Course Name	**: Disaster Preparedness & Management**
Course Code	**:** APBPH 3102
Course level	**: Level 5**
Credit Units	**: 4 CU**
Contact Hours	**: 60 Hrs**

Course Description
The course entails exploratory meaning of disaster and its management, classification of disaster, the context of disaster risk reduction (DRR), the various mechanisms for crisis management, categories of emergency services/social services and their service providers, the approaches to understanding Vulnerability as well as designing numerous social protection measures to alleviate and mitigate the intensity of disaster. The course involves risk assessment that is relevant in checking up the likelihood explosion of relative disasters.

Course Objectives

- To assure student's capacity of identifying and assessing the impact several disasters in different communities.
- To provide knowledge to students in designing measures to avert and mitigate the expected disasters.
- To increase the students' capacity to analyze different crises and risks that is prevalent in our everyday environments.

Course Content
Introduction

- Meaning of disaster management
- Definition of disaster
- Classification of disaster
- Emergency management and Business continuity planning

Disaster Risk Reduction (DRR)

- Meaning of DRR
- Major international Conferences &workshops on DRR
- Major international Agreements & Funding
- Sector leaders in DRR
- Space-based Information
- Disaster mitigation
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Crisis management

- Definition of Crisis Management
- Methods used for crisis management
- Types of crisis
- Models and theories associated with crisis management
- Role of apologies in crisis management
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- Definition of emergency services
- Core emergency services
- Combating environment degradation

Vulnerability

- Meaning of vulnerability
- Common applications
- Major research questions
- Invulnerability
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- Meaning of risk assessment
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- Risk assessment in public health
- How the risk is determined
- Risk assessment in auditing
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- Quantitative risk assessment software
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Mode of delivery Face to face lectures
Assessment
Coursework 40%
Exams 60%
Total Mark 100%

INTRODUCTION TO DISASTER MANAGEMENT

Emergency management (or disaster management) is the discipline of dealing with and avoiding risks. It is a discipline that involves preparing for disaster before it occurs, disaster response (e.g., emergency evacuation, quarantine, mass decontamination, etc.), and supporting, and rebuilding society after natural or human-made disasters have occurred. In general, any Emergency management is the continuous process by which all individuals, groups, and communities manage hazards in an effort to avoid or ameliorate the impact of disasters resulting from the hazards. Actions taken depend in part on perceptions of risk of those exposed. Effective emergency management relies on thorough integration of emergency plans at all levels of government and non-government involvement. Activities at each level (individual, group, community) affect the other levels. It is common to place the responsibility for governmental emergency management with the institutions for civil defense or within the conventional structure of the emergency services. However, emergency management actually starts at the lowest level and only increases to the next higher organizational level after the current levels resources have been exhausted. In the private sector, emergency management is sometimes referred to as business continuity planning.

Emergency Management is one of a number of terms which, since the end of the Cold War, have largely replaced Civil defense, whose original focus was protecting civilians from military attack. Modern thinking focuses on a more general intent to protect the civilian population in times of peace as well as in times of war. Another current term, Civil Protection is widely used within the European Union and refers to government-approved systems and resources whose task is to protect the civilian population, primarily in the event of natural and human-made disasters. Within EU countries the term Crisis Management emphasises the political and security dimension rather than measures to satisfy the immediate needs of the civilian population.[citation needed] An academic trend is towards using the term disaster risk reduction, particularly for emergency management in a development management context. This focuses on the mitigation and preparedness aspects of the emergency cycle.

Definition of disaster

A disaster is the tragedy of a natural or human-made hazard (a hazard is a situation which poses a level of threat to life, health, property, or environment) that negatively affects society or environment. In contemporary academia, disasters are seen as the consequence of inappropriately managed risk. These risks are the product of hazards and vulnerability. Hazards that strike in areas

with low vulnerability are not considered a disaster, as is the case in uninhabited regions.

Developing countries suffer the greatest costs when a disaster hits – more than 95 percent of all deaths caused by disasters occur in developing countries, and losses due to natural disasters are 20 times greater (as a percentage of GDP) in developing countries than in industrialized countries. A disaster can be defined as any tragic event with great loss stemming from events such as earthquakes, floods, catastrophic accidents, fires, or explosions.

Etymology

The word derives from Middle French désastre and that from Old Italian disastro, which in turn comes from the Greek pejorative prefix δυσ-, (dus-) "bar + ἀστήρ (aster), "star".The root of the word disaster ("bad star" in Greek) comes from an astrological theme in which the ancients used to refer to the destruction or deconstruction of a star as a disaster.

Classification of disasters

For more than a century researchers have been studying disasters and for more than forty years disaster research has been institutionalized through the Disaster Research Center. The studies reflect a common opinion when they argue that all disasters can be seen as being human-made, their reasoning being that human actions before the strike of the hazard can prevent it developing into a disaster. All disasters are hence the result of human failure to introduce appropriate disaster management measures. Hazards are routinely divided into natural or human-made, although complex disasters, where there is no single root cause, are more common in developing countries. A specific disaster may spawn a secondary disaster that increases the impact. A classic example is an earthquake that causes a tsunami, resulting in coastal flooding.

Natural disaster

A natural disaster is a consequence when a natural hazard (e.g., volcanic eruption or earthquake) affects humans and/or the built environment. Human vulnerability, caused by the lack of appropriate emergency management, leads to financial, environmental, or human impact. The resulting loss depends on the capacity of the population to support or resist the disaster: their resilience. This understanding is concentrated in the formulation: "disasters occur when hazards meet vulnerability". A natural hazard will hence never result in a natural disaster in areas without vulnerability, e.g., strong earthquakes in uninhabited areas.

Man-made disaster

Disasters caused by human action, negligence, error, or involving the failure of a system are called man-made disasters. Man-made disasters are in turn

categorized as technological or sociological. Technological disasters are the results of failure of technology, such as engineering failures, transport disasters, or environmental disasters. Sociological disasters have a strong human motive, such as criminal acts, stampedes, riots and war. Man-made earthquakes are well documented even though less known by the general public. The latest one is the December 9, 2006 Basel, Switzerland earthquake triggered by a quest for geothermal energy.

Disaster management

With the tropical climate and unstable landforms, coupled with high population density, poverty, illiteracy and lack of adequate infrastructure, India is one of the most vulnerable developing countries to suffer very often from various natural disasters, namely drought, flood, cyclone, earth quake, landslide, forest fire, hail storm, locust, volcanic eruption, etc. Which strike causing a devastating impact on human life, economy and environment. Though it is almost impossible to fully recoup the damage caused by the disasters, it is possible to (i) minimize the potential risks by developing early warning strategies (ii) prepare and implement developmental plans to provide resilience to such disasters (iii) mobilize resources including communication and telemedicinal services, and (iv) to help in rehabilitation and post-disaster reconstruction. Space technology plays a crucial role in efficient mitigation of disasters. While communication satellites help in disaster warning, relief mobilization and tele-medicinal support, earth observation satellites provide required database for pre-disaster preparedness programmes, disaster response, monitoring activities and post-disaster damage assessment, and reconstruction, and rehabilitation. The article describes the role of space technology in evolving a suitable strategy for disaster preparedness and operational framework for their monitoring, assessment and mitigation, identifies gap areas and recommends appropriate strategies for disaster mitigation vis-à-vis likely developments in space and ground segments.

Various disasters like earthquake, landslides, volcanic eruptions, flood and cyclones are natural hazards that kill thousands of people and destroy billions of dollars of habitat and property each year. The rapid growth of the world's population and its increased concentration often in hazardous environment[citation needed] has escalated both the frequency and severity of natural disasters. With the tropical climate and unstable land forms, coupled with deforestation, unplanned growth proliferation non-engineered constructions which make the disaster-prone areas mere vulnerable, tardy communication, poor or no budgetary allocation for disaster prevention, developing countries suffer more or less chronically by natural disasters.[citation needed] Asia tops the list of casualties due to natural disaster.

Among various natural hazards, earthquakes, landslides, floods and cyclones are the major disasters adversely affecting very large areas and population in the Indian sub-continent. These natural disasters are of (i) geophysical origin such as earthquakes, volcanic eruptions, land slides and (ii) climatic origin such as drought, flood, cyclone, locust, forest fire. Though it may not be possible to control nature and to stop the development of natural phenomena but the efforts could be made to avoid disasters and alleviate their effects on human lives, infrastructure and property. Rising frequency, amplitude and number of natural disasters and attendant problem coupled with loss of human lives prompted the General Assembly of the United Nations to proclaim 1990s as the International Decade for Natural Disaster Reduction (IDNDR) through a resolution 44/236 of December 22, 1989 to focus on all issues related to natural disaster reduction. In spite of IDNDR, there had been a string of major disaster throughout the decade. Nevertheless, by establishing the rich disaster management related traditions and by spreading public awareness the IDNDR provided required stimulus for disaster reduction. It is almost impossible to prevent the occurrence of natural disasters and their damages.

However, it is possible to reduce the impact of disasters by adopting suitable disaster mitigation strategies. The disaster mitigation works mainly address the following:
Minimize the potential risks by developing disaster early warning strategies
Prepare and implement developmental plans to provide resilience to such disasters,
Mobilize resources including communication and tele-medicinal services
To help in rehabilitation and post-disaster reduction.
Disaster management on the other hand involves
Pre-disaster planning, preparedness, monitoring including relief management capability
Prediction and early warning
Damage assessment and relief management.
Disaster reduction is a systematic work which involves with different regions, different professions and different scientific fields, and has become an important measure for human, society and nature sustainable development.

Emergency management and Business continuity planning
The local communities at the time of disaster or before the disaster make groups for helping the people from suffering during the disaster. These groups include, First Aid group, Health group, Food and Welfare group etc. They all are well trained by some local community members. All the groups are sent for helping any other local community that is suffering from a disaster. They also migrate the people from the area affected from disaster to some other safe regions. They are given shelter and every possible facilities by those local

management communities. Today, Government is also making effort to provide good facilities during the disaster. In India, in the rural areas, the community(group of families) are choosing a leader and developing their Disaster management skills to protect themselves and other local communities as well.

The Natural Disasters

A natural disaster is the effect of a natural hazard (e.g. flood, tornado, volcano eruption, earthquake, or landslide) that affects the environment, and leads to financial, environmental and/or human losses. The resulting loss depends on the capacity of the population to support or resist the disaster, and their resilience. This understanding is concentrated in the formulation: "disasters occur when hazards meet vulnerability." A natural hazard will hence never result in a natural disaster in areas without vulnerability, e.g. strong earthquakes in uninhabited areas. The term natural has consequently been disputed because the events simply are not hazards or disasters without human involvement.

Land movement disasters / Avalanches

Avalanche on the backside (East) of Mt. Timpanogos, Utah at Aspen Grove trail
Notable avalanches include:
The 1910 Wellington avalanche
The 1954 Blons avalanches
The 1970 Ancash earthquake
The 1999 Galtür Avalanche
The 2002 Kolka-Karmadon rock ice slide
The 2008 Wenchuan earthquake
The 2010 Haiti earthquake
The 2010 Chile earthquake
The 2010 Yushu earthquake

Earthquakes

An Earthquake is a sudden shake of the Earth's crust.The vibrations may vary in magnitude. The underground point of origin of the earthquake is called the "focus". The point directly above the focus on the surface is called the"epicenter". Earthquakes by themselves rarely kill people or wildlife. It is usually the secondary events that they trigger, such as building collapse, fires, tsunamis (seismic sea waves) and volcanoes, that are actually the human disaster. Many of these could possibly be avoided by better construction, safety systems, early warning and evacuation planning.
Earthquakes are caused by the discharge of accumulated along geologic faults.

Lahars

A lahar is a volcanic mudflow or landslide. The 1953 Tangiwai disaster was caused by a lahar, as was the 1985 Armero tragedy in which the town of Armero was buried and an estimated 23,000 people were killed

Volcanic eruptions
An Eruption may in itself be a disaster due to the explosion of the volcano or the fall of rock but there are several effects that may happen after an eruption that are also hazardous to human life.
Lava may be produced during the eruption of a volcano a material consisting of superheated rock. There are several different forms which may be either crumbly or gluey. Leaving the volcano this destroys any buildings and plants it encounters.

Volcanic ash - generally meaning the cooled ash - may form a cloud, and settle thickly in nearby locations. When mixed with water this forms a concrete like material. In sufficient quantity ash may cause roofs to collapse under its weight but even small quantities will cause ill health if inhaled. Since the ash has the consistency of ground glass it causes abrasion damage to moving parts such as engines.

