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DISASTER RISK REDUCTION AND RESILIENCE

A QUEST FOR HUMAN SECURITY IN BANGLADESH

Sheikh Masud Ahmed

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A QUEST FOR HUMAN SECURITY IN BANGLADESH

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CONTENTS

ABSTRACT

Natural Hazards devastate peoples' lives but strike the poorest communities hardest across the globe. The world is now considered as a global village due to its interconnectedness. This has somehow imposed interdependence between the nation states in many forms. If one part of the world is affected by some destructive phenomenon, the other part can be well affected by its spill-over effect and immediately informed due to technological social connectedness. Similarly, the miseries and sufferings of the people have assumed especial concerns under the umbrella term 'Human Security'. Natural hazards affect lives and livelihoods across communities and endanger the human well-being. Situated in the Himalayan delta, Bangladesh has been ironically exposed to the cruel consequences of natural hazards. Despite its demonstrated strength in resilience to manage the catastrophic events, it lacks comprehensive framework which entails the involvement of the national government, state and non-state actors, societal elites and international community. From the perspective of human security, the paper purports to answer the following question. How can Bangladesh effectively respond to reduce natural disaster risk and strengthen resilience to protect the vulnerable population through ensuring human security? Besides, the paper also argues that though Bangladesh's effort in disaster management is worthy, it needs to undertake people-centered, context-specific and prevention-oriented human security approach through a meticulous blend of top-down protection and bottom-up empowerment to build a safe and sustainable society. Again, these measures will be effective to prepare, adapt and mitigate the risks associated with natural hazards.

ACRONYMS

BCCSAP	Bangladesh Climate Change Strategy Action Plan
DAC	Development Assistance Committee
DDR	Disaster Risk Reduction
DMIC	Disaster Management Information Centre
FFW	Food for Work
GBM	Ganges-Brahmaputra-Meghna
GDP	Gross Domestic Product
GEO4	Fourth Global Environment Outlook
HDR	Human Development Report
HFA	Hyogo Framework for Action
IOM	International Organization for Migration
iSDG	Integrated Sustainable Development Goal
ISDR	International Strategy for Disaster Reduction
LDC	Least Developed Country
MDGs	Millennium Development Goals
NAPA	National Adaptation Program of Action
NGOs	Non-governmental Organizations
OECD	Organization for Economic Cooperation and Development
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
SLF	Sustainable Livelihoods Framework
SOD	Standing Orders on Disaster
TR	Test Relief
UDMCs	Union Disaster Management Committees
UN	United Nations
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	UN General Assembly
UNISDR	United Nations International Strategy for Disaster Reduction
VGD	Vulnerable Group Development
VGF	Vulnerable Group Feeding

Chapter 1

Introduction

It is believed that governments should ensure general welfare of the populations.[1] In this connection, Bangladesh stands at a turning point in its development conduit. In terms of poverty eradication and economic growth, Bangladesh has progressed.[2] Despite considerable economic and social development, its position is low on a number of economic and development indicators. On the other hand, due to the country's deltaic nature of geography and tropical weather, it is vulnerable to natural hazards and climate change extremes. Bangladesh attained the status of 'lower-middle income country' on 01 July 2015.[3] It also achieved five out of the eight Millennium Development Goals (MDGs) by the same year.[4] Now, Bangladesh's success to achieve the Sustainable Development Goals (SDGs) and to maintain the current trend of economic growth largely depends on its ability to mitigate the threat of natural hazards[5] as Disaster Risk Reduction (DRR) is central to sustainable development.

The development of Bangladesh, time and again, had been wrecked by natural hazards. Every time the most sufferers were the poorest households. Consequently, their normal life cycle was severely disrupted. Besides, poverty and income inequality also create hindrance towards the development of Bangladesh. All these pose significant risk to its natural hazardous preparedness. As a riverine country, Bangladesh is highly prone to monsoon and flash floods and vulnerable to sea levels rise. Cyclones, river bank erosion and floods are common phenomenon which frequently devastate and damage local areas, hamper agricultural growth and adversely effect Gross Domestic Product (GDP).

A natural hazard is an outcome of the natural course of the earth which is imbibed with cruelty. It occurs when there is a huge loss of life or damage of property along with economic depression. The severity of loss depends on the affected community's resilience or ability to recover.[6] It can have long term impact on humans due to density of population living in small but vulnerable areas, unplanned urbanization, pervasive poverty and global environmental changes. Within a span of about 100 years since

[1] Bjorn Lomborg, "Making Government Smarter: How to Set National Priorities", available at https:// www.foreignaffairs.com /articles/bangladesh/2017-08-15/making-government-smarter, accessed on 12 March 2018.
[2] Copenhagen Consensus Center, "Bangladesh Priorities Smarter Solutions for Bangladesh", available at http:// www.copenhagenconsensus.com /bangladesh-priorities, accessed on 12 March 2018.
[3] Debapriya Bhattacharya and Sarah Sabin Khan, "Bangladesh Becoming a Middle-Income Country, Ceasing to be Least Developed Country: Clarifying Confusion", Centre for Policy Dialogue (CPD), Policy Brief, Vol. 1, 2018.
[4] Robert D. Watkins, "Building a Disaster-resilient, Prosperous Bangladesh: Challenges and Opportunities", *The Daily Star*, 26 February 2017.
[5] Ibid.
[6] "Natural Disaster", available at https://schoolsciencetaskaboutdisasterivangarcia.weebly.com/, accessed on 10 June 2018.

1907, over 400 million people have been affected by both droughts and flooding and over 614,000 have been killed by cyclones.[7] Poor planning and poverty compound with oversight on the susceptibility of the exposed areas and population, make the poor households more vulnerable.[8] Disaster risk can be considered as an intrinsic irony of human civilization, arising from the combination of natural and human factors. It is, arguably, subjected to exacerbation or reduction by human agency.[9] Moreover, disaster risk and climate change are mutually reinforcing as they threaten human well-being. By increasing the disaster risk, climate change can increase the frequency and magnitude of disasters, which can erode environmental and social resilience, thus increase human vulnerability to natural hazards.[10] The upsetting impact can adversely affect the progress of sustainable development. Hence, they pose critical challenges to humankind even in the highly advanced modern world.

The severity of any natural hazard may extend up to loss of lives, social disruption and even hinder economic progression. It is a serious concern for highly vulnerable, low-income people and community. The natural hazards also damage and degrade fertile agricultural land and cause water contamination with ultimate degradation of environment as a whole. Some specific natural hazards, i.e., earthquake or riverbank erosion can affect human settlements and cause large displacements population.[11] Indeed, increased frequency of natural hazard, whether large or small, hampers to achieve the development goals.[12] It also has adverse impact on disaster mortality, economic loss and health and educational facilities as desired by the SDGs.[13]

In Bangladesh, the majority of the people living in ecologically vulnerable and disaster-prone chars (riverine and coastal islands) and *haors* (depression/wetland) are extremely poor. More than 77 per cent of the char dwellers are extremely poor and another 86 per cent are moderately poor.[14] To address the needs of these marginalized

[7] Alex Salamanca, "25 Countries Most Likely to Experience the Devastation of Natural Disasters", available at https://list25.com/25-countries-most-likely-to-experience-the-devastation-of-natural-disasters/, accessed on 05 May 2018

[8] "The Second Session of the Global Platform for disaster risk Reduction: 16-19 June 2009", available at http://www.iisd.ca/ymb/gpdr2/, accessed on 08 May 2018.

[9] International Strategy for Disaster Reduction (ISDR), "Indicators of Progress: Guidance on Measuring the Reduction of Disaster Risks and the Implementation of the Hyogo Framework for Action", available at https://www.unisdr.org/files/7602_IASCISDRpaperccandDDR1.pdf, accessed on 11 June 2018.

[10] Karen O'Brien, Linda Sygna, Robin Leichenko, W. Neil Adger, Jon Barnett, Tom Mitchell, Lisa Schipper and Thomas Tanner, *Disaster Risk Reduction, Climate Change Adaptation and Human Security*, Oslo: University of Oslo, 2008.

[11] "Human and Economic Loss Due to Disasters", available at http://www.un.org/esa/sustdev/natlinfo/indicators/ methodology sheets/natural_hazards/human_econ_loss.pdf, accessed on 04 June 2018.

[12] ISDR, op. cit.

[13] Amina Aitsi, Selmi and Virginia Murray, "Disaster Risk Reduction: A Cross-cutting Necessity in the SDGs", Brief for Global Sustainable Development Report (GSDR), 2015, available at https://sustainabledevelopment.un.org/content/documents/6724139-Aitsi-Selmi-DRR_A%20cross-cutting%20necessity%20in%20the%20SDGs.pdf, accessed on 21 June 2018.

[14] Mahfuz Kabir, "Conflict and Poverty in South Asia, Bangladesh Poverty Report 2016", available at http://

populations, resilience is important. However, more focus on resilience should not undermine and/or replace humanitarian imperative that demands to preserve and secure the dignity of all, especially the marginalized. Resilience and response to humanitarian needs do not contradict with one another. Rather, resilience is a logical extension of the humanitarian imperative.[15] To prevent hazards which can turn into a disaster, to mitigate avoidable impacts and to recover quickly from the disasters, communities need to be resilient. And this resilience should be strong, well-organized and pro-actively able to manage disaster risks.[16] In 2015, the UN General Assembly (UNGA) emphasized on the reduction of the number of disaster affected people through better preparedness which is one of seven global targets of the Sendai Framework for Disaster Risk Reduction (SFDRR).[17] The Sendai Framework is not the only initiative which endorses the human factor in the global vulnerability to natural hazards and need for preparedness.

The 2030 Agenda for Sustainable Development recognizes that disaster resilience building is very significant to eliminate extreme poverty. Poverty acts as one of the key drivers of disaster risk. It creates and aggravates social and economic vulnerability. Poverty significantly contributes to increase the risk conditions of disaster which further limit the progress of sustainable development.[18] In light of sustainable development and poverty eradication, the Paris Agreement on Climate Change emphasizes upon strengthening global responses to address climate change threats.[19] The New Urban Agenda also stresses upon the same kind of themes.[20] Considering the severity of the natural hazards, all such initiatives emphasize on the role of humankind on environmental degradation, ill-planned infrastructural development, low levels of knowledge and inadequacy in disaster preparedness as per the natural hazards'. One way of reducing disaster risks is building safe infrastructure. Safe infrastructure, indeed,

www.saape.org/phocadownloadpap/poverty_reports/country_reports_2016/bangladesh%20country%20report.pdf, accessed on 03 July 2018.

[15] International Federation of Red Cross and Red Crescent Societies, "World Disasters Report, 2016 - Resilience: Saving Lives Today, Investing for Tomorrow", available at https://www.redcross.org.au/getmedia/b58e0dbb-bf48-4204-906e-9660a33653fa/IFRC-World-Disasters-Report-2016.pdf.aspx or www.ifrc.org/wdr, accessed on 09 April 2019.

[16] "Integrated Risk Management, Reducing Disaster Risks by Strengthening Community Resilience", available at https://www.preventionweb.net/publications/view/58036, accessed on 24 August 2018.

[17] "Sendai Framework for Disaster Risk Reduction 2015-2030", p.12, available at https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030, accessed on 13 September 2018.

[18] United Nations Office for Disaster Risk Reduction (UNISDR), "Disaster Risk Reduction and Resilience in the 2030 Agenda for Sustainable Development", paper prepared by the UN Office for Disaster Risk Reduction, October 2015, available at https://www.unisdr.org/files/46052_disasterriskreductioninthe2030agend.pdf, accessed on 13 September 2018.

[19] United Nations Framework Convention on Climate Change (UNFCCC), Paris Agreement, United Nations 2015, available at https://unfccc.int/sites/default/files/paris_agreement_ english.pdf, accessed on 13 September 2018.

[20] "New Urban Agenda, HABITAT III", United Nations publication issued by the Habitat III Secretariat, 17-20 October 2016, available at http://habitat3.org/wp-content/uploads/NUA-English.pdf, accessed on 25 August 2018.

is significant to vulnerable and exposed household[21], their livelihood and the security of their assets. Though building infrastructures require fund, it increases household and community resilience. Such resilience in turn enhances human security against the cruelty of natural disaster.

It is argued that 'human security' is directly linked with DDR. The concept of human security, in recent decades, has become a powerful tool for protecting and empowering vulnerable people.[22] Enhancing human security paves the way towards sustainable development. Minimizing the impact of natural hazards depends on the reduction of disaster risk and people's vulnerabilities from natural hazards. It is, therefore, very important to eradicate the root causes of disaster vulnerabilities. The vulnerabilities are associated with human insecurities, i.e., evils linked to lives and livelihood, environment, health and education. All these factors were highlighted through the MDGs. It endorsed to strengthen cooperation reducing the effects and number of natural and man-made disasters.[23] Thus, a balance between human security and the environment at the center of sustainable development is needed.[24] It is evident that global actors and initiatives needs to progress more for reducing the core drivers of disaster risks such as poverty and its proximal factors. Likewise, the climate governance must take into account how disasters affect individuals, their family and communities as a whole.[25]

Enhanced environmental preservation and management in the sustainable development plan will definitely promote disaster prevention and preparedness efforts with a view to fostering human security.[26] The global communities do recognize the nexus among disaster, environment and sustainable development to achieve the benchmark of human security. Against this backdrop, the paper aims to blend policy with practice, focusing on the human security dimension of natural hazard and development in the context of Bangladesh. The paper addresses several questions. How can DRR strategies and initiatives be implemented effectively in local vulnerable communities? How can Bangladesh's evolving DRR initiatives ensure stronger resilience and human security of the vulnerable populace? What is the importance of people's experience and local knowledge in finding viable actions against disasters arising from natural hazards? How does the resilient development help mitigate disaster risks and add to the broader

[21] Household is meant as all persons living under one roof or occupying a separate housing unit, having either direct access to the outside (or to a public area) or a separate cooking facility. Where the members of a household are related by blood or law, they constitute a family.

[22] Sadako Ogata, "Human Security - A New Response to Complex Threats", available at https://www.huffingtonpost.com/A-View-from-the-United-Nations-/human-security----a-new-r_b_3195120.html, accessed on 10 February 2018.

[23] UNGA, "United Nations Millennium Declaration", Resolution adopted on 18 September 2000, available at http://www.un.org/millennium/declaration/ares552e.pdf, accessed on 11 February 2018.

[24] Amartya Sen, *Human Security Now*, New York: Commission on Human Security, UN, 2003.

[25] Margareta Wahlstrom and Debarati Guha-Sapir, *The Human Cost of Weather Related Disasters 1995-2015*, Brussels: Centre for Research on the Epidemiology of Disasters (CRED), 2015, p. 3.

[26] UN, *United Nations Conference on Environment & Development*, *AGENDA 21*, Rio de Janerio: UN, 3- 14 June 1992.

agenda of ensuring human security? The paper is qualitative in nature. It collects data and statistics from the secondary sources, e.g., books, theses, magazines, newspapers, journals, websites, public records and statistics, historical documents and research reports.

The paper is organized into six chapters. After introduction, chapter two conceptualizes natural hazards and human security. Chapter three highlights the need for a plan of actions for DRR. It also contemplates the impacts of disaster and climate change risk on overall human security. Chapter four deals with correlations between disaster risk and resilience. Chapter five traces the challenges and policy imperatives for Bangladesh to mitigate disasters emanating from climatic events. Chapter six is the conclusion of the paper.

Chapter 2

Conceptual Framework

Before the existence of human, neither hazards nor disasters were calculable because there were no consequences on lives and livelihoods. Thus, to qualify as a disaster, a incident or event must adversely affect humans and other living beings with respect to their existence. Knowledge regarding the associated risks of hazards is significant to understand that disasters are not natural. The nature exerts hazards like hurricane, cyclones, floods, earthquakes, volcanic eruptions, etc., while human factors are responsible for turning these into disaster. It is not possible for human to prevent a hurricane but its effects and impacts can be prevented and/or reduced from becoming a disaster. A hurricane or cyclone can hit any part of the earth, but if it hits a place where there are no habitats and habitants, it will not cause disaster. It has the potential to turn into a disaster if it threatens peoples' lives, livelihoods, households and their assets. A massive earthquake will not be termed as disaster if it does not strike at a populated area. It turns to disaster when these natural events take place in human-induced environment or fragile areas.

Disaster is characterized by its losses and impacts. It is, of course, interlinked with exposure and vulnerability of people and areas alongside its severity.[27] Climate change, which is responsible for a large number of disasters, is mostly human-induced. Climate change and environmental degradation increasingly are triggered by human activities such as deforestation, rapid urbanization, etc. Disaster denotes a critical disruption in the community or societal functioning at a large scale. It arises due to natural hazard that interacts with people's vulnerability. Disasters lead to human, material economic and environmental losses.[28]

A disaster can have immediate and localized impact with widespread and long-lasting consequences. The effect may go beyond the capacity of a community or society to cope with. It, as such, may require supports from external sources like neighbourhood, national or international communities.[29] SFDRR 2015-2030,[30] elaborates on the following discourse of disaster:[31]

- Small-scale disaster: This only affects local community but requires support beyond the affected.

- Large-scale disaster: It affects a society and requiring national and/or international support.

[27] UNISDR, *Annual Report 2013*, Geneva: UNISDR, Biennium Work Programme, 2013.
[28] "Terminology on Disaster Risk Reduction", available at https://www.unisdr.org/we/inform/terminology, accessed on 26 October 2018.
[29] Ibid.
[30] "Sendai Framework for Disaster Risk Reduction 2015 – 2030", op. cit.
[31] UNGA, *United Nations General Assembly Resolution A/71/644*, New York: UN, 01 December 2016.

- Frequent and infrequent disasters: This type is categorized by the likelihood and frequency of occurrence and its impacts. This can have cumulative or chronic impact on the affected community, even for the society as a whole.

- A slow-onset disaster: This is the one that gradually emerges over a considerable period of time. It can be connected with desertification, drought, epidemics, sea-level rise, etc.

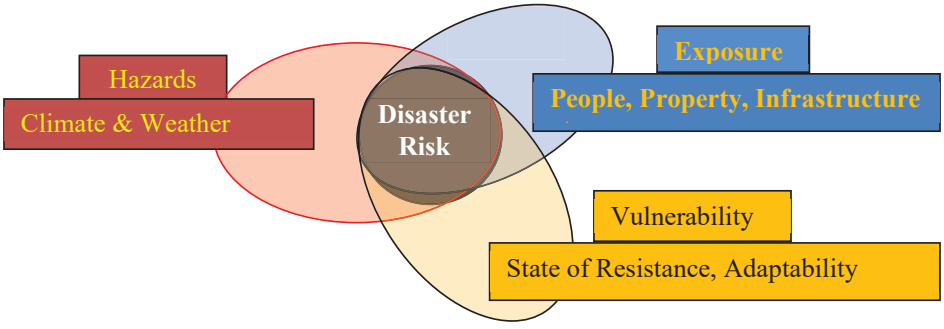
- A sudden-onset disaster: This type of disaster is triggered by a hazard emerging suddenly or unexpectedly from tornado, flash flood, earthquake, chemical explosion, volcanic eruption, road-traffic accident, critical infrastructure collapse, etc.

Natural disaster is the follow up of natural hazard which occurs due to the exposure and vulnerability of people and their assets. Conditions of vulnerability and exposure are not static rather can be altered and improved, based on the institutional and individual capacity to cope with. The development patterns can increase exposure and vulnerability and therefore increase disaster potential.[32] As one of the important components of natural disaster, vulnerability increases the susceptibility of a community to adverse impacts of natural hazard.[33] 'Exposure' as a component of disaster risk is linked with people and property. It deals with the condition of the people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.[34]

Indeed, the potential for disasters result from the climate extremes and from the exposure and vulnerability of human and natural systems.[35] Disaster typically entails unexpected loss of life, livestock, habitats and other properties with immediate as well as long term impacts.[36] The incidents of fatal injuries and deaths occur during the time of disaster whereas outbreak of diseases and food shortages often arise much later, depending on the nature and duration of the disaster and intervention programme. Moreover, disaster emergencies pose serious challenges to agricultural production and food security[37] which are essential components of human security.

[32] UNISDR, *How to Make Cities More Resilient: A Handbook For Local Government Leaders*, Geneva: UNISDR, March 2012.
[33] UNGA, *United Nations General Assembly Resolution A/71/644*, op. cit.
[34] Ibid.
[35] Christopher B. Field, Vicente Barros, Thomas F. Stocker and Qin Dahe, "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation", IPCC, 2012, available at https://www.ipcc.ch/report/managing-the-risks-of-extreme-events-and-disasters-to-advance-climate-change-adaptation/, accessed on 20 October 2019.
[36] United Nations Development Programme (UNDP) and the European Commission Humanitarian Office (ECHO), *Community-Based best Practices for Disaster Risk Reduction*, Maputo: UNDP, March 2010.
[37] Food and Agriculture Organizations of United Nations, *The Impact of Disasters and Crises on Agriculture and Food Security*, Rome: FAO, 2018, p. 2.

