

BACKGROUND PAPER

Prepared for the 2015 Global Assessment Report on Disaster Risk
Reduction

**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**

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Glossary of Terms¹

Adaptation: The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (UNFCCC).

Climate change: The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as change that can be attributed —directly or indirectly to human activity and that alters the composition of the global atmosphere, which is in addition to natural climate variability observed over comparable time periods|. However, scientists often use the term for any change in the climate, whether arising naturally or from human causes. Each of these perspectives is relevant. There is now strong evidence of increases in average global air and ocean temperatures, melting of snow and ice and rising average global sea levels. Climate change is expected to impact on vital sectors, namely water, food production and health, as well as contribute to extreme weather events.

Disaster risk: The potential significant losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period. Risk is often described as a result of the combination of: the exposure to a hazard, the conditions of vulnerability that are present, and insufficient capacity or measures to reduce or cope with the potential negative consequences.

Disaster risk management: The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Disaster risk reduction: The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Ecosystem: An ecosystem is a dynamic complex of micro-organism, plant, animal and human communities and their non-living environment interacting as a functional unit (Millennium Ecosystem Assessment, 2005).

Ecosystem services: Ecosystem services refer to the goods and benefits derived from ecosystem functions; these include —provisioning services| such as food, water, timber and fibre; —regulating services| that affect climate, floods, disease, wastes and water quality; —cultural services| that provide recreational, aesthetic, and spiritual benefits; and —supporting services| such as soil formation, photosynthesis and nutrient cycling (Millennium Ecosystem Assessment, 2005).

Environment: Environment refers to the physical and external conditions, including both natural and human-built elements, which surround and affect the life, development and survival of organisms or communities.

¹ <http://www.unisdr.org/we/inform/terminology#letter-v>

Exposure: People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses. Measures of exposure can include the number of people or types of assets found in hazard zones.

Hazard: A hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. There are different types of hazards: natural hazards, technological and biological hazards. Natural hazards are natural processes or phenomena, such as earthquakes, droughts and tropical cyclones, that may constitute a damaging event, but their occurrence and scale of impact are often influenced by human-induced activities as a result of inappropriate land use, poor building codes and environmental degradation.

Natural resources: Natural resources are actual or potential sources of wealth that occur in a natural state, such as timber, water, fertile land, wildlife and minerals. A natural resource qualifies as a renewable resource if it is replenished by natural processes at a rate comparable to its rate of consumption by humans or other users. A natural resource is considered non-renewable when it exists in a fixed amount, or when it can not be regenerated on a scale comparative to its consumption.

Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner that minimizes hazard impacts and contributes to reducing risk and vulnerability.

Vulnerability: The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. Vulnerability is the result of the whole range of economic, social, cultural, institutional, political and even psychological factors that shape people's lives and create the environment that they live in. In other words, defining vulnerability also means understanding the underlying factors or root causes of vulnerability. However, multiple definitions of vulnerability exist. Some sources regard vulnerability as a composite of exposure, sensitivities or susceptibilities, and coping capacities and resilience (Turner et. al, 2003).

1. Introduction

In the context of sustainable development, it is well established that environment, development and disasters are interconnected and have a synergistic relationship. Disasters can cause massive damage to the environmental assets and human development, while degraded environments, settlement patterns, livelihood choices as well as climate change - exacerbate disaster impacts (UNEP, 2009). The ISDR

The environment and disasters are inherently linked. Environmental degradation affects natural processes, alters humanity's resource base and increases vulnerability. It exacerbates the impact of natural hazards, lessens overall resilience and challenges traditional coping strategies.

Source: Living with Risk (ISDR 2004)

Global Assessment Reports on Disaster Risk Reduction in 2009 and 2011 (UNISDR, 2009b, 2011) also recognized environment as one of the main drivers of disaster risks.

Damage assessments from the 2008 Nargis Cyclone concluded that there was significantly more damage to human lives, environment and

livelihoods where ecosystems had been disturbed (Box 1).

It is also undisputed that ecosystems are affected by disasters as was seen in the case of the 2004 tsunami in Thailand, which caused immediate damage to 55 percent of the mangrove forests (EJF, 2006). The Post Disaster Needs Assessment report² for 2011 floods in Thailand estimated about 17 Million USD in losses from environment sector but the resources needed for building back better recovery and reconstruction within the environment sector is estimated at 273 USD million (Box 2). In other words, disasters not only reveal underlying social, economic, political and environmental problems but also contribute to worsening them and causing serious challenges to sustainable development (UNEP, 2009).

Box 1: Environmental Damage by Cyclone Nargis in Myanmar (UNEP, 2009)

Cyclone Nargis caused devastating damage to the environment of the Ayeyarwady and Yangon Divisions, an area where local livelihoods are heavily reliant on the natural resource base. Cyclone Nargis destroyed 38,000 hectares (ha) of natural and replanted mangroves, submerged over 63 percent of paddy fields and damaged 43 percent of freshwater ponds. The cyclone's impacts were exacerbated by earlier damage to the environment, including deforestation and degradation of mangroves, over-exploitation of natural resources such as fisheries, and soil erosion. The heavy loss of life as a result of the storm surge was primarily due to prior loss of about 75 percent of the original mangrove cover in the Delta, which could have served as a buffer against the storm surge.

² http://gfdrr.org/sites/gfdrr.org/files/Thai_Flood_Overview.pdf -14.03.14

Box 2: Losses to Environment Sector in 2011 floods in Thailand

Unsustainable changes in the landuse patterns in residential, forestry/agriculture, industrial and infrastructure development are seen as plausible cause for amplification of damages caused by the Thai Floods in 2011. It affected Thailand's natural assets, namely, biodiversity resources, forest resources and coastal ecology, as well as both private and public waste management facilities and their ability to cope with disaster waste. Furthermore, flooding around the industrial estate areas has been reported, with possible hazardous waste contamination. The estimated damage and losses total approximately THB 1.43 trillion (USD 46.5 billion) with a total of 551 million baht in environment damages and losses, 87 percent of which as damages to the industrial waste management sector.

The impact of flood significantly reduced the level of salinity in the upper Gulf of Thailand at and around the mouths of the Bang Pakong, Chao Praya, and Ta Chin rivers. As a result, the normal ecological services provided by mangrove forest and near shore ecological system are severely impacted as the level of fresh water pushed out sea water further away from shore. Immovable and small marine animal have perished. The waste run off and flooding also impacted the fisheries, livestock and agriculture sector to reach a total of 40,381 million Thai Baht.

The resources needed for building back better recovery and reconstruction within the environment sector is estimated at 8,184 million THB (US\$273 million). This includes resources needed to properly manage, treat, and dispose of disaster waste, afforestation of mangrove forest in the affected area as well as increasing capacity of water quality monitoring.

Aggravating these effects is climate change that impacts in the form of changing and increasing temperatures, sea level rise, rainfall patterns, reduced water availability, and increasing frequency, duration and intensity of severe weather events such as cyclones, monsoons, droughts and bushfires (IPCC, 2007).

The recent IPCC's Fifth Assessment Report (WG II AR5) reiterated with high confidence that changes in climate cause impacts on natural and human systems on all continents and across the oceans but the evidence of climate-change impacts is strongest and most comprehensive for natural systems and reveal significant vulnerability and exposure of some ecosystems to current climate variability (IPCC, 2014). Impacts of such climate-related extremes include alteration of ecosystems, disruption of food production and water supply, which is related to significant lack of preparedness for current climate variability by countries in pertinent sectors.

With the looming threats, it becomes imperative for a comprehensive approach to disaster risk reduction (DRR) acknowledging the role of the environment in triggering disasters while recognizing that the environment is itself vulnerable to disasters and post-disaster recovery as well as their strong interconnection to climate change and the livelihoods of the communities expected to be affected by these phenomena. This fact is highlighted in the 'Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation' (SREX) by the Intergovernmental Panel on Climate Change (IPCC), by underlining the importance of linking disasters, climate change and poverty (IPCC, 2012). If we look at the

internationally recognized frameworks such as the Hyogo Framework for Action (HFA)³, the Millennium Declaration⁴ and the UN Millennium Ecosystem Assessment⁵, although each has different points of departure, they all come to the similar conclusion that environmental degradation, poverty and disaster risk share common causes as well as common consequences for human security and well-being. A full agenda for sustainable development, therefore, must include policies and actions to integrate DRR into climate change adaptation (CCA) and other environmental policies.

There is also a broadening recognition that the environmental and ecosystem protections and sustainable natural resources management are integral objectives of sustainable development and the recent experiences of disasters effecting critical ecological processes have given impetus to and increased consensus to establish linkages in a greater way. Though earlier overlooked- it is slowly seeping in that protecting ecosystem services can both save lives and livelihoods - can prevent or mitigate hazards, reduce exposure, strengthen resilience to disasters, reduce vulnerability by supporting diversified livelihoods. Healthy and well-managed ecosystems- such as coral reefs, mangroves, forests and wetlands- reduce disaster risk by acting as natural buffers or protective barriers. At the same time, fully

Box 3: Rising Awareness of Importance of Ecosystem management

- HFA called for efforts to “encourage the sustainable use and management of ecosystems, including through better land-use planning and development activities to reduce risk and vulnerabilities.”
- The Millennium Ecosystem Assessment Summit in 2005, concluded that unsustainable development is limiting ecosystems capacity to regulate the climate, to provide protection with respect to hazards, and to sustain livelihoods
- The Global Assessment Reports (GAR) 2009 and 2011 reports on DRR identified ecosystem decline as one of the four major drivers of risks and called for greater protection and enhancement of ecosystem services.
- The negotiations under United Nations Framework Convention on Climate Change (UNFCCC) have also recognized that ecosystems are vital in adapting to climate change.
- The IPCC SREX report (IPCC, 2012), highlighting the important role of ecosystems for both DRR and CCA, also mentioned that investing in ecosystems is easy and invaluable as measures alongside early warning systems; sustainable land management, including land use planning; and ecosystem management and restoration.

functioning ecosystems build local resilience against disasters by sustaining livelihoods and providing important products to local populations. Ecosystem Management as an important subset of the wider environmental management is being seen as a tested solution in sustainable development and has been regarded

³ 168 member states of the United Nations adopted the Hyogo Framework for Action (HFA) in 2005, as a means for building the resilience of nations and communities to disasters with the objective of reducing disaster risk by 2015 (UNISDR, 2005)

⁴ <http://www.un.org/millennium/declaration/ares552e.pdf> (07.01.14)

⁵ See more at <http://www.maweb.org>

as an inherent “win-win” and “no-regret” solution to address rising disaster and climate change issues and increasingly being viewed as an effective approach for achieving both CCA and DRR (Renaud et.al, 2013).

Similarly, there is growing recognition of the importance to improve adaptation to future extreme events from climate change which can be addressed through the current knowledge and tools developed through DRR as there are many overlaps between CCA and DRR: both are concerned with managing disaster risk and addressing the underlying components that contribute to disaster risk and both focus on reducing people’s vulnerability to hazards and seek to build resilience to hazards in the context of sustainable development (Tearfund, 2008).

1.1 The role of environment in the HFA

Although the field of disaster risk management has evolved to recognize the need for addressing sustainable development issues for reducing risk, the environmental dimension was overlooked to a certain extent and not received adequate attention and practical guidance.

In the past decade, HFA has provided a framework for efforts to increase understanding, knowledge and develop approaches and priorities for reducing disaster risk and building resilience. It has also established linkages with a number of international declarations, frameworks and agreements, which indicate both recognition of the links between DRR, poverty reduction, environment and climate change, and a growing political commitment to address these issues (UNISDR, 2011). Environment is primarily recognised and outlined within the Hyogo Framework for Action under priority 4: “Reduce the Underlying Risk Factors”, wherein environmental degradation is recognized as a major driver of disaster risk. HFA Priority 4 also makes explicit reference to healthy ecosystems and environmental management as key actions in DRR.

Reducing the risk of disasters depends primarily on reducing vulnerabilities. However, Priority 4 of the HFA, concerned with ‘reducing the underlying risk factors’, is the area that has seen least progress (UNISDR, 2011, UNISDR 2013). This has raised questions about the scale and rate of implementation of HFA priority area 4 and there have been calls to tackle the risk drivers including environmental and land degradation along with poverty, hunger, poor water and sanitation and other factors.

The participants in the Global Platform on DRR, 2013 stressed the need to particularly look into social, economic and environmental issues in conjunction with solutions provided by DRR⁶. The importance of environment and ecosystem management was reiterated by the chair of the Global Platform for DRR, both in 2011 and 2013⁷ by stating that established mechanisms for environmental protection such as Environmental Impact and Strategic Environmental Assessments, systems for protected areas management and integrated water resource and coastal zone management used in addressing environmental degradation should also be utilized in strengthening livelihoods and address disaster risk.

⁶ http://www.preventionweb.net/files/33306_finalchairsummaryoffourthsessionof.pdf -07.01.14

⁷ http://www.preventionweb.net/files/33306_finalchairsummaryoffourthsessionof.pdf -10.01.14

It is with this broad background that this paper was developed, to have an overview of how environmental policies, frameworks and processes, have integrated DRR into their frameworks since the implementation of HFA. The importance and growing acknowledgement for nature based solutions for DRR and adaptation will be analysed as well as the role of important stakeholders, private sector and media, in establishing linkages between DRR and environmental agendas will be explored.

There is clear international momentum on DRR, which could be observed in major policy discussions and planning around climate change adaptation and the post-2015 Sustainable Development Goals. DRR is also now being included as key priority in private investment strategies. There is clear recognition that DRR provides critical solutions for confronting social, economic and environmental issues, which is being increasingly reflected in print and social media. Although lots of barriers and challenges need to be addressed for enhanced integration of DRR and environment sectors for the post 2015 framework on DRR, the past decade has at least provided a stepping stone in the right direction.

2. Methodology and Scope of the paper

2.1 Methodology

This paper was synthesized, based on input papers received under RA6, CI 1 for GAR 15, literature survey, analysis of decisions and outcomes of related key international agreements as well as reports and policy documents of the UN and other International Organizations. Interviews and consultations with specialists, both in DRR and environmental fields also provided valuable insights.

2.2 Scope of the Paper

The 2013 HFA country reports gave insight into progress that has been made in integrating DRR with the overall legislation of environment-related policies and plans, often bringing together issues ranging from natural resources, the environment, wildlife preservation and climate change adaptation. The subthemes proposed by UNEP elaborated on progress made under the above issues as well as the role of important stakeholders such as the Private Sector and Social Media.

The background paper will consolidate the findings from the input papers, literature survey, consultations and interviews with experts. The analyses will be presented as key result areas based on the 6 important sub themes that were proposed for the Research Area 6, Core Indicator 1.

1. Is DRR getting adequate or increased attention in the global/regional policies and outcome documents relating to environmental management?
2. Are there good examples of DRR being hardwired into environmental policies and plans, including for land use, natural resources management and environmental assessments?
3. Is there off take in the private sector for bringing in DRR into their environmental or natural resources management approach?
4. Is there more scientific evidence base being generated on the effectiveness of an ecosystem based approach to disaster management?
5. Is there increasing effort to link between climate change and disaster risk reduction at a systemic level at international, regional and national levels?

6. Is there increasing realization in online and social media on the potential linkages between disaster risk reduction and better management of environmental resources?

Along with conclusions, the paper will also propose recommendations and strategies, to facilitate better integration of DRR into environmental themes, for post 2015 framework of HFA in its final section.

It is imperative to highlight that although the paper draws from various sources, it should not be considered an exhaustive study since the review is restricted to English language literature. Also the findings and analysis are based, reports and literature available, most of which are published documents, although some 'gray' or unpublished material, such as Input Papers for RA 6, GAR 15 are also used. It also utilizes articles from scientific or academic journals, although a comprehensive scientific review was beyond the scope of the study. The study provides an overview of evolving field of work in Ecosystem-Based Disaster Risk Reduction, Role of Private Sector, Print and Social media, Integration of DRR into environmental plans and policies, but should be regarded as a work-in-progress, as concepts, ideas and applications continue to be developed and tested.

3. Key Result Areas

3.1 Key Result 1

Is DRR getting adequate or increased attention in the global, regional and national policies and outcome documents relating to environmental management?

Environmental management policies can have a major impact on DRR and should explicitly incorporate DRR goals and strategies, thereby helping reduce underlying risk factors as well as promoting environmental solutions for DRR and resilience-building.

Since the implementation of HFA in 2005, global, regional, national and local efforts for disaster risk reduction and reinforcing resilience are increasing. DRR has increasingly been reflected in the various environmental policies and processes, in compliance with the HFA's key priority 4 on reducing the underlying risk factors, where environmental conditions and natural resources management are identified as primary aspects. Also important are relevant DRR policies, which have integrated a strong environmental component.

According to the HFA national progress reports the average score for Priority 4 showed only a marginal increase in comparison to both previous cycles. Progress has been limited with respect to reducing the underlying risk factors. Approximately one third of reporting countries assess their progress as "3", indicating institutional commitment attained, but achievements neither comprehensive nor substantial; a similar percentage assign level "4". It is in this Priority that the highest number of countries report minor progress. But under the core indicator 1 of Priority 4 "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” the countries report a slight progress from 3.2 in 2007-2009 to 3.4 in 2011-2013.

The following section examines prominent policies in the past decade, which have spearheaded integration of DRR and environmental agendas. The boxes highlight mainstreaming of international policies at national level in some cases. More details are given under the section on integration at national level.

3.1.1 Integration of DRR in Environmental Initiatives and Policies at International level

Under this section, the important international environmental policies and processes in the past decade that have incorporated and integrated elements of DRR are summed up below.

Rio+20 and other Rio Conventions

- At **Rio+20**, Heads of States and Governments and high-level representatives from more than 190 countries adopted '**The future we want**'⁸, the outcome document of the conference where DRR was identified as one of the new and emerging challenges along with emphasis "*to accelerate implementation*" of the HFA and building the resilience of nations and communities to disasters. The international community agreed that DRR must be integral to sustainable development and climate change strategies accepting that disaster risk is largely a result of underlying vulnerabilities linked to developmental challenges, namely poverty, environmental degradation and poor governance. It called out all the relevant stakeholders to undertake their responsibilities in implementation and building resilience.
 - At **Rio+20**, Heads of States and Governments and high-level representatives from more than 190 countries adopted '**The future we want**'⁹, the outcome document of the conference where DRR was identified as one of the new and emerging challenges along with emphasis "*to accelerate implementation*" of the HFA and building the resilience of nations and communities to disasters. The international community agreed that DRR must be integral to sustainable development and climate change strategies accepting that disaster risk is largely a result of underlying vulnerabilities linked to developmental challenges, namely poverty, environmental degradation and poor governance. It called out all the relevant stakeholders to undertake their responsibilities in implementation and building resilience.
- Most notable declarations relating to DRR under the 'Future we want' interlink environmental priorities with DRR¹⁰ as can be seen in the table below.

Table 1: Outcomes of Rio+20

Priority Areas	Actions
Food security and	§111 reaffirms the necessity to promote, enhance and support more

⁸ <http://daccess-dds ny.un.org/doc/UNDOC/GEN/N11/476/10/PDF/N1147610.pdf> (11.01.14)

⁹ <http://daccess-dds ny.un.org/doc/UNDOC/GEN/N11/476/10/PDF/N1147610.pdf> (11.01.14)

¹⁰ <http://www.unisdr.org/archive/27335> (11.01.14)

nutrition and sustainable agriculture		sustainable agriculture, while conserving land, water, plant and animal genetic resources, biodiversity and ecosystems and enhancing resilience to climate change and natural disasters.
Sustainable cities and human settlements	§135	underlines the importance of considering disaster risk reduction, resilience and climate risks in urban planning.
Oceans and seas	§165	calls on the international community to enhance its efforts to address the challenges posed by sea-level rise and coastal erosion.
Small Island Developing States	§178	recognizes the exposure to global environmental challenges and external economic shocks, including impacts from climate change, potentially more frequent and intense natural disasters, proposed significant risk sea-level rise and other adverse impacts of climate change.
Disaster risk reduction	§186	reaffirms the commitment to HFA and calls for States, the UN, the international financial institutions, subregional, regional and international organizations and civil society to accelerate implementation of the Framework and the achievement of its goals.
	§187	recognizes the importance of early warning systems and encourages their integration into national DRR strategies, plans and budgets; and encourages international cooperation in support of DRR in developing countries through technology transfer, capacity building, risk assessment, information sharing, including geospatial information.
	§188	calls for more coordinated and comprehensive strategies integrating DRR and CCA considerations.
	§189	calls for all relevant stakeholders to take appropriate and effective measures to reduce exposure to risk for the protection of people, infrastructure and other national assets, from the impact of disasters in line with the HFA.
Climate change	§191	recognizes the importance of mobilizing funding from a variety of sources to support nationally appropriate mitigation actions, adaptation measures, technology development, transfer and capacity-building in developing countries.
Desertification, land degradation and drought	§207	notes the importance of mitigating the effects of desertification, land degradation and drought, including by preserving and developing oases, restoring degraded lands, improving soil quality and improving water management, in order to contribute to sustainable development and poverty eradication.
	§209	reiterates the need for cooperation through the sharing of climate and weather information and forecasting and early warning systems related to desertification, land degradation and drought, as well as to dust storms and sandstorms, at the global, regional and subregional levels
Mountains	§210	recognizes the vulnerability of fragile mountain ecosystems to the adverse impacts of climate change, deforestation and forest degradation, land use change, land degradation and natural disasters; and mountain glaciers around the world are retreating and getting thinner, with increasing impacts on the environment and human well-being
Capacity-building	§208	invites all UN and other relevant agencies to support developing countries in enhancing knowledge and capacity to integrate disaster risk reduction and resilience into development plans.

The Rio+20 launched a process towards Sustainable Development Goals (SDGs), which will build upon the Millennium Development Goals (MDGs), and will converge with the post-2015 framework of the MDGs. The 2010 summit on MDGs explicitly recognized that DRR and increasing resilience to all types of natural hazards in developing countries, in line with HFA priorities, can have multiplier effects and accelerate achievement of the MDGs.

- **Under CBD, the Strategic Plan for Biodiversity 2011-2020¹¹** was endorsed to foresee that actions are taken to halt the loss of biodiversity and to ensure that ecosystems are resilient and are contributing to human well-being and poverty eradication. The Strategic Plan 2011-2020 seeks to “*halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication*”. The new plan consists of five strategic goals including 20 Aichi Biodiversity Targets, mostly for 2020 which are particularly relevant with regard to building resilience of ecosystems as a preventive measure against slow onset events and their impacts¹²; target 5, 7, 10, 14 and 15 have entrenched DRR strategies into their plans.

Table 2: Aichi Biodiversity Targets

Theme	Target	Plan
Forest degradation	5	By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
	7	By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
Ocean acidification	10	By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning
Ecosystem resilience, ecosystem restoration, climate change mitigation and adaptation and desertification	14	By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.
	15	By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification. The decisions adopted are: <ul style="list-style-type: none"> • X/33 provides guidance on ecosystem-based approaches for adaptation, mitigation and reducing biodiversity impacts of climate change mitigation and adaptation measures. • X/28, addresses the role of biodiversity and ecosystems in reducing the vulnerability to the impact of some natural disasters. • X/35 on the biodiversity of dry and sub-humid lands addresses the impact of drought and desertification on biodiversity and the role of biodiversity and actions to combat desertification

¹¹ It states “by 2050 biodiversity is valued, conserved, restored and wisely used so as to maintain ecosystem services and sustaining a healthy planet that can deliver essential benefits for all people.” Its importance has been reaffirmed in the Rio+20 outcomes.

¹² <http://www.cbd.int/doc/decisions/cop-11/booklets/cop-11-decisions-booklet-en.pdf> (15.01.14)

- UN Convention to Combat Desertification (UNCCD) has incorporated in one of the main goals under its **10-Year Strategy (2008-2018)**¹³ *"to forge a global partnership reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability"*. Another of its main objectives is to **improve the condition of affected ecosystems and reduce** the vulnerability of affected ecosystems to climate change, climate variability and drought (UNCCD, 2007). Strategic objectives and expected impacts relevant to disaster risk reduction and climate change include the following:
 - Objective 1: *"To improve the living conditions of affected populations"*
Expected impacts: *People living in areas affected by desertification/land degradation and drought to have an improved and more diversified livelihood base and to benefit from income generated from sustainable land management; and affected populations' socio-economic and environmental vulnerability to climate change, climate variability and drought is reduced.*
 - Objective 3: *"To generate global benefits through effective implementation of the UNCCD"*.
Expected impacts: *Sustainable land management and combating desertification/land degradation contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change.*
- **UN Framework Convention on Climate Change**, has been in the forefront to develop linkages with DRR agenda, as the attention to climate risk management has grown exponentially through:
 - **Nairobi Work Programme**; one of the first to look into DRR agenda, formulated in 2006, to help countries improve their understanding of climate change impacts and vulnerability and to increase their ability to make informed decisions on how to adapt successfully (UNFCCC, 2007).
 - **Bali Action Plan**, adopted in 2007, prominently featured DRR, highlighting it as a critical tool for CCA agenda.
 - **The Cancun Agreements of 2010**, gave further incentive to integration of DRR strategies, by creating a new **Climate Adaptation Framework** and an associated **Adaptation Committee**. The framework highlighted both ecological and socio-economic resilience and called for further enhancement of climate change related disaster risk reduction strategies, taking into consideration the HFA where appropriate (UNFCCC, 2010).
 - **Warsaw International Mechanism for Loss and Damage**¹⁴, one of the key outcomes and milestones of the COP 19 in Warsaw, 2013 (UNFCCC, 2013), to enhance knowledge and understanding of comprehensive risk management approaches to address loss and damage associated with the adverse effects of climate change.

Ramsar Convention on Wetlands

¹³ <http://www.unccd.int/Lists/SiteDocumentLibrary/10YearStrategy/Strategy-leaflet-eng.pdf>
(15.01.14)

¹⁴ https://unfccc.int/files/meetings/warsaw_nov_2013/decisions/application/pdf/cop19_lossanddamage.pdf (17.01.14)

In 2005 the **Ramsar Convention on Wetlands** adopted a resolution emphasizing its role in the "*prevention and mitigation of impacts associated with natural phenomena, including those induced or exacerbated by human activities*".¹⁵ It recognized the importance of HFA and emphasized that conservation of natural wetland ecosystems such as mangroves, contributes to natural flood and tidal surge mitigation, and that protection and rehabilitation of peatlands and other catchment or floodplain wetlands contribute to natural flood prevention. In 2008 a resolution on **Climate change and wetlands**¹⁶ was adopted by Ramsar Convention, which emphasized on managing wetlands wisely to increase their resilience to and reduce the impacts of climate change.

World Conservation Congress

The World Conservation Congress organized by IUCN in Jeju, Korea, 2012, Congress declared resolutions for deploying **nature-based solutions to DRR**, climate change, food security, and economic and social development. The resolution 58 on Ecosystem management for DRR recognized HFA, particularly Priority Action 4 on *Reducing Underlying Risk Factors* as a guide for developing stronger environmentally related policies and practices for nature-based DRR and called IUCN's State Members to develop and establish cross-sectoral policies among relevant sectors such as environment management, DRR and climate change to provide a facilitating framework to develop nature-based solutions for reducing community vulnerabilities and to achieve adaptation, mitigation and conservation goals, while reducing dependence on carbon resources. It also called for establishing innovative nature-based solutions in complementing engineered infrastructure with natural infrastructure for disaster risk reduction, as well as having post-disaster "green recovery" strategies in place. It recommended that cross-sectoral partnerships should be developed, through involvement with the Partnership for Environment and Disaster Risk Reduction (PEDRR) for integrating ecosystem- and nature-based disaster risk reduction into preventative and reactive responses to disasters

It also urged IUCN Member States to adopt a post "Hyogo Framework" that recognizes and capitalizes upon the role of ecosystem services for disaster risk reduction.

