French Contributions in the Caribbean Region

During the IDNDR International Conference organized by the UN in Yokohama (Japan) in May 94, a CARIBBEAN workshop was launched by the Ministry for Foreign Affairs (Humanitarian Action Department). Its aim was to define the options that France could implement in the Caribbean region.

Considering the workshop's success, France decided to organize a seminar bringing together the representatives of the countries of the region interested in the French proposal, in order to draft projects that correspond to France's proposal and these countries' requests.

Following a preliminary mission of a French expert in the area in October 1994, the seminar, was held on November 14 and 15, 1994 at the Regional Council of Guadeloupe. It brought together both political and scientific representatives from countries of the "Caribbean/Central American area" and representatives of regional (OPS/PAHO, CDERA, OECS, CEPREDENAC) and international (UN/IDNDR and ECHO) organizations. The relevant French administrations were also fully represented: Ministry for the Environment, for the Interior, for Foreign Affairs, Inter-ministerial Delegation for Cooperation in the Caribbean-French Guiana Region. Finally, organizations for which the IDNDR's actions are relevant completed this extensive panel: "IPG" (Geological Prospecting Institute), "BRGM" (Office for Geological and Mineral Exploration), "AFPS" (French Association for Anti-seismic Engineering), "CREDA" (metropolitan and/or local representatives).

At the end of the meeting, a final document was issued; it includes the 4 cooperation paths that France has decided to encourage in full agreement with the relevant states, as early as 1995, namely:

- **Technical and scientific training.**
- **The establishment of a network of cities that are determined to work together to exchange their experiences in the area of the reduction of major risks.**
- **Preparedness for the management of major crises.**
- **The dissemination of information and increasing the awareness of the public authorities to the prevention of risks.**

Scientific and Technical Training on the Natural Risks and the Reduction of Related Risks.

Seismic risk

Within the scope of a "State-Region" planning contract financed by the regional councils of Guadeloupe and Martinique, the Office for Major Risks ("DRM") and the "BRGM" (Office of Geological and Mining Exploration), a program for assessing the overall geological risks was developed from 1986 to 1991.

This program is focused on seismic and related landslide risks. It has already resulted in the drafting of micro-zoning maps for risks in the cities of Fort-de-France and Pointe-à-Pitre in particular; these documents include practical recommendations in the area of planning and earthquake-proof construction. Since 1991 the program's goal has been to develop an assessment of the vulnerability of works and constructions.

In Guadeloupe the study campaign on physical vulnerability is underway, in the center of the city of Pointe-à-Pitre, to obtain vulnerability curves assessing seismic risks; later, the same seismic measuring campaign and "site-response" as the one in Fort-de-France is planned in order to improve knowledge of seismic sources and the underground structure of Pointe-à-Pitre.

All these programs have been completed and intensified, by relying both on the "IPG" and the National Institute for the Sciences of the Universe "INSU" and the "BRGM": improving seismic monitoring of the region of the French West Indies; recording of strong dynamic soil movements, in order to assess their reactions; experimental measures of site-effects, in order to control the reliability of the microzoning studies; (in Martinique, a study campaign of "site responses" over a 120 km² area was carried out in 1992/1993 by an "IPGP" team. The findings of the campaign permitted a reassessment of the seismic risks in the area in question and will be used in drafting the "PPR" of Fort de France) analysis of the relations between seismic tremors and slope instabilities; research on individual anti-seismic and anti-hurricane dwellings (and compatibility of the two). Furthermore, within this framework, the current network of seismic stations has been expanded.

Through seismic and micro-seismic monitoring of active faults in urban or developing areas, earthquakes will be taken into account during construction (anti-seismic) and urbanization (zoning of the risk areas). In each homogeneous zone, parameters are to be defined for use by structural engineers in conformity with the specific regulations in force in France, for construction of "buildings" and "individual dwellings".

