for the introduction of risk management practices in rural development projects throughout the region. RUTA is a UNDP project administered by the World Bank in liaison with other international and regional agencies to facilitate the coordination of financial and technical assistance to the region. In a similar vein, CEPREDENAC is now addressing the risks associated with the Puebla-Panama Logistical Corridor, establishing more partnerships with the private sector and the regional and international banking community, and promoting risk reduction across Central America's sectoral development agencies.

Thanks to such actions, acting jointly through CEPREDENAC and working closely with international, bilateral and non-governmental organizations, the governments of the region have established their commitment to risk reduction and reconstruction through social transformation.

However, challenges still remain in successfully moving from the expression of political good intentions toward fundamentally changed policies and practices. Enormous efforts will be required in many fields, including greater social awareness, legislative and institutional changes, modified social practices, a more effective struggle against corruption, and the mobilization of the private sector and commercial interest groups. The definitive change will only take place when society at large accepts the sacrifice of short-term gains in exchange for reaching medium- and long-term goals for the sustained protection of social and environmental resources, as well as economic assets.

A promising expansion has also taken place in the programs and projects aimed at reducing vulnerability to natural hazards at the local level, building national capacity, exchanging information and lessons learned at the regional level, and engaging program and investment partners at the international level. New and crucial linkages are being forged between environmental and risk-reduction interests, as greater attention is paid to the use of environmental management principles that can provide economic benefits locally while increasing the protection against hazards that is afforded by the natural environment. The conservation of mangrove swamps, controls over forest resources, the preservation of biodiversity and the promotion of ecological resilience are all new options for increasing ecosystem productivity and reducing the impact of natural hazards.

CEPREDENAC's website[6] contains regularly updated information on risk reduction plans, programs and projects in the region, as well as disaster statistics and analysis. Each national disaster organization also has its own website, as do many other institutions working in the region in connection with disaster-reduction issues. These include the PAHO Emergency Preparedness and Disaster Relief Coordination Program (PED) and other PAHO/WHO initiatives, as well as various UNDP country programs. Among the latter, the information provided by the El Salvador country office is the most specific in terms of risk assessment.[7]

PAHO has been working with the Central American countries, particularly after Hurricane Mitch, to promote institutional strengthening in the health sector with regard to disaster

[6] www.cepredenac.org

[7] For more information on this subject, visit www.reconstruir.org.sv

reduction, capacity building to assess vulnerability, and improving mitigation measures in health facilities and water and sanitation systems, all this with a community development component.[8]

There have also been a number of new developments in the increasing use of information technologies. The DESINVENTAR software,[9] which allows the storage and recovery of statistical analysis and graphic presentation of information on all types of damaging events registered in the data-base at the smallest territorial scale, has become the official software of all national disaster organizations in the region, thanks to a CEPREDENAC-fostered agreement, and it will soon be introduced into the Caribbean under the joint auspices of The Association of Caribbean States and CEPREDENAC. The use of geographical information systems for risk analysis has also increased, although it is far from widespread due to its cost, availability, technical demands, and continuing lack of locally tailored applications. Beyond its initial use at national government institutions and research centres, efforts continue to enhance this software to address more effectively the needs of local authorities and community organizations.

An important basis for increasing public awareness and understanding of more advanced conceptions of risk and disaster reduction must be a sustained commitment to engage the formal and informal educational systems. However, it is probably in this educational area that the least advance has been made in Central America over the past few years. In contrast to the 1990s, when some attention was paid to raising awareness, and attempts were made to reform school and university curricula in the field of disaster response, less success has been seen recently in addressing more complex risks and their links with broader developmental and environmental issues.

At the university level, many initiatives are currently underway. Among them, four universities are offering master's degrees in disaster management and risk reduction. One of them, Natural Disaster Mitigation in Central America, is coordinated by Costa Rica's National University with the participation of universities from all the Central American countries under the CSUCA umbrella. It has already secured basic funding for 12 years from the government of Sweden. It focuses on hazards (volcanology, seismology, geotechnics, hydrometeorology, floods), although it does incorporate some integral risk management concepts. Another example is the National Autonomous University of Nicaragua, which is offering a Master's degree in the prevention and mitigation of natural disasters that emphasizes geo-science hazard topics and the use of information technology such as GIS and remote sensing systems. Significantly, the course goes beyond the study of hazards by offering courses on risk management, land-use management, and their links to sustainable development. In the case of the other universities, the focus remains on geo-sciences, engineering subjects, and the structural aspects of mitigation, or else on topics pertaining to operational preparedness and response capabilities. As useful as these may be in their respective contexts, little has been achieved so far in developing risk reduction curricula within social science faculties. This relative lack of educational opportunities in the social sciences contrasts starkly with the rapid increase in recent years of such perspectives in conceptual developments and practice on the ground.

