# Regional Environmental Issues: Water and Disaster Management

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50 YEARS OF WORLDWIDE COOPERATION

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# Preface

The last 2 years have been particularly tumultuous in terms of natural calamities such as earthquakes, hurricanes, floods and Tsunamis. The Tohoku earthquake and subsequent Tsunami on March 11, 2011 created a series of equipment failures and radioactive material release at the Fukushima Dai Ichi Nuclear Plant in Japan making it the second largest nuclear disaster after Chernobyl. On June 11, 2012 two earthquakes of the magnitude 5.4 and 5.7 in the Richter scale struck Afghanistan. The epicenter was 160 kms. southwest of Fayzabad. 75 people were killed. The Brahmaputra floods in July this year affected not only 27 districts of Assam in Northeastern India and the famous Kaziranga National Park but also Bangladesh and Myanmar. Another 6.9 magnitude earthquake struck Sikkim and Nepal on Sep. 18, 2011 damaging buildings and killing at least 16 people. To top it all, the hurricane Sandy in October 2012 devastated parts of North-eastern United States, Mid-Atlantic and the Caribbean killing at least 253 people with an estimated loss of US $ 65 billion. All these disasters point to the increasingly erratic, unpredictable and devastating spirit of nature and mankind's helplessness to confront its merciless blows. While we cannot predict the timing and intensity of a natural calamity, we can however, better prepare ourselves to save precious lives and critical infrastructure. The issue of climate change, water and disaster management has come to occupy an important position in the overall strategic planning of nation states.

What is particularly worrying is that the list of environmental problems facing us is ever-growing making it overly complex and its management similarly difficult. The list does not only include floods, earthquakes, hurricanes and Tsunamis but air and water pollution from urban wastes, untreated sewage, famines, soil erosion and degradation, industrial contaminants, forest loss, destruction of

wetlands, glacial lake outbursts etc. Since there cannot be a single country solution to all these growing problems, the crucial question is how to obtain regional and global response to mitigate these challenges.

Affirming the seriousness attached to this issue, the 16th SAARC Summit held in Thimpu in 2010 stated, "South Asia is particularly prone to climate change and related disasters making the need for a regional response to meet the challenge of climate change more urgent and compelling." However, all of us do realize that there is a lot more to be done to reduce environmental risks, create a workable mechanism of public-private partnership, capacity building, and moreover build institutions to deal with major natural calamities in South Asia.

The Centre for South Asian Studies (CSAS) in partnership with the Konrad Adenauer Stiftung (KAS) organized a regional conference on *Regional Environmental Issues: Water and Disaster Management* on February 11-12, 2012 in Kathmandu to study the rich and diverse yet fragile eco-systems of South Asia, the possibility of cooperation in the renewable energy sector especially wind and solar energy, and natural disaster management in order to share knowledge, information and gain insights from a diverse range of case studies in the region. The tight-knit collection of papers in this book by experts of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka offer a variety of ideas and cases ranging from the Tsunami in Sri Lanka to the earthquake in Pakistan and how these crises were handled by individual state(s), how inter-departmental coordination was achieved, the role of foreign assistance in the immediate aftermath of the disaster and the lessons learnt. The blend of practical experience and comprehensive analytical survey not only of the individual authors but also from Mr. Krishna Gyawali, Secretary at the Ministry of Environment of the Nepal Government, Mr. Dipak Gyawali, former water resources minister and Mr. Udo Weber, Counselor of the German Embassy in Kathmandu have added value to this publication.

We are obliged to Mr. Marcel Schepp and Ms. Ritika Rana of the KAS-Delhi office for their invaluable assistance in organizing this conference. We hope this book will be useful to stakeholders, policy makers, academics and students in South Asia and beyond as we pledge to contribute more on this important theme in the year 2013.

Tomislav Delinic
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# Statement by the Chief Guest

Krishna Gyawali[1]

It gives me immense pleasure to be invited as Chief Guest to this very important conference on Regional Environmental Issues focusing on Water and Disaster Management. I feel honored to be amidst such a galaxy of experts and scholars from around the South Asian region, and express my gratitude to the organizers for giving me this opportunity.

As we all know, environment is a cross-cutting issue of multi-sectoral concern. It encompasses a multitude of sectors such as agriculture, fishery, forestry, soil conservation, watershed management, nature conservation, wildlife management, bio-diversity protection, irrigation, energy, pollution control, disaster management, climate change management and so on. In a nutshell, all that belongs to your life-support system such as earth, water, energy, wind and air (called *Pancha-Mahabhutam* in Hindu culture) falls under environment.

My Honorable Minister for Environment rightly says that "environment is like a fruit." He elaborates, "When you go to the market, you need to name a fruit to buy and taste it, such as orange or apple. In the same way, you have to name out a sector such as agriculture or forestry to make people understand what environment means and how it matters to them."

This cross-sectoral character of environment is reflected in its inter- linkage with various institutions. Without ensuring support from

1 Secretary, Ministry of Environment, Science and Technology, Nepal Government.

other sectoral institutions, such as ministries of agriculture or forestry or energy, the Ministry of Environment alone cannot do anything. We need coordination, cooperation and collaboration with these ministries, apart from other pivotal institutions such as the Planning Commission and Prime Minister's Office along with the ministries of Finance, Local Development, Industry, Home and Foreign Affairs, among others. This is by no means an exhaustive list, as many other government and non-government stakeholders are closely affiliated to environmental governance and management. The actors outside of the government system are even more powerful when it comes to handling environmental issues.

Take the case of disaster management, for example. In Nepal, we still call it "Divine Disaster" or *"Daivi Prakop",* as the law has not yet been changed by the Parliament, thanks to its entanglement with many other issues of 'political importance'. Ministry of Home Affairs is designated as the responsible agency to handle it, but so far it has been looking after rescue, relief, recovery and rehabilitation part only. When it comes to prevention, or dealing with education, awareness, early warning and preparedness, and mobilizing the inter-institutional resources more proactively, we can see that Home Ministry has not been playing its role effectively. Because, not only does it lack a clear mandate to do that, it also lacks resources including knowledge resource and expertise. The other sectoral ministries deal with disasters too, but only within their sectoral mandate, which is far short of what is expected and needed.

For example, my ministry of environment is also supposed to deal with disasters or natural calamities focusing on their prevention, mitigation and adaptation aspects, but only to the extent that they are "climate-induced". This fragmented mandate with scattered resources will certainly weaken accountability, which is critical for any public good or service to be efficiently and effectively delivered to the peoples' doorsteps.

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We can learn from other countries' experiences. India, for example, is handling natural disasters with a properly placed institutional mechanism to ensure inter-agency cooperation and coordination. Called the "National Disaster Management Authority", it is chaired by the Prime Minister himself, and the vice-chair is a former state environment minister of Andhra Pradesh. All the concerned agencies of critical significance are in its board. It is equipped with clear-cut mandate, adequate resources and specified accountability framework. This shows the prominence that this institution has received from the government. Pakistan and many other countries also have created a dedicated, resourceful institution for handling natural calamities.

In our context too, we have drafted an Act, but again, it has been sitting in the Parliament for long. Nobody knows when it will see the daylight, if it will ever see, in view of the political mess we are in. So, until this happens, or until we will have a new legislation that will give birth to a new powerful institution to deal with disasters in a more effective way, we have to use the existing institutional set-up at its best, such as the high-level committees both at the Prime Minister's Office and the Home Ministry, along with a dedicated Division housed within the latter.

Talking about climate change, which of late has become a hotcake of the international community, we have yet to clearly articulate what it means to the people, how it has impacted them and how that impact can be managed in a sustainable way. We have used so many jargons to conceptualize climate change that it seems the real meaning is lost somewhere else. For example, we have not been able to differentiate between what is called 'adaptation' and 'resilience' which are so often used to describe the adjustment of the people to the impact in a more prepared way. More so, we have failed to convey their practical meanings to the common people, especially the women and the marginalized in the remote areas, who actually have been the most vulnerable and most negatively affected.

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That is why the Prime Minister, when he was chairing the Climate Change Council meeting recently, instructed us with these remarks: "You need to demystify the notion of climate change to make it clearly understandable by the common people. You need to de-jargonize the concept first before you are able to explain its causes and consequences to them. Make climate change people-friendly before you intend to make people what you call 'climate-resilient'".

The Prime Minister's assertion contains the truth. Until and unless we make people understand what we are talking about in the name of 'environment', 'climate change', 'sustainability', 'green economy' and many such fads and slogans fed into our development lexicons, we cannot mobilize them to successfully design and implement any commensurate programs. Nepal has surely been a least developed country in the development ranking, but in terms of traditional knowledge and expertise, we are rich. We are a mountain country, responsible but not rewarded for preserving and nurturing the mountain ecosystems on earth, feeding, watering and irrigating the countless downstream communities. We are vulnerable with challenges, but we are also blessed with opportunities. All sub-systems of mountain ecosystems such as water, biodiversity, and other means of people's livelihoods have enriched us in potential, but we need to tap it to the best.

Let's hope we will be able to do it. Let's also hope what Nepal will achieve in areas of environment protection and nature conservation will benefit other countries too, as environment has become not only a cross-sectoral agenda but also a cross-national phenomena. A sincere national initiative needs to culminate into a collective regional resolve before it starts benefitting all the men, women and children of this region. I trust this will happen sooner than later.

I thank you for your kind attention.

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# Keynote Address

Dipak Gyawali[1]

Problems such as those of water, climate change, political reforms etc. are called wicked problems, more so those that induce disasters, because they are difficult to define, and hence pinpoint precisely. Take the example of cleaning the Bagmati River running through Kathmandu: you would think it is a pollution problem and you would not be too mistaken. However, once you begin to address it as such, you quickly discover that it is also a flood plains encroachment problem, a land rights problem, a technology (mis)choice problem, a municipal failure problem, a squatter and vote-bank problem, a religious problem (associated with birth-to-death rituals on river banks) etc. etc. Each of these nested problems is as intractable as the others or the pollution problem you started out to solve. Think of it: if the definition of the problem is so amorphous, you can safely bet that the solutions that will be proposed (by different sets of people and organizations affected by the "problem") will be even more so. How one would handle these different "solutions", or even chose between them, will very often define the nature of the conflicts or social disturbance that would arise as you go along.

Water induced disasters and their management are certainly a wicked problem that need some fairly innovative answers. Comfortable, conventional and textbook knowledge will not help us, because if nothing else, they probably got us into the unsatisfactory mess we are in today. What we need is new knowledge, which by definition will make upholders of conventional knowledge

1 Chair, Nepal Water Conservation Foundation & Former Minister of Water Resources, Kathmandu.

uncomfortable. This "bitter truth" will make institutions set in old ways of doing business especially discomfited and how to handle them is what we would call "policy reform" and that could be the subject of another full lecture. What we need to address here is some of the features of uncomfortable knowledge, especially as they relate to water and water-induced disasters.

As South Asians, we live in a region that is semi-arid. Yes, we do get a lot of monsoon rains, but much of our semi-tropical weather system is one of extremes, much more so than compared to Europe or North America where much of the modern (and shall I add "textbook") knowledge of water management and associated sciences have originated. We have four monsoon months of floods and pretty much drought-like condition for the remaining eight. When rain does fall, if often does so with a normal intensity that, in Europe, would be called "raining cats and dogs". In specific instances, it can have extremely high intensity calling it not rain but "cloudbursts". One such better-studied phenomenon was the instance in the monsoon of 1993 when the precipitation in south-west of Kathmandu was about 450 mm of rain in 24 hours. Nothing much can be done when such an event happens except watch as it washes away houses, bridges, highways and even critical parts of hydroelectric plants – as happened when the penstock of the Kulekhani reservoir hydropower plant was smashed up by a fifteen-ton rock that was loosened and was in the long geological process of getting washed away downstream eventually to the Bay of Bengal. One cannot blame nature for it: she is only behaving as per her "nature", only that perhaps with climate change, she is getting more erratic, and more prone to extreme events such as floods and droughts as a hotter atmosphere seeks to equalize its temperatures and dissipate atmospheric energy across the globe between the warmer tropics and the cooler arctic regions. One instead has to look at society and how she learns and responds to extreme events and also copes with uncertainty and surprises.

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We are often victims of our own myths that drive us. There are two in particular that we should note: one, that we are mesmerized into thinking we are "rich in water resources" and the other that "water is hydropower". Both of them have disastrous policy consequences in Nepal. The first leads us to ignoring drought: we are so rich in water ("second only to Brazil" is a common refrain although we have probably never heard Brazil say we are number one) that drought conditions and how to handle them have never really been part of any serious policy framing. A few years back, the lesser winter monsoon, the one that gives us about twenty percent of our annual precipitation, failed completely. East of Kathmandu in Kavre district which had achieved fame as a region of "white revolution", i.e. a region where livestock rearing and milk production had soared and led people out of poverty, that drought led to the complete drying of springs and other water sources. Farmers first had to sell milk to buy tankers of water (milk is after all a lot of water which buffaloes will not give unless they get some water to drink!), and when that became untenable, they had to sell their buffaloes for 'momos' and subsequently have their sons take the next flight to the Gulf for jobs as laborers. This 'water-induced disaster' did not find much interest in the newspapers, nor much national policy response. They were not "sexy" enough, which leads us to ask a question: are disasters a disaster only when media makes it one?

The second is the myth of "water is equal to hydropower", which propels us into thinking and behaving in a way that stymies proper development of water and its management. There is a pervasive belief in political and policy circles that if we give licenses to the first lot of contractors that flies in from abroad to build megawatts of power plants, we will be rich like the Arab Sheikhs. It is one that ignores the economics of a monopsony market completely and has distorted government policy formulation to absurd ends. The ministry of water resources (now unfortunately balkanized into two ministries of energy and of irrigation for no good reason other than to assure more ministerial berths) has been dominated by hydropower. Flood

control has been sequestered under irrigation and is confined to some embankment building – a purely hard civil engineering construction focus – rather than perceiving the problem under a much broader, holistic and integrated framing for proper policy response.

It leads to a failure to understand the simple South Asian reality that much of the floods that do occur happen not so much because rivers bursts their banks but because the heavy rains that occur outside of the protected "embanked" areas have no way of draining into the rivers and stay waterlogged for months after the monsoon has ended. The fact that more land has gone out of production in India's Kosi command because of permanent water-logging than have come under new irrigation development is a bitter testimony to this fallacious thinking. Nepal, under patterns of conventional thinking that constitutes Nepal-India cooperation, is unquestioningly importing this failed paradigm and can well expect disastrous consequences in the years ahead. When the Kosi embankments failed in Kusaha in Nepal displacing over sixty-five thousand in Nepal and over three million in Bihar in August 2008, it happened when the river had only 60% of the water it normally does in the month. It means that the embankment did not fail because of "too much water" but rather, as uncomfortable truth later ferreted out indicated, because of contractor corruption in shoddy embankment construction.

The same story repeats itself with glacier melting: yes, temperatures are rising in the Himalaya and much more in the high altitudes than in the lower ones; but the higher temperatures in the alpine regions is not so much because of more $CO_2$ in the atmosphere but because of ABC (Asian Brown Cloud) which is the result of brick kilns, dung and agri-residues burning as well as the poor quality diesel and petrol and engine maintenance. This ABC seems to hover as dirty smog at between 1500 to 3000 meters absorbing more sunlight, warming faster and melting more glaciers than the normal temperature rise due to increased $CO_2$. This is

uncomfortable knowledge that has to elicit a newer and more innovative policy response than the conventional, meaning one cannot only point the finger at developed countries for putting all the $CO_2$ into the atmosphere since the start of industrialization.

What I have tried to do so far is to argue that wicked problems such as that related to water-induced disasters need uncomfortable knowledge to address them. The question that needs to be asked now is: what are the kinds of institutional arrangements that foster or encourage the generation of uncomfortable knowledge and which are the ones that stymie such possibilities? Given the kind of uncertainties that climate change has brought about (essentially what climate change is saying is that the future of which we know nothing is not going to be like the past of which we know something), and given that climate change is going to manifest itself through water in various sectors of human endeavours whether they be in health or hydropower, livestock rearing or agriculture, our institutions must be designed in a manner that is more humble and less certitude-driven. It means our choice of technologies too must be simpler and more flexible, and must not lock us into patterns from which we cannot easily move out of when conditions change.

Institutions chose technologies that enhance their worldview and strengthen their way of doing things. Large hydrocracies chose large projects such as high dams and embankment building while community groups organized around the idea of voluntary coming together for a common purpose chose technologies that bring people together. The former gravitates towards cement technologies and high dams, while the latter opts for brushwood dams that farmers get together to build for dry season irrigation but get washed away when the monsoons come. The former is "permanent" while the latter is a "disposable dam" meant to be washed away. The former has not asked the question: how permanent is permanent especially under uncertain climate change conditions? It has seen one concrete dam after another being washed away following unexpected cloudbursts. The latter, while local and cheerful, finds itself under increasing stress

with market expansion and the shortage of voluntary labor. Each has defined a water problem differently and expects to solve it differently. For the former, a dam being washed away is a disaster: for the latter it is a normal state of affairs to be expected every monsoon.

What we should therefore aim for in handling water-induced disasters is not absolute certainty but coping with uncertainty, not rigidity in solutions but flexibility that would allow strategy switching when conditions change. What this means is to opt for institutional arrangements that allow for plural ways of doing business, not a single-minded, one solution and "I am right" mentality. And this is not only a Nepali problem but one that plagues all the hydrocracies in the region. In short, to handle water disasters under an increasingly uncertain climate change regime, what we need to handle such wicked problems is uncomfortable knowledge generated by clumsy institutional arrangements that allow for pluralism in defining the problem and finding many answers, some which may work better than expected and others that may fall by the wayside when attempted. That, and the freedom to indulge in them with self-defined, pluralist "many ten percent solutions" of hydrocracies, private businesses and social activists, incidentally, seems to be the very definition of democracy.

Thank you!

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# Remarks by Mr. Udo Weber[1]

Big environmental issues cannot be solved at a national level. This is an experience we are having for centuries. The big river systems, be it in Europe, in the Middle East or in Asia have always been a connecting element between different people and countries - but they also have often been a major bone of contention (German – French history is a vivid example for this). Regional co-operation is therefore the only reasonable way of addressing environmental cross-border issues.

South Asia has always been – to some extent - prone to disasters, especially to water related disasters. In recent years, the risks and also the worldwide perception of risks, have changed dramatically due to climate change. I therefore wish to elaborate a few points on climate change from a German perspective. Climate change is the definitive challenge of the 21st century. Changes in the climate destroy the basis on which human life subsists; drought, for instance, leads to shortages in food and water. Rising sea levels are already threatening the territories of small island states like The Maldives and vast stretches of coastland as we see in Bangladesh.

Climate change impacts in Nepal demonstrate alarmingly increasing trends. According to a recent OECD report, Nepal's average mean temperature is projected to increase by 1.2 to 3 degrees Celsius in the next 40 to 90 years.

Warming trends will have adverse impact on Nepal's glacial landscapes and also bring the threat of Glacial Lake Outburst Flooding (GLOF). Both these trends cause potential danger in the livelihood and security of billions of people depending on the Himalayan headwaters in the South and East Asian Regions.

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1 Counsellor, Embassy of the Federal Republic of Germany, Kathmandu

Changes in snowfall patterns are already being experienced which pose threats to Himalayan snow accumulation forcing glacial retreats. Dry season run-off of the rivers in Nepal emanating from the Himalayas is now partly reduced, meaning Nepal's largely agricultural economy, hydroelectricity potential and river-bank farming will be under substantial danger in coming years.

However, the international community has to admit that it has not, as things stand, stepped up to the challenge posed by climate change. Global $CO_2$ emissions went up again in 2010, global temperatures are already 0.8°C higher than before industrialization, and sea levels rose twice as fast between 1993 and 2003 as they did in the preceding decade; icebergs and glaciers are melting at record speeds and the big re-insurance companies warn us about an ever increasing number of disaster events.

