

CLIMATE SMART GOVERNANCE

Sponsored by
Department of Science and Technology



SECTOR - 8

CLIMATE CHANGE AND DISASTERS

TRAINING MODULE
(2017-2020)

CLIMATE CHANGE AND DISASTERS

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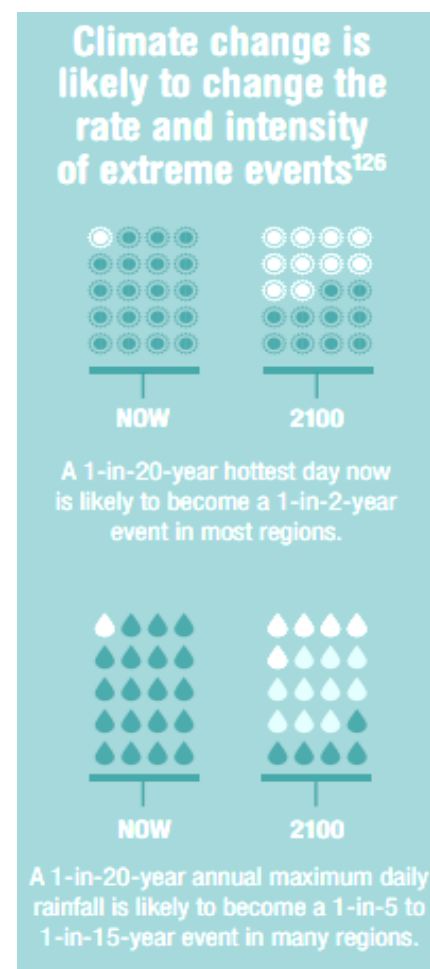
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1. CLIMATE CHANGE AND DISASTERS

Many natural disasters are directly linked with the climate change including floods, hurricanes, heat waves, droughts, wildfires and storms. Such disasters have claimed more than 600,000 lives in the past two decades. The frequency and magnitude of these disasters are increasing with time and is not going to subside even with the plans of reducing our greenhouse gas (GHG) emission and signing of climate change agreement at Paris (Ahmad, 2017).

As global climate change escalates, the risk of floods, droughts and severe storms increases. In its fourth Assessment Report, the Inter-governmental Panel on Climate Change (IPCC) projects that rising global temperature will cause increasing drought in mid-latitudes and semi-arid latitudes, increased water stress in many parts of the world, increased damage from storms, and coastal flooding affecting millions more people each year. With 94 per cent of disaster-related deaths occurring in developing countries, the outlook for poor people is bleak.

Climate change increases disaster risk in a number of ways. It changes the magnitude and frequency of extreme events (meaning that coping and response mechanisms and economic planning for disasters



Source: (Jones, n.d)

based on past vulnerabilities may no longer suffice). It changes average climatic conditions and climate variability, affecting underlying risk factors, and it generates new threats, which a region may have no experience in dealing with. Clearly, the climate change and disaster management communities need to work together in addressing these issues. If climate change adaptation policies and measures are to be efficient and effective they must build on and expand existing DRR efforts. And if DRR approaches are to be sustainable they must account for the impact of climate change (TearFund, 2008).