Supervolcanoes : According to the Toba catastrophe theory 70 to 75 thousand years ago a super volcanic event at Lake Toba reduced the human population to 10,000 or even 1,000 breeding pairs creating a bottleneck in human evolution. It also killed three quarters of all plant life in the northern hemisphere. The main danger from a supervolcano is the immense cloud of ash which has a disastrous global effect on climate and temperature for many years.

Pyroclastic flows consist of a cloud of hot volcanic ash which builds up in the air above under its own weight and streams very rapidly from the mountain burning anything in its path. It is believed that Pompeii was destroyed by a pyroclastic flow.

Water disasters / Floods
The Limpopo River, in southern Mozambique, during the 2000 Mozambique flood
Some of the most notable floods include:
The Huang He (Yellow River) in China floods particularly often. The Great Flood of 1931 caused between 800,000 and 4,000,000 deaths.
The Great Flood of 1993 was one of the most costly floods in United States history.
The 1998 Yangtze River Floods, also in China, left 14 million people homeless.
The 2000 Mozambique flood covered much of the country for three weeks, resulting in thousands of deaths, and leaving the country devastated for years afterward.

Tropical cyclones can result in extensive flooding and storm surge, as happened with:
Bhola Cyclone, striking East Pakistan (now Bangladesh) in 1970,
Typhoon Nina, striking China in 1975,
Tropical Storm Allison, which struck Houston, Texas in 2001 and
Hurricane Katrina, which left most of New Orleans under water in 2005. Much of the flooding was due to the failure of the city's levee system.

Limnic eruptions
A cow suffocated by gases from Lake Nyos after a limnic eruption
A limnic eruption occurs when CO2 suddenly erupts from deep lake water, posing the threat of suffocating wildlife, livestock and humans. Such an eruption may also cause tsunamis in the lake as the rising CO2 displaces water. Scientists believe landslides, volcanic activity, or explosions can trigger such an eruption.Till date, only two limnic eruptions have been observed and recorded:
In 1984, in Cameroon, a limnic eruption in Lake Monoun caused the deaths of 37 nearby residents
At nearby Lake Nyos in 1986 a much larger eruption killed between 1,700 and 1,800 people by asphyxiation.

Tsunami
The tsunami caused by the December 26, 2004 earthquake strikes Ao Nang, Thailand.
Tsunamis can be caused by undersea earthquakes as the one caused in Ao Nang, Thailand by the 2004 Indian Ocean Earthquake, or by landslides such as the one which occurred at Lituya Bay, Alaska.
Ao Nang, Thailand (2004). The 2004 Indian Ocean Earthquake created the Boxing Day Tsunami and disaster at this site.
Lituya Bay, Alaska (1953). A mega-tsunami occurred here, the largest ever recorded.
(This also fits within the "Land movement disaster" category because it started with an earthquake.)

Weather disasters / Blizzards
Significant blizzards in the United States include:
The Great Blizzard of 1888
The Schoolhouse Blizzard earlier the same year
The Armistice Day Blizzard in 1940
The Storm of the Century in 1993

Cyclonic storms
Tropical cyclone and cyclone
Cyclone, tropical cyclone, hurricane, and typhoon are different names for the same phenomenon a cyclonic storm system that forms over the oceans. The deadliest hurricane ever was the 1970 Bhola cyclone the deadliest Atlantic

hurricane was the Great Hurricane of 1780 which devastated Martinique St. Eustatius and Barbados. Another notable hurricane is Hurricane Katrina which devastated the Gulf Coast of the United States in 2005.

Droughts
Well-known historical droughts include:
1900 India killing between 250,000 and 3.25 million.
1921-22 Soviet Union in which over 5 million perished from starvation due to drought
1928-30 northwest China resulting in over 3 million deaths by famine.
1936 and 1941 Sichuan Province China resulting in 5 million and 2.5 million deaths respectively.
As of 2006, states of Australia including Western Australia, New South Wales, Victoria and Queensland had been under drought conditions for five to ten years. The drought is beginning to affect urban area populations for the first time.
In 2006 Sichuan Province China experienced its worst drought in modern times with nearly 8 million people and over 7 million cattle facing water shortages.

Hailstorms
Hailstorms (AKA hailstones) are rain drops that have formed together into ice. A particularly damaging hailstorm hit Munich, Germany on August 31, 1986, felling thousands of trees and causing millions of dollars in insurance claims.

Heat waves
The worst heat wave in recent history was the European Heat Wave of 2003.

Hurricane Katrina
A summer heat wave in Victoria, Australia caused the massive bushfires in 2009. Melbourne experienced 3 days in a row of temperatures exceeding 40°C.

Different Types of Tornadoes
Supercell Tornadoes
Some of the most violent tornadoes develop from supercell thunderstorms. A supercell thunderstorm is a long-lived thunderstorm possessing within its structure a continuously rotating updraft of air. These storms have the greatest tendency to produce tornadoes, some of the huge wedge shape. The supercell thunderstorm has a low-hanging, rotating layer of cloud known as a "wall cloud." It looks somewhat like a layer of a layer cake that hangs below the broader cloud base. One side of the wall cloud is often rain-free, while the other is neighbored by dense shafts of rain. The rotating updraft of the supercell is seen on radar as a "mesocyclone."

The tornadoes that accompany supercell thunderstorms are more likely to remain in contact with the ground for long periods of time—an hour or more—than other tornadoes, and are more likely to be violent, with winds exceeding-200 mph.

Landspout
Generally weaker than a supercell tornado, a landspout is not associated with a wall cloud or mesocyclone. It may be observed beneath cumulonimbus or towering cumulus clouds and is the land equivalent of a waterspout. It often forms along the leading edge of rain-cooled downdraft air emanating from a thunderstorm, known as a "gust front."

Gustnado
Weak and usually short-lived, a gustnado forms along the gust front of a thunderstorm, appearing as a temporary dust whirl or debris cloud. There may be no apparent connection to or circulation in the cloud aloft. These appear like dust devils.

Waterspout
A waterspout is a tornado over water. A few form from supercell thunderstorms, but many form from weak thunderstorms or rapidly growing cumulus clouds. Waterspouts are usually less intense and causes far less damage. Rarely more than fifty yards wide, it forms over warm tropical ocean waters, although its funnel is made of freshwater droplets condensed from water vapor from condensation - not saltwater from the ocean. Waterspouts usually dissipate upon reaching land.
The following are tornado-like circulations

Dust Devils
Dry, hot, clear days on the desert or over dry land can bring about dust devils. Generally forming in the hot sun during the late morning or early afternoon hours, these mostly harmless whirlwinds are triggered by light desert breezes that create a swirling plume of dust with speeds rarely over 70 mph. These differ from tornadoes in that they are not associated with a thunderstorm (or any cloud), and are usually weaker than the weakest

Tornado.
Typically, the life cycle of a dust devil is a few minutes or less, although they can last much longer. Although usually harmless, they have been known to cause minor damage. They can blow vehicles off the road and could damage your eyes by blowing dust into them.

Firewhirls
Sometimes the intense heat created by a major forest fire or volcanic eruption can create what is known as a firewhirl, a tornado-like rotating column of smoke and/or fire. This happens when the fire updraft concentrates some

initial weak whirl or eddy in the wind. Winds associated with firewhirls have been estimated at over 100 mph. They are sometimes called fire tornadoes, fire devils, or even firenadoes.

Fire

Wildfires are an uncontrolled fire burning in wildland areas. Common causes include lightning and drought but wildfires may also be started by human negligence or arson. They can be a threat to those in rural areas and also wildlife.

A notable case of wildfire was the 2009 Victorian bushfires in Australia.

Health and diseases

Epidemic

http://en.wikipedia.org/wiki/File:Colorized_transmission_electron_micrograph_of_Avian_influenza_A_H5N1_viruses.jpgThe A H5N1 virus, which causes Avian influenza

An epidemic is an outbreak of a contractible disease that spreads at a rapid rate through a human population. A pandemic is an epidemic whose spread is global. There have been many epidemics throughout history, such as Black Death. In the last hundred years, significant pandemics include:

The 1918 Spanish flu pandemic, killing an estimated 50 million people worldwide

The 1957-58 Asian flu pandemic, which killed an estimated 1 million people

The 1968-69 Hong Kong flu pandemic

The 2002-3 SARS pandemic

The AIDS epidemic, beginning in 1959

The H1N1 Influenza (Swine Flu) Pandemic 2009-Present

Other diseases that spread more slowly, but are still considered to be global health emergencies by the WHO include:

XDR TB, a strain of tuberculosis that is extensively resistant to drug treatments

Malaria, which kills an estimated 1.6 million people each year

Ebola hemorrhagic fever, which has claimed hundreds of victims in Africa in several outbreaks

Famine

In modern times, famine has hit Sub-Saharan Africa the hardest, although the number of victims of modern famines is much smaller than the number of people killed by the Asian famines of the 20th century.

Space

Fallen trees caused by the Tunguska meteoroid of the Tunguska event in June, 1908.

Gamma ray bursts. Impact eventsOne of the largest impact events in modern times was the Tunguska event in June, 1908.

Solar flares
A solar flare is a phenomenon where the sun suddenly releases a great amount of solar radiation, much more than normal. Some known solar flares include:
An X20 event on August 16, 1989
A similar flare on April 2, 2001
The most powerful flare ever recorded, on November 4, 2003, estimated at between X40 and X45
The most powerful flare in the past 500 years is believed to have occurred in September 1859

Supernova and hypernova
Future of natural disasters
The United Kingdom based charity Oxfam publicly stated that the number of people hit by climate-related disasters is expected to rise by about 50%, to reach 375 million a year by 2015.

Insurance
Natural disasters play a major role in the insurance industry, which pays for certain damages arising from hurricanes, wildfires, and other catastrophes. Large reinsurance companies are particularly involved.

Disaster Risk Reduction (DRR) http://wikimediafoundation.org/
Disaster Risk Reduction (DRR) is a term used for techniques that focus on preventing or minimizing the effects of disasters. For instance, certain areas of a city that are prone to flooding may have development restricted or building codes may be implemented that protect up to a specified level of shaking, to protect against earthquakes. The term has been adopted by the United Nations, which has developed an international strategy on promoting disaster risk reduction as it has been shown to be very cost effective.
Initiatives that are focused on disaster risk reduction will either seek to reduce the likelihood of a disaster occurring (flood protection works, known as dykes, levees and stopbanks) or enhance the community's ability to respond to an emergency (ensuring three days food and water). As a disaster is a product of a severe event and people, changing either will have an effect on any disasters that occur. Further examples of initiatives include increasing knowledge and creating legal and policy frameworks. Closely linked is the issue of post-disaster long term recovery. The International Recovery Platform functions as a knowledge hub to disseminate best practices and lessons from recovery efforts. The platform advocates to ensure the recovery process is utilized as an opportunity for "build back better", to reduce risks inherent before the disaster. Disaster risk reduction is related to the following areas: humanitarian relief, development aid sectors, risk management, climate change, and emergency preparedness.

Definition

The term "Disaster risk reduction" refers to a wide sector of work on disaster management including: mitigationhttp://en.wikipedia.org/wiki/Disaster_Risk_Reduction - cite_note-3#cite_note-3, prevention, risk reduction, preparedness, and vulnerabilities. The common definition of the UNISDR & UNDP for disaster risk reduction is:

> " The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development. "

Context
Only 4% of the estimated $10 billion in annual humanitarian assistance is devoted to prevention and yet every dollar spent on risk reduction saves between $5 and $10 in economic losses from disasters.

Major International Conferences & Workshops
The World Conference on Disaster Reduction (WCDR) was held in Kobe, Japan in January 2005, only days after the 2004 Indian Ocean earthquake. The Conference was to take stock of progress in disaster risk reduction accomplished since the Yokohama Conference of 1994 and to make plans for the next ten years. The key outcome of this conference was the Hyogo Framework for Action.
The International Disaster Reduction Conference (IDRC) was held in Davos, Switzerland in August 2006.
The UNISDR Global Platform for Disaster Risk Reduction held its first session from 5-7 June 2007 in Geneva, Switzerland.
The International Recovery Forum 2010 was held at Kobe Japan on 16 January 2010

Major International Agreements & Funding Loci
The key outcome of the WCDR was the Hyogo Framework for Action : building the resilience of nations and communities to disasters (HFA).
The UNISDR Global Facility for Disaster Reduction and Recovery (GFDRR) is a major initiative launched in September 2006 through a partnership between the World Bank and ISDR to support national, regional and global capacities in reducing disaster risk, particularly in low and middle-income countries. A progress report on GFDRR accomplishments to date in support of the implementation of Hyogo Framework for Action is now available here.