Figure 2.1: Factors and Evolution of Disaster Risk[38]



It is evident from various statistics that number and frequency of natural hazards ever since are on the rise with the devastating impact on human lives and their households. Similarly, the increasing number of natural disasters has been affecting the marginalized people or poor households more adversely. The impact aggravates with increased 'vulnerability' which relates to a condition arising from economic, social, environmental and infrastructural process or factors. These factors are basically responsible for susceptibility of a particular community to natural hazards' impact. Another important component of disaster risk is 'exposure' which primarily relates to people and properties that are likely to face the onslaught of natural hazards. In general, 'risk' relates to the probability of losses regard to human lives, livestock and livelihoods due to natural hazard.[39] Disaster risk may be contemplated as a function of a particular natural hazard associated with vulnerability and exposure, i.e.,

Disaster Risk = Nature and Extent of Climate Hazard + Vulnerability + Exposure

Disaster risk is defined as the likelihood of loss of life, injury or destruction and damage from a natural hazard at a given period of time.[40] It is the probability of harmful consequences or expected losses resulting from the interactions between natural or human-induced hazards and vulnerable populations.[41] Disaster risk is widely recognized as the consequence of the interaction between a hazard and vulnerability and exposure of people and places. It also arises from the complex development processes that generate conditions of exposure, vulnerability and fragility. It is interlinked with the severity and frequency of a hazard including exposure of people and property and vulnerability to damage.[42]

[38] "Total Disaster Risk Reduction-Good Practices 2005", available at http://www.adrc.asia/publications/TDRM2005/ TDRM_Good_Practices/ GP2005_e.html, accessed on 01 December 2019.
[39] Emmanuel M. de Guzman, "Towards Total Disaster Risk Management Approach", available at http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN009657.pdf?, accessed on 15 April 2020.
[40] UNISDR, "Global Assessment Report 2015", available at https://sustainabledevelopment.un.org/content/documents/2046GAR2015_EN.pdf, accessed on 20 December 2018.
[41] UNISDR, "Terminology on Disaster Risk Reduction", available at https://www.unisdr.org/we/inform/terminology, accessed on 20 December 2018.
[42] UNISDR, "Global Assessment Report on Disaster Risk Reduction 2015", op. cit.

Natural hazards bring disaster when and where the people, their assets and households including living condition remain at a risk of being exposed and vulnerable to its effects. As the time and magnitude of a natural calamity is not predictable, preparedness can save lives and critical infrastructure by reducing vulnerability and exposure. Thus, the DRR and disaster management issues are important in the strategic planning of nation states.[43] To reduce risk and minimize its effects, anticipation of the potential disaster's impacts can help determining the course of actions before the hazard strikes.[44]

2.1 Human Security and DRR

The study espouses the concept of 'human security' in addressing the challenges of natural disaster. The concept of security refers to safeguard the territorial integrity from external aggression. It emphasizes on national interests in foreign policy. It is related more to nation-states than to people.[45] The contemporary world faces highly interrelated, multiple and complex threats which affect the world's people and their surrounding environment. Threats like natural disasters often assume transnational dimensions beyond traditional notions of security. While assurance of 'peace and stability' remains pivotal to the notion of national security, consensus prevails among the security analysts, academia, think-tanks and international community to widen and deepen the concept of security.

Human security is understood as the protection of 'the vital core of all human lives in ways that enhance human freedoms and fulfillment'.[46] In June 1945, after the UN conference in San Francisco, the US secretary of state reported to his government that "The battle for peace has to be fought on two fronts. The first is the security front where victory spells freedom from fear. The second is the economic and social front where victory means freedom from want. Only victory on both fronts can assure the world of an enduring peace"[47] In the contemporary security paradigm, the concept of human security has added significant value to the achievement of 'peace and stability' across the nations.

[43] Tomislav Delinic and Nishchal N. Pandey (eds.), "Regional Environmental Issues: Water and Disaster Management", Centre for South Asian Studies (CSAS) and Konrad Adenauer Stiftung (KAS), November 2012, available at http://www.kas.de/wf/doc/kas_33365-1522-1-30.pdf?130130090940, accessed on 22 September 2018.

[44] Lelisa Sena and Kifle W. Michae, *Disaster Prevention and Preparedness, Ethiopia Public Health Training Initiative*, Ethiopia: The Carter Center, the Ethiopia Ministry of Health and the Ethiopia Ministry of Education, 2006.

[45] United Nations Development Programme (UNDP), *Human Development Report 1994*, New York: Oxford University Press, p. 22.

[46] Amartya Sen, op. cit. p. 4.

[47] Edward R. Stettinius Jr, U.S. Secretary of State, cited in "Human Security, Briefing Document", Prepared by Dr. Sven Grimm of Overseas Development Institute (ODI) for Dóchas Irish EU Presidency Project, 2004, available at https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/4803.pdf, accessed on 14 January 2019.

Human security means safety from chronic threats like hunger, disease and repression as well as protection from sudden and harmful disruptions of daily life. The security of people must be regarded as important as the security of a state.[48] The United Nations (UN) in 2012, unanimously agreed on 'human security as an approach' to identify and address widespread and cross-cutting challenges to the survival, dignity and livelihood of the people.[49]

From ancient to contemporary times, human security concerns had been visible —security, environmental and development concerns of the inhabitants of a particular community always have been prioritized. Over the passage of time, security concerns have been viewed beyond territorial threats and included the security of the people and the environment as well.[50] The 'environment' is where we all live in and 'development' is what we all do in an attempt to improve our living within the abode. These two are inseparable.[51]

The human security concerns were also addressed by different commissions such as the Brandt Commission,[52] the Brundtland Commission[53] and the Commission on Global Governance[54] from the 1970s to the early 1990s. However, human security, as a distinct concept, was first propagated by the United Nations Development Programme's (UNDP) Human Development Report (HDR) 1994. The report broadly defines human security as 'freedom from fear and freedom from want'. UN outlines four basic characteristics (universal, people-centered, interdependent and early prevention) and seven key components (economic, food, health, environmental, personal, community and political security) as the main elements of human security.[55] In human security approach, national government plays the primary role to ensure survival, livelihood and dignity of their citizens. It is an invaluable tool to assist government in identifying critical and pervasive threats to the welfare of its people and the stability of its sovereignty.[56] The human security approach of countering and dealing with emerging threats is always

[48] "Our Global Neighborhood–The Report of the Commission on Global Governance", New York: Oxford University Press, 1995, cited in Henry Lamb, A Summary Analysis, eco-logic, January/February, 1996.

[49] UNGA, "Resolution adopted by the General Assembly on 10 September 2012, A /RES/66/290", 25 October 2012, available at https://undocs.org/en/%20A/RES/66/290, accessed on 14 January 2019.

[50] "Our Global Neighborhood-The Report of The Commission on Global Governance", op. cit.

[51] "Our Common Future, Chairman's Foreword", available at http://www.un-documents.net/ocf-cf.htm, accessed on 08 March 2019.

[52] Overseas Development Institute, "The Brandt Commission", Briefing Paper No. 2, 17 March 1980, available at https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/6638.pdf, accessed on 08 March 2019.

[53] Gro Harlem Brundtland, *Report of the World Commission on Environment and Development: Our Common Future*, Oslo: Oxford University Press, 20 March 1987.

[54] "Our Global Neighborhood-Report of the Commission on Global Governance", op. cit.

[55] UNGA, *United Nations General Assembly Resolution A/64/701 on Human security Report of the Secretary-General, Sixty-fourth session Agenda items 48 and 114*, New York: UN, 08 March 2010, available at http://responsibilitytoprotect.org/human%20security%20report%20april%206%202010.pdf, accessed on 02 March 2019.

[56] Ibid.

forward looking. It moves beyond the programmes and policies of the government and relevant stakeholders in a comprehensive manner. The concept is context specific and about ultimate well-being of the people especially the disadvantaged community. This helps better utilize the resources and develop strategies to strengthen protection and empowerment framework. It is very much needed for the assurance of human security and the promotion of peace and stability at every level, e.g., local, national, regional and international.[57]

DRR process is a systematic approach to identify, assess and reduce the risks of natural hazards turning into disaster. DDR aims to reduce the adverse impact of climate and other hazards triggering socio-economic vulnerabilities.[58] It encompasses both the pre-disaster and post-disaster responses. These measures include establishing early warning systems, identifying hazard-prone areas, awareness building as well as establishing temporary shelter and life-support systems. DRR approach also aims to prevent the new disaster from taking shape while reducing the existing ones. It also makes efforts to manage residual risk for strengthening resilience. All these ultimately contribute to achieve the goals of sustainable development. Besides, strategies and policies of DRR set the parameters across varying scale with specific benchmarks and time frames.

United Nations Office for Disaster Risk Reduction (UNISDR) defines DRR as "the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters. It should be worked to achieve reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events."[59] The natural phenomena which devastate the land and the livings are referred as 'hazards'. They will not turn into disasters unless damage humans and properties beyond enduring limit.

The frequency of natural hazards is intrinsically connected to the growing risk of communities and households especially in developing countries. The pervasive socioeconomic vulnerabilities further exacerbate the impact of natural hazards, making the process of recovery more difficult.[60] The hazard's impact could aggravate prevailing poverty condition and arouse feeling of deprivation.[61] DRR thus becomes a necessity and underpinning for sustainable development.[62] However, the ill-conceived planning,

[57] United Nations Development Programme (UNDP), op. cit.
[58] Piers Blaikie, Terry Cannon, Ian Davis and Ben Wisner, *At risk: Natural Hazards, People's Vulnerability and Disasters*, London: Routledge, 2004.
[59] UNISDR, *Terminology on Disaster Risk Reduction*, Geneva: UNISDR, May 2009, available at www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf, accessed on 02 March 2019.
[60] Krishna Vatsa and Frederick Krimgold, "Financing Disaster Mitigation for the Poor", in A. Kreimer and M. Arnold (eds.), *Disaster Risk in Emerging Economies*, Washington: World Bank, 2000.
[61] Michael R. Carter, Peter D. Little, Tewodaj Mogues and Workneh Negatu, "Poverty Traps and Natural Disasters in Ethiopia and Honduras", *World Development*, Vol. 35, No. 5, 2007, pp. 835-856.
[62] Irasema Alcántara-Ayala, Orhan Altan and Susan L Cutter, "Disaster Risks Research and Assessment to

pervasive poverty and a range of other unequal social factors increase the risk conditions. These, along with exposure, and insufficient capacity, limit the ability of vulnerable communities to address the potentially adverse consequences of natural hazards. Thus, exposure and vulnerability interlink with the cruelty of the hazard impacts. As action to reduce disaster risk has become important in the international agenda, it was reflected in the MDGs.[63]

DRR includes national government's policies, strategies and measures to build and strengthen resilience of the people, villages, cities and country as a whole. It enhances the capabilities to reduce or mitigate the risk of disaster arising from hazards. Reducing disaster risk and increasing resilience to natural hazards in different development sectors can have multiplier effects and accelerate the development process.[64] DRR approach is wide ranging which encompasses the political, technical, social and economic action of the government and other stakeholders. The approach enables people to think and work across society. It also ensures that everyone—from governments to individuals-takes the right decisions in reducing the risk and impact of disasters. By doing so, a coming storm or flood will not be able to turn into a disaster for a community or locality.[65]

The DRR process is comprised of different phases, i.e., preventive phase, mitigation phase, preparedness or preparatory phase, recovery phase and reconstruction phase. In the preventive phase, all activities are directed towards evading adverse effects of hazards, and/or at least minimizing related environmental, technological and biological disasters. Though the mitigation assumes different meanings in climate change sphere, for disaster management, mitigation contemplates structural and non-structural measures. It is undertaken to minimize and limit the adverse impact of natural and technological hazards and environmental degradation. Preparedness phase entails plans for timely, effective and quick response by individuals and communities for avoiding potential disaster. Recovery phase encompasses the immediate process of post disaster decision making and activities undertaken to restore the normalcy in lives and livelihood of the stricken community. Reconstruction phase includes short or long term programmes undertaken to enable basic essential services to resume functioning. It directs to refurbish or renovate physical damage of community's facilities, revive economic activities and support the psychological and social well-being of the survivors after the devastation of a natural hazard.[66]

Promote Risk Reduction and Management", March 12, 2015 ICSU ISSC Ad-hoc Group on Disaster Risk Assessment.

[63] "The Global Platform for Disaster Risk Reduction Bulletin", *International Institute for Sustainable Development (IISD)*, Vol. 141, No. 2, 22 June 2009.

[64] Ban Ki-moon cited in "Disaster Risk Reduction: An Instrument for Achieving the Millennium Development Goals", Advocacy kit for parliamentarians by IPU and UNISDR, Geneva, Switzerland, September 2010, p.2., available at https://eird.org/esp/educacion2/files/15711_parliamentariankitfinal.pdf, accessed on 12 November 2018.

[65] Ibid.

[66] UNISDR and ECHO, "Disaster Through A Different Lens-Behind every effect, there is a cause", available at

2.2 Human Security and Development

The concept of human security and development actually reinforces each other. In 1994, UNDP first formalized the contemporary comprehensive concept of human security in the HDR which had shifted the focus of state-centric view of development and security to people centered, more precisely, individual centric human security and development. The report also elaborates on 'the legitimate concerns of ordinary people who sought security in their daily lives'.[67] Consequently, there has been a paradigm shift in global development agenda which focussed on the causes and cures of human vulnerability. In ethical terms, human security is both a 'system' and a 'systemic practice'. Through promoting stability and sustainability it ensures security and progressive integration of individuals to the state, society and region. In sum, human security allows individuals the pursuit of life, liberty, happiness and justice.[68]

In 2000, the then UN Secretary General Kofi Annan stressed on freedom from fear and want and freedom to live in dignity. He also linked development, security and human rights to ensure overall human security. According to him, "Human security in its broadest sense embraces far more than the absence of violent conflict. It advocates human rights, good governance, access to education and health care and ensuring that each individual has opportunities and choices to fulfill his or her own potential".[69] Attaining 'freedom from fear' and 'freedom from want' requires more than just protecting people and their fundamental freedoms. There needs to be short-term protection from critical situations and threats as well as long term protective measures for overall security and stability. It is possible to do so by effectively integrating political, environmental, social, economic, military and cultural systems and processes that allow individuals to prosper over time.[70] The concept of 'people centric security' started drawing international attention and receiving relative prominence. The security of people involves physical safety, socio-economic well-being, respect for dignity including protection of human rights and fundamental freedoms.[71] In 2003, the Commission on Human Security included protection of 'human rights' under the umbrella term 'human security'.[72]

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http://www.zaragoza.es/contenidos/medioambiente/onu/1169-eng.pdf, accessed on 21 October 2018.

[67] UNDP, Human Development Report 1994, op. cit.

[68] P. H. Liotta and Taylor Owen, "Why Human Security?" available at http://www.taylorowen.com/Articles/Owen%20and%20Liotta%20-%20Why%20Human%20Security.pdf, accessed on 17 April 2019.

[69] Kofi Annan, "Secretary-General Salutes International Workshop on Human Security in Mongolia", UN Press Release SG/SM/7382, available at http://www.un.org/News/Press/docs/2000/20000508.sgsm7382.doc.html, accessed on 03 March 2018.

[70] "UN Office for the Coordination of Humanitarian Affairs, Human Security", available at http://ochaonline.un.org/webpage.asp?MenuID=9671&Page=1494, accessed on 23 February 2019.

[71] International Commission on Intervention and State Sovereignty (ICISS), *The Responsibility to Protect: Report of the International Commission on Intervention and State Sovereignty*, Ottawa: ICISS, 2001, available at http://responsibilitytoprotect.org/ICISS%20Report.pdf , accessed on 23 July 2018.

[72] Amartya Sen, op. cit.

'Human security' adjoins together security, development strategy and thinking. Development, according to Amartya Sen is, "a process of expanding the real freedoms that people enjoy."[73] It moves from the narrow lens of economically enhanced livelihood to the broader perspective of dignified living. Hence, "development requires the removal of major sources of unfreedom: poverty as well as tyranny, poor economic opportunities as well as systematic social deprivation, neglect of public facilities as well as intolerance or over activity of repressive states." [74] By emphasizing on the downside risks, the concept of human security stresses that the people must be protected when facing unexpected and profound setback in social and economic life. The concept of human security also takes insights from *Reflections on Human Development* of Mahbub ul Haq. The book seeks ways to ensure human wellbeing and concludes that the people are both the means and ends of economic development.[75] It is also argued that removal of economic, social, political and cultural obstacles is very significant in realizing and understanding human potential and aspiration.

The UN contemplates human security as the right of people to live in freedom and dignity, free from poverty and despair. [76] And natural disasters like tsunamis, heavy earthquakes, cyclones, floods and so on are major threats to human security. The impacts of natural disasters on human security can be silent and slow or rapid. Human security challenges can be manmade as well as stemmed from the natural events. These two aspects again combine together to create human security threats as often the environmental degradation leads to a natural disaster followed by human tragedy.[77] The human security threats can be divided into seven broad categories: economic security, food security, health security, environmental security, personal security, community security and political security.[78] Natural hazards threaten human survival, forestall the economic progress and activities and damage social structure above all hinder people's wellbeing. Therefore, in the natural hazards prone areas DRR approach of resilient development is essential protecting the vulnerable humans.

Considering the climate change induced disasters, the challenges and threats to human security respect to overall development remain high. Human security is regarded as both development and humanitarian concerns considering health and socio-economic impacts of disaster. The human security concern also suggests to give priority on cost-effective mitigation and development in high risk poor regions. It is argued that disasters have incurred more loss to human lives and properties than wars. The human cost of climate induced disasters is interlinked with multiple factors, e.g., structural development, type of hazard, its magnitude, location and local vulnerability thwart. From 1995 to

[73] Amartya Sen, *Development as Freedom*, New York: Oxford University Press, 1999, p. 3.
[74] Ibid.
[75] Mahbub ul Haq, *Reflections on Human Development*, New York: Oxford University Press, 1995, pp. 3-4.
[76] Ibid.
[77] Ibid.
[78] Ibid.

2015, flooding alone affected 2.3 billion people and storms killed more than 242,000 people. Majority of them (95 per cent) lived in Asia. The vast majority of these deaths (89 per cent) occurred in lower-income countries, even though they experienced just 26 per cent of all storms,[79] which clearly indicate the fragile development of these countries.

2.3 Resilience and Development

Resilience extends from ecological resilience[80] to human's way of life under social- ecological resilience.[81] However, recently, the emphasis is given on human system and community resilience termed as 'social resilience'. The mechanism by which the resilience can be achieved depends on four key factors: identification of hazard, adaptation strategy, state of preparedness and recovery and rehabilitation ability.[82] Community resilience can be measured by the ability of groups or communities to cope with external stresses and turbulence as an outcome of political, social, and environmental changes.[83] It can follow both preventive and recovery mechanism and bottom-up approach. The resilient communities should understand the disaster risks with their ability to assess and monitor the risk factors. Only then they would be able to take necessary steps to protect from potential disaster and minimize losses. Community resilience must sustain basic community functions and structures despite hazard's impacts. After the strikes of hazard, the resilient community should be able to reduce the existing vulnerabilities. Notably, being safe and disaster resilient refer that development goals are more likely to be met.[84]

Resilience is ensured and become strongest when environmental, social and economic capitals are concertedly developed in a social group or a community and their functional interaction.[85] Communities with two well developed capitals can be termed as moderately resilient. The communities, with one or no well-developed capital, will have weak resilience including high vulnerability.[86] However, if social and environmental capitals are compromised due to its sole focus on developing economic

[79] Margareta Wahlstrom and Debarati Guha-Sapir, "The Human Cost of Weather-Related Disasters 1995-2015", November 2015, available at https://www.researchgate.net/publication/317645611_The_Human_Cost_of_Weather_Related_Disasters_-_1995_-_2015/citations, accessed on 28 March 2019.
[80] Carl Folke, "Resilience: The Emergence of a Perspective for Social-ecological Systems Analyses", *Global Environmental Change*, Vol. 16, 2006.
[81] Douglas J. Davidson, "The applicability of the concept of resilience to social systems: some sources of optimism and nagging doubts", *Society and Natural Resources*, Vol. 23, 2010.
[82] United Nations, "Guiding principles on internal displacements: United Nations", 2004, available at https://www.unhcr.org/protection/idps/43ce1cff2/guiding-principles-internal-displacement.html, accessed on 09 June 2019.
[83] W. N. Adger, "Social and Ecological Resilience: Are They Related?" *Progress in Human Geography*, Vol. 24, 2000, pp. 347-364.
[84] International Federation of Red Cross and Red Crescent Societies, "The Road to Resilience Bridging Relief and Development for a More Sustainable Future", IFRC Discussion Paper on Resilience, Geneva: IFRCS, 2012.
[85] G A Wilson, *Community Resilience and Environmental Transitions*, London: Routledge, 2012.
[86] W. N. Adger, op. cit.

capital, a particular community is likely to be more vulnerable. However, a marginal number of community members may be benefitting financially. Without the balanced relationship among the three capitals, the interdependence between economic, social and environmental capital may lead 'ripple effect' reducing overall resilience.[87] It is important to create awareness and improve preparedness among the communities to enable them to respond and recover from disaster occurrence. This approach has been emphasized in most of the DRR initiatives over the last decades.[88] Community resilience approach has become stronger and shifted from a 'predict and prevent' paradigm to build the capacity of communities in recent decade. The notion of 'community resilience' is rapidly gaining ground as a process of societal development. Safety and resilience of a community have assumed greater importance in MDGs where 'build better' has become fundamental for sustainable healthy environments.[89] The target community must be able to take part in decision making process which helps them to adjust with the social and economic adaptation efforts.[90] In recent time, there evolved three major views on resilience. These are considered as, resilience as stability (buffer capacity), resilience as recovery (bouncing back) and resilience as transformation (creativity). All these perspectives share commonality in the ability to withstand and respond positively to stress or change.[91]

Resilience, mitigation, preparedness, whatever terms are used, all are meant for protecting communities against evils of disasters arising from hazards. 'Mitigation' amplifies actions to minimize potential disaster impact. Preparedness refers to specific measures that are well planned and well implemented before hazard strikes, usually in the form of issuing early warnings, taking defensive precautions against forecasted hazard and making available essential resources to facilitate a rapid response. Above all, 'disaster resilience' is understood to be the ability of countries, communities and households to manage the changed situation, by maintaining the normalcy in living standards in face of shocks or stresses.[92] Indeed, use of 'disaster' should not invoke the images of emergency relief as an aspect of humanitarian aid. Rather, it should be regarded as a central component of development programmes.[93] In climate events,

[87] G. A. Wilson,"Community Resilience: Path Dependency, Lock-in Effects and Transitional Ruptures", *Journal of Environment, Planning & Management*, Vol. 57, No. 1, 2014, p. 1.

[88] International Strategy for Disaster Reduction (ISDR), *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*, Kobe: ISDR, 2005.

[89] United Nations, "Sustainable Millennium Goals", available at https://www.undp.org/content/undp/en/home/sustainable-development-goals.html, accessed on 27 August 2018.