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[8] For more information, please visit www.disaster.info.desastres.net/sjludca/desastresCR/

[9] See more at LA RED's website: www.desenredando.org

2. Future Challenges

Despite the accomplishments—the wide range of activities promoted in the region by governments, local organizations, NGOs and international agencies, working together with an expanding circle of actors—a number of problems remain that must be addressed to enable further progress in natural disaster reduction.

Few real options exist so far for professional education in risk management and development, particularly those that are multidisciplinary in focus or teach strategic planning. Despite the rapid increase in risk management initiatives in the region, and a substantial increase in the demand for professionals in this field, much remains to be done to provide enough trained people to take up the challenge. This is an area in which professional organizations and the private sector could stimulate the development of new opportunities.

At the local level, several factors limit the easy expansion of risk management. Ironically, the political trend towards decentralization, which also applies to official disaster management organizations, can severely limit the options to build national policies for the local promotion of risk reduction practices that can have a widespread impact throughout the region. Unmet needs also remain in the establishment of standardized, widely applicable, low-cost early warning systems. And despite the considerable experience to date in local risk management practices and practical methodologies, not enough efforts have been made to systematize this information and make it easily available to others.

The rapid increase in the number and scope of risk management projects in the region has not been accompanied by adequate levels of national and regional coordination and communication. The result has been that many organizations are doing similar things, often with inadequate knowledge of parallel or complementary activities. It is no less true that many internationally sponsored projects also suffer from this same problem.

It would be advantageous—and in the long term, probable more economical—to make a greater effort to ensure that international financial and cooperation agencies formulate their own projects with risk considerations in mind. The demonstration effect would also set a positive example for national authorities.

IV. SOUTHERN CONE AND BRAZIL

1. ACTIVITIES AND ACCOMPLISHMENTS

Although the Southern Cone countries—Argentina, Brazil, Chile, Paraguay and Uruguay—are geographically and climatologically different, they are all beset by floods, landslides, drought, forest fires and technological hazards brought about by growing industrialization. On the Pacific side there are also seismic and volcanic hazards shared by Chile and, to a lesser extent, Argentina. The El Niño phenomenon is a recurrent event that affects the region severely, although it also has positive effects that should be taken advantage of.

Some countries have reinforced the emergency plans and programmes to such a degree that they can even provide support to their neighbours. This reflects the capacity and strengths to fight disasters that the area has, even if there is no regional umbrella organization in this field.

In higher education, degree courses are being created in civil protection and disaster management in general. Other advances have taken place in natural hazard assessments, risk maps, and the production of literature and reference material.

Disaster management institutions have also become more adept at organization and planning. In most countries, ongoing and systematic efforts are underway to provide new legal, administrative and policy structures that can improve the effectiveness, timeliness and coordination of disaster reduction initiatives.

Greater emphasis is being placed on prevention and mitigation actions. Investments in retrofitting critical infrastructure are increasing. Significant improvements have been made to early warning systems. Local organization for prevention and mitigation has been strengthened, particularly in fields such as training, education and information.

In Argentina, the floods of 1998 motivated the creation of the National Commission for the Recovery of Areas Affected by Climatic Emergencies (CONAREC). The success of this initiative led to the establishment of the Federal Emergency System (SIFEM), which was conceived an organizational and liaison tool for national, provincial and municipal bodies to prevent disasters and improve emergency management.

SIFEM is under the oversight of a new body, the Cabinet Ministers' Emergency Board (GADE), which is headed by the country's Chief of Staff and includes cabinet-level representatives from the ministries of Internal and External Affairs, Defence, Economy and Services, the President's Office, the Department of Natural resources and Sustainable development and the Environmental Regulation Agency. This makes it possible for disaster reduction to be handled not as an isolated affair, but as part of much broader sustainable development plans and policies.