Germany is aware of how pressing this problem is. We are therefore doing what we can – within our sometimes limited scope – to mitigate it effectively. Thanks to our national reduction measures, we are within the targets which the Intergovernmental Panel on Climate Change recommends for industrialized countries: we intend to reduce our emissions by 40% by 2020 and by 80-95% by 2050. We are also doing our bit to push for ambitious reduction targets within the EU.

At the highest level internationally too, we want to create awareness that we have to act now to tackle climate change. It was under Germany's presidency that the United Nations Security Council, on 20 July 2011, unanimously acknowledged for the first time ever that climate change poses a threat to international security.

The German Government has been assisting countries - in South Asia and worldwide - that are particularly affected by climate change for years. Our partners in developing countries and emerging economies receive support for projects to mitigate and adapt to climate change through German development cooperation under the auspices of the *Federal Ministry for Economic Cooperation and*

*Development* as well as through the International Climate Initiative being run by the *Federal Ministry for the Environment, Nature Conservation and Nuclear Safety*. Between 2010 and 2012, our Government is providing these countries in all regions of the world with a total of 1.26 billion Euro in additional funds for mitigation and adaptation, within the scope of the industrialized countries' fast start finance initiative agreed in Copenhagen in 2009. South Asia has benefited from this initiative with funds for a regional programme with the International Centre for Integrated Mountain Development (ICIMOD) to preserve the biodiversity in the Mount Kailash region. Further funding will be added to this programme in 2012. Other programmes help South Asian countries in the energy sector to build a green economy, reduce green house gas emissions, improve energy efficiency or to preserve its biodiversity.

Parallel to these specific measures, we also need to reach a comprehensive agreement in the international climate change negotiations which encompasses all the big emitters. Only when we finally stop pointing the finger, and create the legal certainty that no country will be at a disadvantage or be able to opt out, can we combat climate change effectively.

As part of the EU, and shoulder to shoulder with many developing countries, small island states and LDCs, Germany is working for a robust, legally binding climate change agreement. That is the only way for us to achieve our common goal of capping global warming at 2°C and so fulfil our obligation to future generations. I am convinced that we cannot afford, economically or otherwise, to hold off combating climate change until its effects become even more drastic.

I am aware the focus of this regional conference goes beyond the issue of climate change. I nevertheless hope, that raising awareness of its international challenge will also contribute to a wider awareness on environmental issues and the need for regional co-operation in general. I therefore appreciate initiatives like this one by

the CSAS and KAS to bring together Government and Civil Society Representatives from the South Asian region for an intensive and open experience of joint learning and discussion.

For this meeting, I wish you all the best and a fruitful exchange.

Thank You!

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# Climate Change and Regional Security

## Water and Disaster Management in South Asia

Major General ANM Muniruzzaman (Retd)[1]

### Introduction

The recent statement of the UN Security Council identifying the impacts of climate change as a threat to international peace and Security is most timely. Climate change has appeared not only as one of the greatest challenges to international peace and security, but also the greatest emerging humanitarian and development challenge of our time. There is a growing realization internationally that climate change is becoming a security issue in many parts of the world.[2] Putting an end to the debate over climate change, the UN Security Council in a presidential statement declared at its meeting on climate change on July 20 that possible adverse effects of climate change may, in the long run, aggravate certain existing threats to international peace and security. Secretary-General of UN, Ban Ki-moon declared that climate change was an "unholy brew" that could create dangerous security vacuums, and that we must address a clear danger that not only exacerbated the threats but was itself a threat to international peace and security. Climate change is now listed as a major task in NATO's revised security strategy.[3]

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1 The writer is President and CEO of Bangladesh Institute of Peace and Security Studies (BIPSS)

2 Militarizing the Climate Change, (2011), ANM Muniruzzaman in an Interview with Isabel Hilton, *The Third Pole*, July 04.

3 Ibid

Climate change acts as a threat multiplier for instability in some of the most volatile regions of the world. Projected climate change will seriously aggravate already marginal living standards in many Asian, African, and Middle Eastern nations, causing widespread political instability and conflict. The matter is thus not one of individually occurring, mono-causal crises and conflicts, but rather one of a great number of destabilizing, mutually amplifying factors.

Climate change induced security threats particularly emanated from water stress and natural calamities have a real crux for the regional security dynamics notably for the South Asian region. The effects of increased climate change most particularly water scarcity, increased natural disasters, food insecurity, loss of livelihood, displacement and migration, loss of marine biodiversity and fisheries that will intensify exiting conflicts and at the same time will draw new lines of conflicts in South Asia like many regions in the world. Effective climate change mitigation and adaption efforts, dialogue and sharing of knowledge and technology and regional mechanisms can diminish climate induced consequences and thereby lessen the likelihood of conflicts in the region.

## Threat Mapping and Security Implications of Climate Change

Climate change induced threats and security implications cover a wide spectrum. A recent scientific assessment presents a worrisome picture. According to the Fourth Assessment Report of IPCC, eleven of the last twelve years (1995-2006) rank among the twelve warmest years since 1850.[4] The 2007 IPCC report predicts temperature rise of 1.1 - 6.4 °C by the year 2100.[5] The number of natural disasters in the

4 IPCC, (2007): Climate Change 2007: Impacts, Adaptation and Vulnerability Exit EPA Disclaimer. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

5 Ibid

world may double during the next 10 to 15 years. Over the past ten years, 3,852 disasters killed more than 780,000 people, affected more than two billion others with a cost a minimum of $960 billion.[6] Major vulnerabilities induced from climatic hazards include human displacement, drinking water shortage, reduced agricultural productivity and food insecurity, loss of livelihood, health hazards, energy crisis, and disaster security.

In different regions with water scarcity, Climate change is worsening water quality and availability. Currently, 1.1 billion people are without access to safe drinking water. 120 million to 1.2 billion will experience increased water stress by the 2020s in South and South East Asia. More than 3.5 million people die each year from water-related disease; 84% of them are children. Nearly all deaths (98%) are in the developing world.[7] This crisis may in turn fuel existing internal or inter-state conflicts and social conflict and it is feared that unresolved water issues could trigger Indo-Pak conflict, which would have unpredictable consequences internationally.

One of the most worrying consequences of climate change is the reduced agricultural productivity and the resultant situation of food insecurity. If global warming rises to 3°C it is likely that the number of people suffering from hunger will increase by 250 million to 550 million. According to German Advisory Council on Global Change, agricultural production from rain-fed agriculture could fall by about 50% in some regions by 2020.[8] Rising food prices could potentially push hundreds of millions of people back into poverty. This situation can undermine the economic performance of weak and unstable

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6 Muniruzzaman, A.N.M. (2011), "Climate change: Threat to international peace and security", *The Daily Star*, August 11.

7 Ibid

8 Miljkovic, A. Environmental Impacts on Human Security and the Potential of Conflict, *Waterwiki.Net,* retrieved form http://waterwiki.net/index.php/Environmental_Impacts_on_Human_Security_and_the_Potential_of_Conflict

states, thereby aggravating destabilization, the collapse of social systems and violent conflicts.

A changing climate affects the essential ingredients of maintaining good health: clean air and water, sufficient food and adequate shelter. Every year, the health of 235 million people is likely to be seriously affected by gradual environmental degradation due to climate change. Climate change is projected to cause over 150,000 deaths annually and almost 45 million people are estimated to be malnourished because of it.[9] Direct economic losses and human casualties of global disasters have increased in recent decades, with particularly large increases since the 1980s. According to Oxfam, developing countries will require at least $50 bln. annually to adapt to unavoidable climate change-related disasters.[10]

The impacts of climate change may damage key energy infrastructures, such as energy plants, energy routes, nuclear installations, and consequently destabilize public order. For instance, the recent earthquake in Japan caused an explosion in the Fukushima nuclear plant, causing human casualties and disruption to energy production. The decline in hydroelectric power generation may additionally reinforce competition and conflicts over fossil energy sources. Climate change could potentially trigger large-scale displacement and migration from one region to another. The 2001 World Disasters Report estimated that there were currently 25 million

9 Global Humanitarian Forum, (2009), The Anatomy of a Silent Crisis, Human Impact Report on Climate Change, Geneva, retrieved form http://books.google.com.bd/books?id=4XjGa2E51G8C&printsec=frontcover#v=onepage&q&f=false

10 Oxfam (2007), From Weather Alert to Climate Alarm, Oxfam Briefing Paper, 108, November, retrieved from http://www.oxfam.org/sites/www.oxfam.org/files/climate%20alarm.pdf

"environmental refugees."[11] It is estimated by IPCC that by 2050, 150 million people could become climate refugees, being displaced by sea level rise (SLR), desertification, increasing water scarcity, floods, storms, etc.

Climate change also has hard security dimensions. Climate-induced insecurities can trigger interstate tensions and conflicts. States may be stressed to the point of collapse. The potential for regional conflicts due to climate induced condition will be extremely high. Radicalization and terrorism may increase in many developing societies, particularly in South Asia, due to the climate-induced social and economic deprivation. When a government can no longer deliver services to its people, conditions are ripe for extremists and terrorists to fill the vacuum. Resource scarcity could be a contributing factor to conflict and instability. The 1994 genocide in Rwanda was in many ways a consequence of squabbles over agricultural resources. The 1974 Nigerian coup resulted largely from an insufficient response to famine. The situation in Darfur, which had land resources at its root, is spilling over into neighbouring Chad. The United Nations estimates 300 potential conflicts over water exist around the world today.[12]

### Water Stress Induced Security Implications in South Asia

South Asia is known to be the most climate change affected and disaster prone region in the world supporting a huge population of more than 1.58 billion[13]. Water is the issue in the region that is affecting human security such as safe drinking water, water related hazards and also aggravating potential military conflicts particularly between India and Pakistan. Major regional security implications

11 Walter, J. (eds), (June 2001), World Disasters Report 2001: Focus on Recovery, International Federation of Red Cross and Red Crescent Society.

12 Muniruzzaman, A.N.M. (2011), op cit.

13 2010 estimate, according to the World Bank Report released in 2011

induced from the water stress include decreased water availability and water quality in many arid and semiarid regions, an increased risk of floods and droughts in many regions, reduction in water regulation in mountain habitats, increased incidence of waterborne diseases such as malaria, dengue, and cholera, decreased agricultural productivity, adverse impacts on fisheries, adverse effects on many ecological systems, decreased reliability of hydropower and biomass production, and importantly increased damages and deaths caused by water related extreme weather events.

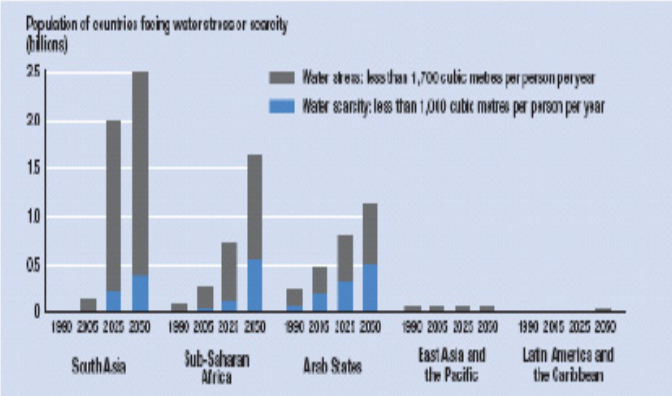


Figure 1: Projected Stress in Water Availability (2025-2050)[14]

Climate change increases the variability of water supply in South Asia, leading to floods during some parts of the year and droughts in others. Increasing water shortages relative to population growth are putting the Indus Basin irrigation and drainage system in danger of collapse. 120 million to 1.2 billion will experience increased water stress by the 2020s in South and South East Asia.[15] Water availability on per capita cubic metre basis in the Himalayan River Basins is likely to decline from 7320 to 5700 in case of Bangladesh in 2030, from 8500 to 5500 in case of Nepal and from 1730 to 1240 in case

14 HDR, 2006

15 IPCC, (2007), op cit.

of India.[16] The report assessed implications of the likely decline 275 Billion Cubic Meters (BCM) renewable fresh water in India, Nepal, Bangladesh and China by 2030 for food security, health, migration, bio-diversity, social stability and interstate relations in the region.[17]

### Indus River Basin and Impacts of Himalayan Glaciers Melting

The Himalayan range contains high altitude glaciers that supply water to many rivers in Asia. These rivers provide water to more than half of the world's population. Many people in Asia are dependent on glacial melt water during dry season. Accelerated glacial melt questions the very perennial nature of many of the Himalayan flowing rivers. This is likely to have huge implications on those dependent on the resource affecting water availability for agricultural purposes.[18] Glaciers in the Himalayas are receding faster than in any other parts of the world. In Northwest China, 27% of the glacier area will decline by 2050 (equivalent to an ice volume of 16,184 km3), as will 10 to 15% of the frozen soil area.[19] IPCC made a forecast that if current trends continue, 80% of Himalayan glaciers will be gone in 30 years.[20] The current trends of glacial melt suggest that the Ganges, Indus, Brahmaputra and other rivers across the northern Indian plain

16 Strategic Foresight Group, The Himalayan Challenge Water Security in Emerging Asia, With support from John D. and Catherine T. MacArthur Foundation, retrieved from www.strategicforesight.com/Himalayan%20Challenge%20ES.pdf

17 Ibid

18 UNDP (2008), South Asian Regional Study on Climate Change Impacts and Adaptation: Implications for Human Development, *Human Development Report 2007/2008:Fighting climate change: Human solidarity in a divided world,* retrieved from http://hdr.undp.org/en/reports/global/hdr2007-2008/papers/ Kelkar_Ulka%20and%20Bhadwal_Suruchi.pdf

19 Singh, C. P. (2008, December) Alpine Ecosystem in Relation to Climate Change, *ISG Newsletter*, 14:1-4.

20 IPCC, (2007), op cit.

could likely become seasonal rivers in the near future.[21] This poses a challenge for reducing the vulnerability of the more than 1.3 billion people living in the major river basins downstream from the Hindu Kush-Himalayan region. The rapid retreat of the Himalayan glaciers has consequences for water-related hazards, such as glacier lake outburst floods, and for water stress, as a result of the decline in fresh water supplies during the lean season.[22] The conflict potential emanating from the melt-down of Himalayan glaciers underlies the factors leading to cross-border water-related conflicts such as per capita water availability, the level of water withdrawals for annual use in relation to its availability, and the extent of dependence on water resources that flow in from the borders.

### Food Insecurity Caused by Water Scarcity

In South Asia, reduced agricultural productivity, due to the decreasing water availability and water related natural catastrophes, is one of most worrisome consequences of water stress. In the next 20 years, China, Nepal, India and Bangladesh in the Himalayan sub-region will face the depletion of almost 275 billion cubic meters (BCM) of annual renewable water.[23] The agricultural sector will continue to be the major consumer of water in China, Nepal, India and Bangladesh; although the industrial and domestic sectors will

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21 Eriksson, M. et al. The Changing Himalayas, Impact of climate change on water resources and livelihoods in the greater Himalayas International, *International Centre for Integrated Mountain Development*, Kathmandu; retrieved from http://books.icimod.org/uploads/tmp/icimod-the_changing_himalayas.pdf

22 Ives, Jack D. Shrestha, Rajendra B. and Mool, Pradeep K. (2010, May). Formation of Glacial Lakes in the Hindu Kush-Himalayas and GLOF Risk Assessment, *International Centre for Integrated Mountain Development, Kathmandu*; retrieved from, http://www.unisdr.org/files/14048_ICIMODGLOF.pdf

23 Strategic Foresight Group, The Himalayan Challenge Water Security in Emerging Asia, op cit.

also need more water in the future. The crop yield will drop by 30-50% in the case of all the four countries by the middle of the century.

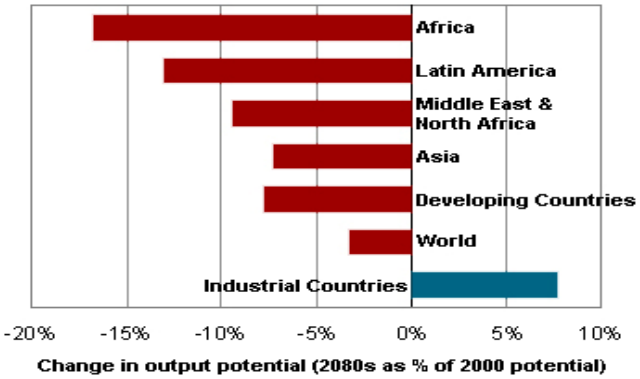


Figure 2: Climate change impact on agriculture output potential
Source: Earth Trends, 2008

Agriculture accounts for almost 90% of the water usage in India, but this will decline to 70-75% by 2050.[24] Nepal and Bangladesh presently use more than 95% of their water for agriculture and will continue to do so until 2030. According to the Ministry of Agriculture and Cooperatives, Nepal will have a food deficit of more than 316,465 tonnes in 2010, owing to the unfavorable monsoon.[25] With changing weather patterns, erratic monsoons and rising temperatures, the 'too much water, too little water' syndrome is likely to continue in Nepal. Reports from the "China Daily" indicate that the 1995 grain harvest in Shandong province declined by 2.7 million tons (food for 9 million people) due to water failures of the Yellow River.

## Hydro-Conflict Emanating from Quarreled River Management

Political and community boundaries are something that water flow ignores at large as decisions in one place affect water use elsewhere.

24 Ibid

25 Ibid

In the case of shared river basins, water use upstream can affect downstream quality and quantity, thus creating the potential for conflicts of interest.[26] Water- related issues led to interstate tensions and significantly hampered development, such as along the Nile, Euphrates, Indus and Ganges rivers. In South Asia, the potential hydro-conflict is more severe than many parts of the world. India is hurtling water by building expensive hydroelectric dams in a remote valleys of India controlled Kashmir.[27] India being rapidly growing but with a power-starved economy, plans to build many more dams over the next decade. There are concerns over the Indus Waters Treaty that was concluded in 1960 that sets out the legal framework for the sharing of the waters of six rivers: Indus, Chenab, Jhelum, Sutlej, Beas, and Ravi- flow through northern India into Pakistan.

But the concern is growing in Pakistan that India is controlling the water flow of the Indus, Chenab and Jhelum rivers that pass through India's Jammu & Kashmir state.[28] Since Indus provides water to over 80 percent of Pakistan's 54 million acres of irrigated land, dam and water withdrawal by India will cause desertification and have devastating impact on Pakistan's agricultural productivity leading to wide scale food insecurity in Pakistan. Water withdrawal and dam construction by India is the potential source of bilateral tension and conflict. Pakistan fears that India can make the country solely dependent on India in terms of war and can create draught or famine during a crucial time like war. The level of securitization went to the stage of nuclear redline with the warning from Pakistan.

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26 Priscoli, J. D. Case Study of River Basin Organizations, Institute for Water and Water sheds, retrieved from http://www.transboundarywaters.orst.edu/research/ case_studies/River_Basin_Organization_New.htm

27 Polgreen, Lydia and Tavernise, (2010, July 20), Sabrina Water Dispute Increases India-Pakistan Tension, *The New York Times*.

28 Wellen, Russ, (2011, December 13), Will Pakistan Counter India's "Water Bomb" With a Nuclear Bomb? *Foreign Policy in Focus,* http://www.fpif.org/blog/will_pakistan_counter_indias_water_bomb_with_a_nuclear_bomb

Afghanistan plans to build 12 dams on the Kabul River with a combined storage capacity of 4.7 million acre-feet, which Pakistan frets will further diminish the Indus water supply.[29]

Bangladesh and India also have unresolved disputes over water sharing of common rivers. Bangladesh shares 54 rivers with India, but it has agreement for only one river. From 1974, India started unilateral diversions of water from Ganges River after the construction of Faraka Barrage. The Ganges Water Treaty which was concluded for 30 years in 1996 is not implemented rightly because of Indian unilateral withdrawal. There is a perception that India is violating clauses of the Treaty by supplying more during the season that cause flood and less in dry season resulting in draughts. Major impacts of this withdrawal include saltwater intrusion, vegetation damage, erosion, reduced conveyance capacity, disrupted fishing. In addition, the construction of Tipai Mukh Dam, disagreement over water sharing agreement for Teesta River and plan to start a country wide river linking project will significantly increase tension between the two countries.