[90] Indian Ocean Tsunami Information Center (IOTWS), "Manual on Evaluating Coastal Community Resilience to Hazards", 2007.

[91] C. Folke, op. cit.

[92] For details, see, "Resilience Renaissance? Unpacking of Resilience for Tackling Climate Change and Disasters", available at http://community.eldis.org/.59e0d267/resilience-renaissance.pdf, accessed on 15 April 2020.

[93] J. Twigg, *Disaster risk reduction: mitigation and preparedness in development and emergency programming*, London: Humanitarian Practice Network, Overseas Development Institute, 2004, available at https://www.preventionweb.net/educational/view/8450, accessed on 17 December 2019.

'resilience' is particularly significant in the context of development which focuses on the adaptation to climate change and the reduction of potential disaster risks. 'Climate resilient development' is increasingly becoming a 'catch-all' to mitigate the climate change impacts in the development context.[94] Through the process of climate change adaptation, a comprehensive strategy can be formulated to moderate the development programmes to cope with and take advantage of the consequences of climatic events[95] Adaptive capacity, if builds coherently with other development indicators, will be able to adjust to climate change events. It can also enhance the coping capacity for reducing potential damages.[96]

Most commonly resilience and vulnerability are regarded as opposing to each other. Characterization of vulnerability is diverse and vast. It could be threshold beyond which a system cannot cope with or is susceptible to fall prey to the hazard's impact. Vulnerability relates to adaptive capacity, fragility, exposure and sensitivity of a system. It is also interlinked with the magnitude, nature and extent of climate events.[97] It is argued that vulnerability and resilience are negatively associated. If vulnerability increases, resilience will be decreased and vice versa. Thus, these two aspects need to be counterbalanced alongside limiting the exposure. However, in socio-ecological systems, this conceptualization of resilience considers disturbances as an opportunity. It views resilience building as an opportunity for doing 'new things' for sustainable development with innovation.[98] The functioning of a resilient system is dependent on groups performing different roles and responding differently to the same environmental change. In this context, community resilience plays an important role in achieving sustainable development which is resilient to climate events. The notion of community resilience to natural hazards looms from the sustainable livelihoods approach where social, economic, human, physical and natural capitals are seen as the determinants of resilience.[99] The concept of resilience also assumes the notion of social resilience. Social resilience denotes as the aptitude of the communities to withstand shocks to the social infrastructure. It is composed of components such as economic growth, stability and distribution of income, degree of dependency on natural resources and diversity in the kind of activities/functions being performed within the systems.[100]

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[94] Aditya V. Bahadur, Maggie Ibrahim and Thomas Tannert, "Characterising Resilience: Unpacking the Concept for Tackling Climate Change and Development", *Climate and Development*, Vol. 5, No. 1, 2013.

[95] Ellina Levina and Dennis Tirpak, *Adaptation to Climate Change: Key Terms*, Paris, France: OECD/IEA, 2006, available at https://www.oecd.org/environment/cc/36736773.pdf, accessed on 07 April 2019.

[96] Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2001: Impacts, Adaptation and Vulnerability*, New York: Cambridge University Press, 2001.

[97] Ibid.

[98] C. Folke, op. cit. p. 253.

[99] J. S. Mayunga, "Understanding and Applying the Concept of Community Disaster Resilience: A Capital-Based Approach", draft working paper prepared for *Megacities as Hotspots of Risk: Social Vulnerability and Resilience Building*, Munich, Germany, 22–28 July 2007.

[100] W. Neil Adger, "Social and ecological resilience: are they related?", *Progress in Human Geography*, Vol. 24, No. 3, pp. 347 – 364, available at https://pdfs.semanticscholar.org/6eb9/1fb61d5f29aee85ed1e62adcd80943c6bb85.pdf, accessed on 09 April 2019.

Chapter 3

Plan of Actions for DRR

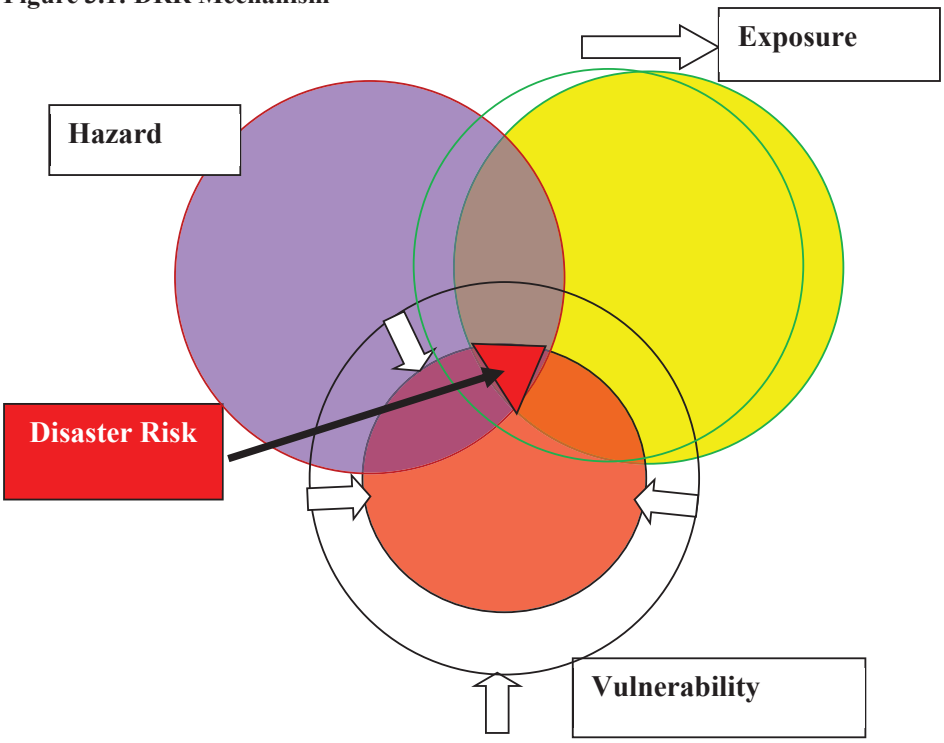
Two factors are critical and must be kept in mind while formulating future risk reduction strategy. First, population growth will remain a concern to create vulnerability and is likely to place more people in harm's way. Second, unplanned and uncontrolled infrastructural development on flood plains and coastal zones will increase human vulnerabilities to extreme weather events. The death tolls since 1995 show the effects of such vulnerability on human lives.[101] State is the primary actor to reduce disaster risk. It, of course, needs to engage other stakeholders such as, local communities, private sector, scientific community and Non-Governmental Organizations (NGOs) in its resilient development efforts. Overall aim of development should be a substantial reduction of disaster losses resulting from both man-made and natural hazards. Besides, state actions should focus on strengthening disaster risk governance to reduce and manage disaster risk, investing in disaster risk reduction for resilience and enhancing disaster preparedness for effective response and to be able to 'Build Back Better' in recovery, rehabilitation and reconstruction.

The SFDRR sets seven targets focusing on substantial reductions in (a) disaster mortality, (b) number of affected people, (c) direct economic losses and (d) damage to critical infrastructure and basic services. It also seeks a substantial increase in (e) national and local DRR strategies by 2020, (f) enhanced cooperation to developing countries and (g) a substantial increase in multi-hazard early warning systems, disaster risk information and assessments.[102] The nation states can follow the guideline and implement them in a way that would go well with the local environment.

[101] Ibid

[102] "Sendai Framework for Disaster Risk Reduction 2015 – 2030", op. cit.

Figure 3.1: DRR Mechanism[103]



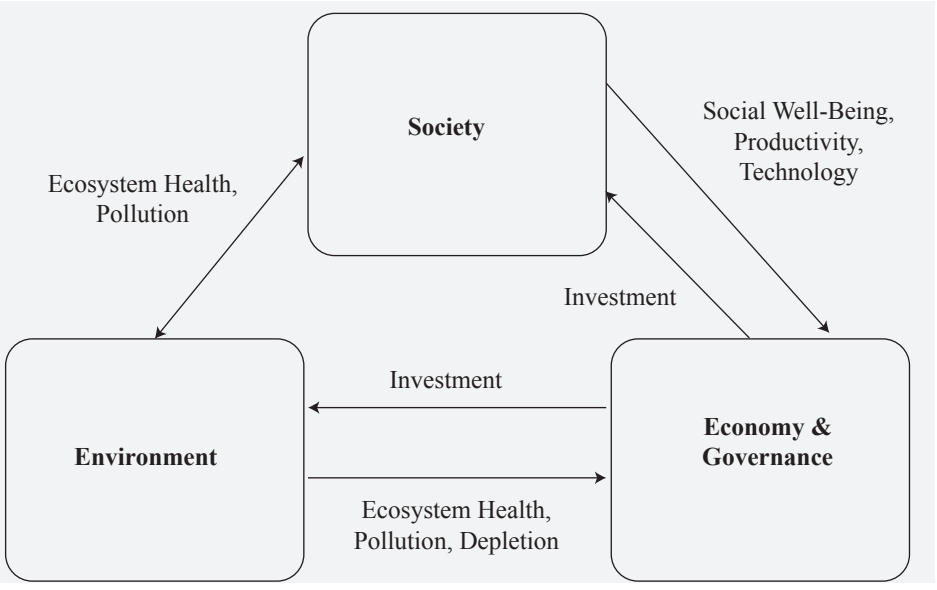
3.1 The Process and Mechanism of DRR

Along with 17 goals and 169 targets, the SDGs outlines global environmental, economic and social development priorities until 2030. These targets, among others, cover a wide range of interrelated and cross-cutting development issues, including ending poverty, improving education and health, ensuring safe cities and combating climate change. Central to the expectations is the recognition of eradicating poverty in all its forms and dimensions. It is the greatest global challenge and an indispensable requirement for sustainable development. Henceforth, achieving sustainable development[104] is of vital importance to every country.

[103] "Total Disaster Risk Reduction-Good Practices 2005", op. cit.

[104] "Transforming our world: The 2030 Agenda for Sustainable Development", Resolution adopted by the General Assembly on 25 September 2015, available at http://www.un.org/ga/search/view_doc.asp?symbol =A/RES/70/1&Lang=E, accessed on 27 July 2019.

Figure 3.2: Main Sectors of the iSDG Model[105]



One study suggests an integrated SDG (iSDG) model (Figure 3.2) for implementing SDGs and to assist in development planning by providing a credible representation of real world development. The model is based on feedbacks between and within three main sectors that may be referred as environment, society and economy and governance. Essential ingredients of such model also emphasizes on the national efforts for development which would help reduce the risk arising from natural hazards.

A number of impediments, for example, social or political unrest/conflicts, economic recession/financial crises, epidemic/pandemic diseases, natural hazards/ environmental degradation, hinder the efforts towards sustainable development. Natural hazards trigger shocking aftermath when there remains unpreparedness and other factors like exposure and vulnerability. Disaster risk management is therefore essential for the realization of sustainable development. The disaster risk increases when there is a development failure. It means that disaster risk is determined by the sustainability of development. Hence, disaster risks include not only hazard, vulnerability and exposure but also the ability of the society to protect it from natural hazards. Reduction of disaster risk is vital for sustainable development and a risk-informed development path is the key to the successful management of disaster

[105] D. Collste, M. Pedercini and S. E. Cornell, "Policy Coherence to Achieve the SDGs: Using Integrated Simulation Models to Assess Effective Policies", *Sustain Science*, Vol. 12, No. 6, 2017, pp. 921–931, available at https://doi.org/10.1007/s11625-017-0457-x, accessed on 23 October 2018.

risks.[106] Disasters are affecting thousands of lives with economic losses averaging US$ 250 billion to 300 billion per-annum[107] So, the hazards, vulnerabilities, risks and disasters etc., should be understood from the perspective of development.

3.2 Limiting Factors for Sustainable Development

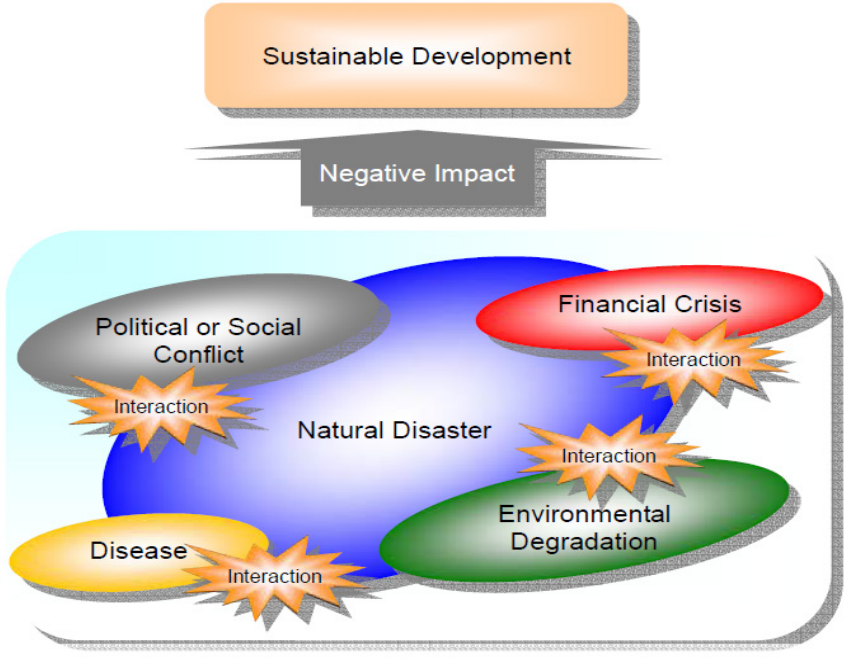
Most of the international frameworks recognize the links between climate change, poverty and disaster risk. These frameworks have put forward a set of goals and targets, which if achieved, would be able to create a significant progress on the DRR, sustainable development, climate and humanitarian challenges of the contemporary world.[108] There are challenges in disaster risk governance. It often appears that there is scanty engagement by the development actors in the affairs of DRR activities. In most of the cases, it is found that the progress in implementing climate change adaptation is slow. The institutional frameworks and adaptation policy are not well connected at both national and international levels.

[106] UNISDR Strategic Framework 2016-2021.

[107] UNISDR, *Global Assessment Report on Disaster Risk Reduction Making Development Sustainable: the future of disaster risk management*, Geneva: UNISDR, 2015, available at https://reliefweb.int/sites/reliefweb.int/files/resources/GAR15_Pocket_EN.pdf, accessed on 23 November 2018.

[108] Katie Peters, Lara Langston, Thomas Tanner and Aditya Bahadur, "Resilience Across the Post-2015 Frameworks: Towards Coherence?", November 2016, available at https://www.odi.org/sites/odi.org.uk/files/resource-documents/11085.pdf, accessed on 07 June 2019.

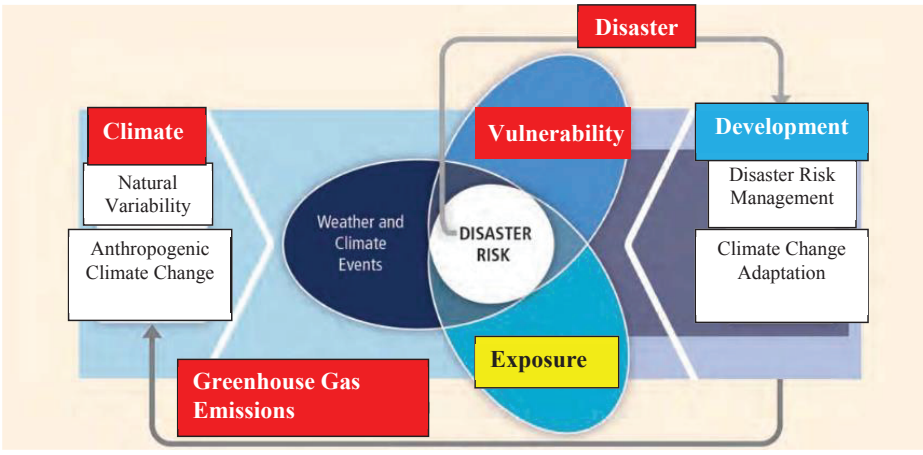
Figure 3.3: Impediments to Sustainable Development[109]



Indeed, well-planned and contextual development efforts aiming to eliminate poverty have substantial potential to mitigate core disaster risk drivers. However, it is found that poverty reduction strategy links with DRR and climate change adaptation. Also, it confines to institutional and policy frameworks. Notably, DRR strategy often focuses on disaster preparedness and response aspects. The character and severity of impacts from climate extremes depend not only on the extremes themselves but also on exposure and vulnerability. Climate extremes, vulnerability and exposure are related to a wide range of factors, including anthropogenic climate change, natural climate variability and socioeconomic development. The Figure 3.4 explains the correlation between development and climate events with respect to DRR.

[109] "Total Disaster Risk Reduction-Good Practices 2005", op. cit.

Figure 3.4: Disaster Risk Management and Adaptation to Climate Events Model[110]



3.3 Model for Disaster Risk Management and Adaptation to Climate Change

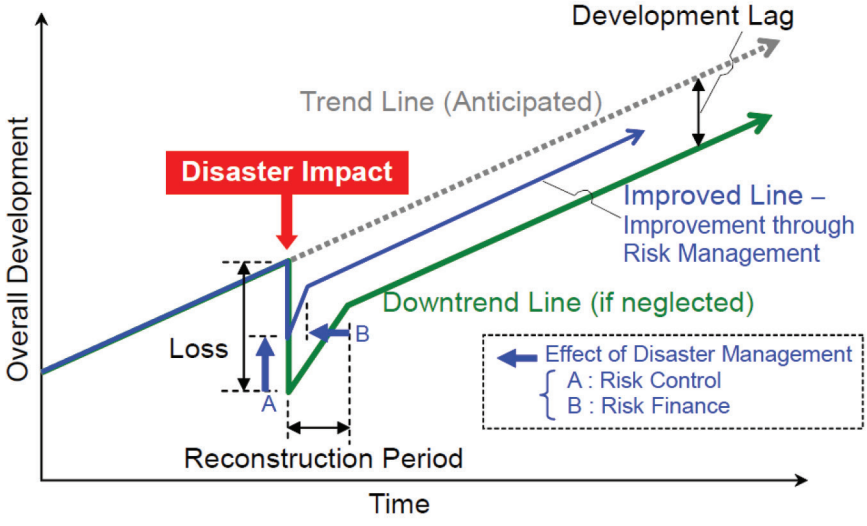
The model illustrates how exposure and vulnerability to climate events determine the impacts of hazards and likelihood of disasters. It portrays the way how natural climate variability, anthropogenic climate change, exposure and vulnerability of human society and natural ecosystem interact with each other and impact on climate extremes which can lead to disasters. It also traces the role of development trends stressing on exposure and vulnerability, implications of disaster risk and interactions between disasters and development. The model tries to figure out how disaster risk management and adaptation to climate change can reduce exposure and vulnerability to weather and climate events and increase resilience to risks.

International community as well as the public and private sectors can contribute to the alternative thinking on development and its implementation and measurement.[111] Innovative approaches at the local level and in different other tiers are already being exercised at different scales. The national governments may provide a platform to institutionalize these initiatives with the provision of land, infrastructure and housing for both urban and rural poor communities. For strengthening rural livelihood resilience, provisioning of ecosystem services, mobilizing microfinance and so on are important to strengthen local resilience. To make the investments cost-effective for building social capital, it is important to have coherence and coordination between national and local governments, NGOs and civil society. All these efforts must be integrated into the mainstream policy framework for sustainable development. Without the combination and coherence, local DRR efforts and climate change adaptation initiatives cannot be

[110] Christopher B. Field et al., op. cit.
[111] UNISDR Strategic Framework 2016-2021, op. cit.

achieved. Unfortunately, decision-making and the governance frameworks underestimate the strategy of DRR while delineating the development plan in many instances.[112]

Figure 3.5: Correlation in Disaster Risk Management[113]



The relationship between natural hazard and development is illustrated in Figure 3.5. Here the dotted line indicates planned/projected development target while the thick green line shows the one which is being hindered by natural hazard turning to disaster. The thin blue line indicates the improved development with appropriately and timely intervention to natural hazard. This can be achieved through risk control/mitigation mechanism with sufficient disaster finance and funding. Despite the relationship between disasters and development, disaster risk and resilience received insufficient importance in the MDGs.[114] Although there is a universal consensus that natural hazard can hinder the development path while destroying the gains, there is limited recognition that different development approaches can create or increase vulnerability. Reducing the risks emanating from natural hazards through early warning systems, preparedness and prevention helps protect both human and economic resources. It is evident that disasters caused by natural hazards will continue to intensify and present significant challenge to development. DRR and resilience therefore need to consider adequately in the development agenda if the objectives of sustainable development are to be achieved.[115]

[112] "UNISDR Work Programme 2016-2019", available at https://www.preventionweb.net/files/51558_workprogramme.pdf, accessed on 12 April 2020.
[113] "Total Disaster Risk Management - Good Practices 2005", op. cit.
[114] UNISDR and WMO, "Disaster Risk and Resilience, Thematic Think Piece", available at https://www.preventionweb.net/files/27462_20120607unttpostmdgthinkpieceondrra.pdf, accessed on 16 June 2019.
[115] Ibid.

For reducing disaster risk, the prime focus of development should be on avoiding recurring risks and incurring new risk. Averting new risks will eventually reduce overall disaster risks. From this perspective, DRR is particularly significant to achieve the SDGs and ensure human security. If resilience develops, new risk will not likely to arise. On the other hand, if it is ignored or missed, new ones will add to the older and will begin to give birth to the bigger ones. For stopping the emergence of new risks, recovery and reconstruction phase are particularly decisive. While managing the post disaster affairs, this is to be approached in a manner so that the hazard's impacts cannot add to the prevalent poverty of a vulnerable community or locality. These two phases are significant in resolving poverty and disaster risk nexus.