A key component of SIFEM/GADE is the National Directorate of Security and Civil Protection Policies, part of the Department of Internal Security of the Ministry of Internal Affairs. It is the Directorate's responsibility to carry out those prevention and response activities needed to protect citizens from natural and man-made catastrophes. A new bill is being drafted to increase the Directorate's scope and powers.[10]

In the field of higher education, Cuyo National University in Mendoza offers a postgraduate degree in Prevention, Planning and Integrated Management of Risk-Prone Areas.

Brazil has its National Civil Defence System (SINDEC), integrated by several bodies. It is managed by the National Civil Defence Department (SEDEC), part of the Ministry of National Integration. SEDEC's job is to coordinate civil protection actions throughout the country; its mission is to reduce disasters through prevention, preparedness, and response and reconstruction activities.

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10 Go to http www.proteccioncivil.gov.ar

Civil Defence's intersectoral work is carried out at all levels, so as to achieve a multiplying effect and promote mutual assistance SINDEC's top-level decision-making body is the National Civil Defence Council, which brings together high-level representatives from various ministries and federal agencies. At the regional level there is a Regional Civil Defence Coordinating Body (CORDEC); at the state level, a State Civil Defence Coordinating Body (CEDEC). At the municipal level, efforts are being made to have all local-level civil defence agencies be part of Municipal Civil Defence Coordinating Bodies (COMDEC) to improve disaster response in each municipality, reducing loss of lives and property.[11]

Chile has its National Emergency Bureau (ONEMI), part of the Ministry of the Interior, which coordinates the National Civil Protection System. A technical agency of the Chilean government, its role is to implement all civil protection policies and initiatives.[12]

At the institutional and participatory level, interdisciplinary and multisectoral partnerships with public and private bodies are encouraged. Methodology has been developed to implement Community Participation in Local Security Management Programs through a risk microzoning process, and resources have been provided to 100 communities throughout the country to establish their own Programs.

Alternating with periods of drought, intense rainfall and flooding took place in 1997 and 2000, affecting housing and infrastructure. These damages and vulnerabilities have led to the development of a Master Plan for Rainwater Drainage that will be implemented in all cities with more than 50,000 inhabitants. An Early Warning Centre (CAT) monitors on an ongoing basis those natural or man-made phenomena that might trigger an emergency.

In the field of education and information, the first postgraduate course has been taught on journalism and emergency and disaster management in Chile. A National Civil Protection Information Centre is also being set up.

Since 1993, Paraguay has had its National Emergency Committee (CEN) within the Ministry of the Interior. The Minister is the head of the CEN Council, which also has representatives from the ministries of Social Affairs, Finance, and Services, the Armed Forces, the National Police Force, and several relief organizations. There are Emergency Committees at the State and local level.

Flooding is the most common adverse natural phenomenon in Paraguay. In 1997-98, 60,000 Km2 were flooded, affecting agriculture, livestock production and infrastructure, and forcing the evacuation of over 15,000 families. With the support of the United Nations Department of Humanitarian Affairs (DHA), CEN and other national institutions have compiled the disaster information available since the 19th Century, assessed the most serious hazards, and drawn risk maps of potential flood patterns, as well as producing a National Contingency Plan and proposing the creation of a National Disaster Prevention and Response System. The country has

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[11] Go to http. www.defesacivil.gov.br

[12] Go to http. www.onemi.cl onemi.html

received significant loans and other support from the international community for these efforts, including a US$16 million loan from the World Bank.

Uruguay is one of the South American countries that is less vulnerable to natural and technological disasters. Even so, is has a National Emergency System that is overseen directly by the President of the Republic.

2. Future Challenges

Thanks to monitoring networks and significant hazard and vulnerability assessments, there is at present a greater understanding of the natural hazards that affect the region. Preparedness measures have been taken, and there are legal and regulatory mechanisms in place. However, it is still difficult to implement land-use management policies that taken natural hazards into account, particularly in densely populated areas.

A growing concern over man-made and technological emergencies reveals a need to gain greater knowledge of the vulnerabilities associated with technological risks. This is especially relevant for the trade corridors and transportation of hazardous material.

One of the greatest challenges, then, is to development research programmes that can help to reduce natural and man-made risks within the framework of a sustainable development policy. This will be the true test of the disaster management organizations and their links with local communities.

