TOWARD SUSTAINABLE BUSINESS ENTERPRISE AND DEVELOPMENT IN THE 21ST CENTURY

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Abstract

This paper will present fundamental information about the evolving and rapidly increasing interest of government and the business sector in sustainable business enterprise and urban development from a global perspective. It will focus on innovative ways that nations, communities, businesses, insurers, and individual citizens can work together on many different coordinated fronts, using existing fiscal and human resources to anticipate and cope with the ominous trend of rapidly increasing economic losses, societal impacts, adverse environmental impacts, mortality, and morbidity taking place in every country from natural hazards (e.g., floods, severe storms, earthquakes, volcanic eruptions, landslides, wildfires, tsunamis, and droughts).

Introduction

A transition is underway to a world where human populations are more crowded, more consuming of natural resources, more interconnected and interdependent, and in many ways, more diverse than at any prior time in history. The building stock and infrastructure, just as the business enterprise, in every nation is also more vulnerable to environmental extremes represented by natural hazards having atmospheric, geologic, and hydrologic origins (figure 1). As a result, all sectors of business and government and all elements of emergency management--public and private--are being challenged as never before by the threats to business continuity, business recovery, and survival posed by natural hazards.

In this paper, we will use the term sustainable development to mean the reconciliation of society's development goals with Planet Earth's environmental limits over the long term. By SMART development, we mean the intelligent use of fiscal and human resources. The urgency and complexity of this problem require a strategic solution involving global partners, because no one organization can solve the problem independently. The urgency for innovative collaborative actions (figure 2) by communities and businesses is clear from the nature and severity of the impacts of recent notable natural disasters triggered by severe

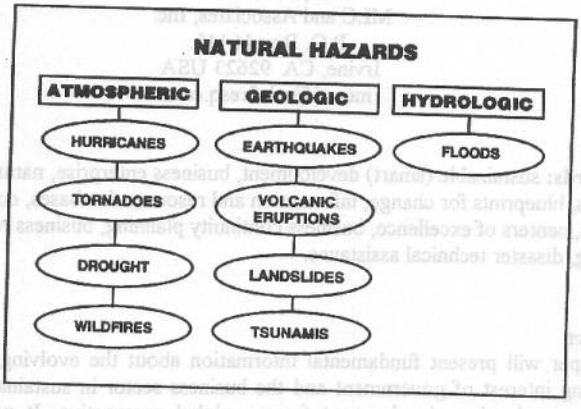

Figure 1: Schematic illustration of the natural hazards having atmospheric, geologic, and hydrologic origins.

storms, floods, earthquakes, volcanic eruptions, landslides, wildfires, tsunamis, and droughts. At present, the world is being overwhelmed by the demands for timely emergency response, recovery, and reconstruction, and is struggling to find cost-effective ways to mitigate and prepare for the direct economic and societal losses from natural disasters. Every year, the Earth's atmospheric, geologic, and hydrologic systems generate 100,000 thunderstorms, 10,000 floods, thousands of landslides, over 100 damaging earthquakes, hundreds of wildfires, scores of windstorms (hurricanes, cyclones, typhoons and tornadoes), and dozens of volcanic eruptions, tsunamis, and droughts. At present, both public and private sectors in the United States are losing $1 billion per week in direct losses, and the world is losing $10 billion.

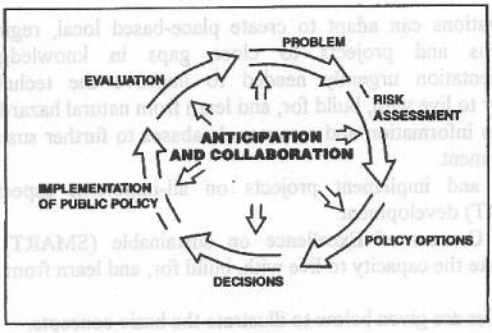

Figure 2: Schematic illustration of the kind of strategic collaboration needed in the 21st century to increase the resiliency of business enterprise and urban development to natural hazards.

