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The Impact of Natural Disasters

The Facts

In the developing countries, natural disasters take a heavy toll in human lives, are an impediment to economic development and a factor in social instability

On a worldwide scale, the amount of people affected by disasters has increased by 6% per year over the past thirty years: more than three times the growth in the world birth rate. Among these, more than 94% are victims of natural disasters. Out of the 3 million deaths and the one billion disaster victims of the past twenty years, 89% were in developing countries. ***Poverty increases the tragic toll exerted by natural disasters on human lives, but also the economic vulnerability of these societies.***

Statistics on the direct costs alone of these national losses compared with the GNP are twenty times higher in the developing countries than in the wealthy ones. The last hurricane which killed 124 000 people in Bangladesh during the night of April 29-30, 1991 caused a 10% drop in he GDP, while the country was still recovering from the effects of the devastating floods of 1990. The secondary or indirect consequences of the loss of infrastructures and production capacity, often more serious than the direct costs, have a lasting effect by decreasing employment and income, disorganizing services, causing trade deficits, increasing national debt and inflation...

Natural disasters, for many developing countries, are an impediment to economic development and a factor in social instability. They deter international cooperation efforts.

What Does the IDNDR Consist of?

(International Decade for Natural Disaster Reduction)

The Objectives Defined by the UN General Assembly

At its 44th Session held on December 22, 1989, the UN General Assembly adopted a resolution proclaiming the International Decade for Natural Disaster Reduction (IDNDR), beginning January 1, 1990.

The goal of the Decade is to reduce, through concerted international action, in particular in the developing countries, loss of human life, material destruction and social and economic upheavals caused by natural disasters such as earthquakes, storms, floods, landslides, volcanic eruptions and other disasters of natural origin.

Whereas until now international cooperation only mobilized after disasters had occurred, the Decade *focuses on actions preceding these dangerous natural events, namely:*

- The identification and assessment of natural risks;
- The assessment of vulnerability (human lives, material goods, production systems, vital facilities, social and institutional organization...) and the corresponding risks;
- Monitoring, forecasting, warning;
- Definition and implementation of long-term means for reduction or prevention (building practices, land use, planning and land management, strengthening or restoring the environment and institutional consistency...);
- Short-term protection measures; crisis preparedness and disaster management;
- Training, education, information and communication.

The United Nations especially recommends that each country:

- ***Make available knowledge and scientific and technical means to communities exposed*** to dangerous natural phenomena, in order to reduce their catastrophic consequences;
- ***Ensure a global and multidisciplinary approach to the issues,*** in particular, to encourage synergies between scientific, technical, sociological, economic and planning sectors... and to break-down specialization barriers within each sector.

France's Support for the Objectives of the IDNDR

1. The French committee for the IDNDR was established by an inter-ministerial order of September 18, 1990. This committee has the following mission with the Minister responsible for the prevention of major risks:

- to participate in the preparatory studies and the implementation of the decisions taken by the relevant institutions of the United Nations Organization;
- to promote the carrying out of operations which meet the objectives defined by the United Nations Organization within the framework of the Decade, by the various French institutional, economic, scientific and technical actors, aimed in particular at aiding the developing countries reduce the effects of natural disasters;
- to promote the development of French skills and know-how in the area of the reduction of natural disasters, on the national level as well as internationally.

2. The committee should strive to cooperate with the international actors concerned by the Decade, in particular the committees of the member States of the European Union.

3. The French committee for the IDNDR is composed of 21 members appointed for three years representing the state (6), the scientific community (6), the local authorities (3), associations (3) and the media (1). It's composition was determined so that it serves as a true meeting place for different specialists concerned with the Decade whether scientific, technical, administrative, economic, sociological or educational.

4. The French committee is a meeting place for reflecting and making proposals, and is backed by the entire French scientific and technical community. The relevant ministries, and in particular those responsible for the prevention of major risks, for research and foreign affairs, are fully entitled to attend the meetings.

The Contributions of France to the Objectives of the IDNDR

1. Since the early 1980s, France has been developing, at the national and international levels, actions which fit perfectly within the framework adopted by the United Nations, under the direction of the ministers responsible for the prevention of major risks (Office for Major Risks, "DRM, Délégation aux Risques Majeurs") and the Civil Defense (Civil Defense Headquarters). The Ministry for Foreign Affairs has also contributed to the financing of cooperation actions.

2. These actions are being pursued and expanded within the framework of the Decade. But the Decade has also helped launch more ambitious programs, in France and for international cooperation, with particular North-South programs, with transfers of technology and knowledge.