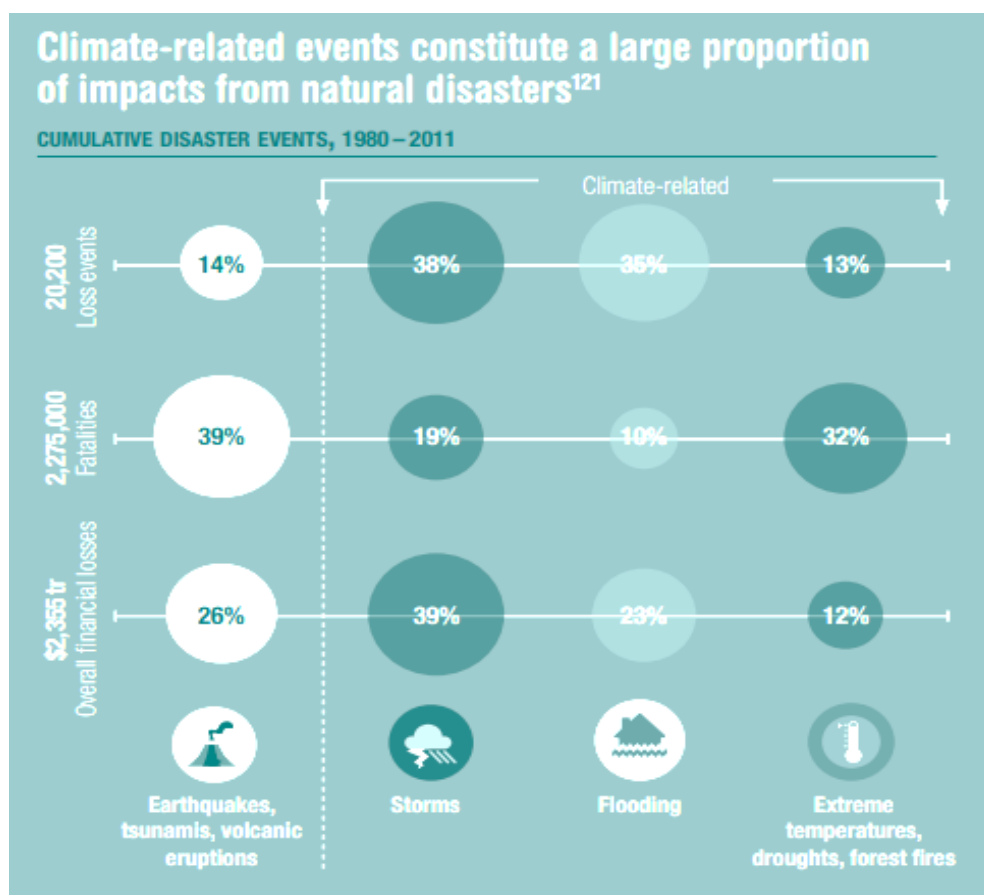


Figure 8.1: Climate related events proportion (Jones, n.d)

1.1 Climate Change impacts on natural disasters

Climate change is predicted to have a range of serious consequences, some of which will have impact over the longer term, like spread of disease and sea level rise, while some have immediately obvious impacts, such as intense rain and flooding. While recognising the importance of the other predicted consequences of climate change, this focuses on this second category: the ‘extreme weather events’ responsible for natural disasters. They include:

- Extreme temperature highs – heat waves
- Storms, including windstorms, hurricanes, etc.
- High levels of precipitation, and associated flooding
- Lack of precipitation, and associated drought

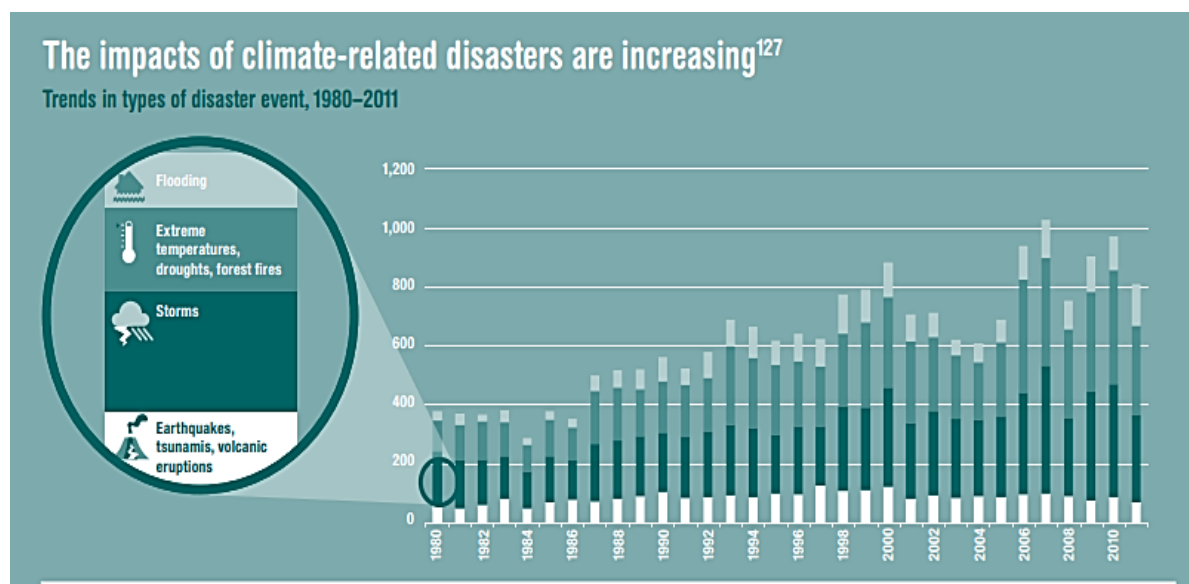


Figure 8.2: Increasing climate related disasters scenario (Jones, n.d)