During the past 20 years, worldwide natural disasters have claimed over 3 million lives and adversely affected nearly 1 out of every 4 people in terms of economic, health, and impact on the environment. Insured losses, a relatively small but rapidly growing percentage of the overall direct and indirect losses, are also increasing.

The Vision of Sustainability

Increasing the technical and political capacity worldwide for innovative actions to stem the toll of natural hazards on businesses and governments is the goal of the initiative, "Unified Sustainable Development in the World" (SMART). This initiative, Project USW, will be implemented during the first five years of the 21st century by an international alliance led by the American Society of Civil Engineers (ASCE) in cooperation with a number of private- and public-sector partners.

The goal of Project USW is to promote sustainable business enterprise and development as a public value throughout the world. This initiative will give all community stakeholders (e.g., scientists, engineers, planners, businesses, insurers, financial organizations, citizens) and community policy makers (e.g., mayors, city managers, city councils, etc.) new opportunities to collaborate in bold, new, and innovative ways. The objectives are to:

1) Create an international alliance. Each member of the alliance will be committed to the goal of marshaling the social, technical, administrative, political, legal, and economic capacity in every natural-hazard-prone nation during the first several years of the 21st century.
2) Create "blueprints for change" to promote sustainable (SMART) development worldwide. Blueprints for change will provide generic guidelines that nations, businesses, and government and non-government

organizations can adapt to create place-based local, regional, and national programs and projects to close gaps in knowledge and gaps in implementation urgently needed to improve the technical and political capacity to live with, build for, and learn from natural hazards.

3) Develop information and resource databases to further sustainable (SMART) development.
4) Devise and implement projects on all-important aspects of sustainable (SMART) development.
5) Create Centers of Excellence on sustainable (SMART) development to accelerate the capacity to live with, build for, and learn from natural hazards.

Two examples are given below to illustrate the basic concepts.

Example 1:

Business Enterprise Continuity and Recovery Planning

A comprehensive business enterprise continuity and recovery plan must include elements of internal and external planning. Both are essential to ensure success. While the concept of the Alliance centers on external planning and cooperation (community-wide mitigation and preparedness), an organization must be prepared internally. Without internal planning, a business is liable to be a victim rather than being able to work with and possibly assist other alliance partners. The following sub-sections outline major aspects of internal and external planning. These form the outline of the "blueprints for change" envisioned from the perspective of local businesses.

Internal Planning

Business Continuity has three main drivers: 1) People, 2) Processes, and 3) Technology. Each of these drivers is composed of different subsets unique to each business enterprise. Underlying each is a need to continually improve, for business continuity purposes as well as normal operations. The table below provides several examples:

PEOPLE	PROCESSES	TECHNOLOGY
• Corporate Executives • Management Leadership • IT Leadership • Core Process Owners • Business Partners • Regulators • Workforce • Customers	• E-Business • Communications • EDI • Logistics • Cash Management • Capital Investment • Payment Processing	• Internet & Intranet • Network Infrastructure • Web Servers & Applications • Internet Service Providers • Back-End Databases • Fault-Tolerant Systems • Data Storage Networks • Backup, Archiving, & Retrieval
Continuous Improvement		

A Business Continuity Program provides the ability to manage and sustain a comprehensive business strategy. Before a disaster, the primary focus is on mitigation and prevention. Typically, the main issues addressed are the availability of key business processes and overall reliability. The strategic means for achieving availability and reliability are "high availability" programs and the development of long-term "enterprise configuration" plans. Proper planning can prevent system outage "disasters" before they occur. This benefits the organization as well as its alliance partners.

	BEFORE		DURING / AFTER
PRIMARY FOCUS >	Pro-active Mitigation & Prevention		Response & Recovery
ISSUES ADDRESSED >	Availability	Reliability	Recoverability
STRATEGIC APPROACH >	"High Availability"	"Enterprise Configuration" Long-Term Plans	Operations Center

During and after a disaster, the primary focus shifts to response and recovery. The main issue is "recoverability" or "operations triage,"--i.e., which systems or processes are most needed and which can be restored in the shortest period of time. The strategic means for achieving response and recovery lies within an Operations Center. Again, planning benefits the organization and positions it to recover as quickly as possible. Eventually, the organization can be of assistance to others through the local alliance.

