

REDUCING THE RISKS OF NATURAL DISASTERS THROUGH HEMISPHERIC COOPERATION

Note by the Secretary General
Organization of American States¹
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SECTION ONE: EXECUTIVE SUMMARY AND STEPS AHEAD

The development trajectory of a number of countries in the hemisphere of the Americas is increasingly being dictated by natural disasters. The cumulative impacts of the 2004 and 2005 hurricane seasons are strong reminders that natural disasters are neither stand-alone nor anomalous incidents. Rather, they comprise a recurring and potentially accelerating pattern of events that are taking a significant toll, measured in deaths, human suffering, direct economic costs and longer-term developmental implications.

Given this pattern, responses to natural disasters require close coordination *within* countries -- including coordination among federal and various sub-federal, municipal, private sector and community entities and groups. Given the shared threats that countries of the region face, couple with the technical expertise and capacity different countries have developed, natural disasters create the opportunity to build international cooperation *among* countries of the hemisphere. Such cooperation comprises technical information such as the sharing of best practices, the development and dissemination of early-warning information systems, governance-related capacity-building such as adherence to land-use planning aligned to hazard-mapping, and the enforcement of appropriate buildings codes and standards.

The opportunity to amplify existing cooperation within the hemisphere has never been greater, in light of the dimensions of disasters. Evidence shows the cost of natural disasters – measured in the number of deaths and injured, displaced refugees, direct economic damage costs, and longer-term indirect costs that include foregone development opportunities – is at unprecedented level, and set to increase. Natural disasters on average cost the world economy, on average, more than US\$50 billion per annum. Since 1965, natural disasters have directly affected more than three billion people, and led to the death of more than three million people.

Although there has been a tendency to view natural disasters as an important but nevertheless “technical” or isolated issue, progress in addressing natural disasters depends on engaging the policy or political process, as well as advancing in the technical arena. From an economic perspective, natural disasters exert a significantly negative impact on employment and poverty – two of the key themes of the 2005 Mar del Plata Summit – and undermine economic stability. Natural disasters are especially costly for smaller developing countries – including the Caribbean and Central America countries – and their poorest peoples. An analysis by the International Monetary Fund (IMF) presented in a joint report on natural disasters prepared by the OAS, IMF, Inter-American Development Bank (IDB) and World Bank (August 2005) shows that natural

¹ This report by the Secretary General has been prepared with the assistance of the Office for Sustainable Development and Environment (OSDE), Organization of American States (OAS), General Secretariat. The lead author is Scott Vaughan, with valuable input from Stephen Bender, Jan Vermeiren, Jean-Marc Racine, Pedro Bastides and Oscar Ceville of OSDE, as well as an outside experts, Dita Kubin. Recommendations contained in the report are partly drawn from an August 2005 joint report on natural disasters, prepared by the Inter-American Development Bank, International Monetary Fund, OAS and World Bank, entitled *The Economics of Disaster Mitigation in the Caribbean: Quantifying the Benefits and Costs of Mitigating Natural Hazard Losses*. Washington, DC. Views expressed in this paper do not necessarily reflect the views of the GS/OAS, its member countries or the above international organizations.

disasters negatively affect the Gross Domestic Product of many affected countries; exert negative effects on fiscal balances and balance of payments; create inflationary pressures; and have spill-over through various channels that create macroeconomic instability similar to other kinds of shocks. A challenge for policy-makers is to shift how natural hazards risks and the potential for disasters are regarded in the policy hierarchy. For progress to proceed, countries need to manage natural hazard risk in similar manner to the way they manage other kinds of core economic, development and financial risks. This requires not only bolstering stand-alone emergency preparedness and response capabilities, but also integrating disaster risk into the agendas and plans of finance hazard events, treasury and key economic sector ministries.

The pattern of natural disasters which has occurred since the last Summit of the Americas reminds leaders that all countries of this hemisphere – large and small, rich and poor – are vulnerable to natural disasters. Based on this shared vulnerability, there is an opportunity for OAS member countries to build-upon current levels of cooperation to strengthen domestic capacities in the four areas of disaster management: mitigation, preparation, response, and recovery.