Over the past 10 years and through its 400 members, the French Association for Anti-seismic Engineering ("AFPS"), has initiated a series of actions aimed at the continuous improvement of knowledge on the consequences of earthquakes. The association has also sent expert missions—under the auspices of the Office for Major Risks ("DRM"); to inspect the condition of the works following major earthquakes, these missions represent an essential source of improvement in anti-seismic engineering knowledge.

All these actions have contributed to establishing anti-seismic regulations (from feedback to the ensuing synthesis), which is contained in a CD-ROM entitled "Terra", made available and presented in Vienna (Austria) during the 10th European Conference on Anti-seismic Engineering (August 28-September 2, 1994).

These tools, and the corresponding know-how (methodology) will be transferred and applied in the neighbouring countries of the Caribbean region.

Volcanic risk

In the area of **volcanic activity**, actions have been developed over several years by French teams of the "IPG/BRGM" for monitoring volcanoes in the various relevant fields: geology (analysis and chronology of deposits), geophysics (seismicity, magnetism, etc.) and geochemistry (gas analysis, the rôle of Radon).

The observatory of the Soufrière can also offer a training base for French specialist ("IPG", "BRGM", Antilles University), to train scientists and engineers of the various countries of the Caribbean basin responsible for the study and reduction of seismic and volcanic risks.

The program developed by the French Committee of the IDNDR has the following purpose: the study of the eruption mechanisms and frequencies and the mapping of the corresponding risks, in order to draft emergency assistance plans in the event of a crisis.

Geophysical research has been carried out by the same French teams in Nicaragua and Costa Rica with assistance from

national teams, to transfer and adapt acquired know-how and apply it to active volcanoes in this Central American region. Geochemical research has been carried out on a similar basis in Costa Rica, following the installation in March 1993 of Radon detectors around the local volcanoes and of an analysis laboratory in San Jose.

Two kinds of studies are being undertaken:

■ Studies on geology, to determine likely eruptions:

Thus, sequential studies carried out on Pelée Mountain in Martinique and on the Soufrière in Guadeloupe in search of events during the pre-Columbian period.

■ Detailed studies to better understand how volcanoes work, within the scope of the program PRE-VO, financed by the Ministry for Foreign Affairs and conducted in Costa Rica on the Rincon and Vieja volcanoes (active on the basis of 3 eruptions over ten years) and Arenal (permanently active, after being dormant until 1968). These studies are linked with the development of gaseous-phase chromatography in Guadeloupe.

Hurricane risk

Regarding the **hurricane risk**, France has specialized centers for studying and monitoring meteorological phenomena in Martinique and Guadeloupe. The Inter-regional Antilles-French Guiana Service ("DIAG") is based in the Martinique and Guadeloupe centers, and managed by Météo-France. There is also a specialized research unit on these phenomena based in Pointe-à-Pitre at the University of Antilles-French Guiana ("UAG").

A large number of activities are managed by "SIAG" for improving meteorological knowledge of the region:

■ specific studies on forecasting the amount of precipitation;

■ studies and implementation of data on hurricane paths (HURDAT Program);

■ study of the implementation of weather radars, in Guadeloupe and Martinique.

However, with the goal of international cooperation in mind, a project has been developed by Météo-France with the support of the inter-ministerial office for Caribbean-French Guiana regional cooperation, and with financial support of the Office of Major Risks at the Ministry for the Environment. This program's purpose is to implement equipment for measuring winds, in the event of tropical hurricanes. The project will give Martinique and Guadeloupe, i.e., the French departments of the West Indies, measuring instruments for swells and tides, the data recorded by these instruments will be made available to the countries of the Caribbean region. This vast program, called "Océantilles", is associated with the project for measuring high sea-levels produced by hurricanes, at the central service for meteorological analysis ("SCEM") and will contribute to improving forecasting of hurricanes and combating their effects in the Caribbean region.