Sector leaders

Some of the leaders in the sector include:
UNISDR, formerly IDNDR - Salvano Briceño
ProVention Consortium - Margaret Arnold
The International Federation of Red Cross and Red Crescent Societies - Antony Spalton
USAID's Office of U.S. Foreign Disaster Assistance (OFDA) - David Hajjar
The Emergency Capacity Building (ECB) Project http://www.ecbproject.org/.
UNDP - Joanne Burke (CADRI), Andrew Maskrey, Maxx Dilley, & Fenella Frost (BCPR)
The World Bank - Saroj Kumar Jha, Global Facility for Disaster Reduction and Recovery (GFDRR)
The BOND UK DRR Working Group
Christian Aid - Sarah Moss
http://christianaid.org.uk/emergencies/prevention/index.aspx
The InterAction Risk Reduction Working Group - Susan Romanski Mercy Corps & Rebecca Schurer (American Red Cross)
Tearfund - Marcus Oxley
ActionAid - Roger Yates & Yasmin McDonnell
Department for International Development (DFID), UK - Olivia Coghlan
Global Risk Identification Program (GRIP) - Carlos Villacis

Space-based Information

The use of space-based solutions and information to support risk and disaster management has increased significantly in recent years. The use of such technologies has been proven useful in the risk assessment, mitigation and preparedness phases of disaster management. As the global community learnt from the tsunami event of December 2004, space technologies have a central role to play in providing early warning to communities that are at risk and in supporting rescue efforts. The recent disasters in Myanmar (Cyclone Nargis) and China (Wenchen earthquake) have shown how the problem now is not accessing such information but coordinating the many opportunities and actually being able to take advantage of the information being provided.

In order for developing countries to be able to incorporate the use of space technology-based solutions and information there is a need to increase awareness, build national capacity and also develop solutions that are customised and appropriate to the needs of the developing world.

This is what the UN-SPIDER is helping achieve. In its resolution 61/110 of 14 December 2006 the United Nations General Assembly agreed to establish the "United Nations Platform for Space-based Information for Disaster Management and Emergency Response - UN-SPIDER" as a new United Nations programme, within the United Nations Office for Outer Space Affairs - UNOOSA, with the

following mission statement: "Ensure that all countries and international and regional organizations have access to and develop the capacity to use all types of space-based information to support the full disaster management cycle". UN-SPIDER is being implemented as an open network of providers of space-based solutions to support disaster management activities. Besides Vienna (where UNOOSA is located), the programme also has an office in Bonn, Germany and will also have an office in Beijing, China and a Liaison Office in Geneva, Switzerland. Additionally, Algeria, the I.R. of Iran and Nigeria are setting up Regional Support Offices.

United Nations - International Strategy for Disaster Reduction
United Nations - International Strategy for Disaster Reduction- Regional Unit for the Americas
UN-SPIDER - United Nations Platform for Space-based Information for Disaster Management and Emergency Response
Preventionweb - Building the resilience of nations and communities to disasters
Education for hazards - What to do A guide for children and youth
International Federation of Red Cross and Red Crescent Societies Disaster Management The ProVention Consortium - Red Cross and Red Crescent
UNDP/CADRI
UNDP/BCPR
UNDP DRR links
The World Bank, Hazards Management Unit
United Nations Platform for Space-based Information for Disaster Management and Emergency Response
Earthquakes and Megacities Initiative
International Recovery Platform

Phases and professional activities
The nature of management depends on local economic and social conditions. Some disaster relief experts such as Fred Cuny have noted that in a sense the only real disasters are economic. Experts, such as Cuny, have long noted that the cycle of emergency management must include long-term work on infrastructure, public awareness, and even human justice issues. This is not important in developing nations. The process of emergency management involves four phases: mitigation, preparedness, response, and recovery.
http://en.wikipedia.org/wiki/File:Em_cycle.png

Disaster Mitigation
Mitigation efforts attempt to prevent hazards from developing into disasters altogether, or to reduce the effects of disasters when they occur. The mitigation phase differs from the other phases because it focuses on long-term measures

for reducing or eliminating risk. The implementation of mitigation strategies can be considered a part of the recovery process if applied after a disaster occurs. Mitigative measures can be structural or non-structural. Structural measures use technological solutions, like flood levees. Non-structural measures include legislation, land-use planning (e.g. the designation of nonessential land like parks to be used as flood zones), and insurance. Mitigation is the most cost-efficient method for reducing the impact of hazards, however it is not always suitable. Mitigation does include providing regulations regarding evacuation, sanctions against those who refuse to obey the regulations (such as mandatory evacuations), and communication of potential risks to the public. Some structural mitigation measures may have adverse effects on the ecosystem.

A precursor activity to the mitigation is the identification of risks. Physical risk assessment refers to the process of identifying and evaluating hazards. The hazard-specific risk (Rh) combines both the probability and the level of impact of a specific hazard. The equation below states that the hazard multiplied by the populations' vulnerability to that hazard produces a risk Catastrophe modeling. The higher the risk, the more urgent that the hazard specific vulnerabilities are targeted by mitigation and preparedness efforts. However, if there is no vulnerability there will be no risk, e.g. an earthquake occurring in a desert where nobody lives.

Disaster Preparedness

Preparedness is a continuous cycle of planning, organizing, training, equipping, exercising, evaluation and improvement activities to ensure effective coordination and the enhancement of capabilities to prevent, protect against, respond to, recover from, and mitigate against natural disasters, acts of terrorism, and other man-made disasters.

In the preparedness phase, emergency managers develop plans of action to manage and counter their risks and take action to build the necessary capabilities needed to implement such plans. Common preparedness measures include:

Communication plans with easily understandable terminology and methods.
Proper maintenance and training of emergency services, including mass human resources such as community emergency response teams.
Development and exercise of emergency population warning methods combined with emergency shelters and evacuation plans.
Stockpiling, inventory, and maintain disaster supplies and equipment.develop organizations of trained volunteers among civilian populations. (Professional emergency workers are rapidly overwhelmed in mass emergencies so trained, organized, responsible volunteers are extremely valuable. Organizations like

Community Emergency Response Teams and the Red Cross are ready sources of trained volunteers. The latter's emergency management system has gotten high ratings from both California, and the Federal Emergency Management Agency (FEMA).)

Another aspect of preparedness is casualty prediction, the study of how many deaths or injuries to expect for a given kind of event. This gives planners an idea of what resources need to be in place to respond to a particular kind of event.
Emergency Managers in the planning phase should be flexible, and all encompassing - carefully recognizing the risks and exposures of their respective regions and employing unconventional, and atypical means of support. Depending on the region - municipal, or private sector emergency services can rapidly be depleted and heavily taxed. Non-governmental organizations that offer desired resources, i.e., transportation of displaced homeowners to be conducted by local school district buses, evacuation of flood victims to be performed by mutual aide agreements between fire departments and rescue squads, should be identified early in planning stages, and practiced with regularity.

Disaster Response
The response phase includes the mobilization of the necessary emergency services and first responders in the disaster area. This is likely to include a first wave of core emergency services, such as firefighters, police and ambulance crews. When conducted as a military operation, it is termed Disaster Relief Operation (DRO) and can be a follow-up to a Non-combatant evacuation operation (NEO). They may be supported by a number of secondary emergency services, such as specialist rescue teams.
A well rehearsed emergency plan developed as part of the preparedness phase enables efficient coordination of rescue. Where required, search and rescue efforts commence at an early stage. Depending on injuries sustained by the victim, outside temperature, and victim access to air and water, the vast majority of those affected by a disaster will die within 72 hours after impact.
Organizational response to any significant disaster - natural or terrorist-borne - is based on existing emergency management organizational systems and processes: the Federal Response Plan (FRP) and the Incident Command System (ICS). These systems are solidified through the principles of Unified Command (UC) and Mutual Aid (MA)

Disaster Recovery
The aim of the recovery phase is to restore the affected area to its previous state. It differs from the response phase in its focus; recovery efforts are

concerned with issues and decisions that must be made after immediate needs are addressed. Recovery efforts are primarily concerned with actions that involve rebuilding destroyed property, re-employment, and the repair of other essential infrastructure. Efforts should be made to "build back better", aiming to reduce the pre-disaster risks inherent in the community and infrastructure. An important aspect of effective recovery efforts is taking advantage of a 'window of opportunity' for the implementation of mitigative measures that might otherwise be unpopular. Citizens of the affected area are more likely to accept more mitigative changes when a recent disaster is in fresh memory.

In the United States, the National Response Plan dictates how the resources provided by the Homeland Security Act of 2002 will be used in recovery efforts. It is the Federal government that often provides the most technical and financial assistance for recovery efforts in the United States.

Phases and personal activities

Mitigation

Personal mitigation is mainly about knowing and avoiding unnecessary risks. This includes an assessment of possible risks to personal/family health and to personal property.

One example of mitigation would be to avoid buying property that is exposed to hazards, e.g., in a flood plain, in areas of subsidence or landslides. Home owners may not be aware of a property being exposed to a hazard until it strikes. However, specialists can be hired to conduct risk identification and assessment surveys. Purchase of insurance covering the most prominent identified risks is a common measure.

Personal structural mitigation in earthquake prone areas includes installation of an Earthquake Valve to instantly shut off the natural gas supply to a property, seismic retrofits of property and the securing of items inside a building to enhance household seismic safety. The latter may include the mounting of furniture, refrigerators, water heaters and breakables to the walls, and the addition of cabinet latches. In flood prone areas houses can be built on poles, as in much of southern Asia. In areas prone to prolonged electricity black-outs installation of a generator would be an example of an optimal structural mitigation measure. The construction of storm cellars and fallout shelters are further examples of personal mitigative actions.

Mitigation involves Structural and Non-structural measures taken to limit the impact of disasters.

Crisis management

Crisis management is the process by which an organization deals with a major unpredictable event that threatens to harm the organization, its stakeholders, or the general public. Three elements are common to most

definitions of crisis: (a) a threat to the organization, (b) the element of surprise, and (c) a short decision time. Venetteargues that "crisis is a process of transformation where the old system can no longer be maintained." Therefore the fourth defining quality is the need for change. If change is not needed, the event could more accurately be described as a failure or incident.

In contrast to risk management, which involves assessing potential threats and finding the best ways to avoid those threats, crisis management involves dealing with threats after they have occurred. It is a discipline within the broader context of management consisting of skills and techniques required to identify, assess, understand, and cope with a serious situation, especially from the moment it first occurs to the point that recovery procedures start.

Introduction

Crisis management consists of:

- Methods used to respond to both the reality and perception of crises.
- Establishing metrics to define what scenarios constitute a crisis and should consequently trigger the necessary response mechanisms.
- Communication that occurs within the response phase of emergency management scenarios.

Crisis management methods of a business or an organization are called **Crisis Management Plan**.

Crisis management is occasionally referred to as incident management, although several industry specialists such as Peter Power argue that the term crisis management is more accurate.

The credibility and reputation of organizations is heavily influenced by the percpetion of their responses during crisis situations. The organization and communication involved in responding to a crisis in a timely fashion makes for a challenge in businesses. There must be open and consistent communication throughout the hierarchy to contribute to a successful crisis communication process.

The related terms emergency management and business continuity management focus respectively on the prompt but short lived "first aid" type of response (e.g. putting the fire out) and the longer term recovery and restoration phases (e.g. moving operations to another site). Crisis is also a facet of risk management, although it is probably untrue to say that Crisis Management represents a failure of Risk Management since it will never be possible to totally mitigate the chances of catastrophes occurring.

Types of crisis

During the crisis management process, it is important to identify types of crises in that different crises necessitate the use of different crisis management strategies.Potential crises are enormous, but crises can be clustered. Lerbingercategorized seven types of crises

1. Natural disaster
2. Technological crises
3. Confrontation
4. Malevolence
5. Crises of skewed management value
6. Crises of deception
7. Crises of management misconduct

Natural crises

Natural crises, typically natural disasters considered as'acts of God,' are such environmental phenomena as earthquakes, volcanic eruptions, tornadoes and hurricanes, floods, landslides, tidal waves, storms, and droughts that threaten life, property, and the environment itself.

Example: 2004 Indian Ocean earthquake (Tsunami)

Technological crises

Technological crises are caused by human application of science and technology. Technological accidents inevitably occur when technology becomes complex and coupled and something goes wrong in the system as a whole (Technological breakdowns). Some technological crises occur when human error causes disruptions (Human breakdowns). People tend to assign blame for a technological disaster because technology is subject to human manipulation whereas they do not hold anyone responsible for natural disaster. When an accident creates significant environmental damage, the crisis is categorized as *megadamage*. Samples include software failures, industrial accidents, and oil spills.