V. North America

1. Activities and Accomplishments

Mexico

In the past two decades, according to the World Bank, more than 80 natural disasters in Mexico have resulted in the loss of some 10,000 lives and about $11.8 billion in damages. Efforts by Civil Protection authorities have focused mainly on disaster monitoring, preparedness, and response. A recent World Bank report acknowledges that these efforts are crucial to mitigating the effects of disasters, but argues that the core of a mitigation program should consist of more "upstream" measures, such as the safe location, design, and construction of structures, infrastructure, and settlements.[13]

Mexico has taken some important steps in this direction. Scientific advisory committees have been established, engineering advances have been made, schools have been retrofitted to withstand earthquakes, and a program for certifying hospitals that meet disaster readiness

[13] Kreimer, Alcira, Arnold, Margaret, Barham, Christopher, et. al., *Managing Disaster Risk in Mexico*, The World Bank, 1999

standards has been put into effect. A shift is underway from disaster response to disaster prevention and risk management, with the support of such agencies as the Economic Commission for Latin America and the Caribbean (ECLAC), the Central American Bank for Economic Integration (BCIE), and the Inter-American Development Bank (IDB).

An illustration of this trend is the launch in 2001 by President Vicente Fox of the Puebla-Panama Plan as part of his National Development Plan. This initiative seeks to accelerate the integration and development in a region that covers nearly 375,000 square miles, has 64 million inhabitants, and includes al seven Central American countries as well as the Mexican states of Campeche, Chiapas, Guerrero, Oaxaca, Puebla, Quintana Roo, Tabasco, Veracruz and Yucatan. One of the main objectives of this plan is to overcome the region's vulnerability to natural disasters and bridge a long-standing infrastructure deficit that has prevented its countries from profiting more from their proximity to large foreign markets. The Puebla–Panama Plan contains a natural disaster prevention and mitigation component that will upgrade the quality of meteorological and hydrological information in the region, where hurricanes, floods, earthquakes, tidal waves, volcanic eruptions, landslides, forest fires, and drought claim thousands of victims and cause hundreds of millions of dollars in economic damages each year.

In another nod to the growing awareness of the links between disaster reduction and financial and economic performance, the Plan will promote the development of a catastrophic insurance market to provide coverage for public infrastructure such as highways, bridges, schools, and hospitals. It is expected that this insurance will reduce the need to raise funds for reconstruction, and the premiums may act as an incentive for builders to construct public works that are more resistant to natural disasters.

Support will also be provided to the organization of public information campaigns to promote measures for reducing the region's vulnerability to natural hazards, which tend to affect the poor the most even as their destructive power is heightened by human actions such as deforestation and building human settlements in areas at risk.

The Mexican Government, well aware of the country's vulnerability to risks from natural hazards, has taken important steps to mitigate their impact. It has developed disaster preparedness and civil defence programs led by the Department of the Interior and the Department of the Environment, Natural Resources and Fisheries (SEMARNAP), and implemented through the Civil Defence System (SINAPROC). It has also established the National Centre for Disaster Prevention (CENAPRED), the main objective of which is "to promote the application of technologies for disaster prevention and mitigation, to provide related professional and technical training, and to disseminate preparedness and self-protection measures among Mexican society exposed to the contingency of a disaster." The organization also coordinates volcanic and seismic monitoring activities.

In 1998, a UN-Sasakawa Disaster Prevention Award Certificate of Distinction was presented to Dr. Roberto Meli, CENAPRED's Director-General, in recognition of the Centre's work and its commitment to disaster prevention and mitigation.

The municipality of Tijuana participated in the Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters (RADIUS) initiative,[14] to assess seismic risk, prepare risk management plans based on those assessments and, most importantly, raise local awareness of seismic risk and affordable measures to reduce it. The Municipality has allocated funds for the implementation of microzoning studies, whose results will be used for city planning. In addition, Tijuana's industrial sector asked the Municipality for assistance in assessing their seismic risk, in exchange for which it offered to fund seismic safety efforts for local school facilities.