Despite these challenges, it is important to formulate resilient development strategies using appropriate policy frameworks. Investment in development needs to take into account the evolving climate change related risks. Given the uncertainties of potential climate events and its impacts, resilient infrastructure needs to be prepared to confront and contain changing climate conditions, for instance by adapting uncertainty-management methods. Hallegatte,[116] identifies several methods. Selecting strategies yield benefits even in the absence of climate change. It therefore creates no or little regret if the climate does not change as expected. For example, reducing leaks in water distribution systems; increasing the standards of new buildings and increasing the frequency of road maintenance, etc. Favouring reversible and flexible options to enhance coastal defence, like insurance and early-warning systems. Buying 'safety margins' in new investments along with restrictive land-use planning; higher coastal protection and bigger drainage capacity for urban infrastructure and roads. Promoting strategies focus on institutions, policies and behaviour change including the 'institutionalization' of long-term investment planning; multi-criteria assessment and use of a range of policy and financial investment instruments. Reducing decision time horizons. For instance, in areas that could be flood-prone in the future; building cheaper houses that can be replaced quickly and at lower cost.

Natural hazards are the potential sources of disaster. It can severely affect development. It can also obliterate the endogenously acquired capacities and reduce the prospects of future wellbeing of a community. In developmental paradigm, disasters consider as pre-disaster indigenous ability to press on for economic enhancements which affect the existing economic functioning and outcomes, i.e. markets, production progression, destroy critical facilities and infrastructures, disrupt communication networks and devastate natural resources and ecosystem and so on. Natural hazard related disaster can be the external cause of economic shocks creating hindrance on economic growth and slowing down the pace of overall development. Consequently, short as well as long term sufferings may increase.

[116] Stéphane Hallegatte, "Strategies to adapt to an uncertain climate change", *Global Environmental Change*, Vol. 19, No. 2, May 2009, pp. 240-247.

Natural hazards, depending on its magnitude and frequency of occurrence, can impede the sustainable development of a country. Its cruelty, particularly from cyclones, droughts and floods has increased manifold than before due to the lack of attention on the vulnerabilities of the marginalized population especially in the developing countries. Emerging risks from increasing climatic variability is likely to increase the climatic hazards in future.[117] Adverse climatic events adversely affect human health, agriculture process, ecological systems, forestry and fisheries, water resources, human settlements and undermine sustainable development.

Amidst uncertainty, unpredictability and growing trends of natural hazards highlight the significance of human security approach to achieve sustainable development. Alongside, human factors have been responsible for disturbing the nature thus contributed to creating or worsening hazardous events leading to disasters. Human induced pollution like, greenhouse emissions, has severely altered the climatic processes and caused global warming. This has been one of the reasons for increasing the magnitude and frequency of extreme climate events.[118] Deforestation is considered as a hazard because it is responsible for desertification and reducing the amount of rainfall leading to drought condition. In the long run, desired development is threatened by the uncertainty of natural hazards and affected the human kind due to poor DRR strategy.[119] Here, human intervention and environmental systems congregate in two aspects. Firstly, where environmental change is caused due to human actions, i.e., human is directly responsible for environmental alteration. Secondly, where in environmental changes directly affect what human values. Humans are not merely considered as innocent victims compelled to adapt to changes in environmental systems. It is not the natural forces which is blamed alone to bring disaster. Rather, it is human behaviour and their way of life that must be controlled to succeed in redirecting global change and reduce the disaster risk for the benefit of all.[120]

The concept of vulnerability is complex which is measured by the prevailing socio-economic structure, developmental stage, mechanism of risk assessment, coping

[117] Hydrologic hazards include floods, storm surges, coastal erosion and droughts. It is important to understand the interrelationship of hydrologic hazards with other hazard groups. For example, extreme rainfall from a thunder and lightning event can cause flooding and winds from a tropical cyclone can exacerbate storm surge and coastal erosion. See also, "Multi Hazard Identification and Risk Assessment: The Cornerstone of the National Mitigation Strategy", Federal Emergency Management Agency, 1997.

[118] Stocker T.F., D. Qin, G.K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.), *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, New York: Cambridge University Press, 2014.

[119] Werner Corrales and Tanya Miquilena, "Disasters in Developing Countries' Sustainable Development: A Conceptual Framework for Strategic Action", Background paper for the 2009 ISDR Global Assessment Report on Disaster Risk Reduction, Geneva: ISDR, November 2008.

[120] Paul C. Stern, Oran R. Young and Daniel Druckman, *Global Environmental Change: Understanding the Human Dimensions*, Washington, DC: National Academy Press, 1992, available at http://nap.edu/1792 accessed on 12 April 2020.

mechanism, frequency and intensity of disasters, etc.[121] Disasters due to natural hazard may increase vulnerability and cause social disparity among and between communities. The poor, already suffering from inadequate earnings and income fluctuations with limited access to economic functions, are more prone to cut off their consumption. Such cut off of consumption also makes them more vulnerable to disaster effects. Besides, they remain unable to access to critical services. Consequently, they struggle for reversals of human and physical capitals thus resorting to child labour and criminal activities.

Other disaster's affects comprise of increased debt potential long-term development implications primarily relating to the opportunity cost of future debt servicing and repayment costs.[122] Creating additional external debt pressures, disasters destroy infrastructure and other assets funded with external loans.[123] As a whole, disaster causes great loss of life and immense damage to communities, infrastructure and national economies.[124] Ethical and humanitarian considerations oblige to take action to protect human life and lessen suffering. Thus, for effective management of disaster risks, it is important to work on the diverse nature of the climate related problems and type of vulnerabilities arising from climate events. Based on the scientific and practical analysis, an integrated risk reduction strategy covering various aspects of vulnerability and offering a range of responses (strategic, policy, regulatory, fiscal, investment, etc.) is fundamental in the development architecture. Evaluation of the strategy also requires a strong monitoring mechanism which oversees the vulnerability implications of a particular policy and financial decision.

For sustainable development and enhanced coping capacity, it is important to address the socio-economic, political and infrastructural aspects of vulnerability to create disaster resilient communities.[125] In the context of sustainable development, resilience building can help developing the social and institutional capacity to respond to the aggressive natural events. For dealing with the consequences of natural hazard events, emphasis should be given on resilient infrastructure, unforeseen events, educating the community on probable actions during the occurrence of natural hazard. Moreover, need- and people-based policy would help reduce the likelihood of damage. The scientific development and engineering design for infrastructure building also will reduce the system vulnerability and improve preparedness, response and recovery

[121] J. Twigg, op. cit.

[122] Ernst Young, "Booming and busting", Economic Forecast, Australia: Asia-Pacific Economics Group, 1991; Benson, C. and Edward J. Clay, "The impact of drought on Sub - Saharan African economies: a preliminary examination", World Bank Technical Paper 401, Washington, D.C.: World Bank, 1998.

[123] C. Benson, "The Economic Impacts of Natural Disasters in Fiji", ODI Working Paper No. 97, London: Overseas Development Institute.

[124] J. Twigg, op. cit.

[125] B. Wisner, P. Blaikie, T. Cannon and I. Davis, *At Risk Natural Hazards, People's Vulnerability and Disasters* (2nd edition), London: Routledge, 2004.

measures.[126]

It is possible to achieve resilience through active participation of community people and consequential cooperation among different stakeholders and development actors. It also requires robust community infrastructures that provide utility services and linkage for the well and uninterrupted functionality of the society.[127] Learning mechanism is vital in resilient development. It is argued that both formal and informal education empowers the local community and strengthens governance.[128] Besides institutional learning, communities also learn from bitter experiences and usually apply that knowledge to better prepare for the future disaster.[129] Thus, it is assumed that resilience is an on-going process of adaptive capacity that lessens disaster risk.

In 2005, UNISDR introduced the Hyogo Framework for Action (HFA) 2005-2015 for building the resilience of nations and communities which are prone to disasters.[130] HFA puts priority on DRR at community level which offers a way of engaging with communities and making them self-reliant.[131] Besides, SFDRR 2015-2030, outlines seven targets with thirteen guiding principles in four priority areas to prevent new and reduce existing risk.[132] It also stresses on climate change and provides measures, guiding principles and means of implementing DRR strategy for making the earth habitable. The involvement of community people in DRR activities, from planning to implementation, help promote more effective civil society mobilization towards resilience building. Community participation in the development process establishes ownership and creates a sense of belongingness. Consequently, it enables communities to prevent, reduce and effectively respond to stress, shocks and potentially disastrous events.[133]

Reducing disaster risk for sustainable development was a breakthrough in 2012 which duly addressed the interplay between DRR and sustainable development at the UN Conference on Sustainable Development (Rio+20) in June. It was further emphasized on in the outcome document, "The Future We Want". It endorses the need of incorporating

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[126] M. A. Janssen, M. L. Schoon, W. Ke and K. Borner, "Scholarly Networks on Resilience, Vulnerability and Adaptation within Human Dimensions of Global Change", *Global Environmental Change*, Vol. 16, 2006, pp. 240-252.

[127] D. Paton and D. Johnston, *Disaster Resilience - An Integral Approach*, Illinois: Charles C Thomas Publishers Ltd, 2006.

[128] G. O'Brien, "The Globalization of Disaster: UK Emergency Preparedness: A Step in the Right Direction?", *Journal of International Affairs*, Vol. 64, No. 5, 2006, pp. 63-85.

[129] G. O Brien and F. O'Keefe, *Managing adaptation to climate risk beyond fragmented responses*, Oxon: Routledge, 2014.

[130] "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters", available at https://www.undrr.org/publication/hyogo-framework-action-2005-2015-building-resilience-nations-and-communities-disasters, accessed on 28 September 2019.

[131] "United Nations Disaster Risk Reduction, Global Review 2007", available at https://www.undrr.org/publication/disaster-risk-reduction-2007-global-review, accessed on 12 February 2019.

[132] "Sendai Framework for Disaster Risk Reduction 2015 – 2030", op. cit.

[133] G. O Brien and F. O'Keefe, op. cit.

disaster risk management into sustainable development frameworks. The Outcome Document also declared that "for DRR and building of resilience to disasters to be addressed with a renewed sense of urgency in the context of sustainable development and poverty eradication, and, as appropriate, to be integrated into policies, plans, programmes and budgets at all levels and considered within relevant future frameworks". This declaration unequivocally opened the door for new opportunities and intergovernmental processes to connect DRR with sustainable development initiatives. Friends of Disaster Risk Reduction Group, led by the Governments of Australia, Indonesia, Norway and Peru advocated to recognize DRR as "fundamental to achieving sustainable development and places it at the heart of the future development agenda" in the Conference Outcome Document. There was general support also for the interpretation of DRR into sustainable development at the second UNGA Thematic Debate on Disaster Risk Reduction.

The recognition of DRR as a cross-cutting activity essential to reduce poverty reduction and attain sustainable development was further underscored at the 2012 Asia Ministerial Conference on Disaster Risk Reduction in October 2012. The Panel viewed that natural disasters and other crises could push millions of people back into poverty. It also underlined the need to safeguard the achievements of MDGs from the setbacks caused by natural disasters and climate change.[134]

UNISDR's advocacy for greater investment to reduce disaster risk was amplified by its collaboration with the Group of 20 (G20) and the World Bank which led to an important move by G20 leaders at the Los Cabos Summit in June 2012. They put the disaster risk management agenda under the remit of Finance Ministers and Governors of Central Banks and instructed them to develop DRR tools and strategies to prevent disasters, protect populations and assets and manage their financial and economic impacts.[135] UNISDR also collaborated with the Organization for Economic Cooperation and Development (OECD) to produce a deliverable, the G20/OECD Methodological Framework on Disaster Risk Assessment and Risk Financing.[136] The call of Busan Partnership on Aid Effectiveness reflected a growing sense of urgency and commitment to increase financing for DRR in development budgets (national and international) which had been made at the fourth High-level Forum on Aid Effectiveness in Busan, Republic of Korea[137] at the end of 2011. It also promised to

[134] Fifth Asian Ministerial Conference on *Disaster Risk Reduction*, Yogyakarta, Republic of Indonesia, 22-25 October 2012, available at https://www.preventionweb.net/files/29332_01yogyakartadeclarationdraftfinalcl.pdf, accessed on 13 August 2018.

[135] "G20 Leaders Declaration", available at http://www.g20.utoronto.ca/2012/2012-0619-loscabos.html, accessed on 26 June 2018.

[136] OECD, *Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework*, Paris: OECD, 2012.

[137] Busan Partnership on Aid Effectiveness made an explicit call for "additional resources to ensure that development strategies and programmes prioritize the building of resilience among people and societies at risk from shocks", while noting that "investing in resilience and risk reduction increases the value and sustainability of development efforts". See also, Busan Partnership for Effective Development Co-Operation, Fourth High

work together to invest in shock resistant infrastructure and social protection systems for the vulnerable communities while increasing the resources, planning and skills for disaster management at the national and regional levels.[138] Soon afterwards, the OECD's Development Assistance Committee (OECD/DAC) adopted a programme on disaster risk and resilience as part of development cooperation. UNISDR and the European Commission's Directorate for Development and Cooperation in 2012 also launched a three-year initiative to support up to 40 countries at risk entitled, "Building Capacities for Increased Public Investment in Integrated Climate Change Adaptation and Disaster Risk Reduction: 2013–2015". The objective of one year includes beneficiary selection and the creation of 13–15 disaster loss databases in three regions, 10–12 national risk assessments and generation of materials to be used in six countries to mainstream DRR into public investment, land use planning and climate change adaptation.[139]

Level Forum on Aid Effectiveness, Busan, Republic of Korea, 29 November - 01 December 2011, available at https://www.oecd.org/dac/effectiveness/49650173.pdf, accessed on 20 December 2019.

[138] Ibid.

[139] UN Sustainable Goals Development Partnership Platforms, "Building Capacities for Increased Public Investment in Integrated Climate Change Adaptation and Disaster Risk Reduction", available at https://sustainabledevelopment.un.org/partnership/?p=7351, accessed on 27 June 2019.

Chapter 4

Disaster Risk Management and Resilience Nexus

History records various applications of disaster management. The story of Prophet Noah's ark, for instance, provides lessons regarding warning, preparedness and mitigation during natural hazards. Noah, upon being warned of an imminent global flood, started preparing for the impending disaster by constructing a floating ark. He then attempted to mitigate the impact on the planet's biodiversity by collecting two of each species and placing them within the ark.[140] Similarly, Joseph, dated to the period between the 7th century BCE and the third quarter of the 5th century BCE was appointed as the vizier.[141] He was the second most powerful man in Egypt, next to the King. The 'discerning and wise' Joseph made the strategic planning to run the administration for successful management of the 'Food Crisis'[142] and put in effect a long-term 'Agricultural Policy and Infrastructure'.[143] Anticipating the impending crisis, Joseph went through all the land of Egypt to become familiar with the people who managed agriculture, the locations and conditions of the fields, the crops, the roads and means of transportation. Joseph could have accomplished all of this on a personal level. He established and overseen the training of 'Department of Agriculture and Revenue'. During the seven years of abundant harvest, Joseph had stored the grain in cities. During the seven lean years, Joseph dispensed grain to the Egyptians and other people who were affected by the widespread famine and thus saved the Egyptian people from disaster.[144]

Evidence of risk management practices also found in 3200 BC in Iraq. There lived a social group known as the Asipu. When community members faced risk or danger, they used to appeal to the Asipu for consultation. The Asipu, upon identifying the important dimensions and possible alternatives for solving the problem, used to follow a process like modern-day disaster risk management and finally give possible outcomes for each alternative.[145]

The greatest Chinese dynasties had been collapsed due to severe changes in climate. It also led to the end of the Maya civilization.[146] Hence, response to the impact of disaster on individuals and societies, many attempts have been made to decrease

[140] "Genesis 7:7–16", available at https://biblia.com/bible/esv/genesis/7/7-16, accessed on 15 March 2019.
[141] The vizier (/vɪˈzɪər/ or /ˈvɪzɪər/) was the highest official in Ancient Egypt to serve the king during the Old, Middle, and New Kingdoms. For details see, https://en.wikipedia.org/wiki/Vizier_(Ancient_Egypt), accessed on 15 March 2019.
[142] "Genesis 41:46-57; 47:13-26".
[143] Ibid.
[144] "Genesis 12-50 and Work", Theology of Work Project, available at https://www.theologyofwork.org/old-testament/genesis-12-50-and-work#toc, accessed on 15 March 2019.
[145] Vincent T. Covello and Jeryl Mumpower, "Risk Analysis and Risk Management: An Historical Perspective", *Risk Analysis*, Vol. 5, No. 2, 1985, pp.103–118.
[146] C. Brahic, "Collapse of civilizations linked to monsoon changes", available at https://www.resilience.org/stories/2007-01-09/collapse-jan-9/, accessed on 21 April 2019.

exposure to the consequences of the natural hazards by developing measures to address initial impact as well as post-disaster response and recovery needs.[147]

In light of the Yokohama strategy and recognizing the need to address the multidimensional aspects of disaster risk from development perspective, 'the HFA 2005-2015: Building the Resilience of Nations and Communities to Disasters" was adopted at the World Conference on Disaster Reduction in Kobe, Hyogo, Japan in 2005. The Framework serves as the guiding instrument for international cooperation, DRR and resilience building. The multi-stakeholder and multi-sector nature of the HFA provides guidance on how DRR contributes to sustainable development. It defines disaster risk reduction "as a cross-cutting issue in the context of sustainable development and therefore an important element for the achievement of internationally agreed development goals, including those contained in the Millennium Declaration". It also emphasizes on the need for clearly defined, agreed and monitored goals and targets around DRR and resilience. Besides, a number of initiatives have been taken to build consensus on measuring results at the regional and sub-regional level. Therefore, the post-2015 development agenda can draw strategies from the HFA and help to address some of the challenges.

In 2010 and 2011, six high level regional strategies or plans of action on DRR were adopted in Africa, Americas, Arab States, Asia, Europe and the Pacific. For example, in Africa development and humanitarian partners were called upon to invest one per cent and 10 per cent, respectively in DRR, preparedness and recovery. The Incheon Roadmap for Asia also sets out indicators for DDR, such as all regional partners to have coordinating mechanisms in place for joint DRR and climate change adaptation programming (priority for five years).[148] In Asia, some specific examples of national level goals, objectives or indicators were seen in Bangladesh (Sixth Five-Year Plan 2011-2015).[149] National or community targets are recognized as best practice for effective implementation of DDR.

Currently, building community resilience for mitigating disaster arising from natural hazards are getting additional attention. There are numerous efforts that outline the way through community or human system should act in response to both man-made and natural hazards. There is a growing concern on increasing carbon emission, biodiversity loss and habitat destruction due to rapid industrialization and social practices. There is a wide recognition that both human-induced activities as well as natural process

[147] Damon P. Coppola, "Introduction to International Disaster Management", available at https://www.sciencedirect.com/science/article/pii/B9780128014776000010, accessed on 25 September 2019.

[148] "Global Platform for Disaster Risk Reduction, Aligning Regional and Global DRR Agendas: Summary of keyregional political commitments & disaster risk reduction priorities", available at http://www.unisdr.org/files/19957_199572011globalplatformv12a.pdf, accessed on 12 January 2019.

[149] Government of the People's Republic of Bangladesh, Ministry of Planning, Planning Commission, General Economics Division Bangladesh, "Sixth Five Year Plan FY 2011-2015", available at https://www.globalpartnership.org/content/sixth-five-year-plan-part-1-bangladesh, accessed on 16 June 2018.

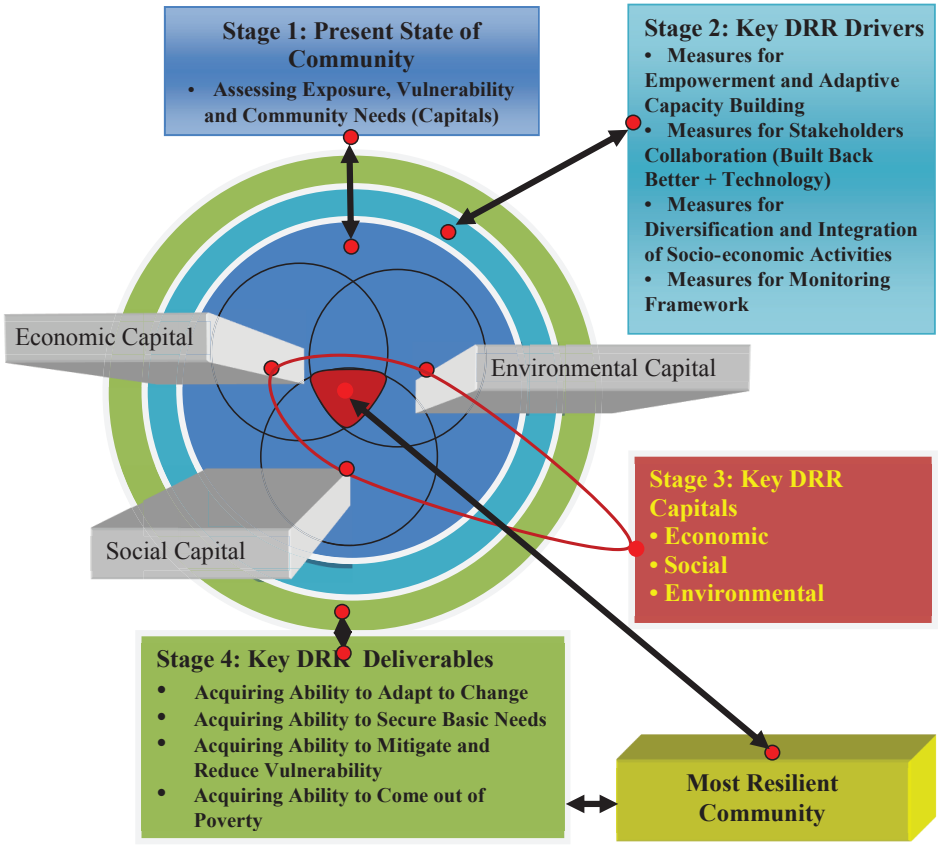
often leads to disasters.[150] Natural hazards if turn into disasters will have both physical and social impacts on the land and community. Short term physical impacts of disaster basically relate to the immediate on-set including losses or damages to properties and infrastructure and human casualties. The long-term impact leads to the psychosocial, socio-demographic, socioeconomic and socio-politic strife. Therefore, DRR of natural hazard requires comprehensive efforts that demand preparing and empowering the community to face, mitigate and manage the future risks.