Asia Parks Congress

The IUCN organized Asia Parks Congress, 2013, adopted the **Sendai Charter for Asia's Protected Areas**, which highlights that ecosystem based DRR and protected areas enhance local resilience in areas at high risk for disasters and encourages proactive approaches that contribute to disaster prevention and mitigation through utilization of ecosystem services (IUCN, 2013).

The next **IUCN World Parks Congress in, Sydney, 2014**, under the theme 'Parks, People, Planet – Inspiring Solutions,' will build on the Asia Parks Congress to highlight the role that protected areas play in conserving nature along with taking action on some of Asia and the world's most pressing challenges including disaster risk reduction and recovery, human health, sustainable economic development and

¹⁵ http://www.ramsar.org/cda/en/ramsar-documents-resol-resolution-ix-9-the/main/ramsar/1-31-107^23509_4000_0 (08.02.14)

¹⁶ http://www.ramsar.org/pdf/res/key_res_x_24_e.pdf (08.02.14)

climate change.

Integration of DRR into policies related to technological disasters / environmental emergencies

Environmental emergencies are caused by sudden onset of natural disasters or from technological and human induced factors, or sometimes a combination of these three (UNEP, 2002). They cause severe environmental damage along with loss of human lives, properties and livelihoods. Some important policies relating to environmental emergencies in the last decade are:

- **International Cooperation on Humanitarian Assistance in the Field of Natural Disasters** *"Recognizes the importance of applying a multi-hazard approach to preparedness, and encourages Member States, taking into account their specific circumstances, and the United Nations system to continue to apply the approach to their preparedness activities, including by giving due regard to, inter alia, secondary environmental hazards stemming from industrial and technological accidents"* (UN General Assembly Resolution A/66/227, December 2011).
- **UNEP Governing Council Decision 26/15** recognises that the extent to which the current limitations of international emergency response systems could unintentionally amplify the environmental impacts of natural and man-made disasters. It also emphasizes that the governments should establish, where possible, adequate structures, procedures and capacities for responding to environmental risks, but preventive action and preparedness should always be prioritized as a strategy for reducing the impact of natural and man-made disasters. It argues for more technological support, capacity development and resources for prevention, preparedness and response for developing countries. There is a need to improve the linkages and coordination between emergency response, early recovery and development actors from the onset of emergency response as well as involve local and regional actors in prevention, preparedness and response to the environmental aspects of natural and man-made disasters ([UNEP/GC.26/19, February 2011](#)).
- **Strategic Approach to International Chemicals Management (SAICM) Global Plan of Action** adopted by the International Conference on Chemicals Management (ICCM) in Dubai, 2006, calls for the development of collaborative practically-oriented tools for chemical accident prevention. SAICM is a policy framework to foster the sound management of chemicals and supports the achievement of the goal agreed at the 2002 Johannesburg World Summit on Sustainable Development of ensuring that, by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health.

UN and Financial Institutions' Role in linking DRR and Environment Agenda

The UN and the programmes under its edifice have also contributed in integration of DRR in environment policies at international, regional and national levels. UN's Policy

committee under its decision 2007/19¹⁷ has mainstreamed DRR and the HFA through all areas of UN programming since 2007, and has developed the UN Plan of Action on DRR for Resilience, initiated in May 2013. As reflected in the Food and Agriculture Organizations's (FAO) Disaster Risk Reduction for Food and Nutrition Security Framework Programme¹⁸, under FAO's Natural Resource Management and Environment Department, International Organization for Migration's (IOM) Policy Perspective Paper, World Food Programme (WFP) Policy on Disaster Risk Reduction and Management and UNDP's Biodiversity and Ecosystems Global Framework (2012-2020), sustainable livelihoods are linked to ecosystem management, sustainable natural resource management and considered as effective means to reduce community vulnerabilities and to build their resilience to natural and environmental hazards and extreme weather events.

As the UN's designated authority to coordinate environmental policies at global and regional level, UNEP, through its programmes such as Ecosystem-based Disaster Risk Reduction (Eco-DRR), Partnership for Environment and Disaster Risk Reduction (PEDRR)¹⁹ and Ecosystem-based Adaptation (EbA), promotes approaches to address disaster risks by way of ecosystem management. In collaboration with UNOCHA, UNEP works on environmental emergencies and as part of the International Recovery Platform, it serves as a catalyst for the development of tools, resources and capacity for resilient recovery. The UNEP Finance Initiative, at the same time, has established the Principles for Sustainable Insurance to promote sustainable investments that yield risk reduction or resilience outcomes.

The following table depicts the strategies by financial institutions focusing on linking DRR into their environmental practices and plans.

Table 3: Financial Institutions – Policies regarding DRR and Environment

Institution	Policies	Objectives
Caribbean Development Bank (CDB)	Guidelines for integration of natural hazard impact assessment (NHIA) EIA procedures	To integrate natural hazard concerns, including potential climate change impacts, into EIAs that are practicable at country level.
International Fund for Agricultural Development (IFAD)	Environment and Natural Resource Management Policy (ENRM)	To enable poor rural people to escape from and remain out of poverty through more-productive and resilient livelihoods and ecosystems.
The World Bank	World Environment Bank's Strategy (2012-2022)	To reduce vulnerability to natural hazards by helping to prevent and mitigate the impacts of natural disasters by climate change adaptation solutions that add value to inclusive green growth To improve climate resilience in infrastructure and to reduce vulnerability through restoration of protective coastal ecosystems such as mangroves

¹⁷ <http://www.undg.org/docs/10328/PC-Decision-DRR-10-Apr-07.pdf>

¹⁸ FAO DRR policy is available at <http://www.fao.org/docrep/018/i3343e/i3343e.pdf>

¹⁹ PEDRR is a global partnership comprised of UN agencies, international and regional NGOs as well as specialist institutes and provides technical and science-based expertise and applies best practices in ecosystems-based DRR approaches. See more at <http://www.pedrr.net>

3.1.2 Integration of DRR in Environment Initiatives and Policies at Regional level

Risks and vulnerabilities go beyond national boundaries and hence often need to be addressed as regional issues. Handling the repercussions of disasters is also often beyond the capacity of a single country. Regional platforms give an opportunity to present regional perspectives, plans and policies for disaster prevention and preparedness, provide leadership and direction, and propose solutions to address disaster risk and to build the resilience of communities and nations.

The regional policies and initiatives taken by various regional and sub-regional programmes and partnerships that highlighted environment and DRR linkages in the past decade are summarized here. There are also regional networks developed during last decade that have contributed in getting the environment and disaster management communities together. The policies, programmed and initiatives focusing on climate change will be included under Key Result 5 (KR 3.5).

Africa

In Africa, while several disaster risk reduction initiatives and efforts have been undertaken, more needs to be done to strengthen them. Challenges remain in building the capacity required and increasing investment to deliver concrete results and also leveraging disaster risk reduction as a cost-effective adaptation measure for climate change.

- One of the most prominent policies on DRR in Africa is the **Africa Regional Strategy (2006-2015) and the Extended Programme of Action for the Implementation of the Africa Regional Strategy for Disaster Risk Reduction (2006-2015)** adopted in April 2010 calls for increased integration of disaster risk reduction concerns in priority sectors including the environment²⁰.
- **The New Partnership for Africa's Development (NEPAD)**²¹, an African Union strategic framework for pan-African socio-economic development, through its Climate Change and Natural Resource Management programme plays a co-ordinating and advocacy role to promote regional and national programmes aimed at counteracting the environmental threats. Its Environment Initiative includes sub-themes concerning desertification, wetland conservation, coastal management, and global warming, amongst others and it complements other African processes, including the programme of the revitalized African Ministers Conference on Environment (AMCEN), to improve environmental conditions in Africa and contribute to economic growth and poverty eradication. **NEPAD's water programme** was developed to address the many challenges including threats posed by drought, floods and climate change.
- In 2007, African Heads of State and Government endorsed the **Great Green Wall for the Sahara and the Sahel Initiative (GGWSSI)**²² to tackle the detrimental social, economic and environmental impacts of land degradation and

²⁰ http://www.preventionweb.net/files/4039_africaprogrammeofaction1.pdf 10.03.14

²¹ See more at <http://www.nepad.org>

²² <http://www.terrafrica.org/great-green-wall/> -10.03.14

desertification, ensure ecosystem restoration and development of arid and semi-arid zones.²³ A harmonized strategy for the Great Green Wall was adopted in September 2012 by the AMCEN.

- **Abidjan Convention** covers the marine environment, coastal zones and related inland waters falling within the jurisdiction of the States of the West and Central African Region. On June 22, 2012, the Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from **Land-Based Sources and the Activities (LBSA)** in the Western, Central and Southern Africa Region was signed and officially adopted by the member countries.
- **The Economic Community of West African States (ECOWAS)** ²⁴ **Environmental Policy of 2008** strives to reverse environmental degradation and depletion of natural resources, ameliorate the quality of the living environment, conserve biological diversity, with a view to ensuring a healthy and productive environment; thereby improving the well-being of the ecosystem and the population of the sub region. **Convergence Plan for Sustainable Management and Utilization of Forest Ecosystem in West Africa** focuses on sustainable management and use of forest ecosystems for resilience and adaptation to climate changes effects.²⁵ **Inter-Governmental Authority for Development (IGAD) Drought Disaster Resilience and Sustainability Initiative (IDDRSI)** Strategy, 2011, made a commitment to end drought emergencies from the IGAD region.
- **East African Community (EAC)** works in sectors where DRR plays a key role: environment and natural resources, peace and security, conflict, and economic development. EAC has established **Disaster Risk Reduction Working Group** as one of the Working Groups under the Environment and Natural Resources Sector (UNISDR, 2013). **The Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region** was amended and adopted in April 2010.

Americas

The Regional Platform in America recognized that inspite of the success stories, there is need to strengthen mechanisms allowing for a joint and permanent review of DRR and CCA strategies, plans, programmes and actions through participatory approach of all stakeholders. The important policies, programmes and initiatives in the last decade are highlighted below:

- The **Central American Policy on Integrated Risk Management (PCGIR)**²⁶ approved in June 2010, included integrating DRR in investments for sustainable development, environment and climate change as main objectives.
- **The Coordination Center for the Prevention of Natural Disasters in Central America (CEPRENAC)**²⁷ created the **Fund for the Promotion of Integrated Disaster Risk Management (FOCEGIR)** focusing on investments in risk reduction to ensure sustainable economic development,

²³ <http://www.fao.org/docrep/016/ap603e/ap603e.pdf> -10.03.14

²⁴ <http://www.ecowas.int> -7.03.14

²⁵ http://www.comm.ecowas.int/dept/d/d2/en/d_d2_activities.pdf -7.03.14

²⁶ http://www.info-gir.org/documentos/pcgir_en/files/assets/basic-html/page15.html-7.03.14

²⁷ <http://www.cepredenac.org/> -7.03.14

including construction in safe locations without endangering ecosystems or the ability to meet the needs of future generations and studies on the effects of climate change.

- **Andean Strategy for Disaster Prevention and Response (EAPAD)** is a set of policies and guidelines aiming at risk reduction and appropriate relief to disasters in the Andean Sub-region. One of the main objectives of EAPAD is that risk reduction and disaster relief in environmental and natural resource management must be directed towards environmental conservation and sustainable use of biological diversity through integrated management of natural environments.
- **CIDI- Declaration of Santo Domingo for the sustainable development of the Americas**, 2010, considers the links between vulnerability, poverty, inequity, environmental degradation, and disasters, as well as the need to incorporate comprehensive disaster risk management into the public agenda of the states (UNISDR, 2011).
- **Cartagena Declaration, joint declaration of the XII Tuxtla Summit, in Colombia** 2010, emphasized the importance of the HFA and aimed to raise awareness, mobilise action and build global, regional, national and local, existing practices to reduce loss of life, social and environmental needs of communities following a disaster, including climate change adaptation (UNISDR 2011).
- **The Forum of Ministers of the Environment of Latin America and the Caribbean**²⁸ constitutes the main body for regional inter-governmental political consensus building on environmental Initiative for Sustainable Development (ILAC), which establishes a common regional agenda geared towards achieving sustainable development and its main implementation tool is the Regional Action Plan (RAP). Vulnerability, human settlements and land use and climate change are some of its lead priorities.
- **The Strategy and Program Framework for the Caribbean Region** (CARICOM/CDEMA-CDM)²⁹ incorporates Comprehensive Disaster Management (CDM) in the development processes of CDEMA member countries.
- The Caribbean Development Bank, the OAS and CIDA have developed **guidelines to integrate natural hazard and climate change impact assessment in the EIAs and project preparation** in the Caribbean and appraisal process of the Bank and participating countries³⁰.
- **St. George's Declaration of Principles for Environmental Sustainability in the OECS (SGD)**, were revised in 2006 and envisioned that "Institutions at the community, national and regional levels are prepared and equipped to reduce the risks from and manage the impacts of natural phenomena on the environment and to prevent man-made disasters".

Arab Region

The League of Arab States, through the Council of Arab Ministers Responsible for the Environment (CAMRE), has taken concrete steps toward increasing awareness and commitment to disaster risk reduction and the integration of disaster risk reduction measures in regional policies on sustainable development, climate change adaptation, environment and disaster management coordination mechanisms.

²⁸ <http://www.pnuma.org/forodeministros/18-ecuador/html/documents.htm>

²⁹ <http://www.cdema.org/CDMStrategyandProgrammeFramework2007-2012.pdf>

³⁰ <http://www.caribank.org/uploads/2012/03/Source-Book5.pdf>

- The Council of Arab Ministers Responsible for the Environment adopted an **Arab Strategy for Disaster Risk Reduction 2020 (AS- DRR)** in December 2010. The expected outcome of the ASDRR is the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries across the Arab region (UNISDR, 2013).
- **Arab Network for Environment and Development (RAED)** and UNISDR formed a partnership which was formalized through a MoU, signed 14 August 2008 to implement joint activities at regional and national levels (UNISDR, 2008).
- **The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA)** was involved in adoption of protocols concerning protection from land-based activities and conservation of marine biodiversity- establishment of a regional network of protected areas, in 2005.
- **Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)** integrates early warning and drought risk management in its work programme.
- **Arab Academy for Science, Technology and Maritime Transport, the Arab Organization for Agricultural Development, the Arab League Educational, Cultural and Scientific Organization (ALECSO)**, as well as the UN Economic and Social Commission for West Asia (ESCWA) have initiated DRR projects, applied research and capacity development programmes focusing on early warning, drought and desertification, knowledge management, and risk assessment for climate change impacts (UNISDR, 2013).
- **Aqaba Declaration for DRR in Arab Cities**³¹ came out of the Arab Conference on Disaster Risk Reduction in 2013 in which they outlined targeted actions to reduce disaster losses and protect development in Arab cities by 2017. It called for sustainable development principles to be closely linked to urban development planning across all sectors, including infrastructure, environment, energy and socio-economic development, in order to increase resilience to disaster.

Asia Pacific Region

Slight progress was observed in Asia- Pacific region in the average self-assessment score for Priority for Action 4 This is a positive development, particularly since Priority for Action 4 'Reduce the Underlying Risk Factors' is commonly recognised as the most challenging priority to address. Despite an increase in the number of specialised DRR/DRM policies, legislation and institutions, many countries are highlighting that implementation is lagging behind. Many reporting countries cite capacity as one of the main challenges impeding the implementation of HFA.

- **Association of Southeast Nations (ASEAN)**
 - ASEAN Socio-Cultural Community (ASCC Blueprint)³² 2009-2015 proclaimed under its objective on ensuring environmental sustainability will work towards protecting and promoting the sustainable use of coastal and marine resources, protecting the natural resource base and will actively participate in global efforts towards addressing global environmental challenges, including climate change.
 - The ASEAN Agreement on Transboundary Haze Pollution aims to prevent and monitor transboundary haze pollution as a result of land and/or forest fires

³¹ <http://www.unisdr.org/we/inform/publications/32077> -10.03.14

³² <http://www.asean.org/archive/5187-19.pdf> -10.03.14

which should be mitigated, through concerted national efforts and international cooperation (DEWGA, 2008).

- **South Asian Association for Regional Cooperation (SAARC)**

- **The Male Declaration was adopted at the special session of the SAARC Environment Ministers in June 2005**, which reiterated the need to formulate a Comprehensive Framework on Early Warning, Disaster Management and Disaster Prevention followed by the establishment of SAARC Disaster Management Centre in 2005 and adoption of the *SAARC Framework for Regional Cooperation in Disaster Management* in 2006³³.
- **The Dhaka Declaration and SAARC Action Plan on Climate Change (July 2008); and the Comprehensive Framework on Disaster Management (2006-2015)** are some of the most significant initiatives taken to strengthen regional cooperation in the areas of environment, climate change and natural disasters.
- SAARC Disaster Management Center has developed a number of **Road Maps** which link DRR strategies several environmental issues such as road map for CBDRM, Coastal and Marine mitigation Plan, Integration of DRR and CCA in South Asia, Mainstreaming DRR in Development, Landslide, Urban and Drought Risk Management in South Asia³⁴.
- The SDMC works with the specialised institutions of SAARC countries and beyond, and in 2012, developed the **Digital Vulnerability Atlas (DVA)** – which integrates layers of data on hazards, vulnerabilities and risks on a WebGIS platform. (UNISDR, 2013).

The South Asia Co-Operative Environment Programme (SACEP) adopted a resolution- '**South Asia's Biodiversity Beyond 2010**' emphasized the role played by healthy ecosystems moderating the effects of climate change and urged members to implement decisions of the Conference of the Parties to CBD.³⁵

- **Mekong River Commission (MRC)**

- Approved in 2011, **MRC's Integrated Water Resources Management-based (IWRM) Basin Development Strategy** sets out how Mekong Countries will share, utilise, manage and conserve the Mekong water and related resources. The Strategy progresses beyond national and sector planning. It moves towards comprehensive basin planning that addresses the Mekong's future development opportunities, challenges and risks in the water sector as well as in flood and drought, tourism, watershed management, climate change adaptation and environment. The Strategy's implementation will require commitment from all Mekong Countries to best manage the future of the river's water resources..
- The overall goal of the **MRC Environment Programme 2011-2015**³⁶ is "*Member countries apply basin-wide IWRM approaches in national water and related sector frameworks and development programmes*". Climate change is one of the future factors expected to significantly affecting the River Basin

³³ http://www.saarc-sadkn.org/saarc_frame.aspx -6.03.14

³⁴ <http://www.saarc-sadkn.org/roadmap.aspx> -6.03.14

³⁵ http://www.sacep.org/pdf/biodiversity_resolution.pdf -6.03.14

³⁶ <http://www.mrcmekong.org/about-the-mrc/programmes/environment-programme/> -6.03.14

including the ecosystems, biodiversity and peoples livelihoods. It also considers the impact and vulnerability assessment of ecosystems to support adaptation planning for mitigation of key impact as well as environmental and social sustainability of adaptation options

- **The Mangroves for the Future (MFF) programme** has two objectives: to strengthen the environmental sustainability of coastal development; and to promote the investment in coastal ecosystem management.
- **Partnerships in Environmental Management for the Seas of East Asia (PEMSEA):** PEMSEA is a regional partnership programme, implemented jointly by UNDP and the United Nations Office for Project Services (UNOPS), involving various stakeholders of the Seas of East Asia, including national³⁷ and local governments, civil society, the private sector, research and education institutions, communities, international agencies, regional programmes, financial institutions and donors. It is also the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)³⁸. Under PEMSEA, disaster risk reduction is incorporated mainly

Box 4: Coordinating Body on Seas in East Asia (COBSEA) Projects

Spatial Planning in the Coastal Zone – Disaster Prevention and Sustainable Development Project (SIDA SP Project): The overall goal of the project is to reduce and prevent the impacts of natural disasters, climate change and sea level rise and to promote sustainable development of the coastal areas in COBSEA member countries through the application of spatial planning for integrated coastal zone management (ICZM) and Ecosystem Based Management (EBM).

Addressing the Challenge of Sea-Level Rise and Coastal Erosion in the East Asian Seas – Initial Implementation of the COBSEA Regional Strategy: The project aims to address the challenge of sea-level rise-induced coastal erosion as a significant and increasingly important threat to the coastal ecosystems, communities and economies of the developing countries of the East Asian Seas region. The main objective of this project is to build capacity in COBSEA developing countries in order to strengthen the sustainability, resilience and wise management of threatened coastal resources and associated ecosystems through the initial implementation of the COBSEA's Regional Programme for the Sustainable and Ecosystem-Based Management of Coastal Erosion in the East Asian Seas Region."

through its Integrated Coastal Management (ICM)³⁹ mechanism that involves a systematic process for managing competing issues in marine and coastal areas, including diverse and multiple uses of natural resources.

- **Coordinating Body on Seas in East Asia:** New Strategic Direction for COBSEA (2008-2012) mentions that COBSEA will focus on the thematic areas of marine- and landbased pollution, coastal and marine habitat conservation and management and response to coastal disasters⁴⁰.

³⁷ There are twelve member countries namely: Cambodia, China, Indonesia, Japan, Lao PDR, North Korea, Philippines, South Korea, Singapore, Thailand, Timor-Leste and Vietnam.

³⁸ More information on PEMSEA at <http://www.pemsea.org/>.

³⁹ So far ICM activities have been implementing in Bali (Indonesia), Batangas (Philippines), Chonburi (Thailand), Danang (Viet Nam), Nampho (DPR Korea), Port Klang (Malaysia), Shihwa (RO Korea), Sihanoukville (Cambodia) and Xiamen (China).

⁴⁰ <http://www.cobsea.org/aboutcobsea/newstrategicdirection.html> -13.03.14

- **The Coral Triangle Initiative⁴¹ on Coral Reefs, Fisheries, and Food Security (CTI-CFF)** is a multilateral partnership of six countries (Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste), formed in 2009, working together to sustain extraordinary marine and coastal resources by addressing crucial issues such as food security, climate change, natural disasters and marine biodiversity.
- **The Asia-Pacific Forum on Environment and Development (APFED)** is a regional group of eminent experts that aims to address critical issues facing Asia and the Pacific region and to propose new models for equitable and sustainable development of the region (DWECA, 2008).
- **Asia University Network on Environment and Disaster Management** shares and works together (bilaterally or multilaterally) in promoting environment and disaster management in higher education (focusing on, but not restricted to, post-graduate education)

Pacific Region

- The **Secretariat of the Pacific Regional Environment Programme (SPREP)** has been charged by the governments and administrations of the Pacific region with the protection and sustainable development of the region's environment. **Its Strategic Plan 2011-2015** stressed on the fact that climate change, destruction and modification of habitats and ecosystems, and severe reductions in species populations continue to threaten the integrity and health of the vulnerable natural systems on which all island life depends. Climate Change and biodiversity and ecosystem management are its 2 principal focus areas. In supporting countries' implementation of the Framework, SPC/ SOPAC and particularly the **Pacific Disaster Risk Management Partnership Network (PDRMPN)**, assisted the development of National Action Plans for DRM (NAPs) and more recently, the **Joint National Action Plans (JNAPs)** which address both disaster and climate change risks (UNISDR 2012).
- **Action Strategy for Nature Conservation and Protected Areas in the Pacific Island Region 2008-2012⁴²** recognises, respects and supports sustainable livelihoods and community development aspirations and manage threats to biodiversity, especially climate change impacts.

European Union (EU)

The European Union has also been actively integrating DRR into their environmental policies, along with helping the developing countries to reduce underlying risk factors linked with poor natural resource management and environmental degradation. The key frameworks, plans and strategies on these issues are summarized below.

- **The EU Strategy for supporting DRR in developing countries 2011-2014**, is in line with HFA and promotes integration of DRR into partner countries' development policies, strategies and sectoral plans, particularly in coherence with integration of adaptation to climate change through the climate-

⁴¹ <http://www.coraltriangleinitiative.org/about-us> -13.03.14

⁴² http://cmsdata.iucn.org/downloads/actionstrategy08_12.pdf -8.03.14

proofing of development aid and the promotion of "green development"(EC, 2011).

- Under EU's **Water Framework Directive**, it has been established to adopt a common strategy amongst EU countries to address water-related hazards, such as flooding and drought, through ecosystem-based approaches, such as river basin management to reduce flood risk. **The European Union's Flood Directive** (European Commission, 2007), is related to water directive and promotes the use of the natural capacity of wetlands, peat bogs and other natural spaces to store excess water
- The proposed revision of the **Environmental Impact Assessment Directive** requires major projects to take into account the possible impacts of natural and man-made disasters (including those related to climate change) at the very first stages of planning (EURO-PA/UNISDR, 2011).
- **The 2011 transport and energy network guidelines** include specific provisions on climate change resilient infrastructure and risk assessments (UNISDR, 2013)
- The EC is also helping establish a **European framework** to improve the resilience of social and economic systems as well as ecosystems across Europe and in other parts of the world; reduce the vulnerability of these systems to the impacts of climate change; and ensure that critical areas such as food safety, human health, ecosystem protection, economic and social cohesion and energy supply are protected (UNISDR, 2013).
- The **Seveso III Directive**, which became effective in August 2012, encourages better access for citizens to information about risks resulting from activities of nearby companies, and about how to behave in the event of an accident (UNISDR, 2012).
- As part of its post-2010 biodiversity policy, the Commission has adopted in May **2013 a strategy on green infrastructure**, promoting ecosystem-based management approaches (UNISDR, 2013).
- Under **European Environment Agency (EEA) Multi-annual Work Programme 2014-2018**⁴³, one specific work programme 'climate change impact, vulnerability and adaptation' (under strategic area 1:informing policy implementation), is linked to DRR with the objective to support and inform policy development and implementation in the area of climate change impacts, vulnerability, and adaptation by means of data, information/indicators, and assessments, specifically to provide up-to-date information and indicators on impacts, vulnerability, and adaptation to climate change including disaster risk reduction (EEA, 2014).
- **The Environment and Security Initiative (ENVSEC)**⁴⁴ seeks to reduce environmental and security risks through transboundary cooperation among countries in four regions: Central Asia, Eastern Europe, Southern Caucasus, and South-Eastern Europe.
- **EU's marine strategy framework**⁴⁵ directive establishes European Marine Regions on the basis of geographical and environmental criteria. The aim of the European Union's ambitious Marine Strategy Framework Directive (adopted in June 2008) is to protect more effectively the marine environment across Europe

⁴³ <http://www.eea.europa.eu/publications/multiannual-work-programme-2014-2018>. 14.03.14

⁴⁴ <http://www.envsec.org/index.php?lang=en> -14.03.14

⁴⁵ http://ec.europa.eu/environment/marine/index_en.htm -14.03.14

and to achieve a healthy marine environment and make ecosystems more resilient to climate change

- Another important initiative is the **Green and Blue Space Adaptation for Urban Areas and Eco Towns (GRaBS) project**. The GRaBS project is a network of leading pan-European organisations involved in integrating climate change adaptation into regional planning and development. The main role of this project is to promote the use of green infrastructure for climate resilience development (i.e., gardens, parks, productive landscapes, green corridors, green roofs and walls and blue infrastructure such as water bodies, rivers, streams, floodplains and sustainable drainage systems)(GRaBS, 2011).
- **The Protocol to Integrated coastal management in the Mediterranean**⁴⁶ – the Barcelona Convention in 2008 calls for the parties to develop policies for the prevention of natural hazard and undertake vulnerability and hazard assessments of coastal zones and take prevention, mitigation and adaptation measures to address the effects of natural disasters, in particular of climate change.