### Water Stress Implications for Bangladesh

Bangladesh is predicted to be one of the worst victims of climate induced insecurities. The IPCC statistics shows that rising sea levels will wipe out more cultivable land in Bangladesh than anywhere in the world. By 2050, rice production is expected to drop 10 percent and wheat production by 30 percent.[30] About 20 to 30 million people in Bangladesh alone could be on the move by 2050 because of climate change, causing the worst migration in human history.[31] Flood is the most frequent and most intense natural disaster in

29 Daly, John (2011, 10 December) Pakistani Editorial Says Nuclear War with India "Inevitable" as Water Dispute Continues, *the Journal of Turkish Weekly*.

30 IPCC, (2007), op cit.

31 UnB Dhaka, (2009, December 2), Climate Change Impacts: 1.5cr people to be displaced in Bangladesh by 2050, *The Daily Star*.

Bangladesh. Every year, thousands of people suffer from loss of shelter, property and also agricultural products from flooding due to heavy rain. Miller states that high projected rise in sea level of about 88 cm (35 inches) would flood agricultural lowlands and deltas in parts of Bangladesh.[32] Sea level rise will increase flood frequency and flooding duration, affecting Aman production.[33] Flood which ravaged the southwestern part of Bangladesh in 2000 caused damage or losses of at least US$500 million in terms of crops, fish farms, property and infrastructure. The shrimp sector was the most affected, losing shrimp fields of equivalent US$230 million[34].

Major impacts of sea level rise on water resources in Bangladesh are fresh water availability reduction by salinity intrusion. Both water and soil salinity along the coast will increase with the rise in sea level, destroying normal characteristics of coastal soil and water. A water salinity map for the period of 1967 and 1997 produced by Soil Resources Development Institute shows that the problem is already on the way[35]. Soil of Jessore, Magura, Narail, Faridpur, Gopalgonj and Jhalokati was newly salinized in 24 years of time expansion.[36] A one meter sea level rise will expand the soil and water salinity area at a faster rate. In Bangladesh, sea level rise and salinity intrusion decreases agricultural production by unavailability of fresh water and

32 Miller, G.T., (2004). *Living in the Environment*. USA: Brooks/ Cole-Thomson Learning.

33 Sarwar, G. M. (2005), Impacts of Sea Level Rise on the Coastal Zone of Bangladesh, Lund University International Masters Programme in Environmental Science, LUMES, Lund University, Sweden, 21 November. Retrieved from http://static.weadapt.org/placemarks/files/225/golam_sarwar.pdf

34 CNN, 2000

35 SRDI, (1998). Coastal area and water salinity map of Bangladesh (1967 and 1997), Soil Resources Development Institute (SRDI), Dhaka.

36 Ibid

soil degradation.[37] For example, loss of rice production in a coastal village of Satkhira district in 2003 was 1,151 metric tons less than the year 1985, corresponding to a loss of 69 percent.[38]

The spread of water borne diseases in the coastal areas is another worrisome consequence of climate induced natural disasters. Almost one in five people in Bangladesh still lack clean water making them susceptible to water borne diseases like Anaemia, Arsenicosis, Cholera, Diarrhoea, Hepatitis, Malaria, Schistosomes, Typhoid and so on. With the increased density and distribution of salinity, cholera germs are getting favorable habitat and spreading in the coastal area. Most major epidemics that have occurred during the last 50 years originated in coastal region. Besides, arsenic contamination in the ground water of Bangladesh is another crucial concern for the country. World Health Organization described the arsenic contamination in Bangladesh as "the largest mass poisoning of a population in history". Half of Bangladeshis, up to 77 million people, have been exposed to the toxic arsenic.[39]

Water related natural disasters is the most striking vulnerability for Bangladesh. Every year, natural calamities disturb people's lives in one part of the country or the other. Major disasters concerned here are the occurrences of flood, cyclone and storm surge, flash flood, drought and riverbank erosion. Although this country with monsoon climate has enough rain, droughts frequently take a significant portion out of the agricultural economy of Bangladesh, and cause hunger, instability, and insecurity.[40] For instance, between

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37 Rashid, M.M, Hoque, A.K.F., Iftekhar, M.S., (2004). Salt Tolerances of Some Multipurpose Tree Species as Determined by Seed Germination, Journal of Biological Sciences 4 (3), pp.288-292

38 Ali, A., (2000). Vulnerability of Bangladesh Coastal Region to Climate Change with Adaptation Option. Bangladesh Space Research and Remote Sensing Organization (SPARRSO), Dhaka.

39 According to a statistics of the British Medical Journal "The Lancet"

40 UNEP (2001), Bangladesh: the Stare of the Environment 2001 Report

1991 and 2000, 93 major disasters were recorded in Bangladesh, resulting in nearly 200,000 deaths and causing US $ 5.9 billion in damages with high losses in agriculture and infrastructure.[41]

### Disaster Security and Management in South Asia

South Asia is extremely vulnerable to natural disasters, with more than 900 events reported since 1970 alone. Between 1990 and 2008, more than 750 million people—50 percent of the population in the region—were affected by at least one natural disaster, leaving almost 230,000 deaths and about US$ 45 billion in damages.[42] Since 1970, the number of reported natural disasters in the region has been rising steadily.

| Country | Population[56] ('000) | Deaths ('000) | People Affected ('000) | Population Affected (%)[57] | Damage (US$millions) |
|---|---|---|---|---|---|
| Afghanistan | 22,615 | 6.1 | 5,410 | 23.9 | 69,060 |
| Bangladesh | 143,990 | 155.3 | 145,713 | 101.2 | 12,984,000 |
| Bhutan | 602 | 0.2 | 66 | 11.0 | 3,500 |
| India | 1,071,608 | 53.4 | 885,244 | 82.6 | 25,743,100 |
| Maldives | 279 | 0.0 | 2 | 0.7 | 500,100 |
| Nepal | 25,278 | 4.6 | 2,796 | 11.1 | 245,100 |
| Pakistan | 162,662 | 9.4 | 27,943 | 17.2 | 3,573,054 |
| Sri Lanka | 19,258 | 0.5 | 6,331 | 32.9 | 1,670,070 |
| **Total** | **1,368,327** | **229.5** | **1,073,504** | **78.5** | **44,787,984** |

*Source:* Emergency Events Database (EM-DAT: The OFDA/CRED International Disaster Database) (http://www.em-dat.net) and United Nations World Population Prospects (http://esa.un.org)

Table 1: Reported Natural Disaster Impacts in South Asia (1990–2008)

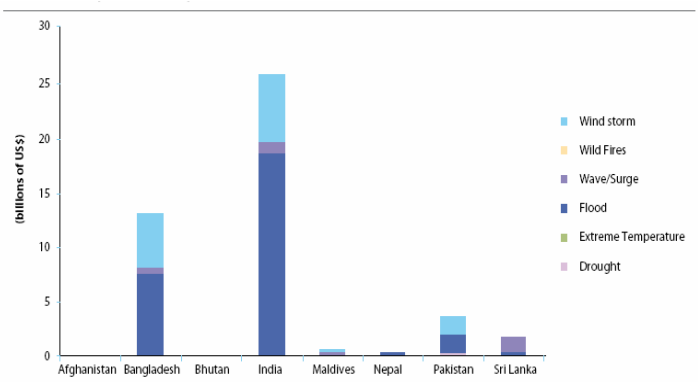
Major impacts of natural disasters in South Asia include: human casualties and damages of properties from extreme weather events; loss of shelter, large-scale displacement outbound migration; water-logging and human sufferings from large-scale flooding; loss of agricultural production due to flood and drought; adverse impacts on fisheries; increased incidence of diseases such as malaria, dengue,

41 Statistics of the Ministry of Environment and Forest, Bangladesh

42 World Bank Report, South Asia: Shared Views on Development and Climate Change.

and cholera; pressure on scarce resources, resource competition and from social instability to violent conflicts; trans-boundary migration and interstate tension and conflicts; damage of critical infrastructure-nuclear plants, energy pipelines and so on.

Areas and populations that face the highest risk from natural disasters are located in Bangladesh and Nepal. According to the recently published 2011 World Risk Report, countries like Bangladesh, India, Nepal and Pakistan exhibit a high level of vulnerability as demonstrated by their lack of coping capacities and adaptive capacities.[43] In September, 2011, a 6.9-magnitude earthquake in Nepal's Kathmandu Valley displaced 12,301 people and killed six people. There are growing fears that if the country's capital, Kathmandu, home to two million inhabitants, is to experience a devastating earthquake – like the 8.0-magnitude quake that occurred 77 years ago killing more than 225,000 people – and is not prepared.[44]




*Source*: Emergency Events Database (EM-DAT: The OFDA/CRED International Disaster Database) (http://www.em-dat.net).

**Figure 3: Reported Costs of Damage in South Asia by Country and Disaster Type (1990–2008)**

43 Searchlight South Asia, available at http://urbanpoverty.intellecap.com/?p=388

44 Searchlight South Asia, available at http://urbanpoverty.intellecap.com/?p=388)

## Flooding: Cases of Pakistan and Bangladesh

Flood is the most frequent and intense natural disaster in South Asia. For instance, the 2010 Pakistan floods began in late July 2010, resulting from heavy monsoon rains in the Khyber Pakhtunkhwa, Sindh, Punjab and Baluchistan regions of Pakistan and affected the Indus River basin. Approximately one-fifth of Pakistan's total land area was under water, approximately 796,095 square kilometers (307,374 sq mi). According to Pakistani government data, the floods directly affected about 20 million people, mostly by destruction of property, livelihood and infrastructure, with a death toll of close to 2,000.[45]

| Event | Impact |
|---|---|
| 1954 floods | Affected 55% of country |
| 1974 flood | Moderately severe, over 2,000 deaths, affected 58% of country, followed by famine with over 30,000 deaths |
| 1984 flood | Inundated 52,520 sq-km, cost estimated at US$378 million |
| 1987 floods | inundated over 50,000 sq-km, estimated damage US$ 1.0 billion, 2055 deaths |
| 1988 floods | Inundated 61% of country, estimated damage US$ 1.2 billion, more than 45 million homeless, between 2,000-6,500 deaths |
| 1998 floods | 1,100 deaths, inundated nearly 100,000 sq-km, rendered 30 million people homeless, damaged 500,000 homes, heavy loss to infrastructure, estimated damage US$ 2.8 billion |
| 2004 floods | Inundation 38%, damage US$ 6.6 billion, deaths 700, affected people nearly 3.8 million |

Table 2: Impacts of Major Floods in Bangladesh

Every year in Bangladesh, thousands of people suffer from loss of shelter, property and also agricultural products due to flooding caused by heavy rain. Miller states that high projected rise in sea level of about 88 cm (35 inches) would flood agricultural lowlands and deltas in parts of Bangladesh.[46] Sea level rise will increase flood frequency and flooding duration, affecting Aman production.[47] Flood which ravaged the southwestern part of Bangladesh in 2000 caused

45 According to the estimate of Pakistan-flood.info available at http://pakistan-floods.info/

46 Miller, G.T., (2004). *Living in the Environment*. USA: Brooks/ Cole-Thomson Learning.

47 Sarwar, G. M. (2005), op cit.

damage or losses of at least US$ 500 million to crops, fish farms, property and infrastructure.

### Exposure to Natural Disasters: Bangladesh Scenario

Bangladesh is most vulnerable to occurrences of flood, cyclone and storm surge, flash flood, drought, tornado, earth quake, riverbank erosion, and landslide. These extreme natural events are termed disasters when they adversely affect the whole environment, including human beings, their shelters, or the resources essential for their livelihoods. Cyclone and storm surges occur frequently and cause significant destruction in the coastal areas of the country. Tropical cyclones and tornadoes uproot trees, telephone, telegraph and electricity lines, destroy bridges, culverts, and houses, kill people and domestic animals, leaving serious and adverse effects on the economy as well as on the whole environment. Although this country with monsoon climate has enough rain, droughts frequently take a significant portion out of the agricultural economy of Bangladesh, and cause hunger, instability, and insecurity.[48] For instance, between 1991 and 2000, 93 major disasters were recorded in Bangladesh, resulting in nearly 200,000 deaths and causing US $ 5.9 billion in damages with high losses in agriculture and infrastructure.[49]

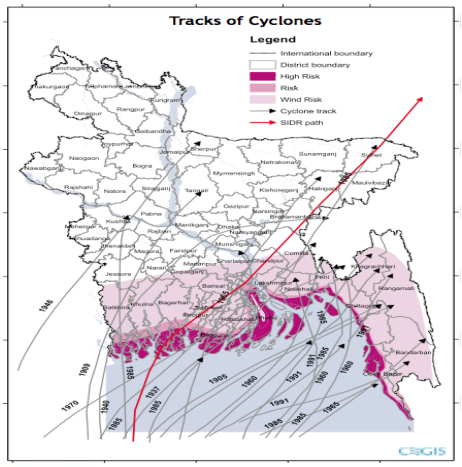
### Disaster and Trans-boundary Migration and Conflict in South Asia

Climate change induced migration is going to be an acute condition in South Asia. Major disasters-flood, earthquake or cyclone may induce massive trans-boundary migration. One of the riskiest places to live is in low-elevation coastal zones. Worldwide, the largest populations living on low-lying coasts are in the Asia-Pacific, in countries like China, India, Bangladesh, Vietnam, Indonesia and The Philippines. It is estimated that by 2050, 150 million people could be

48 UNEP (2001), Bangladesh: the Stare of the Environment 2001 Report

49 According to the statistics of the Ministry of Environment and Forest, Bangladesh

displaced by climate change related phenomenon like desertification, increasing water scarcity, floods and storms etc.[50] Besides, large-scale migration will add extra pressure on the scare resources in the society and thereby heighten competition and conflict over resources. Intra-regional forced migration, such as those from Bangladesh to India is subject to stimulate bilateral tensions.




**Human Exposure**

Modelled number of people present in hazard zones that are thereby subject to potential losses.

Absolute human exposure

| | Average people exposed per year | Country |
|---|---|---|
| 1 | 22,548,120 | Japan |
| 2 | 16,267,090 | Philippines |
| 3 | 9,933,174 | China |
| 4 | 7,607,821 | India |
| 5 | 6,507,695 | Taiwan, prov. of China |
| 6 | 4,641,060 | Bangladesh |
| 7 | 3,573,351 | United States of America |
| 8 | 2,083,071 | Korea (Rep. of) |
| 9 | 1,885,541 | Madagascar |
| 10 | 872,234 | Viet Nam |
| 11 | 867,976 | Myanmar |
| 12 | 629,325 | Mexico |
| 13 | 602,264 | Dominican Republic |
| 14 | 488,556 | Cuba |
| 15 | 423,511 | Hong Kong |

Legend:
Tropical Cyclones (Saffir-Simpson categories)
Cat1 Cat2 Cat3 Cat4 Cat5

**Figure 4 and 5: Human Exposure and Tracks of Cyclones in Bangladesh[51]**

50 IPCC, 2007, op cit

51 Cyclone Hazard Profile, Prevention Web, available at http://www.preventionweb. net/english/hazards/statistics/risk.php?hid=58

## Regional Cooperation Framework: The Way Ahead

In order to reduce the regional security ramifications, South Asia is strongly in need of collective endeavors and efforts. Regional cooperation is bound by certain common grounds. Most of the victim countries in South Asia are interlocked by common geography and geology, having many climate induced vulnerabilities. Natural disasters do not respect national boundaries. For instance, all major floods have their origin and consequence beyond one single country and also earthquake in the Himalayas are likely to affect more than one country. Hence, countries have collective interest in water sharing, disaster management and cooperation.

Existing regional mechanisms for that end include South Asian Association for Environmental Cooperation; South Asia Cooperative Environment Programme (SACEP); South Asia Environment Outlook (SAEO); SAARC Natural Disaster Rapid Response Mechanism and so on. Though these mechanisms exist, they hardly function. To fight effectively with the menaces of water stress and natural disasters, regional cooperation framework should include-

- adoption of regional policy to reduce common environmental degradation
- enhanced political and economic cooperation
- legal regimes and institutional framework
- regional environmental adaptation and mitigation plan
- documentation and sharing of data, lessons from good practices
- a common meteorological greed
- wider dialogue among all the stakeholders in the region

*Specific recommendations on water management:-*

- regional framework for water pollution control and sustainable and renewable use of water resources

- improved ground water management and river basin preservation
- regional common policies for dam construction and water withdrawal
- regional legal convention on water sharing
- bilateral water sharing and trans-border river management agreements based on regional and international legal standards
- common regional plan for handling Himalayan glacier melting

*Specific recommendations on disaster management:-*

- sustainable management: not relief but resilience
- regional disaster management strategy
- regional early warning systems
- strengthen regional and national response mechanisms
- establish a regional information sharing mechanism
- develop and implement Disaster Management training, education, research and awareness programmes
- common flood control and management mechanism
- strategic coordination between the disaster risk- management and the climate-change agendas
- develop network of institutions and organizations
- apply the ICT for disaster management

## Conclusion

Climate change induced implications are looking more and more unpredictable causing more frequent and intense natural disasters and creating new lines of vulnerabilities and conflicts in developing countries like Bangladesh. At this juncture, it is crucially important to recognize that climate change is pervasive and has more security

implications than any other threat today. Climate-induced challenges should be placed at the core of security considerations in a rapidly changing world. Hence, effective international cooperation, as advanced by the UN Security Council, should be formed to address the unpredictable security consequences of climate change.[52]

Mitigation and adaptation responses must go hand in hand. Just because we are adapting, does not mean we can stop mitigation efforts. But in some areas of the world, for example in Bangladesh, we are beyond mitigation because the negative impacts of climate change are already being felt and will become severe in the coming years. We must start building up our capacity to respond immediately. The symptoms of climate change are very clear, so we must prepare for the worst now.[53] Besides, the governments should initiate capacity building of the states, military and the coastal community along with adopting national and regional policy framework, building public awareness, sharing and exchange of knowledge, information, technology and expertise. Strengthening and enacting of legal regimes, and increasing the role of international organization should be prioritized. Above all, political will and cooperation among the political actors must be in the frontline to fight against climate change driven social and political ramifications in the foreseeable future.

52 Muniruzzaman, A.N.M. (2011), op cit.

53 Militarizing the Climate Change (2011), op cit.

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# The Natural Order: People's Faith and Environment Management in Bhutan

Sangay Thinley and Dendup Chopel[1]

**Abstract**

After centuries of uninterrupted peace, stability and prosperity, Bhutan woke up to the changed realities of the world after a series of natural disasters struck, bringing untold destructions and with it, a feeling of insecurity, uncertainty and anxiety among the Bhutanese people. This paper will try to briefly deal with the sense of security that the Bhutanese drew (and continue to draw) from their sustained faith in the power of the natural order that has been embedded in the country's long Buddhist and naturalist traditions. The paper will also deal with how this belief in striking the right balance of the natural order resulted in the country's unique conservation efforts. A study of the country's largely intact natural environment will show that a small effort on the part of an individual nation can indeed show the way forward for the rest of the world. Unfortunately, such initiatives has its limit and the paper will show how Bhutan is now becoming an unwitting victim of the thoughtless destruction of the natural world elsewhere driven by an uncontrollable greed that seems to catch up everyone. Though taken off guard in the beginning, this analysis goes on to show that Bhutan has indeed not only recovered from these jolts, but is now in the process of taking systematic safeguards against future disasters by constantly drawing upon its deep seated faith. In conclusion, the paper gives empirical evidence on the state of

1 Researchers, Centre for Bhutan Studies, Thimpu.

Bhutanese ecology based on fresh new data that were the result of the second Gross National Happiness survey.