United States

The existence of countless disaster prevention, preparedness and response programs for just any group one can imagine—seniors, paediatricians, livestock producers, pet owners, neighbourhood associations—is proof that a culture of disaster preparedness has taken hold in the United States.[15]

Little more than ten years ago, to the extent that there was *national* awareness of the need for disaster preparedness, prevention and mitigation, it was focused on what lessons might be learned from recent natural disasters such as Hurricane Hugo ($9 billion in damages, 49 fatalities) or the Loma Prieta, California earthquake (6 million affected, $6 billion in damages).[16] Other disasters abroad, such as the earthquakes in Mexico City in 1985 and in then-Soviet Armenia in 1988, also made Americans realize the value of pre-disaster planning—and not only regarding natural disasters. The 1986 accident at the Chernobyl Power Plant in the Ukraine gave US citizens a terrifying view of the effects of a nuclear power plant meltdown; an experience narrowly averted 10 years earlier at Pennsylvania's Three Mile Island.

All this has increased the public's awareness of and proactive engagement in disaster prevention, resulting in the significant reduction of economic losses, the protection of property and the saving of lives, particularly during latter half of the International Decade for Natural Disaster Reduction.

Every state has an office of emergency services, by one name or another. Linking these state entities are the Network of State Hazard Mitigation Officers (NEMO)[17] and the National Emergency Management Association (NEMA)[18], the professional association of state emergency management directors.

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[14] http://www.unisdr.org/unisdr/radiusindex.htm , International Decade for Natural Disaster Reduction

[15] Go to, among others, http://www.rap-arcc.org/rccart.htm, http://elderaffairs.state.fl.us/, http://www.aap.org/advocacy/releases/disastercomm.htm, http://www.hsus.org/disaster/, and http://www.garlic.com/~sendpp/.

[16] Reducing the Impacts of Natural Hazards: A Strategy for the Nation, A Report by the Committee on Earth and Environmental Sciences Subcommittee on Natural Disaster Reduction, May 1992

[17] http://www.hazmit.net/index.htm

[18] http://www.nemaweb.org/index.cfm

At the national level, the president, Congress and the federal supporting agencies have also worked together in recent years to promote awareness and action in the area of preparedness, prevention and mitigation. The Federal Emergency Management Agency (FEMA) is the U.S. federal agency in charge of helping people prepare for and respond to emergencies when the President of the United States "declares" a disaster of federal dimensions. The head of FEMA is appointed by the President and may or may not be a disaster professional.

Before 1993, FEMA's emergency preparedness activities were focused largely on response. Mitigation activities were primarily part of the National Flood Insurance Program, which was administered by the Federal Insurance Administration (a component of FEMA), and those mitigation efforts were primarily related to flood mitigation. It was not until the appointment of James Lee Witt in 1993 to head FEMA that the mitigation function was segregated from FIA and a Mitigation Directorate was created for the first time in the history of the agency. Late in 1993, Congress amended the disaster statute to authorize more funding for post-disaster mitigation actions, and the availability of additional funding created a greater incentive to pursue mitigation efforts throughout the United States.

In the late 1990s, under the leadership of Mr. Witt, FEMA developed a program that was popularly known as Project Impact. Project Impact was designed to change the way America dealt with disasters--even before they occurred. To each new community that committed to the Project Impact partnership, FEMA offered expertise and technical assistance at both the national and regional level, and involved other federal agencies and states in the process. The objective was to put the latest technology and mitigation practices into the hands of local communities, and to guide these communities through a complete risk assessment process, allowing them to identify and prioritize those mitigation initiatives that would bring them the greatest benefits. Within only a few years more than 250 communities have become Project Impact partners, as have more than 2,500 businesses throughout the country. Shortly after the current administration took office, FEMA's newly appointed director reconsolidated the Agency's mitigation program and the flood insurance program into a component of the Agency, which is now known as the Federal Insurance and Mitigation Administration (FIMA). Funds were also cut for the continuation of Project Impact.

In 2000, Congress enacted the Disaster Mitigation Act, which called for the implementation of pre-disaster mitigation measures that were cost-effective, improved hazard identification and risk assessments, encouraged community hazard mitigation planning, and promoted public-private partnerships.

