustainable solutions. Measures should be included relating to tsunamis resulting from earthquakes or undersea landslides.

**21. Develop, in partnership with adjoining authorities, a thorough understanding of natural coastal processes and how the coastline is evolving**

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This will allow the preparation of shoreline management plans which establish a framework for management of coastal defences for the next hundred years. The preparation of plans of this kind can provide the necessary support to the planning system, allowing areas at risk to be avoided.

. *Forest fires*

Several forest fires in Europe in recent years have caused widespread damage and loss of life and have adversely affected natural habitats and tourism.

**22. Devise appropriate protection measures in co-operation with specialist agencies**

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In particular, local authorities should encourage plantation policies with adequate firebreaks, ensure that warning and hazard signs are plentiful and that trees and scrub are cleared from residential and recreational areas.

***. Freshwater pollution***

Local authorities must respond to the threat and reality of natural disasters and technological accidents in much the same way: their role is first and foremost one of prevention.

**23. Develop a comprehensive plan to combat freshwater pollution**

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In particular, it is important to encourage farmers and landowners to limit the use of nitrates and pesticides, reduce the release and storage in river basins of chemical and harmful substances from industrial, agricultural and domestic sources, define protected water resource perimeters and limit building and industrial development along river banks.

***. Marine pollution***

Marine pollution is an issue of enormous concern as marine accidents, oil discharges and spills and vessels being washed ashore have a considerable impact on coastal and marine environments. Local authorities are often in the front line in terms of the emergency response, particularly in relation to oil spills, although most countries have central government agencies which will intervene in the event of a major disaster.

**24. Develop an overall contingency plan and a programme to combat marine pollution**

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Such a plan should involve simulation exercises, investment in oil-fighting equipment, if necessary with neighbouring municipalities and regions, training and setting up local and regional emergency services and oil clean-up centres, and mobilising volunteers and civil society for clean-up operations.

Local authorities should also step up their co-operation with other territorial authorities, including national authorities and those in other countries, to exchange information and experience on ways of preventing and tackling oil spills. They should also consider setting up regional maritime safety centres.

Joint capabilities for combating oil pollution should also be developed with the private sector.

**25. Be familiar with relevant international legislation**

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The legislation in question deals with liability in the event of an oil spill, the policies of shipping insurance companies and national and international compensation schemes.

**26. Exercise vigilance and exert pressure on national governments to accept their responsibilities in the prevention and reduction of oil spills**

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This means encouraging governments to apply effectively existing legislation such as IMO Conventions and guidelines and to reinforce the "polluter pays" principle in respect of the transport of oil; this in turn will entail stringent application of national and international legislation (IMO and EU).

Measures should include insistence on double-hulled vessels, imposing heavy fines and severe sentences for offences such as the deliberate discharge of oil into the sea and knowingly taking abnormal risks in transporting oil, insistence on rigid standards before vessels can be insured, reducing the use of flags of convenience and simplifying the currently complicated rules on the ownership and use of oil tankers in order to reduce vulnerability and risk in maritime transport.

***. Air pollution***

**27. Strive, together with citizens, to reduce air pollution at source**

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This will involve setting up monitoring mechanisms for chemical substances such as ozone, taking steps to limit pollution caused by motor vehicles, promoting the use of more ecologically sound energy sources such as sea and wind turbines; it will also mean ensuring that adequate safeguards exist against pollution from nuclear and industrial sites, that public utilities take steps to reduce the environmental impact of their activities and that local Agenda 21 programmes are drawn up.

***. Industrial hazards***

**28. Assess industrial risks**

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Local authorities will need to conduct a survey of industrial and commercial installations and publicly owned infrastructure and facilities on their territory, in order to assess the risks in line with the EU's Seveso I and Seveso II Directives. The former calls on States and firms to identify the hazards associated with certain industrial activities and plan and implement measures to deal with them, while the latter steps up preventive activity by classifying certain establishments as "upper tier", and extends the scope of the Directive to the manufacture and storage of explosives and the elimination of hazardous waste, and to nuclear installations where chemical hazards existed.

Although it can be argued that strict application of the Seveso Directives is liable to have perverse effects on local economic development, municipal management, employment prospects, property prices and even tourism, these considerations must be balanced against the inalienable right of citizens to be informed of the risks in their immediate environment.

**29. Ensure that new installations are sited outside natural hazard zones and at a sufficient distance from residential areas, and discourage the growth of residential areas in the vicinity of existing industrial sites**

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A recurrent dilemma faced by local authorities is the siting of industrial installations. Should they be sited close to urban areas or relegated to the countryside?

In urban areas where factories were established before the subsequent spread of housing and residential areas around them, particular attention needs to be paid to safety; if possible, consideration should be given to relocating the plant.

**30. Encourage regular maintenance of transport and communications infrastructure**

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It is important to ensure that maintenance is conducted regularly and that major structures such as road and rail tunnels deliver maximum safety standards to users and have as little impact as possible on the environment and the local population; there is a need also to introduce tighter controls on movements of toxic waste and to ensure that action is taken to prevent marine pollution.

