



MODULE - I

Environmental Legislation for Disaster Risk Management

MODULE I



Environmental Legislation for Disaster Risk Management

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Message

GIZ has been collaborating with the National Institute of Disaster Management since 2010 for implementing the 'Environmental Knowledge for Disaster Risk Management (ekDRM)' project. The project aims at strengthening the capacity building efforts for reducing risk of disasters caused by natural hazards, such as floods, cyclones, droughts, and technological ones such as chemical accidents. Decision support system with the application of modern tools of geoinformatics and remote sensing can utilize the environmental data to improve the state of disaster mitigation and emergency response. On the other hand, tools and methods of environmental management like EIA and the regulatory mechanisms in form of environmental legislation can also help facilitate the provisions for hazard and vulnerability reduction.

Design and development of training tools and materials, based on policy research or case studies, are key areas of the ekDRM project. It gives me immense pleasure to introduce the training module on 'Environmental Legislation for Disaster Risk Management' based on analysis of global context of environmental laws, policies and approaches of integrating environment and disaster risk management.

I take the opportunity to express appreciation of the commitment of NIDM, Ministry of Home Affairs, Govt. of India, New Delhi, Ifanos, Germany and Ifanos India, for extending their willing participation and cooperation to this effect. I also express my greetings to the authors for taking the innovating topic of intervention for development of training module for improving the disaster risk management capacity development efforts in India.

Dr. Dieter Mutz
Director, GIZ-IGEP

Delhi, June 2012

Foreword



Even before its independence in 1947, several environmental legislations existed in India, but the real impetus for bringing about a well-developed framework came only after the UN Conference on the Human Environment in Stockholm, 1972. Under the influence of this declaration, the National Council for Environmental Policy and Planning within the Department of Science and Technology was set up in 1972. This Council later evolved into a full-fledged Ministry of Environment and Forests (MoEF) in 1985.

Since the beginning of United Nations International Decade of Disaster Risk Reduction in 1990s and following Hyogo Framework for Action (HFA) in 2005, countries started paying greater attention to Disaster Risk Management as compared to the previous relief centric approach. The HFA 2005-2015 provided the basis for intense advocacy for disaster risk reduction funding and the mainstreaming of disaster risk reduction in sectoral planning process. Millennium Assessment Report (2005) also identified environmental degradation as a major factor leading to the increasing vulnerability. A country's legislative and institutional systems provide the basis for plans and organisation in all areas of disaster risk reduction and emergency response. Since strong inter-linkages exist between environmental degradation and disaster risks, environmental legislations and their implementation is an important prerequisite for disaster risk management. In the aftermath of Bhopal Gas Tragedy in 1984, the failure of litigation attempts in proper form to call Union Carbide to account for the gas tragedy provides enough lessons that need to be learned. Thus there is urgent need for developing Legal framework which will be able to address the possible eventualities arising out of such disasters. Environmen-

tal Protection Act 1986 and the rules there under were found to be effective in dealing with disasters particularly Chemical (Industrial) accidents. Role of environmental law in reference to the chemical accidents related emergencies and their risk management has been widely known. However, the role of legal provisions on environment and natural resources can play significant role in addressing hazards and reducing vulnerability of natural disasters, and in handling post-disaster relief and recovery challenges, are seldom recognized. Believing that 'reinventing the wheel not required every time' is the notion behind exploring the potential of such provisions which can be put into practice on various stages of disaster management. The present module has been developed with the objective to present an international overview in this context.

National Institute of Disaster Management (NIDM) has been mandated under the Disaster Management Act for capacity building including training, research, documentation and policy advocacy on all aspects of disaster management. The Institute offers wide range of training programmes specific to hazards and crosscutting issues. The module on "Environmental Legislations for Disaster Management" overview module is developed under the Indo- German Cooperation project "Environmental Knowledge for Disaster Risk Management".

This module cites good examples from across the world along with reference to the Indian legal framework and disaster management. I hope this module shall be of significant contribution for generating awareness regarding the existing environmental legislation and its implications in disaster management in India.

Dr. Satendra

Executive Director

National Institute of Disaster Management

Delhi, June 2012

1.1 Context

India suffers huge losses to life, livelihood, property and environment due to disasters which sets back development. Our disaster mitigation strategies and response mechanisms are often hampered by legal complexities coupled with procedural mystification. Efficient legal, policy and institutional support are therefore indispensable conditions for effective implementation of disaster risk management. Role of law in disaster management is limited only to the right of a disaster victim to rescue, relief and rehabilitation. The existing laws, government schemes and policies are not yet known to the victims. Even in its enforcement particularly in the context of natural hazards, the attitude is of charity by the state. Relief in disasters is not seen as a fundamental right and entitlement in many countries. Legislation concerning the quality of environment, natural resources and ecosystems, may offer opportunities for addressing these gaps.

1.2 About the module

The module entitled “Environmental Legislation for Disaster Risk Management” has been developed under the Project “Environmental Knowledge and Disaster Risk Management” of the Indo-German Partnership Programme (IGEP), within the framework of Indo-German Development Cooperation on behalf of the German Ministry for Economic Cooperation and Development (BMZ).

1.3 Structure of the module

This module cites examples of legal and policy framework from across the world along with special reference to the Indian legal framework and disaster management guidelines. This module is an overview on this topic of Environmental Legislation for Disaster Risk Management.

The module is divided into 3 learning units

Learning Unit A: Environment and disaster linkages

Learning Unit B: Environmental legislation for disaster risk management

Learning Unit C: Integrating environment and disaster risk management

1.4 Aim

The aim of the module is to give the participants an overview of the environmental legislation, and how the existing legal framework for environment management can be used for disaster risk management.

1.5 Target group

The module is intended for the use by the officials from State Disaster Management Authority, State Department of Environment, Science and Technology, Planning Board, Landuse board, Urban development, Factories, Water Resources, Forest, Agriculture, State Pollution Control Boards and faculty members of the institutes involved in disaster management related training, research and capacity building initiatives.

Learning Unit A

Environment and Disaster Linkages

2

Objective of this learning unit is to enable the government officers, academia, researchers, NGOs and Civil Society Organisation at national, state and district level who are involved in disaster management or environment and natural resource management to understand the inter-linkages between the state of the environment and disaster risks. They also need to be familiar with steps or procedures for actions related to administration or legal matters while executing better environmental management practices and supporting disaster management planning process or any other actions related to reducing risks from disasters.

2.1 Environment and disasters

At the global level, there is a need for having consensus around linking Disaster Risk Reduction with environmental management. As Disaster management highlights the interdependence of the economy, environment and inclusive development. While the Hyogo Framework for Action (HFA) calls for efforts to “encourage the sustainable use and management of ecosystems, through better land-use planning and development activities to reduce risk and vulnerabilities.” The framework promotes the implementation of “integrated environmental and natural resource management approaches that incorporate disaster risk reduction, including structural and non-structural measures, like the integrated flood management and appropriate management of fragile ecosystems.” In view of the Hyogo Framework of Action (HFA), the UN-ISDR Global Joint Work programme for 2008-2009 sought to ensure that “national and local authorities are better equipped to protect environmental services in coastal areas, flood and fire-sensitive basins and mountain ecosystems” (UNEP & UNISDR, 2010).

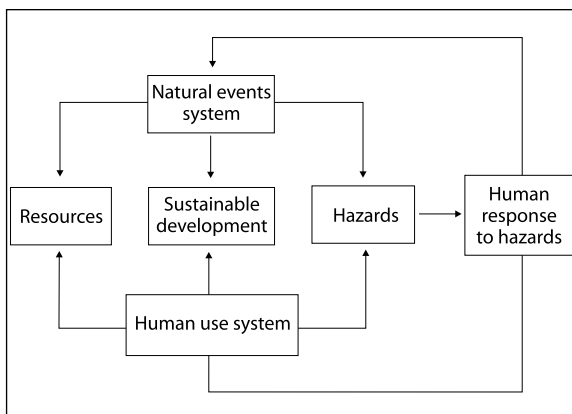


Figure 1: Environmental hazards and interface of natural events system with human use system (Burton et al., 1993)

Hazards and disasters are two sides of the same coin; neither can be fully understood or explained from the standpoint of either physical science or social science alone; and are inextricably linked to the ongoing environmental changes at global, regional and local levels. Environmental hazards exist at the interface between the natural events and human systems. Human responses to hazards can modify both the natural events, and the human use of, the environment (Figure 1. Burton et. al.1993). Environmental degradation is a process that reduces the capacity of the environment for meeting the social and ecological objectives, and related needs. The potential effects of degradation varies, and may contribute to increase in vulnerable conditions along and intensity in occurrence of natural hazards. Some examples include: land degradation, deforestation, desertification, wildland fires, loss of biodiversity, land, water and air pollution, climate change, sea level rise and ozone depletion etc.

Disasters are events of environmental extremes which are inevitable entities of this living world. The major environmental changes driving hazards and vulnerabilities to disasters are climate-change, land-use changes and degradation of natural resource (Gupta and Nair, 2011). Environmental causes consequences of disasters are illustrated in Figure 2.

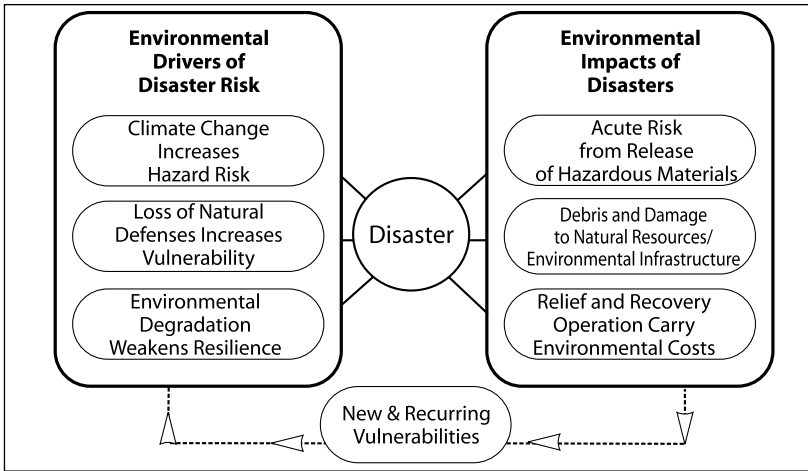


Figure 2: Environmental causes and consequences of disasters (UNEP, 2010).



‘In many countries and regions, mangrove deforestation is contributing to fisheries decline, degradation of clean water supplies, salinisation of coastal soils, erosion, and land subsidence, as well as release of carbon dioxide into the atmosphere.’
 Professor Edward Barbier & Dr. Mark Cox

Photo 1: Degraded mangroves in Vietnam. Source: aquaculturehub.org

The inter-relationship between environment and disasters is now widely recognized in terms of the following interfaces (GDRC):

- a. **Environmental degradation leading to disasters:** Environmental changes are known to generate or aggravate disasters especially of hydro-meteorological origin.
- b. **Environmental degradation causes vulnerability:** Environmental degradation causes vulnerability: People are going to be



Photo 2: Desertification, land degradation and drought are major environmental threats with serious impacts on human well-being © S.Manfredi. Source: <http://ies.jrc.ec.europa.eu/>

worsely affected due to decline in ecosystem services, i.e. the provisional, recreational, regulatory and supporting services. Environment degradation reduces biomass productivity, impacts livelihoods, water, food, health, housing and the overall economy, jeopardizing the coping mechanism and capacity of communities. Low survival

capacities result in high exposure to hazardous locations, social unrest and conditions that increase disaster impacts.

- c. **Disasters impact environment and ecology:** Disasters cause primary and secondary impacts on the environment, affecting natural processes, resources and ecosystems, thereby creating conditions for future disasters or for a complex environment related emergency.

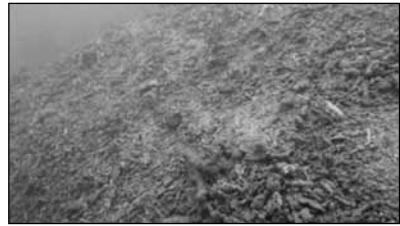


Photo 3: Photo of the National Park Service shows a coral reef in Faga'alu Bay, American Samoa that was flattened by a tsunami September 2009. Source : Paul Brown / AP

- d. **Relief & Recovery compromise environmental sustainability:** Aspects related to Environment is compromised during the event of an disaster management operation and recovery process. Due to improper disposal of disaster and relief waste, there is a mis-management of natural resources such as water, or land, inappropriate use or management of land- mostly ecological sensitive zones or natural hazard prone zones –flood plains, and landscape modifications in the case of sanctuaries, national parks, bio-reserves with introduction of alien species or substances including organisms.

2.2 Environmental management and disaster management cycle

Environment concerns are crucial in all phases of disaster management and vice versa. Environmental services like shelter, water, food security, sanitation, waste management and disease control form crucial components of emergency relief. Considering disaster risk reduction as important aspect in all stages of environmental management is crucial in order to focus on disaster prevention and reduce risk from hazards, minimization of impacts, rehabilitation and overall leading to sustainability. Opportunities for integration also exist in planning and decision making tools, and in regulatory provisions pertaining to environmental governance and disaster management.