The term 'resilience' is drawing more and more attention in social development as well as in research.[151] Wilson argues that the notion of resilience enhances global community interest towards sustainable development concept and becomes the buzzword in policymaking and academic discourses.[152] 'Resilience' as a concept first introduced during Holling's study on ecology in 1973.[153] Since then, the term has become popular in both academia and decisionmakers. It is being applied in a broader perspective, as resilience is meant to be a process and outcome result of overall development in an ideal condition.[154] It is also observed that today's social scientists use the term resilience more vigorously for enhancing community development.[155]

In the field of ecology, resilience is defined as "a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationship between population or state variable".[156] Recently, it is used more comprehensively and includes the 'ability or capacity to build back better after a disaster'.[157] Resilience largely depends on the state and availability of community resources or capitals either acquired inherently or developed over time to mitigate hazard impact. Both collective and individual actions of a community are essential as their performances are interwoven.[158] Wilson identifies three types of community capital or resources, i.e., economic capital, social capital and environmental capital.[159] If these three capitals are strong in a community, it will be stronger in resilience and able to bounce back better against natural disturbance (Figure 4.1).

[150] J. Urry, *Climate Change and Society*, Cambridge: Polity Press, 2011.
[151] Carl Folke, op. cit.
[152] G. A. Wilson, op. cit.
[153] C. S. Holling, "Resilience and Stability of Ecological Systems", *Annual Review of Ecological System*, Vol. 4, No.1, 1973, pp. 1-23, available at https://www.annualreviews.org/doi/pdf/10.1146/annurev.es.04.110173.000245, accessed on 16 June 2019.
[154] K. Magis, "Community Resilience: An Indicator of Social Sustainability", *Society and Natural Resources*, Vol. 23, No. 5, 2010, pp. 401-406.
[155] R. J. Chaskin, "Resilience, Community, and Resilient Communities: Conditioning Contexts and Collective Action", *Child Care Practice*, Vol. 14, No. 1, January 2008, pp. 65–74.
[156] C. S. Holling, op. cit.
[157] Noraini Omar Chong, Khairul Hisyam Kamarudin and Siti Nurhuda Abd Wahid, "Framework Considerations for Community Resilient Towards Disaster in Malaysia", *Procedia Engineering*, Vol. 212, 2018, pp. 165-172, available at https://www.sciencedirect.com/science/article/pii/S1877705818300316, accessed on 11 November 2019.
[158] F. Norris, K. Sherrieb, S. Galea and B. Pfefferbaum, "Capacities that Promote Community Resilience: Can We Assess Them?", 2008.
[159] Wilson, op. cit.

Figure 4.1: Process and Framework for Building Resilient Community[160]



It is said that a well-informed community, with sound knowledge and high level of awareness is able to prevent large scale human casualties including socio-economic loss. Therefore, building a resilient community is a part of DRR initiatives.[161] Moreover, community resilience potentially assists community preparedness, response and recovery in the short-term disaster mitigation.[162]

It is further assumed that a community having well-developed capitals is able to work efficiently and innovating new ways of resilience.[163] Resilience spreads through

[160] Ibid.
[161] Noraini Omar Chong et al., op. cit., pp. 165-172.
[162] Susan L. Cutter, Kevin D. Ash and Christopher T. Emrich, "The Geographies of Community Disaster Resilience", *Global Environmental Change*, Vol. 29, November 2014, pp. 65-77, available at https://www.sciencedirect.com/science/article/abs/pii/S0959378014001459?via%3Dihub, accessed on 21 December 2019.
[163] K. Magis, op. cit.

household/individual, local, regional, national and global community.[164] Henceforth, community resilience involves multiple pathways that intertwine at a range of scales.[165] Availability of resources is vital for a resilient community. The necessary resources must exist at local level, i.e. household, individual and community.[166] A resilient community also recovers faster due to low level damage.[167] Capacity building of local community is pivotal for DRR.[168]

A community will be more resilient if it is supported by well-developed capitals.[169] It is possible to develop these capitals through the process of mitigation and preparedness in disaster management cycle.[170] Once a community becomes resilient, it will be able to 'Prepare and Build Better' with the capability of 'Bounce Back Better'. 'Bounce Back' refers to the ability of a community to revert back to the original state before hazard led disaster.[171] If appropriate resources are well mobilized and well mustered, and all development activities are well done, a particular community will able to 'bounce back better' through eventually building resilient structure, devising adaptive functions and system with innovation using their community capitals. The availability and accumulation of the capitals (economic, social, and environmental) owned by a community is vital for a particular community to become resilient towards natural hazards. But the level of each capital varies within and between communities.[172] Essentially, the community capitals need to be utilized efficiently to derive best out of it. Figure 4.1 outlines the four key drivers which are required for enhancing resilience for a particular community. Among the key drivers, both external and internal resources play vital role for the communities to become resilient.[173] A resilient community, having capitals and enhanced key drivers, will be able to achieve four key deliverables (Figure 4.1). Resilience links community's economic, physical and social adaptive capacities

[164] F. Berkes and H. Ross, "Community Resilience: Toward an Integrated Approach", *Society and Natural Resources*, Vol. 26, No. 1, January 2013, pp. 5-20.
[165] S. Skerratt and A. Steiner, "Working with Communities-of-place: Complexities of Empowerment", *Local Econ*, Vol. 28, No. 3, May 2013, pp. 320–338.
[166] A. J. Imperiale and F. Vanclay, "Experiencing Local Community Resilience in Action: Learning from Post-Disaster Communities", *Journal of Rural Studies*, Vol. 47, October 2016, pp. 204–219.
[167] P. M. Orencio and M. Fujii, "A Localized Disaster -Resilience Index to Assess Coastal Communities Based on an Analytic Hierarchy Process (AHP)", *International Journal of Disaster Risk Reduction*, Vol. 3, No. 1, March 2013, pp. 62–75.
[168] "Building Disaster Resilient Communities: Good Practices and Lessons Learned", op. cit.
[169] G. A. Wilson, op. cit.
[170] M. K. Lindell and C. S. Prater, "Assessing Community Impacts of Natural Disasters", *Natural Hazards Review*, Vol. 4, No. 4, pp. 176–185, available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.474.1741&rep=rep1&type=pdf, accessed on 25 July 2018.
[171] S. Akter and B. Mallick, "The Poverty–Vulnerability–Resilience Nexus: Evidence from Bangladesh", *Ecological Economics*, Vol. 96, December 2013, pp. 114-124.
[172] S. Skerratt and A. Steiner, op. cit.
[173] F. Berkes and H. Ross, "Panarchy and community resilience: Sustainability science and policy implications", *Environmental Science & Policy*, Vol. 61, 2016, pp. 185–193, available at https://www.researchgate.net/publication/301705561_Panarchy_and_community_resilience_Sustainability_science_and_policy_implications, accessed on 29 April 2019.

with the impact of natural hazard.[174] It works for the community in two forms, i.e., enhances the ability and develops the capacity to build back better.[175]

Community context varies based on the historical, socio-political and institutional realities. Hence, comprehensive approach helps mitigating all odds as it focuses on building community-specific capacity for disaster preparedness, response and recovery; emphasizes on increasing the capacity and supportive potential of community members' natural settings to promote wellness; addresses power and resource inequalities and enhances capacity to ensure contextually and culturally appropriate structures, methods and interventions.[176]

Similar kind of situation is prevalent in Bangladesh with diverse economic, cultural and social background, including different understanding of the concept of resilience between and among communities. Based on the context of Bangladesh, there is a need to have a well thought out resilience framework which can translate the concept and policy into practice as well as integrate local needs and national initiatives.

DRR and resilience interventions aim to reduce and mitigate the risk of displacement and increase the resilience of communities to cope with disasters. DRR, more broadly, is defined as a concept and practice of reducing disaster risks through systematic efforts to analyze 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.

DRR is closely linked to building the resilience of crisis-affected people. It is also defined by the International Organization for Migration (IOM) as the capacity of a system (an individual, household or community) exposed to pressures to avoid, resist and recover from their impacts in an efficient manner, without compromising its essential basic structures and functions. Hence, consideration of risks and incorporation of risk-reducing and resilience-building measures into the broader emergency response effort need to begin at the earliest possible stage, generally from the very outset of the humanitarian response, and, where possible, build on pre-existing initiatives.

Crisis-affected populations are frequently concentrated in disaster-prone areas, climate change hotspots and in places characterized by exposure to security risks. Hence, they face great risk of secondary or recurrent displacement that perpetuates and prolongs crisis and generates new protection risks. At the same time, local communities

[174] M. K. Lindell and C. S. Prater, op. cit.

[175] Judith C. Kulig, Dana S. Edge, Ivan Townshend, Nancy Lightfoot and William Reimer, "Community Resiliency: Emerging Theoretical Insights", *Journal of Community Psychology*, Vol. 41, No. 6, 2013, pp. 758–775, available at https://doi.org/10.1002/jcop.21569, accessed on 27 May 2019.

[176] V. Gil-Rivas and R. P. Kilmer, "Building Community Capacity and Fostering Disaster Resilience", *Journal of Clinical Psychology*, Vol. 72, No. 12, 2016, available at https://doi.org/10.1002/jclp.22281, accessed on 30 November 2019.

begin recovery process immediately after a crisis event and often adopt strategies that expose communities to the same risk conditions that caused displacement in the first place, thereby increasing the likelihood of them being affected by shocks and stresses in the future.

Further, early risk sensitive programming provides an entry point to integrate DRR and resilience-based principles more comprehensively into the longer-term recovery process to help build back better and safer, address underlying risk factors and, thereby, strengthen community capacity to respond to future hazard's threats and risks. In the context of emergency response, IOM needs to promote DRR and resilience through both standalone activities and cross-cutting measure that are incorporated into multiple sectors across the response, wherever relevant and technically feasible.[177]

[177] International Organization for Migration (IOM), "Disaster Risk Reduction and Resilience", available at https://emergencymanual.iom.int/entry/ 19624/disaster-risk-reduction-and-resilience, accessed on 09 August 2019.

Chapter 5

Challenges and Policy Imperatives for Bangladesh

The deltaic plains of Bangladesh lie in the Ganges-Brahmaputra-Meghna (GBM) basins which is the Asia's largest and the world's most populated delta.[178] Falling within the GBM river systems, about 80 per cent of the country is deltaic floodplain.[179] Many other rivers also flow from the central India, Himalayas, China, Assam, Lusai and Arakan-Burmese ranges adding more water flows during monsoon (Map 5.1). Only five per cent of cyclones form in the Bay of Bengal but loss of lives and property is about 85 per cent of the global total. The cyclone of 1970 took the lives of 300,000 people but the cyclone of the same intensity of 1991 killed 138,000 people and the cyclones of 1997 and 1998 resulted in only 127 and six to seven deaths respectively. Bangladesh has shown marked development in combating climate extremes especially in saving the human lives and their properties.[180]

Map 5.1: Catchments and Routes of GBM Rivers System[181]

[178] J. P. Ericson, C.J. Vorosmarty, S.L. Dingman, L.G. Ward and M. Meybeck, "Effective Sea-Level Rise and Deltas: Causes of Change and Human Dimension Implications", *Global Planetary Change*, Vol. 50, 2016, pp. 63-82.

[179] Jahir Uddin Chowdhury, Mohammad Rezaur Rahman and Mashfiqus Salehin, "Flood Control in a Floodplain Country Experiences of Bangladesh", available at https://www.isesco.org.ma/wp-content/uploads/2015/05/Flood-Control-Bangladesh.pdf, accessed on 14 May 2019.

[180] "Total Disaster Risk Reduction-Good Practices 2005", op. cit.

[181] M. Anwar Hossen and John R. Wagner, "The need for community inclusion in water basin governance in Bangladesh", available at https://link.springer.com/content/pdf/10.1186/s40728-015-0029-3.pdf, accessed on 27 June 2019.

The long coast line of Bangladesh along with its vast flood plains is vulnerable to the broad ranges of climatic disturbances. It is evident that glacier lakes in the Himalaya's mountains are expanding and occupying larger areas because of the rapid liquefying of glaciers. This causes severe and frequent long-standing floods in the downstream areas. Moreover, tropical meteorological conditions with its heavy and continuous rainfall including cloud outbursts cause flash floods especially in the northern region of the country and impacting the agriculture, households and livelihood.[182] Climatic hazards create serious challenges to food, water, ecological and energy security. It poses a great threat to people's lives and property undermining ultimate development and human security. The rising trends of climatic hazards are likely to aggravate the economic progress of environmentally vulnerable country like Bangladesh. The challenges also adversely impact the fluid domestic markets, small economic base, lack of diversification of domestic produces and diseconomies of livelihoods at varying scale. Importantly, the more a country understands the causes and consequences of risk factors, the better it will be able to adapt, mitigate and prevent in the future.[183] Bangladesh government has well documented its policy, regulatory framework including soliciting international cooperation to mitigate the impacts of natural hazards.

5.1 Greenhouse Gas Emissions and Global Warming

Both natural and human induced climatic change with its adverse effects on human and natural systems in different regions of the world is noticeable. The climate change causes an increase in mean and extreme air and ocean temperatures. It is also responsible for rising sea levels and changes in average rainfall over most of the land areas. Climate change also influences the timing of seasons along with increase in the frequency and intensity of extreme events such as floods, tropical cyclones and droughts.[184] Bangladesh, due to relatively low adaptive capacity and vulnerability to natural hazard, is particularly exposed to climate related risks. The contribution of Bangladesh to global greenhouse gas emissions is very insignificant, but it often becomes the worst victim of climate change events. This condition consequently imposes excessive strain on people's livelihoods and threatens the wellbeing and cultural entity and existence of the affected community. Besides, by rising salinity and affecting agricultural produces, global temperature also creates possibility of outmigration of agricultural-dependent communities.

[182] M. Ghatak, A. Kamal and O. P. Mishra, "Background Paper: Flood Risk Management in South Asia", in *Proceedings of the SAARC Workshop on Flood Risk Management in South Asia,* 2012; A. Rahman, *Study on the Changes of Coastal Zone: Chittagong to Cox's Bazar along the Bay of Bengal,* USA, Maryland: Baltimore, 2011.

[183] Margareta Wahlstrom and Debarati Guha-Sapir, op. cit.

[184] IPCC, "Working Group I: Contribution to the IPCC Fifth Assessment Report Climate Change 2013", The Physical Science Basis, Geneva: IPCC, 2003, available at https://www.ipcc.ch/site/assets/uploads/2018/03/WG1AR5_SummaryVolume_FINAL.pdf, accessed on 23 March 2020.

The past few decades have experienced unprecedented disruptions in the climate. Global warming appears to be virtually certain where up to 2006, 11 warmest years accounts for of the 12 since 1850, the year when recording of systematic temperature started on. The heating up of the earth in the last few decades has been exceptionally speedy as compared to the climatic changes during preceding two millennia. A scientific study records that the surface temperature of the earth has increased by about 0.74°C since 1906. There is a strong consensus among the climate scientists that human activities are mainly responsible for such warming. It is contemplated that the global climate is in a state that has no equivalent since the period before recorded history.[185]

Though threat arising from climate change is yet unknown, it will have massive impacts. It is irrefutable that the climate change does have impacts on ecosystems and organisms affecting human systems and well-being.[186] The impacts also includes rising temperatures of both ocean and land including more frequent heat waves in most parts of the earth. In addition, due to global warming duration and frequency of marine heat waves have increased in. Further, it is proved that human-induced global warming has led to an increase in the frequency, intensity and/or amount of heavy precipitation events globally. Sea level rising because of global warming followed by large scale glacier melting affects the poor in coastal areas.[187]

Due to global warming, human settlements, their households, provision and supply of essential services, fisheries, agriculture, forestry and tourism industry of Bangladesh are going to be threatened in future. Further, changes in temperature, rainfall and relative humidity combined with crop damage, water pollution and other socio-economic problems will create profound obstacles to enhance the already precarious state of human well-being.[188] Solutions of the challenges require policy and actions that are environment friendly and can be easily adopted by the local community. In this context, local knowledge and experience are an invaluable component to be considered during policymaking. The richness of local knowledge, though often overlooked, could contribute to reducing some of the global environmental challenges.[189]

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[185] Vital GEO Graphics, published by UNEP/GRID-Arendal based on UNEP's "Global Environment Outlook: environment for development (GEO-4)", 2009.

[186] Ove Hoegh-Guldberg, Daniela Jacob and Michael Taylor, "Impacts of 1.5ºC Global Warming on Natural and Human Systems", 2018.

[187] IPCC, "Climate change 2014", synthesis report Geneva, Switzerland Intergovernmental Panel on Climate Change, p. 139.

[188] Neil Adger, Pramod Aggarwal, Shardul Agrawala, Joseph Alcamo, Abdelkader Allali, Oleg Anisimov and Nigel Arnell, *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Inter-governmental Panel on Climate, Cambridge: Cambridge University Press, pp. 391–431.

[189] J. Campbell, "Islandness: Vulnerability and Resilience in Oceania", *Shima: The International Journal of Research into Island Cultures*, Vol. 3, No. 1, 2009.

Bangladesh is the sixth most vulnerable country to floods[190] and is recognized globally as the most vulnerable to climate change extremes.[191] More than 68 million people have been directly affected due to natural hazard from 2002 to 2010.[192] Every year, millions of lives and livelihoods are threatened by frequent weather-related disasters. Vast coastal areas including low-lying floodplains of Bangladesh are highly exposed to tropical cyclones and sea level rise, especially the coastal zones. Almost every year, floods and cyclones strike the flood plain and coastal regions of the country. Excessive rainfall is one of the major causes of the unexpected and lasting flood. On an average, monsoon carries nearly 80 per cent of the country's annual precipitation.[193] Bangladesh recorded highest rainfall in the month of April 2017 in last 36 years.[194] Climate change is considered as the cause of this erratic rainfall and flooding.[195]

Global temperature beyond 2°C is likely to result in numerous negative impacts on societies and ecological systems across the world, especially on low-lying coastal communities.[196] Not only that, due to sea-level rise and an increasing number of extreme weather events, these communities are confronted with a number of interconnected impacts, i.e., declining freshwater and food security and diminishing land availability.[197] It is no denying of the fact that Bangladesh suffers from negative impacts of the climate change events. But there are also remedies to alter local condition by addressing some basic infrastructure weaknesses, particularly in the areas of health, sanitation, water and provisioning of electricity with a view to lessening the curses of climate change.

[190] Government of the People's Republic of Bangladesh, Ministry of Environment, Forest and Climate Change, "Bangladesh Climate Change Strategy and Action Plan", September 2008, available at https://www.sdnbd.org/moef.pdf, accessed on 28 March 2019.

[191] Government of the People's Republic of Bangladesh, Ministry of Environment, Forest and Climate Change, Climate Change Cell, "Bangladesh and Climate Change", 2007, available at http://www.bdresearch.org.bd/home/climate_ knowledge/cd1/pdf/Bangladesh%20and%20climate%20change/ Climate%20change%20impacts%20 ,vulner ability, %20risk/Climate%20Change%20And%20Bangladesh.pdf, accessed on 28 March 2019.

[192] F. Vos, J. Rodriguez, R. Below and D. Guha-Sapir, *Annual Disaster Statistical Review 2009: The Numbers and Trends*, Brussels: CRED, 2010, available at https://www.google.com/search?client=firefox-b-d&q=%E2%80%9CAnnual+Disaster+Statistical+Review+2009%3A+The+Numbers+and+Trends, accessed on 15 June 2019.

[193] "Weather Online", available at https://www.weatheronline.co.uk/reports/climate/Bangladesh.htm., accessed on 15 June 2019.

[194] Mofazzal Hossain Chowdhury, "Bangladesh: Statement made at the Global Platform for Disaster Risk Reduction", 2017, available at https://www.preventionweb.net/english/policies/v.php?id=53782&cid=14, accessed on 23 August 2019.

[195] Ibid.

[196] M. Parry, J Lowe and C. Hanson, "Overshoot, Adapt and Recover", *Nature*, Vol. 458, 2009, pp.1102-1103.

[197] W. N. Adger and J. Barnett, "Commentary: Four reasons for concern about adaptation to climate change", *Environment and Planning*, Vol. 41, 2009, pp. 2800-2805.

5.2 Human Security Concerns

The current environmental trends that threaten human well-being and human security are summarized below:

- The climate change can severely undermine sustainable development, human health, food production security and resource availability.
- Sufferings of the vulnerable human communities, particularly the world's poor are likely to increase due to extreme weather conditions.
- Agricultural productivity is apprehensive of being affected due to land degradation resulting in reduction of income and reduced food security of the already poor community.
- Due to water pollution in the urban areas and rise of salinity in the coastal regions, supplies of safe water are likely to jeopardize human health and economic activity.
- There remains a danger for reduction of fish stocks due to ocean acidification creating both economic losses and a loss of food supply including extinction of some of the species which could be possible sources of future medical and agricultural advances.

Currently, Bangladesh needs to embody 'Human Security' as a concept in the national DRR efforts, although some aspects of human security are, by default incorporated in the development agenda. Focus is needed on vulnerable groups who are often overlooked. Notably, Bangladesh government has provisioned and adopted diverse social protection measures in the form of Vulnerable Group Feeding (VGF), Food for Work (FFW), Test Relief (TR), Vulnerable Group Development (VGD) and many more to enhance overall human security. International agencies including UN also provide assistance to Bangladesh to expand and reinforce the social safety net programmes to the impoverished poor living in calamity prone and vulnerable areas. It also needs to undertake significant efforts in line with preventive, mitigation and recovery and reconstruction framework to save the disadvantaged humanity.