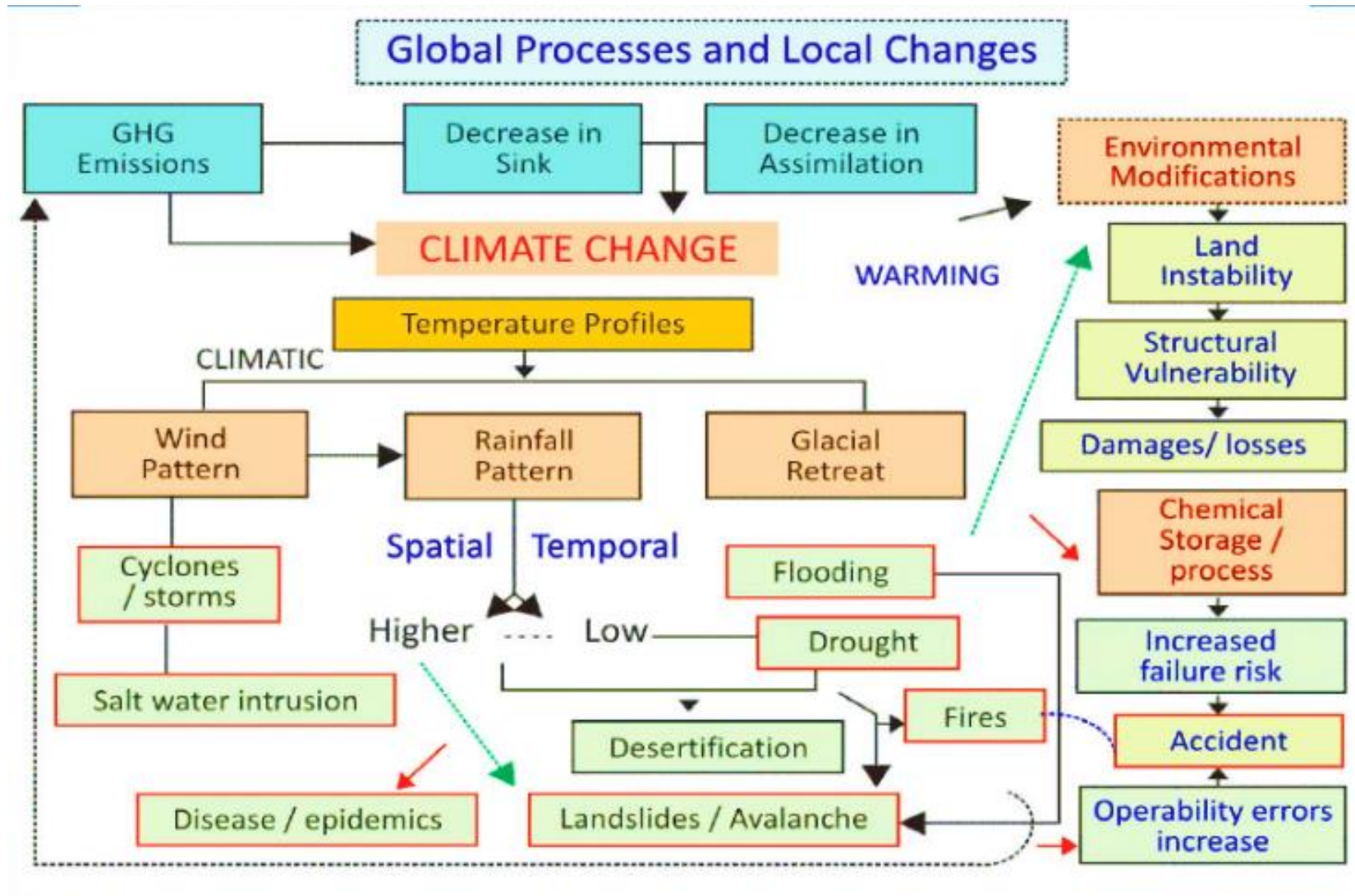


Figure: Relationship between climate change and disasters (Gupta. et,al, 2014a)

There are also important impacts from ‘secondary’ effects of climatic events – e.g. avalanches, rock falls, landslides due to flooding, and forest fires in areas of drought. While significant, as these events are not climatic as such, they are not covered here (Anderson, 2006).