There is also an opportunity to further strengthen the collaboration within the Inter-American system in order to support the efforts of agencies such as the Pan American Health Organization (PAHO) (in emergency response), of the IDB (in technical capacity building), and of the Pan American Development Foundation (PADF) (in exploring the opportunity for more innovative private-public sector partnerships), especially in the pooling of regional insurance options for post-disaster recovery and reconstruction efforts.²

Recent work by the OAS, following the devastating 2004 hurricane season that affected the Caribbean countries, leaves no doubt that *ex ante* risk mitigation policies are a cost-effective way of increasing the resilience of critical areas, such as residential homes, hospitals, schools as well as infrastructure, compared to *ex poste* reconstruction. It is clear that no amount of planning or investments can erase all risks associated with natural disasters. However, a key conclusion of work not only by the OAS at the project and policy levels (see Section Two), but also by the IDB, World Bank, International Federation of Red Cross and Red Crescent Societies (IFRC), and others, is that it is more cost effective to invest in simple risk reduction measures, as opposed to awaiting a disaster to strike and investing in recovery and reconstruction. To illustrate, the annual cost of earthquake losses in the United States is approximately US\$5.6 billion, while the cost of improving a network of seismic monitoring systems is approximately US\$96 million, or less than 2 percent of the estimated losses (NAS, 2005). The average cost of investing in wind-resistant roofing for residential homes in the Caribbean represents approximately 2 percent of the total construction costs, while investments in ports and other infrastructure to withstand a fifty year storm wave event is roughly 10 percent of total construction costs (OAS, 2005).

Some of the experience described below represents over thirty years of work in risk mitigation projects and policies within OAS member countries. There is a clear opportunity within the OAS system to share experiences, and to support precautionary measures that strengthen the resilience of communities, homes, infrastructure and sectors to disasters before they occur; developing vulnerability reduction policies, planning process using natural hazards information, mitigation projects, and preparedness programs. An important component of effective risk mitigation measures is related to good governance in such areas as ensuring that appropriate building codes

² In May 2005, delegations to the OAS approved a resolution by several Member States, instructing the Permanent Council and the Inter-American Council for Integral Development (CIDI) to establish a joint consultative body of the Committee of Hemispheric Security and the Permanent Executive Committee of the CIDI to help support coordination among different OAS bodies involved in risk mitigation activities.

and standards, once adopted, are effectively monitored and enforced; that the commitments to transparency and public participation codified in the Democratic Charter are embraced by risk mitigation policies, so as to ensure more effective and inclusive delivery.

A final key lesson is that when it comes to risk reduction actions to anticipate and prevent natural disaster impacts, there is strength in numbers. Thirty years of regional programs confirms that OAS member countries are benefiting from cooperation, in areas as diverse as education and training for engineers and land-planners, hazard mapping and the use of GIS systems, the vulnerability reduction of social and economic infrastructure, the pooling of regional insurance schemes, and tying mitigation policies to cost-effective environmental priorities like the restoration of wetlands and reforestation of upper watersheds.

SECTION TWO: RECENT EVENTS, TRENDS AND ECONOMIC IMPACTS

As of early November, the year 2005 already ranks as the worst years on record for the number of hurricanes and tropical storms that originated in the Atlantic Basin. The 2005 season saw for the first time all 21 designated hurricane names used up by mid-October. The season opened early, with Hurricane Arlene hitting Jamaica, Grenada and other Caribbean countries in early June. It comprised over 20 more major events, including Hurricane Katrina devastating coastal regions of Louisiana and Mississippi in August, killing approximately 1,000 people, submerging large portions of New Orleans, and causing tens of billions of dollars in damages. In September, Hurricane Rita destroyed or damaged oil rigs, refineries, residential and commercial properties along the Gulf of Texas. In early October, Hurricane Stan killed at least 1,900 people in Guatemala, southern Mexico and other Central American countries. Almost unnoticed, Hurricane Vince exhibited what several experts called "extremely odd" characteristics as it swerved towards Europe (see Figure 1).