3.1.3 Integration of DRR into Environmental Initiatives and Policies at National level

At country level, national policies that integrate environment and disaster risk reduction are more pronounced in developed than in developing states. According to the HFA reports, institutional commitment was attained in 33% of the countries, while substantial achievement was reported by 52% (UNISDR 2013). There are many countries that have shown progress in realigning their DRR and CCA agendas, but this parameter will be given more emphasis under Key Result 5 of this paper.

In the Asia Pacific Region:

In many Asia-Pacific countries, land-use planning is one area that receives significant attention and so too the incorporation of risk reduction perspectives in EIA. In *Australia*, land use planning is an important element of work underway by a number of Australian Government agencies working collaboratively together as in the area of targeted climate change vulnerability assessment as part of the National Coastal Vulnerability Assessment project. In *Japan*, national land conservation projects are carried out strategically for protecting national land, citizens' lives and property from various disasters.

⁴⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:22009A0204%2801%29>

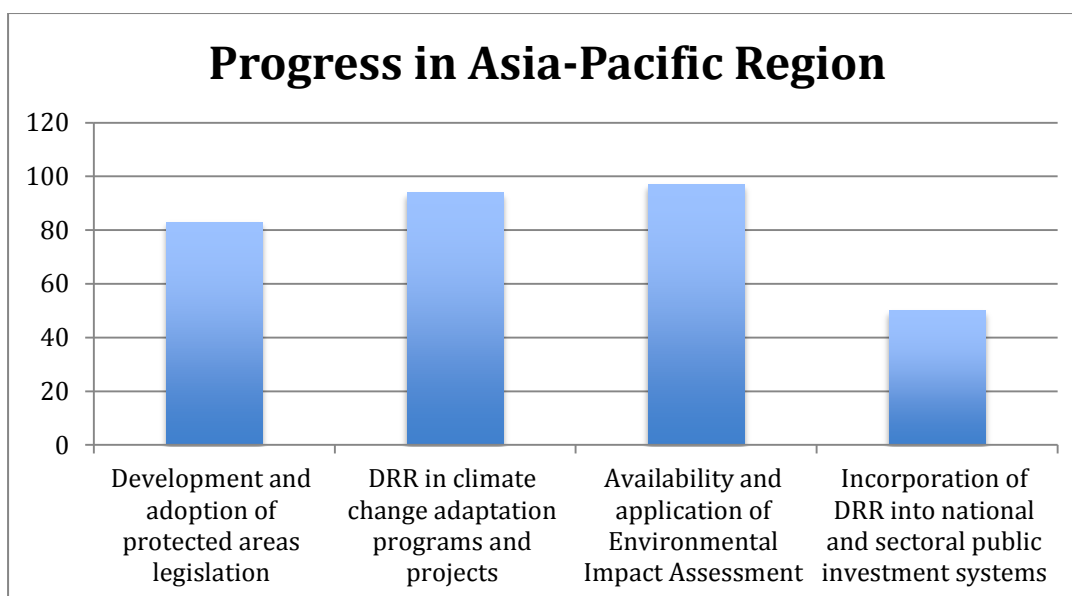


Chart 1: Progress in Asia-Pacific (2011-2013), Priority 4, Indicator 1⁴⁷

Among the developing countries, *Sri Lanka* is credited for its landmark Road Map for Disaster Risk Reduction that specifies a range of activities integrating both risk reduction and environmental management objectives such as incorporation of disaster impact assessments within environmental impact assessments and promoting natural barriers for coastal protection, such as the establishment of coastal vegetation or green belts.

In the neighboring *Maldives*, Ministry of Fisheries and Agriculture is developing an 'Agricultural Land Legislation' for both inhabited and uninhabited islands, which focuses on sustainable agricultural practices on resources management for agriculture. EIA is also made compulsory for any developmental infrastructural project. Comparable works have also been undertaken in *Malaysia* by integrating DRR and CCA into the land use planning system at national, state and local levels and initiatives have been undertaken to enforce EIA for agriculture projects that pose risks to the environment i.e. at hillsides, aquaculture projects and livestock farming. There are varying mechanisms deployed for DRR integration, which include the Environmental Impact Assessment (EIA) as in the *Cook Islands*, and by specific sectors, such as tourism, fisheries and agriculture, as in the *Maldives*.

The Government of Bangladesh has approved Sustainable Land Management Programme. Ministry of Environment and Forests in partnership with relevant stakeholders has finalized and adopted the National Capacity Self-Assessment for Environment and Natural Resource Management, which addresses risk reduction issues. Ministry of Land is implementing Coastal Land Zoning Project and Ministry of Agriculture and its technical agencies are engaged in continuous process to develop climate resilient crop varieties in the context of salinity intrusion, drought and submergence.

⁴⁷ http://www.preventionweb.net/files/32851_hfaregionalsynthesisreportasiapacif.pdf -8.03.14

Likewise, *Indonesia* has started to relate disaster risk reduction with environmental management and integrated it into its development policy, in particular through the ninth priority program in the Middle-term National Development Plan 2010-2014.

Another national initiative that provides a comprehensive framework addressing environmental management and disaster planning and mitigation is the *Vietnamese* plan for the environment and sustainable development. The plan also identifies opportunities for regional cooperation that include disaster reduction, combating the effects of climate change and anticipated sea-level rise, integrated management of watersheds, catchment areas and floodplains through forest management and soil and water conservation (DWEGA, 2008). In similar approach, *the Government of China*, along with implementing the Comprehensive Disaster Prevention and Reduction Plan (2011-2015), has laid out the Overall Plan on National Small and Medium-sized River Control, Risk-Removal Reinforcement of Dangerous Reservoirs, Mountain Torrent Disaster Prevention and Comprehensive Treatment, the National Drought Control Plan, the National Medium and Long-term Plan on Animal Epidemic Disease Prevention and Treatment (2012-2020) and other specific plans since 2011. The 2012 revision of the Law on Urban Planning in *Laos* is observed as a sign of commitment to incorporate DRR elements into human settlements planning and management at an institutional level. A number of government departments, such as the Land Use Department, have established DRRM offices in their respective organizations, in *Philippines*.

In Europe:

According to regional synthesis report for HFA in Europe, 2011-2013, only *Hungary and Switzerland* reported comprehensive and sustained achievement at all levels, where as 60 % of other countries reported substantial achievement with recognized limitations in capacities and resources, in the priority area 4. In *Croatia*, European Union legislation and initiatives has played a key role in integrating EU Directive Seveso II, dealing with industrial accidents, into its national legislation. In *United Kingdom*, 2011 National Ecosystem Assessment explored how ecosystems benefit society and the economy, analyzing the ways some of these systems might change

Box 5: National Environmental Action Programme of Georgia 2012 – 2016

The second National Environmental Action Programme of Georgia (NEAP-2) 2012-2016 is a comprehensive national plan and an important tool for addressing the most acute environmental problems and setting the national agenda for cost-effective improvement of the environment and meaningful protection of the natural resources of Georgia. This action plan, sets long-term goals, short-term targets and provides respective activities for eleven themes: disasters (covers natural and man-made disasters, industrial accidents), climate change, waste and chemical substances, nuclear and radiation safety, water resources, ambient air, Black Sea, biodiversity and protected areas, land resources, forestry, and mineral resources. With regards to DRR, its main objective is to minimize the loss of human lives, negative impacts to human health and the environment, and economic losses, to ensure the protection and rehabilitation of unique eco-systems and to ensure the security of the Georgian population by implementation of measures for adaptation to Climate Change and reduce Green House Gases.

over the next 50 years. UK's 'making space for water' is considered a landmark, along with Netherland's river flood plain policy⁴⁸.

Moldova has merged disaster risk reduction into its agricultural policies, environmental policies with protected areas legislation, payments for ecosystems services, environmental impact assessments and climate change adaptation projects and programmes. As for *France*, the 2009 Grenelle Law offers the administrative authorities a chance to classify risk-prone natural spaces and forested or agricultural areas as protected zones.

Among the Americas:

Argentina has reported success in raising awareness around the links between climate change and DRR, and rallying government and NGOs towards a more proactive stance. In *Panama*, the National environment Authority (ANAM) and the Canal Watershed Inter-Institutional Committee have integrated DRM and climate change in their national agendas. In *Costa Rica*, National Climate Change plan relate to its ongoing DRM efforts while projects on environmental management and recovery of hydrographic basins in *Ecuador* have contributed to a reduction of disaster risk.

Guatemala has developed a methodology that will help territorial entities integrate disaster reduction and recovery into land use planning. In *Jamaica*, the country's frequent experience with hazards prompted the requirement of an Environmental Impact Assessment for medium- to large-scale projects or those that are undertaken in environmentally sensitive areas.⁴⁹ In *Peru*, the national Ministry of Environment, created in 2008, is coordinating several institutions and existing programs involving watershed recovery, reserve area protection, and land use planning, among others.

In Africa:

While most national governments are initiating governance systems for adaptation and DRR and ecosystem-based approaches, are reducing vulnerability, although efforts to date tend to be isolated (IPCC, 2014).

Many nations have made efforts to reduce disaster risk by issuing environmental legislation, policies, strategies and plans. Approved and under implementation the Land Law, the Forest and Wild life Law and the Environment Law of *Mozambique* created the Sustainable Development Centers (CDS) for Natural Resources, Coastal Zones and Urban Areas.

In the same way in *Malawi*, DRR components have been mainstreamed in the environmental management policies with the objective of tackling the underlying risk factors such as the requirement to conduct EIA for all major projects and prioritization of DRR in the National Adaptation Programme of Action (NAPA) to reduce vulnerability of the communities (UNISDR, 2009). *Mauritania*, on the same note, has updated its legislative framework, intensifying risk information and education efforts and formulating strategies and programmes for developing productive natural capital, sustainable land and natural resource management and

⁴⁸ http://www.coe.int/t/dg4/majorhazards/ressources/pub/Ecosystem-DRR_en.pdf

⁴⁹ http://www.gfdr.org/sites/gfdr.org/files/DRM_LAC_CountryPrograms.pdf- 12.03.14

other environment-related activities.

In the Arab Region:

There is a growing interest among local government of the Arab states to prioritize urban risk issues, as demonstrated by the engagement and commitment of more than 280 cities and municipalities from the Arab region in the World Disaster Campaign on "Making Cities Resilient". There has been a reasonable level of commitment in recognizing the need to integrate DRR in environmental plans, land use and natural resources management.

Challenges

One of the biggest challenge faced by the DRR community is that despite the prevailing knowledge that prevention is more cost effective, disaster response and recovery wins sympathy and immediate response, nationally and from across the world. Despite the understanding of interlinkages between environment degradation and disasters and vice versa there is still a lot of scope for better integration of these sectors is because of the following reasons:

- **Lack of coordination and information sharing:** Historically, there have been separate communities of policymakers, practitioners and researchers working on DRR and environmental issues including CCA, with limited overlap in networks, meetings, methods or tools. There are also separate frameworks for DRR and CCA at international, regional and national levels, which cause lack of coordination between DRR, environment and climate change agencies at both international, as they occupy separate policy spheres, and national levels, despite the fact that they interplay and overlap on all levels (CCCCD, 2008). At the national level, weak linkages top-down and bottom-up, as well as laterally, fragmentation of sectoral policies impedes the integrated approach as DRR is usually handled by civil defense or emergency management departments, which typically have few operational links with the environment ministries, that look into environment management and CCA agenda. This also leads to lack of clarity and understanding on what the other agency is doing as well as duplication of efforts.
- **Lack of data and research:** Disaster response and recovery are still most prevalent modes of operation as quantifying the benefits of a particular initiative to reduce climate- and disaster related risks is very challenging, therefore the funding for prevention measures and preparedness is hard to come by when there has not been a devastating cyclone or prolonged drought, for example. The availability of technical and baseline data is still a key challenge to providing information towards the integration of vulnerability and risk assessments of climate related hazards. In spite of the commonalities among environment management, adaptation, mitigation and disaster risk reduction, research on the links between climate change, climate action and disaster risk reduction is mostly case-based and fragmented, giving little guidance to practitioners and policymakers.
- **Lack of Capacity:** It is found that though in some cases regional organizations have achieved progress in including DRR into their policy and strategy papers but these efforts have not been translated, into suitable and coherent programming at national and local levels. Much more work needs to be done to build capacity at the local level. It is also seen that too often responsibilities for DRR have been

transferred to the local levels without sufficient resources to implement the programmes. It is essential to translate integrated risk approaches from the national level both upward to regional levels and downward to local levels. There is a need to bring resources to the local level while at the same time highlighting for national actors the success of local municipalities in creative approaches to move the DRR agenda forward even when resources are limited. Strengthening national mechanisms, legislative frameworks and capacities at national levels for mainstreaming and implementing DRR strategies and frameworks, including climate change implications systematically.

- **Translating Policies for practical implementation:** There needs to be more concerted efforts in actual translation of policies, frameworks and experience into practical tools for decision-makers and practitioners to facilitate the implementation of projects concerning integrating DRR into environmental policies in order to facilitate operational mainstreaming. There is also an issue that governments and policy makers at national levels may make changes according to politically driven agendas, which can hamper practical mainstreaming of policies.
- **Limited stakeholder engagement:** There is a need for interdisciplinary dialogue for engineers, natural scientists, disaster managers and decision-makers, through which integrated solutions may be sought. It is equally important to involve community members who ultimately maintain and care for the DRR systems.
- **Lack of Funding:** Countries are challenged both by the lack of public resources and the limited ability to mandate environmental compliance on private actors. Lack of funding for DRR projects causes obstacles, which in some extent can be overcome by using funds for CCA agenda.

3.2 Key Result 2

Are there good examples of DRR being hardwired into environmental policies and plans, including for land use, natural resources management, environmental Assessments and protected Areas?

As mentioned under key Result Area 1, it is already established that HFA has given impetus to DRR being mainstreamed into environmental plans and policies at international, regional and national level. There has been progress in DRR integration in environmental sectors, as mentioned by the HFA summary of reports 2007-2013 (UNISDR, 2013), and most progress has been seen in EIA processes, followed by implementing actions towards protecting and restoring regulatory functions of ecosystems. The recent IPCC report (IPCC, 2014) highlights that in Central and South America, ecosystem-based adaptation including protected areas, conservation agreements, and community management of natural areas is occurring⁵⁰. In Asia, adaptation is being facilitated in some areas through mainstreaming CCA into integrated water resources management, agroforestry, and coastal reforestation of mangroves.

Integration of DRR in protected Areas legislation and CCA agenda has also seen considerable progress. Following up on what has been established under Key Result Area 1, in this section the focus will be on accentuating the cases where DRR has

⁵⁰ http://ipcc-wg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Approved.pdf -8.04.14

found its way in important environmental foci and themes relating to Environmental Assessments, Land Use Planning, Natural Resource Management, and Protected Areas, in the last decade.

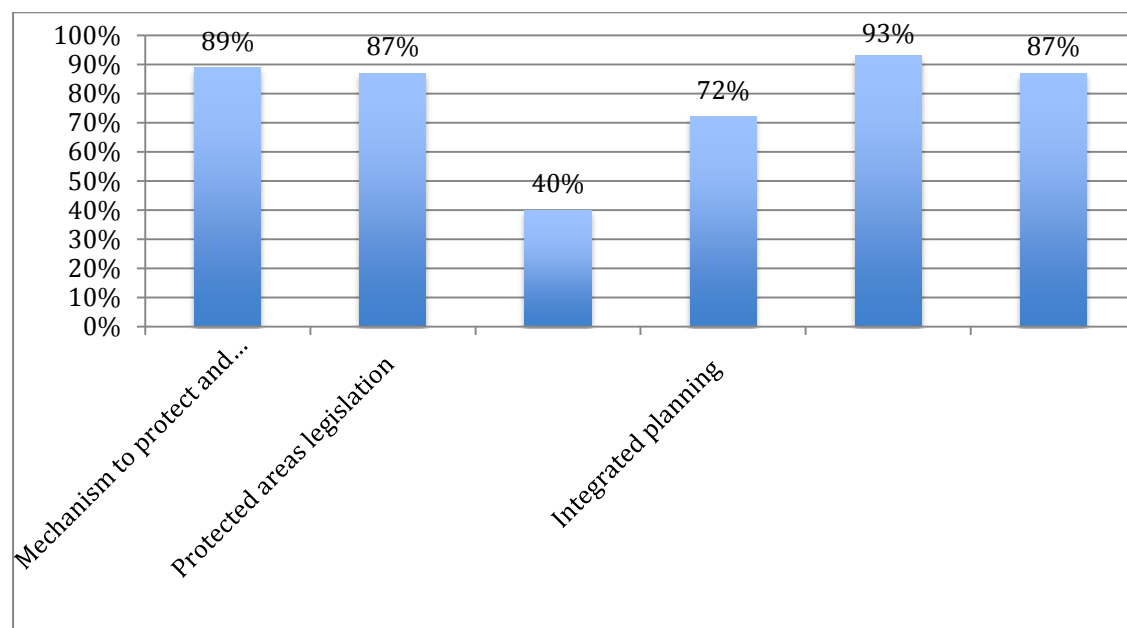


Chart 2: Progress in Integrating DRR in Environment Sectors (GAR 13)

3.2.1 Integrating DRR into Environmental Assessments

The recognition of the relationship between environmental degradation and disaster events has meant that environmental management is now seen as a key means of reducing disaster risk. As a result, one instrument that has gained much attention in this context has been environmental assessment (EA), which has become an important tool to promote the consideration of environmental issues in human development actions. From the HFA progress reports, the field of integration of DRR in EIA systems shows the most progress.

EA has the potential to be a means through which disaster risk and climate change concerns can be embedded into development activity by expanding the tool methodologically to incorporate DRR. EAs should also be fully integrated into activities in the post-disaster period in order to help prevent disaster recurrence and promote sustainability. This is often a time when EA considerations are sidelined officially or unofficially in order to hasten disaster response or recovery interventions.

Environmental impact assessments (EIAs) and strategic environmental assessments (SEAs) are the best-known tools for undertaking environmental assessments as they allow information on social, economic and environmental impacts to be considered, resulting in a much more integrated assessment process. For example, expanding the environmental impact assessment (EIA) process to explicitly consider how deforestation associated with a proposed development project could reconfigure the landslide or flood risk in a locality.

A sourcebook for integrating natural hazard concerns, including potential climate change impacts, into the application of EIAs, at country level, was developed by Caribbean Development Bank (CDB) and the Caribbean Community (CARICOM). It set out ten basic steps to merge disaster risk consideration into EIAs, which in effect provides a framework for defining acceptable thresholds of risk based on environmental sustainability criteria. Grenada and Trinidad and Tobago have already

	Level 1 Intention	Level 2 Guidance	Level 3 Implementation
Developed Countries	Canada	Australia	Australia
	Spain	Canada	Canada
	European Union	Netherlands	Netherlands
Developing Countries	Bangladesh	Grenada	
	Dominica	Kiribati	
	Kiribati	Trinidad and Tobago	
	Saint Lucia	Caribbean Community	
	Samoa		
	Soloman Islands		
	Caribbean Community		
Multilateral Organisations	Asian Development Bank		
	Inter-American Development Bank		
	World Bank		

Image 1: Progress in Integrating Climate Change factors in EIA Process (OECD, 2011)

incorporated proposed changes in their EIA processes⁵¹. A recent review of EIAs conducted in OECD and non-OECD member countries and multilateral organizations showed that Australia, Canada and the Netherlands have moved to the implementation stage in using EIA to climate-proof projects (Agarwala, 2011)⁵². In Canada CCA is considered throughout the EIA process, starting from preliminary considerations, scoping and screening, identifying 'significant impacts', to while considering the effects of the environment on the project itself, and during mitigation planning and monitoring. CCA and biodiversity is a major factor in screening and scoping processes in EU EIA guidelines. Philippines has integrated DRR and CCA strategies in its EIA processes, in accordance to guidelines adopted by Department of Environment and Resources in 2011⁵³. Ministry of Environment, Nepal is working on DRR/CCA considerations in Environmental Impact Assessment Initial Environmental Examination. In Japan, Yokohama City and Kawasaki City prescribe

⁵¹ <http://www.caribank.org/uploads/2012/03/Source-Book5.pdf> -5.03.14

⁵² Incorporating Climate Change Impacts and Adaptation in Environmental Impact Assessments: Opportunity and Challenges, OECD & AECOM, 2011

⁵³ <http://www.emb.gov.ph/portal/Portals/21/EIA%20LAWS/DRR-CCA%20EIA%20Technical%20Guidelines.pdf> -5.03.14

“safety” as an evaluation item of environmental component and includes disaster related matters such as fire disaster, explosion, flood disaster and so forth in their EIA system⁵⁴.

Box 6: EIA DRR/CCA Guidelines in Philippines

Environmental Impact Assessment (EIA) Technical Guidelines for Incorporating Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) concerns in the Philippine EIS System” (EIA DRR/CCA Technical Guidelines),” adopted by Department of Environment and Resources, Republic of Philippines Nov 2011, intend to promote CCA and DRR at the project level, as well as to streamline EIA requirements under the PEISS Specifically, the Guidelines aim to: Provide enhanced standards for the preparation of EIA Reports that are customized for specific industry types as required under the PEISS; and to provide guidance for project proponents in integrating DRR and CCA concerns in the project planning stage through the EIA Process to facilitate review and implementation of projects by incorporating international best practices. These Guidelines were formulated to provide EIA practitioners and stakeholders with:

- an understanding of the implications of disaster and climate change risks in relation to the preparation of an EIA Report;
- direction on a project-specific basis on how disaster risks and climate change need to be considered in an EIA;
- sources of information for use in assessing disaster risks and climate change implications, and guidance in incorporating DRR and CCA considerations into the EIA process.

In contrast to EIAs, SEAs generally have a broader focus on integrating environmental considerations into policies, plans or programmes at the earliest stages of strategic decision-making. It may be applied to a specific sector or geographical area and ideally prior to the identification and design of individual projects.

- In Sri Lanka, the Government in collaboration with UNDP and UNEP undertook an integrated strategic environmental assessment (ISEA) process that takes into account major hazards (storm surges, flooding, strong winds, sea level rise and tsunami) in defining a sustainable development framework for post-conflict rebuilding in its Northern Province (PEDRR, 2011).
- SEA, for the Dutch national plan on river flood protection, was climate-proofed. It incorporated prediction of high water river levels in the year 2100 based on the IPCC mid scenario and an analysis of upstream developments until 2020 (outside of the Netherlands)⁵⁵.
- SEA has been incorporated into the socio- economic development master plan for 2020, which includes a long-term vision for 2050 for An Giang, a province in southern Vietnam, which is vulnerable to climate change and

⁵⁴ http://www.nishikiz.depe.titech.ac.jp/JPUK2012/Proceedings_of_the_JP-UK_joint_WS.pdf

⁵⁵ <http://ec.europa.eu/ourcoast/index.cfm?menuID=7&articleID=66>

changes in the Mekong basin⁵⁶. The expected outcome is a climate-proof master plan for 2020 which includes, adopts different risk standards and adaptation measures (no-regrets, grey, green and social measures), takes into account ecosystem services, and performs comparative analysis of the costs and benefits of the existing and the new master plan.

- In Tajikistan, SEA was performed under an ADB project, which identified natural hazards, including drought, landslides and earthquakes, as one of the country's key environmental problems and promoted environmental management as a way to reduce vulnerability to hazards (ADB, 2005).

Another instrument that has gained acceptance and increased usage is the Rapid environmental assessments (REAs) that are generally applied to assess the environmental situation in the aftermath of a disaster and quickly provide data to support decisions paying close attention to pertinent essential and environmental sectors. REAs can also be used to obtain information on the general status and location of critical ecosystems in the affected area to avoid further potential damage as a result of post-disaster operations, which could then impede recovery. In order to increase the efficiency and rapidity of REAs, a special EIA process for recovery projects was formally introduced in Japan after the Great East Japan Earthquake, which does not include the lengthy scoping stage (Shibata, 2012).

Box 7: Institutionalization and operation of Special-EIA for recovery from the Great East Japan Earthquake

Recovery Special Zone Act, established nine months after the Great East Japan Earthquake, has excluded the Special Reconstruction Project for the earthquake reconstruction from the application of the EIA Law. The Special-EIA is marked by the simplification of the assessment process and the environmental investigation. At the same time, the Special-EIA is also marked by the application of the ex-post environmental monitoring survey and follow-up measures. Now, this Special-EIA is expected to accelerate the environmental consideration in the rapid recovery construction.

Challenges

- To date, the concept of using EA to reduce disaster risk has not been something that has been widely researched, or indeed, been widely implemented in practice, despite its potential as a cost-effective means of reducing disaster risk.
- Accelerated procedures for EA could facilitate faster decision-making, considered vital in a post-disaster situation.
- Emergency plans contain various mitigation measures, of which some could have environmental impacts, but all are exempt from SEA. Therefore, the involvement of environmental authorities is essential in the emergency planning process
- Applying EA in the pre-disaster planning of post-disaster actions could be beneficial, as it would enable application of the instrument outside of the potentially unfavorable conditions of the post-disaster period. Furthermore, applying EA as part of pre-disaster planning activities could have secondary merit by being a means of promoting disaster awareness amongst communities. pre-disaster planning for disaster recovery is still a rare activity globally (Le Duc, 2007).

⁵⁶ http://www.asiapacificadapt.net/sites/default/files/resource/attach/proceedings_0.pdf- 17.03.14

3.2.2 DRR and Land use Planning

The location of residential areas, industries, critical public facilities and services are important parameters that define the vulnerability of communities to hazards. In this contest, land use-planning plays a significant role in the way in which communities are impacted by hazardous events, adapt to climate change and mitigate the effects of the extreme events upon the ongoing sustainability of communities. Land use planning is instrumental in addressing the challenges posed by natural hazards on built environment and through it vulnerability parameters can be modified to reduce risks. DRR and climate change adaptation are enhanced by good practice land-use planning at local, national and regional levels.

Barriers and Progress

Countries have reported modest success in integrating DRR into land use policies and plans in their HFA progress reports but the intent of the HFA strategy for land-use planning has been followed in a piecemeal manner, demonstrating some successes, but also a significant proportion of failures and constraints (UNISDR, 2013). The most fundamental constraint is that land-use planning is oriented towards the promotion and facilitation of new developments, where consideration of DRR and climate change adaptation is still relatively minor issues. Bottlenecks to attitudinal change amongst planners, as well as the private enterprise entrepreneurs and politicians who drive the process, are political and economic realities that continue to be the main challenges in integrating DRR. Limited capacity of the relevant governmental institutions and tight development costs that begrudge expenditure by developers on implementing DRR measures or restrictions on land-use pose major roadblocks.

Land-use planning is mainly structured through legislation, requiring new laws and their implementation. Further bottlenecks are then activated as land-use planners are allowed to specify DRR actions on land that is proven to be a hazard prone. Secondly, the responsibility for mapping, information, communication and community education, awareness and resilience building falls primarily on local governments, whose resources and capacity are the lowest in the political system. On top, the local governments inherit the legacy of past planning decisions, where most hazard risk resides. Alongside these bottlenecks to land-use change, rapid urban growth and urbanisation continue alongside strong population growth, adding to the constant need for new infrastructure and housing (Burby et al, 2000).