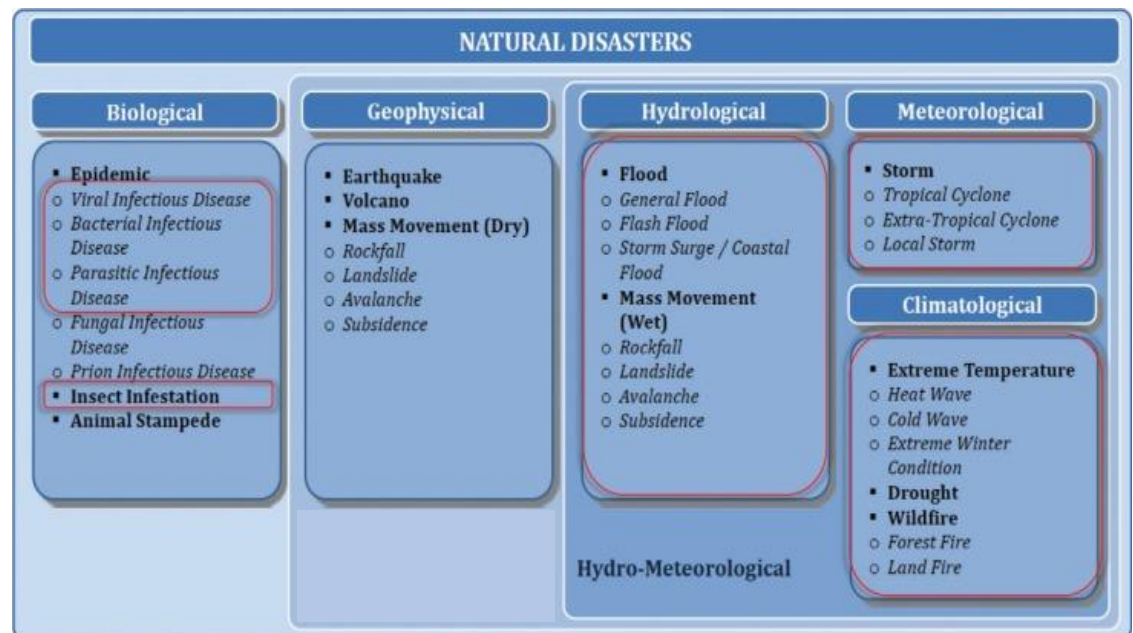


Figure 8.3: Classification of natural disasters. Marked with red rectangles are those groups of disasters, which can be influenced by climate change (Sauerboen & Ebi, 2012).

With increasing global surface temperatures the possibility of more droughts and increased intensity of storms will likely occur. As more water vapor is evaporated into the atmosphere it becomes fuel for more powerful storms to develop. More heat in the atmosphere and warmer ocean surface temperatures can lead to increased wind speeds in tropical storms. Rising sea levels expose higher locations not usually subjected to the power of

the sea and to the erosive forces of waves and currents (U.S. Geological Survey [USGD], n.d).

Projections of climate change-related alterations in the frequency, magnitude, duration, and spatial extent of weather and climate events for the end of the century, relative to the end of the last .0century, are highly uncertain. Major sources of uncertainty in projections for the end of the 21st century include the contribution of natural climate variability, projections of future greenhouse gas emissions (including projections of changes in demographics, economic growth, and technology change), uncertainties in climate model parameters and structure, and the responsiveness of the climate system to increased concentrations of greenhouse gases.

Projecting low-probability, high-impact changes is particularly challenging given understanding of climate thresholds and the coarse spatial scale of climate models. Despite these uncertainties, under all emission scenarios, projected changes are similar over the coming decades because of the inertia in the climate system, with the projected changes due to climate change relatively small compared with natural climate variability (Sauerboen & Ebi, 2012).