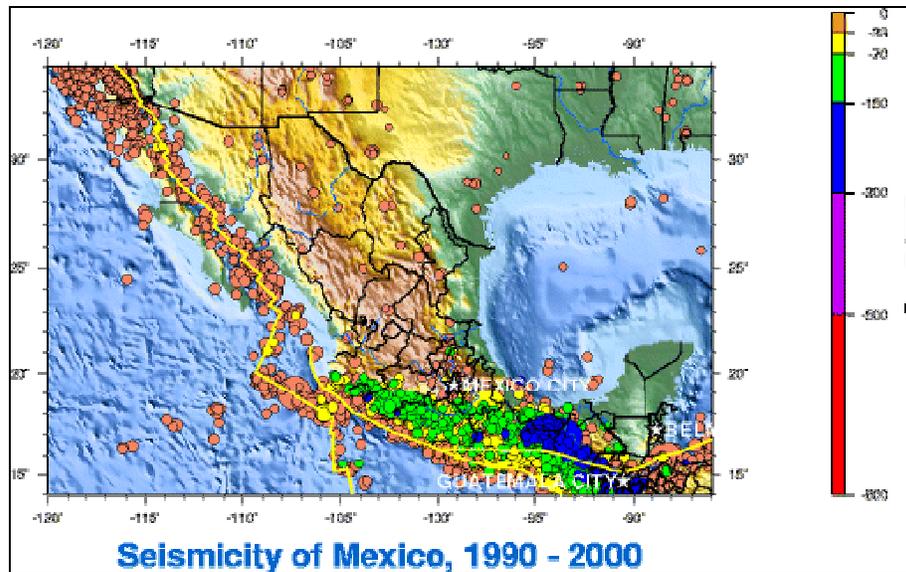
Figure 1. Tropical Cyclone (hurricane) Tracks for 2005

Source: www.wunderground.com

related earthquake losses in the United States alone is estimated to be US\$5.6 billion per year. However, the US National Academy of Sciences recently cautioned that a single significant earthquake has the potential to cause losses of more than \$100 billion (NAS, 2005).

So far in 2005, of the approximately 79,000 people that have died from natural disasters worldwide, the vast majority – almost 60,000 – perished from the devastating 7.6 scale earthquake that struck Pakistan on October 7th, 2005.

Figure 2. Seismicity of Mexico



Source: www.lib.utexas.edu

2.1 EMERGING TRENDS: There is little doubt that in recent years hurricanes and related extreme weather events have increased in their frequency, severity, and geographic range. The direct and indirect impacts in terms of human suffering and direct and longer-term economic losses have also increased. Some projections suggest that this current pattern will likely continue throughout the duration of this decade, and perhaps into the next.³

However, it is worth noting that at the close of 2004, many experts looked back at the preceding 12 months as a record-breaking year that would not likely be repeated soon. From August to November 2004, nine hurricanes hit the Caribbean, killing more than 2,000 people, leaving hundreds of thousands homeless, and causing over US\$60 billion in economic damages. When Tropical Storm Jeanne dumped record rains during mid-September 2004, rivers overflowed, causing the deaths of 23 Dominicans, resulting in the rescue of 40,000 people and affecting overall more than 2 million people. In Haiti, Hurricane Jeanne inundated the coastal town of Gonaives, where floodwaters rose two meters in 30 minutes, killing 1,800 people and leaving 800 missing. Those events, coupled with the unprecedented devastation in Grenada, where some 90 percent of the total housing and building stock was destroyed or severely damaged, were seen as a turning point in moving the issue of natural disasters up the political agenda. One insight into the longer-term implications of the 2004 hurricane seasons is that, as of September 2005, a full year after the events, less than half the public schools in Grenada opened their doors to young

³ It is not the purpose of this Note to review the contrasting arguments regarding overall patterns.

students at the beginning of the new school-year.

Clearly, the events of 2005 have surpassed by a wide margin the events of 2004. Although there are various predictions, it is anyone's guess how 2006 will proceed. What can be done is to look at past trends, in order to extrapolate what the recent future *may* resemble. The Insurance Services Organization, Inc. notes that from 1990 to 1999, six Category III or greater hurricanes moved from the Atlantic Basin to reach landfall in mainland U.S. There were only four such events in the 1970s, and five in the 1980s. By comparison, between 2004 and 2005, eight major hurricanes or tropical storms have hit the mainland U.S.