Confrontation crises

Confrontation crises occur when discontented individuals and/or groups fight businesses, government, and various interest groups to win acceptance of their demands and expectations. The common type of confrontation crises is boycotts, and other types are picketing, sit-ins, ultimatums to those in authority, blockade or occupation of buildings, and resisting or disobeying police.

Example: Rainbow/PUSH's (People United to Serve Humanity) boycott of Nike

Crises of malevolence

An organization faces a crisis of malevolence when opponents or miscreant individuals use criminal means or other extreme tactics for the purpose of expressing hostility or anger toward, or seeking gain from, a company, country, or economic system, perhaps with the aim of destabilizing or destroying it. Sample crises include product tampering, kidnapping, malicious rumors, terrorism, and espionage.

Example: 1982 Chicago Tylenol murders

Crises of organizational misdeeds

Crises occur when management takes actions it knows will harm or place stakeholders at risk for harm without adequate precautions. Lerbinger specified three different types of crises of organizational misdeeds: crises of skewed management values, crises of deception, and crises of management misconduct.

Crises of skewed management values

Crises of skewed management values are caused when managers favor short-term economic gain and neglect broader social values and stakeholders other than investors. This state of lopsided values is rooted in the classical business creed that focuses on the interests of stockholders and tends to view the interests of its other stakeholders such as customers, employees, and the community.

Example: Sears sacrifices customer trust

Crises of deception

Crises of deception occur when management conceals or misrepresents information about itself and its products in its dealing with consumers and others.

Crises of management misconduct

Some crises are caused not only by skewed values and deception but deliberate amorality and illegality.

Workplace violence

Crises occur when an employee or former employee commits violence against other employees on organizational grounds.

Example: DuPont's Lycra

Rumors

False information about an organization or its products creates crises hurting the organization's reputation. Sample is linking the organization to radical groups or stories that their products are contaminated.

Models and theories associated with crisis management

Crisis management model

Successfully diffusing a crisis requires an understanding of how to handle a crisis – before it occurs. Gonzalez-Herrero and Pratt created a four-phase crisis management model process that includes: issues management, planning-prevention, the crisis, and post-crisis (Gonzalez-Herrero and Pratt, 1995). The art is to define what the crisis specifically is or could be and what has caused it or could cause it.

Management crisis planning

No corporation looks forward to facing a situation that causes a significant disruption to their business, especially one that stimulates extensive media coverage. Public scrutiny can result in a negative financial, political, legal and government impact. Crisis management planning deals with providing the best response to a crisis.

Contingency planning

Preparing contingency plans in advance, as part of a crisis management plan, is the first step to ensuring an organization is appropriately prepared for a crisis. Crisis management teams can rehearse a crisis plan by developing a simulated scenario to use as a drill. The plan should clearly stipulate that the only people to speak publicly about the crisis are the designated persons, such as the company spokesperson or crisis team members. The first hours after a crisis breaks are the most crucial, so working with speed and efficiency is important, and the plan should indicate how quickly each function should be performed. When preparing to offer a statement externally as well as internally, information should be accurate. Providing incorrect or manipulated information has a tendency to backfire and will greatly exacerbate the situation. The contingency plan should contain information and guidance that

will help decision makers to consider not only the short-term consequences, but the long-term effects of every decision.

Business continuity planning

When a crisis will undoubtedly cause a significant disruption to an organization, a business continuity plan can help minimize the disruption. First, one must identify the critical functions and processes that are necessary to keep the organization running. Then each critical function and or/process must have its own contingency plan in the event that one of the functions/processes ceases or fails. Testing these contingency plans by rehearsing the required actions in a simulation will allow for all involved to become more sensitive and aware of the possibility of a crisisis. As a result, in the event of an actual crisis, the team members will act more quickly and effectively.

Structural-functional systems theory

Providing information to an organization in a time of crisis is critical to effective crisis management. Structural-functional systems theory addresses the intricacies of information networks and levels of command making up organizational communication. The structural-functional theory identifies information flow in organizations as "networks" made up of members and "links". Information in organizations flow in patterns called networks.

Diffusion of innovation theory

Another theory that can be applied to the sharing of information is Diffusion of Innovation Theory. Developed by Everett Rogers, the theory describes how innovation is disseminated and communicated through certain channels over a period of time. Diffusion of innovation in communication occurs when an individual communicates a new idea to one or several others. At its most elementary form, the process involves: an innovation, (2) an individual or other unit of adoption that has knowledge of or experience with using the innovation, (3) another individual or other unit that does not yet have knowledge of the innovation, and (4) a communication channel connecting the two units. A communication channel is the means by which messages get from one individual to another.

Role of apologies in crisis management

There has been debate about the role of apologies in crisis management, and some argue that apology opens an organization up for possible legal consequences. "However some evidence indicates that compensation and sympathy, two less expensive strategies, are as effective as an apology in shaping people's perceptions of the organization taking responsibility for the

crisis because these strategies focus on the victims' needs. The sympathy response expresses concern for victims while compensation offers victims something to offset the suffering."

Examples of successful crisis management

Tylenol (Johnson and Johnson)

In the fall of 1982, a murderer added 65 milligrams of cyanide to some Tylenol capsules on store shelves, killing seven people, including three in one family. Johnson & Johnson recalled and destroyed 31 million capsules at a cost of $100 million. The affable CEO, James Burke, appeared in television ads and at news conferences informing consumers of the company's actions. Tamper-resistant packaging was rapidly introduced, and Tylenol sales swiftly bounced back to near pre-crisis levels.

Johnson & Johnson was again struck by a similar crisis in 1986 when a New York woman died on Feb. 8 after taking cyanide-laced Tylenol capsules. Johnson & Johnson was ready. Responding swiftly and smoothly to the new crisis, it immediately and indefinitely canceled all television commercials for Tylenol, established a toll-free telephone hot-line to answer consumer questions and offered refunds or exchanges to customers who had purchased Tylenol capsules. At week's end, when another bottle of tainted Tylenol was discovered in a store, it took only a matter of minutes for the manufacturer to issue a nationwide warning that people should not use the medication in its capsule form.

Odwalla Foods

When Odwalla's apple juice was thought to be the cause of an outbreak of E. coli infection, the company lost a third of its market value. In October 1996, an outbreak of E. coli bacteria in Washington state, California, Colorado and British Columbia was traced to unpasteurized apple juice manufactured by natural juice maker Odwalla Inc. Forty-nine cases were reported, including the death of a small child. Within 24 hours, Odwalla conferred with the FDA and Washington state health officials; established a schedule of daily press briefings; sent out press releases which announced the recall; expressed remorse, concern and apology, and took responsibility for anyone harmed by their products; detailed symptoms of E. coli poisoning; and explained what consumers should do with any affected products. Odwalla then developed - through the help of consultants - effective thermal processes that would not harm the products' flavors when production resumed. All of these steps were communicated through close relations with the media and through full-page newspaper ads.

Mattel

Mattel Inc., the toy maker, has been plagued with more than 28 product recalls and in Summer of 2007, amongst problems with exports from China, faced two product recall in two weeks. The company *did everything it could to get its message out, earning high marks from consumers and retailers. Though upset by the situation, they were appreciative of the company's response. At Mattel, just after the 7 a.m. recall announcement by federal officials, a public relations staff of 16 was set to call reporters at the 40 biggest media outlets. They told each to check their e-mail for a news release outlining the recalls, invited them to a teleconference call with executives and scheduled TV appearances or phone conversations with Mattel's chief executive. The Mattel CEO Robert Eckert did 14 TV interviews on a Tuesday in August and about 20 calls with individual reporters. By the week's end, Mattel had responded to more than 300 media inquiries in the U.S. a*

Pepsi

The Pepsi Corporation faced a crisis in 1993 which started with claims of syringes being found in cans of diet Pepsi. Pepsi urged stores not to remove the product from shelves while it had the cans and the situation investigated. This led to an arrest, which Pepsi made public and then followed with their first video news release, showing the production process to demonstrate that such tampering was impossible within their factories. A second video news release displayed the man arrested. A third video news release showed surveillance from a convenience store where a woman was caught replicating the tampering incident. The company simultaneously publicly worked with the FDA during the crisis. The corporation was completely open with the public throughout, and every employee of Pepsi was kept aware of the details. This made public communications effective throughout the crisis. After the crisis had been resolved, the corporation ran a series of special campaigns designed to thank the public for standing by the corporation, along with coupons for further compensation. This case served as a design for how to handle other crisis situations.

Lessons learned in crisis management

Impact of catastrophes on shareholder value

One of the foremost recognized studies conducted on the impact of a catastrophe on the stock value of an organization was completed by Dr Rory Knight and Dr Deborah Pretty (1995, Templeton College, University of Oxford - commissioned by the Sedgewick Group). This study undertook a detailed analysis of the stock price (post impact) of organizations that had experienced catastrophes. The study identified organizations that recovered and even

exceeded pre-catastrophe stock price, (*Recoverers*), and those that did not recover on stock price, (*Non-recoverers*). The average cumulative impact on shareholder value for the recoverers was 5% plus on their original stock value. So the net impact on shareholder value by this stage was actually positive. The non-recoverers remained more or less unchanged between days 5 and 50 after the catastrophe, but suffered a net negative cumulative impact of almost 15% on their stock price up to one year afterwards.

One of the key conclusions of this study is that "Effective management of the consequences of catastrophes would appear to be a more significant factor than whether catastrophe insurance hedges the economic impact of the catastrophe".

While there are technical elements to this report it is highly recommended to those who wish to engage their senior management in the value of crisis management.

Bhopal

The Bhopal disaster in which poor communication before, during, and after the crisis cost thousands of lives, illustrates the importance of incorporating cross-cultural communication in crisis management plans. According to American University's Trade Environmental Database Case Studies (1997), local residents were not sure how to react to warnings of potential threats from the Union Carbide plant. Operating manuals printed only in English is an extreme example of mismanagement but indicative of systemic barriers to information diffusion. According to Union Carbide's own chronology of the incident (2006), a day after the crisis Union Carbide's upper management arrived in India but was unable to assist in the relief efforts because they were placed under house arrest by the Indian government. Symbolic intervention can be counter productive; a crisis management strategy can help upper management make more calculated decisions in how they should respond to disaster scenarios. The Bhopal incident illustrates the difficulty in consistently applying management standards to multi-national operations and the blame shifting that often results from the lack of a clear management plan.

Ford and Firestone Tire and Rubber Company

The Ford-Firestone Tire and Rubber Company dispute transpired in August 2000. In response to claims that their 15-inch Wilderness AT, radial ATX and ATX II tire treads were separating from the tire core—leading to grisly, spectacular crashes—Bridgestone/Firestone recalled 6.5 million tires. These tires were mostly used on the Ford Explorer, the world's top-selling sport utility vehicle (SUV).

The two companies' committed three major blunders early on, say crisis experts. First, they blamed consumers for not inflating their tires properly. Then they blamed each other for faulty tires and faulty vehicle design. Then they said very little about what they were doing to solve a problem that had caused more than 100 deaths—until they got called to Washington to testify before Congress.

Exxon

On March 24, 1989, a tanker belonging to the Exxon Corporation ran aground in the Prince William Sound in Alaska. The Exxon Valdez spilled millions of gallons of crude oil into the waters off Valdez, killing thousands of fish, fowl, and sea otters. Hundreds of miles of coastline were polluted and salmon spawning runs disrupted; numerous fishermen, especially Native Americans, lost their livelihoods. Exxon, by contrast, did not react quickly in terms of dealing with the media and the public; the CEO, Lawrence Rawl, did not become an active part of the public relations effort and actually shunned public involvement; the company had neither a communication plan nor a communication team in place to handle the event—in fact, the company did not appoint a public relations manager to its management team until 1993, 4 years after the incident; Exxon established its media center in Valdez, a location too small and too remote to handle the onslaught of media attention; and the company acted defensively in its response to its publics, even laying blame, at times, on other groups such as the Coast Guard. These responses also happened within days of the incident.

Public sector crisis management

Corporate America is not the only community that is vulnerable to the perils of a crisis. Whether a school shooting, a public health crisis or a terrorist attack that leaves the public seeking comfort in the calm, steady leadership of an elected official, no sector of society is immune to crisis. In response to that reality, crisis management policies, strategies and practices have been developed and adapted across multiple disciplines.