Despite these apparent holdups, there have been successes in the last few years at regional and national levels such as in:

- Malaysia where the National Physical Plan has been adopted to further enhance integrated land use planning as well as developed guidelines to protect and conserve environmentally sensitive areas (ESA) (HFA, 2013).
- Philippines formulated the Guidelines on Mainstreaming DRR in Subnational Development and Land Use/Physical Planning⁵⁷ as an instrument to mainstream DRR in development planning processes. The Guidelines serves as a tool for enhancing subnational (regional and provincial) planning analyses by recognizing risks posed by natural hazard and the vulnerability of the population, economy and the environment to these hazards. These guidelines will provide clear

⁵⁷ http://www.ifrc.org/PageFiles/95743/24664_24664rccguideline3.2landuseplanning.pdf -14.03.14

directions to cities and municipalities in the crafting of corresponding preventive and mitigating policies and measures that address the disaster risks affecting them (RCC, 2011).

There also have been successes in the areas described below.

- The enormous task of detailed hazard mapping has advanced, alongside advances in IT and information has been made available to communities even though many local governments are still wary of releasing too much information and mapping.
- Notwithstanding the limitations the planners face in their capacity to reduce risk in communities that are already well established in hazard zones, DRR retrofitting of infrastructure and lifelines in hazard prone areas through development and enforcement of building codes, though not the direct responsibility of planners, have been extremely successful in reducing the risk of cyclonic and flood destruction of residential dwellings.
- Integration of DRR into a broad range of legislation and government departmental jurisdictions such as in the construction of critical infrastructure, has enhanced the role of land-use planners through incorporation of additional risk reduction strategies into planning decisions.

Box 8: Land Use Planning in Queensland, Australia: The Case of Beach Front Communities' Recovery at Tully Heads and Hull Heads

In 2006 and again in 2011, two (category 4 & 5) tropical cyclones devastated coastal communities of Tully Heads and Hull Heads, 150 km south of Cairns, having been established when beachfront land was cheap and DRR was not part of land-use planning practice. People evacuated well in advance of the cyclone warning so there was no loss of life but some of the dwellings constructed of light materials such as timber were destroyed by storm surge and the stronger houses had their interiors ruined by saltwater.

Queensland Reconstruction Authority (QRA), established after 2011 floods, QRA planners consulted impacted communities and worked with the Cyclone Testing Station of James Cook University to design stronger dwellings built to cyclone standards and able to withstand a severe storm surge as shown here. However, the residents are still living on the same fragile beach ridge that remains as susceptible to sea level rise and storm surge as before. The hazard risk has not been mitigated. The solution is a short-term adaptation, but as noted by residents probably long enough to cover their lifetimes, and meanwhile the location is paradise. Relocation was not an option for people who had invested all they owned into living on the beach. The planners were impeccable in their community consultation, but there has been minimal hazard reduction.



QRA/CTS design for rebuilding for storm surge (QRA, 2011)

Integration of DRR into a broad range of legislation and government departmental jurisdictions at provincial and local levels has helped in operational level

mainstreaming and implementation of activities and plans to this effect as can be seen from recovery and planning following the Tsunami in Phuket (Annex 1). The Province of Potenza, since 2004, Basilicata Region, Italy, has been implementing a Provincial Civil Protection System and has produced two planning documents; the Provincial Risk Assessment/Mitigation Plan and the Emergency Management Plan. Among the instruments and tools employed for Disasters Risk Management (DRM), the realization of a Geographic Information System (GIS) allows the collection and updating of information about the different territorial risks, by integrating the static (buildings, infrastructure, etc.) and dynamic (natural hazards and their space-time evolution) information (Attolico, 2014).

3.2.3 DRR and Natural Resource Management

Nowadays development efforts require that special consideration be given to issues such as climate change, disaster risk reduction and sustainable natural resources management. HFA also advocates assessing and understanding the interrelationships between ecosystem functioning and disaster risk, and to appreciate how improved land, water and natural resource management can increase community resilience. It is concerning, however, that the mid-term review, on the progress countries are making for the implementation of HFA, reports that 'there was little mention of' sustainably managing natural resources to successfully reduce risks, by countries (IUCN, 2011). With the projected increase in disasters and additional risk of climate variability, it becomes imperative to incorporate disaster risk strategies in natural resource management frameworks. Some examples, which showcase this integration are given below:

DRR and Water Resource Management

Vulnerability to water insecurity is particularly high in many developing countries, which cannot afford high investments in alternative technological solutions and water-related disasters like floods and droughts cause major impacts on health and the economy. Climate change further poses high risk of abrupt and irreversible regional-scale change in the composition, structure, and function of terrestrial and freshwater ecosystems, including wetlands (IPCC, 2014). Therefore, wise use of natural resources such as wetlands, watersheds and riverbasins. For their regulatory services is paramount.

Integrated water resource management (IWRM)⁵⁸ is one such tool that integrates DRR strategies in managing both excess water and water scarcity as well as encompassing integrated watershed management (IWM) and integrated river basin management (IRBM) into its approach to contribute towards environmental and socioeconomic development. Given that increasing frequency of water related disasters and the pressures on ecosystems, more national plans on IWRM are being formulated and implemented, providing better knowledge on best practices at the

⁵⁸ Integrated water resource management (IWRM) is a process, which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems

river basin and micro-watershed levels.

- MRC's Integrated Water Resources Management-based (IWRM) Basin Development Strategy is one such strategy, which focuses on comprehensive basin planning and commitments from all Mekong countries to manage risks in water sector. Government of Vietnam with assistance from Netherlands is also developing an integrated long-term Mekong Delta Plan, to respond to the consequences of climate change and to ensure the sustainable socio-economic development.
- The European Union's Flood Directive (European Commission, 2007), is another such water related policy that gave birth to a number of country-level programmes, namely "Making Space for Water" in the United Kingdom, "Room for the River" in the Netherlands, "Living Rivers" in the United Kingdom and France and "Environmental Enhancement of Rivers" in Ireland, which promote the use of the natural capacity of wetlands, peat bogs and other natural spaces to store excess water (Arnaud-Fassetta and Fort, 2008; Defra, 2008; Deltacommissie, 2008; Gilligan, 2008).
- IWM has become more widespread, and many projects and initiatives are being implemented, integrating DRR strategies with IWM such as in Georgia⁵⁹ (USAID funded GLOWS Consortium) and Tajikistan⁶⁰ (Swiss Agency for Development and Cooperation). Various projects on river basin and watershed management by IUCN, across Africa, Asia and Latin America, have seen the strategies getting incorporated into local and national plans. The grassroots approach to water management in Tacaná watersheds on the border of Guatemala and Mexico has shown the way forward in scaling up local level approaches to national level initiatives (Annex 4) (IUCN, 2012).

DRR and Dryland Management

Desertification, land degradation and droughts in drylands reduce food security and are a major cause of famine. Restoring and securing the provision of dryland ecosystems' goods and services is key to enhance the economic and social well-being of dryland communities and strengthen their capacity to manage rainfall scarcity and uncertainty. In the Sahel region of Africa, sustainable agricultural practices and the careful management of protective vegetation have reversed land degradation and conserved soil moisture, thus reducing the impact of drought and ensuring food supply for communities in marginal drylands (PEDRR, 2011). In arid and semi-arid Lands (ASALs) of the greater Horn of Africa various projects have been implemented in Agro-pastoral (crop agriculture and livestock) and pastoral (mainly livestock) sectors due to their importance in Drought Risk Reduction⁶¹ (Annex 3). The actions and lessons learnt from the initiatives this project have contributed to the national and regional policy and programmes including Country Programming Paper (CPP) of Ending Drought Emergencies (EDE), IGAD Drought Disaster Resilience and Sustainability Initiative (IDRISI) priority intervention area 1 on Environment and Natural Resources Management; and African Union's Policy Framework for

⁵⁹ http://www.globalwaters.net/wp-content/uploads/2012/12/Flyer_VERTIKAL_Final_Eng-Geo-21.pdf

⁶⁰ http://www.swiss-cooperation.admin.ch/centralasia/en/Home/Activities_in_Tajikistan/Disaster_Risk_Reduction/Knowledge_Management_for_Integrated_Watershed_Management_and_Disaster_Risk_Reductionin -18.03.14

⁶¹ [http://www.disasterriskreduction.net/fileadmin/user_upload/drought/docs/Natural%20Resources%20Management\(NRM\)%20Thematic%20Factsheet.pdf](http://www.disasterriskreduction.net/fileadmin/user_upload/drought/docs/Natural%20Resources%20Management(NRM)%20Thematic%20Factsheet.pdf) -18.03.14

Pastoralism in Africa. The project also stimulated Kenyan Government in creating the National Drought Management Authority (NDMA) and its associated National Drought and Disaster Contingency Fund (NDDCF).

DRR and Coastal Zone Management

"Due to sea-level rise projected throughout the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion"(IPCC, 2014).

Coral reefs and coastal mangrove forests are known for their ability to adapt to climate change and recover from storms and floods and still provide services of protecting the coast and absorbing pollution, but coastal ecosystems across the world are facing a huge risk of degradation due to various anthropogenic interventions, Integrated coastal zone management (ICZM) considers fragility of coastal ecosystems, the entire spectrum of cross-sectoral uses, their impacts and the trade-offs needed to ensure sustainable development.

Globally, there are increasing applications of ICZM, providing an opportunity to link disaster risk reduction to wider sustainable natural resource management and livelihood goals in coastal areas.

- Belize integrated DRR and CCA measures in its ICZM Plan in 2013 (Clarke et. al, 2013), which was developed by Coastal Zone Management Authority and

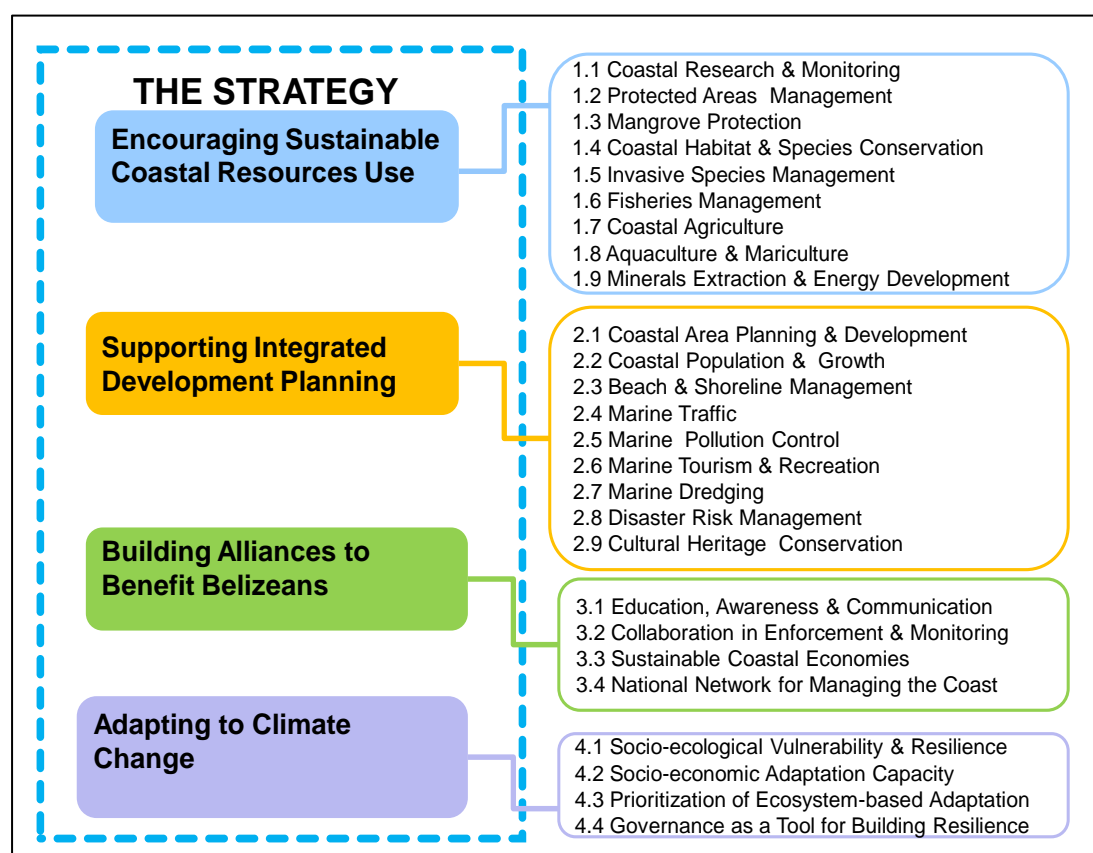


Image 2: Belize- Integration of DRR and CCA in ICZM Plan

Institute Ministry of Forestry, Fisheries, and Sustainable Development.

- With almost 3260 km of coastline, the coastal areas of Vietnam play a very important role in the country's economy which provided the impetus to Ministry of Natural Resources and Environment, to develop 'Vietnam's ICZM Strategy 2020 and Orientation up to 2030'. The main aim of this strategy is to develop and manage the coastal zone of Vietnam in a sustainable way, through inter-sectoral, interagency and inter-governmental coordination and cooperation mechanisms, using integrated coastal zone management, to preserve its role as an equitable source for peoples' livelihood, safety and economic prosperity.
- In Bangladesh, a National Programme of Action for Protection of Coastal and Marine Environment from Land Based Activities in 2010 which focuses on ensuring preparedness to address natural or man-made disasters.
- In Indonesia the law 'Integrated coastal and small island management', 2007, highlights the need to integrate DRR⁶² (Box 10)
- The ICZM Action Plan of Kenya 2011- 2015 addresses the issues and resource management challenges facing its coastal zone including those posed by hazards, environmental risks and climate change.

Box 9: Integrated Coastal Zone Management in Indonesia

Indonesia Law on 'Integrated coastal and small island management', 2007 highlights need to integrate DRR in following articles:

- Article 56: in developing the integrated management and utilization plan for coastal and small islands, the government and or local government oblige to incorporate and implement disaster mitigation.
- Article 57: coastal and small islands disaster mitigation is implemented within the responsibility of the government, local government, and community.
- Article 58: coastal disaster mitigation has to respect social, economy, culture, ecosystem, effectiveness, and areas scope.
- Article 59: 1) everyone in coastal and Small Island oblige to implement the disaster mitigation related to their activities that have potential adverse effects. 2) Disaster mitigation as in verse 1) is conducted through structural/physics and non-structural/non physics countermeasure.

Though the law 27/2007 gives coastal community a comprehensive legal instrument to increase the coastal socio ecological resilience to coastal hazards and incorporates DRR concerns, the urgent need remains is to translate the Law in a more operational regulation in form of government, presidential and ministerial regulations and to cover aspects such as land use, building code, coastal structural design etc.

Integrated Forest Management

"Increased tree mortality and associated forest dieback is projected to occur in many regions over the 21st century, due to increased temperatures and drought. Forest

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http://www.unep.org/disastersandconflicts/portals/155/disastersandconflicts/docs/drr_training/AIDCO_Regional_Training_Manual.pdf - 19.03.14

dieback poses risks for carbon storage, biodiversity, wood production, water quality, amenity, and economic activity” (IPCC, 2014).

Integrated Forest management is required to balance demand for forest products with the ecological requirements of forests, while ensuring other key benefits for livelihoods, notably by stabilizing steep slopes and reducing soil erosion. “Protection forests” in Swiss Alps play an important role in safeguarding people, assets and infrastructure from avalanches, rock falls and landslides (Renaud et al, 2013). Jamaica Strategic Forest Plan focuses on DRR strategies to maintain and restore its forest cover⁶³.

Wildfires in forests and other ecosystems also affect livelihoods. An estimated 150 to 250 million hectares of tropical forests are affected by wildfires annually; more than two million people worldwide were affected in the past 10 years⁶⁴. **Integrated fire management** is a holistic approach that addresses the management of fire on all vegetation, integrating measures for prevention, preparedness, suppression and restoration.

Box 10: Jamaica’s Strategic Forest action Plan 2010-2014

Jamaica’s forests play a crucial role in safeguarding biodiversity, conserving soil, protecting watersheds and mitigating disaster risks (such as severe flooding and damage to housing, agriculture and infrastructure resulting from hurricanes). Failure to maintain and restore forest cover, particularly on steep slopes and in critical watershed areas, will have disastrous consequences.

One of the strategic objectives of Jamaica’s forest action plan is to ‘***maintain and restore forest cover***’ with focus on watershed protection, which is inextricably linked to soil conservation and disaster risk reduction, and implementing measures and strategies to reduce and compensate for deforestation, and restoring degraded areas.

The serious impacts of fires on forests have led decision makers to take necessary steps and several countries in Europe are using prescribed burning both for decreasing wildfire hazards and for biodiversity and forest management objectives, and there is growing interest for better use and integration of traditional fire use and management (Goldammer, 2010, Rego et al, 2010). Lebanese government passed the *National Strategy for Forest Fire Management* in May 2009⁶⁵ to ensure land restoration and traditional and modern fire management practices are being combined to build the social and ecological resilience of local communities (Box 23).

⁶³ http://www.forestry.gov.jm/PDF_files/SFMP_Final.pdf -19.03.14

⁶⁴ <http://www.fao.org/docrep/012/i1363e/i1363e13.pdf> -19.03.14

⁶⁵ http://www.aub.edu.lb/ifi/public_policy/rapp/rapp_research/Documents/cs_lebanon_forest_fire_management/20111031ifi_rapp_lebanon_forest_fire_policy.pdf-19.03.14

Box 11: Lebanon National Strategy for Forest Fire management

Lebanon's forests suffer from degradation, climate change and poor management. Over the past decade, fires began destroying one of Lebanon's most important natural resources due to dry weather conditions and agricultural malpractices. They caused considerable environmental damage and had a profound impact on the economy of the affected area. To remedy the situation and strengthen its role in tackling forest fires, the Lebanese government passed the *National Strategy for Forest Fire Management* in May 2009 to reduce the intensity and frequency of forest fires. The strategy aims to "*Reduce the risk of intense and frequent forest fires whilst allowing for fire regimes that are socially, economically and ecologically sustainable*". It is based on "a risk-management framework", and incorporates a climate change adaptation goal. IUCN supported the development of the strategy and pilot actions that build ecological and social resilience of local communities. Land restoration through planting of fire resilient native species, a joint fire management plan for all farmers and the setup of a nursery to produce seedlings for the restoration were main successes of the project.

Challenges

Despite the progress that these 'good' examples show, more complementary and interdisciplinary approaches between DRR and Natural Resource Management field that learn from each other are needed. Cross-sectoral integration takes into consideration all the stakeholders, exchange of information and scientific data, transfer of technology and forming linkages with other development policies and planning processes. Such an approach will assist in overcoming the 'lag' as identified in the Mid –Term review of HFA (UNISDR, 2011 b)

3.2.4 DRR and Protected Area Management

Protected area ⁶⁶ management is an established and recognized mechanism for maintaining natural habitats and preserving ecosystem functions. The critical role played by protected areas, for protecting people and their livelihoods from devastating impacts, has been clearly shown in the aftermath and assessment of disasters such as the Western Indian Ocean tsunami (2004) and the Great East Japan Earthquake (2011) (IUCN, 2013). The HFA progress reports mention that 87 % of the countries have shown progress in aligning DRR strategies with protected areas legislation. The countries in Asia Pacific region also show substantial progress in this area.

The role of protected areas in staving off the impacts of climate change has been addressed in World Parks and Regional Parks congresses. The third Central American Parks Congress in Mexico, 2010, put concerted efforts to provide policy guidance to the region's governments on how to manage the impacts of climate change on national protected areas systems. The Asia Parks Congress, 2013, adopted the Sendai Charter for Asia's Protected Areas, which highlights that ecosystem based DRR and protected areas enhance local resilience in areas at high risk for disasters and encourages proactive approaches that contribute to disaster prevention and mitigation through utilization of ecosystem services (IUCN, 2013). Protected areas also enable nearby communities to better cope with hazard events through the

⁶⁶ Protected areas encompass a wide range of ecological spaces and include national parks, nature reserves, wilderness areas, wildlife areas, protected landscapes as well as community conserved areas, with differing governance systems.

provision of critical products (food, water, fuel and building materials) and also in carbon sequestration (Dudley et al, 2013).

Many examples of protected areas playing an essential role in DRR have been indicated (Dudley et al, 2013).

- In Mali, the role of national parks in desertification control is recognised, and protected areas are seen as important reservoir of drought-resistant species.
- Swiss forests are managed to ensure protection of steep slopes against avalanche and landslip, with about 17% of forests protected for this purpose.
- The Whangamarino Ramsar site is the second largest swamp complex in North Island, New Zealand and it has a significant role in flood control (the value of which has been estimated at US\$601,037 per annum at 2003 values) and sediment trapping. It contains protected wetlands and swamps that serve as natural reservoirs against floods by containing excess rain and run-off and thus reducing flood peaks.
- The Shivapuri National Park is the main source of water for domestic consumption in Kathmandu, Nepal. Landslide protection measures have been implemented in 12 localities in the protected area.
- Protected areas also mitigate against coastal hazards such as the protected mangrove system of the Sundarbans in Bangladesh and India helps to stabilise wetland and coastlines and contributes to buffering inland areas from cyclones.
- In the Seychelles, the Aldabra marine protected area contains reefs, mangroves and seagrass that mitigate coastal erosion and storm surge and maintain and replenish the beach.

Challenges

The main challenge is that in practice, it is difficult to measure the full benefits of a protected area, as they are disbursed over many beneficiaries and over a longer time horizon. Also, many benefits from protected areas such as hazard mitigation, carbon storage and maintenance of genetic diversity have no market value, and are therefore poorly appreciated. In contrast, the costs of protection are generally incurred over the short-term and remain concentrated, and these include management costs, loss of access to natural resources, human displacement and foregoing alternative uses. Costs are therefore perceived to be greater than benefits.

3.3 Key Result 3

Is there off take in the private sector for bringing in DRR into their environmental or natural resources management approach?

Private sector has a critical role to play in building disaster preparedness in partnership with communities and decision-makers. Business opportunities also exist to partner with vulnerable communities to develop and deploy goods and services that build resilience to disasters and extreme weather events. There is growing awareness that risk drivers, such as badly planned and managed urban development, environmental degradation, climate change and poverty, are key societal challenges that also negatively affect business performance. In response to the increased pressure on ecosystems and natural resources, increased demands on

food and other commodities as well as the economic crisis that the world has been facing, some businesses have adopted the concept and the practices of green economy which is described as low carbon, resource efficient and socially inclusive, that prevents the loss of biodiversity and ecosystem services and contribute to poverty alleviation (UNEP, 2012).

This practice is further enhanced by the realization that by involving directly, beyond one-off financial and in-kind contributions in humanitarian and sustainable development activities, the businesses can project enhanced reputation and brand visibility, improve government relationships and stakeholder perceptions, maintain positive effects on staff motivation and retention, and create new business opportunities (CSR Asia, 2013).

In this section will try to glean how private sector has endeavored to incorporate DRR practices and highlight current practices and cite relevant examples, when possible, of such undertakings, especially focusing on pertinent sectors such as Risk Insurance, Tourism, Agribusiness and Infrastructure.

3.3.1 Integration Efforts by Private Sector

As highlighted in the UNEP-UNISDR joint report in contribution to Global Assessment Report on DRR 'Opportunities in Environmental Management for Disaster Risk Reduction: Recent Progress', the general indicator of progress for DRR is investment into green development (UNEP). Eco-netting, for instance, has proven effective at erosion control and reducing landslide risk, whereas coastal afforestation complements the use of human-made sea-walls. In Darfur, turf roofs were used to deal better with temperature extremes inside dwellings and fuel-efficient stove projects aimed to limit localized deforestation and reduce hazards risks (flooding and droughts). Instruments such as carbon markets present opportunities for DRR by offering funding through climate change mitigation projects that have dual benefits of CCA and DRR, at the same time increasing the recognized value of preserving forest ecosystems.

Some advances can also be seen in new and innovative research and studies that attend to environmental management and DRR concerns. For example, the insurance company AXA Group, thorough its AXA Research Fund (RF), provides philanthropic support for research focused on understanding and preventing the risks threatening the environment, human life and the societies. Since 2007, 186 partner academic institutions have partnered with AXARF to conduct studies covering such topics as climate change, weather hazards, volcanic and seismic risks, biodiversity and more (www.axa-research.org).

Specific sectors where progress has been observed are discussed below.

Insurance Sector

Within the insurance industry, attempts have been made to leverage public finance with the private funds particularly in agricultural sector, for tailored made index-based insurance programmes to transfer risk that provides a safety net for smallholder farmers in the event of crop damage by adverse weather conditions, but it is also a valuable tool for unlocking rural farm input credit.

According to Annual Global Climate and Catastrophe Report of Impact Forecasting⁶⁷, by the global insurance intermediary Aon Benfield, in 2013, despite 86 percent of all economic losses occurred outside the U.S., the country accounted for 45 percent of all insured losses globally due to its greater insurance penetration. The May/June floods in Central Europe were the costliest single event of the year causing an estimated USD5.3 billion insured loss and approximately USD22 billion in economic losses. The top 10 insured loss events in 2013 were five severe weather outbreaks (four in the U.S.), two European windstorms Christian and Xaver in Europe, two floods (Europe and Canada), and losses emanating from drought conditions in the U.S. (Aon Benfield, 2014)⁶⁸. The findings above revealed two distinct patterns of insurance as a risk transfer mechanism worldwide: firstly DRR related insurances are concentrated mainly in first world or developed countries and secondly there is a need to beefed up such risk mitigation schemes in developing and underdeveloped countries in order to help create more resilient communities.

Based on these accounts as well as taking into consideration the potential rise in frequency and intensity of natural hazards by also due to extreme climate events, climate change is also increasingly being perceived by the insurance companies as a challenge, most notably in property insurance. But how much of that has been translated into covering risks generated by natural hazards is elusive. Nonetheless, encouraging signs can be seen as the insurers view measures such as flood control, land-use regulation and improved infrastructure performances as high priority issues in climate insurance practices. Even more heartening is the pursue of innovative public-private initiatives promoted by financial institutions (like World Bank and ADB), international donors and insurance companies to pool the management resources to weather variability and climate extreme as well as transfer of risks to global capital market (Geneva report, 2009).

One instance is the increase in coordinated efforts to encourage the integration of Environmental, Social and Governance (ESG) factors into firms' valuation and investment making processes with many institutional investors signing up to the

⁶⁷ The report is downloadable at http://thoughtleadership.aonbenfield.com/Documents/20140113_ab_if_annual_climate_catastrophe_report.pdf -5.03.14

⁶⁸ Aon Benfield. 2014. Annual Global Climate and Catastrophe Report: Impact Forecasting 2013. Impact Forecasti, Aon Benfield, Chicago, Illinois.-5.03.14

Principles of Responsible Investment (PRI)⁶⁹ and ClimateWise Principles⁷⁰ which include incorporating climate change into investment decisions (ClimateWise, 2013), backed by ClimateWise: the global insurance industry's leadership group to drive action on climate change risk.