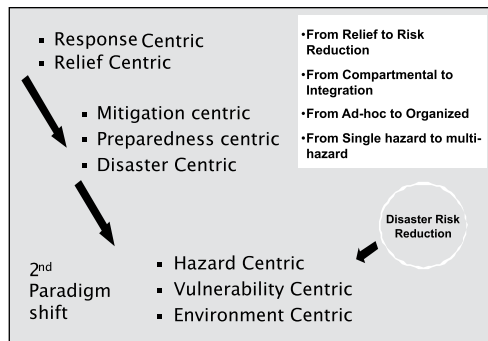


Figure 3 : Second Paradigm shift driven by awareness on climate change and sustainability concerns

BOX 1: Environmental classification of disasters

1) Environmental disasters

– Hydro-meteorological, forest fire, geophysical, geochemical, biological e.g. epidemics, pest infestation...., etc.

2) Technological disasters

– Industrial (chemical, electrical, mechanical), nuclear/radiological, aviation, dam break, mining, structural collapse, etc.

3) Civil disasters and conflicts

– Civil unrest, strike, war, sabotage, mass poisoning, bomb blast, stampede, transport accidents.... etc.

* environmental disasters may be of natural origin or human-induced / man-made and can also trigger a technological disaster or civil strife. On other hand, a technological mishap or civil disaster may trigger environmental calamity.

However, in order to facilitate a strategic and functional understanding of the linkages between the two, a cross-examination and interpretation of environmental tools and legislation towards disaster management is necessary.

Globally, disaster management has voiced a paradigm shift from being 'response & relief' centric' approach to becoming a 'mitigation and preparedness' approach. As lessons are drawn from UN-IDNDR a 2nd paradigm shift is underway, driven by climate-change awareness and sustainability concerns in disaster management (Figure 3, Gupta et. al, 2009). This has resulted in a wider acceptance of the 'Disaster Risk Reduction' as a concept over 'Disaster Management', and giving recognition to the 'environmental approach that includes disaster risk reduction and management', which is now of a prime concern in disaster management strategies world over.

Environmental management for disaster risk reduction does not exist as a formal field of practice. Instead, its scope is largely defined by the goals set by organizations working on related issues, such as ecosystem conservation, , disaster risk reduction and climate change adaptation and mitigation, etc.

Monitoring and observing environmental factors that signal the onset of a hazard are fundamental to early warning systems. Environmental monitoring and assessment play an important role in generating relevant information that assists in identifying risks, vulnerabilities and opportunities to promote community resilience (UNEP-UNISDR-PEDRR,2010). Environmental governance includes policies, legal and regulatory frameworks and institutional structures, and offers important opportunities for mainstreaming disaster risk reduction into environmental management, and for strengthening the environmental components of disaster risk reduction. Policy or regulatory frameworks often specify levels of environmental protection and establish the means for monitoring and enforcing protection.

Environmental approach to disaster risk management aims at utilizing environmental knowledge and practices in all stages of the risk-cycle so as to reduce the risk from disaster, and to ensure sustainability in reconstruction and recovery process. It starts with the understanding of the environmental basis of disasters, or in other words – recognizing disasters as ‘environmental events’(Box 1).

“Human societies cannot be dissociated from the environment that they shape and which in turn influence their development and livelihoods. Together they form a comprehensive system with intrinsic levels of vulnerability and inherent coping mechanisms. The less degraded the environmental component of this system, the lower its overall vulnerability and the higher its coping capacity” (OECD, 2010).

The principles set out in the Hyogo Framework are acknowledged by the UN-ISDR, which defines ten opportunities for environment in the context of disaster prevention or reduction (UNEP, 2010):

1. Engage environmental managers fully in national disaster risk management mechanisms;
2. Include risk reduction criteria in environmental regulatory frameworks;
3. Assess environmental change as a parameter of risk;
4. Utilize local knowledge in community-based disaster risk management;
5. Engage the scientific community to promote environmental research and innovation;
6. Protect and value ecosystem services;
7. Consider environmental technologies and designs for structural defences;
8. Integrate environmental and disaster risk considerations in spatial planning;
9. Prepare for environmental emergencies; and,
10. Strengthen capacities for environmental recovery.

In addressing the relationship between social and environmental vulnerability and the occurrence of disasters, Wilches-Chaux (1993) states, "There is no doubt those natural forces play an important role in the initiation of several disasters, however it is no longer the case that they can be considered the main cause of such disasters. There seem to be three fundamentals causes that dominate the disaster processes in the developing world, which is precisely where their incidence is the largest". Environmental and natural resource management are other key elements in vulnerability reduction; it is essential to place continuous emphasis on implementing long-term environmental measures (IADB, 1999).

2.3 Disaster management law and environment

Country examples

South Africa's Disaster Management Act, 2003, predated both the World Conference on Disaster Reduction and the Hyogo Framework for Action (2005), has generated particular interest as an example of international best practice – especially in profiling the role of legislation in driving integration of DRR action across multiple sectors and disciplines (BCPR, 2004).

India's National Disaster Management Act, 2005, Chapter 1, Section 2(d) has recognized '*...substantial damage to life, human suffering...property...and degradation of environment...'* as a 'disaster' and considered the flora and fauna including microbes (damages and losses to life), ecosystems-services, biodiversity, sustainability, environmental-health

Box 2: Definition of disaster

"Catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, leading to accident, and resulting in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of environment, and is of such a nature and/or magnitude as to be beyond the coping capacity of the community of the affected area" (Disaster Management Act 2005, India)

(human sufferings), natural resources (property), and environmental quality, climate, bio-productivity (environment) while evolving the definition of 'disaster' (Box 2). Simultaneously, interpretation of the coping capacity contexts 'community' as group of populations that shall include all life forms of the area affected.

Learning Unit B

Environmental Legislation for Disaster Risk Management

3

Objective of this unit is to analyse various environmental laws in relation to different phases of disaster management in different countries of the world with special focus on Indian environmental legislation.

3.1 Introduction

Environmental legislation are the strategic tools for enforcing or regulating the implementation of policy provisions, helping judicial proceedings, courts and regulatory authorities to fix the liabilities and give judgment on penalty, relief or compensation, etc. Environmental laws include provisions and regulations related to environment and its constituents, protection and management of natural resources, water, land, agriculture, forests, wildlife; habitats – protected areas, zoo, parks, reserves; procedures and planning to safeguard environment; resources and ecosystems. For environmental clearance, use EIA, audit, risk analysis, land-use and zoning, emergency preparedness; and management of environmental services - drinking water, sanitation, waste disposal, preventive-healthcare, including climate mitigation and adaptation etc. are also part of environmental laws and policies in many countries including India. Although these regulations and policies are primarily aiming at attaining environmental quality, resource management related to procedures, and they have provisions related to Disaster Risk Reduction.

3.2 Environmental legislation

National legislation

- a. Constitutional provisions
- b. Common laws
- c. Statutory laws
- d. Customary laws

International law (treaty and conventions)

Taking example of India, environmental laws can also be broadly grouped as below.

- a. Laws on environment protection and conservation
- b. Laws on pollution and waste management
- c. Laws on safety and emergency preparedness

The laws on environmental protection (conservation, pollution and waste management), are now becoming more relevant in Disaster Risk Reduction (DRR) in the wake of paradigm shift in disaster management to pre-disaster risk reduction and post-disaster sustainable recovery processes. Whereas the safety and emergency preparedness provide for proper risk assessment, emergency planning and response organization aims at minimizing the impacts of a disaster event. The growing emphasis on 'greening disaster response' calls for greater role of environmental law, and related standards and codes ensure preventive environmental-health (food safety and shelter provisions, water and sanitation, waste management and control of disease outbreak) so as to avoid secondary disasters and complex emergencies.

3.2.1 National laws

a. Constitutional provisions

Several countries across the world, constitution contains provisions that establish environmental rights and duties with regard to conserving natural resources and for prevention of harm to life and health.

Indian constitution has many such provisions related to environment and human rights. Article 21 of the Indian constitution states "No person shall be deprived of his life or personal liberty except according to procedure established by law". The right to life has been employed in a diversified manner in India. Besides the mere right to survive as a species, quality of life, the right to live with dignity and the right to live-

lihood etc. are also with the purview of Article 21. The Constitution of India provides that all are equal before the law and shall be accorded equal protection of the law.

Article 14 states that “The State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India. Article 14 can be used to challenge government sanctions for mining and other activities with high stakes on human rights and environmental impact, where the permissions are arbitrarily granted without adequate consideration of environmental impacts.

The Constitution Act of 1976 (Forty Second Amendment) explicitly incorporated environmental protection and improvement as a part of state policy. Article 48 A provides that the state shall endeavour to protect and improve the environment and safeguard the forests and wildlife of the country. Article 51A (g) imposes a similar responsibility on every citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures. Thus, protection of natural environment and compassion for living creatures was made the positive fundamental duty of every citizen.

Section 11 of chapter 2 of the South African constitution deals with the right to life, a non-derogable right. Under section 24 of chapter 2 of the South African constitution, everyone has the right to an environment that is not harmful to health or well-being. Section 24 adds that the government must act reasonably to protect the environment by preventing pollution and ecological degradation, promoting conservation, and securing ecologically sustainable development, while building the economy and society. Section 24 demonstrates that the right to a healthy environment is part of the socio-economic right of people of South Africa applied by the courts to give a meaningful interpretation to the right to life similar to India.

Substantive procedural right to a clean environment is contained in article II, section 16, of the Philippine Constitution, which states that “The State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature”.

Article 50 of the Constitution of the Ukraine, adopted in 28 June 1996, is another good example. It states: “Every person has the right to a safe and healthy environment and to compensation for damages resulting from the violation of this right”.

b. Common laws

The term “Common” is derived from the Latin word ‘*Lex Communis*’ the body of customary law of England, which is based upon the judicial decisions.

The Common law continues to be in force in India under Article 372 of the constitution so far and is not yet altered, modified or repealed by statutory laws. Under the Common Law, an action might lie for causing pollution of environment, viz., air, water, or noise if it would amount to private or public nuisance. The common law remedies against environmental pollution are available under the law of Torts. Tort is a civil wrong other than a breach of trust or contract. The most important tort liabilities for environmental pollution are under the heads of nuisance, trespass, negligence and strict liability.

The Indian Penal Code formulated by the British during the British Raj in 1860, forms the backbone of criminal law in India. The Code of Criminal Procedure, 1973 governs the procedural aspects of the criminal law. Indian Penal Code (IPC), 1860 makes various acts affecting environment as offences (Chapter XIV, section 268 and 294 A). Public health, safety, convenience, decency and morals are dealt under these sections. IPC also cover the negligent handling of poisonous substances, combustive and explosive materials. Criminal Procedure

Code, 1973 (CrPc) can also be invoked to prevent pollution. Chapter X, Part B sections 133 to 143 provides the most effective and speedy remedy for preventing and controlling public nuisance. Section 133 can be used against municipalities and government bodies.

c. Statutory laws

In 2005, the Hyogo Framework for Action (2005–2015) called for nation states and the international community to ensure that DRR is a national and local priority with a strong institutional basis for implementation. The framework identified legislation as a critical component in moving towards a comprehensive and mainstreamed DRR approach.

'Adopt, or modify where necessary, legislation to support disaster risk reduction, including regulations and mechanisms that encourage compliance and that promote incentives for undertaking risk reduction and mitigation activities' (UN-ISDR, 2005).

Many countries do not have specific legislation for DRR (at least till recently). Several countries enacted such legislation in last one decade. e.g. India, Sri Lanka, Pakistan etc. However, these countries have a number of sectoral environmental policies and laws which need to be taken into account in the DRR framework.

Key environment policies and law may include agriculture, forests and wildlife, habitat, water, land-use, sanitation, wildfire, etc. Failure to acknowledge pre-existing sectoral policies with a bearing on DRR can lead to the alienation of those working in these policy sectors, generating perceptions of resource competition that can slow down or stop progress. For example, Kenya has wildfire management legislation that contributes to prevention, but is not recognized as such in disaster legislation (Pelling and Holloway, 2006).

Environmental laws and policies in India provide significantly for DRR in the context of natural disasters, but the environment sector

Parliamentarians' Plan of Action for Making Millennium Development Goals

We parliamentarians will :Review our laws and legislation related to climate change adaptation, environment and disasters to make sure that they are complementary to each other and take necessary action to foster synergy between climate change adaptation and disaster risk reduction.

Programmes Disaster Resilient, Adopted at the Consultative Meeting for West African Parliamentarians, Dakar, 2 June 2010

(narrowly recognized for chemical accidents management only), and rarely represented in the membership of the National Disaster Management Authority or the Board of the National Institute of Disaster Management, the two statutory entities on DRR capacity development under the Disaster Management Act, 2005 which otherwise provides significant consideration of 'environment' while defining a 'disaster' (Box 2). Definition of environment as per the Environmental Protection Act (Section 2(a)). *"Environment includes water, air and land and the interrelation ship which exists among and between water, air and land and human beings and other living creatures, plants, micro organism and property"*

Environmental legislation have been contributing to risk reduction aspects of disaster management and now are emerging to be relevant for disaster preparedness, relief and recovery strategies due to growing recognition of ecosystem functions, livelihood issues, water and sanitation, waste management and environmental health issues, within the DRR agenda in general, and in particular, while integrating climate-change adaptation. A list of laws and policies for environmental protection in India is given in Box 3.