Schools and crisis management

In the wake of the Columbine High School Massacre, the September 11 attacks in 2001, and shootings on college campuses including the Virginia Tech massacre, educational institutions at all levels are now focused on crisis management.[18]

A national study conducted by the University of Arkansas for Medical Sciences (UAMS) and Arkansas Children's Hospital Research Institute (ACHRI) has

shown that many public school districts have important deficiencies in their emergency and disaster plans (The School Violence Resource Center, 2003).

In response the Resource Center has organized a comprehensive set of resources to aid schools is the development of crisis management plans

Crisis management plans cover a wide variety of incidents including bomb threats, child abuse, natural disasters, suicide, drug abuse and gang activities – just to list a few. In a similar fashion the plans aim to address all audiences in need of information including parents, the media and law enforcement officials.http://en.wikipedia.org/wiki/Crisis_Management - cite_note-VaDoE-19#cite_note-VaDoE-19

Government and crisis management

Historically, government at all levels – local, state, and national – has played a large role in crisis management. Indeed, many political philosophers have considered this to be one of the primary roles of government. Emergency services, such as fire and police departments at the local level, and the United States National Guard at the federal level, often play integral roles in crisis situations.

To help coordinate communication during the response phase of a crisis, the U.S. Federal Emergency Management Agency (FEMA) within the Department of Homeland Security administers the National Response Plan (NRP). This plan is intended to integrate public and private response by providing a common language and outlining a chain-of-command when multiple parties are mobilized. It is based on the premise that incidences should be handled at the lowest organizational level possible. The NRP recognizes the private sector as a key partner in domestic incident management, particularly in the area of critical infrastructure protection and restoration. The NRP is a companion to the National Incidence Management System that acts as a more general template for incident management regardless of cause, size, or complexity.

FEMA offers free web-based training on the National Response Plan through the Emergency Management Institute.

Common Alerting Protocol (CAP) is a relatively recent mechanism that facilitates crisis communication across different mediums and systems. CAP helps create a consistent emergency alert format to reach geographically and linguistically diverse audiences through both audio and visual mediums.

Elected officials and crisis management

Historically, politics and crisis go hand-in-hand. In describing crisis, President Abraham Lincoln said, “We live in the midst of alarms, anxiety beclouds the

future; we expect some new disaster with each newspaper we read."http://en.wikipedia.org/wiki/Wikipedia:Citation_needed

Crisis management has become a defining feature of contemporary governance. In times of crisis, communities and members of organizations expect their public leaders to minimize the impact of the crisis at hand, while critics and bureaucratic competitors try to seize the moment to blame incumbent rulers and their policies. In this extreme environment, policy makers must somehow establish a sense of normality, and foster collective learning from the crisis experience.

In the face of crisis, leaders must deal with the strategic challenges they face, the political risks and opportunities they encounter, the errors they make, the pitfalls they need to avoid, and the paths away from crisis they may pursue. The necessity for management is even more significant with the advent of a 24-hour news cycle and an increasingly internet-saavy audience with ever-changing technology at its fingertips.

Public leaders have a special responsibility to help safeguard society from the adverse consequences of crisis. Experts in crisis management note that leaders who take this responsibility seriously would have to concern themselves with all crisis phases: the incubation stage, the onset, and the aftermath. Crisis leadership then involves five critical tasks: sense making, decision making, meaning making, terminating, and learning.

A brief description of the five facets of crisis leadership includes: Sense making may be considered as the classical situation assessment step in decision making.

1. Decision making is both the act of coming to a decision as the implementation of that decision.
2. Meaning making refers to crisis management as political communication.
3. Terminating a crisis is only possible if the public leader correctly handles the accountability question.
4. Learning, refers to the actual learning from a crisis is limited. The authors note, a crisis often opens a window of opportunity for reform for better or for worse.

Structural Mitigation:-
This involves proper layout of building, particularly to make it resistant to disasters.
Non Structural Mitigation:-
This involves measures taken other than improving the structure of building.
Preparedness

Airport emergency preparedness exercise.
While preparedness is aimed at preventing a disaster from occurring, personal preparedness focuses on preparing equipment and procedures for use when a disaster occurs, i.e., planning. Preparedness measures can take many forms including the construction of shelters, installation of warning devices, creation of back-up life-line services (e.g., power, water, sewage), and rehearsing evacuation plans. Two simple measures can help prepare the individual for sitting out the event or evacuating, as necessary. For evacuation, a disaster supplies kit may be prepared and for sheltering purposes a stockpile of supplies may be created. The preparation of a survival kit such as a "72-hour kit", is often advocated by authorities. These kits may include food, medicine, flashlights, candles and money.

Response
The response phase of an emergency may commence with search and rescue but in all cases the focus will quickly turn to fulfilling the basic humanitarian needs of the affected population. This assistance may be provided by national or international agencies and organisations. Effective coordination of disaster assistance is often crucial, particularly when many organisations respond and local emergency management agency (LEMA) capacity has been exceeded by the demand or diminished by the disaster itself.
On a personal level the response can take the shape either of a shelter in place or an evacuation. In a shelter-in-place scenario, a family would be prepared to fend for themselves in their home for many days without any form of outside support. In an evacuation, a family leaves the area by automobile or other mode of transportation, taking with them the maximum amount of supplies they can carry, possibly including a tent for shelter. If mechanical transportation is not available, evacuation on foot would ideally include carrying at least three days of supplies and rain-tight bedding, a tarpaulin and a bedroll of blankets being the minimum.

Recovery
The recovery phase starts after the immediate threat to human life has subsided. During reconstruction it is recommended to consider the location or construction material of the property.
The most extreme home confinement scenarios include war, famine and severe epidemics and may last a year or more. Then recovery will take place inside the home. Planners for these events usually buy bulk foods and appropriate storage and preparation equipment, and eat the food as part of normal life. A simple balanced diet can be constructed from vitamin pills, whole-meal wheat, beans, dried milk, corn, and cooking oil.[10] One should add vegetables, fruits, spices and meats, both prepared and fresh-gardened, when possible.

As a profession

Emergency managers are trained in a wide variety of disciplines that support them through out the emergency life-cycle. Professional emergency managers can focus on government and community preparedness (Continuity of Operations/Continuity of Government Planning), or private business preparedness (Business Continuity Management Planning). Training is provided by local, state, federal and private organizations and ranges from public information and media relations to high-level incident command and tactical skills such as studying a terrorist bombing site or controlling an emergency scene.

In the past, the field of emergency management has been populated mostly by people with a military or first responder background. Currently, the population in the field has become more diverse, with many experts coming from a variety of backgrounds without military or first responder history. Educational opportunities are increasing for those seeking undergraduate and graduate degrees in emergency management or a related field. There are eight schools in the US with emergency management-related doctorate programs, but only one doctoral program specifically in emergency management.

Professional certifications such as Certified Emergency Manager (CEM) and Certified Business Continuity Professional (CBCP) are becoming more common as the need for high professional standards is recognized by the emergency management community, especially in the United States.

Tools

In recent years the continuity feature of emergency management has resulted in a new concept, Emergency Management Information Systems (EMIS). For continuity and interoperability between emergency management stakeholders, EMIS supports the emergency management process by providing an infrastructure that integrates emergency plans at all levels of government and non-government involvement and by utilizing the management of all related resources (including human and other resources) for all four phases of emergencies. In the healthcare field, hospitals utilize HICS (Hospital Incident Command System) which provides structure and organization in a clearly defined chain of command with set responsibilities for each division.

Within other professions

Practitioners in emergency management (disaster preparedness) come from an increasing variety of backgrounds as the field matures. Professionals from memory institutions (e.g., museums, historical societies, libraries, and archives) are dedicated to preserving cultural heritage—objects and records contained in their collections. This has been an increasingly major component within these field as a result of the heightened awareness following the September 11 attacks in 2001, the hurricanes in 2005, and the collapse of the Cologne Archives.

To increase the opportunity for a successful recovery of valuable records, a well-established and thoroughly tested plan must be developed. This plan must

not be overly complex, but rather emphasize simplicity in order to aid in response and recovery. As an example of the simplicity, employees should perform similar tasks in the response and recovery phase that they perform under normal conditions. It should also include mitigation strategies such as the installation of sprinklers within the institution. This task requires the cooperation of a well-organized committee led by an experienced chairperson. Professional associations schedule regular workshops and hold focus sessions at annual conferences to keep individuals up to date with tools and resources in practice in order to minimize risk and maximize recovery.

Tools

The joint efforts of professional associations and cultural heritage institutions have resulted in the development of a variety of different tools to assist professionals in preparing disaster and recovery plans. In many cases, these tools are made available to external users. Also frequently available on websites are plan templates created by existing organizations, which may be helpful to any committee or group preparing a disaster plan or updating an existing plan. While each organization will need to formulate plans and tools which meet their own specific needs, there are some examples of such tools that might represent useful starting points in the planning process. In 2009, the US Agency for International Development created a web-based tool for estimating populations impacted by disasters. Called Population Explorer the tool uses Landscan population data, developed by Oak Ridge National Laboratory, to distribute population at a resolution 1 km2 for all countries in the world. Used by USAID's FEWS NET Project to estimate populations vulnerable and or impacted by food insecurity, Population Explorer is gaining wide use in a range of emergency analysis and response actions, including estimating populations impacted by floods in Central America and a Pacific Ocean Tsunami event in 2009.

In 2007, a checklist for veterinarians pondering participation in emergency response was published in the Journal of the American Veterinary Medical Association, it had two sections of questions for a professional to ask themself before assisting with an emergency: Absolute requirements for participation: Have I chosen to participate?, Have I taken ICS training?, Have I taken other required background courses?, Have I made arrangements with my practice to deploy?,Have I made arrangements with my family?

Incident Participation: Have I been invited to participate?, Are my skill sets a match for the mission?, Can I access just-in-time training to refresh skills or acquire needed new skills?, Is this a self-support mission?, Do I have supplies needed for three to five days of self support?
While written for veterinarians, this checklist is applicable for any professional to consider before assisting with an emergency.

International organizations

International Association of Emergency Managers

The International Association of Emergency Managers (IAEM) is a non-profit educational organization dedicated to promoting the goals of saving lives and protecting property during emergencies and disasters. The mission of IAEM is to serve its members by providing information, networking and professional opportunities, and to advance the emergency management profession.

Red Cross/Red Crescent

National Red Cross/Red Crescent societies often have pivotal roles in responding to emergencies. Additionally, the International Federation of Red Cross and Red Crescent Societies (IFRC, or "The Federation") may deploy assessment teams to the affected country. They specialize in the recovery component of the emergency management framework.

United Nations

Within the United Nations system responsibility for emergency response rests with the Resident Coordinator within the affected country. However, in practice international response will be coordinated, if requested by the affected country's government, by the UN Office for the Coordination of Humanitarian Affairs (UN-OCHA), by deploying a UN Disaster Assessment and Coordination (UNDAC) team.

World Bank

Since 1980, the World Bank has approved more than 500 operations related to disaster management, amounting to more than US$40 billion. These include post-disaster reconstruction projects, as well as projects with components aimed at preventing and mitigating disaster impacts, in countries such as Argentina, Bangladesh, Colombia, Haiti, India, Mexico, Turkey and Vietnam to name only a few.

Common areas of focus for prevention and mitigation projects include forest fire prevention measures, such as early warning measures and education campaigns to discourage farmers from slash and burn agriculture that ignites forest fires; early-warning systems for hurricanes; flood prevention mechanisms, ranging from shore protection and terracing in rural areas to adaptation of production; and earthquake-prone construction.

In a joint venture with Columbia University under the umbrella of the ProVention Consortium the World Bank has established a Global Risk Analysis of Natural Disaster Hotspots.

In June 2006, the World Bank established the Global Facility for Disaster Reduction and Recovery (GFDRR), a longer term partnership with other aid donors to reduce disaster losses by mainstreaming disaster risk reduction in development, in support of the Hyogo Framework of Action. The facility helps

developing countries fund development projects and programs that enhance local capacities for disaster prevention and emergency preparedness.

Emergency service /social services

Emergency services are organizations which ensure public safety by addressing different emergencies. Some agencies exist solely for addressing certain types of emergencies whilst others deal with ad hoc emergencies as part of their normal responsibilities. Many agencies will engage in community awareness and prevention programs to help the public avoid, detect, and report emergencies effectively.

The availability of emergency services depends very heavily on location, and may in some cases also rely on the recipient giving payment or holding suitable insurance or other surety for receiving the service.