## Introduction

On 27th July, 2009, a group of eight boys left their homes and went out on what was an unusually bright sunny day for what they thought was just a regular day out **(**Kuensel, 2009). Little did they know what was in store for them. The boys crossed the Wangchhu[2] and ventured on through the vegetation on its other bank. The river was then just waist high and used to wading through such water, they passed through without any difficulty. After they had had their fill of fun, they returned. However, as soon as they reached the river, the sky turned sour and there was a heavy monsoon downpour. Before they could cross, the river swelled and the first signs of panic showed on the boys. It was then that oldest among them decided to take matters in his hand. After asking his younger peers (his own little brothers included) to stay back while he got help from people across the river, he swam across. True to his words, the boy returned with a few men from the town[3]. It was then that the boy along with the rescuers saw, to their horror, the seven little boys stranded in the middle of the already swollen river. The rain fell steadily and the boys clung onto a slippery boulder in the middle of the river.

There was no time to waste, but the people on site were helpless against the wrath of nature. They thus called for help from the people from the settlement above who in turn informed the district headquarter. Within half an hour, a team of police rescuers came to

2 This tragic incident took place in the district of Chukha in south western Bhutan through which this river flows. During the course of its passage through the place, two dams for the country's oldest and biggest (Chukha and Tala respectively) hydropower plants are built. Parents of most of these boys worked for the projects.

3 The location of this incident was in a deep gorge below the settlement of Wangkha, a distance of 16 km from the district headquarter. The time needed to get to the town and return was roughly an hour.

the site. They threw ropes and mobile phones in plastic bags to the stranded children who caught hold of both items. Message was passed to the boys to tie themselves to the rope. It was in those times of despair that a call for help was sent to the management of the Chukha hydro power project to hold up the water in their dam so that the flow downstream could be controlled. However, all this while, the rain kept pounding without any sign of letting up. Night fell by the time officials including the head of the district administration reached the spot. As the rescuers were able to do hardly anything more than witness the scene as helpless spectators, the agitated children's cries for help became more desperate. Hours passed by, and finally the project authority had to take a call on the dam's steadily rising water level which was now at the point of bursting. The rest is history. All seven boys were washed away.

This single incident when a whole team of rescuers, however ill-prepared they were, failed to rescue even a single boy in seven excruciating hours inevitably raised a lots of questions about Bhutan's preparedness to face up to such challenges. The call to step up the country's disaster management abilities grew as the incident also proved in the most tragic way the increasing unpredictability of nature. As it was, the incident came just after the most devastating cyclone induced flooding that country had seen in recent times. It became clear that in this world of high exploitation and degradation, no one was spared of nature's vengeance.

However, before we proceed any further, we must now take into account the country's historical and religious underpinnings. It then becomes clear that the steadfast adherence to the country's highly regarded value systems have ensured relative stability and prosperity in Bhutan. Calamities in Bhutan were far and few in between that they were considered almost non-existent. However, somewhere along the line, this good fortune has lead to a sense of complacency that might have caused this whole debacle.

## Bhutan: A country profile

Bhutan's recorded history dates back to the eighth century when the Indian saint Guru Padmasambhava came to country on invitation of a local king. It is said that through the display of his grandeur in restoring the health and prosperity of the King, the whole of the kingdom became his field of conversion (Aris, 1979)[4]. Buddhism was introduced with all of its accompanying value systems among the people. However, it was not until the seventh century that Bhutan emerged as a unified state (Adrussi, 2005). The charismatic Tibetan religious hierarch Zhabdrung Ngawang Namgyel introduced a system of dual religious and secular rule which stressed the wellbeing of all sentient beings[5].

After 1907, however, a succession of enlightened Monarchs took over the country's affairs and introduced unprecedented security, stability, peace and prosperity (Ura, 2010). Every facet of governance was aimed at promoting wellbeing. With a strong Buddhist underpinning, the state's responsibilities extended to overseeing all

4 Among his many remarkable deeds, Guru Rinpoche is particularly renowned for assimilating elements of nature worship into Buddhism as a means of placating the strong Bon opposition to the spread of Buddhism in Tibet. Though it may be considered by puritans as a corruption of the doctrine, its many benefits included not only the acceptance of the new religion by the Tibetan masses but it also ensured the carryover of a sophisticated system of living in harmony with the various elements of the natural world. Thus, in Bhutan, people came to believe in an existence that were in accord with understanding the ways of nature. This fact could, without much exaggeration, be contrasted against the rather egoistic presumptions of the western world which believed nature was hardly anything more than their fiefdom of which they should take command.

5 The first state laws introduced in the country were credited to him or his lineage holders. In these laws, provisions were made for the protection and sustainable use of the bounties of nature. These could possibly be considered amongst the very first modern legislations on environment (Aris, 1986).

life forms. Thus, with a strong emphasis on harmony, the country achieved its prosperity without putting at stake its environment. Indeed, in about a century's rule of Monarchy, Bhutan grew so used to peace and security that it was almost unimaginable that anything bad could befall the country.

With only about 700,000 people, Bhutan's generous total land area of 39,500 provide ample livelihood. Bhutan today enjoys one of the highest per capita in the region at USD 2,277 (NSB, 2011). On the back of its strong hydropower and tourism sector, Bhutan's economy continues to see a strong growth[6]. In all respects of human development, Bhutan continues to see strong improvement[7].

## The belief in the natural order

Faith in Bhutan can be of two distinctive origins though they can only be briefly touched upon here for the sake of brevity (for details, see RSPN, 2006). Broadly speaking, the Bhutanese worldview is shaped in equal measures by its Buddhist faith and the pre-Buddhist naturalist traditions which have remained entrenched in the Bhutanese societal make-up even though Bonism from where they derive has largely been replaced.

The Buddhist concern for environment in turn is again twofold. First of these is the Buddhist philosophical consideration for all life forms. Buddhism regards all sentient beings (which in Buddhism implies even such things as vegetation) as being in a cyclical order of existence where each of them are dependent or are a consequence of the other. Thus, it is famously proclaimed that in our unceasing

6 The average growth rate of the economy for the year 2005-2010 was 8.7%.

7 Life expectancy increased from 66.3 to 68.9 from 2005 to 2010. From 45% in 1994, Bhutan's adult literacy rate increased to 55.5% in 2007. Bhutan has achieved universal coverage in child enrolment in school, health coverage and provision of basic amenities.

existences, every being is related to each other through a karmic[8] connection. It then goes that due to our unending births from the time of the inception of the universe, there is no being on this earth who has not been our parent in one of our previous births[9]. Based on such philosophical basis, a sophisticated school of moral instructions exist in Buddhism[10].

The second of these considerations is the Buddhist conception of the universe[11]. According to Buddhist theories, the universe was formed after the right balance of the four primal elements.[12] Consequently, the vitality of life depends on this balance. While this balance can be maintained by further accumulation of merit, this is not always the case. Bhutan's most revered saint figure Guru Padmasambhava is alleged to have said that "It is not the world that is changing, but the people who induce the changes." Through uncontrolled exploitation resulting from greed, the balance of the

8 Karma is an important consideration in Buddhism as a force which dictates the circumstances of our existence. It is believed that positive accumulation of merit by means of right actions will gain us merit which will result in the development of favourable situations for us in the future. It is said that what we are now is the result of what we did in the past and what we will be in the future will be the result of what we do now. Thus, for the general Bhutanese, this is a positive motivation to be good to all life forms that exist.

9 Enlightenment in Buddhism is a belief that a being is forever able to cut off him/herself from the negative circumstances that leads to such repeated birth. Thus, every being while being caught in a fatalistic situation, can hope to better his circumstances through the accumulation of positive merits which will lead to his developing enlightened qualities.

10 The Jakata parables relate the account of an ascetic who cuts a tree that was blocking the view of his meditation hut. As a consequence, in his next life, he is born as a monstrous creature with the same tree sprouting from his head with all its accompanying discomfort and pain.

11 "On space rests that body we call the air; On air rests the body of water; On water rests the body of earth, And the earth holds in it all the life forms" (RSPN, 2006).

12 Earth, water, fire and air.

elements can be disturbed. Thus, from the Buddhist perspective, it is clear that the world's woes today are the result of our untamed greed.

Then there are the pre-Buddhist beliefs that have remained in people's popular culture as traditions. Largely naturalist in nature, they work by deifying elements of nature and amount to what is called nature worship. Different locations and elements of nature are believed to be the abodes of deities whose protectorate extend over a nation, district, locality or in some cases, even just a family. Thus, nature is transformed into an idea that is at once sacred and worthy of being worshipped. An elaborate hierarchy of such divinities has come to be that forms a parallel faith to Buddhism. It is said that if people put faith in Buddhism for provision of spiritual nourishment and possibility of enlightenment, then people dabble in this form of worship for their immediate welfare. Nature represents to them the forces that have to be constantly propitiated and honoured so as to receive their benediction in guise of timely rainfall, abundant harvest, prosperity and good health (Dorji, 2005). It is opportune to mention here that if Buddhism is considered a higher level of discipline which is practiced in monastic settings, then Bon faith is most predominant among the people who are closest to nature like the agriculturists. Above all, the prevalence of such faith deters people from irreverent acts of destruction which can be wrought upon nature where people are not similarly faithful.

Thus, religious and traditional beliefs which are considerate of the very spirit of nature among the devout population of Bhutan translate into care and protection of our natural environment.

## Bhutan's conservation successes

The official development policy of Bhutan reflects its deep-seated beliefs. High emphasis is placed on maintaining its ecology in its pristine form. Thus, every developmental activity must take into consideration the impact it might have on the environment. It is believed that whatever the short term gains, in the long run, any

policy which erodes nature will ultimately be unsustainable[13]. This cautious development policy[14] has today resulted in Bhutan being able to retain much of its natural ecology. 72% of Bhutan's total land surface remains forested and is home to a diverse range of exotic flora and fauna[15].

The Constitution of the Kingdom of Bhutan which was adopted in 2008 makes legal provisions for safeguarding the ecology against undue pressure that might result from increased exploitations in the future. Article 5 of the constitution which is solely dedicated to environment states, among others:

1. Every Bhutanese is a trustee of the Kingdom's natural resources and environment for the benefit of the present and future generations and it is the fundamental duty of every citizen to contribute to the protection of the natural environment, conservation of the rich biodiversity of Bhutan and prevention of all forms of ecological degradation

13 Note: One of Bhutan's step towards conservation has been the restriction that it imposed on the number of tourists visiting the country as high tourist numbers has often been linked with environmental degradation.

14 Despite its huge economic potential, due to restrictive policies, the mining industry in Bhutan constitutes only 2% of the GDP (NSB, 2011)

15 Note: Owing to its location between two major bio-geographic realms, the Malayan and Palearctic, Bhutan's biodiversity wealth includes 5,603 species of vascular plants including 579 wild orchids, 46 rhododendrons, over 300 medicinal plants and at least 30 bamboo species. Close to 200 species of mammal including the Royal Bengal Tiger (Panthera tigris), Snow Leopard (Unicia uncia), Red Panda (Ailurus fulgens), Takin, (Budorcas taxicolor), Golden Langur (Trachypithecus geei), Asiatic Elephant (Elephus maximus), and the Himalayan Musk Deer (Moschus chrysogaster leucogaster). The Royal Bengal Tiger living at 4000 meters above sea level in Bhutan is an extraordinary finding and has been recently documented on film by the BBC. Bhutan also has 678 recorded species of birds. At least 14 species are globally threatened and ten fall within the restricted range.

including noise, visual and physical pollution through the adoption and support of environment friendly practices and policies.

2. The Royal Government shall:

a. Protect, conserve and improve the pristine environment and safeguard the biodiversity of the country;

b. Prevent pollution and ecological degradation;

c. Secure ecologically balanced sustainable development while promoting justifiable economic and social development; and

d. Ensure a safe and healthy environment.

3. The Government shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time.

4. Parliament may enact environmental legislation to ensure sustainable use of natural resources and maintain intergenerational equity and reaffirm the sovereign rights of the State over its own biological resources.

5. Parliament may, by law, declare any part of the country to be a National Park, Wildlife Reserve, Nature Reserve, Protected Forest, Biosphere Reserve, Critical Watershed and such other categories meriting protection.

Thus, the Constitution which forms the basis for Bhutan's many environmental legislations aptly summarizes the spirit of Bhutan's conservation effort.

One of Bhutan's biggest successes has been its ability to protect more than half of its territory as protected areas where developmental activities are restricted as per the mandate of the constitution. The protected areas system of Bhutan was initiated in the 1960s and covered almost the entire southern and northern regions of the country. In 1993, the parks system was revised for better ecological

representation and realistic management. Today 51.4 percent of the country is formally declared as protected area[16].

As a result, Bhutan today is a carbon neutral country. Carbon-neutrality is a term used to demonstrate that all greenhouse gas emissions from energy consumption (mainly transport), industry, agriculture and waste, are either avoided, reduced or offset, to a net result of zero emissions. Bhutan is in effect a carbon sink with its abundant forest cover that is able to absorb carbon emissions from other countries.

Although Bhutan's per capita energy consumption has increased in recent times, much of this requirement is met through production of clean hydropower. The country has placed a high emphasis on tapping its rich hydropower potential and already generates about 40% of national revenue. However, care has been taken to ensure that the construction of such mega plants are as environmentally friendly as can be reasonably expected. Once commissioned, Bhutan's hydropower plants are expected to have minimum impact on the environment as they are mostly run-of-the-mill (Choden, 2011).

In Bhutan, people are often the aggrieved party when brought in confrontation with nature. Due to the state's strong conservation policies, human activities that are considered even marginally adverse to the ecology are shut down no matter how economically viable they are. Many farmers are now having to abandon their farmlands as wild animals ravage through them. The latest nationwide GNH survey suggests that as many as 38% of the farmer respondents are faced with major problems with animal predation. The state though is helpless in the face of their own policies which forbid any retaliatory actions. Though such helplessness can be interpreted in many ways, it must be said that such uncompromising stance only goes to show the strong commitment of the state.

16 Royal Society for the Protection of Bhutan Website http://www.rspnbhutan.org/

However in return for all its initiatives and compromises, Bhutan has gained international recognition for its conservation successes. In 2005, the Fourth King of Bhutan, His Majesty King Jigme Singye Wangchuck was given the Champion of the Earth award as the architect of Bhutan's recent conservation efforts. Bhutan is also acknowledged as a bio-logical hotspot of the world for the high occurrence of bio-diversity as much as for its enviable efforts at preserving it[17].

### Occurrence of natural disasters

Despite its sustained efforts to conserve the best in nature, Bhutan has of late been facing unprecedented calamities. Though it cannot be denied that there is increased pressure on the environment within Bhutan itself, these disasters have often been the result of a larger malaise for which Bhutan bears little personal guilt. It only goes to show the limitation of a single country's effort. It must also be said that given the highly vulnerable nature of Bhutan's location[18], the only thing that has so far held back the strike of nature's wrath has been the collective merit of the people and the resultant good fortune, both of which are now showing signs of receding as people's need and desire for possessions increase. This can be seen in the increased exploitation of natural resources which, though negligible by international comparison, shows a definite increase.

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17 Royal Society for the Protection of Nature Website: http://www.rspnbhutan.org/

18 Bhutan lies hidden in the folds of the eastern Himalayas between two giant neighbours; China (Tibet) to the north and the Indian territories of Assam and West Bengal to the south, Arunachal Pradesh to the east and Sikkim to the West. With a total area of 38,384 sq. kilometres, Bhutan lies between 88o 45' and 92o 10' longitude East and 26o 42' and 28o 15' latitude North. Bhutan is a mountainous country except for a small flat strip in the southern foothills with hot and humid summer. The valleys in the central and northern parts are separated by mountains as high as 7200 metres.

This paper will however not make a detailed enumeration of all disasters which have struck Bhutan. Such attempts have already been made with much greater authority by various stakeholder institutions (see MoHCA, 2006 & UNDP, 2011). So, we will limit ourselves here to presenting a brief synopsis of all the disasters. It will also be the attempt of this paper to make a trend analysis of these calamities which show an increase in frequency of late.

| No. | Nature of Disaster | Year | Death | Cost of damage (In Million Nu) |
|---|---|---|---|---|
| | **Earth quake (On Richter scale)** | | | |
| 1 | 6.6 (Epicentre outside Bhutan) | 1988 | | |
| 2 | 5.5 (Epicentre in Bhutan) | 2003 | | |
| 3 | 5.8 and 5.5 (Double strike Epicentre in eastern Bhutan) | 2006 | | |
| 4 | 6.3 (Epicentre in eastern Bhutan) | 2009 | 12 | 2501 |
| 5 | 6.9 (Epicentre outside Bhutan) | 2011 | 1 | 1197.63 |
| | **GLOF[19] and Flood** | | | |
| 1 | Punakha GLOF | 1994 | | |
| 2 | Pasakha flooding | 2000 | | |
| 3 | Eastern Bhutan flooding | 2004 | 9 | |
| 4 | Cyclone Aila induced flooding | 2009 | 13 | 722 |
| | **Miscellaneous** | | | |
| 1 | Fire in Haa district | 2002 | | |
| 2 | Three fire accidents in Bumthang | 26.9.10, 18.2.11, 27. 5.11 | | |

Figure I: Disaster occurrence

From these disaster statistics (while not comprehensive), it is clear that disasters occurred in Bhutan at regular intervals. However, we can see that both the frequency and magnitude of damage have undoubtedly been greater of late. It is also clear that earthquake is the greatest threat that the country is faced with. This brings us to a brief analysis of what has been held up as the causes of disasters in Bhutan.

Bhutan is located on the fragile Himalayan mountain ranges and studies have shown that it is placed on one of the most seismically active zones of the world. Although a comprehensive seismic zone

19 Glacial Lake Outburst Flood

analysis of Bhutan is unavailable, its proximity to north-eastern parts of India, which is the 'most active' seismic Zone V (Bureau of Indian Standards), indicates that majority of Bhutan is either in Zone IV or V. Records suggest that four great earthquakes of magnitude exceeding 8 on the Richter scale occurred during 1987, 1905, 1934 and 1950.

As a country with some of the highest mountains, Bhutan is now also faced with the threat of retreating glaciers on an unprecedented scale. While the long term dangers of this situation is the drying up of its rivers on which Bhutan has invested heavily, the immediate danger is the formation of water bodies at the source of these rivers which can lead to flooding with grave consequences to both lives and properties. Thus, Bhutan is faced with grave geographical challenges.

Apart from that, with a growing population, there is also an increasing pressure on the environment which aggravates the risk factors. Among others, this leads to unsafe settlement patterns which come with increased vulnerabilities (MoHCA, 2006). One of the most disturbing trends in Bhutan is rapid urbanization. While urbanization in itself cannot be considered bad, haphazard construction practices that has unfortunately accompanied urbanization like elsewhere in the region aggravates the risk factors of disasters. However, rural Bhutan is not much better facing disasters as in fact, the rural populace has been shown as the most vulnerable in recent incidences of disasters. Poverty[20] in Bhutan is a predominantly rural concept and thus people have been compromising on safety measures in developing their properties which are at the most risk of being damaged.

However, it is generally agreed that disasters in Bhutan is mostly the result of the changing realities of the world's environment.

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20 Note: While acute poverty is not reported in Bhutan, income poverty of 21% is the national poverty rate. Of this, maximum poverty incidence is reported in rural Bhutan.

## Disaster Management

Faced with recurrent disasters, and as a result of such incidences as the one recounted as an introduction to this paper, disaster preparedness and management has received attention from the highest authority in Bhutan. His Majesty the Fifth King has been the main force behind the country's revamped disaster management abilities. Among others, His Majesty has instituted a voluntary force called Desuup (Peace Keeper) which has prepared hundreds of civilians to take up peace time duties. They have been trained in rescue and disaster management skills and are expected to put their new capabilities to use in times of emergencies.