France's structural and legislative provisions

In order to manage its policy for the **reduction** of natural risks, France has adopted specific administrative structures: a decree of April 10, 1984 established the Office for Major Risks or "DRM", responsible for assessing the means for reducing major risks from natural causes and for suggesting measures aimed at reducing their effects. Furthermore, the "DRM" is contributing to the drafting of programs for using the available means of national emergency assistance in the event of natural disasters, and suggests appropriate inter-ministerial coordination measures.

Though preventive actions in France are coordinated by the Ministry for the Environment (within which the "DRM" operates), it is the Ministry for the

Interior—the Civil Defense Headquarters —which are in charge of directing, managing and coordinating assistance actions in the event of a crisis.

As for legislation, the principle steps in the reduction of major risks were taken in France as early as 1935 by establishing a flood-prone areas' plan, followed in 1955 (with a ban on building in areas subject to particular risks) and in 1967 with the implementation of zoning regulations ("POS") that take into account natural risks, and in particular the first zoning maps for risks initiated during the 1960s-1970s ("ZERMOSS"). This legislation was reinforced during the 1980s-1990s, with two major laws in 1982 (the law compensating natural disasters, followed in 1984 by the implementation of the plans for exposure to risks ("PER") and in 1987 with the law organizing civil defense and the reduction of major risks).

The law of February 2, 1995 created Natural Risk Reduction Plans ("PPRs") replacing the "PERs" and other risk zones; this law gives the state, in addition, extraordinary police powers allowing expropriation in the event of a foreseeable major risk.

All this legislative arsenal gives a solid legal basis for preventive actions undertaken in France. Moreover, a commission for assessing public policy for the reduction of natural disasters was established at the end of 1995 in order to suggest improvements and to increase the policy's efficiency. Its report will be released in early 1996.

Preventive and planning actions undertaken by France

Under the direction of the Office for Major Risks ("DRM"), the French policy for the reduction of major risks has been implemented, in particular, since 1984, at the following separate levels:

- developing and **improving scientific knowledge** of the phenomena causing natural disasters, in the field of geology (earthquakes, volcanic eruptions, landslides) and in the atmosphere (storms, hurricanes), with their inferred risks (floods, avalanches, forest fires);
- taking into account natural risks in regional planning, and in particular, the implementation of the plans for exposure to risks;
- implementation of work for protecting against the effects of natural disasters, such as dikes and sea-walls (against floods, heavy swells), or flood-control dams, of avalanche, storm and earthquake proof works, and/or works preventing landslides and/or works for the prevention of forest fires;
- preparing and implementing **training** programs in risk-awareness and in **preventive information** on natural risks and the populations' behaviour education in the event of a crisis.
- The **budget** attributed by the French state to the "DRM" in order to carry out the above-mentioned policy amounts to around 25 million French francs yearly, since 1984; it was increased to 40 million French francs per year in 1995.

To this budget for coordination and implementation of the risk reduction plans ("PPRs") since 1995, must be added the budgets of the Ministry for Foreign Affairs, (Humanitarian Action Department) and the Ministries for Research, for Infrastructures, for the Interior, for Agriculture and for French Overseas Territories and Dependencies ("DOM-TOM"). Moreover, in some regions (including the French Antilles), the Regional General Council contributes additional funding.

- Under the leadership of the Civil Defense Headquarters at the Ministry for the Interior, preparation for crisis management is organized on several levels:
- by **implementing monitoring and warning networks**, in cooperation with the Ministry for Infrastructures and the Ministry for the Environment (monitoring

of landslides, forecasting torrential floods, flood warnings, monitoring volcanoes, forecasting hurricanes, "ready to strike" air surveillance in combating forest fires, forecasting avalanche risks...);

■ by **preparing for crisis situations,** at all levels of responsibility: state, department, commune. These planning measures are first concerned with the preparation, drafting and continuous up-dating of emergency assistance plans, and with readying personnel through training and physical fitness exercises, and by equipment and operational preparedness.

There are two types of emergency assistance plans:

■ **Emergency plans,** which mostly concern the departmental level, these "specify measures to be taken and the emergency assistance means to be implemented in the face of particular risks or risks linked to specific facilities and their operation." The measures to be taken are optional and presented on flash-action cards for the use of each person in charge clearly identified as the most likely actor in a situation. Those in charge locally are given great latitude in decision-making depending on the given situation;

■ **ORSEC plans** (assistance organization plans), are structural plans that "are inventories of the public and private means which can be used in the event of a disaster and defines the terms and conditions for their use by the relevant authority directing assistance". The ORSEC plan is usually implemented in conjunction with one or several emergency plans already launched, in order to strengthen their organization and logistics.