External Planning

External planning refers to the dependency of all organizations on the vendors, contractors, service providers, utilities, and government agencies that support the recovery process. Furthermore, an ongoing dialogue with government agencies, police, and fire departments is essential to ensure that life-line organizations are allowed access to areas restricted to the general public or even to residents.

Understanding the causes and solutions to an urban area's vulnerability to natural hazards has expanded into a much broader and very complex global issue. Research in the areas of earthquakes, fire, and tsunamis has increased significantly during the past 50 years. The recent International Decade for Natural Disaster Reduction (IDNDR) is a prime example. To be effective, this research must be included into an organization's internal *and* external contingency planning and mitigation efforts. Clearly, organizations must employ a much broader approach to developing their contingency plans. The importance of external planning, shared resources, reciprocal agreements, and relationship building cannot be over-emphasized.

Several initiatives have been started in the United States to meet the internal and external needs of the business community.[1] The Disaster Recovery Business Alliance (DRBA^{SM}) is a primary example. The objective of a city- or county-based DRBA^{SM} is to bring together the leadership and expertise of business, emergency response, the engineering and scientific community, and others to develop a public/private partnership approach to reduce the vulnerability of the local business community to disasters.

The DRBA^{SM} model was established and funded by the Electric Power Research Institute (EPRI) and co-founded by the U.S. Department of Energy (DOE) and the Association of Contingency Planners (ACP). DRBA^{SM} has also formed partnerships with many public- and private-sector organizations such as the Central United States Earthquake Consortium (CUSEC), National Emergency Management Association (NEMA), the Institute for Business and Home Safety (IBHS), and many others.

The DRBA^{SM} model is highly flexible and can be adapted to the particular needs of the community. The core stages for developing a DRBA^{SM} are listed in the following table:

Stage	Title/ Reference	Typical Activities
1	Needs Assessment	• Identification of key risks • Meetings with business leaders and other stakeholders • Analysis of economic factors • Identification of key utilities as potential sponsors
2	Utility/Beta Sponsor	• Develop relationships • Establish priorities
3	Brain Trust Recruitment	• Gain participation of high visibility leaders in the community • Conduct a Regional Business Impact Analysis (RBIA)
4	Discovery Phase	• Establish priorities for recovery planning; incorporate local public policy; strengthen teamwork among business leaders
5	Founders' Phase	• Elect chairman, establish administrative guidelines; set up office; refine work plan; train local staff
6	"Dots" Phase	• Identify strategic sites and systems within identified market area; record on maps, rosters, notification documents
7	"Connect the Dots" Phase	• Establish connectivity among members; technically network members, strengthen business transactions
8	"Market Recovery" Phase	• Strengthen retail delivery and payment systems; anticipate market dysfunction and remote market misperceptions
9	Service Expansion	• Strengthen niche of DRBA^{SM} among local business community; take economic mitigation services to small business; continue to foster ongoing relationships with local and state government and non-profit organizations

[1] The Disaster Resistant Community program developed by the Federal Emergency Management Agency (FEMA) and the Showcase Community project started by the Institute for Business and Home Safety (IBHS) are two other examples.

To support the various stages necessary, a two-year work plan is developed. A sample outline of a work plan is provided below:

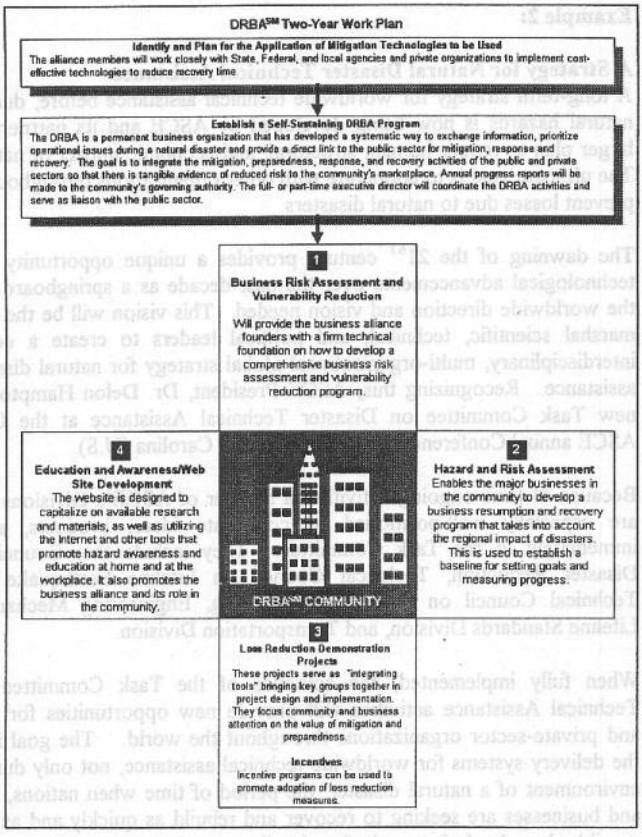

Figure 3: Schematic illustration of a two-year DRBA[SM] work plan.

The end product of the DRBA[SM] process is the establishment of a successful and sustainable business alliance between the businesses within a community or region and the local, state, and federal governments that support them. It is important that this alliance be driven and managed by the business community in order for it to be effective. Ownership by businesses is the best way to ensure participation and acceptance by the private sector. This operation, known as the local or regional DRBA[SM], serves many purposes for the alliance members. Not only does it continue to focus on initiatives to reduce the vulnerability of

businesses in disasters, but it also serves as a basis to promote improvement in the day-to-day economic well-being of the community.

Example 2:

A Strategy for Natural Disaster Technical Assistance

A long-term strategy for worldwide technical assistance before, during, and after natural hazards is now being developed by ASCE and its partners as part of a larger plan to reduce human, structural, and economic impact of natural disasters. The ultimate goal is to cooperate with other organizations throughout the world to prevent losses due to natural disasters.

The dawning of the 21ST century provides a unique opportunity to utilize the technological advancements over the past decade as a springboard for supplying the worldwide direction and vision needed. This vision will be the focal point to marshal scientific, technical, and political leaders to create a comprehensive, interdisciplinary, multi-organizational global strategy for natural disaster technical assistance. Recognizing this, ASCE President, Dr. Delon Hampton, launched a new Task Committee on Disaster Technical Assistance at the October 1999 ASCE annual Conference in Charlotte, North Carolina (U.S).

Because of their ongoing activities, a number of ASCE's Divisions and Councils are especially well-positioned to contribute ideas, products, and expertise immediately to the Task Committee. They include the: Council on Natural Disaster Reduction, Technical Council on Lifeline Earthquake Engineering, Technical Council on Forensic Engineering, Engineering Mechanics Division, Lifeline Standards Division, and Transportation Division.

When fully implemented, the activities of the Task Committee on Disaster Technical Assistance activities will provide new opportunities for many public- and private-sector organizations throughout the world. The goal is to improve the delivery systems for worldwide technical assistance, not only during the crisis environment of a natural disaster, the period of time when nations, communities, and businesses are seeking to recover and rebuild as quickly and as efficiently as possible, but also before and after the disaster when communities and nations are seeking effective ways to enact and implement the changes in public policies and professional practices that have been exposed as flawed. This is also the time when political support for changing public policies and professional practices is greatest, because national and community stakeholders and policy makers make natural disaster reduction a priority.

The objectives of the strategy outlined above are to:

1) Provide a continuum of timely technical assistance to nations in every geographic region that are prone to natural hazards and natural disasters.

2) Provide communities, businesses, universities, and citizens in these countries with access to new and existing information needed to characterize their hazard, built and policy environments, and the technology to devise and implement cost-effective mitigation and preparedness measures.

The elements of such a global strategy exist now, but they have not been marshaled in this way before. A comprehensive strategy can be developed in a cost-effective manner by integrating existing science, technology, and traditional knowledge, and building upon the accomplishments of the 1990's International Decade for Natural Disaster Reduction (IDNDR). A large number of international participants are available as partners to launch an integrated five-phase program during the first ten years of the 21st century.