Bhutan's first professionally trained National Search and Rescue Team (NaSART) was formally launched with 20 members from diverse professional backgrounds who will in turn become master trainers and replicate such capabilities all across the country. The need for such specialized personnel was felt for a long time in the country because in life and death situations, professional capabilities was the main difference between a successful operation and a disaster. However, apart from these specialists, the armed personnel of Bhutan have been the frontline force responsible for Bhutan's disaster mitigation and management efforts. In recent times, soldiers of the Royal Bhutan Army have been deployed all over the country to help people rebuild their lives in aftermath of the recurrent disasters. Bhutan's Constitution mentions that "a person shall have the responsibility to provide help, to the greatest possible extent, to victims of accidents and in times of natural calamity" (Article 8.6) thus making it a responsibility of every Bhutanese to respond.

Bhutan has also developed legislative, institutional and funding mechanisms to deal with natural disasters and other emergency situations. Drawing their inspiration from the Constitution, various acts, by-laws and legislations have been prepared to not only manage the country's environment but also to give a framework for disaster management. Among others, Environment Assessment Act (2002),

Bhutan's Water Policy (2003), Bhutan Building Rules (2002), Bhutan National Disaster Risk Management Framework (2006), National Disaster Management Bill, National, District and School Disaster Management Planning Guidelines were formulated.

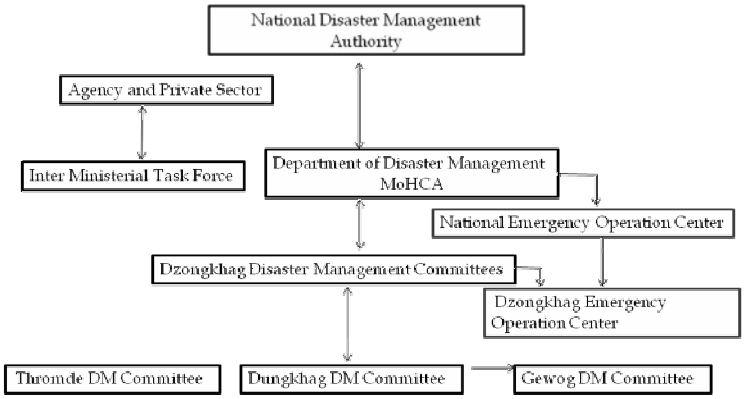


**Figure II: Disaster Management Institutions as per the Disaster Management Bill of the Kingdom of Bhutan**

At the institutional level, a multi-sectoral coordination mechanism has been prepared under the National Disaster Management Authority. The Department of Disaster Management has been formed under the Department of Home and Cultural Affairs as the central coordinating agency after it was upgraded from a division under the same ministry in August 2008. Today, with technical assistance from the Department, a network of all relevant agencies has been formed at both national and local level to meet the need of disaster preparedness and management.

One of the greatest tragedies of natural and other calamities is the huge financial cost involved. However, a sound financial arrangement can have an effect of increasing efficiency in disaster management. The Disaster Mitigation, Prevention and Preparedness Budget, His Majesty's Relief Fund and Major Disaster Fund have been introduced to that effect. Finally, realizing that disasters are inevitable despite all efforts in this age of high degradation, the

insurance policy of Bhutan has been strengthened to reduce the impact of tragedies by ensuring the lives and properties of people[21].

## GNH survey report: Empirical evidence on the state of Bhutanese ecology

This paper will conclude with an analysis of the GNH survey report in giving empirical evidence on the state of Bhutanese ecology. Gross National Happiness has been adopted as the country's official development policy since His Majesty the Fourth King propounded the concept in the 1970s. The philosophy is an extension of the country's religious and traditional values. It stresses that development in the country must encompass all spheres of life and any development that doesn't promote harmony is not worth pursuing. The ultimate aim of development in Bhutan thus became people's wellbeing and happiness which is best achieved when there is a balance between various elements like spiritual development, environment conservation and material prosperity. From a merely philosophical inquiry, GNH today has a definitive policy framework and guides much of the country's development process. From the four pillars[22], the achievement of GNH is today measured against nine domains[23]. In both these frameworks, the issue of ecological conservation features prominently.

The development of GNH policy tools has been the result of years of scientific data collection and analysis. The latest GNH survey was carried out in 2010 and it reveals some empirical evidence on the state of Bhutan's ecology and people's perception of the

21 Mandatory insurance schemes in Bhutan covers both people and properties for immediate relief. However, with increased awareness, people are now getting voluntary insurance coverage as well.

22 Cultural promotion, environmental conservation, good governance and balanced and sustainable development.

23 Psychological wellbeing, health, time use, education, cultural resilience, community vitality, good governance, ecology diversity and living standard.

country's policies which is vital to garner support of the public for the government's conservation efforts. At the same time, the awareness and knowledge of the citizens on their environment is crucial for pro-environmental actions and in making environmental policies successful. So, in order to test people's environmental awareness, a series of questions were developed to test the intensity of environmental problems. The expressions of environmental concern were aimed at understanding people's concerns, knowledge and awareness on environmental conditions in their respective communities.

The survey revealed that among others, an overwhelming 83.9% of 7142 respondents have said that they feel strongly responsible towards conserving the ecology. Another 14.5% of the respondents were reported to having felt similar responsibility though not with the same intensity. An amazing 96.4% of the respondents were found supportive of the state's tough anti-pollution measures though again with different intensity. However, due to the higher rural respondent numbers, the survey shows that only about 9% of the respondents have reported to having comprehensive understanding of the issue of climate change though another 32% reported to having a basic grasp of the situation. The survey also found that Bhutan was doing reasonably well in terms of meeting the people's basic resources need with 78% of the people reporting to have access to adequate water supply. The survey also found that 35% of the respondent had ownership of some kind of automobiles[24] which comes with various implications.

However, the survey has revealed some alarming environmental issues that is mainly felt among the farmers who are closest to the nature. 52% of the farmer respondents have claimed that wildlife was a major constraint in the past 12 months while an additional 21% have also reported to having similar problems though at a lesser scale. 38% of the farmers reported that they suffered major crop

24 Total of 62,700 automobiles in Bhutan of all types

damage while 25% reported some damage to their crop. As many as 87% of the respondents have reported to having left some parts of their fields fallow specifically due to wildlife threats.

The survey also shows various other emerging environmental concerns like landslide, flood, unpredictable weather patterns, littering and pollution. Though most of these have been persistent problems, the gravity of their situation has certainly increased of late. Thus, they will have strong policy implication in the future.

## Conclusion

It has been the attempt of this paper to show that the people's belief system that draws from both Buddhist and naturalist traditions has had a huge impact on Bhutan's conservation. It has been argued that the relative stability and prosperity of Bhutan has been the result of the people's abiding faith in the power of collective merit. Thus, this factor, where they exist, has been promoted as a motivating factor for the care of nature.

However, the paper does acknowledge the limitation of such faith system and shows that increased needs will eventually lead to thoughtless exploitation of our natural resources. And when such things happen, the balance of nature is offset. Nature's ability to correct itself is stretched to its limit. The consequence has been shown as nature's way of teaching a lesson through the inflicting of great calamities.

This paper also shows that even a need based utilization of resources will ultimately be unsustainable as need itself increases due to factors like overpopulation. Thus, preparedness and management of disaster has been posited as the way forward in an increasingly volatile world. It is hoped that the environmental best practices of Bhutan which have their root in the people's faith is emulated across the world as the environmental challenges that we face today require a global effort to tackle successfully.

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After all, Bhutan is too small a country to even hope to remedy the world's woes alone.

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# Renewable Energy Cooperation in South Asia: Perspectives from India

Nitya Nanda[1]

## Introduction

South Asia is among the fastest growing regions of the world and yet per capita energy consumption is among the lowest as it has among the lowest per capita incomes in the world. The region has huge energy gap and energy poverty as a significant population do not have access to minimum energy requirements. Even the energy they use is not clean enough for large part of it. However, because of the growth performance, its energy demand is growing. Providing energy to those who do not have access to clean energy will require even more energy. Some estimates show that energy demand is likely to grow by three times in the next two decades. This is not going to be easy to meet.

**Key Energy Indicators in South Asia**

| Country/ Region | TPES/Pop (toe/capita) | TPES/GDP (toe/ hous 2000USD) | TPES/GDP (PPP) (toe/thous 2000USD) | Elect Cons (KWh/capita) |
|---|---|---|---|---|
| South Asia | 0.50 | 0.72 | 0.15 | 503 |
| OECD Europe | 3.35 | 0.17 | 0.14 | 6287 |
| World | 1.83 | 0.30 | 0.19 | 2782 |
| Africa | 0.67 | 0.75 | 0.26 | 571 |
| Bangladesh | 0.17 | 0.38 | 0.09 | 208 |
| India | 0.54 | 0.75 | 0.14 | 566 |
| Nepal | 0.34 | 1.34 | 0.23 | 90 |
| Pakistan | 0.50 | 0.74 | 0.21 | 436 |
| Sri Lanka | 0.44 | 0.37 | 0.09 | 409 |

Source: International Energy Agency (IEA)

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The region is poorly endowed with conventional energy resources. With more than 20% population share, its share in global oil reserve is about 0.6 % and the same in natural gas reserve is about 1.4 % and global coal reserve is about 10%. (Nanda and Goswami, 2008).

The fossil fuel reserves are depleting very fast not only in the region but globally and hence showing up in their prices. The climate change is not only emerging as a major concern for the future it is also already showing its impacts. In any case the conventional energy sources are going to be exhausted globally. At current rate of depletion and its acceleration, oil might last for 50-60 years while, natural gas may last for 60-70 years, Coal is believed to last longer but accessing that will become much more difficult due to related social and environmental concerns. Hence the region needs to explore alternatives. There is no doubt that renewable energy is going to play a major role in this endeavour. Since conventional energy prices are on a rising trend and renewable energy prices are falling, developing renewable energy sources which have low marginal costs of generation are more economically viable in the long run. Renewables can play an important role in increasing energy security in the region by diversifying supply, reducing import dependence and mitigating fuel price volatility (World Bank 2010).

**Energy Balance in South Asia (2008)**

| | |
|---|---|
| Population (Million) | 1514.74 |
| GDP (Billion 2000 USD) | 1043.73 |
| GDP (PPP) (Billion 2000 USD) | 5163.08 |
| Energy Production (Mtoe) | 568.83 |
| Net Imports (Mtoe) | 188.41 |
| TPES (Mtoe) | 750.49 |
| Electricity Consumption (TWh) | 761.76 |

Source: International Energy Agency (IEA)

The nature is slightly more generous to South Asia in terms of renewable energy potential. For example, globally the potential of hydroelectricity generation is about 13000 TWh per year, of which

about 1083 TWh (about 8%) is in South Asia. The potential for wind power in South Asia is estimated to be in the range of 150000-200000 MW mainly in India, Pakistan and Sri Lanka. Potential for solar energy is estimated to be more than 300000 MW. India, Pakistan, Afghanistan and Nepal have good potentials. There is huge biomass potential everywhere in the region (Nanda and Goswami 2008). There is also significant geothermal potential but no mapping has been done except in India at a preliminary level. Potential for ocean energy is also believed to be reasonably good in the region but still remains an unexplored territory.

Despite huge potential, South Asia has been able to create an installed hydroelectric capacity of 50000 MW which is less than 12 percent of the potential capacity. Of the countries in the region, Sri Lanka and Bangladesh cannot do much further as they have almost exhausted their potential. Pakistan has potentials that can satisfy current needs but not in the long run. India has high (50% of the region) potentials but cannot satisfy even current needs. Afghanistan, Nepal and Bhutan have potentials for surplus even in the long run and hence can supply their surplus to energy deficit countries like India, Bangladesh and Pakistan. As of now only Bhutan has surplus generation capacity which exports to India (Nanda 2010). Hydropower in Bhutan has become the main driver of the economy as it contributes about 19 per cent to GDP, about 40 per cent in exports and more than one-third in government revenue and funds critical for improvement in health and education. It could achieve this even as only about 5 percent (1500MW) of total potential (30000MW) have been utilized so far.

## India's Energy Scenario

India's GDP is expected to grow by 8 – 9 % over the next two decades and accordingly its energy demand is expected to grow by 4.5-5.5%. Its extractable coal reserve is estimated to be about 13000Mt and is expected to last only for about 40 years with required growth. Its oil and gas reserves are 1130Mt and 1100BCM

respectively and is going to last only for slightly more than three decades though there is a possibility that India can find more gas in its territory.

India has a huge electricity generation capacity of 186654MW but its per capita electricity consumption is only 779 kWh/year against the world average of 2782kWh/year. With over 400 million people with no access to electricity and about 100000 villages yet to be electrified, its electrification status is quite poor. Electricity supply situation is generally poor even in electrified villages. Over 80% of rural India is dependent on traditional fuels for cooking. The burden of such fuels is quite high on people as they cause respiratory and other diseases.

**Installed Capacity in India (In MW on 31.12.2011)**

| Fuel | MW | % age |
|---|---|---|
| Total Thermal | 122963.98 | 65.87 |
| Coal | 104,021.38 | 55.72 |
| Gas | 17,742.85 | 9.50 |
| Oil | 1,199.75 | 0.64 |
| Hydro (Renewable) | 38,748.40 | 20.75 |
| Nuclear | 4,780.00 | 2.56 |
| RES** (MNRE) | 20,162.24 | 10.80 |
| Total | 1,86,654.62 | 100.00 |

Source: Ministry of Power, Government of India

India has ambitious plans of electricity for all and per capita electricity consumption of 1000kWh/year by 2012. But certainly these targets are going to be missed. Nevertheless, its heavy dependence on coal for generation of electricity has become a major concern. Its electricity generation is often hampered due to shortage of coal. It has also become a major importer of coal and the fact that coal prices in global market is rising, indicate that India is up to face bigger challenges. Naturally, it has been giving emphasis on renewable energy.

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**Grid-Interactive Renewable Power in India (Capacity in MW**

| Renewable Energy Programme/ Systems | Potential in MW | Target for 2011-12 | Achievement during 2011-12 (8 months) | Cumulative achievement up to 31.08.2011 |
|---|---|---|---|---|
| Wind Power | 48500 | 2400 | 833.00 | 14989.00 |
| Small Hydro Power | 15000 | 350 | 111.30 | 3153.93 |
| Biomass Power | 23700 | 460 | 86.50 | 1083.60 |
| Bagasse Cogeneration | | | 111.50 | 1779.03 |
| Waste to Power -Urban | | 25 | 1.20 | 20.20 |
| -Industrial | | | - | 53.46 |
| Solar Power (SPV) | | 200 | 8.50 | 46.16 |
| Total | | 3435 | 1152.00 | 21125.38 |

Source: Ministry of Power, Government of India

## Renewable Scenario in India

India's renewable potential (excluding large hydro) is about total installed capacity of today but the current utilization level is about 11 percent. Obviously, it can play a much greater role than it is currently playing. But it is not possible to replace non-renewable with renewable sources. A major issue in this regard is consistency. Due to inconsistent supply of most of the renewable sources, it has to rely on non-renewable sources for the base supply. Of course hydropower can play its role in this regard which has relatively higher consistency compared to other renewable sources. Given this, it may also be worthwhile not to exhaust all its non-renewable sources quickly.

Meanwhile, it is also important that full exploration of geothermal and tidal resources is carried out. These sources are also relatively more consistent in supply. Geothermal resources in particular are easier to tap. When some other Asian developing countries like Indonesia and The Philippines have made significant progress in this regard, there is no reason for India not being able to tap the potential.

India has adopted the National Action Plan on Climate Change (NAPCC) in 2008 which puts emphasis on solar power. Under the NAPCC, Jawaharlal Nehru National Solar Mission (JNNSM) is one of the eight missions which plans to have 20000 MW of grid-interactive

solar power by 2020 and 2000 MW of off-grid solar power by 2022. While this is commendable in itself, the NAPCC has also been criticised for not giving high emphasis on other renewable sources. Moreover, there is now a lot of scepticism in India if the mission will be able to achieve its targets as the progress is slow.

Fiscal policies like higher depreciation and the Renewable Portfolio Obligation (RPO) with Feed-in-Tariff (FiT) have significantly boosted the growth of renewable energy in India. Electricity Act - 2003 was a major way forward to promote renewable energy as it mandates renewable portfolio obligations on utilities. According to this, RPOs were fixed for utilities of different states primarily depending on the renewable potentials available in the state. Western and southern states of India did better in this regard as they also have relatively better renewable potential. Economic efficiency of renewable energy promotional policies like RPO with FiT has also been questioned (Singh, 2010). Fixation of RPOs based on potential is also questionable particularly when it is possible to trade in renewable energy certificates (RECs) which has now been implemented by the Central Electricity Regulator Commission. Given that renewable energy is still much more expensive compared to conventional sources, all states should come forward in purchasing this irrespective of the potential available in the state. Shortage of manpower and technology is also believed to be hindering the progress of renewable energy in India.

One approach that is currently being promoted is distributed generation which is linked to renewable energy. This could be a way forward in remote areas with small number of households as linking such habitations could be prohibitively expensive. However, some concerns remain. While some success has been achieved in providing renewable energy in remote villages, these have generally been done with some subsidies. Hence up-scaling of such initiatives with financial sustainability is questionable. Even if such a system can be promoted with financial sustainability as often people are willing to pay higher prices, the question of equity will be there. For example,

solar home system has been installed by many poor people and costs of such power is much higher than the grid power normally available to better off people. Such supply system could also be lacking in consistency of supply of power.

### Renewable Technologies and India

While lack of suitable technologies is often considered to be a factor that hindered progress of renewable energy in India, the country has been able to develop technologies in specific areas of renewable energy. India's technological capabilities in hydropower are at par with global standards both in large and small categories. India's capability in wind power is also well known. Till recently, India had the highest capability in Asia in terms both installed capacity as well as capacity to produce wind turbines. Currently, of course, the top position has been occupied by China. India's capabilities in these areas are not due to the fact that it developed the technologies on its own but technologies in such areas are relatively standardized and hence it could develop these capabilities.

In solar power, India's capability is rather weak though it has developed some manufacturing base for modules/systems and recently entered the SPV cell sector as well. It has however, developed several solar power based appliances, like solar cooker, solar water heater and solar cooler. Indian box-type solar cookers are considered to be among the best in the world, while solar water heaters with solar thermal collectors (flat plate type) and absorbers are of global quality. India has also developed solar harvest processing (Solar driers) and solar water pumping systems that are suitable for farmers in rural areas.

India's unique capability is in the area of biomass energy and it is a pioneer in this field. While developed countries have dumped this type of fuel in favor of fossil fuels like oil and gas, India realized that it cannot ignore this source and hence made investment in improving the technology of its use. A significant portion of its population has been using this fuel but the cconventional modes of use are inefficient

and hazardous to health. Gasification technology gives the advantage of fossil fuel at much lower costs. With new technologies biomass can deliver energy in all forms, solid, gas, liquid fuel, heat, electricity, and mechanical power. Easy availability of biomass in rural areas means that it is the most economical and feasible alternative in remote areas. Biomass therefore, can contribute to energy security, poverty reduction and positive environment effects. It can also help restoration of degraded land, water retention etc. if suitably used.

## Conclusion

The potential for cooperation in renewable energy in South Asia is huge. However, so far, the achievement has been quite limited. The only example of successful cooperation in South Asia is that of India-Bhutan cooperation. This has brought significant benefits to Bhutan while contributing to energy security of India. However, whether the example can be promoted as a model is a politically controversial issue. It may be true that this success may not be replicated in exactly the same way in other contexts. But that does not mean that the lessons of this success can be ignored. India's significant capability in large hydropower development can be utilized by its neighbors that have significant potentials to generate hydropower.

India also has significant capability in small hydropower development. This can be used in locations where large projects are not feasible. This is environmentally more acceptable as it causes minimum interference with nature. Similarly, India's capability in wind power can be utilized in countries like Pakistan, Sri Lanka and Maldives that have potentials. India's capability also exists in both manufacturing of wind turbines and installation of wind mills. Similarly, solar appliances/equipments developed in India can be useful for a large population in other South Asian countries.