Scientific and technical training

Technical training sessions are organized at the Soufrière Observatory (Guadeloupe) by the Institute for Global Physics in cooperation with the "BRGM", the University of the Antilles-French Guiana, Météo-France and other specialized French and regional organizations. These meetings will focus on a better understanding of the risks (seismic, volcanic, tropical hurricanes, floods, landslides), on new analysis techniques and technologies (computerized mapping methods, geographical information systems, remote-sensing techniques, monitoring methods, etc.), prevention methods (in particular earthquake and hurricane-proof construction standards) and crises management preparedness.

Furthermore, the "IPGs" activities in the Lesser Antilles are being developed

through the stationing of two *cooperating agents* on a regional basis, *one in Sainte Lucia*, in March 1995, to improve seismic networks, retrieving gaseous samples, selecting potential trainees and the implementation of specialized equipment (2 seismic stations, gaseous sample retrieving equipment); *the other in Trinidad*, at the seismic research center (from May 1995). These two cooperating agents will be supervised by the "IPG" of Paris, Martinique and Guadeloupe. In the two sub-regions of the Caribbean, two French cooperating agents are scheduled to be stationed in Nicaragua and Santo Domingo.

Contribution at the level of studies and prevention of risks in large cities

Within the framework of the programs financed by the Ministry for the Environment, the Ministry for Research and the Martinique and Guadeloupe regions, a demonstration project is underway in the cities of Fort-de-France and Pointe-à-Pitre (GEMITIS project from the Greek "gé" = earth and "mitis" = soft, temperate: gemitis = civilized lands).

It's purpose is to lower the risks linked to earthquakes, hurricanes and landslides in the high-risk areas of large cities.

Carried out under the coordination of the "BRGM", with the cooperation of the "IPG", of Météo-France, of the University of Antilles-French Guiana, its main objectives are the following:

- improving methods for assessing the risks and vulnerability of constructions, and of social, functional and institutional vulnerability;
- adapting anti-seismic and anti-hurricane building regulations to local circumstances;
- developing programs for preventive improvements and planning, integrating the reduction and management of risks;
- training, educating, and heightening the awareness of the populations and engineering services, organizing preparedness for crisis management;
- applying these strategies in other cities in the Caribbean basin.

The relevant administrative services and authorities for each of these programs are systematically involved in the working-groups implemented.

The multi-annual "Géminitis-Caraibe" program (1993-1996) proposed for the reduction of risks in problem areas of two major cities in the Caribbean (Pointe-à-Pitre and Fort-de-France) are aimed at testing and applying a methodology for the analysis and reduction of risks which can be transferred to other large cities in the Caribbean.

In 1994, the program enabled developing, under a geographical data system, a method for assessing the vulnerability of buildings to earthquakes, at the scale of a large city, and to apply the method to the city of Pointe-à-Pitre (Guadeloupe).

As part of a French action within the scope of the International Decade for Natural Disaster Reduction, the proposed program is aimed at serving as a demonstration of methods and techniques which can be disseminated and reproduced in other urban sites in the Caribbean.

Thus it is definitely geared towards developing methods that are technically and financially accessible in developing countries.

GEMITIS Cities program
(Antilles-Caribbean and Central America)

Based on the demonstrations carried out in the cities of Pointe-à-Pitre and Fort-de-France in the area of risk assessment, preventive planning and crises management preparedness, the GEMITIS Cities program will apply to the capitals of the Caribbean-Central American region. Its purpose is to help the municipal authorities and those in charge of safety and relief operations on the local level, to organize, themselves to carry out programs similar to those developed in the French West Indies:

■ Identification and analysis of major risks linked to dangerous natural phenomena, map of the risks;

■ Implementation of preventive building codes adapted to local practices;

■ Introduction of prevention plans in the urban development schemes;

■ Drafting of crises scenarios, for crisis management preparedness (operational and functional aspects);

■ Information on natural risks in urban environment.

The programs will lead to establishing a *GEMITIS Network*, of Caribbean cities, an effective system for discussing and trading experiences where each partner will participate in adapting preventive strategies which have been experimented or are under improvement.

