

A STRATEGIC FRAMEWORK FOR DISASTER RISK MANAGEMENT FOR THE CAYMAN ISLANDS

HAZARD MANAGEMENT CAYMAN ISLANDS

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1. PURPOSE

This Strategic Framework is the key strategic tool for management of the hazards which threaten the Cayman Islands. The Framework captures the vision for disaster risk management and will guide the national risk management programme.

2. INTRODUCTION

The development of the National Strategic Framework for Disaster Risk Management is in keeping with the now accepted global movement from response to a pro-active approach which prevents or reduces risk and thus provides greater public safety and economic stability.

Disaster Risk Management entails prevention, preparedness, mitigation, response and recovery for any hazard. It is achieved through policy, administrative and legal instruments and procedures as well as operational procedures. The official United Nations definition is given at Appendix 1. Disaster Risk Reduction aims to reduce damage and losses to the population, infrastructure and economy, from the impact of a hazard. The United Nations definition is given at Appendix 1.

There is now global recognition that prevention and mitigation interventions are the most cost effective approaches in the bid to reduce the losses from the impact of hazards. The concept of risk management embodies all aspects of managing the potential impact of hazards. These are prevention, preparedness, mitigation, response, relief and recovery and rehabilitation. (See Appendix 1 for United Nations Definitions). The term comprehensive disaster management is also used sometimes as a synonym for disaster risk management. Comprehensive disaster management is the approach which has been agreed on in the regional context, and is promoted by the Caribbean Disaster Emergency Response Agency (CDERA). It should be noted that the concept of risk implies quantitative analysis, whereas that of comprehensive disaster management does not necessarily connote quantification, although quantitative approaches can be included.

At the 2005 World Conference on Disaster Reduction in Hyogo, Japan, the international community adopted the *Hyogo Framework for Action* which establishes a global framework for disaster risk reduction. The Priorities under the Hyogo Framework are:

1. Ensure that disaster risk reduction is a national priority with a strong institutional basis for implementation
2. Identify, assess and monitor disaster risks and enhance early warning
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels
4. Reduce the underlying risk factors
5. Strengthen disaster preparedness for effective response at all levels

The Cayman Islands National Strategic Framework for Disaster Risk Reduction will be closely aligned to this international framework. Indeed, the decision by the Government of the Cayman Islands to establish a dedicated office for disaster risk management is in keeping with Priority 1 above. A strong institutional basis will also require establishment of legislation and appropriate policies for risk management.

Regional and International partnerships and exchanges will also be an integral part of the framework. In addition to other Overseas Territories, the Cayman Islands will establish partnerships with other Caribbean Territories and become members of Regional Organisations such as CDERA, and international organisations such as the International Strategy for Disaster Reduction, among others.

The Cayman Islands has in the past concentrated on hurricanes in its emergency management planning. There is however a growing recognition that although hurricanes may present the highest probability threat, other threats exist and must be planned for. The December 2004 magnitude 6.8 earthquake was a reminder that the country is vulnerable to this hazard.

It is vital, therefore, that a multi-hazard approach to managing the country's threats be adopted. Credible threats which must be addressed include major transportation accidents, earthquakes, major power failure, hazardous materials incidents, major fires, and major medical emergencies and epidemics.

The increasingly accepted effects of global climate change and the global reality of terrorism must also be factored into the country's hazard assessment as potential threats.

Projections for global climate change indicate that changes in climate parameters such as rainfall, temperature, mean sea-level and storm/hurricane frequency and intensity may be expected. In the region, a rising sea level would increase risks of coastal erosion and inundation, threatening key tourism, energy, transportation and communications infrastructure. In addition, warmer waters may cause the bleaching and extinction of coral reefs which act as natural barriers against storm surges, tsunamis and other damaging coastal waves. The impact of these hazards upon island states, demonstrates a disproportionate impact not usually experienced by continental countries.

Past events as well as future threats demonstrate the need for a multi-hazard approach to planning for the Cayman Islands.