Projected changes during the twenty-first century in extreme climate phenomena and their likelihood	Representative examples of projected impacts (all high confidence of occurrence in some areas)
Higher maximum temperatures; more hot days and heatwaves over nearly all land areas (very likely)	<ul style="list-style-type: none"> • Increased incidence of death and serious illness in older age groups and urban poor • Increased heat stress in livestock and wildlife • Shift in tourist destinations • Increased risk of damage to a number of crops • Increased electric cooling demand and reduced energy supply reliability
Higher (increasing) minimum temperatures; fewer cold days, frost days and cold waves across nearly all land areas (very likely)	<ul style="list-style-type: none"> • Decreased cold-related human morbidity and mortality • Decreased risk of damage to a number of crops, and increased risk to others • Extended range and activity of some pest and disease vectors • Reduced demand for heating energy
More intense precipitation events (very likely in many areas)	<ul style="list-style-type: none"> • Increased flood, landslide, avalanche and mudslide damage • Increased soil erosion • Increased flood runoff could increase recharge of some floodplain aquifers • Increased pressure on government and private flood insurance systems and disaster relief
Increased summer drying over most mid-latitude continental interiors and associated risk of drought (likely)	<ul style="list-style-type: none"> • Decreased crop yields • Increased damage to building foundations caused by ground shrinkage • Decreased water resource quantity and quality • Increased risk of forest fire
Increase in tropical cyclone peak wind intensities, and mean and peak precipitation intensities (likely over some areas)	<ul style="list-style-type: none"> • Increased risks to human life, risk of infectious disease epidemics and many other risks • Increased coastal erosion and damage to coastal buildings and infrastructure • Increased damage to coastal ecosystems, such as coral reefs and mangroves
Intensified droughts and floods associated with El Niño events in many different regions (likely) (see also under droughts and intense precipitation events)	<ul style="list-style-type: none"> • Decreased agricultural and rangeland productivity in drought- and flood-prone regions • Decreased hydro-power potential in drought-prone regions
Increased Asian summer monsoon precipitation variability (likely)	<ul style="list-style-type: none"> • Increase in flood and drought magnitude and damages in temperate and tropical Asia
Increased intensity of mid-latitude storms (little agreement between current models)	<ul style="list-style-type: none"> • Increased risks to human life and health • Increased property and infrastructure losses • Increased damage to coastal ecosystems

Figure 8.4: Projected Climate Change and its impacts leads to disasters (Sauerboen & Ebi, 2012).

2. NATIONAL AND INTERNATIONAL SENARIO

An average of 335 weather-related disasters between 2005 and 2014, an increase of 14% from 1995-2004, and almost twice the level recorded during 1985-1995 being recorded by UN Office for Disaster Risk Reduction. According to the report, 4.1 billion people were injured, left homeless or were in need of emergency assistance as a result of weather-related disasters between 1995 and 2015. About 332,000 deaths occurred and 3.7 billion people were affected in Asia alone. These figures are alarming and an eye opener to all to understand and to promptly react to this urgent problem based on our floods and storms accounted for the majority of deaths due to weather related natural disasters.

According data, floods accounted for 47% of all weather-related disasters from 1995-2015, affecting 2.3 billion people and killing 157,000. Storms were the deadliest type of weather-related disaster, accounting for 242,000 deaths or 40% of the global weather-related deaths, with 89% of these deaths occurring in lower income countries.

As a result of global warming, extreme temperatures caused deaths of about 164,000 people, of which 148,000 deaths, about 92%, were caused due to heat waves; 90% of the deaths from heat waves occurred in Europe alone. In Russia, more than 55,000 people died as a result of heat wave in 2010 and total deaths were 70,000 in 2003 in Europe.

According to the World Bank's "Natural Disaster Hotspots: A Global Risk Analysis" report released in March 2015, more than 160 countries have more than a quarter of their populations in areas of high mortality risks from one or more natural disasters. The first decade of the 21st century saw 3,496 natural disasters from floods, storms, droughts and heat waves.