Box 3: Laws and Policies for Environmental Protection in India

ACTS

- The Indian Forest Act, 1927
- Factories Act, 1948
- Factories Amendment Act, 1987
- Wildlife (Protection) Act, 1972
- The Water (Prevention and Control of Pollution) Act, 1974
- Forest (Conservation), Act, 1980
- The Air (Prevention and Control of Pollution) Act, 1981
- Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- Biological Diversity Act 2002
- Forest Rights Act, 2006 (Ministry of Tribal Affairs)
- The Cultural Heritage Conservation Bill 2010 (draft)
- Mine and Mineral Act 2010
- National Green Tribunal Act, 2010

RULES

- The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989
- Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms, Genetically Engineered Organisms or Cells Rules, 1989
- Emergency Preparedness, Planning and Response to Chemical Accidents Rules, 1996
- Dumping and disposal of fly ash discharged from coal or lignite based thermal power plants on land, Rules, 1999.
- Bio-Medical Waste (Management and Handling) Rules, 1998
- The Hazardous Wastes (Management and Handling) Rules, 1989
- Environment (siting for industrial projects) Rules, 1999
- The Noise Pollution (Regulation and Control) (Amendment) Rules, 2000
- The Municipal Solid Waste (Management & Handling) Rules, 2000
- Hazardous Waste (Management, Handling and Trans-boundary) Rules, 2008
- Wetlands (Conservation and Management) Rules, 2010
- Guidelines for diversion of forests lands for non-forest purposes under the Forest (Conservation) Act, 1980
- Plastic Waste (Management and Handling) (Amendment) Rules, 2011

Notifications

- Coastal Regulation Zone (CRZ) Notification (revised 2011)
- EIA Notification 1994 (revised 2006)

Policies

- National Forest Policy, 1988
- National Water Policy, 2002
- National Agricultural Policy, 2000
- National Environment Policy 2006
- National Disaster Management Policy, 2009

Other laws

Disaster Management Act, 2005. (recognises damage /destruction of environment as disaster)

Law relating to land use zoning, land acquisition, land pooling, resettlement and rehabilitation also have provisions for environmental protection.

Important environmental laws in the United States are briefly described in Box 4.

BOX 4: Environmental laws in the United States

- **Food Quality Protection Act (1996)** is to ensure that food quality meets strict standards for public health protection. Under this law, the Environmental Protection Agency is required to better protect infants and children from pesticides in food and water, and from indoor exposure to pesticides.
- **Food, Agriculture, Conservation, and Trade Act (1990)** contains a title on the conservation of environment intended to protect soil and water resources, a conservation plan (FACTA90) and includes the Conservation Reserve Program, the Wetlands Reserve Program and the Environmental Easement Program to remove agricultural production in environmentally sensitive areas, including highly erodible cropland, wetlands, and areas which threaten surface and groundwater quality.
- **Water Quality Act (1987)**, Section 404, have specific provisions for regulating the discharge into waters including marshes and wetlands, which are associated with activities, such as port development; channel construction and maintenance; development sites; and water resource projects, such as dams, jetties, and levies; land-clearing and soil deposition, which lead to the change the hydrology; flow or circulation

of waters, and affect the wetland area.

- ***Emergency Planning and Community Right-to-Know Act (1986)*** requires companies to disclose information about toxic chemicals they release into the air and water and dispose off on the land.
- ***Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*** (1980) commonly called as the Superfund Law, requires cleanup of releases of hazardous materials in air, surface and groundwater, and on land. The legislation established a trust fund to pay for cleaning up the environment and the liability for cleanup costs.
- ***Surface Mining Control and Reclamation Act (1977)*** is intended to ensure that coal mining activity is conducted with sufficient protection of the public and the environment, and provides for the restoration of abandoned mining areas to beneficial use.
- ***Fisheries Conservation and Management Act (1976)*** governs the management and control of U.S. marine fish populations, and is intended to maintain and restore healthy levels of fish stocks and prevent over harvesting.
- ***Federal Land Policy and Management Act (1976)*** provides for protection of the scenic, scientific, historic and ecologic values of federal lands and for public involvement in their management.
- ***Resource Conservation and Recovery Act as Amended (RCRA) (1976)*** to regulate the disposal of all types of solid wastes, with emphasis on hazardous waste disposal. Under the law, EPA lists substances that are considered hazardous when disposed of on land. Act provides the requirements for treatment, storage, and disposal of the waste.
- ***Safe Drinking Water Act (1974)*** establishes drinking water standards for tap water safety, and requires rules for groundwater protection from underground injection; amended in 1986 and 1996, added a fund, and included public “right to know” requirements to inform consumers about their tap water.
- ***Endangered Species Act (1973)*** is to protect and recover endangered and threatened species of fish, wildlife and plants in the United States and beyond. The law works in part by protecting species habitats.
- ***Coastal Zone Management Act (1972)*** provides a partnership structure allowing states and the federal government to work together for the protection of U.S. coastal zones from environmentally harmful overdevelopment. The program provides federal funding to participating coastal states and territories for the implementation of measures

that conserve coastal areas.

- **Marine Mammal Protection Act (1972)** seeks to protect the species of marine mammals, many of which remain threatened or endangered. The law requires wildlife agencies to review any activity that has the potential to “harass” or kill these animals in the wild. The law is the nation’s leading instrument for the conservation of these species, and is an international model for such laws.
- **National Environmental Policy Act (1970)** was the first of the modern environmental statutes. NEPA created environmental policies and goals for the country, and established the President’s Council on Environmental Quality. Its most important feature is its requirement that federal agencies conduct thorough assessments of the environmental impacts of all major activities undertaken or funded by the federal government.

There are several other legislation, for example, Solid Wastes Disposal (State) Act of US, which provide for protection of drainage systems and low lying areas from being affected by garbage, dirt or otherwise. Other laws of concern are the Atomic Energy Act (1954), Oil Pollution Act (1990), Clean Air Act (1970), Clean Water Act (1972), etc.

(Source: Natural Resources Defence Council, New York, <http://www.nrdc.org/reference/laws.asp>)

Environmental litigation can take many forms, including civil actions based on tort, contract or property law, criminal prosecutions, public interest litigation, enforcement of constitutional rights, international law, and also involve dealing with trans-boundary issues (Shelton and Kiss, 2005). Necessary integration of DRR and development goals have been recognized at national Government level in Nepal in its National Development Planning, National Policy on Environmental Adaptation to Climate Change, and National Strategy for Disaster Risk Management recognizing their interrelatedness (NSET, 2008). In Nepal, the Water Resources Act, 1993 contains provisions to minimize environmental impacts, including soil erosion, floods and landslides. This provision calls for carrying out an EIA study prior to project implementation (Section 20). The Electricity Act, 1993 also contains provisions to minimize soil erosion, floods, air pollution and damage to the environ-

ment (Section 24). The Electricity Rules, 1993 stresses environmental analysis, which should include environmental mitigation measures to minimize adverse impacts (Rule 12 and 13).

Environmental governance and its development in Nepal have contributed towards disaster risk reduction and climate-change adaptation framework as well. The Environment Protection Act, 1996 (Nepal) envisaged for the 'Development of Environmental Action Plans' at various levels of governance has provided an umbrella framework to the 'disaster prevention and mitigation' and its mainstreaming into developmental planning. Decision-making, plans and programmes

Box 5: Policies related to environment and natural resources in Nepal

- National Conservation Strategy, 1988
- Nepal Environmental Policy and Action Plan, 1993
- Tourism Policy, 1995
- Solid Waste Management Policy, 1996
- Hydropower Development Policy, 2001
- Nepal Biodiversity Conservation Strategy, 2002
- National Wetland Policy, 2003
- Irrigation Policy, 2003

for environmental protection and natural resource management, and thereby inducted provisions for disaster mitigation and resilience in Nepal, are guided by a number of environment-related policies (Box 5).

Box 6: Acts and rules on environment in Sri Lanka

- National Environmental Act No. 47 of 1980 (broad framework on environmental protection including Environmental Impact Assessment)
- Forest Ordinance No. 16 of 1907
- State Lands Ordinance No. 8 of 1947 (lands and management of resources, including lakes, rivers and streams)
- Irrigation Ordinance No. 32 of 1946 (environmental aspects of water, irrigation and land use in agriculture)
- Water Resources Board Act No. 29 of 1964 (afforestation, pollution of

rivers, streams and other water courses, use of water resources)

- Coast Conservation Act No. 57 of 1981 as amended (Coastal Zones and activities within such zones)
- Soil Conservation Act No. 25 of 1951 (conservation of soil resources, mitigation of soil erosion and the protection of lands against flood and drought)
- Plant Protection Act No. 35 of 1999 (plant diseases, pests, wild plants and invasive species)
- Felling of Trees (Control) Act No. 9 of 1951
- Flood Protection Ordinance No. 4 of 1924 as amended (protection of areas from flood damage and declare a flood area).
- Urban Development Authority Law No. 41 of 1978.

In Sri Lanka, Acts and Rules on environment significantly provide for disaster risk mitigation and ecological sustainability in disaster management actions. Important environmental laws of Sri Lanka are given in Box 6.

e. Customary Law

Customary law is an important source of international environmental law. These are norms and rules that countries and communities follow as a matter of custom and they are so prevalent that they bind the states. When a principle becomes customary law is not clear cut and many arguments are put forward by states not wishing to be bound. Examples of customary international law relevant to the environment include the duty to warn other states promptly about icons of an environmental nature and environmental damages to which another state or states may be exposed, and Principle 21 of the Stockholm Declaration ('good neighbourliness' or *sic utere*).

Customary law, by definition, is a non-state legal system that parallels the substantive and procedural functions of the state made laws. Unlike State laws, these emerge from within the community and command social acceptance and observance. Statutory law is uniform whereas customary law is an adaptive, flexible, evolving body of

norms and rules governing the behaviour of communities. While the former is for the community latter is in the community.

Recognition of the importance of customary laws in India is evident from the enactment of The Provisions of the Panchayat (Extension to Scheduled Areas) Act, 1996 (PESA) and the Forest Rights Act (2006). The provisions of the Panchayat have been extended to the Scheduled Areas with exceptions and modifications as specified in the Extension Act. One of the important features of PESA is that it acknowledges the competence of Gram Sabha, the formal manifestation of a village community, to 'safeguard and preserve the traditions and customs of the people, their cultural identity, community resources and the customary mode of dispute resolutions. A good example of speedy and flexible redressal under customary law can be found in

Box 7 Few examples of Case law, Guiding laws, standards and codes

Case laws

Judgments and directives of the courts, while deciding on a case involving environmental concern, right or violation, are important contributions to environmental jurisprudence and become part of environmental law for reference in future litigation. These also contribute to the development of environmental law and induct the process of amendments in specific contexts. Court's decision on 'The right to live in a healthy and balanced environment' (in cases, viz. *Asociacion Para la Proteccion de Medio Ambiente y Educacion Ecologica '18 de Octubre' v Aguas Argentinas S.A. & otros*, Federal Appellate Tribunal of La Plata (2003); *Kattan, Alberto and Others v. National Government*, *Juzgado Nacional de la Instancia en lo Contencioso administrativo Federal. No. 2, Ruling of 10 May 1983, La Ley, 1983-D, 576*) are examples of case laws. The clashing interests of forests and agriculture set the stage for *Sibaji Waiswa v. Kakira Sugar Work Ltd* (High Court of Uganda, Jinja, No. 6/2001). While the main suit over the Butamira Forest reserve was pending, respondent entered the disputed forest reserve, uprooted trees and routinely destroyed seed nurseries, resulting in an irreparable damage to the environment. The Court held that an award of damages alone could not adequately compensate for the alleged environmental damage (Shelton and Kiss, 2005).

Guiding laws, standards and codes

These are non-binding laws, and may be supported or prescribed by the regulations but are not regulations in itself. Quality standards often vary according to the particular use made of the environmental resource. For example, different water quality standards may be set for drinking water and water used for bathing and fishing. Quality standards also can vary in geographic scope, covering national or regional zones, or a particular resource, such as a river or lake, but each quality standard establishes base norms against which compliance or deviance are measured. Standard methods of American Water Works Association (APHA/AWWA) and WHO water quality standards were referred worldwide, whereas, Sphere standards are recognized in minimum relief in disasters. In India, a number of Environmental Standards and Codes/Standard Procedures are developed by the Bureau of Indian Standards (BIS), Central Pollution Control Board (CPCB), Indian Council of Medical Research (ICMR), Indian Bureau of Mines (IBM), Directorate General of Factory Advice Service & Labour Institutes (DGFASLI), and Geological Survey of India (GSI).

the Nishi case from Arunachal Pradesh, India. The village headmen had constituted a volunteer force to monitor any illegal activities in the community forest.