Following the devastating cyclones of 1970 and 1991, Bangladesh has taken significant efforts to reduce its disaster vulnerability. It is now considered as a global leader in coastal resilience due to its long-term investments in protecting lives. Despite these efforts, the vulnerability of the coastal population is on the rise due to climate change. Frequent cyclones, i.e., Gorky in 29 April 1991; Sidr in 15 November 2007; Aila in 25 May 2009; Mohasen in 16 May 2013; Komen in 31 July 2015, are indicative

of increasing natural hazards.[198] Limited financial and non-financial resources along with political will are the major constraints for combining DRR initiatives with the sustainable development process. Considering the exposure, vulnerability and above all potential assets and environmental loss, Bangladesh needs to mobilize significant finance to ensure human security through structural and non-structural mitigation of natural hazards. Emphasis should be given more on structural mitigation to save lives and livelihoods of the struggling vulnerable people.

Calamities, especially the climate events, affect poor the most. Unfortunately, more than 90 per cent of the people exposed to disasters live in the developing world. More than half of natural disaster deaths occur in countries having a low human development index.[199] One study finds that from 2012 to 2014, 994 disasters impacted more than 326 million people across the globe.[200] Costs of physical damage caused by these events are also on the rise. It has increased to about US$ 100 billion per year in the first decade of this century from an estimated US$ 20 billion on average per year in the 1990s.[201] Death and casualty decreased, but economic losses increased. It has increased 49 per cent than the previous average of US$ 141 billion.[202] It was estimated that 4.2 billion people, or more than half the worldwide population, were potentially exposed to natural disasters in 2017.203

Bangladesh falls within one of the most disaster-prone countries (Figure 5.2). According to a report, in 2004, cyclones related death rate was the highest in Bangladesh amongst other cyclone prone countries.[204] It also found that natural calamities took 32.1 lives per 100,000 people over the past 100 years.[205] It is argued that the magnitude of natural hazards, poor land-use practices and un-envisioned public policy are the prime

[198] Ibid.

[199] United Nations Environment Programme, Vital GEO Graphics, UNEP/GRID-Arendal based on UNEP's "Global Environment Outlook: environment for development (GEO-4)", 2009, available at https://gridarendal-website-live.s3.amazonaws.com/production/documents/:s_document/7/original/vital-geo-graphics.pdf?1486725137, accessed on 15 June 2019.

[200] "GFDRR Story Highlights", available at https://www.gfdrr.org/en/as-natural-disasters-rise, accessed on 15 June 2019; Debarati Guha, Sapir Philippe Hoyois and Regina Below, *Annual Disaster Statistical Review 2013: The numbers and trends*, Brussels: Université Catholique de Louvain, available at https://www.google.com/search?client=firefox-b-d&q=Annual+Disaster+Statistical+Review+2013%3A+The+numbers+and+trends.+Institute+of+Health+and+Society+%28IRSS%29%2C+Universit%C3%A9+Catholique+de+Louvain+%E2%80%93+Brussels%2C+Belgium, accessed on 15 June 2019.

[201] Nicole Laframboise and Boileau Loko, "Natural Disasters: Mitigating Impact, Managing Risks", IMF Working Paper, 2012, available at https://www.researchgate.net/publication/256038743_Natural_Disasters_Mitigating_Impact_Managing_Risks, accessed on 23 March 2020.

[202] R. Below, and P. Wallemacq, "CRED Annual Disaster Statistical Review", 2017, available at https://www.cred.be/annual-disaster-statistical-review-2017, accessed on 11 May 2019.

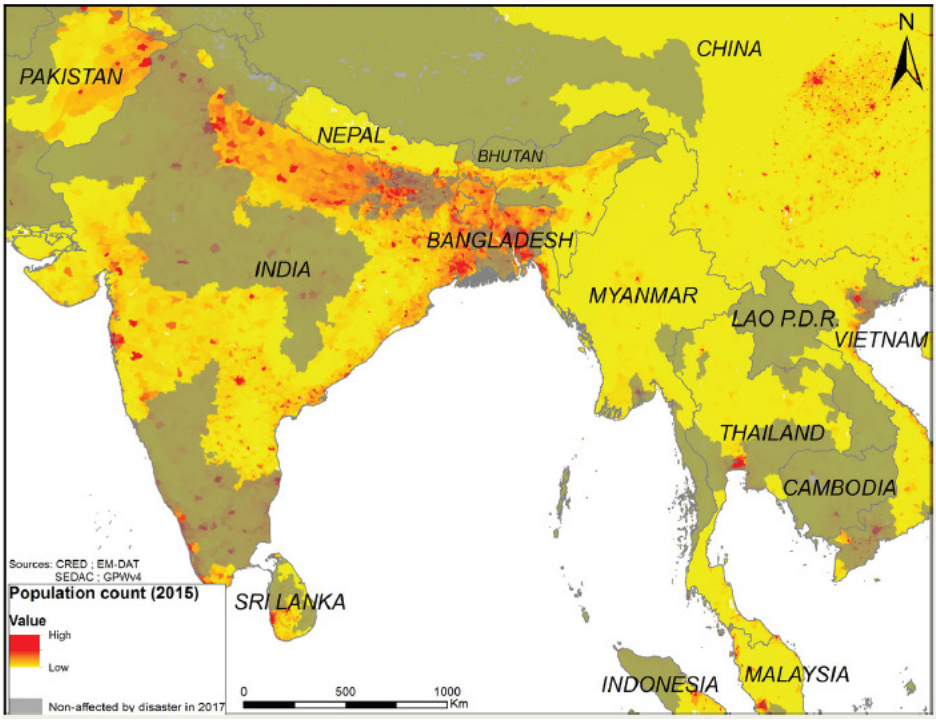
[203] Ibid.

[204] UNDP, Bureau for Crisis Prevention and Recovery, *Reducing Disaster Risk: A Challenge for Development,* New York: UNDP, 2015.

[205] Ibid.

causes of disaster-related death and casualty.[206] Here, important is to understand that a disaster is first and foremost a 'local' phenomenon. As such, the local communities remain at the frontiers and are the immediate victims. They need to be equipped and empowered to response initially. Experience showed that this is crucial for saving the lives.[207] Bangladesh has demonstrated its ability to withstand natural hazards' shock and climate risks by combining infrastructure development and community-based coping practices. Bangladesh must embody local community in its DRR strategy.

Map 5.2: Population and Administrative Zones Affected by Natural Disasters in South and South-East Asian Region[208]



Adequate preparedness and infrastructure development are essential for people exposed to continued risk. Preparedness ensures informed choices for the people during the crisis and makes them mobile at the shortest possible time to facilitate a swift recovery. Bangladesh's emergency response can incorporate community-based preparedness measures in host/return communities, in several ways:

[206] D. Paton and D. Johnston, op. cit.
[207] UNISDR, "Building Disaster Resilient Communities, Good Practices and Lessons Learned", op. cit.
[208] R. Below and P. Wallemacq, op. cit.

- Establish effective hazard monitoring and periodical assessment of vulnerability to revisit local risk conditions and capacities.
- Establish risk mapping mechanism, engage concerned community in disaster preparedness planning and management.
- Ensure adequate stockpiling of essential materials at evacuation sites.
- Promote periodic disaster preparedness, response and recovery exercises, including evacuation drills, training and awareness-raising.
- Establish modern communication infrastructure and effective systems for better disaster synchronization of efforts and needs.
- Combine indigenous knowledge with modern framework for better outcome and maximization of mitigation and management efforts.

Measures undertaken by Bangladesh will determine how environmental threats will unfold in the future. Bangladesh's 'Delta Plan 2100' is a landmark policy framework in this regard. Addressing the adverse impact of environmental threats is a great challenge. Hence, finding solution to environmental problems is urgent to ensure overall human well-being and human security.

5.3 Unscientific Development and Ignoring Local Knowledge

In hazard prone areas, mainstreaming climate concern in development planning, policy and implementation is urgent, especially in sectors such as energy, transport, agriculture, forests and infrastructure development. Being one of the most vulnerable countries to frequent climate extremes Bangladesh could effectively use local knowledge in the past to mitigate the effects of natural hazards. There is a perception that due to population growth, rapid urbanization, unplanned road construction and industrialization, many good practices of traditional knowledge of frequently affected areas of Bangladesh have been overlooked or eroded. The coastal zone of Bangladesh is facing the consequences of additional pressure on the environment due to the rising demand for water, inadequate maintenance of existing embankments and other environment protection measures including rapidly growing unplanned urbanization and industrialization. Climate change-induced floods, cyclones, storms, tidal surges, salt water intrusion, river and coastal erosions etc. force many rural people to migrate to the coastal cities thus creating new environmental problems in the country's fast urban slums.[209]

[209] G. McGranahan, D. Balk and B. Anderson, "The Rising Tide: Assessing the Risks of Climate Change and Human Settlements on Low Elevated Coastal Zone", *Environment and Urbanization*, Vol. 19, No. 1, 2007, pp. 17–37, available at https://journals.sagepub.com/doi/abs/10.1177/0956247807076960, accessed on 25 June 2018.

Many local level actors remain mostly unaware of government's policy including the responsibilities and roles of other actors in the field of disaster management. Promoting public awareness among the populace of geo-hazard prone areas is thus significant for Bangladesh. Amidst many uncertainties because of climate related events are likely to increase due to both development and climate drivers. The impacts will be felt most acutely by the vulnerable and the poor. Unless measures are taken to reduce risks, climate change is likely to undermine development goals and exacerbate inequality in the days to come.[210] Therefore, use of scientific and indigenous knowledge to build climate and disaster resilience should form an integral part of national strategy for the development of Bangladesh.

It is important to incorporate local knowledge in the planning and policy of adaptation.[211] The vulnerable and affected people of Bangladesh are habitually accustomed to use the local knowledge to mitigate the risk and impacts of natural hazards. Unfortunately, many aspects of traditional knowledge of local community have been eroded due to non-adherence. Instead of 'a one size fits all' approach, traditional and cultural experiences and knowledge of potential victim community must be taken into consideration in adaptation planning.

5.4 Water Pollution and Near Droughts

At times reduced rainfall and inadequate water-flow from the rivers become the cause of increasing water pollution around the urban settlements and industrial zones especially in the downstream. It also affects river water reservoir as fresh water sources offering suitable environment for harmful pests and diseases. Sometimes delayed monsoon affects the traditional cropping and livelihoods. These kinds of near droughts are increasing in Bangladesh especially in the northern and southwestern regions. People of these areas suffer from acute scarcity of water in the dry season upsetting agro-ecological balance and affecting agricultural production, thus posing threat to livelihoods and overall food security.

Notably, decline in sweet water supply due to upstream withdrawal, affects the coastal zones with increased salinity that extends deep into inland agricultural plains. Climate governance, cognitive understanding, technical knowledge and cultural factors are perceived to be some of the common barriers. Thus, there is a need of adaptation funding to undertake collaborative research projects to generate compatible knowledge which will be able to meet the local adaptation needs.

[210] IPCC, "Climate Change 2013: The Physical Science Basis", Summary for Policymakers, Working Group I Contribution to the IPCC Fifth Assessment Report, 2013, available at http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf, accessed on 03 March 2019.
[211] H. Lazrus, "Sea Change: Island Communities and Climate Change", *Annual Review Anthropology*, Vol. 41, No. 1, 2012, pp. 285–301.

5.5 Livelihoods Vulnerability

The agricultural and farm production capabilities including the forest products have secured livelihoods and brought greater wealth for billions at the cost of land degradation, biodiversity loss and disruption of biophysical cycles, such as the water and nutrient cycles. These create many challenges and opportunities. Land use changes have had both positive and negative effects on human well-being and on the provision of ecosystem services. Decline in crops production due to disaster shock is another facet that adds to high livelihood vulnerability owing to exposure impact. No region of the world is immune from the effects of global climate change. The most sufferers are the poor or the vulnerable. Poor people of the tropical zone of Bangladesh will be particularly vulnerable to climate change impacts, such as increase in water salinity in the coastal areas, water shortages for irrigation, declining crop yields and increase in diseases. Sea level rise will impact millions of people and major economic centers in coastal areas. Both ecosystems and human well-being are very vulnerable. Coasts and rapidly growing coastal settlements and infrastructure in a country like Bangladesh, is at risk of coastal flooding and erosion due to sea level rise. Sea levels have been rising at a rate of about 3 mm/year since 1993, compared to less than 2 mm/year over the previous century.[212] Impacts on coastal regions also include the degradation of wetlands and coastal lowlands.

For Bangladesh's geographical position, it is vulnerable to disaster losses. Currently, the expected annual average losses from earthquakes, tsunamis, tropical cyclones and river flooding are estimated at US$ 314 billion globally.[213] In such scenario, the climate change impact on agricultural productivity can be reduced by making available and affordable climate-resilient seed to the farmers of especially hazard prone areas. The agricultural services department can provide subsidized crop seeds of different varieties, assist in controlling the spread of insects and maladies arising from climate change and can also ensure proper storage of agriculture outputs. As natural hazard events are becoming more frequent and severe, it is more and more essential to capitalize on the rural youth by empowering them to cope with the risks and enhancing their sources of livelihoods which is adaptive to climate change.

5.6 Livelihood Resilience

The people of Bangladesh are unique in innovative and endogenous resilience which is based on more or less local experience and practice. Furthermore, national

[212] John A. Church, Peter U. Clark and Anny Cazenave, "Sea Level Change", in *Climate Change 2013: The Physical Science Basis,* Contribution of Working Group I to the Fifth Assessment Report of the IPCC, Cambridge: Cambridge University Press, 2013.

[213] United Nations International Strategy for Disaster Reduction (UNISDR), *Making Development Sustainable: The Future of Disaster Risk Management: Global Assessment Report on Disaster Risk Reduction*, Geneva: UNISDR, 2015.

preparedness along with efficient responses has significantly reduced the extent of deaths and damages from natural hazards in the country in the past decades. The adverse impacts of natural hazards cannot be prevented fully, but their extent of devastation or severity can be substantially reduced by various strategies and actions through building community resilience. Essentially, resilience relies and rests on inclusive development which is akin to valuing the welfare of both poor and marginalized people.[214]

Rural economies should be based on people-centric development to diminish poverty and reduce deprivation with ultimate aim of building resilience. Farmers' vulnerability of livelihood can be offset by enhancing the adaptive capacity with respect to climate change variability. The livelihood resilience of rural agricultural households not only needs strengthening of the agriculture sector but also diversifying their livelihood activities within the rural economy. Income-generating opportunities and market functioning systems are important to reduce risk and building resilience. The fungible nature of money creates a broader set of choices available to affected community to invest strategically in their most pressing mobility and recovery needs.

The Sustainable Livelihoods Framework (SLF) defines livelihoods as comprising "the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."[215] The framework highlights that less diversified livelihoods are more vulnerable to trends, shocks and seasonality. In contrast, households that pursue multiple income-generating strategies, e.g., pastorals and seasonal workers can apply 'fall-back' strategies during crisis, hence often possess a greater ability to bounce back. In this connection, one of the options for Bangladesh could be exploring the 'mobility' opportunity. Mobility is often an important component of a sustainable livelihood and an essential coping and preventive strategy used by people facing continued risk. During natural hazards, mobility allows people to move to safer places where basic needs are available and accessible. It also creates opportunities for people to preserve and diversify their livelihood sources and secure additional resources to cope and recover.[216]

5.7 Diversification of Income Source

Bangladesh needs to continue its effort to enhance capacity to lessen vulnerabilities of rural livelihoods as well as effectively use new scientific information and blend them with local knowledge to anticipate and combat climate change risks and stressors. Similarly,

[214] UNISDR, *Annual Report 2017*, Geneva: UNISDR, 2017.
[215] IOM, "Disaster Risk Reduction and Resilience", available at https://emergencymanual.iom.int/entry/ 19624/ disaster-risk-reduction-and-resilience, accessed on 14 February 2019.
[216] Ibid.

rural populace and mainstream workforce are also to be trained to develop modern skills for alternative livelihoods. This can be acquired through collaborative training imparted and organized by Government and NGOs. The district or upazila-level Technical Education and Vocational Training can play a significant role in this regard. Effectively doing so will decrease households' climate vulnerable livelihoods and also allow them to diversify the sources of income. Government can establish agro-based small industrial hubs in the rural area which will provide employment opportunities to the marginalized poor of the adjoining villages. Bangladesh government may mobilize and take on board the private sector and NGOs including assistance from international initiatives.

To ensure poor women's livelihood security, government may encourage their participation in farm and non-farm activities, such as providing them training and fund to own cottage industries, livestock farms or engaging them in rural infrastructure development works. Appropriate skill development training programme may be arranged at local government level on public-private partnership basis. One survey, up to 2005, showed that over the past five decades, though there was a decrease in loss of lives due to climate induced hazards, the economic losses had increased manifold. However, by developing effective early-warning systems based on technological advancements in forecasting and monitoring weather-related hazards, combined with well-planned emergency preparedness, effective communication and coordination at local to national level, Bangladesh is one of the few countries which has been successfully address those economic loss.[217]

5.8 Hazard Monitoring and Early Warning

At the local level, there is insufficient hazard monitoring mechanisms. All stakeholders at the local level need to be aware of government's policies as these are mostly unknown to the people due to social backwardness. Making use of space-based information, forecasting mechanism of flood especially in the upper basin and inundation mapping can be of great value and effective for reducing hazard impact. To achieve this, there is a need of developing essential skills and knowledge of the key actors and other stakeholders. This will integrate and manage DRR efforts with increased awareness among all citizens and institutions.

Effective early warning systems must be developed to augment the DRR strategies in order to make the vulnerable populace cautious and enhance people's preparedness to respond to an impending natural hazard. In case of slow-onset hazards, acquiring the ability to detect potential crisis, can play key role for building resilience.[218]

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[217] Arjumand Habib, Md Shahidullah and Dilder Ahmed, "The Bangladesh Cyclone Preparedness Program: A Vital Component of the Nations Multi-Hazard Early Warning System", in Maryam Golnaraghi (ed.), *Institutional Partnerships in Multi-Hazard Early Warning Systems: A Compilation of Seven National Good Practices and Guiding Principles*, Berlin, Heidelberg: Springer, 2012, pp. 29-62.

[218] "Department for International Development: Departmental Report 2004", available at https://publications.parliament.uk/pa/cm200304/cmselect/cmintdev/749/749.pdf, accessed on 04 June 2019.

Knowledge regarding the type and nature can help locate and even anticipate different time-periods of occurrence. Anticipation can range from long-term to the monthly, daily or even hourly detection based on probabilistic analysis.

Early warning systems can be a critical life-saving tool for cyclones, floods, bushfires, droughts and other hazards.[219] Bangladesh needs to develop and improve the early warning system to acquire the early information of a potential hazard, which can (a) detect, monitor and forecast the hazards; (b) analyze the risks; (c) disseminate timely and authoritative warnings and (d) activate emergency preparedness and response plans. The effort needs to be coordinated in nature including many agencies at the national and community levels as lack of coordination can lead to the failure of the system.[220]

The specific design and implementation of early warning systems arguably vary due to the governance mechanisms, specific history, culture, socio-economic conditions, institutional structure, capacities and resources for sustainability of their respective systems.[221] However, there are some common principles that have led to the reduction impacts of hazards, through increasing community resilience. The principles include the importance of political recognition, clear roles and responsibilities of the various stakeholders, exploitation of shared risks knowledge and procedures, adequate resources (human, technical, financial and institutional), authoritative messages easy to understand, access or receive, sensitization of vulnerable groups, education and training of experts and general public and finally feedback mechanisms to ensure continuous improvement.[222] Strengthening early warning/early action is an important component of preparedness. Maintaining communication and managing information in crisis situation between the affected population and concerned authorities will enable better risk identification and facilitate informed choices.

5.9 Priority Setting

The government of Bangladesh needs to prioritize the comprehensive risk assessment of health, shelter, agriculture, sanitation, water and livestock of vulnerable communities with a view to ensuring human security both at national and local levels. Potential hazard risk assessment mechanism needs to be developed in accordance with modern technology and scientific data. Communication hubs should be utilized

[219] "Early Warning Systems Saves Millions of Lives", A WMO Factsheet, available at https://library.wmo.int/pmb_ged /MHEWS.pdf, accessed on 07 June 2019.
[220] Ibid.
[221] These include: (i) Bangladesh Cyclone Preparedness Programme; (ii) Cuba Tropical Cyclone Early Warning System; (iii) The French "Vigilance" System; (iv) The Warning Management of The Deutscher Wetterdienst in Germany, (v) Multi-Hazard Early Warning System in Japan, (vi) Multi-Hazard Early Warning System of The United States' National Weather Service; and, (vii) Shanghai Multi-Hazard Emergency Preparedness Programme. See also, available at https://link.springer.com/content/pdf/bfm%3A978-3-642-25373-7%2F1.pdf, accessed on 23 November 2019.
[222] Ibid.

to disseminate early warnings to local community. In turn, local community should be able to receive and even acquire information regarding an impending hazard. But the community people face difficulties in understanding and using the early-warning messages and hazard forecast which is one of the key constraints. Many times, it is evident that despite disseminating information regarding impending hazard, common people are unable to interpret the messages, ultimately failing to take appropriate action. The media and volunteers are also need to be trained on early-warning and its accurate and timely communication for raising awareness among the vulnerable community.

The fourth Global Environment Outlook (GEO4) assesses the current atmospheric state of the world, i.e., land, water and biodiversity, including the state of environment. It exhibits that the environment is vital for improving human well-being and sustainable development. It also shows that potentials of sustainable development are greatly hampered due to the environmental degradation. The outcome document provides a set of policies for action highlighting alternative development paths.[223] Bangladesh can derive appropriate action plan drawing from such initiatives and guidelines.

The pledge of sustainable development was visible in the landmark 1987 Brundtland Commission report—Our Common Future. Examining the relationships among environment, development and human well-being, it advocates for institutional developments and changes.[224] By taking into account of the environmental, social and economic trends and the impacts natural hazards on environment and human well-being, the government of Bangladesh can prepare strategies to achieve sustainable development.

5.10 Education and Awareness Building

It is significant to link and educate local communities with Bangladesh Meteorological Department's forecasting procedure. Early warning system and procedure should be introduced in the educational curriculum at the primary level. The early warning system should include flash floods, drought, landslides, cyclones, tornados etc. Dissemination of comprehensive information regarding potential hazard along with action plan at the community level is significant in reducing the impact of natural hazard. Disaster related issues like preparedness, mitigation, rescue, recovery or rehabilitation are to be incorporated in education curriculum at various levels.