India is vulnerable to varying degree of natural and man-made disasters. About 55% of India's landmass is prone to earthquake of varying intensity, 68% is vulnerable to drought, 12% to floods, 8% to cyclones apart from heat waves and severe storms (Gupta, Nair & Singh, 2013).

According to the World Meteorological Organisation, the world is nearly five times as dangerous and disaster prone as it was in the 1970s, because of the increasing risks brought by climate change. Everybody need to understand that the climate changes are not uniformly spread around the world. The sea level rise is expected to be 10-15% higher in countries closer to the equator, low lying, coastal countries and small island states like Bahrain. The warming will bring more droughts, flooding, sea level rise, heat stress, more water consumption, more energy and cooling requirements and spread of waterborne diseases like cholera and diarrhoea. Thus, it will affect all irrespective of one's location and status. The time has come for every individual to adopt environmentally safe habits and caring attitude towards finite natural resources (Ahmad, 2017).

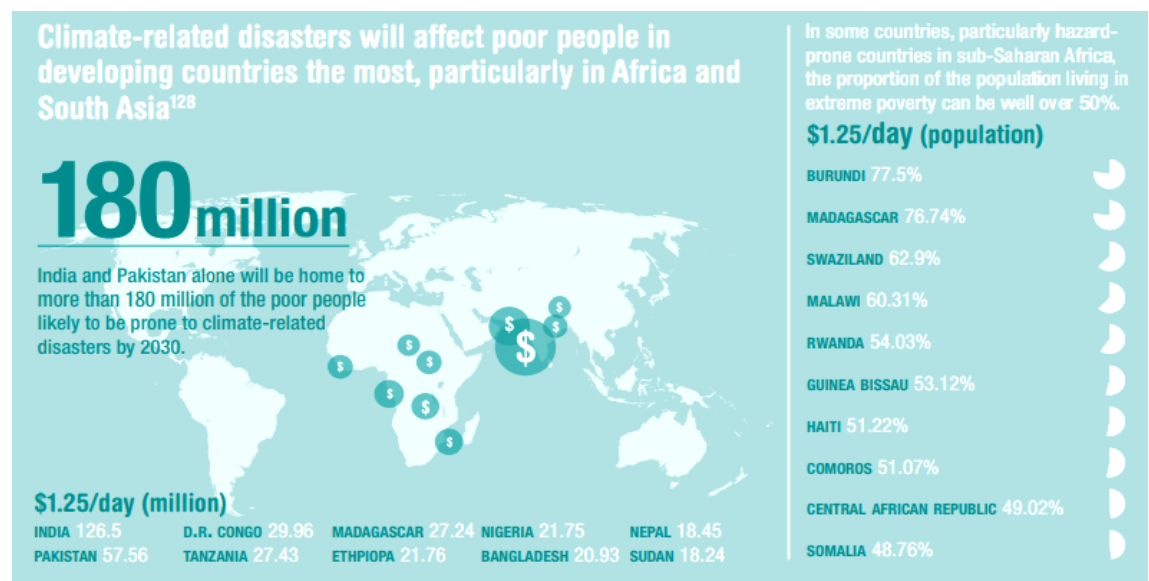


Figure 8.5: Climate related disasters affecting people Scenario (Jones, n.d)

3. DISASTER RISK REDUCTION

Disaster risk reduction (DRR) is the concept and practice of reducing risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, reduced vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events (International Network for Education in Emergencies [INEE], 2018).

Disaster Risk Reduction: people and institutions involved in preparedness, mitigation and prevention activities associated with extreme events. These include hazard forecasting and immediate relief efforts for major disasters resulting from floods, cyclones and, in some cases, pollution events. This community is being enlarged to include specialists in the longer-term strategy of disaster prevention by anticipatory actions such as improved land-use planning, the establishment and enforcement of higher building codes, and modes of cost sharing such as insurance.

Action that addresses the interlinked challenges of disaster risk, sustainable development and climate change is a core priority given that 90% of recorded major disasters caused by natural hazards from 1995 to 2015 were linked to climate and weather including floods, storms, heatwaves and droughts.

The Sendai Framework

The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other

stakeholders. It aims for the following outcome: *The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.*

The seven targets focus on substantial reductions in

- disaster mortality,
- number of affected people,
- direct economic losses, and
- reducing damage to critical infrastructure and disruption of basic services, including education.
- The Sendai Framework also seeks a substantial increase in national and local disaster risk reduction strategies by 2020
- enhanced cooperation to developing countries, and
- substantial increase in multi-hazard early warning systems, disaster risk information and assessments.