In part because of its economic and political orientation, in the United States the role of corporate involvement in emergency preparedness has become an important factor. An earlier man-made emergency, a major outage of the dominant AT&T telecommunications network, raised corporate America's attention to the need for preparedness (also known as "business continuity"). The financial, technological, and logistical capabilities of the private sector make it an eminently logical actor in disaster reduction. Examples include the Business and Industry

Council for Emergency Planning and Preparedness, the Disaster Recovery Business Alliance, the Institute for Business and Home Safety, and the Public Private Partnership (PPP) 2000.[19]

The growing professionalization of disaster management and related academic, scientific and administrative disciplines has also been dramatic in the past decade. Once viewed as the exclusive purview of individuals with military backgrounds, civil defence has evolved into the profession of emergency management--a profession that requires rigorous interdisciplinary training. A survey conducted last year by the *Natural Hazards Observer* and the Natural Hazards Centre in Boulder Colorado counted 42 graduate programs and 29 undergraduate programs at colleges, universities, and institutions, principally located within the United States, offering emergency management courses.[20]

Canada

On February 5, 2001 Prime Minister Jean Chrétien announced the creation of the Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP)[21] to act as the Government of Canada's primary agency for ensuring national civil emergency preparedness and to enhance the protection of Canada's critical infrastructure—energy and utilities, communications, services, transportation, safety and government—which constitutes the backbone of the nation's economy and well-being. The Minister of National Defence, Art Eggleton, is responsible for this organisation, which encompasses all responsibilities of what used to be Emergency Preparedness Canada (EPC). The Office provides national leadership to help ensure the protection of infrastructure, in both its physical and cyber dimension, regardless of the source of the threat, by developing and enhancing the capacity of individuals, communities, businesses and governments to effectively manage risk.

Although OCIPEP is a new organisation, its responsibilities relating to civil emergency preparedness and planning have a long history. Through the former EPC, a great deal of experience in preparedness, response and recovery activities had been gained. There have always been efforts across the nation to help mitigate disasters, including land use zoning guidelines, and structural protective features such as the Red River Floodway in Manitoba[22]. In these cases, however, mitigation had largely been an implicit component of other plans, and needed to be promoted in a more explicit and systematic way. It was not until the International Decade for Natural Disaster Reduction that calls by various individuals and groups to place disaster mitigation at the forefront began to bear fruit. The National Mitigation Workshop, hosted by

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[19] Go to http://www.bicepp.org/, http://www.acp-international.com/drba/, http://www.usgs.gov/ppp2000/index.html, and http://www.ibhs.org/.

[20] Colleges, Universities, And Institutions, Offering Emergency Management Courses, Natural Hazards Center, University of Colorado, Boulder, Colorado, December 4, 2000

[21] OCIPEP Web Site: http://www.ocipep-bpiepc.gc.ca

[22] International Joint Commission, *Living with the Red*: A Report to the Governments of Canada and The United States on Reducing Flood Impacts in the Red River Basin, November, 2000, ISBN: 1-894280-24-5.

EPC and the Insurance Bureau of Canada in 1998, and attended by academic, private sector and government representatives, concluded that a comprehensive national mitigation initiative would be a positive step towards the long-term goal of reducing vulnerability to disasters and the losses they bring about.

These ideals have been reinforced by participants of the ongoing Canadian Natural Hazards Assessment Project (CNHAP)[23]. A community of scientists, scholars and practitioners in the natural hazards and disasters field in Canada who came together early in 2000, CNHAP members began a major new assessment project which examines the causes and consequences of natural hazards and disasters. Background research papers from this project are now becoming available, and more will be published an upcoming special issue of the *Journal of Natural Hazards.*[24] Interesting research has also been done in the area of disaster preparedness, mitigation and risk management as it relates to climate change.

Without the framework of the growing economic integration of North American, EPC co-ordinated in 1999 the production of the *North American Map of Natural Hazards and Disasters*[25], produced by The National Geographic Society. The project was instrumental in initiating cross-border dialogue and the sharing of knowledge between hazard experts and national, state/provincial and local organisations that have a vested interest in supporting mitigation and emergency preparedness in Mexico, The United States of America, and Canada.

2. Future Challenges

In Mexico, much remains to be done to reduce vulnerability to disasters in the long term. Pending tasks include the need to create incentives and adopt regulations that will encourage individuals and businesses to reduce the risks they face, and promote a culture of prevention. The regulatory approach to encouraging disaster mitigation in Mexico requires a comprehensive reassessment of formal building codes and land-use management laws and regulations, so that they can effectively contribute to public safety in the informal sector.

As already initiated by CENAPRED, active programs of dissemination, targeted professional training, and broad public education on disaster risk and mitigation should be developed and delivered throughout Mexico. These programs should disseminate information on natural hazards, the inclusion of disaster preparedness and mitigation materials in elementary and high school curricula, and special programs to target low-income communities.