Core emergency services

There are three services which are almost universally acknowledged as being core to the provision of emergency care to the populace, and are often government run. They would generally be summoned on a dedicated emergency telephone number, reserved for critical emergency calls. They are:

- **Police** — providing community safety and acting to reduce crime against persons and property
- **Fire and Rescue Service** — providing firefighters to deal with fire and rescue operations, and may also deal with some secondary emergency service duties
- **Emergency medical service** — providing ambulances and staff to deal with medical emergencies

Other emergency services

These services can be provided by one of the core services or by a separate government or private body.

- **Military** — to provide specialist services, such as bomb disposal or to supplement emergency services at times of major disaster, civil dispute or high demand.
- **Coastguard** — Provide coastal patrols with a security function at sea, as well as involvement in search and rescue operations
- **Lifeboat** — Dedicated providers of rescue lifeboat services, usually at sea (such as by the RNLI in the United Kingdom).

- **Mountain rescue** — to provide search and rescue in mountainous areas, and sometimes in other wilderness environments.
- **Cave rescue** — to rescue people injured, trapped, or lost during caving explorations.
- **Mine rescue** — specially trained and equipped to rescue miners trapped by fires, explosions, cave-ins, toxic gas, flooding, etc.
- **Technical rescue** — other types of technical or heavy rescue, but usually specific to a discipline (such as swift water).
- **Search and rescue** — can be discipline-specific, such as urban, wildland, maritime, etc.
- **Wildland fire suppression** — to suppress, detect and control fires in forests and other wildland areas.
- **Bomb disposal** — to render safe hazardous explosive ordnance, such as terrorist devices or unexploded wartime bombs.
- **Blood/organ transplant supply** — to provide organs or blood on an emergency basis, such as the National Blood Service of the United Kingdom.
- **Emergency management** — to provide and coordinate resources during large-scale emergencies.
- **Amateur radio emergency communications** — to provide communications support to other emergency services.

Civil emergency services

These groups and organisations respond to emergencies and provide other safety-related services either as a part of their on-the-job duties, as part of the main mission of their business or concern, or as part of their hobbies.

- **Public utilities** — safeguarding gas, electricity and water, which are all potentially hazardous if infrastructure fails
- **Emergency road service** — provide repair or recovery for disabled or crashed vehicles
- **Civilian Traffic Officers** — such as operated by the Highways Agency in the UK to facilitiate clearup and traffic flow at road traffic collisions
- **Emergency social services**
- **Community emergency response teams** — help organize facilities such as rest centers during large emergencies
- **Disaster relief** — such as services provided by the Red Cross and Salvation Army
- **Famine relief** teams
- **Amateur radio** communications groups — provide communications support during emergencies
- **Poison Control** — providing specialist support for poisoning

- **Animal control** — can assist or lead response to emergencies involving animals
- **Forest Service**
- **St. John Ambulance / Red Cross / Order of Malta Ambulance Corps** — Medical & First Aid Support

Location-specific emergency services

Some locations have emergency services dedicated to them, and whilst this does not necessarily preclude employees using their skills outside this area (or be used to support other emergency services outside their area), they are primarily focused on the safety or security of a given geographical place.

- Park rangers — looking after many emergencies within their given area, including fire, medical and security issues
- Lifeguards — charged with reacting to emergencies within their own given remit area, usually a pool, beach or open water area

Working together

Effective emergency service management requires agencies from many different services to work closely together and to have open lines of communication. Most services do, or should, have procedures and liaisons in place to ensure this, although absence of these can be severely detrimental to good working. There can sometimes be tension between services for a number of other reasons, including professional versus voluntary crew members, or simply based on area or division.

To aid effective communications, different services may share common practices and protocol for certain large-scale emergencies. In the UK, commonly used shared protocols include CHALET and ETHANE while in the US, the Department of Homeland Security has called for nationwide implementation of the National Incident Management System (NIMS), of which the Incident Command System (ICS) is a part.

Environmental degradation

Environmental degradation is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife]

Environmental degradation is one of the ten threats officially cautioned by the High Level Threat Panel of the United Nations. The **ten threats** identified by the High Level Threat Panel of the United Nations are these: Poverty , Infectious

disease , Environmental degradation , Inter-state war , Civil war , Genocide , Other Atrocities (*e.g.*, trade in women and children for sexual slavery, or kidnapping for body parts) , Weapon of mass destruction (nuclear proliferation, chemical weapon proliferation, biological weapon proliferation) , Terrorism .

Transnational organized crime. The World Resources Institute (WRI), UNEP (the United Nations Environment Programme), UNDP (the United Nations Development Programme) and the World Bank have made public an important report on health and the environment worldwide on May 1, 1998.

Environmental degradation is of many types. When natural habitats are destroyed or natural resources are depleted, environment is degraded.

Environmental Change and Human Health, a special section of World Resources 1998-99 in this report describes how preventable illnesses and premature deaths are still occurring in very large numbers. If vast improvements are made in human health, millions of people will be living longer, healthier lives than ever before. In these poorest regions of the world an estimated 11 million children, or about one in five, will not live to see their fifth birthday, primarily because of environment-related diseases. Child mortality is larger than the combined populations of Norway and Switzerland, and mostly due to malaria, acute respiratory infections or diarrhea — illnesses that are largely preventable.

Combating Environmental Degradation

Introduction

The landmark report of the World Commission on Environment and Development, entitled "Our Common Future", warned that unless we change many of our lifestyle patterns, the world will face unacceptable levels of environmental damage and human suffering. The Commission, echoing the urgent need for tailoring the pace and the pattern of global economic growth to the planet's carrying capacity, said that: "Humanity has the ability to make development sustainable and to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."

In the final analysis, the environmental crisis affects everyone on the planet, but the degree to which the inhabitants of different parts of the world contribute to this crisis depends on the level of their economic development and their consumption patterns. As much as 70% of the world's consumption of fossil fuel and 85% of chemical products is attributable to 25% of the world's population. Water consumption is also unevenly distributed. The per caput water consumption in the United States is about 2 300 m^3 per annum, as

compared to 1 500 m^3 for the Canadians and 225 m^3 for the British. The average per caput consumption of water in developing countries ranges between 20 to 40 m^3. The consumption patterns for forest products and many other commodities have the same direct inverse proportion to the size of population of the top 20% of the richest societies. This profligate demand puts excessive pressure on both national and global natural resources. The rest of the world, comprising 80% of its population with a share of less than 20% of global income, has a far more modest consumption level.

While international environmental concerns are often expressed in broad terms such a desertification or climatic change, the environmental problems of concern to vulnerable groups in marginal areas are generally quite localized in nature, revolving around immediate issues, such as the degradation of a particular rangeland or soil erosion on farmland or the progressive shortening of fallow. These affect the poor because they are directly related to household food security. Degradation of the resource base generally translates into decreases in production or income and thus in the availability of food. Declining soil fertility leads to lower crop yields while rangeland depletion reduces offtake, and any deterioration in water quality adversely affects the fish catch. Degradation of common property resources pulls labour away from directly productive activities towards gathering - simply collecting non-wood and minor forest products - and probably diminishes opportunities for deriving income from this source. Linkages with food security can also be less direct. Shortages of biomass may result in a transition to lower-nutrition foods that require less fuel for cooking. In addition, recurrent drought or natural calamities also directly result in progressive loss of food security prospects.

In their quest for food security, the rural poor have sometimes little choice but to overuse the limited resources available to them. The resulting environmental degradation imposes further constraints on their livelihood in what has been called a "downward spiral" or "vicious circle". They are often forced to make trade-offs between immediate household food requirements and environmental sustainability both in production and consumption. Their negligible man-made capital assets, ill-defined or non-existent property rights, limited access to financial services and other markets, inadequate safety nets in time of stress or disaster, and lack of participation in decision-making can result in their adopting "short time horizons", which favour immediate imperatives over longer-term objectives. This can result in coping strategies that rely on the drawing down of the capital available to them -- mainly in the form of natural resources. It also makes them more vulnerable to environmental degradation, including degradation wrought by others than the poor themselves.

The poor may be both agents and victims of environmental degradation, especially in marginal areas, where the resource base is ill-suited to agriculture. But it cannot be assumed that the poor have an intrinsic propensity to degrade environmental resources. On the contrary, many poor

traditional communities demonstrate an admirable environmental ethic and have developed complex resource management regimes. There is little evidence that the rural poor, when offered an appropriate environment - including secure tenure and access to markets- pursue resource-degrading strategies. Thus, while poverty may be an underlying cause of environmental degradation, it is more accurately seen as a proximate cause influenced by a complex of policy and institutional factors. The very same processes that lead to and perpetuate poverty constrain the poor in their decision- making with regard to natural resource management. Affluence and poverty affect the environment in different ways: poverty eradication would not erase environmental degradation but change the nature of environmental problems facing **society.**

Poverty in fragile ecosystems

Absolute poverty has been on the retreat in most high-potential areas in developing countries. The combination of more productive technologies, fertile land and water, and high levels of development and public investment have raised incomes significantly for people living in these areas. While this development has not always been equitable - or sustainable, the most important disparities are not between rich and poor people within high-potential areas, but rather between high-potential high-investment areas and fragile ecosystems. In the latter areas, politically marginal indigenous populations have been neglected and have been joined by new groups displaced from more fertile areas through a variety of processes. These processes, although varying across countries and regions, include expropriation, demographic pressures, land fragmentation, privatization of common property lands, and consolidation and expansion of the commercial sector combined with reduced demand for labour due to mechanization.

While the challenge for poverty alleviation in high-potential areas remains considerable, the prognosis is not grim provided agricultural intensification proceeds without environmental destruction. On the other hand, for the 60% of poor populations who are found in fragile ecosystems and mainly remote and ecologically vulnerable rural areas, the challenge of environmentally sustainable poverty alleviation is immense. It has been estimated that 80% of poor people in Latin America live in such areas, 60% in Africa and 50% in Asia. Reliance on the currently prevailing patterns of growth will postpone the resolution of poverty in marginal areas, with severe implications not only for the people affected but also for the environment. The immediate-to-medium-term prospects for the rural poor to abandon these areas for other sectors of the economy, as was the case in Europe in the last century, are not promising. As a result, fragile ecosystems are rapidly becoming ghettos of poverty and environmental degradation.

The need for urgent action can be recognized in relation to the following characteristics of these regions:

(a) They constitute a significant part of the world's land resources. Forty percent of the earth's land surface is considered dryland, of which approximately 70% is already degraded or subject to heavy degradation. On the other hand, hilly and mountainous regions cover about 21% of the earth land mass and, although not so extensive as dry lands, they exert a far-reaching influence on other areas, primarily through watershed functions.

(b) The role of both ecosystems in terms of human habitat is also significant: approximately 900 million of the world's population are subsisting in dry zones. Although only about 10% of the world population live in mountain areas, a much larger percentage (about 40%) occupies the watersheds below. It is safe to assume that the future of mountain ecosystems affects the life of half of the world's population. From the Andes to the Himalayas, and from South East Asia to East and Central Africa a serious ecological deterioration caused by overgrazing, deforestation and excessive cultivation threatens the livelihood of these populations.

(c) Mountains are important sources of water, energy, minerals, agricultural products and a major reserve for the world's biodiversity. Similarly, dry zones are rich in biodiversity, hosting many endangered species. Moreover, crops, grasses, trees, and livestock species, that form the core of survival in drought prone regions, exist in these regions only.

(d) A high proportion of the absolute poor in ecologically fragile areas are indigenous peoples, estimated at some 300 million worldwide. They depend on renewable resources to maintain their well-being. This has led to the development of livelihood systems which are well-adapted to the harsh conditions in which they lived. Their holistic, traditional knowledge of their natural resources and environment constitutes a rich human heritage. However, their traditional ways of life are now being threatened, disturbing the delicate balance of natural resource use. Nevertheless, viable technology and institutional arrangements for resource conservation in these areas could be built upon indigenous knowledge; and similarly effective disaster prevention policies can benefit from coping strategies developed by the local population.

(e) Rural women play a key role in on- and off-farm activities in the developing countries. This is particularly true in the case of the ecologically fragile areas. With the growing male out-migration from marginal areas, the number of women headed households in these areas is increasing. Women are becoming more and more responsible for the day to day survival of the family. Women tend to be more vulnerable than men to the effects of environmental degradation because they are often involved in harvesting common property resources such as wood and water. Since women usually make a greater

contribution to household food security than men, a decline in women's access to resources may have a significant impact on household consumption. Environmental degradation implies further burdens and responsibilities which are not compensated for by increased decision-making power.