All these plans are being modernized. This approach is taking into account **feedback** and the capabilities offered by computerization: networking of operational actors, decision-support systems integrating geographical data systems, simulation and e-mail systems.

As soon as an accident or disaster is serious enough to overwhelm the emergency capabilities of a commune, the French doctrine for furnishing assistance provides for rapidly organizing operational units under the single command of a prefect, representing the state in the department, with the aid of a warning network specified in the emergency assistance plan. The efficiency of the implementation of this system is greatly increased if the system is equipped with a pre-warning mechanism so the assistance means are on alert.

This explains the essential function of forecasting natural phenomena, integrated with monitoring and warning systems.

Personnel preparations

Personnel is considered essential. Professionalism at all levels is very important in ensuring efficiency and can only be garnered through the implementation of a high quality training policy: the preparation and obtaining of basic trades and qualifications, continuous improvement, continuing education. A special effort, under implementation, is being geared towards the continuing education of the decision-makers, in particular by a more adequate approach to disaster situations of the tactical reasoning method and by an increased awareness in its use and practical training with modern decision-support tools.

Decision-support also requires establishing, over the entire territory, a group of experts in all the risk fields. These experts, which are most of the time in charge of prevention, are members of the operational crisis cells.

Material preparation

The skill of the personnel would not suffice without the appropriate material means for each situation, these being constantly improved and maintained. Civil Defense Headquarters has made a continual research effort in the developing of new emergency assistance equipment, of

innovative operational procedures, as well as of the monitoring, communications, operations' management and decision-making support systems.

Specific Contribution of France to the Objectives of the IDNDR

Within the framework of the actions of the French committee of the IDNDR, the choice of specific actions of France has focused on two specifically exposed areas, the Mediterranean shoreline on the one hand and the "Antillean-Caribbean-Central American" regions on the other.

The Mediterranean Program

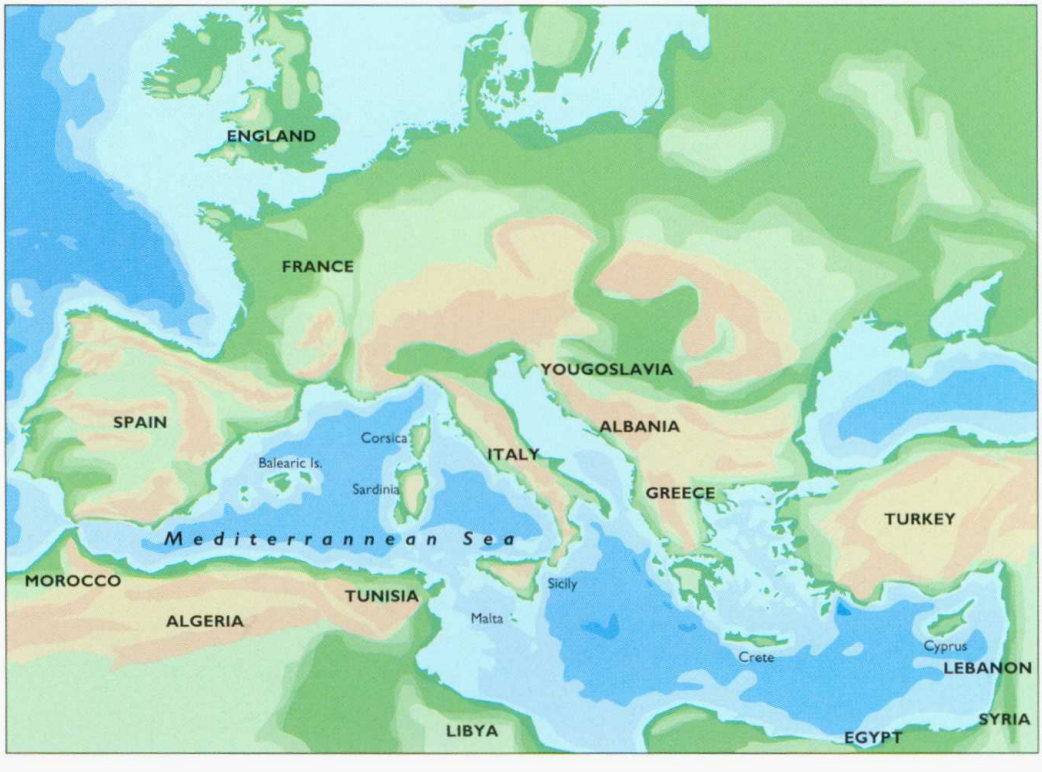
The Mediterranean program consists of **four actions** of which two are theme-oriented, concerning major risks (seismic and climatic, including floods), and two are more holistically-oriented, under the name "roving seminar in the Mediterranean" (RSI-MED) and "risk management in Mediterranean urban complexes". This program was launched in 1992 in the field and is currently being carried out.