2.2 THE ECONOMIC COSTS: Extreme natural disasters show an unmistakable pattern of increasing both in frequency and severity. Compared to the 1970s, the number of natural disasters, including wind storms, floods, droughts and earthquakes, that has occurred in the hemisphere has increased three-fold in the 1990s. Economic losses have increased five-fold, reaching US\$1.1 trillion (in 2002 prices) in accumulated losses over the past three decades (see Figure 3).

Figure 3. Natural Disasters Worldwide

Table. Natural catastrophes in the world						
Decade	1950-59	1960-69	1970-79	1980-89	1990-99	last 10 years
Number of events	20	27	47	63	91	63
Economic losses in US\$ billion (2004 values)	44.9	80.5	147.6	228	703.6	566.8
Insured losses	--	6.5	13.7	28.8	132.2	101.7
Memorandum item:						
Economic losses (in percent of world GDP)	0.06	0.08	0.11	0.12	0.24	0.16
Sources: Munich Re (2004) and IMF estimates						

One way of quantifying some of the economic costs of natural disasters is by measuring the increase in direct losses reported to insurance and reinsurance companies. Munich Re estimates that the annual cost of natural disasters worldwide has climbed from US\$75.5 billion during the 1960s, to US\$659.9 billion during the 1990s. Munich Re concluded that 2004 was the most expensive year for natural disasters ever recorded, with direct economic losses for that year capping US\$145 billion. Most insurance and reinsurance companies have concluded that the economic costs of natural disasters are set to increase, because of a variety of factors. Among them, mega-cities have expanded rapidly in many parts of the hemisphere; construction has increased adjacent to hazard-prone areas; and the frequency and severity of hurricanes and tropical storms has unquestionably accelerated in the past decade, and appears to be entering a cycle that may last one or two decades.

About one-third of all loss-events and one-third of total economic losses incurred worldwide are due to the effects of flooding, and nearly one-half of all people killed by natural catastrophes in recent decades have been the victims of floods (Munich Re, 2005). In global terms, the great flood catastrophes of the 1990s alone accounted for losses exceeding US\$ 200 billion. The decade's figures clearly show a dramatic increase both in the number of losses and in the economic and insured losses, even if the figures for the last decade are lower than those for the 1990s. All around the globe we have to reckon with more and more flood catastrophes (Munich Re, 2005).

2.3 DEVELOPMENT IMPLICATIONS: Natural disasters are especially devastating to developing countries, disproportionately affecting the poor. It has been estimated (Rasmussen, 2004) that of

the more than 6,000 natural disasters and over 5 billion disaster victims that have been recorded between 1970 and 2002, three-quarters of the events and an estimated 99 percent of the human casualties occurred in developing countries.

The pattern of hurricanes in the past twenty-years has made clear that due to their geographic location within a high-density hurricane zone, coupled with their narrow range of economic activities and high rates of poverty, the Caribbean countries are vulnerable to natural disasters. One of the most compelling reasons why natural disasters need to be regarded and managed as an economic development issue is because of the longer-term shocks that natural disasters exert upon developing countries, with such shocks akin to other kinds of risks to macroeconomic stability.

The developmental implications of natural disasters on the Caribbean region cannot be overstated. As one minister of the economy from the region recently noted, the two single greatest impacts on the Caribbean economy are natural disasters and escalating oil prices. Several factors differentiate developed from developing countries in the context of natural disasters. The first, and most important, is the extent to which natural disasters exert economic effects at the multiple sectoral levels. For example, the impacts of Hurricane Katrina affected numerous sectors, from the agricultural and commodity sectors that relied on internal navigation to move their goods to market, to the tourism sector of New Orleans and the oil and natural gas sectors. However, for most small-island countries in the Caribbean and Central America, these upstream sectoral impacts are especially costly, since those countries rely on a narrow range of economic activities for their foreign revenue sources. The impacts of hurricanes on irrigation and overall agricultural outputs, coupled with the effects of hurricane risks on tourism, have profound economic implications for these countries.