These will require organizing regular meetings and technical seminars during which case studies will be discussed, dealing with regional issues or experiences to which concrete and appropriate solutions will be sought.

Prevention programs launched within this framework will be constantly monitored and adapted gradually, and each partner will be able to benefit from these.

The establishment of this network is currently under consideration. A number of capitals of the Caribbean and Central American region have already expressed a keen interest in participating.

Crisis Management Preparedness

Programs implemented by the Office for Major Risks ("DRM") for geological risks avoidance, were completed as early as 1991 by further down-stream developments aimed at improving crisis management.

Moreover, the intervention capabilities from our two French Departments of the Eastern Caribbean (Martinique and Guadeloupe), in particular for the OECS countries, have been increased substantially with the help of a two-tiered program aimed at the member countries of the OECS.

■ The first tier was initiated by the prefecture of Martinique, with the contribution of the Inter-ministerial Office and the Caribbean Fund. It concerns supplying equipment for a first-aid base aimed at interventions in the countries of the OECS, the strengthening of radio communications with these countries (Military Radio Band 'BLU' links), and training for the personnel (first-aid workers, firemen, doctors and medical auxiliaries). The local authorities of both Martinique and Guadeloupe are closely associated in this operation.

■ The second tier is financed and supervised by the Ministry for Cooperation and covers all the countries of the OECS, it concerns hospital preparedness in the event of disasters and for the management of emergency assistance. It reflects the joint technical cooperation between France and the Pan-American Health Organization, the guidelines of which were defined in 1990, and which provided for the participation of the two French Departments of the Eastern Caribbean (Martinique and Guadeloupe) in inter-island assistance.

These programs are covered, for the most part, by the Ministry for Cooperation and by France's Caribbean Inter-ministerial Fund ("FIC"). They are proof of the concern France has for the development of a concept of regional cooperation in the face of major disasters.

Obviously, in the event of a crisis, each country has its emergency plans, and its experience with dealing with the events. However, international cooperation and solidarity allow for initiatives which reach well beyond the national sphere. The following points should be focused on:

■ synthesizing and managing in the long run information on the evolution of the causes of natural phenomena (regional scale);

■ interpreting the data for the purpose of issuing warning messages to the populations;

■ implementing of the first emergency measures: appropriate assistance is largely dependent on the quality of international coordination, as well as on an assessment that is as fined-tuned as possible of the nature and seriousness of the destruction caused to these populations. This is particularly significant in the health care and medical area.

In the French departments of the West Indies, emergency plans of action in the event of volcanic eruptions or hurricanes can be launched at any moment and integrate efficient forecasting, which has made it possible for hardly any instances of loss of life to occur over many years in spite of the occurrence of several catastrophic events (Soufrière volcano, hurricane Hugo, etc.). Feedback, in particular concerning hurricanes, is analyzed and taken into account in the improvement of assistance plans.

Contribution at the Training and Preventive Information Level

Prevention is also dependent on informing the populations of the risks they are exposed to and the mechanisms which can contribute to a better assessment of risk impact, and the protective measures to be taken. This information must be written in clear and understandable language and regularly updated, taking into account the population's mental concept of the local natural risks and the effectiveness of prior experience.

Prevention should also include teaching proper attitudes in particular for building homes in risk areas (gullies, shorelines). Informing the populations and taking some precautionary measures to forestall many human tragedies. Though the above-mentioned public education remains, for the most part, up to the public authorities, the experts (researchers, risk engineers), associations and the media should be closely involved.

The quality and efficiency of the information and training effort will directly affect, to a large extent, the understanding the populations will have of the messages received from the public authorities in the event of a crisis and the ensuing collective behavior. With this in mind, the Office for Major Risks ("DRM") asked the Union of International Engineering Organizations (UIEO) to organize, during the International Conference of the IDNDR in 1993 a seminar on preventive information in Guadeloupe. This national seminar enabled an inventory to be made of the methodologies and teaching tools developed in France by "DRM" and available for consultation (in particular its pedagogical briefcase which includes information booklets—over a dozen—and slides on each natural or technological risk and a video film on all the major risks).