(f) Degradation of land and loss of its vegetative cover also have consequences at the global level, primarily because of its influence on carbon exchange, but also in terms of loss of biodiversity. The large amount of carbon stored in the vegetation of the dry zones, for example, averaging about 30 tonnes per hectare, decreases when the vegetation is depleted or disappears. Carbon-rich soils, frequently found in dry zones, store a substantial amount of this element (nearly half the total quantity of carbon is stored in the organic matter in the soil, much more than is found in the world's vegetation). The destruction of these soils has a very powerful effect on the carbon cycle and boosts the greenhouse effect as a result of the release of carbon.

Towards action

Over the past two decades, environmental degradation, including land degradation has continued to worsen exacerbating further poverty and food insecurity. Conversely, awareness of the importance of the environment and its conservation has increased. There has been a transformation in people's perception of the poverty problem in developing countries. If one accepts that hard core rural poverty is increasingly a phenomenon associated with marginal lands, then new strategies are required that integrate poverty alleviation and environmental management. Until recently, the international community and national governments have tended not to appreciate the need for integrated rural poverty alleviation and environmental management programmes in marginal areas. There were a number of promising initiatives in this field, usually undertaken by NGOs and community- based organizations, but they were usually small and very localized. At the same time, in many regions, rural people's perception of their environment and the priority they give to a better relationship with it have changed. Increasingly, rural people are realizing that: (a) the fragile environment on which they depend for their survival is being neglected or over- exploited, and it is now necessary to rehabilitate it and manage it sustainably; and (b) the environment belongs primarily to them, and they must take the responsibility for the land and organize themselves in groups, cooperatives, village development associations and other local association to defend it.

UNCED's Agenda 21, the global action programme for sustainable development, is perhaps the first expression of international commitment to addressing the poverty- environment nexus. Chapter 3 on "combating poverty" called for specific long-term strategies that integrate poverty eradication and sustainable management of the environment. Agenda 21 devoted two chapters to the special needs of fragile ecosystems, namely Chapter 12 on "Combating

Desertification and Drought" and Chapter 13 on "Sustainable Mountain Development". In the follow-up to UNCED, promising initiatives have emerged for these thematic areas. For drylands, the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (CCD) provides a framework for concrete action at the local level. For mountainous areas, efforts are currently under way to develop the basis for an action plan for sustainable mountain development, known as the "Mountain Agenda".

The Agenda involves the establishment of a network on sustainable mountain development consisting of United Nations agencies, NGOs and intergovernmental institutions. A set of action proposals has been developed by those involved in promoting sustainable mountain development. In recognition of the need to give prominence to the "Mountain Agenda" on the international and national lists of priorities, a global Inter-Governmental Organizations (IGO)/NGO Conference, as well as regional inter-governmental consultations are being convened. The main proposals for action that are emerging, identified through a broad participatory process involving the major NGOs, encompass five specific areas of focus: poverty eradication; the strengthening of a global information network and database; strengthening country capacity and the generation of "National Mountain Action Programmes"; raising awareness through the preparation and organization of a World Conference on Sustainable Mountain Development in early 1997; and the formulation, negotiation and implementation of regional or sub-regional mountain conventions and possibly the development of a "Global Mountain Charter".

The Desertification Convention offers new and exciting opportunities for collective action, as well as a fertile field for testing and nurturing innovative partnerships in development cooperation for local level action. It is the first International Treaty to squarely address poverty and environmental degradation in rural areas. Unlike the other Conventions associated with Rio, the direct beneficiaries of CCD are the hundreds of millions of predominantly poor and food-insecure people who populate the drylands of the world. It is the first Convention that casts resource users and their communities as central to the solution rather than part of the problem. At the very heart of the CCD is the concept of "Partnership". Partnership embodies the new thrust in development assistance, in which it is finally recognized that interdependence rather than dependence is the way forward. But partnerships won't work unless all partners stand to benefit. CCD tries to translate this attractive concept into more or less concrete terms.

While the underlying incentives to enter into partnership must exist, what is also needed is a favourable context to promote its emergence and functioning. In the context of CCD, the National Action Programmes - or NAPs - are the instrument for partnership. NAPs, which are not intended as static plans but as a dynamic programming capacity, should offer a macroeconomic and

institutional framework that will support local-level action. Here, more is meant than economic and fiscal policies, although these are of course extremely important. It also means a policy orientation that actively focuses on empowerment of local actors to take advantage of new opportunities and overcome old constraints. The Convention therefore encourages devolution of decision-making from the centre to local populations and resource users. The most important reasons for this are compellingly obvious:

Local Ownership in Decision-making - Local structures are more likely to make decisions that are relevant and suitable to local circumstances.

Removing Bottlenecks in Information Flow and Decision-making - Decision-making for natural resource management requires prompt and relevant information.

Improved Ability to Involve Marginalized Groups - Decentralization might allow better targeting of services and better identification of needy groups.

Better Tailoring of Approaches to Local Conditions - Local appreciation of constraints and opportunities can only improve the quality of solutions.

An emphasis on empowerment of local populations and civil society should not be construed as a wish to actively withdraw from the sustainable development arena. Instead, it is based on a recognition that the public sector and multilateral finance can facilitate but cannot substitute for action that must come from economic agents at the local level that act individually or collectively. What is needed now is to build an operational coalition between NGOs, CBOs as well as other institutions of civil society together with government institutions and international agencies, to form action-oriented partnerships around specific and concrete areas of intervention.

The Challenge of Financing Action

Promoted by the world's distress over the loss of life in the Sahelian famine of early 1970, the UN Conference on Desertification (UNCOD, Nairobi 1977) adopted a plan of action to end desertification by the close of the century. The response to the plan of action was dismal and it was virtually left on the shelf. Now with only four years left to the day when UNCOD's promises should have materialized, desertification has almost doubled, and the poor are paying the cost, with their health and lives. The CCD diligently negotiated and enthusiastically adopted holds new promises, as the degree of awareness, globally and locally, has increased. But unlike its sister Conventions on climate change and biological diversity, the CCD does not promote establishment of a new financial mechanism. Instead it foresees the creation of a "Global Mechanism" to be housed in an existing organization to coordinate and

facilitate the flow of additional funds including grants and concessional loans through both bilateral and multilateral channels.

Neither national budgets nor statistics on international financial flows to developing countries give clear figures on resources presently allocated to combat desertification. But there is little argument about the dearth of international funding for desertification control. Even resources formally provided under Global Environmental Facility (GEF) - which, by and large, precludes eligibility for desertification programmes - are judged to be inadequate. Nevertheless, financing constitutes a major pillar for the success of CCD without which it may very well face the same fate as UNCOD. Within this context, a proactive role for the Global Mechanism should be promoted.

The multi-source and multi-channel orientation of the CCD is more of a strength than a weakness. Instead of relying on one mechanism - say, the GEF - the Convention is not predicated on the availability of external grant finance earmarked for the purpose. In contrast, the Global Mechanism configuration is about improving the effectiveness and efficiency of existing flows, in addition to catalyzing and leveraging new flows and sources of finance. It encourages a greater role for domestic resource mobilization, private sector initiative, and a blending of various concessional and non-concessional external finance.

This diversity of flows and the multifaceted diverse coalition which one hopes it would represent, will in the end make the Convention and the actions it triggers more robust and sustainable. One should work towards that coalition, by assisting to set in place policy and institutional frameworks that are favourable to private initiative, by helping governments to provide public goods, by pump-priming promising initiatives, and by assisting local populations and community organizations to interface more productively with the private sector.

Financing Peoples' Participation

Local-level activities and creativity championed by CCD have a number of implications for the nature of resource mobilization as well as the manner through which resources are utilized. First, there is a need to step up efforts aimed at awareness- building at local level. This is a task for which NGOs and CBOs are best suited. The NGO community, and in particular the international NGOs, should give a high priority to this objective when mobilizing resources for CCD as stipulated in the Convention. Second, CCD calls upon Parties to promote a National Desertification Fund (NDF) and similar mechanisms for directing funds to the local level. Such mechanisms should be run on the basis of a participatory governance involving local communities and their partners in the NGO community.

NDF should also be flexible and simple in design. To preserve the confidence of both donors and local populations, it is imperative to ensure full transparency and effective accountability in its management. Moreover, the local populations could be true shareholders and effectively claim their share in the partnership if, in addition to the contribution from the external donors and national resources, they shoulder part of the financial burden. This could be done by mobilization and pooling of individual savings as well as through decentralization of collection and management of taxes, levies and other revenues derived from local resources. Third, it is absolutely important that the NDF resources are to be utilized for community level investment and that they lead to the creation of durable economic assets, shared collectively. Using the proceeds of NDF for relief activities or financing individually- owned enterprises would be a costly mistake. The former would deplete the resources of the fund without any lasting benefit, and the latter would distort the local financial market, preventing the creation of sound credit/saving structures. Such structures are equally important to facilitate investment for crop intensification or to promote economic diversification to lessen man and livestock pressure on land.

Conclusion

Populations in marginal areas are not doomed to despair. On the contrary, it is in these very regions that the people, forced by circumstance, manage to cope most creatively with their harsh and unpredictable environment, and to diversify their resource use strategies over space, season and sector. They capitalize as much as they can on biological diversity - most pronounced in these regions and constituting a core of their survival. They are responsible for most appropriate technological and institutional innovations which depend minimally on costly and external inputs. This is particularly true in the conservation of rainwater, notwithstanding the saline soils common in those regions. It is also true for the institutions which developed for the collective management of very scarce common resources, such as water points, grazing land and forests.

Effective actions against poverty, household food insecurity, and environmental degradation in marginal areas require first and foremost the empowering and equipping of local communities to take up the reins of resource management. The importance of local area development and improved local governance - also covered in the other issues papers - must be emphasized. An important factor in this context, of course, is the issue of incentive frameworks and enabling environments, with specific regard to the question of how to combine longer-term concerns for environmental rehabilitation and conservation with the pressing short-term needs of household food security. Also important are the technology and related measures to be promoted that build on traditional knowledge, such as those which will in the short term generate tangible benefits for the farmer, as outlined in the discussion paper on this topic.

Many conservation policies and strategies in the past have failed because of their top-down approach and their reliance on technologies which were irrelevant to the local circumstances. In contrast to the result of these efforts, the micro-projects implemented in many places over the past decade have made it possible to build up a store of knowledge allowing for the implementation of new approaches. Within this context, a consensus has emerged on the importance of indigenous people's traditional knowledge and practices in the management of arid land, forest, pasture and farmland to conserve soil and moisture, and in diversifying crop and livestock production to minimize risks.

Some traditional rural communities have developed complex resource management systems that have stood the test of time, and have much to offer in addressing present-day concerns over long-term resource sustainability. Their admirable environmental ethic deserves its due place. Asserting the importance of local knowledge calls for the empowerment of local people through their own organizations. Moreover, the considerable cultural and environmental heterogeneity of mountain areas and the scattered nature of dryland populations underline the need for decentralized local-level action toward integrated management of local areas.

This is not to suggest that local communities can be left to their own devices. There is a need for supportive and facilitating measures on the part of governments. The international community should also be aware of the global dimension of the process and the responsibility that this implies. There is therefore a need for a coalition of actors ranging from the international to the national and the local level. This is precisely what the CCD is promoting and what an eventual Mountain Agenda might promote. In the short term, what is needed is what one might risk calling "affirmative action" in the form of finance and assistance to local communities.

The immediate challenge is to consider how ratification of the CCD can be expedited, how it can be implemented and how to secure adequate financing for local area development. The CCD also stipulates a major role for civil society organizations, foremost among them the community-based organizations - namely that they should galvanize energies and mobilize resources. The private sector, as well as civil society at large, should also be encouraged to think beyond individual or corporate interests towards a recognition of a shared responsibility for the environment. Vigorous resource mobilization to combat desertification would stand a better change of succeeding if launched on the basis of empirically verifiable improvements.

Vulnerability

Vulnerability is the susceptibility to physical or emotional injury or attack. It also means to have one's guard down, open to censure or criticism. Vulnerability refers to a person's state of being liable to succumb, as to manipulation, persuasion or temptation.

A **window of vulnerability**, sometimes abbreviated to **wov**, is a time frame within which defensive measures are reduced, compromised or lacking.

Common applications

In relation to hazards and disasters, **vulnerability** is a concept that links the relationship that people have with their environment to social forces and institutions and the cultural values that sustain and contest them. "The concept of vulnerability expresses the multidimensionality of disasters by focusing attention on the totality of relationships in a given social situation which constitute a condition that, in combination with environmental forces, produces a disaster" (Bankoff et al. 2004: 11).

It's also the extent to which changes could harm a system.In other words, it's the extent to which a community can be affected by the impact of a hazard.