3.2.2 International law

International law is considered the supreme body of law by international tribunals and in international relations. International law may be considered persuasive in interpreting constitutional or statutory provisions. The jurisprudence of international tribunals also can be considered in this context. In *Andhra Pradesh Pollution Control Board-II v. Prof. M.V. Nayudu & Others* [2001] 4 LRI 657, Sup. Ct. India, the Court referred to the Declaration of the United Nations Water Conference, the International Covenants on Civil and Political and Economic, Social and Cultural Rights, and the Rio Declaration on Environment and Development as persuasive authority in implying a right of access to

drinking water as part of the right to life in the Indian Constitution.

The main principles of international environmental law are found in treaty law (The Brundtland Commission). 'Legal regimes are rapidly outdistanced by the accelerating pace and scale of impacts on the environmental base of development.' Law must be reformulated to keep human activities in harmony with the unchanging and universal laws of nature (Brundtland, 1987). On occasion, courts have looked to treaties for the meaning of undefined terms in national law. In *Ramiah and Autard v. Minister of the Environment and Quality of Life* (Mar. 7, 1997), the Mauritius Environment Appeal Tribunal looked to the Ramsar Convention for a definition of wetlands, even though the convention had not yet been ratified by Mauritius. The Ministry of Environment agreed that the Convention provided guidance on the issue.

The sources of international law that may become domestic law through incorporation generally include those sources as listed under Article 38 of the Statute of the International Court of Justice. The Statute refers to (a) international conventions, (b) international custom, (c) general principles of law, and, (d) judicial decisions and doctrine, as subsidiary persuasive sources.

3.3 Principles of environmental law

Sustainable Development

Most commonly accepted and cited definition is of sustainable development is that of the Brundtland Commission on Environment and Development, which stated in its 1987 Report, that sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The parameters of sustainable development are clarified in Agenda 21 and the Rio Declaration, both adopted at UNCED.

Inter-Generational and Intra-Generational Equity

Equity is central to the attainment of sustainable development. **Principle 3 of the 1992 Rio Declaration** states that “The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations; and Rio Principle 5 provides that all States and all people shall cooperate in the Essential task of eradicating poverty as an indispensable requirement for sustainable

Development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world. Equity thus includes both inter-generational equity (i.e. the right of future generations to enjoy a fair level of the common patrimony) and intra-generational equity (i.e. the right of all people within the current generation to fair access to the

current generations entitlement to the Earth’s natural resources). The concept of equity is also embodied in the United Nations Millennium Goals (e.g. the Eradication of Poverty) and Millennium Declaration (e.g. paragraphs 6, 11 and 21).

Precautionary Principle

Precautionary principle is essential to protecting the environment (including human health) and is accordingly one of the most commonly encountered concepts of international environmental law. 1992 Rio Declaration , Principle 15 states that “ In order to protect the environment, the

Precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”

The Polluter Pay Principle

The 'polluter pays principle' states that whoever is responsible for damage to the environment should bear the costs associated with it. Principle 16 of the Rio Declaration, 1992 provides "National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment".

3.4 International environmental law and India's obligations

India has obligations under numerous international treaties and agreements related to environment. As a party India either have ratified a treaty by adopting it as a national law before it came into force or by acceding to it after come into force. A treaty will come into into force the requisite number of countries must ratify the treaty. Some of the most important global treaties are The Antarctic Treaty (1961), Ramsar Convention (1971), Stockholm declaration on Human Environment (1972), World Heritage Convention (1972), Convention on International Trade of Endangered Species (1973), United Nations Convention on the Law of the Sea (1982), Vienna Convention for the Protection of the Ozone Layer (1985), and its 1987 Protocol; Basel Convention (1989), Climate Change Convention (1992); Convention to Combat Desertification (1994), Biodiversity Convention, (1992), Rio declaration on Environment and development (1992), Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998), Stockholm Convention on Persistent Organic Pollutants (2001), The Johannesburg declaration on Sustainable Environment (2002).

The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable develop-

ment throughout the world."The concept of precaution operates as part of a science-based approach to regulation, with no substitute for such an approach where perceptions on disaster risk and vulnerability have been addressed in international law. "The likelihood of environmental harm" (e.g., the Rio Declaration Principle 15 uses "where there are threats;" the 1996 Protocol to the London Dumping Convention Article 3 uses "reason to believe [dumping] is likely to cause harm"); "the extent of environmental harm" (e.g. Biosafety Protocol Articles 10 and 11 use "potential adverse effects;" U.N. Framework Convention on Climate Change Article 3 uses "threats of serious or irreversible damage").

Stockholm Declaration on the Human Environment 1972 is a landmark in international relations as it placed the issue of protection of biosphere on the official agenda of policy and law of the member states. Environmental law instruments that link the environment and human rights began to appear as early as 1972, in the Stockholm Declaration on Human Environment, which states that "Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of quality that permits a life of dignity and well being". Environmental Protection and development were conceptualised as two sides of a coin inseparable from each other. Hence Environmental protection was an essential element of social and economic development. Principle 1 of the declaration provides that man has the fundamental right to freedom, equality and adequate conditions of life in an environment of quality that permits a life of dignity and well-being and he bears the sole responsibility to protect and improve the environment for present and future generations. Principle 6 provides for the discharge of toxic substances that can cause serious or irreversible damage to ecosystems must be halted. Principle 15 provides that planning must be applied to human settlements and urbanisation with a view of avoiding adverse effects on environment. Principle 18 incorporates the "precautionary principle" which propagates the avoidance of environmental risks. Principles of the Stockholm Declaration on Human Environment have many provisions on risk avoidance,

risk reduction and integration of environment as a part of the Disaster Risk Reduction and Sustainable Development.

The Vienna Convention for the Protection of the Ozone Layer (adopted, 1985, entered into force, 1988) to protect human health and the environment against adverse effects resulting from human activities: The ultimate objective of the Convention is to protect human health and the environment against adverse effects resulting from human activities which modify or likely to modify the ozone layer and urges the Parties to take appropriate measures in accordance with the provisions in the Convention and its Protocols which are in force for that Party. The Montreal Protocol on Substances that Deplete Ozone Layer adopted, 1987; entered into force, 1989, provides for the control on production of ozone depleting substances: The Montreal Protocol on Substances that Deplete Ozone Layer is a protocol under the Vienna Convention. The Protocol controls the production and consumption of the most commercially and environmentally significant ozone-depleting substances - those listed in the Annexes to the Protocol. One feature of the Montreal Protocol which makes it unique is Article 6 that requires the control measures to be revised at least every four years (starting 1990), based on the review and assessment of latest available-information on scientific, environmental, technical and economic aspects of the depletion of ozone layer

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad. The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as "hazardous wastes" based on their origin and/or composition and their characteristics,

as well as two types of wastes defined as “other wastes” - household waste and incinerator ash.

The Biodiversity Convention provides a number of general obligations for member states. These include in particular a commitment to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity. Conservation under the Convention is to be achieved in two ways. Firstly, the Convention emphasizes on In-situ conservation which proposes the conservation of genes, species and ecosystems in the surroundings where they have developed their distinctive properties. The In-situ and Ex-situ conservation implies among other things of the development of guidelines for protected areas; the regulation of biological resources; the promotion of the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings; the promotion of environmentally sound and sustainable development in adjacent areas; the rehabilitation and restoration of degraded ecosystems and the promotion of the recovery of threatened species; controlling the risks associated with the use of living modified organisms; controlling alien species; seeking compatibility between present and future use; developing necessary legislation to protect threatened species or populations; regulating any processes or activities found to have an adverse impact; and providing financial support for in situ conservation, especially in developing countries. Secondly, supplementary ex-situ conservation outside the natural habitats of the protected biodiversity components has also been proposed. Ex situ conservation requires the use of gene banks and zoological and botanical gardens to conserve species, which can contribute to saving endangered species. CBD defines biotechnology and provides on the widespread and potential risks associated with the handling and introduction into the environment of living modified organisms (LMOs). The need to promote bio-safety has centred on two related issues: (1) protect workers and prevent accidental liberation into the surrounding ecosystem, and (2) regulatory systems to govern the deliberate

release of LMOs into the environment. A risk assessment report as part of a regulatory process has been envisaged.

The United Nations Framework Convention on Climate Change is concerned with greenhouse warming. The Protocol to the UN Framework Convention adopted in Kyoto on December 11, 1997 specified different goals and commitments concerning emission of greenhouse gases. The potential adverse effects of climate-change have been characterized as changes in the physical environment or biota which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare (U.N. Framework Convention on Climate Change (New York, May 9, 1992), Art. 1. IPCC formation). Article 3(3) of the Convention refers to minimizing the cause and mitigating adverse effects, with obligations (articles 4 and 12) for inventory of emissions, sinks and reservoirs, technology transfer, coastal zone management and research cooperation.

The Rio Declaration states that the only way to achieve long-term economic progress is to link it to environmental protection. Therefore, nations must establish a new and equitable global partnership involving governments, populations and key sectors of societies and build international agreements that protect the integrity of the global environment and the development system. The Rio declaration thus reaffirms and builds upon the declaration of the United Nations Conference on the Human Environment, adopted in Stockholm 1972 where there was a presence of many world leaders from 179 countries. The UNECD in Rio underlined that thinking of environmental, economic and social development as isolated fields is no longer possible. At the Earth Summit major international treaties and agreements were made on issues of global climate change, biological diversity, deforestation, and desertification. In addition the Rio Declaration contains fundamental principles on which nations can base their future decisions and policies, considering the environmental implications of socio-eco-

conomic development. Principle 6 states that the special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries. Principle 7 states that “States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth’s ecosystem.” According to Principle 13, “States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.” Principle 18 states that “States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.

Agenda 21 was adopted at the Earth Summit 1992 in Brazil by nations representing over 98% of the Earth’s population, it is the principal global plan to confront and overcome the economic and ecological problems of the late 20th Century. It provides a comprehensive blueprint for humanity to use to forge its way into the next century by proceeding more gently upon the Earth. As its sweeping programs are implemented world-wide, it will eventually have an impact on every human activity on our planet. Deep and dramatic changes in human society are proposed by this monumental historic agreement. Understanding those changes is essential to guide us all into the future on our fragile planet. Seven Central Themes of Agenda 21 include 1. The Quality of Life on Earth, 2. Efficient use of the Earth’s Natural Resources, 3. The Protecting of our Global Commons, 4. Management of Human Settlements, 5. Chemicals and the Management of Waste, 6. Sustainable Economic Growth and 7. Implementing Agenda 21. Chapter 3 on

the efficient use of the Earth's natural resources deals with different types of resources, detail reasons for protecting them, and benefits associated with resource protection. Areas of concern include: sustainable agriculture, water, energy, bio-diversity, and bio-technology .Forests, Deserts and drought and mountain ecosystems are given special importance.

Salient principles of "sustainable development " as culled out from Brundtland Report, Rio- declaration and Agenda 21 are (i) Intergenerational Equity (ii) Use and conservation of Natural resources (iii) Environmental Protection (iv) The Precautionary Principle (v) Polluter Pays Principle (vi) Obligation to Assist and Cooperate (vii) Eradication of Poverty and (viii) financial assistance to developing countries .These principles are important in achieving disaster risk reduction as well.

Responsibility of transboundary harm

Principle 22 of the Stockholm Declaration provides that states are to "cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction. Twenty years later, Principle 13 of the Rio Declaration called on States to develop national law regarding liability and compensation for victims of pollution and other environmental damage. Principle 2 provides that "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction".

3.5 Environmental provisions for DRR in national laws

Almost all the environmental laws provide for facilitating or supporting actions that either directly or indirectly helpful in reducing

the intensity and frequency of hazards and vulnerabilities, risks and in improving post-disaster emergency management and recovery process.

Examples of environmental law on certain key references of environmental approach within DRR procedures or guidelines are given hereunder:

People's environmental rights and sustainable systems of natural resource management hold the key of vulnerability control and natural hazard mitigation. Among states of Latin America, Argentina deems the right to environment a subjective right entitling any person to initiate an action for environmental protection. In *Irazu Margarita v. Copetro S.A.*, *Camara Civil y Comercial de la Plata*, Ruling of 10 May 1993 (available at www.eldial.com), the court said: "The right to live in a healthy and balanced environment is a fundamental attribute of people. Any aggression in the environment ends up becoming a threat to life itself and to the psychological and physical integrity of the person."

"African Charter on Human and Peoples Rights" (1981) was the first international human rights instrument to contain an explicit guarantee of environmental quality. Subsequently, the American Convention on Human Rights included the right of everyone to live in a healthy environment (Articil. 11).