A noteworthy device: Sustainable Insurance, established under UN Environment Programme Finance Initiative (UNEP FI), has been advocated as a strategic approach where all activities in the insurance value chain, including interactions with stakeholders, are done in a responsible and forward-looking way by identifying, assessing, managing and monitoring risks and opportunities associated with environmental, social and governance issues. It tackles the risks and threats pertaining to the loss of biological diversity and the growing pressures on forests, freshwater and other essential ecosystems.

Box 12: UN Environment Programme Finance Initiative (UNEP FI) and Sustainable Insurance⁷¹

UN Environment Programme's Finance Initiative (UNEP FI) was the catalyst in establishing four overarching Principles for Sustainable Insurance for the global insurance industry the Rio+20 Summit in June 2012 that tailor to the needs and aspirations of the insurance industry and the clients and citizens it serves. Via UNEP FI, UNEP works with over 200 banks, insurance companies and investment firms to understand the impacts of environmental, social and governance issues on financial performance and sustainable development. Through a comprehensive work programme spanning research, policy engagement, capacity building, global events and regional activities, UNEP FI carries out its mission to identify, promote and realize the adoption of best environmental and sustainability practice at all levels of financial institution operations. The Sustainable Insurance provides a holistic approach to managing a wide range of global and emerging risks in the insurance business, from climate change and natural disasters to water scarcity, food insecurity and pandemics. They represent the first-ever global sustainability framework tailored for the insurance industry that takes into account the fundamental economic value of natural capital, social capital and good governance.

⁶⁹ Principles for Responsible Investments are (<http://www.unpri.org/about-pri/the-six-principles/>):

Principle 1: We will incorporate ESG issues into investment analysis and decision-making processes.

Principle 2: We will be active owners and incorporate ESG issues into our ownership policies and practices.

Principle 3: We will seek appropriate disclosure on ESG issues by the entities in which we invest.

Principle 4: We will promote acceptance and implementation of the Principles within the investment industry.

Principle 5: We will work together to enhance our effectiveness in implementing the Principles.

Principle 6: We will each report on our activities and progress towards implementing the Principles.

⁷⁰ ClimateWise Principle 4: Incorporate Climate Change into our investment decisions

- Consider the implications of climate change for company performance and shareholder value, and incorporate the information into our investment decision-making.
- Encourage appropriate disclosure on climate change from the companies in which we invest.
- Encourage improvements in the energy-efficiency and climate resilience of our investment property portfolio.
- Communicate our investment beliefs and strategy on climate change to our customers and shareholders.
- Share our assessment of the impacts of climate change with our pension fund trustees.

⁷¹ www.unepfi.org

Tourism Sector

In addressing the interrelated risks spawned by natural disasters and environmental mismanagement, the tourism sector has adopted eco-friendly risk reduction practices in line with eco-tourism, promoting investments in building resilient communities, environmental protection and local culture to be on the agenda of large hotel chains, airlines and tour operators (UNWTO, 2011). Specifically for small island countries and nations relying on coastal tourism as their key GDP generators, one hotelier in Antigua and Barbuda noted that the coastal area in which her hotel operates faced constant flooding, as well as, significant beach erosion due to the clearing of the mangrove swamps to make way for the construction of the country's premier harbour complex and marina (Mahon et al, 2013).

In Maldives, coastal erosion, often associated with damage to vegetation due to human activities, has made many areas vulnerable to flooding especially during storms. Based on the past experiences, a shift has now occurred in terms of leaving some of the original vegetation intact instead of cutting down to make place for construction of resorts; but as an alternative the resort structures are built around them. Environmental management in a broader sense maintains the integrity of the ecosystem with positive effects on resilience. Still, the pace and the degree of DRR integration into eco-tourism or sustainable tourism practices, as of now, are intermittent.

Agricultural Sector

In combating the rising trends of interrelating threats presented by natural hazards and environmental degradation, private operators in agricultural sector are engaging in or embracing inventive solutions in areas summarized underneath.

- ***Organic farming:*** Based on the standards set by standards set by the International Federation of Organic Agriculture Movements (IFOAM), organic farming is a form of agriculture that relies on techniques such as crop rotation, green manure, compost, and biological pest control, sustainable practices are adopted throughout the entire production and supply chains. Many players are involved in making organic farming possible: from large scale organic fertilizer and biological pesticide producers, livestock companies, big supermarket chains that sell organic produces to local level small scale farmers and neighbourhood farmer market stall owners.
- ***Hazard resistant crops:*** Certain agricultural based companies are working on launching or improving the already existing flood and drought resistant crops. Monsanto, a multinational chemical and agricultural biotechnology corporation headquartered in Creve Coeur, Missouri, has

launched its first commercially available transgenic (GM) drought tolerant crop DEKALB Genuity Drought Gard Hybrids in 2013⁷². Companies such as BASF (Germany), Syngenta (Switzerland) and Bayer (Germany) are also developing drought resistant seeds and crops. In Asia, this effort is mainly undertaken by Philippine-based International Rice Research Institute (IRRI) that is developing rice varieties that can withstand drought, flood, heat,

Box 13: Weather Index Insurance Scheme in Thailand

In Thailand, Sompo Japan Thailand, a subsidiary of the Japanese insurance agency Sompo Japan, and the Thai financial agency Bank for Agriculture and Agricultural Co-operatives (BAAC) are currently providing 'Weather Index Insurance' for drought risk in selected Thai provinces. Sompo Japan Thailand started selling insurance contracts in January 2010, with BAAC acting as an intermediary between Sompo Japan Thailand and local rice farmers. The insurance contracts, developed in conjunction with the Japan Bank for International Co-operation (JBIC), have been designed to pay out to farmers in the event of drought. Drought is indicated, and payouts triggered, if the observed accumulated rainfall over the period from July to September falls below a pre-determined set level (Sompo Japan, 2010).

The trial was launched in one Thai province in 2010 and expanded into four additional provinces in 2011, with over six thousand insurance contracts issued in 2011. The trial is set to run until January 2012, when Sompo Japan Thailand intends to review the outcomes of the trial and will consider revising the insurance product, diversifying the types of crops for which it is available, and expanding its availability in other Thai provinces and in other Southeast Asian countries (Sompo Japan, 2011).

- ***Weather index insurance schemes:*** Some leading insurance and reinsurance companies are offering weather index insurance schemes to protect the livelihoods of vulnerable farmer communities such as Swiss Re starting in India in 2004, in collaboration with a micro-finance institution and a local insurer where a total of 350,000 policies have since been sold to smallholder farmers.
- ***Research:*** Research and development by business sector to comprehensively study the compound risks of environment and natural hazard on agricultural sector could be seen in IRRI's collaboration with agribusinesses such as fertilizer and agricultural equipment companies in Asia in conducting studies on environmental factors on the sector and in creating pioneering solutions such as conservation agriculture technologies.

Infrastructure Sector

A move has been made in the infrastructure sector from employing solely structurally dominant approaches to more natural, environmentally-friendly alternatives to counter risks from environment induced disasters as well as natural hazards. The

⁷² More information available at <http://www.monsanto.com/>.

private utility service providers, in a similar sense, have started to invest in measures that address environmental, natural and climate change risks in unison such as in the case of the Anglian Water of UK that has implemented adaptation measures in response to climate change, particularly in the context of water management and flood prevention by supporting research works on understanding climate change risks, delivering appropriate responses to increased flooding risk, improving the resilience of the water supply network (Anglian Water, 2011).

In Philippines, SM Prime Holdings, Inc. in association with DSGN Associates, JRP Design Inc., D.A. ABCEDE & Associates, New Golden City Builders and Development Corp., is incorporating environmental-focused measures in the construction of a shopping mall SM City Masinag, to minimize environmental impacts on the surrounding community and also to help alleviate their flood problem. Given the mall's proximity to a highly flood-prone area, the design incorporates a 15,000 cubic meter holding tank to reduce the impacts of super typhoons that plague the area. The holding tank is designed to collect rainwater from the mall's roof gutter, driveway and roadway drainage systems, and floodwaters from nearby subdivisions and Marcos Highway and the water is used for various mall purposes, preventing negative impacts of mall water consumption on the local communities.

Another example of the modification of infrastructures to take future droughts and increasing water prices into consideration can be seen in the water cooling system of Rio Tinto Alcan's Yarwun alumina refinery in eastern Australia. The plant's water cooling system was adjusted so that it could use both saltwater and freshwater for cooling purposes. This increases the plant's flexibility and allows it to switch to saltwater cooling during drought periods (Agrawala et al, 2013).

Box 14: Examples of DRR-Environmental Linkages Supported by Businesses

- In Tanzania, the Mwanza Rural Housing Programme (MRHP) created a brick-making programme in 1994 that would address flooding challenges in rural areas by training local villagers on how to use agricultural waste as kiln fuel for brick production. The programme that has resulted in the establishment of over 60 brickmaking enterprises and production of over 400 million bricks, has saved an estimated 110,000 m³ of fuel wood and increased resilience against flooding in the area's housing stock by increasing the use of a stronger building construction material. The programme is fully supported by a public-private partnership between Environmental Resource Management (ERM) Foundation, Nyumba Bora Brick Company (NBBC), Ashden and the Department of Community Development of Tanzania Government. With funding support from ERM Foundation, NBBC was set up to provide business incubation and training through a fee-for service model while Department of Community Development provided consultancy and Ashden provided funding and technical assistance to develop a business plan (MCGI, 2013).
- Based in the Philippines, CocoTech, a private medium sized company that grew from small community-based project, manufactures and markets products derived from waste

coconut husk. Among the company's product range is a coco coir geotextile net (coconet) for erosion control. The net holds soil and seeds, protects vegetative shoots, and promotes re-greening in erosion-prone land formations or areas with environments that are harsh for plants. Derived from natural organic materials, the coconet naturally degrades at a slow rate, which allows plant re-colonization while holding the soil in place. The natural and biodegradable nets can be effectively used in slope protection and the rehabilitation of river and shorelines. The coconet production offers benefits at the grass-root level through providing livelihood opportunities to 6,000 low-income coconut farmers and at the same time it helps reduce the likelihood of disaster-related impacts such as landslides (CSR-Asia, 2013).

- Swiss Re Foundation (of Swiss Re Insurance Company) has been partnering with different NGOs and non-profit agencies to tackle environment and DRR concerns in various countries.
 - In Guatemala, together with Foundation Vivamos Mejor, a community risk management project is being implemented to reduce natural risks through community organisation and training as well as reforestation and sustainable forest use.
 - In Mekong Delta of Vietnam, in collaboration with Swiss Red Cross, the Foundation aims to help poor communities mitigate the impact of natural catastrophes and boost resilience to typhoons and climate change through risk assessment and training.
 - In El Salvador, Swiss Re again teams up with Swiss Red Cross to implement an extension of an earlier Swiss Re-funded initiative. Under the extended project, villages in Bajo Lempa learn to benefit from their new capacities in disaster management, risk reduction and adaptation to climate change as well as improved healthcare (Swiss Re, 2014).
- For the Coca-Cola Company⁷³, water is a strategic priority and they lay a lot of stress on maintaining healthy freshwater systems to attain that goal. In the Mesoamerican Reef catchments of Guatemala and Honduras, Coca Cola partnered with WWF to enhance the health of the Mesoamerican Reef by protecting the upper watershed while providing sustainable livelihoods for local people. The USDA's forest service began working with Coca-Cola, NFF and NFWF in 2012 to restore national resources and wildfire-damaged watersheds. The partners rehabilitated stream channels impacted by severe wildfires to provide clean water for the greater Denver areas and returned water to its natural flow through a meadow in California's Sierra Nevada Mountains, which improved the watershed that supplies the East Bay area.

Challenges

The following discussion points stress the gaps, limitations and challenges hampering the DRR-environment-climate change integration in private sector.

- **Financial short-termism** is one major obstacle preventing many businesses to concentrate more on long term benefits and stability than on short term profit making that ends up with businesses committing only through one-off donations

⁷³ <http://worldwildlife.org/projects/wwf-coca-cola-s-work-to-serve-fresh-water>

and ad-hoc contributions. Resource constraints faced, especially by Small and Medium Enterprises (SMEs) also hinders process of integration of DRR strategies.

- **Inadequate linkage between environment, DRR and climate change** that result in many of the interventions are taking place separately, confined to each sector. In addition, the business case for mainstreaming of DRR into green economy or climate change adaptation has not been clearly demonstrated nor communicated (UNEP, 2012).
- **Public-private sector divide** that hamper any long-lasting public-private partnerships that are the crucial element in strengthening business' engagement in countering the composite threats of natural hazards, environment and climate change.
- **Lack of commitment** on the part of top management of private enterprises can lead to less concerned over any DRR, climate change or environmental issues and reluctant to allocate adequate financial, technological and human resources to implement the relevant practices.

3.4 Key Result 4

Is there more scientific evidence base being generated on the effectiveness of an ecosystem based approach to disaster management

3.4.1 Ecosystem Based DRR and Adaptation

Ecosystem- based disaster risk reduction (Eco-DRR) is the sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development (Renaud et. al, 2013). Eco-DRR is a strategy consistent with the ecosystem approach of the Convention on Biological Diversity⁷⁴, for the integrated management of land, water and living resources for human benefits as well as conservation goals. Also, the emerging adaptation approaches, both Ecosystem and Community-Based, can offer a unique vehicle to integrate collective action around disaster risk reduction and sustainable livelihoods.

⁷⁴ The UN Convention of Biological Diversity, has defined ecosystem-based adaptation as 'the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change as part of an overall adaptation strategy' (CBD, 2009). This was further elaborated to include the 'sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities' (CBD, 2010).

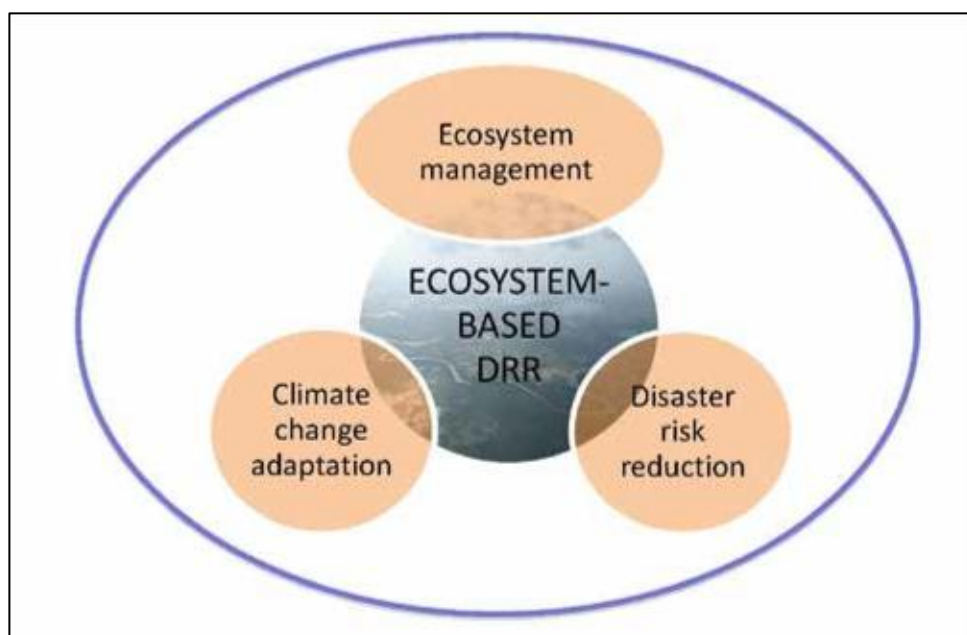


Image 3: Ecosystem Based Adaptation and DRR (PEDRR)

Sustainable ecosystem management has an important role in regulating and mitigating hazards, controlling exposure and reducing vulnerability. Investments in sustainable ecosystem management can offer cost-effective solutions to reducing vulnerability to disasters (IUCN, 2011). Though difficult to assess in economic terms, the regulating services of ecosystems may form the largest portion of the total economic value of ecosystem services. The International Federation of Red Cross and Red Crescent Societies (IFRC) has estimated that mangrove restoration is seven times cheaper than maintaining dykes as a mitigation measure against the impacts of tropical cyclones, in Vietnam. The management of protection forests in the Swiss Alps is approximately 5 to 10 times less expensive than the construction and maintenance of technical measures. In monetary terms, the risk reduction, provided by forests against risks of rock falls to the roads, corresponds to approximately 1,000 USD per ha per year (Wehrli and Dorren, 2013).

Ecosystem management approaches to DRR and adaptation are low-cost, no-regret solutions, providing benefits for multiple sectors –but still they are often not considered in the menu of options especially for DRR. The IPCC Special Report (2012) as well as the latest IPCC report (WG II AR 5) have mentioned that engineered and technological options are commonly implemented adaptive responses, there is increasing recognition of the value of social, institutional, and ecosystem-based measures for adaptation.

In the field of CCA, though there has been more focus on Ecosystem based Adaptation (EbA) by the recent and acknowledged under the auspices of the Nairobi Work Programme of the UNFCCC, still much more needs to be done at the operational level (Renaud et.al, 2013). This was also valid in case of EU, where, although, recognition is given to the benefits provided by ecosystem-based actions, such as benefits of protected areas, ecological connectivity and ecosystems as carbon stores, but little specific mention is made of actions for their implementation

(Naumann et. al 2011)⁷⁵.

Many initiatives by various international, national and non-governmental organizations as well as the scientific studies carried out focus on how ecosystems management has an important role to play in DRR strategies. A few important examples are given below:

Well-managed ecosystems can reduce the impact of many natural hazards, such as landslides, flooding, avalanches and storm surges.

- In Switzerland, mountain forests are managed for protection against avalanches and rockfall (ProAct Network, 2008).
- 'Making Space for Water' initiatives in Germany, Netherlands and UK are restoring wetlands and river channels to improve their water retention capacity, instead of building expensive infrastructure⁷⁶.
- In Roche Calman Sanctuary, Mahe, Seychelles, it was found that a well functioning and restored wetland successfully prevents floods.⁷⁷
- Restoration of Manalana Wetlands in Mpumalanga (Midgely et al, 2012), South Africa helped in controlling erosion and streamflow regulation.⁷⁸
- In the Tacana Watersheds in Guatemala, demonstration projects helped the region recover from flood damage and adapt to the expected effects of climate change (Annex 4) (IUCN, 2012).

Ecosystems also reduce disaster risk by reducing social-economic vulnerability to hazard impacts as ecosystems sustain human livelihoods and provide essential goods such as food, fibre, medicines and construction materials, which are equally important for strengthening human security and resilience against disasters. For example, in addition to providing coastal hazard protection, mangroves, coral reefs and seagrass beds are generally important resources for local livelihoods, as they support fishing and tourism activities (Campbell et al, 2009).

- In Tanzania, conservation of coastal ecosystems is improving the livelihoods of people in Bagamoyo-Pangani and Menai Bay Seascapes⁷⁹.
- In China, wetlands in Hubei province are being restored to achieve flood prevention while providing other social and economic benefits such as enhanced biodiversity, increased income from fisheries by 20-30% and improved water quality to drinkable levels (PEDRR, 2011).
- CARE Ecuador implemented a GEF funded project (PRAA), which helped to increase adaptive capacities of communities impacted by rapid glacier retreat in the high Andes in Bolivia, Peru and Ecuador. Partners for resilience implemented a project to reduce vulnerability and build resilience of communities living within Mahanadi Delta, Odisha and Gandak- Kosi

⁷⁵ http://ec.europa.eu/environment/nature/climatechange/pdf/EbA_EBM_CC_FinalReport.pdf - 20.03.14

⁷⁶ <http://www.deltacommissie.com/en/advies-20.03.14>

⁷⁷ <http://www.mangrovesforthe future.org/news-and-media/news/seychelles/2014/wetlands-in-seychelles-proves-successful-against-flooding/-21.03.14>

⁷⁸ http://unfccc.int/files/secretariat/momentum_for_change/application/pdf/biodiversity_climate_change_sustainable_development_technical_report.pdf -22.03.14

⁷⁹ <http://www.sanbi.org/sites/default/files/documents/documents/biodiversity-climate-change-and-sustainable-development.pdf> -21.03.14

floodplains, Bihar through ecosystem restoration, disaster risk reduction and climate change adaptation. (Annex 4).

Ecosystems also contribute in post disaster recovery and form an essential part of local coping and recovery strategies as affected communities especially in poor, rural areas often turn to their surrounding environment to meet immediate needs. But, this important role of ecosystems in supporting local recovery is generally poorly acknowledged in post-disaster interventions as well as in long-term prevention strategies (PEDRR, 2011).

3.4.2 Scientific Evidence Base for Ecosystem Based DRR and Adaptation

In the past decade, as has been illustrated earlier, especially after the Indian Ocean Tsunami of 2004, international attention on ecosystem-based approaches towards disaster prevention and risk reduction has been amplified. There has been progress in scientific analysis and research on ecosystem based DRR, which has given enough empirical evidence that Eco-DRR works at many levels. The recent IPCC assessment report (IPCC, 2014) also confirmed that the number of scientific publications available for assessing climate-change impacts, adaptation, and vulnerability more than doubled between 2005 and 2010, with especially rapid increases in publications related to adaptation.

Eco-DRR as well as EbA are also being enthusiastically promoted by conservation and development organisations that recognise the integral relationship between ecosystems and livelihoods. As a result there are numerous anecdotal case studies of its apparent success, which are informative, and provide evidence that people are using ecosystems to adapt, but they largely lack a scientific assessment and provide rather limited insight in terms of measuring and evaluating the effectiveness of eco-DRR and adaptation, especially when compared with technical or structural adaptation interventions.

In order to give a methodical overview of the state of the evidence base for Eco-DRR an attempt was made to summarize the findings of searches on relevant and important peer-reviewed published journal papers and selection of grey literature (i.e. published and unpublished documents that do not pass through the scientific peer-review system). A more rigorous, comprehensive, systematic and planned exercise will help to analyse the knowledge gaps, which in turn might help the policymakers to compare Eco-DRR with other adaptation options.

Most of the non- scientific or 'grey' literature that has highlighted and developed a case for Ecosystem based DRR, in the past decade has come from various UN, Multilateral and Bilateral funding agencies and International NGOs that are active in the field of implementation of Eco-system Based DRR. Recently '**The Role of Ecosystems in Disaster Risk Reduction, 2013**' was developed by Partnership for Environment and Disaster Risk Reduction (PEDRR) and co-edited by United Nations University Institute for Environment and Human Security (UNU-EHS), IUCN's Commission on Ecosystem Management and the United Nations Environment Programme (UNEP). This book scientifically demonstrates that healthy ecosystems offer protection and resources for resisting and surviving disasters. There are other reports, articles, case studies and websites, which center on showcasing the various programmes and projects on ecosystem based DRR and adaptation that have been implemented by different agencies around the world. The most relevant ones are

listed in the table 4 and indicate the important work that has been carried out on Ecosystem based DRR and Adaptation in the last decade.

For analyzing the peer reviewed technical papers on Eco-DRR, which give a comprehensive scientific base, Google scholar and database on ScienceDirect (www.sciencedirect.com) was used to infer the scientific evidence base that is being generated and their area of focus. ScienceDirect database showed a steady progression in the number of scientific papers in journals and books, from 136 in 2005 to 637 in 2013 articles and papers, when searched for the broad research area of 'Ecosystem based DRR', for the last decade. Both on Google scholar and ScienceDirect, there were substantial number of scientific papers on coastal zone ecosystems and their importance in DRR and CCA. Ecosystem based Adaptation to Climate Change was also an important theme in the technical papers. Linking livelihoods and ecosystems for enhanced disaster management and community based DRR were featured prominently followed by role of watersheds and wetlands in DRR and CCA.

Books, treatise and series have been developed recently which concentrate on Environment and DRR, coastal protection, CCA incorporate many relevant scientific studies that have been carried out on Ecosystem based DRR and adaptation. Some relevant ones are:

- Climate Adaptation Futures, 2013, Wiley Blackwell
- Community, Environment and Disaster Risk Management Series, Emerald group Publishing Limited
- Natural Coastal Protection Series: Report 1,2 and 3, 2012 & 2013, The Nature Conservancy and Wetlands International
- Integrating Ecology and Poverty Reduction: Ecological Dimensions, 2012, Springer
- Treatise on Estuarine and Coastal Science, 2011, Elsevier Inc.

Journals in biological, ecological and environmental sciences such as Nature, Ecology and Society, Ecosystem Services, Environmental Science & Policy, Estuarine, Coastal and Shelf Science, Frontiers in Ecology and the Environment, Coastal Management, Ecological Economics, Ecological Indicators, Journal of Environmental Management, Science of Total Environment etc. are some of the prominent journals which have published scientific works related to various aspects of Ecosystem based DRR and adaptation in the last decade. Another journals such as Water Policy, Journal of Hydrology, International journal of River Basin Management etc. focusing on water related issues and Climatic Change, Climate Vulnerability, Global Environmental Change, Natural Hazards and Natural Hazards & Earth System Sciences on climate change and hazards also carried studies relating ecosystems management and DRR and CCA agendas. There is definitely increasing attention being paid by the scientific community for ecosystems based DRR and adaptation as confirmed by the recent IPCC report and more work is also being produced by developing countries (IPCC, 2014). However, bridging the science policy divide is still a challenge. Also multi-disciplinary and inter- disciplinary approaches, over broader time and spatial scales, are needed for more concrete results for showcasing the value of Ecosystem based DRR.