The Cayman Islands National Strategic Plan 1998 -2008 lists "comprehensive contingency planning" and establishment of a "national emergency management agency" among its strategies. The document also mentions prevention and mitigation as desirable activities to be undertaken to safeguard the country. The proposal for a national agency with a comprehensive mandate to lead the risk management process is therefore in keeping with the plans for national development.

The post Ivan project "A Strategy for Risk Management in the Cayman Islands: Phase One" included "increased capacity for vulnerability reduction and hazard management" as one of its outputs, and includes a number of activities which could be undertaken by the new national agency.

In summary, there is a clear convergence of thinking on the necessity for a national agency for hazard and risk management utilising a comprehensive approach.

The Disaster Risk Reduction Strategic (Policy) Framework recognizes the necessity and value of this comprehensive, multi-hazard approach and provides a context for its development and application.

3. AIM OF THE DISASTER RISK REDUCTION FRAMEWORK

The Framework will:

- Articulate the national vision for risk reduction
- Guide government policies

- Take a pro-active all-hazards, multi-agency approach to risk management
- Place the country's approach in alignment with regional and international norms
- Plan for the adaptation of best practice models to the local context
- Integrate risk reduction into national development at all levels and across all sectors
- Seek to engage all residents of Grand Cayman, Cayman Brac and Little Cayman in the disaster risk management process
- Establish the Government's policy, roles and responsibilities on the national risk management programme

4. VISION

The National Disaster Risk Management Programme of the Cayman Islands will provide a safe environment for the population from natural and man-made disasters. It will do so by emphasizing prevention and mitigation as national priorities and by maintaining a high standard of preparedness for all hazards.

5. VALUES

- Stakeholder buy-in through education and public consultation
- The government will recognise its responsibilities for public safety by supporting the programme through the provision of adequate resources.
- Each individual is accountable for his or her safety.
- Resource management will be governed by transparent processes.
- Each stakeholder's role and contribution will be recognised and valued.
- Adoption of best practices and high standards, in keeping with international standards and local needs.
- Empowerment of communities to manage their risk.
- Respect for the heritage and culture of the Cayman Islands

6. GENERAL PRINCIPLES/PARAMETERS

- Achievement of consensus through a consultative process
- Commitment to a comprehensive approach to risk management, including prevention, preparedness, mitigation, response and recovery
- Ensuring public safety through maintaining a high level of community preparedness
- Providing residents with adequate information, capacity and skills to allow them to take responsibility for their personal safety
- All levels of Government must be committed to consistently improving their risk management programmes to ensure reduction of impact on the country from hazards, and to maintain public safety
- Establishment of agreements with local and overseas service providers for assistance
- Establishment of Inter-agency agreements and partnerships to achieve common goals
- Cooperation with Regional, International and Corporate partners to further the cause of disaster risk management locally and regionally

7. ELEMENTS OF THE FRAMEWORK

The major elements of the Framework are:

POLICY AND GOVERNANCE
 RISK ASSESSMENT
 RISK MAPPING
 MITIGATION
 PREPAREDNESS
 PUBLIC AWARENESS AND EDUCATION

RESPONSE
RELIEF
RECOVERY AND REHABILITATION
POST IMPACT EVALUATION

8. POLICY AND GOVERNANCE

8.0 Policy Statement

National Policies provide clear direction which guide priorities, resource allocation, and accountability for the national disaster risk management programme. A national office for disaster risk management will be created to undertake responsibility for the implementation of the national disaster risk management programme.