Land use controls form an important part of the environmental laws for both urban and rural areas, through zoning, physical planning, and the creation of protected areas. Zoning helps distribute harmful activities in order to limit potential damages and allow different legal rules from zone to zone for more effective protection. In Alabama, numerous federal and state laws contain provisions affecting agricultural land use and land use patterns (LaParde and Hairston, 2004). Zoning helps implement the concept of environmental justice by ensuring that the benefits and burdens of resource use are shared throughout the society, and thereby, reduce people's vulnerability to hazards. Benefits from urban agriculture

BOX 8: River Regulation Zone Notification

The High Court in Allahabad (India) recently issued a directive for the halt of construction activities and provided for the regulation of construction activities to encroachments within 500 metres of the (Ganga) river's highest flood level (Seth, 2011). As of now, there is no regulation to protect floodplains from encroachment, where lives are at risk when rivers are in flood. Inevitable is the loss of its ecology as well as groundwater recharge zones. Union Ministry of Environment and Forests is attempting to notify a River Regulation Zone (RRZ) notification on the lines of the Coastal Regulation Zone notification, and seeks to regulate activities within 500 metres from the boundary of the floodplain. A primary objective of notifying RRZ is to protect people from floods and to protect the river system from anthropogenic hazards.

in economical, social, and environmental terms are envisaged in the Michigan Right to Farm Act. Pre-emption of Detroit Zoning provides for adopting an ordinance for 'environmental site assessment' for agriculture and related activities in urban areas (Meyer, 2011).

In India, National Resettlement and Rehabilitation Policy, 2007, and the Proposed Land Acquisition, and Rehabilitation and Resettlement Bills also provide for efficient management of land use and land resources. A recent initiative on River Regulation Zone for flood risk management is underway in India's Ministry of Environment and Forests (Box 8).

The Sun Prairie Zoning Regulations - Chapter 7 (Town of Windsor ETJ Area) is focused on natural resource protection, and provides for permanently protected open spaces, mitigation standards, natural resource site evaluation, and residential and non-residential minimum standards including Green Space Ratios (GSR) and Landscape Surface Ratios (LSR) related to State of Wisconsin Statutes 62.231; Dane County Code of ordinances pertaining to floodplains. It prescribes for drainage ways protection, pollutants and sediments control, infiltration and groundwater recharge, and habitat for water/land margin with emphasis on

soil erosion prevention, vegetative cover and runoff flows. It provides for steep slope protection with environmental measures, re-vegetation and flood risk reduction (Section 13W-7-8), and ridge top protection with environmental protection and site stabilization using mixed approach of biological and engineering methods (Section 13W-7-9).

Ecosystems contain a complex interrelationship of species and functions, governed by natural rules leading towards equilibrium. The diversity of ecosystems is itself an essential part of biological diversity (Shelton and Kiss, 2005). An International Treaty on Plant Genetic Resources for Food and Agriculture (Rome, Nov. 3, 2001) recognizes the sovereign rights for the conservation and sustainable use of plant genetic resources, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security. Many states have enacted laws to designate and protect wetlands. The Ramsar Convention on Wetlands of International Importance (Feb. 2, 1971) was the first treaty based entirely on the idea that habitat should be the focus of protection.

The Ministry of Agriculture, Irrigation and Livestock in **Afghanistan** is currently developing the Forest Law and the Rangeland Law, both of which will become law, once approved by the National Assembly. The Ministry is also drafting hunting and wildlife regulations, which will be issued under the Environment Law (Shelton and Kiss, 2007).

In **Belgium**, protected areas are legal persons and can be represented in litigation tending to their rehabilitation (Cour correctionnelle de Bruges, Belgique), September 16, 1998, O.M. et Réserves naturelles v. E.R., Luc Lavrysen, p.571). India's Forest Conservation Act of 1980 (amended 1988) restricts assigning any forest land to any private person for any non-forest purposes.

The National Heritage Wilderness Area Act No. 3, 1988 (Sri Lanka) and, Fauna and Flora Protection Ordinance, 1993 (amendment) sig-

nificantly provide for coastal reserves, protection areas of catchments, and forest possessing unique ecosystems, and thereby, for mitigation of hazards and reduction of ecological vulnerability towards risk of hydro-meteorological disasters. Indian Fisheries Act, 1897, provides for prohibition of explosions and poisoning of waters for destruction of fishes.

In the **Philippines**, the passing of the Disaster Risk Reduction and Management Law in 2010 and the Climate Change Law in 2009 reflect significant advancements in orienting DRM towards a risk reduction and resilience approach. This has been hard won by a multitude of stakeholders. Supported by the context of participatory governance and the culture of 'accountability', important lessons have been emerging from the Philippines from efforts to hold the government to account on its DRR responsibilities (Polack et al., 2010). Environmental law, thus, not only provides for 'accountability' of actions but also helps make decisions and negotiations in trans-boundary implications of a major hazard or its effects. Informational rights are widely found in environmental treaties and regional agreements, including the 1992 Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Art. 16), the 1992 Espoo Convention on Environmental Impact Assessment in a Transboundary Context (Art. 3[8]), and the 1992 Paris Convention on the North-East Atlantic (Art. 9).

Environmental regulations provide for the application of environmental assessment and evaluation tools help reduce the risk of disasters by generating knowledge of the hazards and underlying causes of vulnerability within the process of planning itself. EIA became a regulatory provision with National Environmental Protection Act in 1969 (USA). Environmental clearance of major developmental and industrial projects in India as per EIA notification (1994, 2006) under the Environmental Protection Act, 1986, specifically requires (a) Environment Impact Assessment Report, (b) Environment Management Plan

including a disaster management plan, and (c) Rehabilitation plans (wherever necessary) for assessing the case.

Several environmental laws provide for conservation and management of water environment. Water (Cess) Act, 1977, in India, prescribed for collection of charges for withdrawal of water from the environment. The 77th Texas legislature passed in 2001 (amended Section 11.32 of the Texas Tax Code) allows exemption from tax on water conservation modifications, it has been made for (i) City of Austin – to buy rain barrels at subsidized rates and avail rebate for the installation of approved cistern systems, and (ii) City of San Antonio - rebate for new water-saving equipment including rainwater harvesting systems. The Kerala Municipality Building Rules, 1999 (amended 2004) provide for rainwater harvesting structures in all new constructions. Tamil Nadu Municipal Laws Ordinance, 2003, made rainwater harvesting mandatory for all buildings, both public and private, in the state. The Andhra Pradesh Water, Land and Trees Act, 2002, aims at promoting land conservation; tree cover; protecting, conserving and regulating the exploitation and use of water, environment and matters connected therewith.

“Tourism is like fire. It can cook your food or burn your house down” (Quote by R. Fox on UNEP website), illustrates the complex relationship between environment and tourism – tourism being the world’s biggest industry and its concern within DRR framework. Tourism activities can reduce people’s vulnerability by creating livelihood opportunities and resources, and on the other hand, they can create harmful effects on environment causing or aggravating hazards, exposure and threat of disaster. Three main environmental effects of tourism are: depletion of natural resources, pollution, and physical impacts. A number of countries have developed regulatory provisions to address the environmental effects of tourism. For example, Australia’s Environmental Planning and Assessment Act, 1979, deals with the construction of tourist facilities.

Air pollution is responsible for the green-house effect and decrease in CO₂ sink. This together accelerated the phenomenon of climate-change implications driving hydro-meteorological disasters. Besides, more than 500,000 people in Asia die every year from diseases related to air pollution (Shelton and Kiss, 2005). Air pollution is the introduction, directly or indirectly, of substances or energy into the air, resulting in deleterious effects of such an environment as to endanger human health, harm living resources and ecosystems and material property, and impair or interfere with amenities and other legitimate uses of the environment. Climate and climatic processes including formation of clouds, winds, transport and dispersion, rainfall patterns including primary impact of climate-change and heat-island effect, etc., thus, relate to the uses of environment in the troposphere. Authorization, licensing, and standard of allowable limit, are the most widely adopted legal techniques for combating air pollution.

The Netherlands was the first state in Europe to have specific legislation on soil protection in 1987, to protect the functions of the soil

BOX 9: Coastal zone management in Malaysia

In case of Malaysia, there are nine regulations related to the coastal zone, and each of them provides opportunities for integrating DRR. These legislation are:

- a) Environmental Quality Act 1974;
- b) Town and Country Planning Act 1976;
- c) Merchant Shipping Ordinance 1952;
- d) Land Conservation Act 1960;
- e) National Land Code 1965;
- f) Street, Drainage and Building Act 1974;
- g) Fisheries Act, 1985;
- h) Guidelines for the Approval and/or Implementation of Development Projects within the Coastal Zone (General Administrative Circular No. 5 of 1987);
- i) National Forestry Act 1984.

Malaysia has also made the policy commitment and developed corresponding initiatives related to CZM. Eight policy commitments and initiatives can be identified: the Malaysia Plans, National Coastal Erosion Strategy 1987, State Structure Plans and Local Plans, National Agriculture Policy 1990-2010, National Forestry Policy 1978, National Biodiversity Policy 1998, Draft National Tourism Master Plan, and Draft Policy on Integrated Coastal Zone Management 1991. These policies are either cross sectoral or sectoral in nature and are in line with international commitments on protecting coastal resources and implementing a sustainable development approach.

through conservation and restoration and to regulate pollution sources. After the Council of Europe adopted the European Soil Charter in 1972 (Committee of Ministers, Res. (72)19 of May 30, 1972), the UN Food and Agriculture Organization proclaimed a World Soil Charter on November 25, 1981. Both documents contain guidelines for action and basic principles, and land use programs for ensuring productivity and avoiding the loss of productive soil. Agenda 21 devoted five chapters to different aspects of soil conservation respectively related to planning and management of land resources, deforestation, desertification, sustainable mountain development, and agriculture and rural development. The first treaty exclusively dedicated to soil was adopted on October 16, 1998 as a protocol to the November 7, 1991 Convention Concerning the Protection of the Alps, 31 I.L.M. 767, where parties recognized soil erosion as a problem in the Alpine region.

The U.S. enacted its Resource Conservation and Recovery Act to regulate, among other things, the land disposal of waste in 1976, and its so-called "Superfund" legislation in 1980. Protection of soil to some extent appears in forestry laws that are designed to avoid erosion and consequential flooding. A few cases have been decided (for example, the Environment Appeal Tribunal of Mauritius, Case No. 03/01, Mrs. Jamamloodeen Dulloo v. Minister of Environment). The U.N. adopted the first international treaty concerning one aspect of soil protection,

the problem of desertification, on June 17, 1994. The United Nation Convention to Combat Desertification defines desertification as land degradation in arid, semiarid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.

Despite the ecological richness and the contribution to economy, coastal and marine areas are under stress due to increased commercial exploitation, biotic and abiotic pressure, urbanization and industrialization, infrastructure growth and impacts of climate-change. This is affecting the coastal ecology, and thereby, the livelihood, health and well-being of the coastal population; affecting in turn prospects for sustained economic growth. Coast is subject to severe hazards including weather events, tsunami, oil spills, erosion, flooding, drought, etc. and resilience of the communities to extreme weather variability had been low, mostly because of impoverishment. Countries like Jamaica, developed policies and laws to address the challenge. Examples of such policy initiatives are: Mangrove and Coastal Wetland Protection Policy (1996), Coral Reefs Protection and Preservation Policy (1996), Protected Areas Policy (1997), and EIA provisions. World Bank's Environmental and Social safeguard policies are applicable for the projects, and the projects have been designed according to the principles and requirements of these policies. These principles and requirements are: (i) Environmental Assessment, OP 4.01, (ii) Natural Habitat, OP 4.04, (iii) Indigenous Peoples, OP 4.10, (iv) Cultural Property, OP 4.11, (v) Involuntary Resettlement, OP 4.12, and (vi) Forests, OP 4.36. Furthermore, since both coastal ecosystem services and DRR come into play in the wide range of policy processes, along with the policy directly related to DRR or coastal zone, even other policies such as poverty reduction or water management etc. provide an entry point for integrating DRR and ecosystem services in coastal areas. Coastal zone management provisions in Malaysia are mentioned in Box 9.

The approach to manage India's coastal zone has been regulatory one, as per the Coastal Regulation Zone (CRZ) Notification of 1991 (revised in 2011). The Environment (Protection) Act of 1986, prevents, restricts and controls development activities within a landward distance along the coasts, and it provides for demarcation of hazard line. Besides, common environment policies in India, there are certain other strategies of relevance - Deep Sea Fishing Policy, 1991; Tourism Policy, 1998; Marine Fishing Policy 2004; and National Rehabilitation and Resettlement Policy, 2007. Environmental regulations in coastal context include Land Acquisition Act, 1894; Indian Fisheries Act, 1897; Indian Ports Act, 1908; Coast Guard Act, 1950; Merchant Shipping Act, 1958; The Model Town and Country Planning Act, 1960; Major Port Trust Act, 1963; Wildlife Protection Act, 1972 (amended in 2001); Water (Prevention and Control of Pollution) Act, 1974; Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1976; Marine Fishing Regulation Act, 1978; Forest Conservation Act, 1980 (amended in 1988); Air (Prevention and Control of Pollution) Act, 1981; Environment (Protection) Act, 1986; Hazardous Wastes (Management and Handling) Rules, 1989; Coastal Regulation Zone Notification 1991; National Environment Tribunal Act, 1995; The National Environmental Appellate Authority Act, 1995; Biological Diversity Act 2002; Disaster Management Act, 2005; Environment Impact Assessment Notification, 2006; and Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.