The French Conference of October 1993 for disaster preventive in the French West Indies was followed by an international seminar, entitled ICAROS (IDNDR CAribbean ROving Seminar), in order to simultaneously extend and even expand, on the Caribbean level, the discussions held and the results obtained at the level of the French West Indies. This call was directed towards the neighbouring West Indian countries, along the Lesser Antilles arc (the Bahamas, Saint Kitts and Nevis, Anguilla, Dominica, Saint Lucia, Saint Vincent and the Grenadines, Barbados, Trinidad and Tobago.).

In concluding the seminar, the participants recognized that enough progress had not yet been accomplished in the region in the field of reducing vulnerability to disasters (social as well as economic) and that the situation had to be improved rapidly. The roving natural risks awareness seminar formula seemed to satisfy this wish. Thus, the ICAROS program was born.

ICAROS Roving Awareness Program

This program—which will be carried out over the second half of the Decade, ***1995/2000 Period***—will include the following different actions:

Phase 1:

■ 1995-1997: Roving exhibits throughout the Caribbean basin (French, English or Spanish-speaking islands and countries) and production of the documentation needed for the roving exhibits (posters, videos, data briefcases, brochures...).

Phase 2:

■ 1998-2000 Adapting the documentation to new prevention technologies, and pursuit of the roving exhibits.

The roving seminars and exhibits will have the following subjects as their main themes:

■ 1. Presenting the risks for the countries concerned by the project.

■ 2. Description of the vulnerability of the countries.

■ 3. Impact reduction technologies:

- construction techniques and codes;
- soil use related to the risks;
- environmental protection, deforestation, protection of the populations exposed to risks.

■ 4. Warning systems:

- Hurricanes, floods...
- Volcanic eruptions, landslides...

The first ICAROS seminar was held in Dominica on March 27, 28 and 29, 1995, in the Lesser Antilles

The second seminar will be held either in Venezuela, in South America, or in Puerto Rico in the Greater Antilles.

The next seminar should concern Central America.

The seminar on increasing awareness to natural risks held in the Caribbean from March 27 through 29, 1995, confirmed in practice the French proposal made in Yokohama, just ten months before, during the International UN Conference on the Reduction of the effects of Natural Disasters.

"ICAROS 95", is a seminar on increasing awareness to major natural risks and has illustrated one of the major subjects in the chain of preventive actions: preventive information.

This new event conducted at France's initiative and with French financing, was characterized both by the impact of its message, and by the total commitment of the participants to the recommendations adopted at the various seminar sessions.

The real success of the operation shows the importance granted (by the representatives of the dozen Caribbean countries assembled in Dominica) to the priority given by France to increasing awareness to natural risks such as earthquakes, volcanic eruptions and hurricanes... This subject served as a catalyst of the interest not only of the representatives of the Lesser Antilles, but also of all those from the Greater Antilles and Central America who also attended.

The subject and geographical impact explains the consensus that emerged on March 29, 1995 at the end of the seminar, in expressing the recommendations, the outline of which can be summarized as follows:

■ The need to implement an appropriate mechanism for informing decision-makers of potential crises;

■ Priority given to weather warning systems and to emergency plans regarding volcanic or seismic risks;
■ Need for the information to be freely disseminated;
■ General agreement to hold an Annual Caribbean Conference such as ICAROS 95, with the executive committee including not only the Secretariat of the OECS, but the CEPREDENAC (Central America) and the FUNVISIS (Venezuela);
■ Implementation of building codes suited to the region, and of mechanisms for reviewing and improving insurance systems in the region.

It goes without saying that the priority expressed in these recommendations concerns the gathering and dissemination of data on major natural risks.

The synergy France can instill in the application of this priority measure will testify to France's presence in the Caribbean region.

Through the potential spin-off, some of which was already noticeable during the ICAROS 95 seminar, the impact of France's contribution to the UNs IDNDR can already be seen in the region.

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