8.1 Goal

Risk management outcomes are achieved through the development and implementation of sound policies and mechanisms for effective governance

8.2 Strategies

- a. Ensure policy development process is participatory
- b. Disaster risk management to be integrated into all public sector work programmes and to be financed by annual budgetary allocations
- c. Ensure that adequate financial resources are made available through the budget for implementation of policies and programmes by responsible public sector entities
- d. Clear and transparent decision making through consultation and communication
- e. Consistent and impartial application and enforcement of policies and regulations
- f. Ongoing reviews of the risk management system to:-
 - Clearly define roles and responsibilities
 - Define channels of communication
 - Ensure transparency of the decision-making process
- g. Integrate risk reduction into strategic and corporate plans at all levels of government, the private sector, economy and communities
- h. Develop adequate supporting legislation for disaster risk management structures, policies and programmes, and update existing partner legislation as necessary

8.3 Key Performance Indicators

- a. Clearly defined and documented roles and responsibilities of all actors, agencies and organisations in the disaster risk management system
- b. Policies have benefitted from public consultation
- c. Legislation developed and passed
- d. Relevant existing legislation updated and appropriate regulations added

9. RISK ASSESSMENT

Risk assessment is the process of evaluating and quantifying the threat of various hazards to the country. Risk assessments identify hazards, their probability of occurrence, vulnerability to these hazards, probable impact and cost of this impact, and can be carried out at any level, community to national, or for any sector. Risk assessments are needed, inter alia, for effective disaster risk reduction planning, sustainable development planning, identifying high risk areas, identifying mitigation and loss reduction strategies and developing preparedness and response plans. Risk assessments are also important for setting risk management priorities.

9.0 Policy Statement

Risk assessments, including socio-economic impacts, will guide national development and will be required for all development projects.

9.1 Goal

Risk Assessments are used to ensure public safety and to contribute to sustainable national development.

9.2 Strategies

- a. Use of risk assessments prior to development and implementation of any national risk reduction programme
- b. Ensure engagement between developers of corporate and residential sites and planning authorities to enhance the social and environmental acceptability and success of developments
- c. Use of risk assessments to inform all housing, infrastructural, commercial/industrial developments
- d. Risk assessments and environmental impact assessments to include public dialogue and to inform planning of projects in environmentally sensitive areas
- e. Ensure objective and accurate risk assessments by adhering to best practice models
- f. Ensure outcomes are clearly articulated and are available to entire country through public consultations
- g. Ensure adequate research to inform risk assessments
- h. Ensure ongoing update of risk assessments by establishment of hazard and risk database, ongoing research and periodic update of data base and assessments

9.3 Key Performance Indicators

- a. Risk assessments are completed, kept updated and available to the public
- b. Risk assessments are utilised by government agencies to inform planning

10. RISK MAPPING

Risk mapping is the spatial representation of risk through the use of maps. Typically these maps will show the probability of occurrence of the hazard, the area at threat from the hazard and the facilities/resources at risk. If a value has been assigned to the facilities or resources, a dollar value can be calculated for probable loss.

10.0 Policy Statement

Risk mapping will be conducted for all hazards, and will be updated at regular intervals to capture changing risk patterns and emerging threats.

10.1 Goal

Risk maps are prepared for all major hazards and the entire country

10.2 Strategies

- a. Ensure accurate risk mapping by adherence to best practice models
- b. Ensure risk maps are kept current by ongoing risk analysis and updating of maps at prescribed intervals
- c. Ensure maps are freely available to entire country
- d. Ensure use of maps integrated into national development at all levels and across all sectors

10.3 Key Performance Indicators

- a. Risk maps produced and updated regularly
- b. Risk maps easily available to public
- c. National development reflects input of risk mapping

11. MITIGATION

Mitigation is the process of reducing the impact of hazards and thus saving lives and reducing damage. Implementation of mitigation measures results in the saving of costs through reduced damage and faster recovery. Calculations of cost: benefit ratios can be used to quantify probable savings.

11.0 Policy Statement

Mitigation measures to reduce identified risk must be explicitly stated in all development applications and must be assessed by technical agencies prior to any final approval.