Japan: In 2005, the National Spatial Planning Act (revision of Comprehensive National Development Act) was enforced in order to make a shift from the development centred policy. One of the strategic goals envisage a disaster resilience nation to ensure a safe and secure living environment including comprehensive disaster risk reduction. The "Forest Improvement and Conservation Works Master Plan (5-Year Plan)" was formulated in 2003 to promote forestry improvement and soil conservation.

Vanuatu: The Environmental Management and Conservation Act, 2002 of Vanuatu provides for Environmental Impact Assessments (EIA) for all development activities. The land use management policy seeks a full risk assessment before development can be approved.

Right to ‘environment’ helps necessitate the green-recovery and sustainable livelihood systems during post-disaster reconstruction. At the United Nations, the Sub-Commission on Prevention of Discrimination and Protection of Minorities appointed a Special Rapporteur on Human Rights and Environment in 1989, whose final report was delivered in 1994 (*Human Rights and the Environment: Final Report Prepared by Mrs. Fatma Zohra Ksentini, Special Rapporteur, E/CN.4/Sub.2/1994/9, 6 July 1994*).

3.6 Environmental policies and DRR: some examples

Cayman Islands: The Environmental policy addresses a number of issues relating to protection from natural hazards. The Hazard Management Legislation especially addresses to vulnerable areas such as wetlands, and areas prone to flooding.

Egypt: Disaster management and risk reduction are integral components of environmental protection. For example, the Law of Environment No. 4/1994 includes among other articles, Article 19 which underlines environmental impact assessment for new establishments (EIA), Article 25 underlines national environmental disaster contingency plan, and other articles regarding projects and programmes related to land use. The concept of disaster management and risk reduction is considered and a set of regulations and codes of practice were developed by the National Centre for Planning State Land Use. The environment related policy has been presented in the National Environmental Action Plan (2002 - 2017).

India: The National Environmental Policy, 2006 adopts a comprehensive approach towards integrated coastal management including wetlands and river systems; conservation and development of mountain ecosystems; land use planning; watershed management and reduction of hazards like landslides, and hazards resulting from impacts of climate-change. EIA notification envisages for a Risk Assessment Report and a Disaster Management Plan as part of environment management plan of the projects.

Indonesia: Spatial planning as stipulated in Law No. 26/2008 on Spatial Planning, for instance, has accommodated the importance of disaster risk assessments in land use planning.

Malawi: Environmental management policies in the country do incorporate DRR and seek to reduce underlying risk factors. For example, the requirement for Environment Impact Assessments (EIA) undertaken for all major projects seek to ensure that all developmental activities do not exacerbate the vulnerability of communities. Link between DRR and environmental management is reflected in the National Adaptation Programme of Action (NAPA) to reduce vulnerability of communities.

Mauritius: The National Environment Policy (revised version 2007) has a number of measures pertinent to disaster risk reduction. The National Forest Policy has a provision for land use management in the context of climate change.

New Zealand: The Resource Management Act has a sustainable management purpose with explicit requirements to address the effects of natural hazards, and requires particular regard to the effects of climate change.

Pakistan: Under the framework, the Ministry of Environment has been made responsible for the following:

- a) Incorporate Natural Disaster Risk Assessment in the Environmental Impact Assessment (EIA) guidelines; and
- b) Develop mechanisms for assessment of environmental losses and damages in the aftermath of disasters and their rehabilitation.

Saint Lucia: All environment related policies consider DRR concerns such as the climate change policy, environmental management policy and water policy.

United Rep of Tanzania: The National Land Policy of 1995 emphasizes the secure land tenure for investments in land, whereas the village Act No.5 of 199 envisages Village Land Use plans for various uses e.g. agriculture, pastoralist, forestry, water, minerals and conservation. The National Human Settlement Policy, 2000 emphasizes on planning based on the national guidelines for the participatory Village Land Use Management. With the Land Use Planning Act No. 6 of 2007, the village assembly is the approving authority of village land use plans. The outcome is therefore to reduce vulnerability of environmental disasters.

Yemen: Articles related to drought and flash flood risks reduction have been included in the National Water Strategy, 2007. More than 10 articles related to disaster (natural and man-made hazards) and risk reduction have been added in the updated draft of the Environmental Law No 96, 1995.

3.7 Environmental laws and role in Disaster Risk Reduction

‘Economic efficiency’ and ‘disaster risk management’ are two complementary objectives of an environmental policy or law on its strategy for ‘sustainable development’, which is defined as “Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” (Our Common Future, World Commission on Environment, 1972) with three main principles

viz. (a) Inter-Generational Equity, (b) The Precautionary Principle, and (c) Polluter Pays Principle. This provides a strong vision for disaster risk reduction and green-relief-recovery approach within the framework of environmental sustainability. Although, most environmental laws may not use the terms 'hazard, vulnerability, disaster, emergency or response' but a blended approach of science-based and human ecology to the interpretation of their provisions shall help significant opportunities for DRR tools and actions. Nation's initiatives on integrating environment and disaster management are therefore, right steps towards sustainability of lives, livelihoods and development. An assessment of environment and natural resource laws in context of their potential role in disaster risk reduction is given in Tables 2.1 to 2.8

Table 2.1 land resource laws and policies (wetlands, soil, agro-ecosystems, landscape, wastelands, watershed, catchment, river-basin, land-use)

Addressing hazards	Reducing vulnerability	Coping Capacity	Emergency Response
Desertification control and reducing drought, flood and fire, storm attenuation, preventing disease and conflicts	Alternative cropping, livelihoods and employment, ecosystem services, food, water, health resources	Alternative options; Safer sites/ landscapes, Migration, Rapid recovery capacities	Neighbouring resources for response supplies

Table 2.2 Water related (resources and quality, flood & drought mitigation, disease prevention livelihood options, ecosystem-health & services, recreation, health, waste disposal etc).

Addressing hazards	Reducing vulnerability	Coping Capacity	Emergency Response
Flood control, drought reduction, disease prevention	Livelihood options, agriculture, ecosystem-health and services, recreation, health, transport	Water reserves for meeting drought; levees for flood-water relief, water / waste treatment	Water and sanitation, waste disposal, disease control

Table 2.3 Forests protection and conservation laws (related to protected and reserved areas, village forests and common property resources, forest produce, species diversity, regeneration, ecology, rights of forest dwellers)

Addressing hazards	Reducing vulnerability	Coping Capacity	Emergency Response
Reducing catchment degradation and erosion, climate-change effects, flooding, drought, fire, invasion; increasing water recharge, land-stability	Increasing livelihoods, food, recreation, health resources, watershed services, clean air and water; reduces migration to cities	Alternative resources, Shelter-belt, Green-belt, Wind-breakers, Mitigation/ protection, Climate-resilience	Timber, fuel-woods/ other produces, for shelter, food, lighting, medicinal resources

Table 2.4 Biodiversity Laws (Habitat, bio-resources, gene pool, eco-balance)

Addressing hazards	Reducing vulnerability	Coping Capacity	Emergency Response
Reducing drought/ water scarcity, flooding, pest and diseases, fire, wilt, rodents	Alternative crop, food, diversifying livelihoods, health, eco-aesthetics and cooperation	Resistance (avoidance, tolerance, resilience), alternative / sustainable resources	Local resources and emergency support – medicinal, timber, food, fodder, shelter, water, etc.

Table 2.5 Wildlife conservation and laws. (animal-plant-soil relations, habitat conservation and regeneration, ecotourism)

Addressing hazards	Reducing vulnerability	Coping Capacity	Emergency Response
Protecting habitats, preventing man – animal conflict	Ecotourism, forest produce, handicrafts, ecosystem services Eco-education	Alternative employment, Coastal, mountain / watershed protection	Medicinal resources, food, fuel-wood, etc.

Table 2.6 agricultural laws. (diversification, agro-forestry livestock, waste reuse, biofuels, alternative cropping, land-use, soil & water)

Addressing hazards	Reducing vulnerability	Coping Capacity	Emergency Response
Reducing drought/ water scarcity, flooding, pest and diseases, fire, wilt, rodents	Alternative crop, food, diversifying livelihoods, health, eco-aesthetics and cooperation	Resistance (avoidance, tolerance, resilience), alternative / sustainable resources	Local resources and emergency support – medicinal, timber, food, fodder, shelter, water, etc.

Table 2.7 Coastal area management laws (landuse, natural resources, ecosystems, conservation, disaster risk reduction)

Addressing hazards	Reducing vulnerability	Coping Capacity	Emergency Response
Reducing storm surge, sea ingression, salt-water intrusion, erosion	Reducing exposure, losses; enhancing livelihoods – fisheries, ecotourism	Critical infrastructure, cyclone shelter, warning systems,	Food, medicinal resources, shelter, material transport, etc.

Table 2.8 Hazardous substances laws (related to the manufacture, storage , handling, use, transport and disposal of hazardous chemicals and wastes)

Addressing hazards	Reducing vulnerability/ exposure	Coping Capacity	Emergency Response
Hazard Analysis Threshold Risk Assessment Process safety (design & maintenance) Safety Audit	Zoning , Industrial siting Isolated storages, personal protection, Consent to Establish and Operate Transport, Public Liability	Prior Information Consent MSDS, Risk Communication Training Right to Know, Public disclosure of Information	Onsite and Offsite plan, Mock-drill Crisis Groups

Learning Unit C

Integrating Environment and Disaster Risk Management

4

Objective of this learning unit is to emphasize the needs, opportunities and benefits of integrating environmental concerns with in the state and district level disaster management framework for all the phases of disaster management. Certain examples of integration of environmental concerns in disaster management legislation and guidelines are also described in this unit.

4.1 Introduction

DRR related legislation are fundamental to the enhancement of human security. Out of the 119 national reports submitted to the UN World Conference on Disaster Reduction, Hyogo, 2005, 80% have some form of legislation for disaster management (Pelling and Holloway, 2006). State's recognition of environment-disaster relations is manifested in their National Progress Reports on the implementation of the Hyogo Framework for Action: HFA Priority 4, core indicator 4.1 - *"Disaster Risk Reduction is an integral objective of environment related policies and plans, including for land use, natural resource management and adaptation to climate change."*

Integration of environment and disaster management framework holds the key for promoting the environmental approach for DRR. It shall require reforms and adaptation on legal, institutional and implementation framework of both environmental governance and disaster management, at different levels of planning and action. Knowledge building and perception holds the key of attitudinal change. Environmental education provides communities with the necessary skills to make informed decisions as well as the motivation to participate in and take responsibility for environmental management (IADB, 1999). The Inter-American Development Bank has adopted a strategy that

BOX 10. The Kingdom of Morocco: effective coalition

Following the Yokohama UN conference on disaster management, 1994, Morocco's First National Workshop on Catastrophe Risks drew from a very wide base, as part of a national programme for evaluation need and capacity for natural disaster risk management. Participants included representatives from ministerial department, local and provincial government, the private sector, developmental in the Division of the Environment at the Ministry of Land Use Planning, Water and Environment. The National Committee held several thematic workshop, for example on housing and urban planning, and development of a national strategy for disaster risk management. Ministries were asked to submit budgeted plans for risk reduction programmes.

In addition to the more tangible outputs of evaluation and programming, the broad-based dialogue enabled through this process encouraged the exchange of ideas and generated support for risk reduction from a wide range of policy actors.

(Source : Direction de la Surveillance et Prevention des Risques, Departement de l' Environnement, Ministere de l' Aménagement du Territoire de l'Eau et de l' Environnement, Kingdom of Morocco, www.matee.gov.ma)

stipulates that all projects financed by the Bank include an analysis of natural hazard risks. A central aspect of this strategy is cooperation with member countries to ensure that projects are designed to improve or preserve the environment, and to reduce vulnerability to natural disasters (IAEB, 1999). The countries of Central America have declared, through the Alliance for Sustainable Development (ALIDES), that both formal and informal environmental education, as well as community participation in environmental management, is important for achieving sustainable development in the region (ALIDES 1994).

4.2 Examples of integrated environment and DRR framework

Following examples of Institutional Framework of Integrated Environment-DRR in different countries indicate worldwide initiative of environment based DRR:

- a. **Japan:** Japan has National land Conservation Projects such as river improvement, soil erosion control (sabo), and soil and coastline conservation are carried out strategically for protecting national land, citizens' lives and property from various disasters.

- b. **Bangladesh:** National Capacity Self-Assessment for Environment and Natural Resource Management addresses risk reduction in the policies and plans. A Sustainable Land Management Programme is intended to cover land related risk reduction issues including mining. Ministry of Land is implementing Coastal Land Zoning Project. Ministry of Agriculture and its technical agencies are engaged and in continuous process to develop climate resilient crop varieties in the context of salinity intrusion, drought and submergence. A project is launched in 2008 to understand effectiveness of DRR approaches into climate change context in three agro-ecological zones.