1. Seismic risk is linked to relative shifts in plates and micro-plates that ***cause high magnitude quakes.*** This occurred recently in Morocco (Agadir), in Algeria (El Asnam-Chleff; Tipaza), in Italy (Irpinia, Friuli) in Yugoslavia (Skopje, Montenegro), in Greece (Kalamata) in Turkey (Anatolia).

Seismic risk has been studied using two methods over a 3 to 4 km² experimental area in the center of the city of Nice (France):

- An experimental method that permitted defining homogeneous areas based on the response of recorded sites (with the help of seismometers and accelerometers);
- The digital method.

This study's findings have been released in 1995; its "output" will be "inputted" into the vulnerability study.



Indeed, **seismic micro-zoning and vulnerability assessment** will be carried out simultaneously in order to reduce seismic risks and implement preventive planning in Nice and other cities.

2. Climatic risks, resulting from conflicts in air masses, activated by strong convection from ocean-atmospheric thermal contrast can result in short-lived but serious ***torrential rains*** (see the catastrophic run-off in Nîmes, 1988 and in Vaison-la-Romaine in 1992). Symmetrically, a weak flow of humid air masses from the "polar front" in particular, encourages the extension of ***drought*** in the Maghreb region and eventually over some areas in Southern Europe, where human activity (for example deforestation) increases the drought's effects, with serious consequences on economic and social development.

Torrential rains: the "variable grid" "ARPENGE" physical-mathematical model of the National Meteorological Directorate ("DMN") will find important applications in the local forecasting of these phenomena. Its association with hydrological mathematical models represents the key to future important practical developments in the forecasting of floods and flash floods. The application of these models in exposed cities on the Mediterranean shoreline should lead to effective risk reduction plans.

A meeting was organized on October 25, 1994 to inform the Mayors on "flash-floods and urban run-off", in the 24 departments of South-Eastern France where the book **"Exceptional Hydrological Phenomena"** was introduced.

3. Roving awareness seminar in the Mediterranean

This action is coupled with the "demonstration project" chosen by the Scientific and Technical Committee of the United Nations designated as the "Roving Seminar". It's purpose is through a roving scientific and technical exhibit, associated with round-tables and discussions, to increase the awareness of the population and elected officials regarding the kinds of natural risks in the Mediterranean, their formation and impact, as well as means for preparing for crises and current prevention techniques.

The first RSI-MED seminar is to be held in Rabat (Morocco) in November 1995.

4. Risk management in large urban centers

This project proposes to undertake a study on management methods for natural risks in the development and organization of large cities that are likely to become megalopolises in the next century. This management is based on three elements:

- An urban ***architectural and space outline.***
- From the preventive angle, ***specific protection of "vital" facilities and functions,*** in particular public facilities (schools, hospitals, transportation, parking lots, etc.), networks (gas, drinking water, sanitation; telecommunications; energy), regulated facilities.
- ***Prevention, monitoring, warning and intervention,*** through a defensive system combining a variety of means of automated control (computerized systems and networks) of data transmission, and the assessment and decision-making methods at the various levels of public safety action. The objective is to also deal with all means of preparation whether individual or collective, based on the social sciences, available to the public authorities.

The Antillean-Caribbean/ Central American Program

The "Antillean-Caribbean-Central American" program, concerns one of the regions of the world with the greatest exposure to major natural risks.

The islands of Martinique and Guadeloupe are the two French departments which are the most exposed to natural disasters; over the past centuries and even recently, they were hit by catastrophic phenomena of worldwide renown: the Pointe-à-Pitre earthquake in 1843, volcanic eruptions of the Pelée Mountain (1902) and the Soufrière (1976), the hurricanes of October 1780 (which caused 9,000 deaths in Saint-Pierre), of 1928 (1,200 victims in Martinique) and of 1989 (Hurricane Hugo in Guadeloupe) and of 1994 (hurricane Debbie, which devastated Sainte Lucia and southern Martinique, in September 1994 and hurricane Gordon, on Haiti, two months later.

Considering the consequences of these risks for the French West Indies, preventive actions have been undertaken well before the implementation of the programs of the French committee of the IDNDR.

Therefore, the committee suggested completing and strengthening the current programs, in the area of "seismic", "volcanic" and "hurricane" risks, at the various prevention levels previously mentioned (see paragraph: improvement of knowledge, taking into account the risks, preparing for crisis management, preventive protection, training and information).

The entire program is described hereafter.