In addition to these sector-specific effects, analysis by the International Monetary Fund notes that natural disasters exert economy-wide shocks on smaller developing countries, which are akin to other kinds of macroeconomic shocks. The short-term effects of natural disasters through various economic transmission channels include:

- Decline in Overall and Sector-Specific Gross Domestic Product: For many developing countries, the effects of natural disasters include a contraction in the agricultural, fishing and tourism industries. Other sectors, notably transportation, electric utilities and other services sectors, are also affected. In general, natural disasters tend to increase economic volatility, at least in the immediate aftermath. Empirical studies (Crowards, 2000) confirm a negative contemporaneous growth impact of natural disasters. For the Caribbean countries, natural disasters led directly to a three percent per year slow-down in economic performance following an event. The agricultural sector was among the most affected by natural disasters in the Caribbean.
- Adverse Impact on Public Finances: The fiscal balance deteriorates in the aftermath of natural disasters, as the domestic tax base contracts and expenditures increase. This deterioration usually adds to the public debt, which in turn can affect macroeconomic performance that extends beyond the short-term, including rising the risk of inflation and a contracting in investment.
- Balance of Payments Deterioration: Due to natural disasters, the current account balance weakens as natural disasters impair the export capacity of many countries (due to the effects of disasters on ports, merchant fleets, highways and other infrastructure), while at the same time curtailing revenues from tourism. In addition, the current account is affected because of an increase in imports needed for reconstruction. While donor aid, reinsurance payments and foreign remittances can partially offset these factors, they are

- unlikely to offset completely the economic costs of disasters, at least in the short-term.
- Inflationary and Depreciation Pressures: As a result of the impacts on current accounts and other factors noted above – including the concern of foreign investors about future earnings – the exchange rate of many countries is likely to face depreciating pressures. Inflationary pressures are also likely to build-up, due to an excess of money holdings coupled with reduced incomes and concern about currency depreciation.
- Negative Spill-over Effects: Finally, natural disasters can have negative spill-over effects, even in those countries that have not been directly hit by a disaster. Examples of spill-over channels include regional input-output networks (such as damages to important ports, disruption in cross-border supply chains) as well as financial linkages (such as an increase in sovereign credit spreads and cross-border exposure of banks and insurance companies).

SECTION THREE: LESSONS IN NATURAL DISASTER RISK REDUCTION

In the last twenty years, progress has been underway at the country and regional level to bolster *ex ante* risk mitigation measures. However, the challenges to strengthening risk mitigation policies remain high. A post-tsunami relief evaluation report by the World Bank notes that since disaster mitigation represents a periodic priority that competes with other development and economic priorities, it often loses out after the media headlines have turned to other issues (World Bank, 2005). There is an additional problem of moral hazard associated with a reliance on post-disaster relief spending by international agencies, as opposed to allocating up-front expenditures on risk reduction priorities.

Despite these and other barriers, the case for increasing investments in risk reduction measures has strengthened. Practices of numerous organizations, including the World Bank, IDB, Caribbean Development Bank (CDB), IFRC, as well as consortia such as ProVention⁴ underscore the importance of risk mitigation. From a cost-benefit perspective, each dollar spent on *ex ante* mitigation measures saves between 2 to 10 dollars or more in post-disaster reconstruction.

A key actor in translating risk mitigation policies into on-the-ground action is the insurance sector. There are two problems facing the sector today. Property owners today are experiencing greater difficulty in acquiring insurance for all risks associated with natural disasters, and if available, have to pay considerably more for it than they have in the past. This means that most low-income homes owners in developing countries are excluded from home insurance coverage. In addition, it appears that most home buyers ignore catastrophe risks by failing to purchase earthquake and flood coverage. The problem is compounded by poor land-use planning and zoning, so that both residential and commercial development is increasingly located in vulnerable coastal and other flood or landslide prone areas. Despite these significant gaps, the insurance sector has an important role to play in requiring property owners to adopt, and together with local authorities, enforce building codes and standards as a condition for coverage. The World Bank has announced a new initiative to create a regional insurance pool for the Caribbean countries. That initiative aims at mitigating the socio-economic impacts of natural hazards in the region by pooling the risks among the countries of the region, through the implementation of a competitive insurance coverage that is easy to mobilize in *ex poste* disasters.⁵

⁴ The ProVention Consortium is a global partnership of governments, international organizations, academic institutions, the private sector and civil society dedicated to increasing the safety of vulnerable communities and to reducing the impacts of disasters in developing countries.