Table 4: Relevant 'Grey' Literature on Ecosystem Based DRR and Adaptation

Publications (Relevant Reports/Books/ Articles)	Organizations
Adaptation Good Practices (http://www.apan-gan.net/adaptation-practices)	Asia Pacific Adaptation Network
Ecosystem-based approaches to adaptation and mitigation – good practice examples and lessons learned in Europe, 2011	Bundesamt für Naturschutz (BfN) Federal Agency for Nature Conservation
World Risk Reports (http://www.worldriskreport.com)	Bündnis Entwicklung Hilft (Alliance Development Works) with UNU-EHS
<ul style="list-style-type: none"> Participatory Monitoring, Evaluation, Reflection and Learning for Community-based Adaptation: A Manual for Local Practitioners, 2012 Participatory Scenario Planning Brief: Decision-making for climate resilient livelihoods and risk reduction: a participatory scenario planning approach⁸⁰, 2013 	CARE International
ELAN case studies on adaptation practices (http://elanadapt.net/) Integrating Community and Ecosystem-Based Approaches in Climate Change Adaptation Responses	Ecosystems and Livelihoods Adaptation Network
<ul style="list-style-type: none"> Ecosystem-based Adaptation- Science for Environment Policy, March 2013 Issue 37, EC Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe, 2011 Ecosystem Approach to DRR; Basic concepts and recommendations to governments, with a special focus on Europe , 2013 	European Commission
The Role of Coastal Forests in the Mitigation of Tsunami Impacts, 2007 Forests and Floods: Drowning in Fiction or Thriving on Facts? RAP Publication 2005/03, Forest Perspective 2.	Food and Agriculture Organization
Manual on Guidelines for Rehabilitation of Coastal Forests damaged by Natural Hazards in the Asia-Pacific Region, 2009	International Society for Mangrove Ecosystems (ISME) and International Tropical Timber Organization (ITTO)
<ul style="list-style-type: none"> Ecosystems, Livelihoods and Disasters: An Integrated Approach to Disaster risk management, 2006 Environmental Guidance Note for Disaster Risk Reduction; Healthy Ecosystems for Human Security, 2009 Ecosystem-based Adaptation: A natural response to climate change, 2009 The Ecosystem Approach: Learning from Experience. IUCN, 2009 Environment as infrastructure: Resilience to climate change impacts on water through investments in nature, 2009 Building Resilience to Climate Change: Ecosystem-based Adaptation and lessons from the field, 2010 Water and Nature Initiative Case studies (http://www.iucn.org/about/work/programmes/water/resources/wp_resources_case_studies/) Tacaná Watersheds Guatemala & Mexico; Transboundary water governance and implementation of IWRM through local community action, 2012 	International Union for Conservation of Nature (IUCN)

⁸⁰ http://www.careclimatechange.org/files/adaptation/ALP_PSP_Brief.pdf

Natural Solutions: Protected areas helping people cope with climate change	IUCN- WCPA, TNC, UNDP, WCS, The World Bank and WWF
Ecosystems and Human Well-being: Synthesis, 2005	Millennium Ecosystem Assessment
Ecosystem approach to Disaster Risk Reduction, 2012	National Institute for Disaster Management, India
The Role of Ecosystems in Disaster Risk Reduction, 2013	PEDRR (UNU, UNEP, IUCN-CSM)
The Role of Environmental Management and Eco-engineering in Disaster Risk Reduction and Climate Change Adaptation, 2008	ProAct Network
Ramsar Convention, Technical Report series http://www.ramsar.org/cda/en/ramsar-pubs-reports-tech-rpts/main/ramsar/1-30-99^21374_4000_0	Ramsar Convention
Urban Areas and Watershed Services: Strategies for Ecosystem Management and Urban Risk Reduction, 2014 http://dx.doi.org/10.7711/feemre3.2014.03.003	Review of Environment, Energy and Economics (Re3), The Nature Conservancy (TNC)
<ul style="list-style-type: none"> • Natural Coastal Protection: Coastal Ecosystems Reducing Risks from Natural Hazards and Climate Change, 2012 • Modeling and Abating the Impacts of Sea Level Rise on Five Significant Estuarine Systems in the Gulf of Mexico, Final Report to the U.S. Environmental Protection Agency – Gulf of Mexico Program, Project, 2013. • A series of publication on coastal ecosystems • http://coastalresilience.org/science/reports-and-publications 	
Ecosystem Goods and Services in Development Planning: A Good Practice Guide, 2010	UNCBD
<ul style="list-style-type: none"> • Environment and Disaster Risk: Emerging Perspectives, 2009 • Risk and Vulnerability Assessment Methodology Development Project (RIVAMP): Linking Ecosystems to Risk and Vulnerability Reduction. The Case of Jamaica. Results of the Pilot Assessment, 2010 • The Role of Ecosystem Management in Climate Change Adaptation and Disaster Risk Reduction. Issues Paper prepared for the Global Platform for Disaster Risk Reduction, June 2009 	UNEP
A Toolkit for Integrating Disaster Risk Reduction and Climate Change Adaptation into Ecosystem Management of Coastal and Marine Areas in South Asia, 2012	UNISDR/UNDP
<ul style="list-style-type: none"> • Ecosystem-based approaches to adaptation: compilation of information, 2011 • Database on ecosystem-based approaches to adaptation https://unfccc.int/adaptation/nairobi_work_programme/knowledge_resources_and_publications/items/6227.php 	UNFCCC
Urban Areas and Watershed Services: Strategies for Ecosystem Management and Urban Risk Reduction, 2014 ⁸¹	Review of Environment, Energy and Economics (Re3),

⁸¹ <http://dx.doi.org/10.7711/feemre3.2014.03.003>

<ul style="list-style-type: none"> Natural Security. Protected Areas and Hazard Mitigation. The Arguments for Protection Series, 2008 Viet Nam Case Study from Field Testing an Operational Framework for Ecosystem-based Adaptation, 2013 	WWF
<ul style="list-style-type: none"> Building with nature for coastal resilience, 2013 Criteria for Ecosystem-Smart Disaster Risk Reduction and Climate Change Adaptation, 2012 	Wetlands International
<ul style="list-style-type: none"> Putting community resilience into practice, 2013 	Partners for Resilience
Convenient solutions to an inconvenient truth: ecosystem-based approaches to climate change, 2010	World bank
<ul style="list-style-type: none"> ECOSYSTEMS AND HUMAN WELL-BEING: WETLANDS AND WATER Synthesis, 2005 Reefs at Risk Revisited in the Coral Triangle, 2012 	World Resources Institute

From this preliminary research we could infer that there is growing scientific interest, which is generating more scientific evidence in the field of Eco-DRR and EbA. But, though there are scientific studies pointing out to the benefits of ecosystems based DRR, and the growing interest and database on scientific evidence, this evidence is often dispersed across a range of related fields, such as natural resource management, disaster risk reduction, climate change and ecological and social sciences. There has been little attempt to systematically assemble and analyse this scientific evidence, which hampers in identification of knowledge gaps both for the research community and the policy makers (Munroe et al, 2012).

Challenges in implementing Ecosystem Based DRR and Adaptation

Despite this growing scientific evidence relating environmental degradation to increased disaster risk, and that restoring ecosystems can lead to disaster risk reduction, still the progress in operational mainstreaming is slow due to challenges such as:

- There is poor systematic science–policy interaction on ecosystem based DRR, which have led to unclear and sometimes contradictory scientific information on the role of ecosystems for DRR. Scientifically quantifying ecosystem services for DRR and building a strong economic case for ecosystem-based approaches provides a big challenge leading to lack in decision-making on all possible cost-effective DRR options. Challenges also remain in measuring ecosystem thresholds or levels of resilience to various hazards, which is important to assess the risk reduction potential of a given ecosystem and estimating the impact of environmental changes. Only limited information exists on performance thresholds of different ecosystems and levels of ecosystem resilience against environmental change and different hazards (i.e. hazard type, intensity and frequency). Further investment in scientific research on ecosystem services is therefore needed.
- Policy-makers and decision-makers are generally under a lot of pressure to show immediate results from their efforts to protect the public against hazards, but ecosystem-based approaches generally require much longer temporal scales to implement and yield tangible disaster reduction outcomes. There are also clear knowledge gaps in assessing ecosystem capacity to maintain services over time, especially in the context of changing environmental conditions and disturbances (TEEB, 2009). Therefore, engineered structures are quicker and preferred way, besides also providing financial profits for some stakeholders.

- Use of ecosystems services is limited where land is scarce. This is especially true in urban landscapes where setting up 'green' spaces or vegetative buffers, for DRR properties, is not applicable sometimes due to lack of space.
- Ecosystem management is mostly still considered as a conservation tool but not so much as part of the portfolio of solutions to DRR. Both environmental and disaster management communities have to work in tandem for implementing ecosystem management approaches for DRR, which is difficult as traditionally they have worked independently of each other.
- There is also an issue of mal-adaptation and that risk associated with hazards can become complex and problematic due to mal-adaptation and fragmented understanding of ecosystems, hazards and livelihood linkages. Therefore, adaptation initiatives can only become meaningful, if the role and expertise of resource-dependent communities are recognized and are involved in designing and shaping adaptation measures (Feagin et al, 2010).

3.5 Key Result 5

Is there increasing effort to link between climate change and disaster risk reduction at a systemic level?

Climate change is altering the face of disaster risk, not only through increased weather- related risks and sea-level and temperature rises, but also through increases in societal vulnerabilities, therefore, full agenda for sustainable development must include policies and actions to strengthen DRR and Climate Change.

The fields of DRR and CCA have developed in parallel rather than in a more integrated manner. Essentially the former has focused on addressing existing risks related to all categories of hazards, on the other hand, adaptation has been more concerned with addressing future climate risks. Although at their core both concepts are concerned with disaster risk and their resulting impact on sustainable development, they cover different ranges of disasters and have different interpretations on the immutability of hazards. But CCA and DRR are linked together by their basic aim to reduce the exposure and vulnerability of communities and increasing resilience to the potential adverse impacts of climate extremes in order to achieve sustainable development as suggested by SREX (IPCC, 2012). SREX also found that economic losses from weather- and climate-related disasters have increased, but increasing exposure of people and economic assets has been the major cause of such increases, therefore, most effective adaptation and disaster risk reduction actions are those that offer development benefits in the relatively near term, as well as reductions in vulnerability over the longer term.

Both DRR and CCA have converging political agendas. Governments or regions with current climate vulnerabilities use existing DRR activities to improve their capacity to deal with future climate change (Tearfund, 2008). There is growing recognition of the importance to improve adaptation to future extreme events from climate change which can be addressed through the current knowledge and tools developed through DRR. The integration of the two fields will provide opportunities to strengthen the common parts and improve the management of present and future hazards and risks.

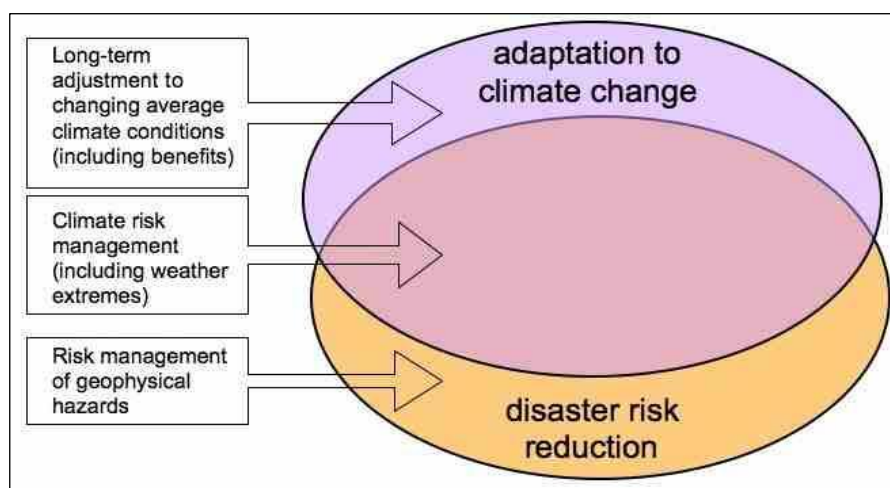


Image 4: Convergence of DRR and CCA (Mitchell et. al, 2008)

3.5.1 Integration of DRR and CCA at International Level

Although there are challenges, there is definitely more attention being paid to converging these agendas both conceptually and in practice at the international, national and sub-national levels. The latest IPCC report (WG II AR5) mentions that adaptation is becoming embedded in some planning processes but with more limited implementation of responses and governments at various levels are starting to develop adaptation plans and policies and to integrate climate-change considerations into broader development plans (IPCC, 2014). With the threat of increased disasters from climate change, countries are taking steps to reduce their vulnerability to weather and climatic hazards, such as floods, cyclones, heatwaves and droughts, using DRR strategies. This has been mainly spurred on by UNFCCC processes, which have assimilated components of DRR, such as:

- **Nairobi Work Programme** was one of the first to look into DRR agenda, formulated in 2006 at Conference of Parties (COP) 12, to help countries improve their understanding of climate change impacts and vulnerability and to increase their ability to make informed decisions on how to adapt successfully (UNFCCC, 2007). The 28th session of Subsidiary Body for Scientific and Technological Advice⁸², (SBSTA) emphasized that the practices, tools and systems for climate risk assessment and management and DRR strategies included in HFA should be incorporated into the Nairobi Work Programme.
- **Bali Action Plan**⁸³ adopted at COP 13, in 2007, prominently featured DRR,

⁸² <http://unfccc.int/resource/docs/2008/sbsta/eng/l13r01.pdf> (17.01.2014)

⁸³ In paragraph 1c, the Bali Action Plan highlights the significance of disaster risk reduction, as part of enhanced action on climate change adaptation, including, inter alia, consideration of the following: (i) International cooperation to support urgent implementation of adaptation actions, including through vulnerability assessments, prioritization of actions, financial needs assessments, capacity-building and response strategies, integration of adaptation actions into sectoral and national planning, specific projects and programmes, means to incentivize the implementation of adaptation actions, and other ways to enable climate-resilient development and reduce vulnerability of all Parties, taking into account the urgent and immediate needs of developing countries that are particularly vulnerable to the adverse effects of climate change, especially the least developed countries and small island

highlighting it as a critical tool for CCA agenda that reflected a growing recognition of the close linkage between CCA and DRR agendas and the need for the governments to recognize it and use DRR as an effective element of adaptation policy. This document is a crucial landmark for the 'convergence agenda,' recognizing the need for enhanced action on adaptation including "...disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change" (UNFCCC, 2006). The SBSTA in preparation for Poznan, 2008, produced a series of background papers on issues at the interface of DRR and CCA. The session in risk management and risk reduction strategies, including risk sharing and transfer mechanisms focused on the value of DRR and the HFA in supporting CCA in a post-2012 agreement and parties formally recognized the need for a 'common framework' between DRR and adaptation.

- **The Cancun Agreements** in 2010 gave further incentive to integration of DRR strategies, by creating a new **Climate Adaptation Framework** and an associated **Adaptation Committee**. This raised the prominence of adaptation and for a more coherent, action-oriented treatment of adaptation. The framework highlighted both ecological and socio-economic resilience and called for further enhancement of climate change related disaster risk reduction strategies, taking into consideration the HFA where appropriate (UNFCCC, 2010).

Another highlight of the Cancun agreement was a process to enable Least Developed Countries to formulate and implement **National Adaptation Plans (NAPs)**, building upon their experience in preparing and implementing National Adaptation Programmes of Action (NAPAs). NAP Guidelines (UNFCCC, 2010), highlight the value of integrating DRR capacities and tools, in national adaptation planning processes.

- **Warsaw International Mechanism for Loss and Damage**⁸⁴ associated with climate change impacts, was one of the key outcomes and milestones of the COP 19 in Warsaw, 2013 (UNFCCC, 2013). The emerging policy field of 'loss and damage' reveals the relevance of considering adaptation, mitigation and disaster risk reduction alongside one another. 'It recognizes that impacts of climate change have become unavoidable, the ability of nature and society to adapt to impacts is limited, and residual impacts may be irreversible and intolerable. Therefore, the mechanism will work to enhance knowledge and understanding of comprehensive risk management approaches to address loss and damage associated with the adverse effects of climate change, including slow onset

developing States, and further taking into account the needs of countries in Africa affected by drought, desertification and floods. (ii) Risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance. (iii) Disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change. See more at http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf (17.01.14)

⁸⁴ https://unfccc.int/files/meetings/warsaw_nov_2013/decisions/application/pdf/cop19_lossanddamage.pdf (17.01.14)

impacts; strengthening dialogues, coordination, coherence and synergies among relevant stakeholders; and enhancing action and support, including finance, technology, and capacity building to address loss and damage.

Rio+20 also emphasized on the importance of tackling poverty, climate change and disaster risk in an integrated manner. In particular, it called for better-coordinated strategies that integrate DRR and climate change considerations into public and private investment, decision-making and planning of humanitarian, post-recovery, and development actions.⁸⁵

Financial Institutions such as African Development bank, **AfDB**, by introducing **Climate Risk Management and Adaptation Strategy (CRMA)**⁸⁶, in 2009 has managed to prioritize climate change and disaster risk reduction activities to support member countries facing intensified challenges to sustainable development. Its **Climate Change Action Plan**⁸⁷ (2011-2015) has adaptation as one of its main pillars and will focus on increasing investments to promote sustainable land use and water resources management, building the resilience and minimizing climate change related risks to key infrastructure and urban systems, and climate-proofing AfDB's investment projects. Asian Development Bank, **ADB**, was the first multilateral development bank to have a dedicated disaster policy which was reinforced in its '**Strategy 2020**' with DRR, CCA, and risk financing identified as elements of ADB's agenda (ADB, 2013).

Among other multilateral organizations, UNDP's **Climate Risk Management (CRM) programme** assesses the risks associated with climate variability and change and takes into account both the risks triggered by current climate variability and projected climate change trajectories. A **Global Framework for Climate Services**⁸⁸ was established under World Meteorological Organization, in 2011, which incorporates DRR as one of the high priorities to increase disaster resilience. It has a comprehensive multi-sector, multi-hazard, and multi-level (local to global) approach based on appropriate use of meteorological, hydrological and climate information⁸⁹. **World Food Programme** Policy on Climate Change outlines WFP's approach to the impact of climate change on hunger and recommends mainstreaming of climate change and DRR into WFP's operation (WFP, 2011)⁹⁰. As clearly stated in its Policy Perspective Paper 'Disaster risk reduction, climate change adaptation and environmental migration'; to foster sustainable development while making migration a choice, **International Organization for Migration** is engaged in building the resilience of vulnerable countries and communities to a changing climate,

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http://sustainabledevelopment.un.org/content/documents/2301TST%20Issue%20Brief_CC&DRR_FIN_AL.pdf

⁸⁶ <http://www.afdb.org/en/topics-and-sectors/sectors/climate-change/our-strategy> (19.01.14)

⁸⁷ <http://www.afdb.org/en/topics-and-sectors/sectors/climate-change/2011-2015-afdb-action-plan-on-climate-change> (19.01.14)

⁸⁸ See more at <http://www.gfcs-climate.org>

⁸⁹ <http://www.wfp.org/disaster-risk-reduction> 5.01.2014

⁹⁰ <http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp247914.pdf> (7.02.14)

environmental hazards and structural factors (IOM, 2009)⁹¹.

3.5.2 Integration of DRR and climate change mechanisms

- **The Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF)**, two financing mechanisms set up under the UNFCCC and managed by the GEF, incorporate DRR in their guidance. The LDCF focuses on reducing the vulnerability of sectors and resources central to development and livelihoods. Based on its distribution of funds by October 2013, the LDCF has allocated 9% of funding to disaster risk management. The SCCF was established to support adaptation and technology transfer for all developing country parties to the UNFCCC. Although more focused on adaptation than the LDCF, the SCCF only allocated 7% of funding to disaster risk management by October 2013.
- **The Adaptation Fund**, under the guidance of the Adaptation Fund Board (AFB) recognizes DRR related components in projects and funds them as long as they are also linked to national adaptation priorities as expressed in UNFCCC national communications, NAPAs or other national adaptation planning documents.
- **The Climate Investment Funds (CIFs)**, under the World Bank support global climate objectives endorse Pilot Program for Climate Resilience (PPCR), in order to help countries transform to a climate resilient development path, consistent with poverty, risk reduction and sustainable development goals, through national and sectoral planning. The pilot programmes and projects implemented under the PPCR are built on NAPAs and other relevant country studies and strategies and include elements focusing on DRR such as in Zambia PPCR, the objectives include the development of a National Disaster Management Policy.
- **Africa Adaptation Fund** financed by the Government of Japan under the Japan-UNDP Joint Framework for Building Partnership to address climate change in Africa includes better management of extremes including DRR.
- **Green Climate Fund (GCF) was established** at UNFCCC COP 16, Parties, as an operating entity of the financial mechanism of the Convention. The Fund will promote the paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries to limit or reduce their greenhouse gas emissions and to adapt to the impacts of climate change, taking into account the needs of those developing countries particularly vulnerable to the adverse effects of climate change.
- **Global Facility for Disaster Reduction and Recovery (GFDRR)**, under the World Bank supports DRR and risk transfer mechanisms, but the funding available under Track-II and the new initiative on South-South capacity building, explicitly includes adaptation to climate change among their objectives. A policy forum on Climate-Smart Disaster Risk Reduction, held in Stockholm in October 2009 under the GFDRR resulted in a joint communiqué on climate smart disaster risk management signed at high level, committing to integrated delivery of support for adaptation and disaster risk reduction, including incorporation of climate risk into relevant operations and sectors (WB, 2009)
- **Global Environmental Facility** includes DRR as a key perspective under the area: 'Climate Change: Adaptation and Mitigation'; included in **GEF's**

⁹¹ IOM's Policy perspective on 'Disaster Risk Reduction, Climate Change Adaptation & Environmental Migration'

http://www.iom.int/jahia/webdav/shared/shared/mainsite/activities/env_degradation/DRR-CCA-Policy-Paper-Final.pdf (7.02.14)

Adaptation Strategy 2010-2014⁹² as part of the expected outcomes: the incorporation of risk analysis and vulnerability assessment as part of development programs and project planning, the development and application of climate change and variability-induced disaster planning mechanisms and the raising of awareness and involvement of communities in disaster planning, preparedness and prevention.

Box 15: CC DARE

The United Nations Environment Programme/UNDP joint programme funded by the Danish Government – CCDARE – provided financial and technical support to 15 sub-Saharan Africa countries to remove barriers and create opportunities for integrating CCA into national development planning and decision-making frameworks. This was achieved through the provision of targeted, flexible and rapid technical and financial assistance to country specific needs identified nationally. CC DARE was designed to complement and strengthen ongoing and planned country driven CCA and risk management initiatives and built capacity of national institutions to continue the mainstreaming processes beyond the project period. Using the national system and UN country teams as entry points in the countries, a wide range of stakeholders including national institutions, academia, NGOs, community groups, independent experts, and the private sector were involved in implementation. Special emphasis was laid on: Small-scale, short-term activities that can have catalytic effects on the enabling environment for climate risk management; Expanding the number of stakeholders involved in CC and fostering linkages and exchange of information between them and building capacity on a range of the multifaceted dimensions required to integrate CCA responses into projects and development planning and decision-making frameworks (Olhoff, 2011).

3.5.3 Integration of DRR and Climate Change Agenda at Regional, National and Subnational level

Integration at Regional Level

Europe

- In April 2013, the **European Commission adopted a climate change adaptation strategy**⁹³, underlines the close synergies between DRR and CCA, especially in cross-cutting areas such as data and knowledge dissemination, assessment of risks and vulnerabilities, mainstreaming into relevant EU policies and financial instruments, and coherence between national adaptation strategies and national risk management plans (EC, 2013).
- **The South-East European Climate Outlook Forum (SEECOF)** helped sub-regions to develop strong and sustainable working mechanisms to prepare seasonal weather outlooks through the collaboration of climate experts from many countries under the leadership of the South-East European Virtual Climate Change centre (SEEVCCC). The identification of the needs of sectors like water

⁹² <http://www.thegef.org/gef/sites/thegef.org/files/publication/GEF-ADAPTION%20STRATEGIES.pdf>.

⁹³ http://ec.europa.eu/clima/policies/adaptation/what/documentation_en.htm (20.01.14)

management, energy and disaster risk management has been initiated and the awareness of the users in the benefits of seasonal forecasting in their operational planning has been raised. The over- all capacity in utilizing and downscaling of products provided by leading long-range forecasting centres has been significantly improved.

Asia- Pacific

- **The Incheon Declaration of 2010 and the Incheon REMAP** adopted at the 4th Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) identified the integration of DRR and CCA as the key priority focus area to facilitate an effective disaster risk reduction implementation. It also promotes the integration of DRR and CCA into development for green growth, in particular in the areas of urban development, land use planning (UNISDR, 2011).
- The ASEAN Agreement on Disaster Management and Emergency Response (AADMER) and its Work Programme for 2010-2015 focuses on **Building Partnerships between DRR and Climate Change Adaptation** to amplify the synergies between DRR and CCA ⁹⁴
- The SAARC Action Plan on Climate Change was adopted in July 2008. As a follow up, a Road Map on Integration of DRR with Climate Change Adaptation was developed by the SAARC Disaster Management Centre in August 2008⁹⁵.

Box 16: Integration of DRR and CCA in the Pacific region

In the Pacific region, DRR and CCA are increasingly recognized as having a shared aim to reduce the vulnerability of the communities and contribute to sustainable development by improving the ability to better anticipate, resist, prepare for, respond to and recover from the impacts of hazards. Since 2010, several Pacific island countries have developed strategic integrated national approaches (e.g. Tonga, Tuvalu and Cook Islands) or are currently in the process of doing so to reduce more effectively the risks to sustainable national development from multiple hazards or phenomena. The integration of disaster risk reduction, climate change and sustainable development goals (DRR-CC-SDG) has picked up momentum recently in the Pacific and importantly the countries are showing ownership of this approach. There is also a coordinated process for inputs from the DRM and CC communities to the post-2015 consultations on DRR and the preparatory and actual meetings of the Small Island Developing States (SIDS) in 2013 and 2014. National Action Plans for DRM (NAPs) and more recently, the Joint National Action Plans (JNAPs), which address both disaster and climate change risks have been developed.

In the study "Disaster risk reduction and climate change adaptation in the Pacific: an institutional and policy analysis", UNISDR analyzed DRR and CCA integration in seven Pacific island countries- the Cook Islands, the Federated States of Micronesia, Fiji, Palau, Samoa, Tonga and Vanuatu. The results indicate that despite the low level of integration at the operational level, countries are making efforts to develop Joint National Action Plans for DRR and CCA.

⁹⁴ <http://environment.asean.org/wp-content/uploads/2014/02/ANNEX-8-Lead-Countries-for-ASEAN-Action-Plan-on-Joint-Response-to-Climate-Change-27-March-2013.pdf>

⁹⁵ <http://saarc-sdmc.nic.in/pdf/publications/climate/chapter-2.pdf>

- The Sixteenth SAARC Summit held in Thimphu in April 2010 adopted the Thimphu Statement on Climate Change which outlines a number of important initiatives to strengthen and intensify regional cooperation to address the adverse effects of climate change in a focused manner⁹⁶.
- **Pacific Islands Framework for Action on Climate Change (PIFACC) 2006 -2015** was adopted with the vision that "Pacific island people, their livelihoods and the environment resilient to the risks and impacts of climate change." (UNISDR, 2013 b)
- **MRC's Climate Change and Adaptation Initiative (CCAI)**⁹⁷ is a long-term programme aiming to understand and reduce the impacts of climate change on the people and ecosystems of the Lower Mekong Basin, by assisting the governments of Cambodia, Lao PDR, Thailand and Viet Nam in planning for adaptation.
- **The Asia-Pacific Network for Global Change Research (APN)** fosters global environmental change research and promote information exchange on climate-change-related programs and projects within the Asia-Pacific region (DWECA, 2008).
- **The Asia Pacific Adaptation Network (APAN)** is a regional programme for managing and applying adaptation knowledge in the region, and supports governments and other organisations working on adaptation, with special emphases on the management of knowledge and capacity building.

Africa

- **The Secretariat for the Common Market for East and Southern Africa (COMESA)**⁹⁸ developed a comprehensive approach and program initiative to address climate change within the context of its responsibilities and strategy for promotion of the Comprehensive Africa Agriculture Development Programme (CAADP). The overarching goal of the COMESA Climate Initiative is to contribute to the establishment of sustainable landscapes and livelihoods, including adaptation and mitigation to climate change.
- **Action Programme for Adaptation to Climate Change Vulnerability in West Africa** was developed with overall objective "to develop and strengthen the resilience and adaptability of the sub-region to climate change and extreme weather events".
- **The NEPAD Climate Change Fund** established in 2014 aims at supporting implementation measures that address the effects of climate change, particularly adaptation and biodiversity conservation in Africa. It supports innovative actions and strategic projects/interventions that serve as models for building sustainable livelihoods, environmental sustainability and climate change adaptation
- **The Economic Community of Central African States (ECCAS)** has adopted a disaster risk reduction and climate change adaptation policy, which is in alignment with the Africa Programme of Action and the HFA (UNISDR, 2013).
- The SADC Experts Group prepared the **Southern Africa Sub-Regional Framework of Climate Change Programmes** in 2010, in order to emphasise the importance of adaptation to this changing climate (UNISDR, 2013).