- c. **British Virgin Islands:** With regards to Physical Planning, the CDM Strategy includes various efforts that contribute to 'focusing on risk reduction in the future from natural and man-made disasters' and 'improving the coordination of disaster management, physical planning and environmental management to ensure that these considerations are incorporated in decision making in an integrated fashion'. Apex officials of Disaster Management are members in the Planning Authority as well as in the Environmental Management Committees, and there are awareness efforts targeting planners, engineers and developers particularly on non-structural mitigation. On the other hand, Senior Officials of Environment Management are involved in the disaster management planning and implementation committees. The strategy on disaster risk management and climate change adaptation is envisaged to contribute to 'strengthening environmental planning among the various land environmental management agencies'.

- d. **United States of America:** The National Science Technology Council (NSTC) Subcommittee on Disaster Reduction is working with the interagency Climate Change Science Program to ensure that the disaster reduction perspective is incorporated into strategies being developed to address climate change with the recognition that a number of aspects of mitigating disaster risks can also be effective for climate change adaptation.

BOX 11: Environment – DRR in Mozambique

Relationship between Disaster Risk Reduction and environment are strongly addressed in the 2nd generation 5 year plan (2005-2009) and is approved by Government of Mozambique in 2006. Effects of droughts, floods and erosion are faced as a result of climate change to which government and partners have to clearly address by improving land use and natural resources management by capacity building of the local communities and implementing good land use planning and environmental protection policies and strategies. Improved water supply and sanitation are seen as key factors to reduce environmental related diseases. On the other hand, legal framework and institutional capacity building have been identified as essential to ensure changes and rapid dissemination and implementation of this broad vision to all government level so that disasters risk reduction and environmental protection must be viewed as tied issues each other.

In this sense, natural disasters are seen as critical part to attain sustainable development in Mozambique. Since 2007, this vision is being disseminated in all the country provinces and districts by evolving local leaders and technical staff in workshop trainings with the objective of integrating disasters risk and environment in the local strategic and operational plans and budgets. In 2005, a National Council for Sustainable Development (CONDES) chaired by the Prime Minister was set up to monitor the progresses achieved in the implementation of the Government Plan related to sustainable development, where natural disasters are seen as a big environmental constraint. Thus, since 2006, all the provinces and districts are gradually integrating disaster risk reduction and environment protection, and placing them together in their annual plans and budgets.

- e. **Pakistan:** Under the framework, the Ministry of Environment has been made responsible to: (a) Incorporate Natural Disaster Risk Assessment in the Environmental Impact Assessment (EIA) guidelines; (b) Develop technical capacities of the staff of Environment Ministry to undertake disaster risk assessment and disaster risk reduction activities in the environment sector; (c) Undertake assessment of vulnerability of natural resources (forest, lakes, streams, mangroves, coral reefs, protected areas, and coastal areas) to natural and human induced hazards; (d) Implement programmes for conservation and rehabilitation of natural resources in order to reduce risks of natural hazards, e.g. reforestation, mangrove plantation, combating desertification, conservation of special natural resources; (e) Allocate resources for implementation of programmes to conserve and rehabilitate the natural resource base, particularly in up-stream areas of the Indus River basin; (f) Develop mechanisms for assessment of environmental losses and damages in the aftermath of disasters and their rehabilitation; and (g) the NDMA is coordinating with the Ministry of Environment for implementation of DRR policies and strategies on environment as envisaged in the Framework.
- f. **Switzerland:** Disaster risk reduction and environmental protection are closely interrelated in Swiss federal laws (e.g. in laws relating to forests and water) and are overseen by one common institution at the federal level (the Federal Office for the Environment, FOEN). Utility of, protection of and protection from major natural resources (water, forests, soils) are considered jointly. Thus sustainability and robustness of protection measures are required. This can be explained by an example that protection measures have to withstand the impact of stronger events than those for which they were designed. Land use planning is preferred to protection measures whenever possible and adaptation to climate change has been integrated to environmental management as well as disaster risk reduction framework.

- g. **Turkey:** Turkey gives importance on the coordination of disaster risk reduction with environmental and natural resources policies, with all its plans and programs, including disaster risk reduction as a key element. The National Environmental Approximation Strategy was adopted by Higher Planning Council and then Head of Disaster Affairs has undertaken the responsibilities of adaptation of climate change issue. The Ministry of Environmental and Forestry (MEF) gives special importance on the adaptation of climate change issues and activities related with flood mitigation.

On behalf of UN-ISDR and ADPC, the ERM Consultants (2007) developed a strategy document on 'Mainstreaming the Environment into Humanitarian Response: An Exploration of Opportunities and Issues' (Box12). Principle 8 of the Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief, currently endorsed by 413 agencies worldwide, states: *"We will pay particular attention to environmental concerns in the design and management of relief programmes."*

As the UNHRC quoted *"Although environmental concerns have taken a back seat to humanitarian needs at such times of crises, the close links between the well-being of human populations and a healthy environment are being increasingly recognized"*. The UNHCR established an environment unit in 1995 to monitor environmental activities and produced a number of handbooks in 2002 and guidelines in 2005 (UNHCR Environmental Guidelines, UNHCR, August 2005, p5), that is intended to serve as sources of information and reference on environmental practices and approaches in refugee operations. The document reiterates the *"Environmental considerations need to be taken into account in almost all aspects of UNHCR's work with refugees and returnees. The state of the environment, in turn, will have a direct bearing on the welfare and wellbeing of people living in that vicinity, whether refugees, returnees or local communities"*.

BOX 12: Environmental Response: Minimum Standards

SPHERE (2004, 2010) is a multi-year project sponsored by NGOs, the International Red Cross and Red Crescent, donor governments, and UN agencies. It has produced The Humanitarian Charter and Minimum Standards in Disaster Response, with the aim to improve the quality of assistance provided to people affected by disasters and to enhance the accountability of the humanitarian system in disaster response. It includes standards for environmental services in disasters and emergencies e.g. water, sanitation, food, shelter and health, and concerning other aspects of environment safeguards for human well-being, besides process standards (www.sphereproject.org).

Source: Tools for Mainstreaming Disaster Risk Reduction: Environmental Assessment (Guidance Note 7) by IFRC / Prevention Consortium available from <http://www.proventionconsortium.org>

BOX 13: Mainstreaming DRR into environment sectors in India

UNDP jointly with National Disaster Management Authority of India, under their DRR Programme is taking strides in developing guidelines, tools and training modules for mainstreaming disaster management into developmental process. It has taken a sector –based approach and has identified ‘Environment’ as a key sector with manifold significance. Guidelines and tools for DRR integration with environment sector are being developed by National Institute of Disaster Management, New Delhi, involving Indian Institute of Public Administration, and using a multi-stakeholder, multi-disciplinary consultative process. It includes the sector aspects, viz. water, land and land use, forests, agriculture, industry, energy, tourism and health within its framework.

Special emphasis is on mountain and coastal systems, climate-change, river-basins, urban systems, environmental-health, sustainable agriculture and livelihoods. Guidelines in making are expected to suggest a conceptual plan with legal, institutional and operational framework for integrating DRR and post-disaster relief and recovery with environment and natural resource management system at national, state, district and local area levels. A project of GIZ-NIDM cooperation facilitated by the Indian Ministry of Environment and Forests addresses the use of environmental knowledge, law, EIA and ecosystem approach in DRR and post-disaster relief.

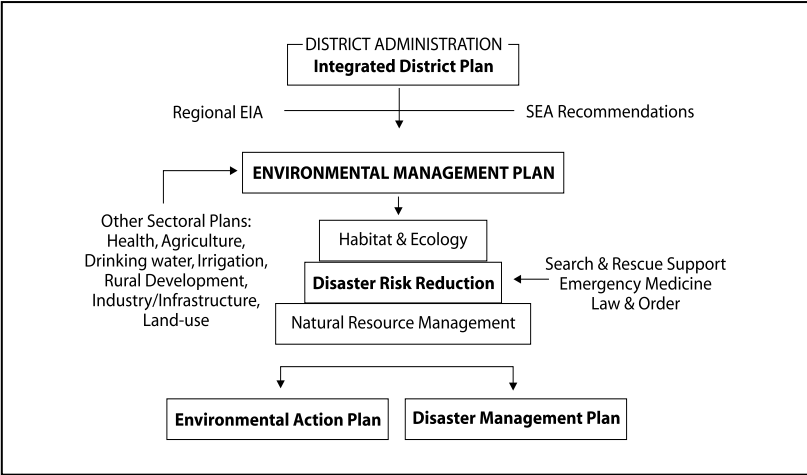


Figure 4: Integration of environment and natural disaster management at district level

Disaster Management Guidelines in India

Disaster Management Act 2005 recognises damage to or destruction of environment as disaster. The National Disaster Management Authority, the apex guiding organization on disaster management in India, has developed a number of guidelines on disaster management which prescribe for various environmental approaches in disaster mitigation and post-disaster management covered widely under environmental policies and laws (Box 14). The 1992 UN Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes calls on each party to define water-quality objectives and to adopt criteria and set guidelines for this purpose. Some bilateral and regional agreements on freshwater and air foresee or mandate water-quality objectives. They significantly address the precursors of the hazards in the river-zones and costal zones known to aggravate the impacts of river or sea erosion, flooding, cyclone. Such private regulations may constrain behaviour of breaching by exercising a moral or practical (sanctioning) influence and litigants may argue that breach of such codes or standards may be an evidence of malpractice or negligence.

BOX 14: National Disaster Management Guidelines: Environmental approaches

The Government of India has developed specific guidelines for management of different disasters. Many approaches based on environmental knowledge and management of natural resources and ecosystems are manifested in their contents. A pilot assessment of the three guidelines*, viz. Flood, Cyclone and Drought, has been undertaken to identify ecosystem and environmental-based approaches referred therein

Reference	Flood Management Guidelines	Cyclone Management Guidelines	Drought Management Guidelines
Environmental rights	Lives and livelihoods, Livelihood systems	Livelihood	Livelihoods, Alternative livelihood
Climate-change	Snow melt, GLOF, LLOF	Climate-change and sea-level rise	Climate-change impact on drought and agriculture
Natural Resource Management	Catchment area treatment, Anti-erosion measures, Coastal protection, Carrying capacity of rivers and drainage, River-bank erosion, Sediment load from river catchments, Drainage congestion, Wetlands, Integrated water resource management, Environmental-health, Encroachment of waterways, Waste management	Coastal afforestation, Aquaculture, Coastal resources, Bio-shields, Mangroves, Shelterbelt plantations, Coastal flood plain management, Coastal erosion, Crop and livestock protection, Environmental-health responses, Shelterbelt plantation monitoring	Agriculture, waste Land resource management - Soil-moisture, Soil amendment, Integrated nutrient and pest management, Water scarcity and management, Reservoirs and wetlands, Ground-water, streams, Drought prone area programme, Desert development programme, Alternative cropping, In-situ conservation, Horticulture, Ecosystems, Forest management, Crop phenology, Coastal and marine resources, Pollution control
Land-use / land-cover	Afforestation, Watershed management,	Alternative developmental scenario, Preferred scenario, Land-use	Afforestation, Alternative land-use, Agroforestry, Biofuel cultivation
Environmental Impacts / Risk Analysis, Environmental statistics	Eco-friendly structural and non-structural mitigation, Environmental database for forecasting and damage assessment, Dam safety	Coastal zone management, EIA, Assimilative capacity estimation, Regional environmental management plans	Environmental impacts of drought – environmental health risks, livelihood impacts, Environmental indicators for risk and impact assessments including databases, Environmental planning,
Environmental regulations	River regulation zone, Flood-plain zoning	National environmental policy, Coastal zone management, EIA	Environmental law
Date of release	January 2008	April 2008	September 2010

4.3 Recommendations of integrating DRR initiatives in environment

Analysis of the environment based DRR initiatives and integration in different countries enabled a sketch of operation framework for implementation, with following six strategic recommendations:

1. Strategic and professional presence of ecological science/ environment policy and EIA (experts) within the apex level institutions of disaster management framework (for example, for India, Pakistan, Afghanistan and Bangladesh – National Disaster Management Authority, Disaster Risk Reduction, Capacity Development Programme Office, Response Force Planning and Management, etc.), policy-level representative from Ministry of Environment and the Natural Resource Research Organization to be a member/ permanent invitee in the authority/board mandated for planning and organizing key functions of disaster risk management.
2. Establishment and functional maintenance of interdisciplinary cell/centres or specialized office on Disaster Risk Reduction affairs within the apex organization of policy, research, monitoring and funding promotion on environment and natural resource matters (example from India are, Ministry of Environment and Forests, Planning Commission, Council of Agriculture Research, Forestry Education, etc.)
3. Introduction of regional EIA (district level, and preferably national and state level as well) as a pre-requisite to term-planning. For example, five-yearly planning is common in India and Regional EIA can facilitate for preparation of an 'Environment Management and Action Plan' at District/State level as an strategic Umbrella Approach on sustainable development (figure 4).
4. Disaster Risk Reduction and post-disaster relief and recovery to be

introduced as a compulsory module within the higher education, research and awareness courses in the Universities, colleges and school curriculum. On the other hand, the module on ecosystem-approach to DRR within disaster management training and sensitization framework needs to emphasize the role of legislation, and in particular, of environmental/natural resource law and EIAs.