11.1 Goal

Reduced risk through maximum resilience for country and natural environment

11.2 Strategies

- a. Position mitigation as the primary method of increasing resilience
- b. Ensure mitigation programmes aligned with risk assessments
- c. Integrate mitigation into all government policies and programmes
- d. Improve land use management through the use of hazard data base and assessments, and risk maps to inform decision-making
- e. Apply building codes stringently for all structures
- f. Ensure review and update of codes and standards to meet emerging or changing threats
- g. Integrate mitigation into education curricula
- h. Establish indicators to track performance in mitigation/risk reduction
- i. Declare Specially Vulnerable Areas and No Build Zones based on risk analysis and mapping

11.4 Key Performance Indicators

- a. Indicators show improved resilience of communities and systems
- b. Mitigation priorities determined by risk assessments

12. PREPAREDNESS

Preparedness arrangements ensure that if a threat exists, it can be detected and that available resources to meet that threat can be efficiently mobilized and deployed.

12.0 Policy Statement

Government will maintain a state of maximum preparedness through the provision of necessary resources to the public sector, and will require the private sector to adhere to local preparedness standards.

12.1 Goal

State of maximum preparedness for identified threats achieved and maintained for country

12.2 Strategies

- a. Ensure adequate monitoring and forecasting capability for all threats
- b. Ensure warning and alerting systems adequate and functional
- c. Ensure timely release of alerts and warnings to public
- d. Ensure existence of hazard management plans from community to national level, and for all sectors, and carry out regular exercises of these plans.
- e. Ensure alignment of plans with credible scenarios

- f. Ensure plans address business continuity for all sectors including government
- g. Develop local capacity through training and development of community hazard management teams and NGO network
- h. Capture local capacity in community teams and volunteers
- i. Adequately resource national preparedness programme
- j. Integrate preparedness into national education curricula
- k. Establish benchmarks for public sector preparedness, including development of plans
- l. Ensure private sector accepts and discharges responsibility for their preparedness
- m. Ensure adequate shelter arrangements for persons displaced by disaster

12.3 Key Performance Indicators

- a. All necessary hazard management plans in place
- b. Systems in place for testing and reviewing plans including worst case scenarios
- c. An informed and aware population
- d. Communities self-sufficient for initial response
- e. Benchmarks established and achieved

13. PUBLIC AWARENESS AND EDUCATION

This is the processes of informing the general population about the hazards affecting the country and how they can act to reduce their exposure to hazards. This is particularly important for public officials in fulfilling their responsibilities to save lives and property in the event of a disaster. Public awareness activities aim to foster changes in behaviour leading to a national culture of prevention and mitigation. Activities include information dissemination, education, radio or television broadcasts, use of printed media, as well as the establishment of information centres and networks and community participatory activities.

13.0 Policy Statement

Government will position public awareness and education as the primary tool for achieving an informed population that accepts responsibility for personal safety and is committed to disaster prevention and mitigation.

13.1 Goal

An informed population committed to a culture of prevention and mitigation

13.2 Strategies

- a. Create a high level of public awareness and knowledge through ongoing public education and awareness programmes

- b. Delineate roles and responsibilities for public awareness, including alerting, warning, mitigation and recovery
- c. Integrate media into public awareness programme and define their role
- d. Ensure schools' public education programme including drills
- e. Ensure availability of adequate public awareness material through waiving of inter-departmental service agreements, fees and other mechanisms as necessary
- f. Integrate disaster risk management into education curricula
- g. Ensure Education curricula aligned with national policy on disaster risk management

13.3 Key Performance Indicators

- a. Disaster risk management principles visible in education curricula
- b. Public awareness material freely available in appropriate form
- c. Public aware of major hazards and precautionary measures for protection

14. RESPONSE

Disaster Response encompasses those actions taken immediately before, during and after the impact of a hazard to safeguard life and property and to ensure that the immediate effects are minimized.