India's biomass capability can be used in almost all South Asian countries as all of them produce huge amount of biomass but a significant population use this source of energy in inefficient and hazardous ways. India's technologies like biogas, improved cook-

stoves and gasifiers can bring immediate relief to a large section of rural household. In some of these technologies there are several manufactures with diversified products and packages and competitively priced. More importantly, many of these technologies have been developed in government owned facilities or with government assistance and hence transfer of such technologies should be relatively easy.

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# Disaster Management in South Asia: A Regional Approach

D. Suba Chandran[1]

South Asia is not new to natural disasters. From Tsunami to avalanches, from earthquakes to floods, the region invariably witnesses all forms of natural disasters periodically. Yet, the region is ill prepared to manage the disasters. Worse, within South Asia, neither at the national level nor at the regional level, there have been a process of learning from the previous mistakes both individually and collectively.

Besides the failure to learn from our mistakes, we have also not prepared enough early warning systems to get ourselves prepared to face the initial wrath and the follow up destruction. Investment in technology to predict the natural disasters are quiet advanced in developed countries; in South Asia, despite the development in information technology and related communication studies, the region is yet to develop a sophisticated and reliable early warning system. True, natural disasters like tsunami cannot be predicted accurately, but floods and cyclones, which seem to be the primary disasters in the region, can be both predicted and monitored.

Besides the early warning, the region has also not developed a good system to help in immediate relief and long term rehabilitation. Invariably, in all forms of natural disasters – be it earthquake or floods, it is not the natural disaster that results maximum casualty. It

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is primarily the disaster management and the failure of State that increases the casualty and long term implications.

This essay looks into two major disasters in the recent years in South Asia, explores the lessons learnt and not learnt, and concludes with what could be done both at the national and regional level.

## I
## TWO CASE STUDIES

During the recent years, there were multiple natural disasters in the region, the avalanche´ in Siachen killing more than a hundred Pakistani soldiers, earthquake in Sikkim, floods in Pakistan and cloud burst in Ladakh.

This essay analyses two natural disasters – floods in Pakistan in 2009, and the cloud burst in Ladakh in 2010, as case studies for the following reasons:- It is essential to study the floods in Pakistan and how the country managed it, because the region is not new to floods. Pakistan, Bangladesh, and most of India, especially the northern regions have been prone to floods during monsoon. It is not that neither the State nor the civil society is totally unaware of the threat of floods during monsoons. Hence, it would be useful to analyse how Pakistan dealt with the flood disaster in 2009, for it is a recurrent disaster. On the other hand, the cloud burst in Ladakh during 2010 was totally unexpected. Both the State and the Society were unprepared and the disaster took place in a geographically isolated periphery of India, where the physical connectivity between Ladakh and the rest of India is limited. The primary road through Kashmir valley and via Kargil is opened only during six months of a year, while the other road via Manali and Rohtang pass is opened for three months in a year.

### Case Study –I
### The Floods in Pakistan, 2009

The incessant floods in Pakistan in 2009 affected all four provinces, besides Gilgit-Baltistan. According to the UN estimates more than 4 million people were affected and more than 1600 dead. After the

floods, according to local reports, one fifth of Pakistan's land was under water, with more than 20 million people displaced with half of them not having a roof to live under. Immediately after the floods, there were certain immediate requirements, especially in terms of addressing the human casualty and relief, and also in terms of long term reconstruction and rehabilitation.

What were the immediate challenges after the floods? The biggest challenge was addressing the immediate relief requirements of the victims – from providing food, makeshift shelter and medicines. The hard truth was, continuous political instability and regime changes between democratic and military, have deeply affected the institutions that could plan ahead and deliver. Given the nature of the disaster, effective functioning of delivery mechanisms was the immediate challenge to understand the nature of requirement and proper distribution of existing relief and ensure it reaches the people who are in dire need. The same problem was observed in J&K as well, immediately after the earthquake in 2005. The first casualty, much before the human casualty was the disappearance of local institutions, which is responsible for relief – from civil administration to health sector.

While on the one hand there is a collapse of the local administration at the ground level after the natural disasters, what makes the situation worse is the political blame game between the provinces and the federation. After the floods in Pakistan, all four provinces were asking for more aid and were totally dependent on the federal government. Who gets what and how much from the federal government becomes a major issue and is laced with political blame gaming.

Worse, the provinces get deeply divided and start accusing each other, for purposefully ignoring the interests of smaller provinces. For example, the controversy over flooding Jaffarabad in Balochistan was seen as a deliberate effort to save the Jacobabad air base, which was being used by the US. *The Nation,* reported a senior leader - Mir Jan Mohammad Khan Jamali, the Deputy Chairman of the Senate,

making this accusation, resulting in more than 85 percent part of Jaffarabad was inundated by the flood. On the other hand, the powerful water lobby has been accusing the smaller provinces that had they allowed the dams like Kalabagh to be built, the floods situation could have been managed better. There were reports in the print media, that there should be a referendum on building Kalabagh. Natural disasters, thus become a political test for unresolved federal issues, as happened in Pakistan after the floods. While the pro dam people of Punjab accused the anti dam people of the smaller provinces blaming them, had there been a dam in Kalabagh, the impact of disaster would have been less.

The provincial and political differences affect millions of people looking for immediate relief and long term rehabilitation, the responsibility to save lives, which is essentially a civilian duty then becomes the responsibility of the military. Both in case of the earthquake in 2005 and the floods in 2009, the militaries of India and Pakistan got involved.

Does natural disaster provide an opportunity to the extremist and radical elements to win the popular sentiment and enlist new recruits for their cause? This remains the greatest fear, especially amongst the international donors, whose role is vital in post disaster rehabilitation. True, after the 2005 earthquake in J&K, the jihadi groups were able to make substantial gains – in terms of raising the funding support, earn public sympathy and improve their cadre support. The LTTE in Sri Lanka made use of the Tsunami to improve its financial conditions. However, this will remain an exaggerated threat; the jihadis will be able to gain considerable publicity, but they simply do not have the mechanisms and structures to make long term gains. In retrospect, one could conclude, that the situation in Afghanistan and the Frontier region was the primary reason behind the growth of the militancy in Pakistan, rather than the earthquake in J&K.

Role of the jihadi groups, however, needs to be watched closely – in terms of who is working where, and what their primary objectives

are. Some groups, especially their front organisations, may be working in terms of providing immediate relief, in terms of organizing medical camps, in certain remote areas. Critiquing such efforts may be counter productive. On the other hand, there will be some groups, working in relief camps, trying to manipulate the youth, like the Taliban did in various refugee camps.

Finally, the worst nightmare for a regional approach towards any disaster management is the emergence of jingoistic sentiments within the victim country, which negates any external support. For example, a section within Pakistan became absolutely jingoistic after the floods and did not want the Pakistani government to accept any Indian aid. A leading commentator, known for her anti-Indian and anti-US views, commented in the *Nation*, that accepting Indian aid is against their Kashmir policy. The paper's editorial, separately screamed: "The PPP government has played a reprehensible role, and not only mismanaged the response to the floods, but has also made the receipt of aid a surrender of sovereignty at American and Indian hands."

**Case Study – II**
**Cloud Burst, Ladakh, 2010**

In 2010, in the Ladakh region abutting the Himalayas in J&K state of India, there was a sudden cloud outburst, leading to significant losses of lives and material. Since Ladakh hardly experiences any rainfall, the local construction in rural areas are mud based even today. Being the northern most periphery, the region is neither well connected within, or with the rest of India.

The cloud burst and its implications highlighted the modern day problem of urbanization of towns without adequate infrastructure. Leh, the capital of Ladakh district today is a crowded city. Reasons are not difficult to fathom. The growth of tourism in Ladakh has been phenomenal over the last few years, visited by both domestic and international tourists. Despite the fact that Ladakh is opened only for few months and is connected with the rest of India by two roads, and

closed during the winters, there is a significant inflow of tourists. Today, tourism in Ladakh is growing at a rate of 30 to 40 percent annually, and is likely to create serious issues that need to be addressed.

Since Leh has the only serviceable airport (for civilians), it becomes the primary point to receive the bulk of the tourists who reach Ladakh. Leh is not adequately catered to serve the growing tourists, who are increasing at a spectacular rate. Besides the narrow roads and narrower markets, civic amenities of Leh – from bus stand to sewage facilities, there is a need to provide better facilities, if the capital has to provide adequate services.

Since Leh has become the primary service center for tourism industry, there is a significant movement of population from rural Ladakh to Leh for economic reasons. While, this is happening in some other parts of J&K as well, for example, the city of Jammu, this migration from rural areas has created an additional stress. Unlike Jammu, Leh cannot expand any further. Nestled between the mountains and the Indus, any further expansion of Leh will have environmental implications as well.

This extra focus on Leh as a tourist destination and economic hub, has created a visible divide in terms of equitable development of the region. Besides Leh, there is no other town in the district, which is comparable to how the capital has grown and become a centre of attraction in the last decade. It is not that there are places that would attract the national and international attention; unfortunately, there has been an inadequate focus. Villages like Shey, Thiksey, Hemis, Khaltse and Deskit have the potential to grow exponentially attracting tourists from national and international levels.

Ladakh is one of the few regions in India that attract the same tourists repeatedly over a period of time. From trekking to heritage, the monasteries, mountains, snow and the rivers have so much to offer. In fact, returning foreign tourists would prefer to stay outside Leh; the above mentioned villages could be developed into small

towns that act as satellites to Leh. Creation of tourist satellite towns is the need of hour; rebuilding Ladakh should keep this long term objective in mind.

As a result of the above urbanization process and the fast development of rural towns without adequate infrastructure pose a great danger in meeting the challenges of natural disasters. When the towns develop without adequate infrastructural facilities within or without adequate road connectivity with other regions, reconstruction and rehabilitation becomes a nightmare.

For example, in Ladakh, immediately after the cloud burst, there was a complete jam in connectivity. The airport is perhaps one of the smallest in the country and could not cater to the outward and inward flows. The road connectivity, which becomes absolutely essential to transport relief materials becomes a greater problem, as the existing connectivity is only through one or two routes, which get either closed because of the disaster or jammed because of the mindless traffic to and fro.

Border regions also suffer from another problem – the sensitivity of region, from a security perspective. For example, the Indian military is believed to adopt a defensive attitude towards the border regions. The China threat has a particular reverberation, resulting in keeping border regions from even national access and not developing them. Undoubtedly, inner-line permits and a defensive approach made sense in the 1980s, like that of license-raj and closed growth. Today, almost two decades after liberalization and economic growth, such an attitude in Ladakh is counter-productive. This affects post-disaster rehabilitation and relief.

## II
## Lessons Learnt and Unlearnt
## Build Disaster Management Agencies at Provincial, National and Regional Levels

So, what are the major lessons, that have been learnt and not learnt in South Asia in dealing with natural disasters?

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### Keeping the Local Civil Administrations Functional

As mentioned above, the first and foremost lesson of the natural disaster in South Asia is the need to keep local civil institutions alive and functional. Since, they are the delivery mechanisms at the ground level, their survival and functionality becomes crucial for immediate disaster relief. While reconstruction comes at the larger State or provincial level, for the immediate relief – from medical treatments to food and shelter distribution, local civil institutions should stay intact.

Since the required data is available at the local civil institutions – from demographic pattern to contact details of individuals and institutions, keeping the local institutions functional is extremely important at the disaster level. At a larger level, to keep the local institutions functional during disaster periods, what is required in the first place to keep them functional is empowerment during the normal times. Unless the local institutions are empowered with adequate powers and entrusted with significant responsibilities, South Asia will continue to witness human casualty in the immediate aftermath of the disasters, and the failure of relief and rehabilitation process in the long term.

While it has been generally agreed the strengthening of local institutions and devolution of power and responsibility helps any nation to strengthen its delivery mechanisms, it does so even more during a disaster situation.

### Improving Physical Connectivity

Though South Asia takes pride in being a home to a great civilisation with well planned townships starting with Harappa; today, it is one of the badly connected regions within the region and within each country. Even today, there are regions, in which people have not seen a train in their life time, or where a substantial portion of the peripheries is linked with the rest of the world through one pass or a single tunnel.

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Undoubtedly, the physical barrier is not easy to breach. The Himalayas and its second tier today prove to be a formidable barrier. But, that has become more of an excuse, than the real reason. When compared to other regions, especially China and Southeast Asia in the neighbourhood, South Asia has not invested sufficiently in creating basic infrastructure. A simple analysis of how much new rail roads have been laid after the departure of the British six decades ago, would highlight the pathetic nature of our emphasis in building basic infrastructure. The British build the basic rail network in what constitutes India, Pakistan, Bangladesh and Sri Lanka. Afghanistan is yet to witness rail tracks even today, and there have been no great revolutionary new initiatives in the other countries where the British had already built.

Neither has the region invested substantially in building the basic technical know-how relating to transport infrastructure. This sector remains labour intensive; construction industry has not been sufficiently modernized to increase the pace of road and rail construction.

For immediate relief, there is an essential need to build the basic infrastructure and ensure there is connectivity. In many parts of South Asia, immediately after a natural disaster, the ambulance takes more than 24 hours to reach the spot, while in the developed world, the reaction time is in minutes and certainly not in hours and days.

Marching in the 21st century, there is no excuse for any State in South Asia to keep any sub-regions under developed and ill connected. Especially those regions, which have been prone to disasters should be better connected.

### Creating National and State/Provincial level Disaster Management Authorities

In India, the National Disaster Management Authority (NDMA), is an apex organization to deal with natural and man-made disasters. This institution is fairly well developed in India at the national level,

though this is still in the process of evolving. States and provinces in the region should evolve their own State/Provincial Disaster Management Authorities at the sub-regional levels.

In the last few years, the sub-regions in South Asia have faced the following major disasters – earthquake, floods, snow slides and avalanches. Besides, there are also minor disasters which occur at regular intervals such as landslides, road accidents, epidemics etc.

The sub-regional disaster management authorities should focus on the following: First, organizing the first responders, with clear standard operating procedures (SOPs). From civilian authorities including the health sector to para-military forces, the first responders should be derived from the departments of Police, Power, Fire-Service, Meteorology, Health, Roads Organisation etc. While the core team of first responders should consist of the above, there should be other departments as well, working in tandem with the first responders. Of course, this should evolve based on needs and requirements, which will differ as the situation may demand

Second, such an effort should be a Civil-State partnership. The NDMA in India, though, is formed through a statute and is established primarily by the Union government, it has sufficient space to include civil-society organizations. This is extremely important, especially in a disaster environment where the State will need assistance from the civil society groups. How much ever prepared these sub regional authorities are, in a disaster situation the State/provincial forces may be insufficient. And there may be a large group of well meaning citizens, who would genuinely want to help the situation.

Such an initiative should be welcome and channelled properly, by including them in the process. Imagine, how much of the civil society assistance could not be made good use during the 2005 earthquake in J&K? At times, over enthusiasm by these groups, in fact become a hurdle, than a help, if left unregulated. Also, the civil society groups are important to create an awareness among the

people about impending disasters and how to minimize the casualties. One of the young officers, who was involved in the 2005 J&K earthquake relief operations later commented "earthquake don't kill people; bad buildings do." How true! The civil society groups, in particular the media, have a great role to play in creating awareness and also to provide help during a disaster situation.

Third, there should be enough training and mock exercises for such an organization. This needs intellectual inputs and funding support. This is where the federal government and the States/ provinces should help in terms of funding and sharing experiences respectively. In India, from the NDMA to Defence Research and Development Establishment (DRDE) in Gwalior, there are numerous organizations at the national level that provide quality training in facing disaster from handling equipments to field experiences. While the military and para-militaries send their officials on a regular basis to get trained, unfortunately, there is not much interest from the State governments in sending their officials.

We may not be able to avert natural disasters. But certainly, we can avoid subsequent human casualties by proper planning, awareness and management. Such sub-regional institutions will be a great tribute to those lives, we have lost.

### Reducing Corruption and Bureaucratic Hurdles in Disaster Management

South Asia is known for its corruption and the level of bureaucratic interferences in delaying. Numerous reports on corruption and governance at the global and regional level would underline the threats faced by the institutions from these two factors.

While corruption and nepotism has become a part of normal functioning, what is totally unacceptable is their role in disaster management and rehabilitation. People who have survived natural disasters live to tell even more disastrous stories of how our administration treated them in providing relief and rehabilitation. This

is not the reflection of a particular disaster in a particular country; rather, this is a sad reality of our region. In fact the living would praise those dead, for they don't have to go through what they do to get the relief. Invariably the story in South Asia is: Disasters don't hurt people that much, as disaster management does.

In fact, disaster management has become a business for a section. What have we become?

## III
## Regional Disaster Diplomacy: Allow Humanity to takeover Political Correctness

South Asia is perhaps one of the most reluctant region, in terms of regional cooperation. The success of SAARC would highlight the efficiency of our cooperation. The region, should evolve a culture of cooperation, at least on disaster management. Besides accepting relief and rehabilitation from the rest of world, the region should have enough institutional mechanism to help each other in terms of disaster relief and rehabilitation.

The experience of this would be amply exemplified with the nature of cooperation at the regional level after the floods in Pakistan in 2009. Though Pakistan was asking for more aid from the international community, there was also so much of politics on whether Pakistan should accept Indian aid or only under through the U.N. India should have ignored certain political statements by vested interests and attempted to use the disaster to build a bridge and connect with the people of Pakistan.

### Allow Greater Movement of Technical and Humanitarian Help

In a report published in Nicholas Kristoff's column in the *New York Times*, a Pashtun teen has reported, "I don't think they (the international organization) should send more food, water or clothes as there are already many agencies working on that. I want aid organizations and workers to come here (instead of sending their

money) to help us clean our streets with the modern technological devices we lack."

This is where India can help the region – both at the official and unofficial level. From doctors, nurses to social workers, India can help the region by physically being present there and helping the victims in a huge way. From military to para-military, India should be able to send a huge team, but given the political sensitivities attached to, this may not be a good idea. However, India is also known for its National Cadet Corps (NCC) with highly trained and extremely equipped students from schools and colleges. The NCC in India, in particular is highly trained in disaster relief – from bed and tent making, nursing, first aid to signalling, and evacuation of victims in a flood or earth quake situation. From fracture to skull injuries, the cadets are taught all the basics of first aid.

The NCC also has a select medical corps within its fold, formed by students from medical colleges. More importantly, it is a huge a group, consisting of more than 10 lakh students. This is a huge number. Even if one fourth of this group could have been sent to Pakistan on a voluntary basis, this would have made a big difference. No family in India is likely to object to such an endeavor.

Though primarily defined to be the second line of defence, the NCC has been effectively helping the civilian administration in the past, in disaster relief. Since they are composed of students from schools and colleges, accepting their help should not be politically sensitive for Pakistan. Besides the NCC, there are other student bodies, for example the National Service Scheme (NSS), though not as qualified and trained as NCC, it is still an effective force.

### Open Relief Points and Allow Individual and Social Organisations to Provide Relief

After the 2005 earthquake in J&K, both India and Pakistan agreed to open the LoC, at five places for people to meet and provide relief materials. India and Pakistan should seriously consider the same at

the international border. South Asia should follow a similar initiative regarding other disasters as well.

For example, after the floods, both countries could have agreed to open the Wagah and Munabao border points for providing relief materials. Since both have railway stations linked with the rest of India and Pakistan, it would not have taken time for the rest of India to flood Pakistan with relief trains.

There are credible individuals and social originations, who could help collecting the relief materials and funds; even the media could play a positive role.

### A Regional Disaster Management Authority (RDMA)

Since, India has a relatively better developed infrastructure in terms of its National Disaster Management Authority (NDMA) and better experience, India has a role and responsibility in helping the region during and after disasters. Aiming for a global role, a rising India will have to share the problems and burdens in the neighbourhood, especially during natural disasters.

Disaster is not the time for being politically correct and talk about political boundaries and historical conflicts. Both India and its neighbours will have to take a humanitarian perspective and consider working together. While India can take the lead, other countries could join with multiple expertise that they possess. South Asia should establish a "Regional Disaster Management Authority" (RDMA) and pool in all resources.