The four Priorities:

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in disaster risk reduction for resilience
- Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction (United Nations Office for Disaster Risk Reduction [UNISDR], n.d.).

Climate Change Adaptation and Disaster Risk Reduction CCA-DRR

An integrated approach to climate change adaptation (CCA) and disaster risk reduction (DRR) is needed now, more than ever. Both share a focus on risk-informed development and preventing the worst impacts of climatic disasters from emerging. They have a common objective to build the resilience of communities so they can withstand and bounce back from crisis.

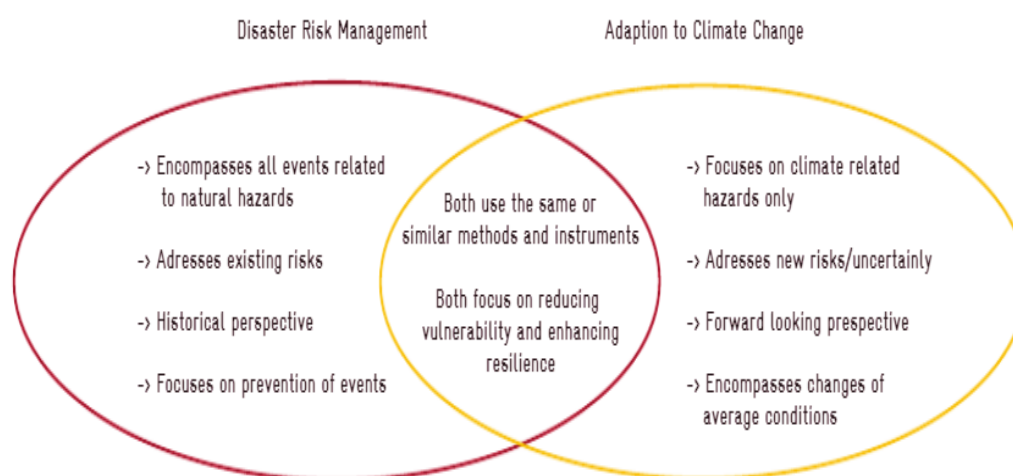


Figure: Interaction between CCA and DDR (Gupta. et,al, 2014b)

Recent years have seen devastating impacts of more frequent and severe droughts from Syria and Iraq to Somalia and Sudan. Some studies now show that the region may face multi-year mega droughts in the future as the region's climate shifts to a 'new normal'.

Both CCA and DRR aim to make communities more resilient to these drivers of change. One way UNDP is supporting more integrated CCA-DRR approaches in the Arab region is through a new SDG Climate Nexus Facility. This is a regional initiative between the League of Arab States, the Arab Water Council, UNDP, UNEP, UNISDR and WFP to help

countries integrate disaster and climate resilience into development and humanitarian interventions.

Through joint UN action, the initiative will develop local capacities for risk-informed development through integrated CCA-DRR approaches and bring greater coherence in implementation of the Arab Action Plan on Climate Change and the Arab DRR Strategy. It will scale up the use of science for decision-making and expand early warning systems, social protection mechanisms like climate- and drought-indexed insurance, and enhance resilience of agriculture and water systems to more severe droughts and floods.

Through the SDG Climate Nexus Facility, UN partners will bring together the UN's leading development and humanitarian agencies to promote an integrated approach to adaptation as a means to:

- protection of capacities and assets from impacts of climatic disasters;
- preparedness of communities and institutions to cope and mitigate the impacts of climatic shocks and disasters;
- strengthening of communities' ability to recover and reconstruct from conflicts in a way that ensures their resilience to future climatic disasters.

By enhancing capacities to take an integrated CCA-DRR approach, the UN system can help countries implement the Sendai Framework on DRR, the Paris Agreement to combat climate change and the Sustainable Development Goals in a coherent manner, help bridge the divide between humanitarian and development solutions, and help build resilience in the wake of what is emerging to be one of the most devastating crises facing the world since the birth of the United Nations (Ali, 2017).