Five to this program steps are visualized:

1) Step one is the formation of a unique new alliance. The goal is to enlist many diverse partners from the public and private sectors. Priority will be given to those who have already shown that they can work together to meet the needs of natural disaster-prone nations for information on risk assessment and risk management. As illustrations of the opportunities that would come from working together, consider an alliance involving ASCE and others including: the Institution of Civil Engineers (United Kingdom), the World Bank, the Federation of Red Cross and Red Crescent Societies, the Institute for Business & Home Safety, the United Nations Educational Scientific and Cultural Organization (UNESCO), and the World Meteorological Organization (WMO).

2) The second step is for members of the alliance to develop "blueprints for change," focusing on ways to improve the current state-of-practice in risk assessment and risk management. The objective of the blueprints is to become more adept at controlling the controllable, pre-empting the unthinkable, and preparing more effectively for the inevitable.

3) The third step is for members of the alliance to develop information and resource databases for sustainable development, giving priority to the kinds of information needed to implement each blueprint for change. Each blueprint requires: 1) information on the location, severity, and frequency of the natural hazards (i.e., characteristics of the hazard environment), 2) the locations and vulnerabilities of buildings and infrastructure (i.e., characteristics of the built environment), and 3) the options, incentives and networks of co-operating organizations to implement public policies on risk management (i.e., characteristics of the policy environment). The goal is for the partners in the alliance to work together to develop information that is directly related to three broad strategies: 1) living with natural disasters, 2) building for natural disasters, and 3) learning from natural disasters.

4) The fourth step is to implement the blueprints, information, and resource databases in one or more projects. The objective is to develop projects or demonstration studies that can be used to refine the first two steps and to develop success stories. These projects can be undertaken in any country, but the need is greatest in developing countries.

5) The fifth step is to create "Centers of Excellence for Disaster Technical Assistance." Each center would have access to ASCE members living in the country and non-resident experts on all aspects of risk assessment and risk management for natural hazards having geologic, atmospheric, and hydrologic origins.

By definition, a disaster is a situation when the physical and societal consequences of the impacts of the natural hazard exceed the capacity of the stricken community or region to respond and recover. Flaws in the policy environment can exacerbate a disaster. The typical flaws are manifest in the new and existing development of the built environment as a result of incomplete information and inadequate professional practices of planning, siting, design, construction, and use.

Disaster technical assistance must be based on science, technology, and traditional knowledg--the three essential cornerstones. The guiding principle is to use ASCE'S credibility as a national and international leader in natural disaster research and research applications, its scientific and technical products, and its political capital to forge public-private partnerships that will be successful in promoting the five phases referenced above.

Science helps each disaster-prone nation to understand where, how often, and why natural hazards having atmospheric, geologic, and hydrologic origins are occurring and why they become natural disasters. Scientific knowledge is made up of an orderly system of facts that have been acquired and learned from study, experiments, and observations of floods, severe storms, earthquakes, landslides, volcanic eruptions, wildfires, tsunamis, and their impacts on humankind. The scientific disciplines include those related to the hazard environment (i.e., hydrology, geology, geophysics, seismology, meteorology, biology, and volcanology), the built environment (i.e., engineering, architecture, urban planning, and materials), and the policy environment (i.e., social science, political science, and management science).

Technology is scientific knowledge that has been accepted by a consensus process and considered reliable enough to be applied in practical works, professional practices, and public policies for the benefit of humankind. The kinds of technology available for use during the 1990s (i.e., the International Decade for Natural Disaster Reduction (IDNDR)) include: 1) geographic information systems (GIS), 2) remote sensing, 3) global positioning systems, 4) new building materials, 5) computer technology for hazard maps, zonation, disaster scenarios,

risk assessment, loss estimation, and "what it" scenarios to evaluate the benefit/cost of various mitigation options, 6) monitoring systems, and 7) the Internet.

Traditional knowledge is the body of facts known or learned from experience or from research and post-disaster studies and handed down from generation to generation to facilitate emergency response and disaster management. Although a tragedy, a disaster provides the "laboratory" needed to document, understand, and explain what happened. In the long run, such studies are beneficial to the stricken community and nation because they provide important experience.