14.0 Policy Statement

Government will provide the tools and resources needed to ensure swift and efficient responses to threats and emergencies in order to save lives and safeguard property

14.1 Goal

Efficient and effective response results in saving lives, protecting property and minimizing suffering and damage

14.2 Strategies

- a. Develop appropriate and effective forecasting and early warning systems
- b. Ensure adequate means of communication and warning for public
- c. Establish standards for operational efficiency
- d. Ensure adequate operational capacity for response across all sectors and levels
- e. Ensure existence of coordinating focal point for multi-hazard responses
- f. Ensure delineation and documentation of roles and responsibilities

- g. Ensure development of standard operating procedures and other appropriate tools for enhancing response
- h. Document assessment procedures and ensure immediate post-impact assessment capacity

14.4 Key Performance Indicators

- a. Response standards met or exceeded for all responses
- b. Warnings result in appropriate action by public

15. DISASTER RELIEF

Disaster relief entails addressing the immediate needs of the affected population by provision of medical care, shelter, psychological and welfare support.

15.0 Policy Statement

Government will provide relief assistance to the most vulnerable, and will recognise the roles of the international community and the private and volunteer sectors in relief operations.

15.1 Goal

Efficient dispensing of relief minimizes suffering and dislocation after a disaster

15.2 Strategies

- a. Establish standards for dispensing of relief assistance
- b. Ensure adequate provisions for immediate dispensing of post impact assistance
- c. Ensure transparent system for reception and distribution of relief supplies
- d. Develop holistic approach to welfare management for affected population, including care for special populations such as children, the elderly and persons with disabilities
- e. Ensure means of obtaining feedback from affected communities on relief operations
- f. Adequate communication to ensure affected communities are kept apprised of all actions being taken
- g. Ensure relief operations do not compromise or increase vulnerability to future events

15.3 Key Performance Indicators

- a. Relief operations meet or exceed stated standards
- b. Special needs populations adequately managed during relief operations
- c. Country's resilience not compromised by relief operations

16. RECOVERY (REHABILITATION AND RECONSTRUCTION)

These terms cover short to long term recovery from a disaster. Often, recovery is said to comprise rehabilitation – short term restoration of services, access etc., and longer term reconstruction. Recovery operations need to be carefully planned to ensure that rehabilitation does not cause more damage, e.g. to the environment, and that reconstruction increases resilience.

16.0 Policy Statement

A national recovery plan, which includes mitigation and vulnerability reduction, and permits rapid recovery will guide recovery operations.

16.1 Goal

Recovery completed within shortest timeframe with improved resilience

16.2 Strategies

- a. Ensure recovery procedures documented
- b. Ensure priorities for recovery identified and agreed on
- c. Ensure economic and business continuity
- d. Ensure recovery operations include adequate mitigation and prevention provisions
- e. Ensure environmental recovery included in recovery and rehabilitation plans and efforts
- f. Establish benchmarks for successful recovery programmes
- g. Economic Continuity Subcommittee involved in recovery planning and process
- h. Establish national fund for disaster recovery

16.3 Key Performance Indicators

- a. Recovery plans documented and reflect adequate risk reduction measures
- b. Environmental recovery plans documented
- c. Benchmarks achieved or exceeded in recovery process
- d. Social recovery plans documented

17. POST-IMPACT EVALUATIONS

These evaluations are designed to a) confirm good practices, b) identify variance from standards, c) identify areas in need of improvement and increased focus for mitigation interventions, d) raise confidence levels of the public and business community and e) identify areas where interventions are needed. Evaluations will lead to improvements in the national disaster risk management system and programmes and therefore increased preparedness for any future events.

17.0 Policy Statement

Post-impact evaluations will be done for all major events and results will be made public and inform the revision of plans and procedures.

17.1 Goal

Post-impact assessments improve the quality of the national disaster risk management programme and hazard management capability through feed back loop.