4. CASE STUDIES

Study 1: Bangladesh Cyclone Preparedness Programme

Storms in 1970 and 1991 in Bangladesh resulted in deaths of 500,000 and 138,000 respectively. Following the 1970 disaster, the government along with agencies initiated the Bangladesh Cyclone Preparedness Programme, a bottom-up programme aimed at reducing the vulnerability of communities and resilience building through social learning processes. This strengthened self-help capacities based on indigenous knowledge of vulnerabilities and using participatory methods to develop programmes such as community training in disaster preparedness. This exhibits willingness at the institutional level to undertake a new approach and to learn from experience. This is institutional learning. Examples of the measure implemented are Early Warning Systems, evacuation procedures and shelter provision. In the 1991 cyclone fatality rates were 3.4 percent in areas with access to cyclone shelters compared to 40 percent in areas without access to shelters. Because of improved preparedness during another strong storm in 1994, three quarters of a million people were safely evacuated and only 127 died (Aryal & Gadema, 2008).

Study 2: Involvement of local Institutions in Zimbabwe

In Zimbabwe, there is a Law on the Civil Protection, which allowed the establishment of an interdepartmental organization called the Department of Civil Protection at the national, provincial and district levels to respond to natural as well as man-made risks. Due to the lack of financing and resources within state organizations to develop disaster preparedness, ACF concentrated on the reinforcement of the capacities, within the districts of Chipinge and Chiredzi, of the Civil Protection teams , leaders

and community representatives to identify risks and hazards, to create a mapping of capacities and to establish preparedness and emergency response plans. These plans cover the principal hazards such as floods, epidemics and droughts. Ministries such as the ministries of health and agriculture, and the local government agencies were involved in the consolidation of these plans. ACF played a crucial role to simplify the process of coordination between the ministries, NGOs and the private sector to design and implement these plans. Despite the functionality of the Civil Protection, there was no framework to follow for effective preparedness and response mechanisms. Each ministry had its plan according to its specific sector of activity, but there was no coordination and communication between the different entities. From having developed these local plans, stakeholders could harmonize their actions plans.

Study 3: Participation of students and teachers in Ethiopia

One of the activities established in Ethiopia, as a part of the community-managed drought project, is holding awareness sessions in elementary schools regarding preparedness, mitigation and prevention of droughts and other risks.



These sessions educate many people thanks to the fact that teachers and students disseminate and share their knowledge within their communities. Schools created “Health and Disaster Risk Reduction Clubs” that allowed children to become agents of change, gaining the tools and knowledge so that actual generations are better prepared (Action Contre la Faim [ACF], 2015).

5. GOVERNMENT POLICIES

a) Disaster Management Act, 2005

The Disaster Management Act, 2005 has been enacted as the central Act to deal with the management of disasters. This act envisaged a three tier Disaster Management structure in India at National, States and District levels. Under the act, the NDMA, SDMA, NEC, NDRF, NIDM and disaster related funds were established.

As stated in the act, there shall be no discrimination on the ground of gender, caste and community in providing compensation and relief. The act also provides penalties for obstruction, false claims, etc., and ensures the establishment of Disaster Response fund and Disaster Mitigation fund at central, state and district level. The Disaster Management Division of Ministry of Home Affairs is the nodal agency for all issues related to disaster management except the drought which is looked after by the Ministry of Agriculture. The Act comprises of 79 sections and 11 chapters (National Disaster Management Authority [NDMA], 2005).

6. WAY FORWARD

Natural disasters can occur anywhere; however, developing countries are the most vulnerable to their effects. These countries are unable to build up their resilience prior to the event or to efficiently manage the post-disaster effects (Mbaye, 2017). Climate change adaptation and DRR policy makers, experts and practitioners must communicate and collaborate with each other effectively to ensure a

comprehensive risk management approach to development at local, national and international levels of government.

7. FURTHER READINGS

- https://www.wmo.int/pages/prog/dra/vcp/documents/7607_Climate-Change-DRR.pdf
- https://www.iucn.org/downloads/disaster_risk_reduction_and_climate_change_issues_brief_cop21_031215.pdf
- <https://www.cbd.int/sbstta/sbstta-22-sbi-2/EbA-Eco-DRR-Guidelines-en.pdf>
- <https://unfccc.int/resource/docs/publications/impacts.pdf>

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