5. Environmentally sustainability mitigation option and the concept of 'greening disaster-response' and 'sustainable-recovery' need to be promoted within the framework of sustainable development by integrating SEA to the developmental planning process. SEA and EIA scope need to necessarily include hazard-risk and vulnerability assessment within the assessment framework.
6. Apex organizations in disaster management need to establish a consortium at strategic level involving Environment and Natural Resource Ministries, Research Institutes and Academia, relevant NGOs and international agencies, to generate and maintain environmental database for disaster risk management functions, developing relevant guidelines and manuals, training and educational modules, and standards on environmental approach to DRR. In the line with UN-PEDRR, countries and states can promote strategic and functional partnership of institutional frameworks of environment and disaster management.

References

- ADB.Tajikistan (2004). *Country Environmental Analysis*. Manila: Asian Development Bank. Retrieved from <http://www.adb.org/Documents/Reports/CEA/taj-july-2004.pdf>
- AfDB/ADF (2004). *African Development Bank Group's Policy on the Environment*. Abijan: African Development Bank and African Development Fund. Retrieved from <http://www.afdb.org/en/pls/portal/docs>
- Alex, J.P. (2006). *Disaster Management: Towards a Legal Framework*. New Delhi: Indian Institute of Public Administration and UNDP.
- Benson, C. (2007). *Tools for Mainstreaming Disaster Risk Reduction, EIA, Guidance Note 7*. International Federation of Red Cross and Red Crescent Societies / the Provention Consortium, Geneva, Switzerland, and Caribbean Development Bank.
- Bhatt, R. P., & Khanal, S. K. (2009). Environmental Impact Assessment System in Nepal – An overview of policy, legal instruments and process. *Kathmandu University Journal of Science, Engineering and Technology*, 5 (2), 2009: 160- 170.
- Blaikie, P., Mainka, S., & McNeely, J. (2005). The Indian Ocean tsunami: Reducing risk and vulnerability to future natural disasters and loss of ecosystems services. International Union for Conservation of Nature Information Paper, February 2005. Retrieved on 1 June 2012 from <http://data.iucn.org/dbtw-wpd/edocs/Rep-2005-006.pdf>.
- Burton, I., Kates, R. W., & White, G. F. (1993). *Environmental Hazards*. The Guildford Press, London.
- CDB & CARICOM Secretariat. (2004). *Integration of Natural Hazards into Environmental Impact Assessment (EIA): NHIA-EIA Sourcebook*. Bridgetown, Barbados: Caribbean Development Bank. Retrieved on 7 March 2012 from [http://www.caribank.org/Projects.nsf/NHIA/\\$File/NHIA-EIA_Newsletter.pdf](http://www.caribank.org/Projects.nsf/NHIA/$File/NHIA-EIA_Newsletter.pdf)
- Diwan, S. & Rosencranz, A. (2001). *Environmental Law and Policy in India*. Mumbai: Tripathi and Tripathi.
- Dynes, R. (2004). Expanding the Horizon of Disaster Research. *Natural Hazards Observer*, 28(4): 1-2.
- Gupta, A.K., Kumar, A., Misra, J., & Yunus, M. (2002 a). Environmental Impact Assessment and Disaster Management: Emerging Disciplines of Higher Education and Practice. In R. Srivastava and D. P. Singh (eds.), *Environmental Education*. New Delhi: Anmol Publication.

- Gupta, A.K., Kumar, A., Misra, J., & Yunus, M. (2002b). EIA & Disaster Management: Principles, Methodological Approach & Application. In Y C Tripathi & G Tripathi (eds.) *Bioresources & Environment*. Campus Books International, New Delhi.
- Gupta, A. K., Suresh, I. V. , Misra, J. ,& Yunus, M. (2002c). Environmental Risk Mapping Approach – risk minimizing tool in developing countries. *Journal of Cleaner Production*, 10: 271-281.
- Gupta, A. K., Misra, J. ,& Yunus, M. (1999). Environmental-health Assessment of Thermal Power Project within the Scope of EIA and Risk Analysis: Guide view . In Proceedings of National Seminar on Energy & Environment, Lucknow, July 1999, pp 86-95.
- Gupta, A. K., & Yunus, M. (2004). Indian and WSSD (Rio+10) Johannesburg: Issues of National Concern and International Strategies. *Current Science*, 87(1): 37-43.
- Gupta, A. K. (2010). Policies, Strategies and Options for Disaster Risk Reduction interventions in India. In A.K. Gupta, S. S. Nair, S. Chopde and P.K. Singh (eds) *Proceedings of International Workshop on Risk to Resilience: Strategic Tools for Disaster Risk Management*. NIDM New Delhi and ISET, Colorado, US (with Winrock International, DFID and US-NOAA).
- Gupta, A. K., & Nair, S. S. (eds.) (2011). Environmental Knowledge for Disaster Risk Management – Concept Note in Abstract Book of the International Conference 9-10 May 2011, New Delhi. National Institute of Disaster Management, New Delhi and GIZ Germany.
- Huppes, G., & Simonis, U.E. (2001). Environmental Policy Instruments in a New Era. Research Professorship Environmental Policy, FSII 01-404. Science Center Berlin Retrieved from <http://www.wz=berlin.de/uta>.
- ICNEC (2002). Economic and Political Development. Papers of the XIIIth International Congress, 7-10 April, 2002, Chiang Mai, Thailand, International Centre for the Study of Nature, Environment and Culture ICNEC Kathmandu, Vol I, pp. 409-446.
- IFRC (2011). Analysis of legislation related to disaster risk reduction in Nepal. International Federation of Red Cross and Red Crescent Societies, Geneva.
- Inter-American Development Bank (1999). Working paper on Reducing Vulnerability to Natural Hazards: Lessons Learned from Hurricane Mitch A Strategy Paper on Environmental Management. Stockholm, Sweden.
- Mahapatra, R. (2011). True measure of Growth: GDP grows at environmental cost – can this be reversed?. *Down to Earth* 20 (9): 66.

- Meyer, Z. (Jan 21, 2011). Homegrown Groceries get a Boost. Detroit Free Press
- MoEF (2006). *National Environmental Policy*. New Delhi : Government of India, Ministry of Environment & Forests.
- Murthy, A., & Patra, H.S. (2005). *Environment Impact Assessment Process in India and the Drawbacks*. Environment Conservation Team, Vasundhara, Bhubaneswar.
- NSET, UNDP, & ECHO(2008). NSDRM Draft 2008: Nepal National Planning Commission, 'Three Years Interim Plan (2007-2010)', Kathmandu: Nepal National Planning Commission, Government of Nepal. Retrieved on 12 March 2012 from www.npc.gov.np/en/plans-programs/detail.php?titleid=19,2008;
- Organization for Economic Co-operation and Development –OECD (2008). *Strategic Environmental Assessment and Ecosystem Services*. Endorsed by members of the DAC Network on Environment and Development Co-operation (ENVIRONET) at their 8th Meeting on 30 October 2008.
- Pelling & Holloway (2000). *Legislation for Mainstreaming Disaster Risk Reduction*. Middlesex, UK: Tearfund.
- Polack, E., Luna, E.M., & Dator-Bercilla, J. (2010). *Accountability for Disaster Risk Reduction: Lessons from the Philippines*, CDG Working Paper 2. Brighton: CDG. Retrieved on 17 March 2012 from www.climategovernance.org
- Ramsar Convention Secretariat (2007). Impact assessment: Guidelines for incorporating biodiversity-related issues into environmental impact assessment legislation and/or processes and in strategic environmental assessment. *Ramsar handbooks for the wise use of wetlands, 3rd Edn., 13*. Gland, Switzerland : Ramsar Convention Secretariat.
- Seth, B. L. (2011). Courts act to protect floodplains: Centre dithers on banning encroachment in River Zones. *Down to Earth*, 20(9):16 (Sept. 16, 2011).
- Shelton, D. & Kiss, A. (2005). *Judicial Handbook on Environmental Law*. Nairobi, Kenya: United Nations Environment Programme,
- Thakur, K. (2003). *Environmental Protection Law and Policy in India*. New Delhi: Deep & Deep Publications.
- UNEP & UN-ISDR(2010). *Environment and Disaster Risk: Emerging Perspective*. United Nations Environment Programme, Post-Conflict and Disaster Management Branch, Geneva, Switzerland. retrived from <http://postconflict.unep.ch>
- UNEP (2007). *A Guide to Afghanistan's 2007 Environment Law*. UNEP/GEF. Retrieved from <http://www.nepa.gov.af/>
- UNEP, UNISDR-PEDRR(2010). *Opportunities in Environmental Management for Disaster Risk Reduction: Recent Progress - A Practice Area Review*. Contribution

to the Global Assessment Report on Disaster Risk Reduction. Special circulation. Retrieved from <http://www.preventionweb.net/english/hyogo/gar/background-papers/documents/sChap5/thematic-progress-reviews/UNEP-Environmental-Management-for-DRR.pdf>

UNEP/OCHA (2005). Hurricanes Ivan and Jeanne in Haiti, Grenada and the Dominican Republic: A Rapid Environmental Impact Assessment. Geneva: Joint United Nations Environment Programme and /Office for the Coordination of Humanitarian Affairs.

UNEP/OCHA(2005). Indian Ocean Tsunami Disaster of December 2004: UNDAC Rapid Environmental Assessment in the Democratic Socialist Republic of Sri Lanka. Geneva:UNEP&UNOCHA.

UNEP (2007). Judges & Environmental Law: A Handbook for the Sri Lankan Judiciary 2009 United Nations Environment Programme (UNEP), Environmental Foundation Limited, Colombo 5, Sri Lanka UNHCR(2005).UNHCR Environmental Guidelines. Retrieved on 10 June 2012 from www.unhcr.org/protect/PROTECTION/3b03b2a04.pdf

UNHCR(2007). Working for People and the Environment. Retrieved from <http://www.unhcr.org/protect/3b94c47b4.html>

UN-ISDR (2005). *Hyogo Framework for Action 2005-2015; Building the Resilience of Nations and Communities to Disasters*. Hyogo: UN-ISDR.

Urban, F., Mitchell, T., & Villanueva, P.S. (2010). Greening disaster risk management: Issues at the interface of disaster risk management and low carbon development. *Strengthening Climate Resilience. Discussion Paper 3*. Brighton BN1 9RE UK: Institute of Development Studies

Vani,M.S. (2010). Customary Law and Modern Governance of Natural Resources in India – conflicts, prospects for accord and Strategies. In Rajendra Pradhan (ed). *Legal Pluralism and Unofficial Law in Social, Legal Pluralism and Unofficial Law in Social, Economic and Political Development, Economic and Political Development*, Papers of the XIIIth International Congress, 7-10 April, 2002, Chiang Mai, Thailand, ICNEC Kathmandu, Volume I, pp. 409-446. Retrieved on 10 June 2012 from <http://www.dcapindia.org/pdf/20.pdf>

Wilches, C,& Gustavo (1993). “*La vulnerabilidad global*” in *Los Desastres no son Naturales*, Andrew Maskrey (ed.) Bogotá: La Red/ITDG.

World Bank (1995). *Mainstreaming the Environment. The World Bank Group and the Environment since the Rio Earth Summit*. Washington, D.C.:The World Bank.

About NIDM

National Centre for Disaster Management (NCDM) set up under the Department of Agriculture and Cooperation, Ministry of Agriculture in March 1995. NCDM has been upgraded into full fledged National Institute of Disaster Management in October 2003. Under the Disaster Management Act, 2005, the Institute has been entrusted with the nodal national responsibility for human resource development, capacity building, training, research, documentation and policy advocacy in the field of disaster management. NIDM is steadily marching forward to fulfil its mission to make a disaster resilient India by developing and promoting a culture of prevention and preparedness at all levels. Both as a national Centre and then as the national Institute, NIDM has performed a crucial role in bringing disaster risk reduction to the forefront of the national agenda. It is our belief that disaster risk reduction is possible only through promotion of a “Culture of Prevention” involving all stakeholders. We work through strategic partnerships with various ministries and departments of the central, state and local governments, academic, research and technical organizations in India and abroad and other bi-lateral and multi-lateral international agencies.

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- Energy - Renewable Energy and Energy Efficiency
- Sustainable Urban and Industrial Development
- Natural Resource Management
- Private Sector Development
- Social Protection
- Financial Systems Development
- HIV/AIDS – Blood Safety

About EKDRM

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), GmbH, Germany (formerly GTZ and InWEnt) have entered in cooperation with National Institute of Disaster Management for a joint project ‘Environmental Knowledge for Disaster Risk Management’ (ekDRM, 2010-12) focuses on capacity building and knowledge management for disaster risk management. The specific components of project activities include the following:

- Environmental statistics and decision support systems
- Environmental and natural resource legislation for disaster risk
- Spatial /land-use planning for disaster risk management
- Natural Resource Management and Disaster Risk Management linkages (including integrating disaster risk management and climate-change adaptation, eco-system approach to DRR etc)
- Post-disaster environmental services and role of EIA in context of disaster management.

Cooperation aims at promoting research, case studies, documentation, effective training methodologies, including blended learning approach, tools and methodologies and outreach activities like workshops, conferences developing and maintaining web-enabled human resource platform.

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