17.2 Strategies

- a. Develop, adapt or adopt evaluation tools for emergency management process as well as impact management
- b. Undertake post-impact evaluations using developed methodologies
- c. Capture and document lessons learnt
- d. Involve affected communities in evaluations
- e. Use results to modify procedures and structures to improve national disaster risk management plans and programmes
- f. Ensure results of evaluation used to inform recovery and rehabilitation processes

17.3 Key Performance Indicators

- a. Post-impact evaluations completed for all major or significant events
- b. Risk management programme improved by integration of evaluation results
- c. Emergency management capacity enhanced by application of lessons learnt

REQUIREMENTS FOR SUCCESSFULLY IMPLEMENTING THE NATIONAL STRATEGIC FRAMEWORK

1. Development of Disaster Risk Management Legislation which will provide the mandate and legal authority for implementing/applying the national strategic framework, is required. The legislation should also specify any and all institutions which will be necessary.
2. Updating of all relevant legislation related to matters of the environment, planning, health, safety and national development will be necessary to adequately capture prevention and mitigation aspects, as well as emerging threats. Where necessary, legislation should also speak to roles and responsibilities of positions or posts which are necessary for the success of the risk management programme.
3. Establishment of Institutional Framework – The full time office, and other structures will be required to fully implement the disaster risk management programme. The present NHC and sub-committees can be adapted for multi-hazard approaches. The need for other structures, such as a National Mitigation Committee, should be assessed, and the structures established. This will require inclusion of agencies and organisations which may not now be included in the National Hurricane Committee.

4. The full time office's strategic plan will be based on priorities of the National Strategic Framework (NSF), and the agency's corporate plan and work programmes will be derived from these priorities. The NSF should also guide all public sector entities in development and implementation of their disaster risk management programmes.

5. Integration of disaster risk reduction (DRR) into plans/programmes of public sector agencies, as well as into the private sector is important if the national disaster risk management programme is to be successful. There are several regional and international initiatives which are seeking to develop methods for 'mainstreaming' DRR into national sustainable development. There is therefore opportunity for the Cayman Islands to benefit from these initiatives directly – through participation in projects or indirectly, through application of results.

REFERENCES

1. International Strategy for Disaster Reduction, Terminology: Basic Terms of disaster risk reduction at <http://www.unisdr.org/eng/library/lib-terminology-eng-p.htm>

Director HMCI/ December 08 2006

APPENDIX 1 – GLOSSARY OF TERMS



International Strategy for **Disaster Reduction**

[Home](#)

[UN/ISDR Africa](#)

[UN/ISDR Asia & Pacific](#)

[UN/ISDR Latin America and the Caribbean](#)

[Early Warning Platform](#)

[Terminology of disaster risk reduction](#)

Terminology: Basic terms of disaster risk reduction

The ISDR Secretariat presents these basic definitions on disaster risk reduction in order to promote a common understanding on this subject, for use by the public, authorities and practitioners. The terms are based on a broad consideration of different international sources. This is a continuing effort to be reflected in future reviews, responding to a need expressed in several international venues, regional discussions and national commentary. Feedback from specialists and other practitioners to improve these definitions will be most welcome.

Acceptable risk	<p>The level of loss a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions.</p> <p><i>In engineering terms, acceptable risk is also used to assess structural and non-structural measures undertaken to reduce possible damage at a level which does not harm people and property, according to codes or "accepted practice" based, among other issues, on a known probability of hazard.</i></p>
Biological hazard	<p>Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.</p> <p><i>Examples of biological hazards: outbreaks of epidemic diseases, plant or animal contagion, insect plagues and extensive infestations.</i></p>
Building codes	<p>Ordinances and regulations controlling the design, construction, materials, alteration and occupancy of any structure to insure human safety and welfare. Building codes include both technical and functional standards.</p>
Capacity	<p>A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster.</p> <p><i>Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.</i></p>
Capacity building	<p>Efforts aimed to develop human skills or societal infrastructures within a community or organization needed to reduce the level of risk.</p> <p><i>In extended understanding, capacity building also includes development of institutional, financial, political and other resources, such as technology at different levels and sectors of the society.</i></p>
Climate change	<p>The climate of a place or region is changed if over an extended period (typically decades or longer) there is a statistically significant change in measurements of either the mean state or variability of the climate for that place or region.</p> <p><i>Changes in climate may be due to natural processes or to persistent anthropogenic changes in atmosphere or in land use. Note that the definition of climate change used in the United Nations Framework Convention on Climate Change is more restricted, as it includes only those changes which are attributable directly or indirectly to human activity.</i></p>
Coping capacity	<p>The means by which people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster.</p> <p><i>In general, this involves managing resources, both in normal times as well as during crises or adverse conditions. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and human-induced hazards.</i></p>