⁵ Designated as Catastrophic Risk Insurance (CRI) Program, this project is being proposed by the World Bank's Board of Director under the new Country Assistance Strategy (CSA) for the Organization of Eastern Caribbean States (OECS) for a four years period: 2005-2009.

For example, an effective way to reduce some future losses is to require insurance in order to condition the adoption of well-enforced building codes and land use regulations as a condition for insurance coverage. Since the early 1980s, the Office for Sustainable Development and Environment of the OAS has been involved in technical assistance projects and programs – all of them from external or non-OAS regular budget sources – to strengthen risk mitigation policies at the country and regional level. Work by the OAS, in partnership with the United States Agency for International Development (USAID), and the Canadian International Development Agency (CIDA) and other agencies, demonstrate that it is possible and cost-effective to attack the root causes of vulnerability of communities – and their infrastructure – to natural hazard events like hurricanes, flooding, earthquakes, drought and landslides. Although all risks cannot be foreseen or eliminated, the experience of the OAS and others show that investing in risk mitigation is a highly cost-effective means of increasing the resilience of countries, communities, residential homes, schools, infrastructure to natural disasters.

3.1 EXPERIENCE OF THE OAS IN RISK MITIGATION: The following highlights some of the projects and programs the OAS has been involved in since the early 1980s. With USAID support, the OAS prepared several technical manuals, including *Disasters, Planning and Development: Managing Natural Hazards to Reduce Loss* and *Primer on Natural Hazard Management in Integrated Regional Development Planning*. It has also prepared the first natural hazard vulnerability maps and analysis, focusing on vulnerable sectors such as agriculture and transportation. Furthermore, with support from USAID, the OAS prepared the first GIS application of flood hazard mapping in Latin America.

In the 1990s, work of the OAS focused on vulnerability assessments and risk mitigation plans for the Small Island Developing States (SIDS) and Central American countries. Again with USAID, this work included the implementation of a six-year Caribbean Disaster Mitigation Project (CDMP), that strengthened at the regional level natural hazard loss mitigation through such tools as improved hazard mapping, vulnerability assessments, improvements in design and construction techniques, and working with the insurance sector to identify and improve the transfer of risk. Following the destruction of coastal areas by Hurricane Lenny, a Coastal Design, Construction and Maintenance Project trained engineers, coastal zone managers and land-use planners in techniques to reduce the vulnerability of coastal infrastructure. Other projects and partnerships have focused on building private sector partnerships in the agricultural, energy, transportation, water utility and urban planning sectors (for example with PROCORREDOR⁶) to reduce the vulnerability of economic and social infrastructure to natural hazard events, and supporting educational programs. In the education sector the OAS developed the Hemispheric Action Plan for Vulnerability Reduction in the Education Sector to Socio-Natural Disasters (EDUPLANhemisférico) to support the design and implementation of activities that focus on the reduction of natural disaster vulnerability in the sector, and the Disaster Reduction of University Campuses in the Americas (DRUCA) to reduce the vulnerability to natural hazards of university campuses infrastructure focusing on the process of design and implementation of natural hazards mitigation plans. Also the OAS developed the Program for Flood Vulnerability Reduction and the Development of Local Warning Systems in Central America (SVP) to meet the needs of minor river basins to reduce flood vulnerability.

⁶ PROCORREDOR is the Inter-American Program for Training and Research for Trade Corridor Development. The program is directed at new forms of partnership among institutions from OAS Member States in addressing trade corridor development, an emerging Inter-American development issues. The OAS/OSDE serves as the international technical secretariat of PROCORREDOR and on its Advisory Committee, along with the Inter-American Committee on Ports (ICP) and the Pan-American Institute of Highways.