The education and health sectors need to focus more on exploring the potentials of public-private partnerships. Education sector can establish and strengthen DRR social structures. The education providers and receivers can participate in disaster management committees and establish child clubs at the community and school levels; improve

[223] United Nations Environment Programme (UNEP), *Global Environment Outlook GEO4 - Environment for Development*, Malta: Progress Press Ltd, 2007.
[224] Gro Harlem Brundtland, op. cit.

linkages and coordination with government agencies; increase the disaster resilience of schools and build the capacities of students, teachers and communities to cope with the impacts of disasters.[225]

The HFA's explicit reference to 'using knowledge, innovation and education to build a culture of safety and resilience at all levels' makes it clear that schools should be involved in DRR process.[226] Education and communication materials and methods remain a key cultural barrier[227] related to climate change adaptation and disaster management. It is significant to discuss on the climate change issues with the local vulnerable community. Complying with new ideas with adjusted behaviour depends on the acceptance of new knowledge. As such when DRR and adaptation efforts are not familiar to the local communities, especially in rural areas, it might be rejected by local decision makers/leaders. This barrier can be overcome by educating younger people or educating community decisionmakers through face-to-face dialogue, visual material in local dialects and radio broadcasts.[228]

DRR begins at home, in the educational institution, places of work and worship and through the lifestyle of local communities.[229] It is recognized that the experience of previous disastrous events helps create disaster resilient community using different DRR mechanisms. Saving lives or losing them ultimately rests on the steps taken to reduce the vulnerability of local community against potential hazards. Thus, education as well as sharing of experience within and among communities are vital in DRR strategy.

Education, including formal education and training on building public awareness is recognized as a process by which human beings and societies can realize their potential. Education is critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making. Both formal and informal educations are important in changing people's attitudes to develop their capacity to assess and address their sustainable development concerns.[230] Importantly, for risk reduction, disaster risk managers need to listen and learn from the grassroots people as they have tried and tested local experience. A

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[225] D. Gautam, *Good Practices and Lessons Learned*: *Disaster Risk Reduction through Schools*, Nepal: ActionAid, December 2010.

[226] Ibid.

[227] Kuruppu contemplates that, "Cultural barriers refer to processes impeding the totality people's way of life, including the distinctive spiritual, material, intellectual and emotional features through which life continues". See also, N. Kuruppu, R. Willie, "Barriers to reducing climate enhanced disaster risks in Least Developed Country-Small Islands through anticipatory adaptation", available at https://www.sciencedirect.com/science/article/pii/S2212094714000504, accessed on 23 December 2018.

[228] Patrick D. Nunn, "The End of the Pacific? Effects of Sea Level Rise on Pacific Island Livelihoods", in O. Warrick, Australian Government Department of Climate Change and Energy Efficiency, *The Adaptive Capacity of the Tegua Island Community*, Torres Islands, Vanuatu, Suva, Fiji, 2011, pp. 1-28.

[229] "Building Disaster Resilient Communities, Good Practices and Lessons Learned", op. cit.

[230] United Nations Educational, Scientific and Cultural Organization (UNESCO), *Education for Sustainability from Rio to Johannesburg: Lessons learnt from a decade of commitment*, Paris: UNESCO, 2002, available at https://unesdoc.unesco.org/ark:/48223/pf0000127100, accessed on 08 April 2020.

UN resolution emphasizes on the development and the application of technology which are climate-sensitive. It promotes biodiversity to achieve resilience where human would live in harmony with nature; where wild lives and other living species are protected.[231] Bangladesh needs to work on the climate change issues in accordance with the UN outlined strategy.

The urban population as well as different other stakeholders like local authorities and representatives of local governments are not aware of building code and its consequences on violation. Thus, awareness building measures are essential for land owners, concerned government agencies and real estate entrepreneurs. In most cases, the level of exposure to hazards is not considered during site selection for schools, hospitals, religious, or institutional buildings.[232] Building construction monitoring authority of Bangladesh needs to take care of this aspect. Local Government Engineering Department needs to train their planner and workforce on safe construction principles for key institutional infrastructures like, cyclone shelters, schools and hospitals.[233]

5.11 Adaptation Strategy and Adaptation Governance

Adaptation to predictable climate change is now a global priority. It includes policies and measures for soft and hard infrastructures to mitigate climate change effects. Over the past few decades, there have been number of initiatives with regards to climate change concerns. Collaboration across existing governance regimes can strengthen the integration of environmental concerns into the wider development agenda.

It is significant for Bangladesh to undertake more tightly managed system and entities in the field of development, humanitarian assistance and the environment in line with the guideline of the UN Secretary General during the General Assembly session in 2006. According to UN, the system should 'Deliver as One' at country level, with one leader, one programme, one budget and where appropriate, one office. The guideline provides important lessons due to its particular focus on systems-wide coherence in the area of the environment.[234]

[231] "Transforming our world: the 2030 Agenda for Sustainable Development: United Nations General Assembly Resolution A/RES/70/1", op. cit.
[232] Kazi Shahidur Rahman, Zahid Hussain and M. Kamran Jacob (eds.), "Education in Emergency: Exploring options for continued education during disasters in Bangladesh", available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=6&ved=2ahUKEwjJx-u3hPvoAhXSyDgGHeKvCrsQFjAFegQIBBAB&url=https%3A%2F%2Fs3.amazonaws.com%2Finee-assets%2Fresources%2FFINAL_SLBangladeshINEE_AAEdits.docx&usg=AOvVaw3lK-BtYzMgHYoXFLwR97sv, accessed on 02 April 2020.
[233] Hyogo Framework for Action (HFA), "Progress Monitoring and Review Through a Multi Stakeholder Engagement Process 2013 –2015, Bangladesh Final Report for the Period of January 2013 – December 2014", available at https://modmr.portal.gov.bd/sites/default/files/files/modmr.portal.gov.bd/publications/625bf856_2910_4355_a049_1ad00bd6de39/bgd_HFA%20Monitoring%20and%20Review%20Through%20a%20Multi%20Stakeholder%20Engagement%20Process(MoDMR%20Comments)%20(3).pdf, accessed on 11 March 2019.
[234] UNGA, *General Assembly of the United Nation, resolution A/61/583*, New York: UN, 20 November 2006.

The governance approaches should be flexible, collaborative and knowledge based. Such approaches may be responsive, adaptive and able to cope with the challenges of integrating environment and development. They should also be able to address complex interlinkages and to manage uncertainty and periods of change. Such measures are likely to result in incremental and cost-effective evolution of the institutional structures and reduce the need of more fundamental institutional restructuring. Tools for dealing with interlinkages, such as assessments, valuation techniques and integrated management approaches that link environment to development, provide a critical foundation for adaptive governance. Greater integration of policies across levels, sectors and time, strengthening local rights and building capacity will help achieve environmental and human well-being goals as well.

For instance, broad adaptation efforts at national level are sector driven focusing on agricultural vulnerability or biodiversity, health, or water instead of, building local government's adaptive capacity or strengthening community leadership.[235] It appears that sector driven interventions are adopted due to donor preference to top-down policy development by central government rather than community empowerment. As a result, local institutions and local leadership remain weak to deal with and manage the natural resources which in turn reduce the adaptive capacity of traditional governance structures.[236] Bangladesh is not an exception to this scenario. Natural hazards harm Bangladesh's poor and vulnerable the most. The impacts of natural hazard substantially sway the progress of development of Bangladesh almost every year. Thus, managing and reducing disaster risk is central to development efforts and poverty reduction. It is expected that integration of disaster risk management approach with development planning would better protect people and properties from hazards' impacts.

The geographical position of South Asia makes it particularly vulnerable to natural hazards and disasters.[237] As a South Asian country, Bangladesh is exposed to tropical cyclones including seasonal and flash floods. Among various disasters, floods have been threatening the lives of people for ages.[238] Population growth and changes in land-use patterns have increased human vulnerability to floods. Harmful impacts of floods include direct mortality and morbidity, indirect displacement and widespread

[235] N. Kuruppu and R. Willie, "Barriers to reducing climate enhanced disaster risks in Least Developed Country-Small Islands through anticipatory adaptation", *Weather and Climate Extremes*", Vol. 7, March 2015, pp. 72-83.
[236] Tim Bayliss Smith, Katherine V. Gough, Andreas Egelund Christensen and Søren Pilgaard Kristensen, "Managing Ontong Java: Social institutions for production and governance of atoll resources in Solomon Islands", *Singapore Journal of Tropical Geography*, Vol. 31, No. 1, 2010, pp. 55-69.
[237] Tanvir H. Dewan, "Societal Impacts and Vulnerability to Floods in Bangladesh and Nepal", *Weather and Climate Extremes*, Vol. 7, pp. 36-42, March 2015.
[238] S. Ferreira, "Nature, Socio-Economic and Flood-Mortality", in the Proceedings of the 2011 *Georgia Water Resources Conference*, University of Georgia, Athens, Georgia, 2011.

damage of crops, infrastructure and property.[239] Bangladesh is more vulnerable due to lack of coping and adaptive capacities and high level of exposure.

Seasonal flooding and flash flooding have also created great degree of inconvenience, i.e., restricting movement, depriving people from healthy and hygienic living, impacting crop production and besieging livelihood earnings. Two-fifths of the world's storm has been experienced by Bangladesh every year.[240] According to the report of World Bank in 2016, Bangladesh's economy is at risk due to the impacts of climate change than any other country. With a per capita GDP of about US$ 1,220, the economic losses in Bangladesh over the past 40 years were US$ 12 billion. Consequently, it's GDP declined by 0.5 to 1 per cent annually.[241]

The adverse effects of climate change create additional pressure on the overall development of Bangladesh. However, until now, the country has made little progress in mainstreaming disaster risks reduction and integrating community adaptation to address climate risks. However, recently, importance is given to risk identification and management measures including responses by government, development partners and other non-governmental actors.

Realizing the threats of climate change, Bangladesh has undertaken several measures to integrate appropriate response measures within the development planning process for reducing the impacts of climate change. In past decade, Bangladesh has spent more than US$ 1.5 billion for adaptation efforts. Almost half a billion came from the Bangladesh Climate Change Trust Fund.[242] However, Bangladesh will have to deal with, and plan for two major overarching trends in the future as well. The first is, decline in share of grants and concessional loans in development assistance due to graduation from Least Developed Country (LDC) status. The second one is, tackling the increasingly adverse impacts of climate change with its own initiatives. Thus, adaptation financing both from external and domestic sources will play a critical role.[243] Considering this, Bangladesh government needs to comprehensively plan about how to allocate, mobilize and utilize native budgets more effectively under climate fiscal framework, to promote and integrate adaptation into national, sectoral and local development plans.

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[239] S. Doocy, A. Daniels, S. Murray and T. D. Kirsch, "The Human Impact of Floods: A Historical Review of Events 1980–2009", available at https://www.semanticscholar.org/paper/The-Human-Impact-of-Floods%3A-a-Historical-Review-of-Doocy-Daniels/12513c8b56b6434cb1eeea46e0cfa9539ac085e1, accessed on 03 April 2020.

[240] T. S. Murty and M. I. El-Sabh, "Mitigating the Effects of Storm Surges Generated by Tropical Cyclones: A Proposal", *Natural Hazards*, Vol. 6, No. 3, 1992, pp. 251-273.

[241] World Bank, *Bangladesh: Building Resilience to Climate Change*, Washington, DC: World Bank, 09 October 2016.

[242] S. Huq and M R Khan, "Planning for Adaptation in Bangladesh: Past, Present and Future", Policy Brief, Dhaka: ICCCAD, 2017, available at http://www.icccad.net/wp-content/uploads/2017/08/Final-policy-brief_28-Aug.pdf, accessed on 29 January 2019.

[243] Ibid.

For environmental governance, over the past few decades, states have created a growing number of institutions, authorities, treaties, laws and action plans to conserve and safeguard the environment and to respond to new understanding of global environmental change.[244] Bangladesh has prepared National Adaptation Program of Action (NAPA) in 2005 and updated in 2009 under the framework of United Nations Framework Convention on Climate Change (UNFCCC). Prioritizing 'Adaptation and DRR Mainstreaming Climate Change in Local and National Development', it has also prepared and adopted Bangladesh Climate Change Strategy Action Plan (BCCSAP) in 2008 and revised it in 2009.[245] But all these initiatives are confined to policy structure rather than implementation practices. Based on practical knowledge over cause and consequences of climate change, it also needs to develop adaptation strategies, e.g., drought resistant crops, more resilient infrastructure, economic diversification and poverty reduction to avoid the worst impacts.[246]

Bangladesh may also seek regional and global assistance in this regard. It can develop strategy in line with HFA which outlines five 'Priorities for Action' to achieve sustainable development. These are (a) making DRR a priority, (b) improving risk information and early warning, (c) building a culture of safety and resilience, (d) reducing the risks in key sectors and (e) strengthening preparedness for response.[247] If these actions are prioritized comprehensively, it will address the evils of natural hazards through evading human sufferings and averting disastrous situation.

Adaptation governance is also a challenge for Bangladesh. Adaptation initiatives focusing on empowerment of both young citizens and the old help adopt appropriate adaptation strategies that are culturally appropriate and effective.[248] The adaptation governance, related to financial, technical, cultural, cognitive and social vulnerability, remains one of the major challenges of Bangladesh. Governance, here, is referred to as the set of decisions, actors, processes, institutional structures and mechanisms, including norms and authoritative culture in shaping course of action.[249]

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[244] "Global Environment Outlook GEO4", op. cit.

[245] T. Arif, "Bangladesh's Climate Change Response and Adaptation Efforts", available at http://unfccc.int/files/adaptation/groups_committees/ldc_expert_group/application/pdf/bangladesh.pdf, accessed on 13 November 2019.

[246] "Climate Change and Food Insecurity Multiplying Risks of Conflict and Civil Unrest in 32 Countries", available at https://reliefweb.int/report/world/climate-change-and-food-insecurity-multiplying-risks-conflict-and-civil-unrest-32, accessed on 04 November 2019.

[247] "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters". op. cit

[248] E. Ronneberg, T. Nakalevu and P. Leavai, *Report on Adaptation Challenges in Pacific Island Countries*, Samoa: Secretariat of the Pacific Regional Environment Programme (SPREP), 2013, pp.1–32.

[249] S. Moser, "Governance and the art of overcoming barriers to adaptation", *Magazine of the International Human Dimensions Programme on Global Environmental Change*, No. 3, November 2009, pp. 31–36, available at https://www.researchgate.net/publication/242676989_Governance_and_the_Art_of_Overcoming_Barriers_to_Adaptation/link/53d2fc820cf228d363e96ded/download, accessed on 16 April 2020.

Adaptation challenges dwell at local, national, regional and international level. Due to limited engagement, socio-economic inequalities, poor coordination and weak linkages between communities and government, local or community needs are often overlooked in the adaptation efforts.[250] In Bangladesh, poverty alleviation and basic infrastructure building efforts naturally dominate the development agenda, while environmental concerns remain at the backyard. Consequently, environmental changes and development challenges are likely to worsen the situation.[251] Hence, additional focus on strengthening governance and coordination between agencies responsible for climate change adaptation and disaster management is essential.[252] Top-down governance ignoring the large and vulnerable local community may result in futility.

Bangladesh should harness fund from the international donors to foster, respect and preserve the users' sovereignty enabling them to act on their own motivation and of course, on the basis of equity and justice. The funds for adaptation must enable vulnerable communities to uphold their dignity and culture. In this respect, considering the traditional knowledge and practices of local communities, adaptation funding needs to address root causes of vulnerability and focus on local government's capacity building.

5.12 Resilient and Sustained Development

Though climate change affects every part of the world, it is a matter of concern for the developing countries to pursue their development goals. Thus, global community needs to meet all the commitments and obligations of the UNFCCC and other relevant international agreements. Firm commitment is also required to achieve the SDGs. Attainment of the developmental and environmental objectives will require a substantial flow of new and additional financial resources for the developing countries, in order to cover the incremental costs for the actions they have to undertake to deal with global environmental problems and to accelerate sustainable development[253] through implementation of international treaties, agreements and protocols, i.e., the Johannesburg Plan of Implementation,[254] Rio principles,[255] etc. These efforts will integrate the three

[250] World Bank, *Reducing the Risk of Disasters and Climate Variability in the Pacific Islands: Solomon Islands Country Assessment*, Washington: World Bank, 2009, pp. 1–32.
[251] Anthony G. Patt, Mark Tadross, Patrick Nussbaumer, Kwabena Asante, Marc Metzger, Jose Rafael, Anne Goujon, Geoff Brundrit and Stephen H. Schneider, "Estimating Least-Developed Countries' Vulnerability to Climate-Related Extreme Events over the Next 50 Years", *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 107, No. 4, 2010, pp. 1333–1337, available at www.jstor.org/stable/40536328, accessed on 17 April 2019.
[252] SPREP*, JNAP Development and Implementation in the Pacific: Experiences, Lessons and Way Forward,* Samoa: SPREP, 2013, pp.1–118.
[253] UNCED, *Report of the United Nations Conference on Environment and Development*, New York: United Nations publication, 1993.
[254] "Report of the World Summit on Sustainable Development", Johannesburg, South Africa, 26 August-04 September 2002, New York: United Nations Publication, 2002.
[255] "Report of the United Nations Conference on Environment and Development, Rio de Janeiro", op. cit.

components of sustainable development, i.e., economic development, social development and environmental protection.

From humanitarian and developmental perspectives, disaster is regarded as a situation which extensively disrupts the life of a community or society. In such situation for recovery most of the affected people depend on the external support. Disaster due to natural hazards necessitates both humanitarian and developmental intervention. The key to development lies on people's empowerment as it is a multidimensional process to achieve a higher quality of life for all people.

The components of sustainable development, e.g., economic development, social development and environmental protection are interdependent and mutually reinforcing.[256] Humanitarian response and development strategy thus necessitate incorporating measures to reduce the core risk factors to achieving the goal of sustainable development. However, natural disasters remain one of the most important barriers to the achievement of sustainable development. Evidence shows that disasters from 2001 to 2010 affected 232 million people per year on an average killed 106 million and caused US$ 108 billion economic damages.[257] Besides, numbers of other disasters also adversely impact the lives, health and livelihoods of the disadvantaged and poor people. Contemporary development approach widely accepts that impacts on and interruptions to development by natural disasters are not unavoidable in the age of high-tech advanced world.

Between 1877 and 1995, Bangladesh was hit by 154 cyclones out of which 43 were severe in nature and 68 tropical depressions creating storm surges of even more than 10 meters.[258] All these hazards took a heavy toll mainly on agriculture and infrastructures. Agriculture is the largest economic and livelihood source of Bangladesh and it is heavily reliant on the monsoon. Bountiful harvests during the monsoon bring food and financial security in Bangladesh. Unfortunately, when monsoon fails due to natural calamity, sufferings and economic loss become widespread. Therefore, it is important to build the capacity and capability to cope with and mitigate the impact of sea level rise, manage soil and water salinity, reduce the impact of storms and floods on the one hand and control industrialization, unplanned urbanization and preserve forestry and agricultural land on the other.[259]

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[256] "Resolution Adopted by the General Assembly, 51/240, Agenda for Development", 103rd plenary meeting, 20 June 1997, available at http://www.un.org/documents/ga/res/51/ares51-240.htm, accessed on 11 March 2019.

[257] Centre for Research on the Epidemiology of Disasters (CRED), *Disaster Data: A Balanced Perspective,* Brussels: Institute of Health and Society, available at www.cred.be/sites/default/files/CredCrunch27.pdf, accessed on 28 July 2019.

[258] Susmita Dasgupta, Mainul Huq, Zahirul Huq Khan, Manjur Murshed Zahid Ahmed, Nandan Mukherjee, Malik Fida Khan and Kiran Pandey, "Cyclones in a Changing Climate, The Case of Bangladesh", *Climate and Development*, Vol. 6, No. 2, 2014.

[259] L. Sieghart and D. Rogers, "Bangladesh: The Challenges of Living in a Delta Country", 19 May 2015, available at http://blogs.worldbank.org/endpovertyinsouthasia/ar/comment/3013, accessed on 09 April 2020.

Bangladesh has strength in endogenous governance which is rooted in the local practices of resource management and livelihood functions. Unfortunately, in the development planning, the community needs and experience are mostly overlooked as it follows top-down approaches. This, in turn, weakens the local capitals (social, economic and environmental) which ultimately makes the local institutions weak and impedes the growth of local leadership at the grassroots level. Most of the time, development initiatives constrain the natural resource management. Consequently, adaptive capacity of traditional governance structures reduces.[260] While planning development of especially calamity prone areas, Bangladesh must consider the environmental realities prior implementing the DRR strategy.

Deforestation especially in the coastal areas of Bangladesh affects the natural shields and mangroves. It also increases the probability of flooding, erosion, heavy and unusual rainfall which ultimately can raise the vulnerability. Huge efforts have been undertaken for afforestation along the coastal belt and embankments. Since independence, several GO-NGOs and the local communities have together planted numerous floras but bulks of these trees are dying due to water-logging and floods. Lack of feasibility study on growth characteristics of the plants seems to be the major cause for such occurrence. Notably, plants which are very susceptible to flooding and cyclonic storms and which are suitable for highland were planted in the flood-plains.[261] It is therefore significant that policy regarding the reduction of the impacts of natural hazards of vulnerable areas should include construction of embankments along with coastal afforestation based on scientific suitability and sustainability as well as local, endogenous and traditional knowledge.