In recognition of the fact that most mitigation decisions are made at the community level, resources must be allocated to increasing capacity and authority for risk management and disaster mitigation at the state and community levels.

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[23] Canadian Natural Hazards Assessment Project: http://www.msc-smc.ec.gc.ca/hazards_assessment/

[24] See the Institute for Catastrophic Loss Reduction (ICLR) Research Paper Series No. 16 for some recently published papers: www.iclr.org.

[25] *Natural Hazards of North America Map*, The National Geographic Society, Washington, DC, July, 1998

While it is apparent that the field of disaster reduction reflects the degree of economic and technological development of the United States, plainly superior to that of its southern neighbours, this does not mean that there are no pending issues, or that reversals may not occur.

The terrorist attacks of 11 September 2001 have had a severe impact on the public's—and the politicians'—perception of what a disaster is. If the average US citizen were stopped in the street and asked to define disaster prevention, he or she would probably mention increased airport security, a stricter immigration policy, and increasing the availability of antibiotics against anthrax. The danger is that citizens and government officials will lose sight—at least until the next major earthquake or hurricane—of the importance of continuing to pay attention to those catastrophes that have nothing to do with terrorism.

Bearing in mind the scientific consensus on climate change and the role of human actions, moreover, the United States faces a significant challenge, the outcome of which will not only affect the country but the planet: the need for it to assume responsibility of being the nation that, with only 4% of the world population, is the producer of 25% of carbon dioxide emissions worldwide. The current emphasis on increasing the national extraction of fossil fuels and the use of nuclear energy have made critics wonder whether the risk of new environmental disasters may not increase.

As far as Canada is concerned, it is another highly industrialized country, which entails its own challenges. A 1999 paper for EPC, Environment Canada, and the Insurance Bureau of Canada discusses the vulnerability of Canadian society as it becomes increasingly complex, with economic and societal costs of natural disasters increasing each year. The authors' reading of demographic projections suggests that more and more Canadians will live and work in regions with significant natural hazard risk. They argue that the need to encourage timely, cost-effective means to save lives, reduce property damage, and limit disaster costs has never been more apparent, particularly with the prospect of extreme weather events becoming more frequent and severe due to climate change. The authors call for a higher national priority for hazard mitigation, prevention and preparedness activities. "Clearly," they say, "in spite of past efforts, a need exists to renew and improve the framework for setting long-term national goals and the establishment or improvement of technical standards and a system of evaluation of progress."[26]

In light of these and other cross-sectoral, multi-disciplinary discussions regarding emergency management and disaster mitigation, the Government of Canada, through the Minister of National Defence, announced on June 26, 2001 that OCIPEP will lead consultations on the development of a National Disaster Mitigation Strategy (NDMS). The challenge, then, will be to see if all stakeholders can come together around a strategy that will privilege sustainability and reduce vulnerability, currently on the increase.

At the subregional level, it is also clear that the growing commercial links between Canada, the United States and Mexico, at once united and divided by 12,000 Km of borders and a growing flow of legal and illegal immigrants, call for the development of joint disaster reduction policies.

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[26] Bruce, James P., Burton, Ian Egener, I.D. Mark, *Disaster Mitigation and Preparedness in a Changing Climate*: A synthesis paper prepared for Emergency Preparedness Canada, Environment Canada, and the Insurance Bureau of Canada, 10/99

Considering, however, that the ultimate goal is a hemispheric Free Trade Area, the search for such policies may well have to be expanded, from Alaska to Tierra del Fuego.

C. Conclusions—current trends and future challenges

I. Current Trends

There is a **growing recognition of the social and economic benefits** associated to disaster risk reduction activities throughout the Americas, which is shown in new policies, allocation of budgetary opportunities for such activities and conceptual developments, this despite variations in terms of achievements in application.

In most countries in the region, there is an increasing tendency to move from solely disaster response and preparedness oriented mechanisms towards integrated **multisectoral approaches** and institutional reforms **focusing also on long term preventive measures,** including **environmental and land use planning considerations**. In many cases, this is accompanied by reformed **legislation** and policy integration reflecting a more proactive approach and multisectoral assignment of responsibilities. Particular relevance is being increasingly recognized to the strengthening of institutions at the local and community level.