⁹⁶ <http://www.saarc-sec.org/userfiles/ThimphuStatementonClimateChange-29April2010.pdf>

⁹⁷ <http://www.mrcmekong.org/about-the-mrc/programmes/climate-change-and-adaptation-initiative/>

⁹⁸ <http://www.comesa.int>

- **Regional Strategy for Climate Change Adaptation for Western Indian Ocean Islands**, which includes areas related to DRR awaits approval by COI ministerial council (UNISDR, 2013).

Americas

- The Climate Smart Community Disaster Management (CSCDM) Programme is an initiative of the CDEMA to promote and build capacity for the inclusion of climate change considerations in community disaster management initiatives in the Caribbean. As such, it contributes to and complements the wider policy environment that guides climate change adaptation and disaster risk reduction in the region, including the CDEMA's **Enhanced Comprehensive Disaster Management Strategy and Programme Framework 2007 – 2012; and the, Climate Change in the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change 2009-2015**, which is being implemented by the Caribbean Community Climate Change Centre (CCCCC). The Caribbean Development Bank, the OAS and CIDA have developed **guidelines to integrate natural hazard and climate change impact assessment in the EIAs and project preparation** in the Caribbean and appraisal process of the Bank and participating countries⁹⁹.
- **The Caribbean Risk Management Initiative (CRMI)** provides a platform for coordinating and sharing knowledge and experiences on disaster risk management and climate change adaptation throughout the Caribbean
- The Department of Sustainable Development of **Organization of American States (OAS) through its Risk Management and Adaptation to Climate Change section (RISK-MACC)**, supports the priorities of OAS Member States in adapting to and managing the increasing risks associated with natural disasters.

Arab region

- Arab Governments through the Council of Arab Ministers Responsible for the Environment (CAMRE) issued **The Arab Ministerial Declaration on Climate Change** in 2007.¹⁰⁰ The Declaration among other recommendations stressed on the potential risks of climate change and called for adaptation programmes to *"include appropriate mechanisms for risks insurance, improvement in the management efficiency of natural resources through the use of appropriate techniques and advanced monitoring, control and early warning systems, as well as adequate preparedness to confront disasters caused by climate change"*. The declaration was followed by **The Arab Framework Action Plan on Climate Change for 2010-2020 (AFAPCC)**, prepared under the auspices of the League of Arab States, CAMRE Technical Secretariat in partnership with ESCWA, the United Nations Environment Programme/Regional Office for West Asia (UNEP/ROWA) and Regional Arab Organizations.

Integration at National and Sub-National levels

There have been considerable but patchy efforts at the national and sub-national level in terms of implementation (as highlighted in section-3). In most of the countries there has been integration and mainstreaming at the policy level

⁹⁹ <http://www.caribank.org/uploads/2012/03/Source-Book5.pdf>

¹⁰⁰ http://www.unisdr.org/files/23612_bookletcbdr.pdf

but operational mainstreaming has been lacking. In the Asia Pacific region, 83% of reporting countries confirmed that they have or are developing CCA strategies and action plans and thirty-two (32) countries (89%) reported that they have established new DRR/DRM/CCA bodies specifically to deal with climate and disaster risks. In the Pacific region, DRR and CCA are increasingly recognized as having a shared aim to reduce the vulnerability of the communities and contribute to sustainable development.¹⁰¹

While many countries such as **Bangladesh, Fiji, Vanuatu** reported considerable progress in integrating DRR and CCA agenda, eighteen countries specifically referred to the need to integrate CCA more fully into the post-2015 disaster risk management framework. These comments included various calls for integration of CCA into national disaster risk management frameworks (**Federated States of Micronesia**), integration of DRR into CCA strategies (**Niger**) and merging CCA and DRR into a joint national action plan (**Fiji**). The harmonisation of CCA and DRR at the programmatic level - rather than within a single framework - was pursued by **Samoa**. **Thailand** has adopted National Strategy for Climate Change Management 2008-2012. This national framework clearly identifies DRR as one of the strategies. One of the countries, most affected by climate change is **Philippines** and it has given strong impetus to integrating DRR and CCA agendas as seen in Box 17.

Box 17: Philippines- Integration of CCA and DRR strategies

The Philippines is one of the most vulnerable states to natural disasters and is thus the one focusing on mainstreaming both CCA and DRR into its development agenda. Philippines' recent legislation has focused on converging CCA and DRR institutions to promote synergy. One of the evidence is the Philippines government's new legislation, the Climate Change Act of 2009, which incorporates climate change concepts into policy and development plans. The newly crafted law considers disasters to be of primary relevance to the overall resilience of the country to climate change and will address climate change impacts through DRR measures. In the overall effort to combat the effects of climate change, DRR will be the primary focus and the framework will concentrate on expanding and upgrading the country's capacity to address and anticipate disasters.

Under the new act, a Climate Change Commission headed by the President of the Philippines will be created as the sole governmental policy-making body on climate change. Its primary function is to 'ensure the mainstreaming of climate change, in synergy with disaster risk reduction, into national, sectoral and local development plans and programmes.' The Act also gives local governments the primary responsibility for planning and implementing local climate change action plans, which will be consistent with national frameworks. The Climate Change in 2009 also resulted in the development of the National Framework Strategy on Climate Change and the National Climate Change Action Plan. These two institutions serve as the basis for climate change planning, research and development, and harmonizing related policies and institutions. The act explicitly recognizes the overlapping objectives between CCA and DRM, declaring that "further recognizing that climate change and disaster risk reduction are closely interrelated and effective disaster risk reduction will enhance climate change adaptive capacity, the State shall integrate disaster risk reduction into climate change programs and initiatives."

For CCA, the Government of **Bangladesh** developed the Bangladesh Climate Change Strategy and Action Plan which identified six thematic areas for action on climate change, one of them being comprehensive disaster management. This framework is being implemented by the Climate Change Unit, which is established under the Ministry of Environment and Forests. The biggest obstacle is the division of ministries overseeing CCA and DRR since the ministries do not currently coordinate to align DRR and CCA policies, programs and projects (Shamsuddoha et.al, 2013).

Since the aftermath of the Indian Ocean tsunami, reducing disaster risks became an important cross-cutting development issue **in Maldives**. Against this background, the government has recently initiated a process to develop a Strategic National Action Plan (SNAP) on disaster risk reduction and climate change adaptation.

In Solomon Islands, the government has brought both the Climate Change Office and National Disaster Management Office under the Ministry of Environment, Conservation and Meteorology, in view of rationalising and strengthening coherence in the design and implementation of adaptation and disaster risk reduction policies. The National Disaster Risk Management Plan explicitly integrates climate change and reflects some NAPA priorities. **In Vanuatu**, the National Advisory Board (NAB) for Disaster Risk Management and Climate Change, simultaneously addresses DRR and CCA and support the mainstreaming of both topics into key sectors.

Indonesian National Council for Climate Change (Dewan Nasional Perubahan Iklim/DNPI) has initiated the integration of DRR into CCA in the formulation of the National Action Plan for Climate Change. Disaster risk reduction is an important part of the **Germany's** sustainability strategy, integrated with its national strategy for adapting to climate change.

Integration at Local level

Till now CCA and DRR joint efforts have been channeled through integrated policies and plans, joint working groups, and comprehensive activities on the ground. Efforts have also been made to integrate DRR and CCA to other sectors such as food security, health, traditional knowledge, gender and humanitarian responses, bringing different communities of practice together at all levels to guide and implement integrated approaches. However, there is still need to build new institutions and governance mechanisms that can help bridge the gap between current policy intentions in National Adaptation Plans and local emergent, self-organized adaptation practices (Girod, 2014).

A review of landscape and community practice, covering a range of local DRR and adaptation projects and governance processes, reveals a wide range of adoption of vulnerability assessment tools, modelling and participatory planning approaches. All point to a greater adoption of DRR practice in adaptation. One shining example is the Province of Albay, in Philippines (Box 31). However, adaptation practice is still incipient in most, and local DRR approaches can constitute effective stepping-stones

Box 18: Province of Albay

In 2008, the Province of Albay in the Philippines was declared a **"Global Local Government Unit (LGU) model for Climate Change Adaptation"** by the UN-ISDR and the World Bank, due to the many innovative approaches, it has launched to tackling disaster risk reduction (DRR) and climate change adaptation (CCA) and continues to integrate CCA into its current DRM structure. Albay is being recognized throughout the world as a local government exemplar in Climate Change Adaptation as it has managed to maintain its record to ensure zero casualties during calamities, due to the good practices it has adopted.

The **Albay in Action on Climate Change (A2C2)** program was launched by the province to incorporate climate-proofing and disaster-proofing into its development. Several programs and activities on promoting and mainstreaming DRR and CCA were initiated such as ; climate smart programs on information and awareness raising; climate smart programs for health, quality education, housing for resettlement, water, sanitation and hygiene; resilient livelihood programs and agriculture, fishery and forestry support; and local policy building.

The Albay Declaration catalyzed the adoption of Philippines' **Climate Change Act of 2009** as well as mainstreaming of climate change into the local and national development policies as both Congressional houses recognized the declaration as the national framework for the mainstreaming of global warming leading to climate change adaptation.

to achieve longer adaptation goals and address future climate risks (Girod, 2014).

3.5.4 Integration of DRR and CCA in Practice Area

There also has been a lot of impetus in integrating and sharing of DRR and CCA tools due to projects and activities of various bilateral funding organizations, international and regional level NGO's. Workshops led by bilateral organizations and research groups such as GTZ, DFID, IDS, IISD and the World Bank have been organized under UN-ISDR Working Group on Climate Change and DRR. Many civil society organizations are also placing emphasis on integrating DRR and CCA tools and humanitarian organizations, such as IFRC, national Red Cross and Red Crescent societies and UNOCHA, have also realized the additional threats of climate change and have started to integrate climate information more systematically into their operations (Mitchell et al, 2010).

Challenges in Integrating DRR and CCA Agendas

- **Differences in the basic concepts and principles of HFA and UNFCCC:**
Although there is much shared language between the UNFCCC and the HFA, the definitions and understanding of key terms differs due to their different aims and objectives. While HFA limits its scope to *"disasters caused by hazards of natural*

origin and related environmental and technological hazards and risks", UNFCCC only talks about human-induced climate change. Even though Regional Platforms address "*cross- boundary risks*", these remain risks from hazards of natural origin and not human-induced hazards. In recent years, the disaster reduction community has energetically engaged in the climate change discussions, offering concepts, tools and methods for adaptation but still the differences in concepts and perspectives persist and hamper the integration (Mace et.al, 2013).

- **Lack of accountability and voluntary nature of HFA:** DRR proponents use the HFA as the international justification and architecture for scaling up DRR efforts in the environmental policy framework and CCA agenda. However, HFA, through with its well-crafted policies, is voluntary and not legally binding and gains little recognition outside the DRR community (ODI, 2012). This weakens the accountability and evaluation mechanisms of most countries to monitor the HFA and thus, only limited information and data is available on implementation of HFA or their outcomes in terms of reducing disaster risk. The Hyogo Monitor has tried to overcome this issue but is based largely on government submissions that tend to be subjective.
- **Lack of funding for DRR:** The singular view of DRR as humanitarian aid also limits the flow of funds towards any mainstreaming efforts by environmental or CCA focused organizations. CCA, on the other hand, is typically funded by environmental departments within bilateral development agencies. Also in CCA field, the reluctance of donor governments to support integration of DRR into CCA agenda stems from the apprehension that it will lead to potentially expensive and complex overlaps. Within regular development financing, especially within budget support and policy dialogues, both adaptation and DRR face the same obstacles: they lack strong demand from recipient countries and are often perceived as donor interests. At national level, while political momentum exists to create new institutional systems, lack of dedicated resources from national budgets hampers the operation of such systems.

3.6 Key Result 6

Is there increasing realization in online and social media on the potential linkages between disaster risk reduction and better management of environmental resources?

This section will underline the current status of media's role in promoting environment, DRR integration, especially the online and social media¹⁰², the challenges in using and in enhancing the use of media in integrating the aspects of environment, climate change and DRR.

¹⁰² The term 'social media' refers to such activities as blogging, networking and information sharing (e.g. Facebook, LinkedIn, chat rooms like Skype, Twitter, ushahidi, MySpace, Google+), collaborative creation of data and information (e.g. Wikipedia) and sharing of audio, photographic and video files (e.g. YouTube, Flickr, Instagram). Other forms of media are broadcast media (e.g. TV, film, radio), print media (e.g. paper-based materials, images, texts) outdoor media (e.g. billboards) and digital media (e.g. internet, mobile).

3.6.1 Role of Media in Environment-DRR-Climate Change Linkage

"Social media have become the latest, hottest tools in natural history circles as scientists confront a populace that knows laptops better than landscapes. In the quest to give communities a grasp on complex ecological systems — particularly as they face decisions imposed by climate change — social networking promises to link scientists with the public, empowering naturalist armies to act on their behalf."

Caroline Fraser for Environment 360

In linking DRR, environmental management and climate change, the common factor is 'community resilience building' that calls for integration of all three sectors, under the umbrella of sustainable development. In this aspect, the traditional role of media has always been to support the information, education and communication (IEC) activities. The digital media like mobile and internet are becoming vital in researching and disseminating information, including dispatch of instant warnings through e-mail and SMS (e.g. Pacific Disaster Center's World Disaster Alert, 'wild fire app red cross' by American red cross).

Social Media

Social media is a most general term that holds together blogs, micro-blogs, forums, audio-photo-video-sharing, wikis, social bookmarking, social networking and other digital tools and applications that facilitate interactive communication and content exchange among and between individuals, audiences, publics, organizations. On the

Box 19: How Social media can help in Community Resilience Building? (Dufty, 2012)

Disaster Risk Reduction

- Goal: 'Minimisation of residual risk'
- Informing others of disaster risks
- Discussing and planning ways to minimise risk
- Coordinating and managing tasks
- Conducting post-event learning to improve

Emergency Management

- Goal: 'Safe communities through shared responsibility'
- Providing emergency intelligence through crowdsourcing
- Helping people prepare for disasters
- Communicating warnings to others
- Coordinating community response and recovery

Community Development

- Goal: 'Formation of social capital for disasters'
- Increasing and improving social networks, leadership and support systems
- Providing support to people during and after a disaster
- Conducting post-event learning to improve

one hand, these may serve as direct means of information and communication. On the other hand, these may serve to monitor issues and environments for authorities to get a coherent picture of the situation.

A rapidly expanding universe of citizens' groups, researchers, and environmental organizations are making use of social media and smart phone applications to document changes in the natural world and to mobilize support for taking action. The usage of social media is still relatively new and, in some countries, limited, due to legal, political and development related constraints; but its practice is growing significantly with more and more users favouring its interactive nature which

Box 20: Aftermath of Japan Earthquake seen through You Tube

In Japan, directly after the occurrence of the Great East Japan Earthquake, in addition to ICT, which was used conventionally, through the wide use of methods to transmit and gather information with social media, their validity in times of disaster was recognized. The mayor of Minami Soma City in Fukushima Prefecture, Katsunobu Sakurai, used YouTube to ask the world for support, subtitling his video in English and at the same time as shocking the world with the extent of the serious situation in the disaster zone and the influence of social media and the widespread diffusion of information was recognized.

indicates the growing awareness and concerns over these said topics and the people's desire to be heard. The websites of majority of international and some national agencies and online networks and partnerships (e.g. EMA, FEMA, Gender and Disaster Network, GFDRR, ProAct network, Stockholm Environment Institute, UNFCCC, UNEP) working in three areas have links to blogs, Facebook, Twitter, Yahoo Group and Google+; to stimulate discussions and to expand their reach.

Under the social media, the shots at integration take many forms from chat room, forums, debates and discussions (on Facebook, Yahoo Group, etc.; sometimes organized or overseen by agencies active in the three fields), personalized blogs and twitter messages, special video reports on YouTube, etc. One advantage of using social media is that although it is opened to and encourages the participation of people from various backgrounds, the contents shared can still be tailored to one key focus area and users' specific needs. Nevertheless, such freedom of information exchange also entices inaccuracy, resulting in the spread of rumours and misinformation.

Box 21: Examples of Social Media Applications in Disaster Preparedness, Response and Recovery

- In Japan, an e-community platform of disaster risk communication has been established for local residents. From their simple browser or their cell phones, the residents can not only enhance their literacy of disaster risks and knowledge concerning previous disaster experiences, but also to share the information of early warnings, or evacuation alarms at their locations so that they are able to cooperate with each other (Nagasaka, 2006).
- In the aftermath of 2011 Japanese earthquake and ensuing tsunami, cellular and landline phone service suffered major disruption in the affected area but internet services were largely unaffected. Instant messages through twitter became the main communication, recording, 1200 tweets per minute coming from Tokyo (Manso & Manso, 2012).
- During 2012 Typhoon Haiyan response in Philippines, Micro Mappers Global Network of Volunteers employed social media to provide aid workers with real-time maps of who needs help, and where by monitoring and sifting tweets coming out from disaster zone.
- Twitter and Facebook are used to collect donations by directing social media users to donation sites or to give instructions on how to donate to disaster relief efforts after major disasters; the latest one of which is Typhoon Haiyan in Philippines (2012).

Initiatives by Media Agencies

Although the involvement of the media in the integration effort is still predominantly driven by the key agencies working in these sectors, some encouraging progress has been taking place under the initiatives of certain leading media agencies. But till date, environment stories have a hard time competing with a political or economic story, and seldom see front-page coverage.

Major media players like Thompson Reuters Foundation (www.trust.org) and Inter Press Service (IPS) (www.ipsnews.net) are increasingly addressing the strong association between climate change and DRR with environmental degradation as one of the main factors generating more intensified hazards and climate induced crisis. Reuters has created Alertnet (www.alertnet.org), free global online humanitarian news service, to post stories, articles and latest happenings from around the world covering natural disasters, conflicts, climate change and other crisis like diseases and refugees. Other online services like Integrated Regional Information Network (IRIN) (www.irinnews.org), Earth Journalism Network (www.earthjournalism.net) and Reliefweb (reliefweb.int), also provide linkages between the three areas, highlighted under climate related hazards and environmental emergencies.

Important Web Portals

Growing number of web portals have been set up to support the linkages between DRR, Environment and Climate Change agendas, such as-

- Adaptation Learning Mechanism (adaptation focus) www.adaptationlearning.net
- EcoEarth.info(Environmental Sustainability) <http://www.ecologicalinternet.org>
- Natural Resource Management & Development Portal by USAID (Natural

- Resource management focus with DRR issues) <http://rmportal.net>
- PEDRR News alert (Ecosystem based DRR and Adaptation focus) <http://pedrr.org/publications/pedrr-news-alert/>
- PreventionWeb (DRR focus with environment and CC) www.preventionweb.net
- ProVention Consortium (September 2000-January 2010) (DRR focus) www.proventionconsortium.org
- Eldis (development issues including DRR, environment and CC) <http://www.eldis.org>
- The Asia-Pacific Gateway for Disaster Risk Management and Development (DRR with environment and CC focus)- <http://www.drrgateway.net>
- WeAdapt/WikiAdapt (adaptation focus) www.weadapt.org
- World Bank Climate Change Portal (Climate change focus including mapping visualisation tool (webGIS)) www.sdwebx.worldbank.org/climateportal

Box 22: 350.org

350.org is building a global movement to solve the climate crisis with their online tools and campaigns, grassroots organizing, and mass public actions are coordinated by a global network active in over 188 countries. The 350.org movement is treating the 350ppm cap of carbon dioxide as a safe upper limit of what can be released into the atmosphere, and using that number as a rallying cry. They believe that the only way a meaningful action on climate change will take place is by countering the power of the fossil fuel industry with the power of people taking collective action. Online tools are used to leverage that power, to help those people see themselves as one movement, and to facilitate strategic offline action. In 2009, 350.org, agitating for action on climate change, used social media to organize more than 5,000 events in some 180 countries, in what CNN called “the most widespread day of political action in the planet’s history.” In 2010, 350.org mobilized tens of thousands of people against offshore oil drilling, holding hands across 900 beaches.

Increasingly, ICT and social media tools are being used as part of developmental projects, especially highlighting the DRR and environment linkages.

- One such project is Communication for Development (ComDev)¹⁰³, under FAO, seeking change at different levels including listening, establishing trust, sharing knowledge and skills, building policies, debating and learning for sustained and meaningful change. Sustainable natural resource management, climate adaptation and disaster risk reduction are the priority objectives of ComDev. FAO ComDev supports a series of platforms in Latin America, Near East, Asia and the Caribbean Region to facilitate the sharing of information, good practices and experiences.
- A global programme called Communication for Sustainable Development Initiative (CSDI)¹⁰⁴ has achieved positive results in countries such as Bangladesh, Bolivia, Jamaica, Dominican Republic and Haiti applying ComDev in support of

¹⁰³ <http://www.fao.org/oek/communication-for-development/comdev-home/en/>

¹⁰⁴ <http://www.csinitiative.org>

- community-based climate adaptation and disaster risk reduction.
- Building Resilience through Innovation, Communication and Knowledge Services project (BRICKS)¹⁰⁵ is the regional hub for the Sahel and West Africa Program (SAWAP) in support of the Great Green Wall and has established a regional web portal to help identify regional and global innovations in drought risk reduction and other hazards facing the area, promote them through better communication, and put that knowledge into us.

Media Summits on DRR

There have been attempts to form collaborative partnerships between the media and the development agencies. One highlight is the upcoming '*Media Summit on Climate Change, ICTs (information and communication technology) and Disaster Risk Reduction*'¹⁰⁶ that will be held in Jakarta, Indonesia from 4-6 June 2014. It is to be hosted by the Ministry of Communication and Information Technology, Republic of Indonesia (MCIT) together with Asia-Pacific Broadcasting Union (ABU), International Telecommunication Union (ITU) and UNESCO. The Summit, a follow up to 2009 UNESCO-UNEP led 'International Conference on Broadcast Media and Climate Change: A Public Service Remit'¹⁰⁷ organized in France, will address the role of media and ICTs in creating awareness on climate change, DRR and other environmental issues, and helping the public contribute to reducing the factors driving climate change and focus on environmental issues and DRR.

Documents and News Stories

Furthermore, documents of different sizes; full-length books, articles in the specialised journals like 'Community, Environment and Disaster Risk Management', dealing exclusively with the three issues are available both in print and digital forms. If we look at the broadcast media, on top of reporting latest news stories on all the topics, their active engagement is particularly noticeable in the field of climate change through production of documentary pieces such as BBC's 'Climate Wars' and 'Earth Report'; the latter was produced in association with UNESCO. Environmental management is usually presented as both the cause and the product of combined DRR and climate scenario.

Challenges

Online and social media may have indeed sparked a lot of heat but the main challenge but they have not yet moved climate change or biodiversity loss very far

¹⁰⁵ <http://www.terrafrica.org/projects/bricks/#sthash.edr1m1Xb.dpuf> -12.03.14

¹⁰⁶ The summit will offer a platform for exchange of ideas and practices on Social Dimensions of Climate Change, ICTs and the Environment, Broadcasters Before and After Disasters, Cases in Green Technology Implementation and Increasing Effectiveness of Emergency Broadcasts.

¹⁰⁷ The first event of its kind, the Conference brought together 250 representatives of national broadcasters from both developing and developed countries, scientific organizations, regional broadcasting associations and unions, and climate-related agencies. They explored current coverage of climate change issues in different regions of the world and the challenges being faced by broadcasters. The result was the Paris Declaration adopted on the 5 of September 2009 which reflected a consensus on the importance of media in stimulating policy debate and mobilising knowledge to empower societies to make informed decisions on options for mitigation and adaptation. The Declaration confirms the commitment of the international and regional broadcasting unions and other stakeholders to increase cooperation and step up their efforts to give media exposure to climate change so as to help mitigate its impact and avert potential human suffering.

forward on the political agenda, though there certainly has been a strong impact. The challenges and constraints in promoting the DRR, environment and climate change linkage through different media are summarised below:

- Environment stories have a hard time competing with other political, economic, entertainment stories, and seldom see front-page coverage. The coverage in media suddenly sparks as an aftermath to disastrous events, or during high profile conferences and world events such as Rio+20, or Climate Change COPs, but is never consistent and uniform. Twitter trends also indicate increased activities during these events. Also the short life span of a news story, in other words the constant chase for the next big story by the media, is not suitable for the fields of DRR and environmental management where the effects cannot be measured over a short timeframe. It can take years to detect any changes in behaviour and practices. Besides, it is harder to see the results of good planning than the devastating consequences of bad planning.
- Another challenge lies with restrictions faced by the government agencies in using the alternative communication tools. In certain countries, social media platforms are not allowed as official/ formal information dissemination tools as they do not endorse that particular country's ethical and legal framework or there exist laws that restrict sharing of official information concerning the crisis affected population. Moreover, many public officials view people to people communication (social media) as 'back channel' with strong potentials to spread misinformation and rumours (Keim & Noji, 2012) and tendency to sensationalize or exaggerate¹⁰⁸. The strict rules and regulations with regards to censorship in certain countries create unwillingness to engage in any meaningful dialogue with the government agencies.
- The highly technical terminologies and language used in the available information pose difficulties for the media, especially the local media association, to break them down into a format more comprehensible for the general public. This is often exacerbated by unclear communication and information strategy of professional and scientific organizations in handling matters relating to media.
- In developing and underdeveloped countries, the role and the influence of media could be limited by inadequate resources (financial, technological and human) and under-developed infrastructure, which also creates a divide in the awareness level of their citizens and the availability of resources.
- With the rise of the popularity of online and social media, there is also the increased concern regarding the credibility of the information being offered, especially on sites. Sometimes, the use of digital and social media also creates increased expectations by the general public that their opinions, suggestions and queries would be addressed promptly and regularly.

4. Conclusions and Recommendations

¹⁰⁸ To add to the scepticism of digital and social media are the proven incidents and stories about scams, incomplete or misquoted information, supposedly from the affected area, with the intention of soliciting donations.

There is now global recognition that disaster risk is largely a result of underlying vulnerabilities linked to developmental challenges, namely poverty, environmental degradation and poor governance, and hence DRR must be mainstreamed into sustainable development and climate change strategies. It is also evident that environmental management offers an opportunity to increase the links and connections between DRR and climate change adaptation agendas, with potential for additional social and economic benefits.

This study has explored the progress in DRR being integrated with the overall legislation of environment-related policies and plans, often bringing together issues ranging from natural resources, the environment, ecosystem management and climate change adaptation. There is clear evidence that the HFA has helped to link DRR to managing climate-related risks and climate change adaptation. There is clear international momentum on DRR, which could be observed in major policy discussions and planning around climate change adaptation and the post-2015 Sustainable Development Goals. DRR is also now being included as key priority in private investment strategies. The IPCC SREX has reiterated that good land use planning, environmental protection and preparedness and early warning systems are effective no-regret actions to adapt to climate change. More scientific evidence is being generated to make the case for sustainable ecosystems management as a 'no-regrets' solution and a strategy for DRR and CCA, as could be seen from the case studies mentioned in the review.

But despite the clear knowledge about the value of and links between environmental management and DRR, along with examples of progress that illuminate potential opportunities for collaboration, there still remain barriers which should be overcome to spread the implementation of these lessons more widely.

The rare alignment of international policy processes for the post-MDGs, SDGs and post-HFA agreement in 2015 provides that unique opportunity for mainstreaming DRR and positioning it as a cornerstone in efforts to foster resilient and sustainable growth and development, and makes it imperative that the existing barriers should be addressed. Some recommendations, to strengthen the integration between environment, climate change and DRR policies and agendas, have been presented below and should be taken into consideration for both HFA 2 and to maximize shared priorities between DRR, CCA and sustainable development agendas.