Five kinds of activities are urgently needed. Each is summarized below:

1) Communicating scientific, technical, and traditional information and developing an ongoing process for education/public awareness.

   This activity calls for concerted efforts to cooperate globally in acquiring, communicating, and using the existing global monitoring capacity (e.g., satellites and atmospheric-building-land surface-subsea-subsurface systems, networks, and arrays) and information systems.

2) Hazard assessments, communicating the results, and developing an ongoing process for education/public awareness.

   This activity involves concerted efforts to use existing methodologies to characterize and map the effects of natural hazards in terms of location, severity, frequency, and probability on a regional scale, to communicate the results, and to use them in forming public policies and professional practices.

3) Risk assessments, communicating the results, and developing an ongoing process for education/public awareness.

   This activity calls for concerted efforts to use existing mathematical models to characterize the nature, temporal, and spatial distribution, level of risk, and uncertainties on a regional scale, to communicate the results, and to use them in forming public policies and professional practices.

4) Risk management, communicating what we know, and developing an ongoing process for education/public awareness.

   This activity calls for concerted efforts to adopt and implement a mix of emergency response, recovery, reconstruction, mitigation, and preparedness measures that are tailored for the community and region. Mitigation measures include social, structural, and non-structural mitigation strategies such as the following: a) Mitigation/Prevention (e.g., citing criteria for avoidance/ land use, zonation maps, relocation, demolition, rerouting,

upgrading, retrofit, design to prevent collapse, design to prevent loss of function, base isolation, protective works, and non-structural mitigation), b) Spreading the Risk (e.g., redundancy, and insurance), c) Spreading the Responsibility (e.g., wider ownership of the problem, training, community participation, formation of public/private partnerships, and bilateral and /or multilateral common agendas in global perspective), d) Pre- and Post-Disaster Management (e.g., public awareness, preparedness, c) scenario events, exercises, post-disaster audits, emergency response, search and rescue, and pre-planning for reconstruction, and e) Legislation (e.g., building regulations and codes, design guidelines for lifeline systems, executive orders, and dire emergency supplemental funding to facilitate recovery, to learn, to communicate, and to implement the lessons learned.

5) Evaluation, communicating the results, and developing an ongoing process for education/public awareness.

   This activity calls for concerted efforts to evaluate each element periodically, obtaining feedback, learning from the experiences, and improving the process.

Increasing scientific, technical, and political capacity and public awareness in natural-disaster-prone communities worldwide will enable them to cut their losses and to cope with natural disasters more effectively. Communities that are able to become natural-disaster-resistant have the following additional characteristics:

1) They make reduction of vulnerabilities on the scale of the community built environment a priority.
2) They adopt, enforce, and improve public policies and professional practices that call for:
   - Anticipation instead of reaction.
   - Integrated programs instead of fragmented programs.
   - Strategic planning instead of random or ad hoc planning.
   - Partnerships instead of individual efforts.
   - A mix of applied and basic research linked with new public policy initiatives instead of the status quo.
3) They provide a stable environment for regional development and international trade.

Conclusions

The beginning of the 21st century is the ideal time for business, industry, and insurers to join with governments throughout the world to take innovative steps to reduce local, regional, and national vulnerabilities to natural hazards. The public- and private-sectors have access to new and improved information technology and cost-effective policy tools because of the ongoing technology revolution and the broad advances in technical and political capacity achieved throughout the world

during the 1990s. With everyone joining in, we believe that the world can reach the goal of Project USW early in the 21st century.

A successful global strategy for sustainable business enterprise and development will dispel the following myths:

1) The myth that the catastrophic impacts of natural disasters are inevitable.
2) The myth that there is a general solution that will meet the needs of everyone.
3) The myth that policymakers cannot process scientific and technical information.
4) The myth that creating a disaster reduction culture is a short process.
5) The myth that stakeholders (e.g., researchers and practitioners) and policymakers (e.g., community decision-makers) have a common culture and a common agenda.
6) The myth that enactment, adoption, and implementation of public policy is an easier process than research.
7) The myth that technical consensus (i.e., agreement based on science, technology, and traditional knowledge) drives overall consensus on public policy).

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