In global warming, vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes

Emerging research

Vulnerability research covers a complex, multidisciplinary field including development and poverty studies, public health, climate studies, security studies, engineering, geography, political ecology, and disaster and risk management. This research is of particular importance and interest for organizations trying to reduce vulnerability – especially as related to poverty and other Millennium Development Goals. Many institutions are conducting interdisciplinary research on vulnerability. A forum that brings many of the current researchers on vulnerability together is the Expert Working Group (EWG).1 Researchers are currently working to refine definitions of "vulnerability", measurement and assessment methods, and effective communication of research to decision makers (Birkmann et al. 2006).

Major research questions

Within the body of literature related to vulnerability, major research streams include questions of methodology, such as: measuring and assessing

vulnerability, including finding appropriate indicators for various aspects of vulnerability, up- and downscaling methods, and participatory methods (Villagran 2006).

A sub-category of vulnerability research is social vulnerability, where increasingly researchers are addressing some of the problems of complex human interactions, vulnerability of specific groups of people, and shocks like natural hazards, climate change, and other kinds of disruptions. The importance of the issue is indicated by the establishment of endowed chairs at university departments to examine social vulnerability.

Military vulnerability

In military circles Vulnerability is a subset of Survivability (the others being Susceptibility and Recoverability). Vulnerability is defined in various ways depending on the nation and service arm concerned, but in general it refers to the near-instantaneous effects of a weapon attack. In some definitions Recoverability (damage control, firefighting, restoration of capability) is included in Vulnerability.

Invulnerability

Invulnerability is a common feature found in video games. It makes the player impervious to pain, damage or loss of health. It can be found in the form of "power-ups" or cheats. Generally, it does not protect the player from certain instant-death hazards, most notably "bottomless" pits from which, even if the player were to survive the fall, they would be unable to escape. As a rule, invulnerability granted by power-ups is temporary, and wears off after a set amount of time, while invulnerability cheats, once activated, remain in effect until deactivated, or the end of the level is reached. Depending on the game in question, invulnerability to damage may or may not protect the player from non-damage effects, such as being immobilized or sent flying.

In comic books, some superheroes are considered invulnerable, though this usually only applies up to a certain level. (e.g. Superman is invulnerable to physical attacks from normal people but not to the extremely powerful attacks of Doomsday.

Expert Working Group on Vulnerability

- The Expert Working Group on Vulnerability is a group of experts brought together by the United Nations University Institute of Environment and Human Security (UNU-EHS). The overall goal of the Expert Working Group is to advance the concept of human security regarding vulnerability of societies to hazards of natural origin. The EWG

exchanges ideas about the development of methodologies, approaches and indicators to measure vulnerability. This is a key task to build a bridge between the theoretical conceptualization of vulnerability and its practical application in decision-making processes. The Expert Working Group is an exchange platform for experts and practitioners from various scientific backgrounds and world regions dealing with the identification and measurement of vulnerability. Emphasis is given to the identification of the different features and characteristics of vulnerability, coping capacities and adaptation strategies of different social groups, economic sectors and environmental components.

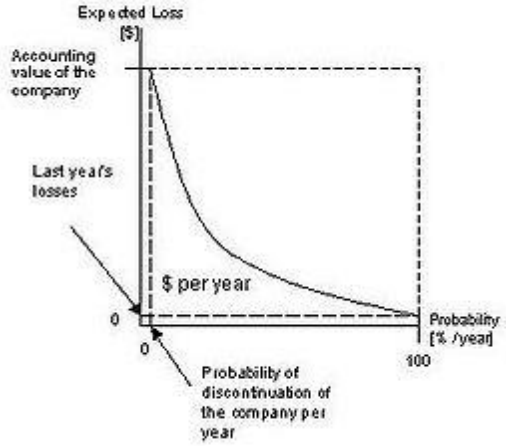
Risk assessment

Risk assessment is a step in a risk management process. Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat (also called hazard). Quantitative risk assessment requires calculations of two components of risk: R, the magnitude of the potential loss L, and the probability p, that the loss will occur.

Methods may differ whether it is about general financial decisions or environmental or public health risk assessment.

Explanation

Risk assessment consists in an objective evaluation of risk in which assumptions and uncertainties are clearly considered and presented. Part of the difficulty of risk management is that measurement of both of the quantities in which risk assessment is concerned - potential loss and probability of occurrence - can be very difficult to measure. The chance of error in the measurement of these two concepts is large. A risk with a large potential loss and a low probability of occurring is often treated differently from one with a low potential loss and a high likelihood of occurring. In theory, both are of nearly equal priority in dealing with first, but in practice it can be very difficult to manage when faced with the scarcity of resources, especially time, in which to conduct the risk management process. Expressed mathematically,



http://en.wikipedia.org/wiki/File:Risk.jpg

Risk assessment is a in financial point of view.

Financial decisions, such as insurance, express loss in terms of dollar amounts. When risk assessment is used for public health or environmental decisions, loss can be quantified in a common metric,such as a country's currency, or some numerical measure of a location's quality of life. For public health and environmental decisions, loss is simply a verbal description of the outcome, such as increased cancer incidence or incidence of birth defects. In that case, the "risk" is expressed as:

If the risk estimate takes into account information on the number of individuals exposed, it is termed a "population risk" and is in units of expected increased cases per a time period. If the risk estimate does not take into account the number of individuals exposed, it is termed an "individual risk" and is in units of incidence rate per a time period. Population risks are of more use for cost/benefit analysis; individual risks are of more use for evaluating whether risks to individuals are "acceptable"....

Risk assessment in public health

In the context of public health, risk assessment is the process of quantifying the probability of a harmful effect to individuals or populations from certain human activities. In most countries, the use of specific chemicals, or the operations of specific facilities (e.g. power plants, manufacturing plants) is not allowed unless it can be shown that they do not increase the risk of death or illness above a specific threshold. For example, the American Food and Drug Administration (FDA) regulates food safety through risk assessmen. The FDA required in 1973 that cancer-causing compounds must not be present in meat at concentrations that would cause a cancer risk greater than 1 in a million lifetimes.

How the risk is determined

In the estimation of the risks, three or more steps are involved, requiring the inputs of different disciplines:

Hazard Identification, aims to determine the qualitative nature of the potential adverse consequences of the contaminant (chemical, radiation, noise, etc.) and the strength of the evidence it can have that effect. This is done, for chemical hazards, by drawing from the results of the sciences of toxicology and epidemiology. For other kinds of hazard, engineering or other disciplines are involved.

Dose-Response Analysis, is determining the relationship between dose and the probability or the incidence of effect (dose-response assessment). The complexity of this step in many contexts derives mainly from the need to extrapolate results from experimental animals (e.g. mouse, rat) to humans, and/or from high to lower doses. In addition, the differences between individuals due to genetics or other factors mean that the hazard may be higher for particular groups, called susceptible populations. An alternative to dose-response estimation is to determine an effect unlikely to yield observable effects, that is, a no effect concentration. In developing such a dose, to account for the largely unknown effects of animal to human extrapolations, increased variability in humans, or missing data, a prudent approach is often adopted by including safety factors in the estimate of the "safe" dose, typically a factor of 10 for each unknown step.

Exposure Quantification, aims to determine the amount of a contaminant (dose) that individuals and populations will receive. This is done by examining the results of the discipline of exposure assessment. As different location, lifestyles and other factors likely influence the amount of contaminant that is received, a range or distribution of possible values is generated in this step. Particular care is taken to determine the exposure of the susceptible population(s).

Finally, the results of the three steps above are then combined to produce an estimate of risk. Because of the different susceptibilities and exposures, this risk will vary within a population.

Small subpopulations

When risks apply mainly to small subpopulations, there is uncertainty at which point intervention is necessary. What if a risk is very low for everyone but 0.1% of the population? A difference exists whether this 0.1% is represented by *all infants younger than X days or *recreational users of a particular product. If the risk is higher for a particular sub-population because of abnormal exposure rather than susceptibility, there is a potential to consider strategies to further reduce the exposure of that subgroup. If an identifiable sub-population is more susceptible due to inherent genetic or other factors, there is a policy choice whether to set policies for protecting the general population that are protective of such groups (as is currently done for children

when data exists, or is done under the Clean Air Act for populations such as asthmatics) or whether if the group is too small, or the costs to high. Sometimes, a suitable position is to at least limit the risk of the more susceptible to some risk level above which it seems too inequitable to leave them out of the risk.

Acceptable risk increase

The idea of not increasing lifetime risk by more than one in a million has become common place in public health discourse and policy. How consensus settled on this particular figure is unclear. In some respects, this figure has the characteristics of a mythical number. In another sense, the figure provides a numerical basis for what to consider a negligible increase in risk. Some current environmental decision making allows some discretion to deem individual risks potentially "acceptable" if below one in ten thousand increased lifetime risk. Low risk criteria such as these do provide some protection for the case that individuals may be exposed to multiple chemicals (whether pollutants or food additives, or other chemicals). But both of these benchmarks are clearly small relative to the typical one in four lifetime risk of death by cancer (due to all causes combined) in developed countries. On the other hand, adoption of a zero-risk policy could be motivated by the fact that the 1 in a million policy still would cause the death of hundreds or thousands of people in a large enough population. In practice however, a true zero-risk is possible only with the suppression of the risk-causing activity.

More stringent requirements, or even the 1 in a million one, may not be technologically feasible at a given time, or so expensive as to render the risk-causing activity unsustainable, resulting in the optimal degree of intervention being a balance between risks vs. benefit. For example, it might well be that the emissions from hospital incinerators result in a certain number of deaths per year. However, this risk must be balanced against the available alternatives. In some unusual cases, there are significant public health risks, as well as economic costs, associated with all options. For example, there are risks associated with no incineration (with the potential risk for spread of infectious diseases) or even no hospitals. But, often further investigation identifies further options, such as separating noninfectious from infectious wastes, or air pollution controls on a medical incinerator, that provide a broad range of options of acceptable risk - though with varying practical implications and varying economic costs. Intelligent thought about a reasonably full set of options is essential. Thus, it is not unusual for there to be an iterative process between analysis, consideration of options, and then further analysis.

Risk assessment in auditing

In auditing, risk assessment is a very crucial stage before accepting an audit engagement. According to ISA315 Understanding the Entity and its Environment and Assessing the Risks of Material Misstatement, "the auditor should perform risk assessment procedures to obtain an understanding of the entity and its environment, including its internal control."<evidence relating to

the auditor's risk assessment of a material misstatement in the client's financial statements. Then, auditor obtains initial evidence regarding the classes of transactions at the client and the operating effectiveness of the client's internal controls.In auditing, audit risk includes inherent risk, control risk and detection risk.

Risk assessment in information security

There are two methods of risk assessment in information security field, qualitative and quantitative. Purely quantitative risk assessment is a mathematical calculation based on security metrics on the asset (system or application). Qualitative risk assessment is performed when the organization requires a risk assessment be performed in a relatively short time or to meet a small budget, a significant quantity of relevant data is not available, or the persons performing the assessment don't have the sophisticated mathematical, financial, and risk assessment expertise required.Qualitative risk assessment can be performed in a shorter period of time and with less data. Qualitative risk assessments are typically performed through interviews of a sample of personnel from all relevant groups within an organization charged with the security of the asset being assessed. Qualitative risk assessments are descriptive versus measurable.

Quantitative Risk Assessment software

Quantitative risk assessments include a calculation of the single loss expectancy (SLE) of an asset. The single loss expectancy can be defined as the loss of value to asset based on a single security incident. The team then calculates the annualized rate of occurrence (ARO) of the threat to the asset. The ARO is an estimate based on the data of how often a threat would be successful in exploiting a vulnerability. From this information, the annualized loss expectancy (ALE) can be calculated. The annualized loss expectancy is a calculation of the single loss expectancy multiplied the annual rate of occurrence, or how much an organization could estimate to lose from an asset based on the risks, threats, and vulnerabilities. It then becomes possible from a financial perspective to justify expenditures to implement countermeasures to protect the asset.

Criticisms of quantitative risk assessment

Barry Commoner, Brian Wynne and other critics have expressed concerns that risk assessment tends to be overly quantitative and reductive. For example, they argue that risk assessments ignore qualitative differences among risks. Some charge that assessments may drop out important non-quantifiable or inaccessible information, such as variations among the classes of people exposed to hazards. Furthermore, Commoner and O'Brien claim that quantitative approaches divert attention from precautionary or preventative measures. Others, like Nassim Nicholas Taleb consider risk managers little more than "blind users" of statistical tools and methods.

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