While there will always be political problems unresolved both inside and outside the SAARC, the region should not shy away from creating a RDMA. Time now, is to show how human we are; by helping our brethrens in need. The RDMA can also become a powerful regional confidence building measure in South Asia.

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# Natural Disaster Management in Nepal: Problems and Response from the State

Dr. Jan Sharma[1]

Nepal's unique location on the slopes of the southern Himalayas as well as its young geology and topography make it highly prone to natural disasters. The country has three major geographical areas – the Terai in the south, the Hills in the middle and the Himal in the north–located within the flight distance of less than 200 kilometers. Such a geographic location gives it distinct characteristics: the unstable steep slopes, the fragile geological nature of the young mountains, and heavy monsoon rains contributing to geological and hydro meteorological disasters. They annually take heavy toll in terms of human lives, damages to property and development infrastructure, loss of agricultural land, loss of livelihood, apart from long term social consequences.

**Disaster Hot Spot**

Natural disasters include flood, glacial lake outburst floods (GLOFs), avalanches, landslides, debris flows, earthquakes, fires, and drought and hailstorms. The melting of the glaciers, triggered by the climate change, has increased the risks of GLOFs. Nepal, especially the Kathmandu Valley, is prone to earthquake. Nepal has been described as a disaster hot spot due to the high vulnerability and frequent occurrences of natural disasters.[2] The table below lists various natural disasters and the areas of their prevalence:

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1 Author is a senior journalist based in Kathmandu.

2 Government of Nepal. 2009. *Nepal Disaster Report 2009: The Hazardscape and Vulnerability*. Kathmandu: Ministry of Home Affairs.

**Table 1: Natural disasters and their prevalence**

| Types of Disaster | Prevalence |
|---|---|
| Earthquake | All of Nepal is prone to earthquake |
| Flood | Terai, Hills |
| Landslide | Hills, Mountains |
| Debris Flow | Hills, Mountains but severe in elevations above 1,700m |
| Glacier Lake Outburst Flood | Himalayas |
| Avalanche | Himalayas |
| Fires | Hills, Terai |
| Drought/Hail Storm | Hills |

Source: UNDP, ISDR, NSET, 2010.

*Earthquake*: Nepal lies in an active seismic zone with three main fault lines – the main central thrust at the foot of the Himalayas, the main boundary fault at the lower Himalayas, and the Himalayan frontal fault south of the Siwalik – each running east to the west to cause earthquake. These fault lines are the result of the movement of the Indian Plate under the Eurasian Plate.[3] Nepal was hit in 1934 by an earthquake measuring 8.3 on the Richter scale, and mostly devastated Kathmandu where some 60 percent of the buildings were destroyed and an estimated 8,519 people killed. Another major earthquake was in 1988 measuring 6.5 on the Richter scale, killing 721 people.

One of the major lessons from the earthquakes is the challenge posed by the buildings, most of which are built without any architectural or engineering input, making them highly vulnerable to quakes. Enforcing the national building code remains a major challenge. Narrow streets rule out the possibility of any rescue and evacuation effort very challenging. Access to medical care is severely constrained. The National Society for Earthquake Technology-Nepal has been facilitating an awareness program by retrofitting the school buildings in the Kathmandu Valley. It has been providing training to

3 International Center for Integrated Mountain Development. 2007. *Natural Hazards in Nepal: Disaster Preparedness for natural Hazards: Current Status in Nepal*. Kathmandu: ICIMOD.

the local people to cope when earthquakes visit them. It has been organizing awareness programs every February to mark the Earthquake Safety Day. They are important but not enough.

*Flood and Landslides*: Floods are caused, apart from the high intensity of precipitation, when its drainage system is congested because of a number of reasons such as the infrastructures downstream. The intensity of precipitation is dependent on cloud bursts, which also triggers landslides. Most devastating flood recently was on the Koshi River in 1993, which cut off the eastern region from the rest of the country for several weeks, with a toll of 1,500 human lives and rendering some 600,000 people homeless.

More recently, the flash flood in the Seti River in May 2012 swept settlements, killing 31 people, and 40 people are still missing. A preliminary estimate of the damages by a technical team said damages worth Rs. 50 million. The Nepalese Army said the flood was triggered after the blockade created by a landslide a few days ago along the river's normal course burst at an altitude of around 4,600 meters in the Annapurna mountain region.[4] Again, the 2008 breach of the Koshi embankments affected 3.5 million people in Nepal and India, underlying the multi-national nature of the problem. It also underlined the importance of installing flood forecast and early warning systems. They are regional problems seeking regional solutions.

*GLOF*: The glacial lake outburst flood poses a serious risk to the mountain communities as well as the settlements downstream. The glaciers in the higher altitudes of the Himalayas melt into lakes with a huge volume of water that are naturally dammed with ice and rubble. The GLOF is triggered by unstable conditions that break the dam. There are about 2,323 glacial lakes in the Nepal Himalayas, and of this the International Center for Integrated Mountain Development (ICIMOD) has identified 22 of them as more at risk in the next five to

4 *Naya Patrika*, Kathmandu, 6 May 2012.

10 years. It is reported that 14 GLOFs have occurred between 1935 and 1991. An avalanche triggered the breach of Dig Tsho in 1984, and within hours it carried four million cubic meters of sediments on the Dudh Koshi River, damaging a hydro power plant near Namche Bazar besides damaging 14 bridges and 30 houses.

*Fire*: According to the Nepal Red Cross Society, fire affected 608 families in 23 districts, claiming 14 lives, injuring 48 persons, and destroying 569 houses in 2009. Major reported fires in the settlements include the one in Myanglung in Terathum district in 2002, Fungling Bazar in Taplejung district in 2003, and at the Bhutanese Refugee Camp in Jhapa district in 2008. A fire in Aurahi in Siraha district gutted 1,500 houses and rendered several hundred homeless in May 2012. Major reasons are reported to be electricity leakages and human error. Forest fires are also common in the country where community forestry has been a major success story. It has helped expand forest coverage, which promotes cost effective carbon banking to mitigate greenhouse gas emissions. However, hills are reportedly getting drier, and if the intensity and frequency of the dry spell continues or prolongs, the forest coverage also risks getting fire.

*Climate Change*: Nepal is highly vulnerable to climate-related disasters. A new study shows the Himalayas warming about three times faster than the global average temperature during the last 25 years. The study revealed that the average annual mean temperature between 1982 and 2006 has increased by 1.5 degree Celsius with an average increase of 0.06 degree Celsius annually.[5] This is alarming because an earlier study showed that almost 20 percent of the glaciated areas in Nepal above 5,000 meters were expected to be snow and glacier free if the air temperature increased by 1 degree Celsius and a 2 degree Celsius rise would result in the loss of almost

5 The study was made by a Harvard University team consisting of Uttam Babu Shrestha, Shiva Gautam, and Kamaljit Bawa. See for details *The Kathmandu Post*, Kathmandu, 18 May 2012.

40 percent of the total land area under snow.[6] The Himalayan glaciers are retreating at the rate ranging from 10 to 60 meters a year. Many small glaciers have already disappeared and vertical retreats of as much as 100 meters have been recorded during the last 50 years. This will have an adverse impact on hydroelectricity projects, irrigation systems and drinking water supplies.

## Human and Economic Cost

Natural disasters have taken a heavy toll of life. More people are killed by natural disasters in Nepal than any other country in South Asia. In addition to high mortality, more than 50,000 people were reported as injured, 3,000 people missing and about five million people affected by natural disasters between 1971 and 2007.[7]

**Table 2: Disaster Loses in Nepal between 1971 and 2006**

| Events | Death | Injury | People Affected | Buildings Destroyed | Buildings Damaged | Land Loss (Ha) | Livestock Death | Loss in Mn Rs. |
|---|---|---|---|---|---|---|---|---|
| Drought | 1 | - | 1,512 | - | - | 329,332 | - | 10 |
| Earthquake | 873 | 6,842 | 4,539 | 33,710 | 63 | - | 2,257 | 72.8 |
| Epidemic | 15,529 | 37,773 | 323,896 | - | - | 1 | 78 | - |
| Fire | 1,081 | 735 | 218,128 | 62,634 | 2,762 | 352 | 113,922 | 6,244 |
| Flood | 2,864 | 349 | 3,315,781 | 70,115 | 1,041 | 196,955 | 31,117 | 3,713 |
| Forest Fire | 24 | 13 | 10,718 | 1,698 | 18 | 3,173 | 82 | 1,031 |
| Landslide | 3,899 | 1,188 | 480,069 | 16,799 | 1,209 | 21,797 | 9,046 | 835 |
| Others | 2,385 | 2,670 | 360,725 | 3,917 | 388 | 290,323 | 79,935 | 2,030 |
| **Total** | **26,656** | **49,570** | **4,715,828** | **188,875** | **5,482** | **841,954** | **236,459** | **13,885** |

Source: National Society for Earthquake Technology, 2008.

## Response from the State

Nepal has been in a state of political transition ever since 2006, and it is not going to end in the next few years. The preoccupation with a new constitutional regime has delayed progress on the review of the existing strategies, policies, programs, and activities to minimize risks

6 Nepal Disaster Report 2009.

7 Nepal Country Report: Global Assessment of Risk. 2009. ISDR Global Assessment Report on Poverty and Disaster 2009. http://www.undp.org.np/uploads/publication/2010102909383499.pdf

from the natural disasters in the future as well as building and enhancing capacities at the local level to cope with the situation. This remains more challenging in the absence of local elected bodies.

On a positive note, the National Strategy for Disaster Risk Management was adopted in 2011, and a new draft on the Disaster Management Act is under consideration of the council of ministers. The Strategy seeks to create a disaster resilient Nepal by providing guidance for improving the policy and legal environment and prioritizing strategic interventions. The key elements of the strategy are being implemented by the Nepal Risk Reduction Consortium with its Flagship Programs developed in consultation with the government and other stakeholders.[8] However, there remains the need for a more comprehensive and broad approach for disaster management. There is also urgency for integrating disaster risk reduction strategy with the development goals for the implementation at the district and local level, especially in the disaster prone areas.[9]

The legal framework is provided by the Natural Disaster Relief Act of 1982, which has been amended twice already – in 1989 and 1992. However, it mainly focuses on relief and rescue operations. The Disaster Management Section at the Ministry of Home Affairs plays a lead role in disaster management. The Planning and Special Service Division of the Ministry is responsible for disaster management, and the National Emergency Operations Center created in December 2000 functions as a coordination and communication point. District emergency operation centers have also been planned to be created in all 75 districts but have been operational only in 11 districts. A Central Natural Disaster Relief Committee (CNDRC) is

8 The Nepal Risk Reduction Consortium comprises of the Asian Development Bank, the IFRC, the United Nations Development Program, the Office of the Commission of HA (OCHA), and the World Bank.

9 International Federation of Red Cross and Red Crescent Societies. 2011. *Analysis of Legislation Related to Disaster Risk Reduction in Nepal*. Geneva: IFRC.

also provided for under the home minister. The Ministry of Water Resources as well as the Department of Mines and Geology and the Department of Water Induced Disaster Prevention are also involved in a number of disaster prevention activities.

The security agencies, most significantly the Nepalese Army, has a key role in actual disaster rescue and relief operations. The Army has both the training and the capability to respond effectively to disaster situations, primarily in the search and rescue missions, medical assistance and evacuation, air rescue, and mass evacuation. The Army organized a South Asian regional seminar on disaster response and humanitarian assistance in April 2012 with participation from the India Army, the US Army's Pacific Command and other SAARC countries to discuss ways and means of dealing with a major earthquake in Kathmandu and its aftermath. With the US Army's Marine Force of the Pacific Command, it also undertook a joint "table top exercise" on military humanitarian assistance and disaster management in June 2011 with the objective of achieving an effective co-operation and mobilization of the international military assistance for the rescue efforts during major disasters.

**Major Gaps in Policies and Implementation**

*Flood and Landslide*: There is a wide gap between policy and its implementation. The government's pathetic approach to the Seti River floods in May 2012 reflects the gap between policy and practice. The security agencies did their best in the rescue and relief operations but the agency officially responsible for investigating what precisely went wrong is the Department of Meteorology and Hydrology, which has neither the manpower nor the financial resources to undertake an investigation. The Glacier and Glacial River Hydrology Section under the Department has been without a chief for long. Most experienced experts in the Department are now retired and many gainfully engaged by the international nongovernmental organizations.[10] The Home Ministry's priority

10 *Nagarik*, Kathmandu, 14 May 2012.

remains rescue. The lead taken by the private sector such as the Pokhara Chamber of Commerce and Industry, which has set up a Sardikhola Reconstruction Fund to restore the damaged infrastructure in the area, is laudable.

Such disasters, in many instances, can be prevented if the previous studies are taken seriously. For example, a 1998 study of the Seti River confluence had found that 100 meters on both sides of the banks were vulnerable for disasters. Yet human settlements and structures were allowed. The current interventions are mainly focused on structural measures such as the gabion boxes filled with stones to prevent and minimize the impact of landslides and encroachment of embankments. At the community level, cheaper, and sustainable non-structural measures are popular. The embankments and retaining dams are important for prevention but are not enough. Improving the drainage system, providing outlets for water during floods, and improvement in an early warning system will go a long way in mitigating flood and landslide disaster. There is no doubt that this calls for a new and more scientific approach in flood and landslide management at the regional level as the problem is not confined to only a single country.

*Earthquake*: If the earthquake of the same magnitude as the one in 1934 would strike again, at least 40,000 people would die, 100,000 others injured, and tens of thousands would be left homeless, according to the Kathmandu Valley Earthquake Risk Management Project. In case of an earthquake, millions of people could be buried in a city-wide pile of rubble. Access routes would be blocked. The airport could be disabled. Serious damage to critical infrastructure will reduce operational capacity by more than 50 percent.[11] As the population continues to grow in Kathmandu, without a proper land use planning and construction practices and

11 Disaster Risk Reduction in Nepal: Flagship Programs. 2011. The Nepal Risk Reduction Consortium. April 2011. http://www.un.org.np/sites/default/files/report/ 2011-04-19-nrrc-doccument-version-april-2011.pdf

minimal emergency response mechanisms, it will no doubt be a major disaster. There is timidity in enforcing the building code, popularize use of better construction materials, and construction of earthquake-resistant infrastructure. For a number of reasons such as corruption, ignorance and unaccountability, monitoring the physical structures for compliance with the building code remains doubtful. The government itself has been violating the building code, as is reflected in the current drive for the expansion of the narrow streets in Kathmandu. Half the houses that the government found standing on the roads being expanded have been destroyed, but the other half stand. With the entire foundation of the remaining sections of the houses along the roads, they have now become doubly vulnerable. The fear is that even a minor earthquake could possibly flatten the houses, threatening the lives of the occupants, blocking roads for emergency services and rescue and relief operations. No consideration for safety measures against earthquake has been made.

"There is good reason to believe the country is on the brink of a major disaster – one with potentially cataclysmic results," concludes Alan Duncan, the British minister for international development. "The Nepalese government's capacity and investment in disaster management remains low, hamstrung by bureaucracy and political stasis. There is a serious lack of investment in critical infrastructure like schools and hospitals. Nepal's disaster strategy sits in the constituent assembly awaiting approval, along with a logjam of hundreds of other acts and bills."[12] A major problem will be medical treatment because the National Society for Earthquake Technology-Nepal says 80 percent of the hospitals in Kathmandu will fully collapse in case of a major earthquake. The existing nine major hospitals in Kathmandu, if they stand, can treat only 700 injured at a time. Managing the emergency rooms will be a major challenge, and

12 Alan Duncan. 2011. "Preparing for future shocks– disaster risk reduction in Nepal". The Guardian, 15 April. See also, http://www.guardian.co.uk/global-development/poverty-matters/2011/apr/15/disaster-risk-reduction-nepal-earthquake accessed on 28 April 2012.

there will be problems in prioritizing the injured, as it happened when 20 injured persons were brought at the Bir Hospital at one time when a minor earthquake shook Kathmandu on 20 September 2011.[13]

It is an exhaustive list. This brief paper does not allow these to be discussed in detail. The gaps between the policy and the practice are most glaring in the case of floods and earthquakes as has been discussed above. Similar gaps are noticeable in the case of the GLOF where more research and monitoring is necessary. Telemetric system consisting of 19 early warning systems was established in 17 villages along the Tama Koshi River in 1997. More of these will be required on the basis of the research and monitoring. Another case is fire, both in the human settlement as well as forest. The major problems in managing fire are poor preparedness and response, and lack of fire-fighting machines. Another challenge remains the climate change. There have been some very significant initiatives at the regional and global levels. For example, Nepal is forging the Mountain Alliance Initiative for Climate Change at the regional and global climate change forums. Climate change was a key theme at the 16th SAARC Summit in Thimphu in April 2010. A SAARC inter-governmental mountain initiative is also under consideration.

The country does not have necessary resources and programs to minimize risks resulting from disaster.[14] The Nepalese Government has lagged behind in developing an emergency response mechanism to mitigate post-disaster damage. There is lack of equipment to deal with natural disasters. Fire brigades are in short supply to extinguish fire even in the capital city. In the absence of the resources, it is

13 *Nagarik*, Kathmandu, 14 May 2012.

14 Statement by Home Secretary at a symposium on "Experiences in Disaster Risk Reduction and Response" on the Earthquake Safety Day (observed on 16 January every year) organized in Kathmandu on 12 January 2011. Also see http://www.icimod.org/?q=5920 accessed on 26 April 2012.

seriously doubtful whether the Disaster Reduction Risk Strategy will be effectively implemented.

## Conclusion

It can be concluded that Nepal's preparedness for the management of natural disasters is very poor. There are a number of measures that are urgent. First, no disaster management plan will succeed unless it has the involvement and support of the local communities. This will require empowering the people and enhancing the capacity of the local communities in disaster preparedness and management by way of training and increased awareness. Secondly, anticipation and a stronger focus on preparing for disasters, especially for effective planning on the threats posed by the earthquake and floods, are necessary. This will need all the support from the international community, specifically China and India. Thirdly, Nepal must learn to improve its ability and preparedness to deal with the calamities effectively. This includes improving the building code and effectively implementing them.

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# Early warning system to Minimize GLOF risks in the Hindu-Kush Himalayan Region: A Case Study from Nepal

Pragati Shahi[1]

**Abstract**

The weak geological formations compounded with fragile topography and tectonic layout makes the country highly susceptible to various water-induced disasters such as floods, landslides, erosion, avalanches and glacial lake outburst flood (GLOF). Due to the frequent occurrence of the disasters, particularly during the monsoon season, the country is bearing a huge economical and social loss every year. The increase in frequencies and extremities related with any kind of disasters across the Hindu-Kush Himalayan (HKH) region is attributed to the changing climate and weather phenomenon both at global and local levels in the recent years. The rising temperatures in the higher altitudes are responsible for higher thinning and retreating rate of the glaciers and later in forming the unstable glacial lakes. A latest study has identified that the HKH region is home to thousands of the glacial lakes and out of which 200 are regarded as potentially dangerous glacial lakes (likely to burst their moraine dams anytime in near future and cause flooding). Though, the occurrence of the GLOF is not reported as frequent as floods, landslides and avalanches reported in the mountain areas, the risks of GLOF cannot be neglected as similar bursts occurred earlier have caused huge economical, social and cultural damage at different times across the region.

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1 Author is a board member of Nepal Forum of Environmental Journalists and is a journalist associated with The Kathmandu Post.

Due to its complexities, the mountains and disasters associated with them have not been well studied and researched properly, which makes the situation of both the mountain communities and those living in the downstream areas more vulnerable. In the meantime, not much has been done to reduce the risks posed by the disasters along the HKH region and Nepal is not an exception. This paper will look into how the government of Nepal along with the concerned partners working in the disaster field is initiating and strengthening the disaster risk reduction activities both at policy and program level. It will also present some of the activities related with the installment of the early-warning systems earlier and in recent years as a part of the prevention and mitigation of the disaster risks and their existing situation. Finally, the paper will delve into how important it is for Nepal to identify and assess the threats related with the glacial lakes and related flooding, carry out prevention measures and include the DRRs in both national and regional policies and programs. It will also try to explore the role of local communities in successfully implementing community-based and cost-effective prevention and mitigation strategies related with water-induced disasters in the country.