5.13 Comprehensive Strategy and Policy Imperatives

Natural hazards with higher frequency and magnitude and rising sea levels threaten people's health, physical security, material needs and social cohesion all over the world. Some experience devastating cyclones or earthquakes, some face extensive flooding, while others endure intense droughts. As a result of rapid climate change, there is a danger of species' extinction, safe water shortage, decline in economic activity and overall development. Amidst all these apprehensions, the World Commission on Environment and Development (Brundtland Commission) stated that, "Humanity has the ability to make development sustainable."[262] The fourth Global Environment Outlook insisted on the steps needed to achieve this vision.[263]

[260] Albert S, Grinham A, Bythell J, Olds A, Schwarz A, Abernethy K, Aranani K, Sirikolo M, Watoto C, Duke N, McKenzie J, Roelfsema C, Liggins L, Brokovich E, Pantos O, Oeta J and Gibbes B, *Building social and ecological resilience to climate change in Roviana, Solomon Islands,* Brisbane: University of Queensland, 2019, available at https://www.environment.gov.au/system/files/resources/8e6008db-5122-46a1-8ccb-a6da1af518c3/files/pasap-solomons.pdf, accessed on 23 July 2019.

[261] Shukla Rani Basak, Anil Chandra Basak and Mohammed Ataur Rahman, "Impacts of Floods on Forest Trees and Their Coping Strategies in Bangladesh", *Weather and Climate Extremes*, Vol. 7, 2015, pp. 43–48.

[262] Gro Harlem Brundtland, op. cit.

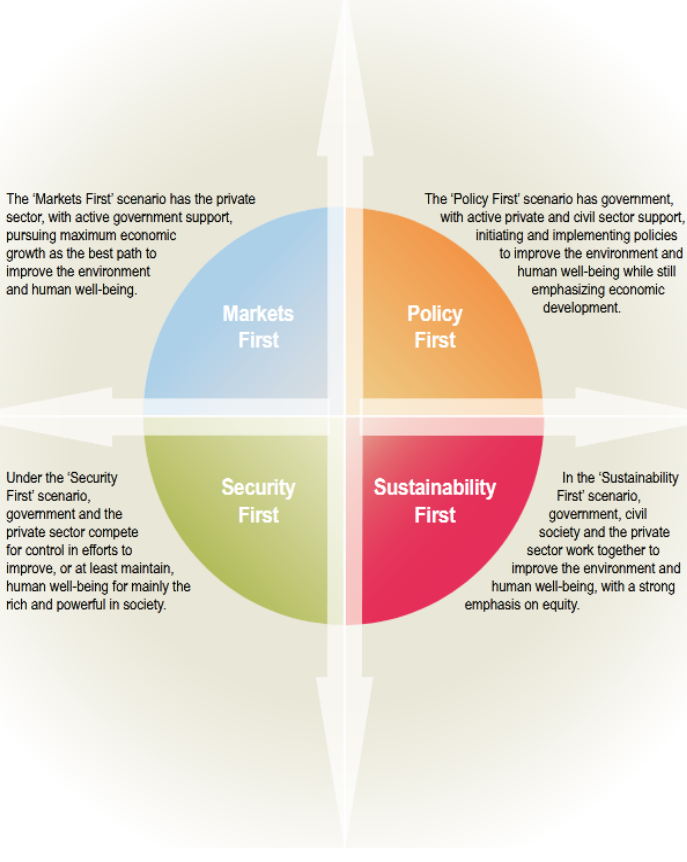
[263] Global Environment Outlook GEO4, op. cit.

Disaster risks in Bangladesh can also destabilize security situation, affect the human well-being and impact the economic flow and functions. Historically, the Armed Forces have deployed in post disaster relief operations in Bangladesh. During that time, they remain away from their classical and conventional security role. This can affect their operational capabilities thus endangering traditional security of the country. Other effects may also include increased poverty, migration and disruption of education which in turn can lead to disenfranchisement of affected communities and radicalization of the affected people. Bangladesh needs to focus on balanced and sustainable development with increased adaptive capacity of local communities. An improved capacity to tap local knowledge and develop environment friendly technology is also an important step towards sustainable development in a number of sectors, including crop diversification, agricultural processing, construction, communications and the marine sciences. [264]

With respect to climate change and its related challenges to the environment, GEO-4 analyzes four scenarios of future development approach, i.e., 'Market First', 'Security First', Policy First' and 'Sustainability First' (Figure 5.1).[265] In general, 'Market First' and 'Security First' have worst impacts while 'Sustainability First' comes out best across a number of indicators.[266] Integrating policies at all levels and across all sectors is a timely key step in this regard.

[264] FAO, *Document Repository: Sustainable Management of the Natural Resource Base*, Rome: FAO, 2014, available at http://www.fao.org/docrep/t3384e/t3384e03.htm, accessed on 29 October 2019; Hari Srinivas, "10 Things you Need to Know of Small Island Developing States", available at htt://www.gdrc.org/oceans/10things/, accessed on 17 April 2019; United Nations Environment Programme (UNEP), "Programme of Action for the Sustainable Development of Small Island Developing States, Extract from A/CONF.167/9, Part I, Annex I", 1994, available at http://islands. unep.ch/dsidspoa.htm, accessed on 17 April 2019.
[265] Global Environment Outlook GEO4, op. cit.
[266] Ibid.

Figure 5.1: Four Scenarios of Future Development Approach by GEO4[267]



From the perspective of environment, development and human rights, there are strong synergies between improving human well-being and reducing vulnerability. Economic growth and environmental protection are not mutually exclusive as efforts towards poverty alleviation and environmental protection reinforce each other. In order to achieve sustainable development, governance must be integrated and coordinated. Integrating policies across levels, sectors and time, strengthening local rights and building capacity will help achieve environmental and human well-being goals. Interlinked environment-development challenges require effective and coherent governance and policy responses within the framework of sustainable development. Collaboration across existing governance regimes can strengthen the integration of environmental concerns into the wider development agenda.

[267] Vital GEO Graphics, op. cit.

Bangladesh has developed strong disaster management policy and organizational framework through revised Standing Orders on Disaster (SOD) 2010, Disaster Management Act, National Disaster Management Policy, MoFDM Corporate Plan, Bangladesh Disaster Management Model, Disaster Management Information Centre (DMIC) and National Plan for Disaster Management and so on.[268] However, there is a strong need to integrate DRR with climate change adaptation programmes towards achieving resilience. In this respect, community risk assessment is vital as it provides the foundation for development including the plan for recovery and reconstruction. For ensuring disaster resilient development, institutional capacity building of project planner and appropriate resource allocation are important so that development initiatives cannot maximize new risks due to inappropriate or ill-conceived planning. The development interventions should be able to enhance community resilience strengthening their capacity to respond effectively during and after the hazards.

UNISDR attempted to mobilize activist parliamentarians to spearhead disaster risk approaches to the national planning of the countries. By end-2012, the Advisory Group of Parliamentarians involved more than 900 parliamentarians from 124 countries. Their achievements included the Globe Rio+20 Legislator's Protocol (where parliamentarians committed to mainstream DRR thoroughly in national policies) and the strengthening of national disaster risk management legislation in Africa, the Americas and Asia. Implementation of these policies is a difficult task. National Platforms are key coordinating points for implementing DRR commitments and plans in the countries. In 2012, UNISDR's Regional Offices facilitated the establishment or upgradation of such national coordination mechanisms in countries of all regions, bringing the total number of National Platforms to 85 from 45 in 2008. Monitoring disaster losses is a prerequisite for proper disaster risk management. In 2012, UNISDR in cooperation with partners such as UNDP and the World Bank supported 61 governments to create or upgrade national disaster loss databases that serve as inventories of damage and effects. Almost 38 databases, including one regional, were completed in 2012, covering 56 countries. Another five databases are under development. UNISDR and its partners also identified more sophisticated evidence-gathering tools, including multi-hazard hybrid risk models that combine data from national disaster loss databases with probabilistic risk assessments to sharpen the design of cost-effective risk reduction strategies.[269] Bangladesh can closely engage with such initiatives to combat the climate extreme challenges to improve overall human security.

Private sector should be mobilized and used for resilient development of the vulnerable community. Coordination between government agencies and other stakeholders in building resilience must be very effective for optimum utilization

[268] Government of the People's Republic of Bangladesh, Disaster Management Bureau, Disaster Management & Relief Division, "National Plan for Disaster Management 2010-2015", April 2010.
[269] "UNISDR Annual Report 2012", available at https://www.unisdr.org/files/33363_ unisdrannualreport2012. accessed on 22 August 2019.

of the allocated, mobilized and available resources. Top down approach to climate change adaptation and DRR should be linked with the bottom up risk identification and development needs. The other key challenges remain with decision making process that needs to be decentralized and ensure vulnerable communities' participation including adequate and equitable resource allocation to local level DRR interventions. While allocating the resource at the national and local government level, essential is to ensure community participation. It is evident that local level disaster management committees are not well functional and mostly unequipped owing to inadequate capacity and capability to work on DRR matters. They often suffer from communication challenges within and between disaster management committees at various levels.[270]

Challenges also remain regards to the protection and restoration of ecosystem services with constrained internal and external resources. For example, it is highly costly to supply solar energy to rural poor which is environment-friendly. Thus, collaborative mechanism should be developed to build institutional capacity with respect to acquire modern technology, develop human resources and increase financial ability. Safety net programmes should be expanded to the vulnerable poor because these play a key role in enabling vulnerable groups to cope with disasters by reducing their poverty level.[271] Ensuring allocation and mobilization of resources, coordination among various actors, ownership of the local community and strategic direction are key constraints in disaster management in Bangladesh. Nonetheless, DRR initiatives need to be scaled up to bring all vulnerable groups of people under disaster safety net. Both population size and vulnerability to hazards should be taken into consideration while prioritizing and setting the programmes with a view to enhancing the coping capacity of the vulnerable people.

Bangladesh has progressed in formulating policy and organizational framework. In case of implementation, compliance and monitoring, it needs further improvement. Though the disaster mortality is lower than ever before, the financial cost of disasters has steadily risen in the past decades. Disaster damage and loss in Bangladesh is now 10 times higher than it was in the 1970s, with annual losses ranging between 0.8 per cent and 1.1 per cent of the country's GDP. In sum, the country reported over US$ 180.3 million in economic losses from natural disasters between 1971 and 2013.[272]

Among 173 countries, Bangladesh ranked the 6th globally and was declared the second most disaster-prone country in Asia with exposure of 27.52 per cent in 2011.[273] With 19.57 per cent Bangladesh ranked 10th among 171 countries in terms

[270] Author's own point of view.
[271] World Bank, *Social Safety Nets in Bangladesh: An Assessment*, Dhaka: The World Bank Office, January 2006.
[272] Robert D Watkins, op. cit.
[273] "World Risk Report 2011", United Nations University, UNU-EHS, Institute for Environment and Human Security, available at https://www.google.com/search?client=firefox-b-d&q=World+Risk+Report+2011%2C+%E2%80%9CB%C3%BCndnis+Entwicklung+Hilft+in+cooperation+with+United+Nations+University%2C+UNU-EHS%2C+Institute+for+Environment+and+Human+Security. Bündnis Entwicklung Hilft, Berlin

of improvement in risk. But its exposure increased with 31.70 per cent.[274] Disasters, throughout the history, have demonstrated the devastating impact of extreme natural events on human, its livelihood, agriculture, households, health ecosystem and human security. However, the severity of extreme natural events is not the only factor for human sufferings and economic losses; rather economic, political and societal factors influence the nature and scale of the damage in equal measure.[275]

The pace of development causes environmental degradation and uncertainty in many domains. Consequently, it creates challenge to many decision-making processes. Over the last several decades, progress in hazard monitoring, predictions and forecasting has assisted decision makers to reduce risks of extreme events. More and relevant data can be collected, exchanged, analyzed and eventually injected into multidisciplinary (e.g., combining Earth, the ecology, and the socio-economic system) prediction models to understand the frequency and intensity of natural hazards and potential exposure and vulnerability. The application of scientific knowledge, supported by technology transfer and capacity development is crucial in DRR and building resilience. Further, investment is therefore needed to make science and climate information more available to support policies around investment and planning.[276]

Significant shift is visible in addressing the challenges arising from natural hazards. Earlier natural hazards were seen as climate events and used to be combated by adopting humanitarian response and relief distribution. However, since last few decades, disasters emerging from natural hazards have drawn greater attention with regard to strengthening preparedness and ensuring a more effective and efficient mitigation strategy. The 'preparedness saves lives' approach emphasizes on the significant role of economy approach and recognizes that a longer-term approach was required to reduce disaster risk and build resilience. However, lack of understanding over the causal link between disaster risk and development, or more precisely the impact of poor development that increased vulnerability resulting in development losses.

The HFA 2005–2015 on 'Building the Resilience of Nations and Communities to Disasters' provides the latest framework and strategy for disaster risk management. Bangladesh signed the HFA and thereby committed to achieve the HFA's objectives and priorities. Bangladesh Disaster Management Bureau prepared the SOD in 1997 which was further developed in 2010. The key roles and responsibilities particularly of DMCs are divided into two major categories: (a) risk reduction and (b) emergency response

accessed on 29 October 2019.

[274] "World Risk Report Analysis and Prospects 2017", available at https://reliefweb.int/sites/reliefweb.int/files/resources/WRR_2017_E2.pdf, accessed on 02 May 2019.

[275] Ibid.

[276] World Meteorological Organization, "Climate Knowledge for Action: A Global Framework for Climate Services –Empowering the Most Vulnerable", report of the High-Level Taskforce for the Global Framework for Climate Services, Geneva, 2011, available at http://www.wmo.int/hlt-gfcs/downloads/HLT_book_full.pdf, accessed on 06 October 2019.

—during warning period, during hazard onset and the post hazard period.[277] Under the Disaster Management Regulatory Framework, there are provisions for preparing a short, medium and long term vulnerability reduction and capacity building action plan for the identification of high-risk people through participatory approach. For effective implementation of SOD, the Union Disaster Management Committees (UDMCs) are needed to be more functional and proactive by providing training and resources and establishing proper monitoring as well as follow up system. Besides, financial and other logistic supports are also needed to be ensured. Moreover, for long-term policy, the traditional and indigenous knowledge, e.g., development of water ways, conservation and protection of natural and traditional water reservoirs have been overlooked during quick and unplanned infrastructure development especially, for industrial, urban and agricultural expansion. During the development of road transportation system most of the river flows have been disturbed and the catchments have lost their water holding capacity; thus, floods become more frequent.

Adverse effects of climate change include several factors, i.e., physical environment which have harmful effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare. Various actions to address climate change can also help solving other environmental problems. Thus, responses to climate change should be coordinated with social and economic development in a comprehensive and integrated manner with a view to avoiding adverse impacts on the latter. It also needs to take into full account of the priority needs of the country. In this respect, Bangladesh needs to prioritize the achievement of sustained economic growth and eradication of poverty.[278]

People all over the world are facing disparities between and within nations, poverty, hunger, ill health and illiteracy and the continuing deterioration of the ecosystems. However, integration of environment and development concerns will lead to the fulfillment of basic needs, improvement in living standards for all, better protected and managed ecosystems and a safer, more prosperous future. No nation can achieve this alone, but through global partnership for sustainable development, they can preserve the environment and ensure overall human security.[279]

In 2005, Bangladesh has prepared NAPA under the framework of UNFCCC. It has prioritized floods as the most challenging disaster because it affects about 80 per cent of land in Bangladesh with an immense economic loss from 1954 to 2004. NAPA has also identified agriculture, water, infrastructure, human settlement, health,

[277] Government of the People's Republic of Bangladesh, Ministry of Food and Disaster Management, Disaster Management & Relief Division, Disaster Management Bureau, *Standing Orders on Disaster,* April 2010.
[278] "Treaties and International Agreements Registered or Filed and Recorded with The Secretariat of the United Nations (30822)", Vol. 1771, Nos. 30813-30843, 199, available at https://treaties.un.org/doc/Publication/UNTS/Volume%201771/v1771.pdf, accessed on 03 December 2019.
[279] "Report of the United Nations Conference on Environment and Development", op. cit.

and energy as the vulnerable sectors and finalized 15 projects for coping with climate change effects including floods.[280] But it lacks detailed work plan on floods wherein very little attention is given to traditional knowledge. The NAPA does not reveal the long-term mitigation practices rather, it focuses on policies on floods. Such policies are yet to show any significant result in reducing floods and damages. There is a need of developing navigation system, preservation of natural and traditional water reservoirs and water-flows that are not obstructed. Therefore, more work is needed to adopt a policy framework that includes traditional knowledge and considers their scientific value for long-term sustainability. A bottom-up policy should be developed based on research with participation from communities having local knowledge and wisdom, policymakers, NGOs and other stakeholders. The findings should be incorporated in the policy framework through discussion, dialogues, workshops, seminar and symposium.

[280] General Economics Division, Planning Commission, Government of the People's Republic &UNDP Bangladesh, "Policy Study on the Probable Impacts of Climate Change on Poverty and Economic Growth and the Options of Coping with Adverse Effect of Climate Change in Bangladesh. Support To Monitoring PRS And MDGs in Bangladesh", available at http://fpd-bd.com/wp-content/uploads/2013/04/ The-probable-impacts-of-climate-change-on-poverty-and-economic-growth-and- the-options-of-coping-w.pdf, accessed on 23 November 2019.

Chapter 6

Conclusion

Human security, development and disaster are inter-related. Bangladesh is one of the most vulnerable countries due to its exposure to frequent and extreme climatic events such as cyclones and associated storm surge. Thus, human security approach related to DRR should be comprehensive, people-centric, context-specific and prevention-oriented and the policy framework should be cross-sectoral based on local resilience. The key philosophy of the approach should be focussed on bottom-up empowerment and top-down protection. Human security is relevant to every individual across the globe whether from rich nations or poor. Due to the increase of unscientific development, the likelihood of natural hazard has become more frequent. Consequently, concerns regarding human security will also increase.

The sustainable development paradigm values 'human' both as an individual and a collective. In this respect, DRR is an investment—not a consumption. Climate change adaptation and risk reduction allow development to proceed amid disasters. In disasters, local government is the grass root level institutional entities which can response appropriately and widely. Unfortunately, in most of the time the local government lacks capability to deal with the consequences due to insufficient capacities. Thus, review of mandates, responsibilities and resource allocations is needed to increase the capacity of local governments to respond to these challenges. These challenges need to be addressed by Bangladesh urgently to substantially reduce the impact of disasters and to make risk reduction an essential component of development policies and programmes.

The impacts of disaster on individuals are immense. These impacts include, from the loss of life and livelihood to injury, psychological trauma, migration, starvation, beggary, suicide, disability and illness. For a community as a whole, disaster causes significant economic loss, erodes social and financial capital, decreases agricultural productivity and damages physical infrastructures. Due to poor resilience, the poor and disadvantaged are especially vulnerable to disaster. Henceforth, adoption of a DRR strategy is crucial to mitigate the effects of disaster and increase people's resilience to disaster risks. A comprehensive approach to reduce disaster risk is set out in the UN endorsed HFA, adopted in 2005. Its outcome is "The substantial reduction of disaster losses, in lives and the social, economic and environmental assets of communities and countries."[281] The International Strategy for Disaster Reduction (ISDR) system provides a platform for cooperation among Governments, organizations and civil society actors to implement the Framework.

[281] Hyogo Framework for Action 2005-2015, op. cit.

Disasters arising from natural hazards are essentially a local phenomenon. Thus, local communities play the vital role in emergency response, immediate recovery and reducing underlying risks factors. Disasters must be viewed more than a state of emergency with long term social impacts including loss of public facilities followed by a drastically reduced functioning of the affected community. Disaster makes the individuals jobless, destroys the income sources, renders them homeless, takes away the livestock and damages the infrastructure or small businesses and many more. The affected communities suffer from a severe setback in development gains. The longer-term consequences from disasters keeps nations, communities and individuals trapped in poverty cycles. Often the cumulative effect of high - frequency and low - impact disasters cause most losses, particularly amongst the poor.[282] Though, often disasters attribute to the acts of nature, major factors influencing disaster risks are human and social vulnerability, connected to the capacity of community to respond to, or reduce the impact of natural hazards. An integrated approach including environmental conservation is therefore vital in DRR. Ecological services and their indirect economic values are often overlooked from disaster assessments while relief works tend to focus on damage to life and property. Mainstreaming and integrating climate change and ecosystem concerns into the development agenda targeting DRR thus become essential. By addressing environmental hazards together with poverty, Bangladesh can protect the communities who are vulnerable to natural hazards and trapped in a grinding poverty cycle. Poverty escalates disaster risk by reducing existing coping capacities and future resilience. The less privileged are suffering the most from the immediate and long-term disaster impacts.

Environmental losses are often overlooked, even if this might have the most significant and long-term effects on livelihood as an income sources (e.g. agriculture) for the poor. Natural hazard should therefore be seen as an integrated part of development. Again, without major efforts to address disaster losses, it will create obstacle to achieve the SDGs. Consequently, hazards, vulnerabilities and capacity building need to be considered in development initiatives and activities aiming at enhancing environmental conservation and reducing disaster risk. Though in the recent decades Bangladesh's DRR initiatives have strengthened, its DRR capacity building measures need to be focussed on grassroots level with the objective of resilient development aiming towards ensuring human security.

Many challenges remain with regard to resilient infrastructure development, quality maintenance, accurate data collection, scientific risk assessment and capacity of emergency responses. Nevertheless, there is also evidence of broadening and strengthening of national policy architecture over recent decades which have taken into cognizance of the international guidelines for DRR. The peoples of Bangladesh are constantly facing growing and acute threat from natural hazards. However, greater knowledge, evaluation

[282] UNISDR, "Linking Disaster Risk Reduction and Poverty Reduction Good Practices and Lessons Learned", 2008.

capacity, appropriate skill development training, advanced monitoring-early warning-communication system, strong local government bodies, empowered local community and developed emergency response capabilities will definitely improve and contribute to enhance resilience and ensure human security. In addition, two critical policy components are vital to provide stronger human security protection for Bangladesh, especially for those who are marginalized, live in poverty and heavily rely on agricultural sector for their daily needs. The first is a continued prioritization of DRR by the government with increased budgetary provision and the second relates to both policy and practice of the government and the international climate community that demands strengthened international cooperation as an important practical step.

Thus, integration of environment and development concerns is essential to ensure basic needs, sustainable livelihood, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future. Together, nations across the globe through greater partnership will be able to preserve the environment for sustainable development, thereby ensuring overall human security.

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