Since 2002, the Caribbean Hazard Mitigation Capacity Building Program (CHAMP) – a project funded by CIDA in cooperation with the Caribbean Disaster and Emergency Response Agency (CDERA) and with support from the OAS – is focusing on practical ways to reduce the vulnerability of natural hazards in the Caribbean through the development of comprehensive, national vulnerability reduction policies and associated implementation programs, and the development and implementation of safer building training and certificate programs. Through the CHAMP program, significant advances continue to be made in the area of hazard mapping and vulnerability assessments, developing a model for natural mitigation plans, and in assisting countries in translating the plans into on-the-ground practice.

The OAS has undertaken a number of other risk mitigation projects and programs. For example, through the regional Caribbean Planning for Adaptation to Climate Change (CPACC) supported by the Global Environment Facility (GEF), the OAS supports – in close cooperation with the CDB – Saint Vincent and the Grenadines in preparing to adapt to climate change. Some activities carried out during 2004 under this project include the preparation of an assessment on technology needs for adaptation, the installation of a sea level and climate monitoring system, the development of a public education and awareness campaign, and the development of an inventory of greenhouse gases for St. Vincent's National Communications commitments. (See Annex for more information on OAS projects)

SECTION FOUR: RECOMMENDED STEPS FORWARD

The undertaking of precautionary, forward-looking measures to reduce the risks of natural disasters continues among the countries of the OAS. Given the probable increase in the frequency, severity and geographic scope of some natural disasters, coupled with the rising economic and developmental damages associated with such disasters, the opportunity exists to build upon recent regional and multi-country risk mitigation policies in the hemisphere.

Building upon this experience, in August 2005 the OAS identified six specific areas in which Member States may consider increasing, at the regional as well as hemispheric levels, risk mitigation policies and programs:

1. *Natural Hazard Information Sharing*: Compile and distribute best practices in risk mitigation policies, including an inventory at the technical and public level that describes projects that worked, those that did not, and an analysis of the policy, regulatory and economic factors needed to replicate such practices.
2. *Governance and the Support of Technical Norms*: Support local communities, agencies and insurance sector in monitoring and enforcing appropriate building codes and other standards.
3. *Housing*: Support the inclusion of low-cost wind resistant construction measures for residential roofs, and support the enforcement of land-use planning that integrates hazard flood-plain mapping and other risk information. Develop measures that support the inclusion of low-income and middle-income housing standards.
4. *Education and Health*: Support the adoption of building codes and emergency preparedness plans for public schools and hospitals, and support retrofit plans.
5. *Energy, Transportation, Telecommunications and Water and Sanitation Infrastructure*: Develop risk mitigation plans for these and other sectors, including the sharing of information, building codes and engineering training, cost-benefit analysis and measures to reduce the vulnerability of critical public infrastructure.
6. *Agriculture and Tourism*: Finally, given the importance of these two sectors in many OAS countries, develop risk mitigation programs to support irrigation programs, rural roads and

soil/land management systems, as well as work with the hotel and tourism sectors to share information about best practices in risk reductions policies.

Annex and References

Other examples of projects in which the OAS has recently been involved in include:

- *Incorporating Natural Hazard Risk Management in Development Programs:* The OAS has worked with World Bank staff in developing training materials related to natural hazard risk reduction. A similar project was also undertaken to help train staff of the Caribbean Development Bank in aspects of natural hazards – floods, drought, hurricanes, landslides and earthquakes – including calculating the impacts of hazards on economic development and investment.
- *Natural Hazard Risk Management Options for Central America:* The project, supported by the World Bank, helped identify the main challenges to Central American countries related to natural hazard risk management, specifically in the context of disaster reduction needs in the Hurricane Mitch follow-up process.
- *International Federation of Red Cross and Red Crescent Societies (IFRC) – Community-Based Vulnerability and Capability Assessment (VCA) in Central America:* In partnership with the International Federation of Red Cross and Red Crescent Societies and the ProVention Consortium, the project identifies vulnerability and capacity assessments in partnership with local authorities and communities in four countries in Central America, and focuses on vulnerability reduction plans for schools, hospitals, community centers and potable water supply facilities.
- *Quantification of Risk, Vulnerability and Impact of Disasters:* The project, in partnership with the United Nations Development Programme (UNDP) and UN HABITAT, prepares an inventory of risk analysis and vulnerability assessment tools, which are intended to be readily accessed by Member States and the public through the Internet.

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