## C. As part of a joint approach to dealing with natural hazards, local authorities should:

### . *As regards contingency planning*

A national plan for dealing with major emergencies is vital. It must be based on legislation which enables the various levels of government to take whatever steps are required to safeguard people and property.

Ideally, a single multi-disciplinary agency should be established with powers to coordinate the activities of the different departments and bodies concerned.

**31. Prepare local contingency plans and programmes to accompany national plans**

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Local relay points for detection, assessment, early warning and alert are vital to ensure people's safety. Likewise, a local operational structure, i.e. one which is instantly on the scene in an emergency, is the sole means of delivering aid in situations of extreme urgency.

Such contingency and emergency provision will include preparation of plans and training in executing them, definition and simulation modelling, and mobilising and coordinating the resources and skills needed in the event of a disaster.

Local authorities should also ensure that major public utilities such as electricity, gas and water suppliers develop contingency plans in coordination with the local and regional authorities and with the technical resources of the municipalities and departments.

**32. Provide training for local elected representatives and professionals**

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In addition to training on natural disasters, their consequences and the means of preventing or reducing them, training modules will be needed covering consultation, waste storage, carriage of dangerous substances, air pollution, application of the Seveso Directives and technological hazards in the context of spatial planning.

### . *Public information*

**33. Develop comprehensive and properly funded programmes to alert the public in times of danger**

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Local authorities should develop public warning systems, preferably with a single information point, and seek the help of the media in this respect. They should stage public hearings and debates in their municipalities and distribute leaflets and brochures explaining the warning system and how to respond.

Such programmes should form part of a European approach using uniform signals to mark the beginning and end of the alert, as well as uniform signs. Radio should be used to disseminate information rapidly. The information must take account of the specific circumstances, e.g., whether it is day or night, and of persons with special needs (visual or hearing impairments, disabilities, etc.).

Warnings of certain weather events (wind velocity, rainfall, snow depth) should also be relayed via the media and the Internet and by phone.

### 34. Respond to public demand for information

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Local authorities should make general information on potential risks freely available to the public to enable people to react responsibly to risks and emergencies. The authorities should also disseminate this information through posters, public meetings, the media and new technologies.

This information should also take account of persons with special needs.

. ***Preventive education***

### 35. Contribute to preventive education everywhere and for everyone

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Local authorities should contribute to environmental education to ensure sustainable development. Education on the prevention of natural disasters, providing information on and improving understanding of natural hazards, is one component of this. It must be universally available, progressive and authenticated. It will involve initial and continuing training of teachers, and should be conducted in partnership with environmental associations.

### 36. Ensure the safety of children at school

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Local authorities should provide school buildings which are designed, built, maintained and run in such a way as to ensure the safety of pupils and the entire school community in the event of an emergency. The measures in place should be simulated and tested regularly. Local authorities should also promote basic safety training for everyone, tailored to individual capacities.

. ***Risk culture***

**37. Contribute to a shared culture engendering collective awareness**

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Local authorities should gather, publish and evaluate material information and past testimonies. They should also erect signs reminding the public of past incidents, such as highest-recorded water levels in flood-prone areas, in order to instil risk awareness in individuals as the basis for collective awareness.

Decentralised co-operation should provide an opportunity for comparing experiences and methods in order to engender an overall awareness of natural hazards.

## D. In the event of an incident

**38. Develop a disaster rehabilitation and support programme together with key agencies and with the support of regional/central government**

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In the event of a disaster, local authorities should ensure that full alert is given and assist in managing operations on the ground and with victim support, including psychological support. They should also assist in the provision of temporary accommodation, clothing, food and social services, and facilitate or coordinate the activities of the fire brigade, police and other emergency services, including army experts.

## E. After an incident, local authorities must

**39. Take all necessary steps to rehabilitate affected areas and assist the population**

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In particular, they should promote and co-operate with effective and speedily-conducted independent inquiries, ensure that the financial implications and liabilities of insurers and relevant parties are respected and honoured, ensure that lessons are learnt and further remedial steps taken if recommended and, where appropriate, lend backing to public appeals for funds.

**40. Increase public awareness of the importance of insurance**

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This will involve a number of steps: encouraging individuals to take out personal accident/risk insurance, promoting awareness of the risks associated with ownership of land and buildings in certain areas, encouraging the establishment of an equitable and efficient system of compensation for victims and ensuring that compensation matches public expectations, within the limits of the current system of compensation and given the new environmental demand for sustainable development. Finally, where appropriate, local authorities should encourage national governments to consider setting up a national disaster compensation scheme.

Insurance companies can play an important role in reducing the costs arising out of disasters. Most insurance policies are based on a broadbrush assessment of risk, usually based on past claims. Higher premiums may be charged if the insurance company believes that a higher level of risk exists. In some areas the level of risk is such that cover may not be available at all.