Counter measures	All measures taken to counter and reduce disaster risk. They most commonly refer to engineering (structural) measures but can also include non-structural measures and tools designed and employed to avoid or limit the adverse impact of natural hazards and related environmental and technological disasters.
Disaster	<p>A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.</p> <p><i>A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.</i></p>
Disaster risk management	The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.
Disaster risk reduction (disaster reduction)	<p>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.</p> <p><i>The disaster risk reduction framework is composed of the following fields of action, as described in ISDR's publication 2002 "Living with Risk: a global review of disaster reduction initiatives", page 23:</i></p> <ul style="list-style-type: none"> • <i>Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;</i> • <i>Knowledge development including education, training, research and information;</i> • <i>Public commitment and institutional frameworks, including organisational, policy, legislation and community action;</i> • <i>Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;</i> • <i>Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities.</i>
Early warning	<p>The provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response.</p> <p><i>Early warning systems include a chain of concerns, namely: understanding and mapping the hazard; monitoring and forecasting impending events; processing and disseminating understandable warnings to political authorities and the population, and undertaking appropriate and timely actions in response to the warnings.</i></p>
Ecosystem	A complex set of relationships of living organisms functioning as a unit and interacting with their physical environment.

The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2001).

El Niño-southern oscillation (ENSO)

A complex interaction of the tropical Pacific Ocean and the global atmosphere that results in irregularly occurring episodes of changed ocean and weather patterns in many parts of the world, often with significant impacts, such as altered marine habitats, rainfall changes, floods, droughts, and changes in storm patterns.

The El Niño part of ENSO refers to the well-above-average ocean temperatures along the coasts of Ecuador, Peru and northern Chile and across the eastern equatorial Pacific Ocean, while the Southern Oscillation refers to the associated global patterns of changed atmospheric pressure and rainfall. La Niña is approximately the opposite condition to El Niño. Each El Niño or La Niña episode usually lasts for several seasons.

Emergency management

The organization and management of resources and responsibilities for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation.

Emergency management involves plans, structures and arrangements established to engage the normal endeavours of government, voluntary and private agencies in a comprehensive and coordinated way to respond to the whole spectrum of emergency needs. This is also known as disaster management.

Environmental impact assessment (EIA)

Studies undertaken in order to assess the effect on a specified environment of the introduction of any new factor, which may upset the current ecological balance.

EIA is a policy making tool that serves to provide evidence and analysis of environmental impacts of activities from conception to decision-making. It is utilised extensively in national programming and for international development assistance projects. An EIA must include a detailed risk assessment and provide alternatives solutions or options.

Environmental degradation

The reduction of the capacity of the environment to meet social and ecological objectives, and needs.

Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards.

Some examples: land degradation, deforestation, desertification, wildland fires, loss of biodiversity, land, water and air pollution, climate change, sea level rise and ozone depletion.

Forecast

Definite statement or statistical estimate of the occurrence of a future event (UNESCO, WMO).

This term is used with different meanings in different disciplines.

Geological hazard

Natural earth processes or phenomena that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Geological hazard includes internal earth processes or tectonic origin, such as earthquakes, geological fault activity, tsunamis, volcanic activity and emissions as well as external processes such as mass movements: landslides, rockslides, rock falls or avalanches, surfaces collapses, expansive soils and debris or mud flows.

Geological hazards can be single, sequential or combined in their origin and effects.

Geographic information systems (GIS)

Analysis that combine relational databases with spatial interpretation and outputs often in form of maps. A more elaborate definition is that of computer programmes for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced.

Geographical information systems are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk management measures.