KR 1: Although HFA has given the impetus for increasing consideration and integration of DRR in environmental policies over the years as mentioned under Mid-term review of HFA (UNISDR, 2011b), many countries still have inadequate or no policies that address both environmental management and DRR under the same policy or legislative framework. In order for DRR to get increased attention in environmental policy sphere there are some recommendations below:

- 1. Environment should be made a cross cutting issue in HFA 2.** In the current HFA, explicit acknowledgement of environment and ecosystems are only made in Priority 4: 'Reduce the underlying risk factors' of HFA. But, according to the Mid-term Review of HFA, least implementation progress was made in Priority 4. It is; therefore, fair to say there should be greater recognition of the role of environmental actors and drivers of risk in the implementation of the post-2015 framework. This can be accomplished by according environment the status of cross-cutting issue and strengthening the role of the environmental actors such

as Ministries of Environment and national, regional and international institutions working on ecosystem management, in the implementation of the next HFA. It will certainly help leverage more weight for integration of DRR in global/regional environmental policies.

2. Bridging Policy and Institutional Gaps and Improved Multi-Sectoral Coordination

Recognizing the environmental drivers of risk and the role environment management in DRR policies and legislation is critical in facilitating increased cooperation between environmental and disaster management agencies. The inter-linkages between DRR and environmental agencies can be enhanced through improved coordination, collaboration and information sharing between the policy makers, planners, development practitioners and the other key stakeholders at national, regional and international level. This enhanced collaboration can bring about the development of an integrated framework with inter-related causes. Apart from national and global levels, attention needs to be provided to the DRR processes at the local level as risks that are characterised by small-scale and recurrent hazards can have greater impact on the livelihoods and ecosystems at the local level. However, such daily interface and impact of hazards often remains uncouned in the public gaze (UN/ISDR, 2009).

3. Increased Funding Support

More cooperation and support by the bilateral and multilateral funding organizations is needed for implementation of integrated environment, DRR and development programmes at regional and national levels. Donors should take initiatives to integrate and mainstream DRR into their development funding guidelines so that DRR criteria is firmly linked to their support to adaptation and sustainable development programmes (CCCC, 2008).

KR 2: There are good examples of DRR being hardwired into environmental policies and plans as inferred from the HFA progress reports from 2009-2013. It is essential that the variety of tools, instruments and approaches used in ecosystem management, such as EAs, protected area management, natural resources management and land use planning should be increasingly adopted and applied at country and community levels as part of DRR strategies with improved disaster risk information, in order to maximize their impact. With regards to Environmental Assessments, few countries have successfully established process mechanisms that ensure DRR considerations are reviewed during policy, programme or project development but this can be enhanced by:

4. Using Strategic Environmental Assessments and Environmental Impact Assessments as a vehicle to hardwire DRR

In the current HFA, reference to incorporating DRR into EIAs is made but only in generic terms and should therefore be elaborated in the new HFA framework. For instance, approval of development plans and projects could be made contingent upon completion of risk-sensitive SEAs and EIAs, respectively. Environmental impact assessments and Strategic Environmental Assessments (SEAs) – should be expanded to incorporate DRR so that both public and private investments, including in post-disaster reconstruction contexts, must legally take cognizance of the disaster risks and take proactive action to mitigate those risks in an environmentally-sustainable manner.

KR 3: Given that the private sector is responsible for up to 85 percent of total investment in most countries, whether or not businesses factor disaster risk into their decisions will have a decisive impact on future risk levels and on sustainable and inclusive economic growth and social welfare. In response to the increased pressure on ecosystems and natural resources, increased demands on food and other commodities as well as the economic crisis that the world has been facing, business sector has started embracing the concept and the practices of green economy which is described as low carbon, resource efficient and socially inclusive, that prevents the loss of biodiversity and ecosystem services and contribute to poverty alleviation (UNEP, 2012). Integration of DRR strategies in their sustainable practices can be enhanced by:

5. Strengthened partnerships and collaborations between businesses, and other important stakeholders

Public-private partnerships can be strengthened by amplified government's support and encouragement, which can be achieved with a suitable mix of regulations and standards, infrastructure support, research and development, economic instruments (incentives) and information-based solutions including provision of advice and assistance. Innovative financial incentives such as risk transfer schemes, investments in natural infrastructure for reducing risk, payments for ecosystem services, will complement the regulatory frameworks and will help in innovative solutions to DRR and CCA agenda. Mutually beneficial partnerships between businesses, government, national and local academic and research agencies, NGOs and civil society organizations (CSOs) will facilitate pooling of expertise and resources. More consolidated partnerships with SMES (small and medium sized enterprises) will help facilitate transfer of technology and capacity to improve the efficient use of resources, reduce risks and hazards and safeguard environmental qualities (UNEP Agenda 21).

Also needed are more focused research efforts particularly in evaluating and quantifying the economic benefits of DRR integration into current sustainable practices; the employment of DRR-oriented environmentally sound technologies that draw upon indigenous knowledge; the possibility of incorporating DRR outlooks in existing environmental standards, the internalization of adaptation costs into accounting and pricing mechanisms; and location specific future impacts of climate and environmental hazards.

KR 4: Sufficient scientific evidence already points out towards the positives of adopting ecosystems approaches for DRR. But, there is a need to foster more science - policy - practitioner dialogues so that the performance thresholds of ecosystems and resilience against hazard events and climate change are better understood.

6. Advancing Scientific Knowledge on the Role of Ecosystems in Disaster Risk Reduction

As hazards become more frequent or more extreme or when ecosystems are degraded, further scientific research efforts are needed to better understand and quantify more systematically the role of ecosystems in reducing exposure and

vulnerability reduction for different types of hazards and how effectively and sustainably we can increase coping capacities of ecosystems (e.g. forests, fisheries and agriculture) that support human resilience. These efforts will require multi-disciplinary and inter-disciplinary approaches, over broader time and spatial scales, while recognizing and adding value to local and indigenous knowledge systems. Above all, it is crucial to transmit existing knowledge through guidelines to national and local governments on how to move forward in integrating ecosystem-based management with DRR and CCA (PEDDR, 2010).

7. Increased adoption of Ecosystem Based Approaches to DRR and CCA

Ecosystem-based approaches, that integrate the use of biodiversity and ecosystem services, should be adopted to promote the integration of CCA and DRR agendas to reduce people's vulnerability and increase their resilience to natural hazards and climate change. This can commence by enhancing the role of science and scientific research on the related subjects, complemented by local and indigenous knowledge. Inclusion of this in post-2015 framework is central to make informed risk assessments and policy decisions. This approach will also ensure that the vision for the future developed at the Millennium Summit is achieved.

8. Capacity Building and Enhanced Political Support

It is important to enhance governance capacities for adoption of ecosystem based DRR methods through multi-sector, multi-disciplinary platforms and especially in spatial planning. Lack of enforcement of policies and political willingness to carry out initiatives is another major barrier and strong multi-sectoral mechanisms or platforms are needed at national as well as sub-national levels. Multi-sectoral, multi-disciplinary mechanisms facilitate sharing of available data, help ensure scientific and technical rigour in designing and implementing ecosystem-based DRR initiatives and obtain the political support necessary to integrate them into national and local development plans. There is also the need to build new institutions and governance mechanisms that can help bridge the gap between current policy intentions in National Adaptation Plans and local emergent, self-organized ecosystem based adaptation practice.

9. Adopting of Hybrid Approaches Where Applicable

Ecosystems solutions are, however, should not be taken as a panacea; but should be part of DRR strategies along with early warning and other risk reduction strategies. Enhancement of technology transfer efforts and stakeholder awareness raising is needed so that a medley of best practices and lessons learned can be tailored and applied to specific situations. Also a hybrid approach with a combination of hard infrastructure and green approaches could be the best option to adopt in many cases. But benefits of natural buffers and other soft protection measures should not be overlooked as they also help to avoid maladaptation. Diversified approaches also recognize that multiple adaptations take place and that by taking stock of adaptation practices there are more options to choose from (Pelling, 2011). This would help address some of the shortcomings of current approaches, particularly in terms of DRR, where one group's adaptation may be another's risk.

10. Adoption of Community-based/Community-led Initiatives

Also apparent from various case studies that it is important to weaving into this adaptive tapestry local and traditional knowledge, as local communities are often direct resource users and their knowledge of local ecosystems can provide critical information in planning successful ecosystem-based DRR initiatives. Combining this local knowledge with forecasting, modelling and other technical tools, can

help monitor natural hazards, identify vulnerable segments of society and prioritize adaptation measures. The latest IPCC report suggested that in small islands, community-based adaptation has been shown to generate larger benefits when delivered in conjunction with other development activities (IPCC, 2014).

Due to the above given reasons, **it is essential that the HFA 2 should recognize, ecosystems-based DRR as a significant contributor to the arsenal of risk-reduction options** and make it central in risk management and development practices.

KR 5: Though the HFA also specifically states that regional and international organizations and other actors should commit to promoting “the integration of risk reduction associated with existing climate variability and future climate change into strategies for the reduction of disaster risk and adaptation to climate change, which would include the clear identification of climate-related disaster risks” (HFA, 2005), **climate change needs more focus in the HFA 2.**

11.Strengthening linkages between Disaster Risk Reduction and Climate Change Adaptation

As stressed upon in the Rio+20 Outcomes, **DRR and CCA activities should be institutionally linked** to enable more integrated planning, to leverage financial resources and investments, and to reduce redundancies and administrative bottlenecks (UNEP, 2013). CCA planning and implementation can benefit from the years of experience and wealth of lessons learned in the DRR community, particularly in risk assessment methodologies, economic valuation and institutional arrangements. Existing DRR institutions and structures should be formally recognized in the post-2015 framework as effective vehicles for delivering action on climate change mitigation and adaptation priorities and targets. This would enable better synergies and institutional linkages between climate change adaptation and disaster risk reduction as called for in the Rio+20 outcomes. Integrated risk assessments of disaster risks and climate change should be undertaken and results used for joint programming in DRR and CCA.

Future **DRR approaches under the HFA 2** need to address trade-offs between adaptation at different scales, and between colliding visions and ambitions of groups vying for limited resources. Building and developing institutions and the larger governance structure, is thus crucial to scaling up adaptation measures in a policy context in most countries with dispersed and often conflicting interests (Agrawal, 2010; Ribot, 2009). These local and national institutions involved in regulating and driving adaptation policy will also need to be wary of the risks of maladaptation and the future risks that lie within apparently sound adaptation policy today.

KR6: There is recognition, in online, print and social media that DRR provides critical solutions for confronting social, economic and environmental issues. But, there is no doubt that more studies need to be carried out in advancing the DRR-environment-climate change assimilation through media; especially in identifying the perspectives and level of acceptance of the target audiences and cater the message content in order to capture the public’s attention. If we look at the progress report of HFA 2010-2013, there is very little mentioning of media. Therefore a lot more work and research is required to ensure the proper and effective dealing with media.

12. Getting Online and Social media to increasingly partake on DRR and environment linkages

In promoting awareness on subjects like DRR, environmental management and climate, constant reminder is essential and not only when dramatic images and stories of human sufferings are available during or after a crisis, therefore a more uniform and consistent outsourcing of information is needed. Also, the message has to be made specific to local conditions and focus more on positive outcomes rather than concentrating on the scare tactics. Also more engagement between the professional/scientific organizations and media is needed and professionally trained media people with understanding of DRR and environmental issues to translate them and make them more user friendly

To overcome doubts and uncertainties in employing non-conventional media pathway, especially social media, its key benefit needs to be highlighted; that is transforming people from content consumers into content producers and analysts (Keim & Noji, 2011), which can help build community of interest that share idea, experience and responsibility and create social capital. But, it is vital to utilize both traditional and social media so as to have a wider reach across the generations. This approach would also make the most of citizens' increased usage and aptitude of social media and their reliance on production and consumption of information through it.

As a conclusion, we can say that, although lots of barriers and challenges need to be addressed for enhanced integration of DRR and environment sectors for the post 2015 framework on DRR, the past decade has at least provided a stepping stone in the right direction. Environmental degradation, loss of biodiversity and sensitivity to natural resource limits and environmental tipping points continue to be identified as pressing concerns in the context of integrated approaches to development. Escalating disaster losses globally and the new risks posed by climate change calls for search for cost-effective and integrated solutions for reducing disaster risk. Therefore, a holistic approach that embraces disaster risk reduction and climate risk management as fundamental for poverty reduction and sustainable development, is the need of the hour with environmental actors in DRR- including Ministries of Environment as well as other national, regional and international institutions playing a stronger role in the implementation of the HFA 2 due to its improved and enabling DRR policy and implementation framework.

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5. Annexes

Annex 1

DRR and Land Use Planning: Case study of Recovery at Phuket, Thailand: Recovery and Planning following the Tsunami

Government Tourism Related Policy and Redevelopment

Following the 2004 Indian Ocean tsunami, the Thai government used the opportunity of the disaster to rethink its' development priorities for the region. In response to concerns about repeat disaster events and adversity, the government proactively engaged in a review of existing disaster management knowledge, capacity and procedures. Extensive hazard and vulnerability mapping was performed, resulting in the development of the Phuket Province Risk Management Plan and Municipality Disaster Management Plan in 2008 utilising an "all hazards" approach and community education strategies. Strict zoning regulations, building codes, and an integrated set back system were also mandated to mitigate future adversity and exposure to coastal hazards. Formulated without any community consultation or consideration for local businesses and vendors, all buildings and structures were strictly prohibited along the beach and coastline

Community Resilience and adaptation

However, in reality, this responsibility was relegated down to the provincial and sub-district levels (Calgaro and Lloyd 2008) and many long term recovery initiatives were compromised due to funding shortages and weakness in governance structures. Government efforts were subsequently short lived as the private sector, community, and social networks mobilised to facilitate their own recovery initiatives. Elite and dominant landholder groups used existing network alliances and resources to influence the government to grant access and entitlement to development opportunities that often contravened official planning and zoning regulations (Calgaro and Lloyd 2008) to maximise self-interest, with limited input or consultation from other stakeholder groups.

At the individual, micro-industry, and small to medium business level, residents with influential family/contacts, access to extensive assets and resources, or well developed entrepreneurial skills managed to adapt and in some cases expand and prosper. Financially, few local residents in any of the affected regions possessed significant savings, investments or assets, particularly evident for those working in the informal sector.

The consequences are that just as sun lounges, Jet Skis and vendors returned to the beaches of Phuket in defiance of such government prohibitions, coastal development resumed in other restricted set-back zones. Unplanned and uncontrolled development continues, while environmental problems such as degradation, coastal erosion, pollution and resource depletion are becoming more apparent. Without the financial and/or human resources to enforce legislative changes, built structures and inhabitants were again directly exposed to a potential tsunami hazard.

Southern Thailand's aid experience highlighted the significance of social and community dynamics in influencing the direction of resilience and recovery. Impacts were highly differential at the micro level, contrasting stakeholder innovation and informal initiatives against the weakness of the formal governance system.

Annex 2

Sustainable Dryland management in ASALs

Arid and semi Arid Lands (ASALs) of the greater Horn of Africa constitute up to 76% of the total land coverage and are home to some of the poorest populations in Africa. ASALs are prone to recurrent bouts of drought that affects availability of pastures and water, resulting in losses of livestock and therefore increases the vulnerability of the pastoral population. Since 2006, the European Commission Humanitarian Aid and Civil Protection (ECHO) is supporting implementation of various DRR projects, geared to enhancing natural resources management for drought preparedness, drought disaster risk reduction and building community resilience, at national cross border and regional levels.

- Many water sources like pans/ponds and wells have been developed and rehabilitated by partners in wet season grazing areas to extend utilization.
- Communities' capacities to manage, operate and maintain the water sources has been improved community structures e.g. formation and/or strengthening of WUAs in Kenya.
- Pasture improvement through bush control, reseeding, pastureland enclosures, including fodder production both rainfed and irrigated systems.
- Grazing management, strengthening of traditional institutions, involvement of Pastoral Field School (PFS), CMDRR in grazing management control, reciprocal grazing agreements and other DRR initiatives by partners, have been carried out.
- The water points developed have enhanced the cross border migration of people and livestock
- There is cross-border (informal or formal) planning at community and local authorities in supporting resource sharing and sustainable use. The regional bodies like IGAD, AU, UN (FAO, UNISDR, UNDP) have been involved in enhancing policy and legal frameworks in HOA for cross-border utilization and management of NR.
- Participatory mapping and planning of range resources (e.g. wet and dry season grazing resources) and migration patterns has assisted communities to better plan development and utilization of their resources. The mapping assisted in recommending the location of water points to enhance pastoralists migration.
- water monitoring to plan for utilization of natural resources in areas of focus and plan alternative measures especially in times of dwindling water resources e.g. gradual rationing of the water use. In some instances there is also community based pasture monitoring and intercommunity planning.

The actions and lessons learnt from the initiatives this project have:

- Contributed to the national and regional policy and programmes including Country Programming Paper (CPP) of Ending Drought Emergencies (EDE), IGAD Drought Disaster Resilience and Sustainability Initiative (IDRISI) priority intervention area 1 on Environment and Natural Resources Management; and African Union's Policy Framework for Pastoralism in Africa.
- Contributed to the MDGs, Vision 2030 in Kenya and acted as linkages with long-term development initiatives being undertaken by governments and other development partners.

Annex 3

BUILDING RESPONSE CAPACITY

Restoring Highlands in Ecuador (adapted from Input Paper for GAR 15- Girot, 2014).

Since 2010 CARE Ecuador has worked with national authorities and local partners in a regional GEF funded project (PRAA) seeking to increase adaptive capacities in communities impacted by rapid glacier retreat in the high Andes in Bolivia, Peru and Ecuador. In a pilot located in Papallacta, at the foot of the Antisana glacier, CARE Ecuador developed adaptation measures that included:

- i) Implementation of home gardening techniques to enhance the resilience of subsistence farming
- ii) Implementation of agroforestry plantations for protection ecosystems and water sources.
- iii) Participatory water monitoring.
- iv) Implementation of a Wildfire Prevention Plan for the *Páramo* (high mountain wetlands).



Following the application of several vulnerability assessment tools (CVCA, Cristal) in Papallacta, CARE Ecuador prioritized the following activities: i.) Implementation of home gardens, ii.) the establishment of environmentally sustainable livestock systems, iii.) Restoration of forest cover to protect the *páramo* iv.) Adaptive management of native vegetation, v.) Establishment of live fences with native species, vi) Wildfire prevention programmes through the establishment of local fire brigades, vii.) Design of water harvesting techniques adapted to local cloud conditions (e.g. through the installation of fog gates) viii.) Local land use planning to designate conservation areas, biological corridors and wetlands.



These interventions have achieved several important short term impacts. By focusing on addressing the drivers of the communities main source of vulnerability (e.g. loss of crops due to bad weather), the introduction of home gardens and the improvement of livestock management techniques has had an impact in family income and well-being. At the landscape level, these adaptation measures are contributing to reduce the pressure on the *páramo* wetlands, from overgrazing and fuelwood extraction. The long term benefits of the sustainable management of the *páramo* will benefit both the community of Papallacta and the downstream urban users of water in the metropolitan area of Quito.

Community-based Ecosystem Restoration (PFR-India), Partners for Resilience, 2012 (adapted from Input Paper for GAR 15- Girot, 2014).

Partners for Resilience – India aims to reduce vulnerability and build resilience of communities living within Mahanadi Delta, Odisha and Gandak- Kosi floodplains, Bihar through ecosystem restoration, disaster risk reduction and climate change adaptation. Its implementation was initiated in 2011 by a partnership of 21 NGOs led by Wetlands International – South Asia, Cordaid and Red Cross-Climate Center. Field implementation of the project in Mahanadi Delta, Odisha is led by NetCoast and CENDRET, whereas Caritas leads implementation in Gandak – Kosi floodplains, Bihar. In this approach, piloted by PFR in India, the village-level DRR plans are still at the core of risk reduction practice, but the interventions are reviewed using ecosystem management and climate change adaptation criteria. Additionally, interventions are jointly planned with a cluster of villages to better enhance regional resilience. This regional approach to risk reduction practice will not be limited to physical activities, but will also connect planning to policy dialogues and efforts to strengthen the capacity of civil society groups.

The Gandak-Kosi region is replete with riverine wetlands in the form of river/streams, natural waterlogged areas, ox-bow lakes, ponds, and cut-off meanders. Locally known as *Mauns*, *Chaur*s and *Taals*, these wetlands play an important role in regulating hydrological regimes, particularly floods and ensuring water supply for agriculture and domestic uses. Fisheries and vegetation sources from these wetlands have immense socio-economic significance and are major source of livelihood for communities living in and around.

However, of late these lakes are under tremendous anthropogenic pressure and are in a critical phase of ecological transition owing to changes in land use pattern, increased sediment and nutrient load and loss in hydrological connectivity.

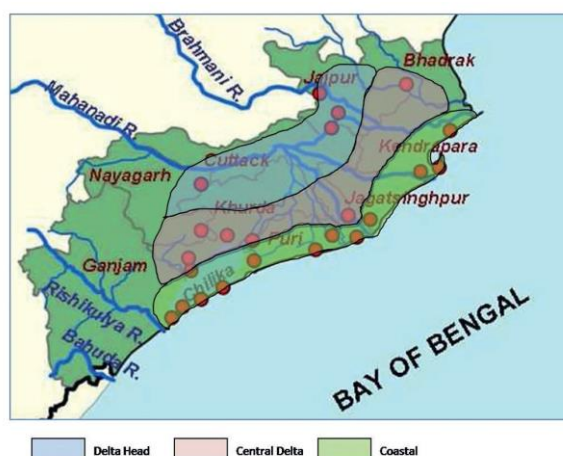


Image 5: Landscape Clusters in Mahanadi Delta

The Kabar Taal wetland complex, located in the Begusarai District of North Bihar forms a part of the extensive floodplain wetland linked to River Gandak and Kosi. Its waterspread is known to vary widely from ~400 ha in summer to ~ 7,400 ha in monsoon wherein Kabar connects with nearby water bodies,

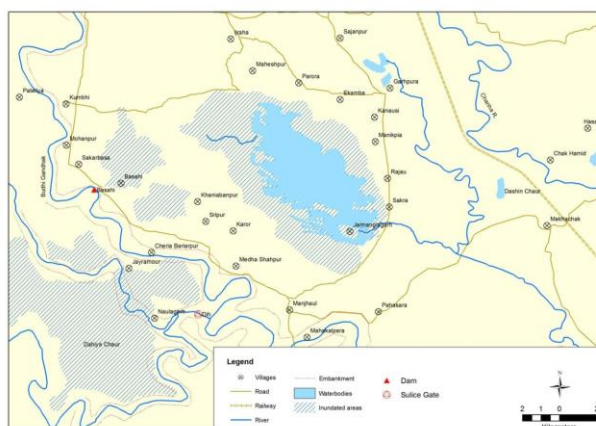


Image 6: The Kabar Taal Wetlands

marshes and Budhi Gandak river channel. The wetland plays an important role in regional economy, in particular local livelihoods through a range of ecosystem services which include provision of water for irrigation and domestic purposes, fisheries, wild rice, edible mollusc (*Pila globosa*), and reducing flood risk. Communities living in 21 villages around the wetland system practice a mix of dry season agriculture and fisheries for sustenance. Kabar is eutrophic, sustains rich plant and animal diversity and teems with waterbirds. Every year, over 20,000 waterbirds of more than 26 species are known to descend into the wetland, making it one of the most important waterbird habitats in Indo-Gangetic Plains. More than 40 economically important species of fish have also been recorded from Kabar. Considering its rich diversity, Kabar was declared as a protected area in 1986 under the Wildlife (Protection) Act, 1972.

Despite its rich diversity and role in local livelihoods, Kabar has been under tremendous anthropogenic pressure and is rapidly degrading. Increasing upstream demand of water for agriculture and fragmentation of hydrological regimes through construction of dykes and channels has led to overall reduction in water availability, sedimentation and overall shrinkage in area (by over 800 ha during 1984 – 2002). The hydrological connectivity with River Kosi has been almost severed by choking of the connecting channels. *Phragmites karka* and *Eichhornia crassipes* infest the wetland growing luxuriantly on the nutrient enriched waters from the runoff of adjoining agriculture fields. There is an intensive pressure on waterbird habitats through poaching (prior to declaration of the Sanctuary) and more lately through poisoning. Dispute on land ownership has further impacted effective implementation of provisions of Wildlife (Protection) Act. Increasing pressure on expansion of agriculture through drainage of the wetlands is a big deterrent to community participation in management of Kabar. The overall availability of water in the region has declined as the riverine flows have limited connectivity with the wetland. With construction of embankments, the risk of waterlogging and impeding loss of human lives and assets due to breaches has significantly increased.

Risk assessments conducted in the Gandak – Kosi floodplains distinctly highlighted degradation of Kabar Taal and associated wetlands as one of the key factors contributing to high vulnerability of communities to disaster risk. PfR partner – Caritas generated local evidences on the state of wetland. This was used as a basis for a dialogue with World Bank, which is currently supporting capacity building on environmental management within the Government of Bihar. A joint project on integrated planning for restoration of Kabar Taal and building capacity for wetland management in Bihar emerged from these efforts. The World Bank assistance will be used to formulate an integrated management plan for Kabar Taal wetland complex. In the work done since October, the Government of Bihar has also evinced integrated in constituting a State Wetland Authority to provide the base institutional arrangement for wetland management

Annex 4

Transboundary water governance and implementation of IWRM through local community action in the Tacaná watersheds on the border of Guatemala and Mexico

(Adapted from IUCN WATER PROGRAMME – DEMONSTRATION CASE STUDY NO.5)

The region around the Tacaná volcano on the border of Guatemala and Mexico has shown the way forward in scaling up local level approaches to national level initiatives. Water and Nature Initiative (WANI) and partners set up a demonstration project in the Tacaná Watersheds, which combined pilot livelihoods projects and bottom-up integrated governance of water resources management. Raising awareness and disseminating information about water resources management were major goals for WANI. Numerous community pilot projects to improve livelihoods through water, soil and environmental conservation were carried out. These were also part of the mechanism to bring stakeholders together to organize themselves into Microwatershed councils. Additionally, when Tropical Storm Stan struck the area in 2005, activities to restore water supplies were carried out by WANI in this part of Guatemala.

Many lessons have been identified from WANI's work in the Tacaná Watersheds. Among these is the understanding that developing local governance and organisational structures benefit and complement IWRM actions. Integrating local communities and their social structures into Microwatershed councils leads to greater cohesion and unity. Additionally, that strengthening community-based alliances and integrating them with municipal and national development institutions increases

Microwatershed Development from Local to National Level

At Local Level:

14 Microwatershed councils;
Combined microwatershed planning and management with community-led action; 14 management plans developed;
Training on microwatershed management.

Sub-National Level:

Coordinated alliance of Government and NGOs – CORNASAM
Adoption of the microwatershed as a unit of planning.

At National Level:

Formation of the national microwatershed commission of Guatemala
Replication in other municipalities.

coordination between administrative levels. Finally, developing disaster risk management planning should be integral to the overall watershed management planning and not just as an emergency response (as demonstrated by Tropical Storm Stan).

The WANI Tacaná Watersheds demonstration project has built a platform for wider influencing of regional and national water management. The promotion of integrated water resources management and resilience at the local, national and regional level has

continued with other projects which mostly focus on governance through Microwatershed councils and building resilience through water management.