In the field of **education,** there is an increasing number of universities offering postgraduate studies and masters programme on risk management and disaster reduction. Furthermore, in many countries efforts are made to include disaster reduction in the school curricula at different levels.

In the field of **health**, one of the first to internalize the need for disaster reduction, vulnerability and mitigation assessments are being incorporated into many of the hospital infrastructure projects, as well as in the management of water and sanitation systems. Moreover, local health centres often play a significant role in areas such as risk assessment and integral disaster management plans at the local level.

Regional or **subregional institutional mechanisms** (such as CEPREDENAC, CDERA and PREANDINO) have shown to be crucial to further the multidisciplinary approach and support member countries to engage in comprehensive disaster risk reduction practices and institutional development in that regard.

II. Future Challenges

Despite the accomplishments and the wide range of activities being promoted in the Americas, at different levels and including governments, local organizations, NGOs and international agencies, working together with an expanding circle of actors, there are a number of problems that still must be addressed to enable further progress and make disaster risk reduction effective.

There is still need for greater policy integration and to raise awareness among high level governmental decision-makers to ensure and their **commitments** being linked to sectoral and decentralised development, as well as their closer association and support to the concerns **emanating from** local authorities.

While there is a myriad of many individual technical, scientific and academic initiatives under way related to different aspects of hazards, vulnerability and risk reduction, there is much scope to greater collaboration among them and **harmonization** of these diverse activities.

- The need for far greater mobilization and interest on the part of governmental decision-makers linked to **sectorial and territorial development organizations, in particuar in relation to land use management and planning**. This will require a more imaginative use of convincing political arguments favouring risk reduction than have been employed to date. Particular attention needs to be given to members of government economic cabinets- Finance, Commerce, etc.

Institutional approaches, building systems: While traditional approaches to **disaster management and emergency assistance**(mainly civil protection) will remain important mechanisms during crisis and preparedness, in the future they may not be seen as primary 'home' to comprehensive risk and disaster reduction mechanisms, but rather as a 'contributor ' to the multisectoral approaches (including sectors like finance, health, agriculture, education, etc.) emanating from coordinating ministries (such as Planning, Environment, Economic Development, etc.) or senior levels of political authority (Office of the President, Prime Minister, Cabinet Committee, etc.)

Countries need to incorporate natural disaster and risk reduction considerations into **development plans, relevant programme and strategies,** ensuring that sufficient human and financial resources are provided to sustain commitments towards the realization of **longer term objectives**. The preparations for the Programme of Action of Johannesburg for sustainable development, currently under discussion and to be finalised in September 2001, could provide a valuable opportunity to develop the commitment towards disaster and global risk reduction by national environmental and development authorities.

There is still a great deal of work to be done to promote vulnerability reduction and the need to incorporate **risk assessments and mitigation measures in all development programme and projects (**critical facilities, etc.), in bilateral, multilateral as well as national programming. The major financial institutions in the region (World Bank, IADB, BCIE, Caribbean Development Bank and the Corporacion Andina de Fomento) all have introduced important changes in this regard. Their collaboration and partnerships among themselves as well as with other relevant international strategies or conventions (Climate Change, Desertification, Biodiversity, ISDR etc.) still has however a long way to go. Whilst the occurrence of a disaster may be the best promoter, it is our duty to go beyond lip-service make the managerial and leadership changes that are required to ensure effective collaboration.

The greatest and potentially most effective challenge remains: to build a **culture of risk reduction** and professional attributes into educational curricula. Both to increase the number of professionals able to be engaged in practice, but also to lay the ground for changes in values, attitudes and behaviours, across generations. As the world becomes more crowded and vulnerable in the future, disasters are likely to increase. However, the social, ecological and economic negative impact of disasters can be reduced if we act today with future generations uppermost in mind.

"There is a clear financial incentive for disaster reduction and prevention. In eh 1960s, natural disasters caused some US$52 billion in damage; in the 1990s, the cost has already reached US$479 billions. More effective prevention strategies would save not only tens of billions of dollars, but save tens of thousands of lives. Funds currently spent on intervention and relief could be devoted to enhancing equitable and sustainable development instead, which would further reduce the risk for war and disaster.

Building a culture of prevention is not easy. While the costs of prevention have to be paid in the present, its benefits lie in a distant future. Moreover, the benefits are not tangible; that are the disasters that did not happen. "

Kofi Annan, Secretary General of United Nations

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