Greenhouse gas (GHG)

A gas, such as water vapour, carbon dioxide, methane, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), that absorbs and re-emits infrared radiation, warming the earth's surface and contributing to climate change (UNEP, 1998).

Hazard

A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability.

Hazard analysis

Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behaviour.

Hydrometeorological hazards

Natural processes or phenomena of atmospheric, hydrological or oceanographic nature, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hydrometeorological hazards include: floods, debris and mud floods; tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; drought, desertification, wildland fires, temperature extremes, sand or dust storms; permafrost and snow or ice avalanches. Hydrometeorological hazards can be single, sequential or combined in their origin and effects.

La Niña

(see El Niño-Southern Oscillation).

Land-use planning

Branch of physical and socio-economic planning that determines the means and assesses the values or limitations of various options in which land is to be utilized, with the corresponding effects on different segments of the population or interests of a community taken into account in resulting decisions.

Land-use planning involves studies and mapping, analysis of environmental and hazard data, formulation of alternative land-use decisions and design of a long-range plan for different geographical and administrative scales.

Land-use planning can help to mitigate disasters and reduce risks by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion, and in the siting of service routes for transport, power, water, sewage and other critical facilities.

Mitigation	Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.
Natural hazards	<p>Natural processes or phenomena occurring in the biosphere that may constitute a damaging event.</p> <p><i>Natural hazards can be classified by origin namely: geological, hydrometeorological or biological. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing.</i></p>
Preparedness	Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.
Prevention	<p>Activities to provide outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological and biological disasters.</p> <p><i>Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disasters. In the context of public awareness and education, related to disaster risk reduction changing attitudes and behaviour contribute to promoting a "culture of prevention".</i></p>
Public awareness	<p>The processes of informing the general population, increasing levels of consciousness about risks and how people can act to reduce their exposure to hazards. This is particularly important for public officials in fulfilling their responsibilities to save lives and property in the event of a disaster.</p> <p><i>Public awareness activities foster changes in behaviour leading towards a culture of risk reduction. This involves public information, dissemination, education, radio or television broadcasts, use of printed media, as well as, the establishment of information centres and networks and community and participation actions.</i></p>
Public information	Information, facts and knowledge provided or learned as a result of research or study, available to be disseminated to the public.
Recovery	<p>Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.</p> <p><i>Recovery (rehabilitation and reconstruction) affords an opportunity to develop and apply disaster</i></p>

risk reduction measures.

Relief / response

The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.

Resilience / resilient

The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

**Retrofitting
(or upgrading)**

Reinforcement of structures to become more resistant and resilient to the forces of natural hazards.

Retrofitting involves consideration of changes in the mass, stiffness, damping, load path and ductility of materials, as well as radical changes such as the introduction of energy absorbing dampers and base isolation systems. Examples of retrofitting include the consideration of wind loading to strengthen and minimize the wind force, or in earthquake prone areas, the strengthening of structures.

Risk

The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

*Conventionally risk is expressed by the notation
Risk = Hazards x Vulnerability. Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.*

Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.

Risk assessment/analysis

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

The process of conducting a risk assessment is based on a review of both the technical features of hazards such as their location, intensity, frequency and probability; and also the analysis of the physical, social, economic and environmental dimensions of vulnerability and exposure, while taking particular account of the coping capabilities pertinent to the risk scenarios.

**Structural / non-structural
measures**

Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure.

Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts.

Sustainable development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and the future needs. (Brundtland Commission, 1987).

Sustainable development is based on socio-cultural development, political stability and decorum, economic growth and ecosystem protection, which all relate to disaster risk reduction.

Technological hazards

Danger originating from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Some examples: industrial pollution, nuclear activities and radioactivity, toxic wastes, dam failures; transport, industrial or technological accidents (explosions, fires, spills).

Vulnerability

The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

For positive factors, which increase the ability of people to cope with hazards, see definition of capacity.

Wildland fire

Any fire occurring in vegetation areas regardless of ignition sources, damages or benefits.

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