## Introduction

Few days before the devastating flood in the Seti River washed away over three dozen people along with their belongings and left few dozen missing, the water-level in the river that originated from the Annapurna range was reportedly dropped significantly.

"This could have been a good early warning signal for local communities to move to a higher altitude to avoid the flood or a related disaster, if only they were informed how to respond immediately to the situation," said Om Ratna Bajracharya, former senior meteorologist at the Department of Hydrology and Meteorology under the Ministry of Environment, Science and Technology.[2.]

2 Om Ratna Bajracharya. 2012. *"Lack of preparedness to blame for Seti havoc: Experts,"* The Kathmandu Post, May 11, 2012

For the last five years, the locals of Halji village in remote Humla district of the country are living in fear of the massive flooding caused due to the bursting of Takh Tsho Lake located in the mountains. During every summer, the melting of glacier causes expansion of the glacial lake and results flashfloods affecting the lives, vegetation, infrastructure and property of the locals living in around the village.[3]

The above mentioned cases are just a tip of the iceberg. The high vulnerability compounded with underdevelopment and lack of resources to deal with these catastrophic natural events is making the situation acute in terms of loss of lives and properties in developing countries like Nepal, Bangladesh, Pakistan and Bhutan to various water-induced disasters in recent years.

With a lack of proper disaster risk prevention and reduction measures in place, approximately 358 people are killed and around US $ 43.5 million is lost annually to the disasters including floods and landslides in last two decades.[4] Nepal being the signatory to the Hyogo Framework for Action (HGA) on Disasters since 2005 has not been able to implement the plans and policies effectively and does not score more than 3 out of 5 in any criteria as defined by HFA monitor. (Score 3-Institutional commitment attained, but achievements are neither comprehensive nor substantial).[5]

In the past decades, the HKH region has already witnessed a total of 35 GLOF events and Nepal alone has recorded 20 GLOFs.[6]

The studies and researches conducted on glacial lakes assessment and monitoring so far are focused only on a few which are highly publicized in past few decades depending on their

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3 Jaya Bahadur Rokaya. "Flood, landslide, glacial lake burst threaten to wipe out Humla village," The Kathmandu Post, July 1, 2012

4 Nepal Disaster Statistics ( 1980-2010) http://www.preventionweb.net/english/countries/statistics/index.php?cid=121

5 National Progress Report on Hyogo Framework ( 2009-2011), UNISDR.

6 Glacial Lakes and Associated Floods in Hindu Kush-Himalayas, 2011

vulnerability namely Imja, Tsho Rolpa and Thulagi. However, the number of highly risky glacial lakes is likely to go up if an intensive scientific study is carried out to identify and asses the risks of the numerous glacial lakes in various river basins across the country. On one hand, the changing global climate is likely to have local-level effects with more severe in the higher altitudes and on the other hand, lack of adequate information on the status of these glacial lakes and the level of the risk they posses is likely to affect thousands of people living in vulnerable areas.

Despite of the fact that Nepal government in tandem with concerned partners including I/NGOs, donors and local communities is prioritizing the need of disaster risk reduction strategies and preparedness plans, there is still a lack of concerted efforts to effectively work to minimize the risks related with disasters every year. Even in the disastrous cases mentioned above, if only the local communities living along the downstream areas had access to information about the risks through various communication means including telephones, monitoring stations, sirens and alarms among others, huge loss of lives and properties could have been aborted. It is now well accepted that Early Warning System (EWS) plays an integral part in reducing risks related to both geological or climatic induced disasters, however, the government of Nepal still lacks a national level multi-hazard risk assessments for floods (particularly GLOFs) and landslides.

So, should the government and concerned actors including the donors and I/NGOs feel the urgency to work together towards building disaster resilient communities than providing millions of amount in relief package and rehabilitation programs for the victims? The role of the locals in the process of building resilient communities should be well-assessed while designing any EWS plans. How can government work to invest in DRR related with GLOF more effectively by first understanding the risk related with it?

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## Climate change and GLOF hazards in the Himalayas

The world is already experiencing visible impacts of changing climate as the frequency and intensity related with natural disasters is increasing every year. Though the climate change phenomenon is global, it is having localized impact on agriculture, biodiversity, forests and also has the tendency to trigger series of natural disasters.

Flooding is already one of the most widespread of hydro-meteorological hazards, and international panels such as the Inter governmental Panel on Climate Change (IPCC) and International Society for Diatom Research (ISDR) have predicted that it is very likely that flood hazard will continue to increase in many areas of the world, including the Himalayan region.[7]

Himalayas are warming about three times faster than the global average temperature during the last 25 year period. The average annual mean temperature between 1982 to 2006 has increased by 1.5 degrees Celsius with an average increase of 0.06 degree Celsius annually. Meanwhile, the average annual precipitation during the same period has increased by 6.52 mm per year in the region.[8]

It is confirmed that the Himalayas are among the regions most vulnerable to climate change. The rapid melting of glaciers and formation of the glacial lakes has increased the vulnerability of the people living in the mountains. The recent remote sensing data shows that the HKH region has more than 50,000 glaciers and estimates that there are 200 potentially threatened dangerous glacial lakes in the HKH region. Out of total 35 GLOF events recorded in the region in the past decades, Nepal alone has experienced 14 similar cases. The past records show that at least one catastrophic

7 McCarthy *et al.*, 2001.

8 Uttam Babu Shrestha, Shiva Gautam and Kamaljit Bawa, "Widespread Climate Change in the Himalayas and Associated Changes in Local Ecosystems" PLos one, May 2012.

GLOF event had occurred at an interval of 3 to 10 years in the Himalayan region.[9]

The increasing uncertainties with the disasters in the mountains has led various groups including government authorities, I/NGOs, donors and local communities to put efforts on minimizing the impacts of a disaster, however, still the efforts are focused on post-disaster stage including relief, rehabilitation and rescue package than on the preparedness and mitigation strategies. Meanwhile, the unstable geology of the mountains is vulnerable to yet another natural disaster triggered by the movement of the tectonic plate.

Fig 1: The remains of devastation caused by the Dig Tsho glacial lake outbursts in Thame village in 1985.

## GLOF Risk Reduction and EWS

Nepal installed the first EWS in 1998 in Tsho Rolpa glacial lake and Tamakoshi valley after the lake was identified as potentially dangerous lake in a 1994 survey. A total of 25 early warning stations were established– GLOF sensors- 2, Signal relay-3, Warning and DMC-1, DMC-1 and warning stations-18 to relay warning message in sufficient time to the people living in Rolwaling, Tamakoshi and

9 Samjwal Ratna Bajracharya, "Glacial lake outburst floods risk reduction activities in Nepal,". Asia-Pacific Symposium on new technologies for prediction and mitigation of sediment disasters, Japan Society of Erosion Control Engineering (JSECE), 18-19 Nov 2009, Tokyo, Japan.

Bhotekoshi Rivers. However, due to poor monitoring, maintenance and lack of ownership of the infrastructure and equipments installed for the project, the EWS in Tsho Rolpa was not fully operational after less than three years from its installation. Before, the installation of EWS, a siphon system was installed in 1995 where an open channel through the moraine dam was cut and the four-metre-deep artificial spillway completed in 2000 succeeded in lowering the lake level by three metres.[10] In the meantime, the United Nations Development Programme and Practical Action through the Comprehensive Disaster Risk Management Programme are working on rapid field assessment to establish a low cost, less technology and resource intensive and community oriented EWS for the communities downstream of Tsho Rolpa in early 2012. Similarly, Wireless Fidelity (Wi-Fi) based lake monitoring system in Imja lake in the Khumbu region has been set up by ICIMOD and Keio University of Japan. A web-camera with 24 sensors has been connected through Wi-Fi network where the camera takes image of the lake in every 10 minutes along with the atmospheric data from the sensors.[11]

EWS has been set up in the upper Bhotekoshi River in 2001 to protect the hydropower project and also provide warning signals to the downstream communities in case of flash floods and GLOFs. An automated sensor and a siren are placed to signal a warning in case the water level exceeds the threshold limit.

The term 'early warning' is used in many fields to describe the provision of information on an emerging, dangerous circumstance where that information can enable action in advance to reduce the risks involved.[12]

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10 Meena Menon, "Glacial lake, a potential threat", *The Hindu*, May 24, 2011.

11 WiFi network at Imja Tsho (lake), Nepal: an Early Warning System (EWS) for Glacial Lake Outburst Flood (GLOF)

12 National Strategy for Disaster Risk Management -2009, Nepal

Hence, in the case of GLOF, relaying the information before the occurrence of the disaster to the communities and help them to respond or to avoid the threat or at least minimize the risks. An effective and efficient EWS developed in taking account of the need and role of the local communities in managing and adapting the system will be critical to reduce the deaths and loss of properties caused due to disasters.

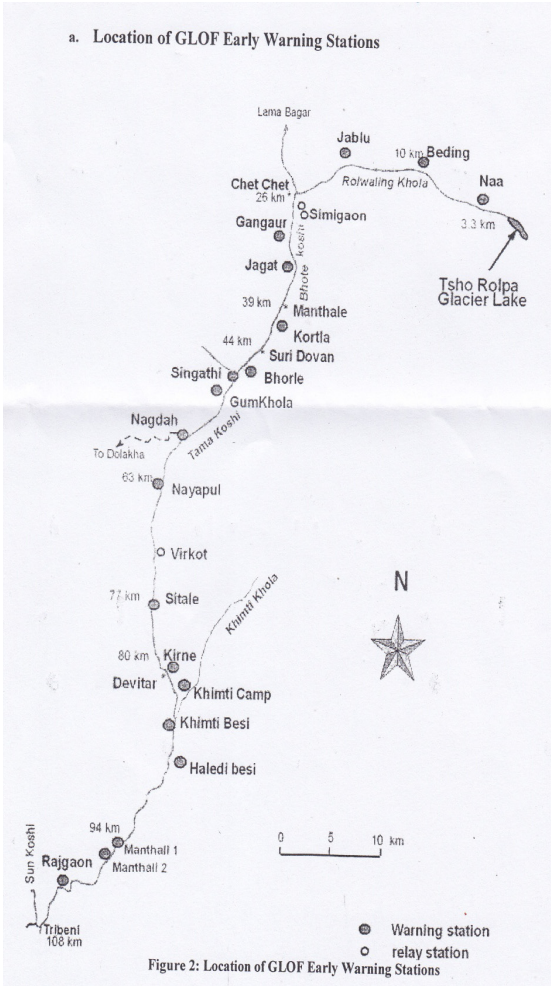


Fig:2: EWS in Tsho- Rolpa glacial lake. (DHM)

## Conclusion

Water-induced disasters are inevitable along the HKH region, and the level of preparedness to deal with it is inadequate in most of the countries including Nepal. The global climate change compounded with local environmental and geological conditions, the rapidly growing glacial lakes are likely to pose danger for the people in the mountains as well as to those living down-streams. And at the same time, due to limited resources and technologies to deal during pre and post disaster phases, millions of vulnerable communities living along the downstream villages in the mountain region are exposed to severe environmental, social and economical burdens.

The government in support from research-based organizations and donors is carrying out risk assessment and frequent monitoring of the few potentially threatened glacial lakes namely Imja, Thulagi and Tsho Rolpa and working on mitigation and prevention strategies related with GLOFs in these places. However, there are still a few dozen similar glacial lakes in the mountains that can pose hazards to the people. Identifying the vulnerabilities of the glacial lakes and study of the places where the GLOFs occurred is vital to develop disaster risk reduction strategies for long-term. Early warning systems and climate forecasting systems should be developed at district or regional levels to make community-level EWS fully functional.

Under its "building resilience to climate related hazards" component, the Strategic Program for Climate Resilience Document has stated, "the establishment of community based early warning systems (for GLOFs, floods, landslides and droughts) will be focused initially in targeted areas that are most vulnerable to climate change impacts".[13] But, due to the weak geological formation and steep slopes in the mountains, construction of physical infrastructure including dams and siphoning walls is still a big challenge in terms of investment as well as the technical resources. However, there is a

13 Navin Singh Khadka, "Left out in the cold", The Kathmandu Post, August 12, 2011.

need to emphasize on creating awareness among the people living near the vulnerable areas and also provide information through various media including radio, mobile, alarms and sirens among others about the threat related with the disasters as a part of the mitigation and adaptation measures.

The activities related with the DRR is moving steadily in recent years, thanks to the positive role of the UN bodies, government authorities, I/NGOs and donors, however, still there is lack of integrating the risk reduction and mitigation strategies in various development programs focused on disasters by the concerned actors.

The level of awareness and knowledge sharing about risk reduction by the government is appreciable, but now action-oriented approaches are needed to fight disasters that take lives of hundreds of people every year in the country. "If we invest one dollar in disaster risk reduction, we can get 50 dollars in disaster response mechanism and save lives of many people and property."[14]

Due to the failure to properly aware the local communities and work adequately on risk mitigation and prevention strategies, various types of natural disasters are claiming huge loss of lives and properties every year. The government should formulate a Disaster Risk Management Act that identifies the disaster preparedness and prevention measures as one of the key components in minimizing the risks related with any disaster at the earliest. The role of vulnerable communities should be in utmost priority while implementing any disaster mitigation and resilience strategies to reduce vulnerabilities to natural disasters. Finally, there is a need of strengthening the institutional and human resource capacity of the Department of Hydrology and Meteorology to forecast real time data on weather and rainfall as majority of the meteorological stations are either non-functional or poorly equipped to come up with relevant data.

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14 Amod Mani Dixit, *"High time for investment in disaster risk reduction",* The Kathmandu Post, January 15, 2011.

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# Climate Change and Energy Structure of Nepal

Prof. Dr. Rhiddi Bir Singh[1]

**Country Landscape:**

The state of Nepal is typically characterized by a varied landscape having diverse geographical, topographical and physiographical situations within a narrow span of 200 kilometers from north to south and about 850 kilometers from east to west. About 83% of the land area is raised into rugged hills and mountains. The country still maintains the highest topographical variations in the world ranging from 80 meters up to 8848 meter above sea level within the narrow range of 50 to 100 kilometers. The country can be classified into geographic, physiographic or ecological zones. Many versions are found regarding the types of landscapes retained in different categories. Against the snow capped mountains on the northern belt there is barren dry land. The southern part of the country is represented by the continuous belt of plain land area stretching 20-40 kilometer wide and about 850 kilometer from east to west end.

Nepal's topography falls within the subtropical monsoon climatic region, but because of the unique variations of topographical exposure and elevation distribution, the country enjoys a wide range of climatic effects. The plain land along with the Siwalic and Churay regions pass through hot monsoon or sub-tropical climate with hot and wet summers but mild, dry winters. The lower mid-hills up to

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about 2000 m. experience a warm temperate monsoon climate along with warm, wet summers and cool but dry winters. The middle mountain region at around 3000m. experiences a cool temperate monsoon climate with mild, wet summers and cool, dry winters. The high mountains at around 4000m. possess an alpine climate along with cool summers and frosty winters. The northern belt of high Himalayan region above the snow line possesses a tundra type arctic climate associated with perpetual frost and cold environmental conditions.

The annual precipitation varies greatly from one place to another every year. The average annual down pour ranges from 250mm to 4500mm. Climate change has already shown the effects on the temperature profile observation by shifting the maximum scale up and the minimum scale further down during summer and winter respectively. The range of precipitation has varied greatly throughout the country. Droughts and floods are rampant in many parts of different geographic regions.

The population census revealed in 2001 that the total population is 23.15 million with an annual rate of growth of 2.25%, which is higher in comparison with the international level. The recent population census of 2011 states the nation's total population as 28.53 million with the annual growth rate of 1.40%.

The population distribution is very unequal and heterogeneous in terms of physiographic areas. Only about 7% people inhabit the high mountain region occupying about 35% of the total land area. Mid hills region occupies about 42% land area and supports about 44% population. The southern belt of the Terai stretches 23% of the fertile plain land area of the nation, which supports 49% of the population. Still about 83% of the total populations live in rural area with relatively high growth rate. The urban population with about 17% population shows some decreasing fertility rate.

Nepal is classified as a Least Developed Country. Gross Domestic Product for the fiscal year 2008-09 is Rs. 818.4 billion. The

structure of GDP indicates that the contribution of agriculture, forestry and fishery is estimated at 32.4%, which is the largest sector. Since the last three fiscal years, the nation's economic growth rate has remained stagnant at a mere 3.5 %. Per capita income is just US $ 536, which is the lowest figure among the SAARC countries. Apart from the traded commercial energy resources, the solid biomass fuels have not been included in the GDP assessment. This factor also affects the lower level of GDP growth.

### Effects of Climate Change

Climate change is a worldwide phenomenon. Nepal cannot stand alone without due consideration of effects assessment, analyses and evaluation. Only after these, the required strategic steps of adaptation and mitigation processes can be initiated.

The cumulative effects of the factors inducing the atmospheric concentrations of carbon dioxide have shown consequences like snow melting, hotter summer, much colder winter, anomalies on occasional snow falls, shifting of the conventional range and quantities of precipitations, changes in the courses of natural waterways, drying up of agricultural land, etc. It is not a simple case to understand and solve in the near future. No single country can solve it but if it is properly diagnosed and understood, can definitely attempt to minimize national causes to climate change gradually moving towards wider and larger regional or global scale reduction.

Nepal is surrounded by two of the most populated countries of the world. China and India together comprise of a population of 2.5 billion. With due consideration of the GHGs emission, each country should be made mandatory to work for minimizing its gross contribution in terms of climate change effect on a global scale. It should be made a compulsory requirement of the member countries of the United Nations and member states must also be able to present the gross energy resources generation and consumption database to be evaluated by the concerned international monitoring body. The parameter should be on the scale of fossil fuel and the renewable fuel

resources consumption. The consumption of more fossil fuel should be taxed or penalized against the consumption of the natural renewable fuel resources. The relative ratio of renewable fuel resources against the fossil fuel can also form the basis of evaluation.

China is the number one consumer of the energy resources in the world. India also stands under top 10 energy consumers. Both the countries are heavy generators of the GHGs to the atmosphere. In fact, all the developed countries are proportionately responsible to the climate change effects through the load factor of carbon emission. Developing countries are relatively less responsible for the generation and the accumulation of the GHGs in the atmosphere.

**Ranking of the Fuel Resources Generating Energy in Nepal (Fiscal Year 2008-09).**

| Fuel Resources | Quantity In Million | Energy Generation In Million GJ | Share % |
|---|---|---|---|
| Fuel Wood | 18.425 M MT | 311.1673 | 77.69 |
| Cattle Dung | 2.114 M MT | 23.0174 | 5.74 |
| High Speed Diesel | 0.4665 M KL | 17.6931 | 4.41 |
| Agriculture Residue | 1.062 M MT | 14.6847 | 3.66 |
| Electricity | 2.2604 M Mwh | 8.1372 | 2.03 |
| Coal | 0,3086 M MT | 7.7515 | 1.93 |
| LPG | 8.1558 M Cylin | 5.7026 | 1.42 |
| Motor Spirit | 0.1242 M KL | 4.1584 | 1.03 |
| Biogas | 0.5934 M MT | 2.5931 | 0.64 |
| Superior Kerosene | 0.0701 M MT | 2.5414 | 0.63 |
| Aviation T. Fuel | 0.0894 M KL | 2.4934 | 0.62 |
| Other Petroleum | ---------- | 0.4099 | 0.10 |
| Micro H.Power | 37800 Mwh | 0.0136 | 0.03 |
| Light Diesel Oil | 378 KL | 0.0148 | 0.0036 |
| Solar PV | 1556 Mwh | 0.0056 | 0.0013 |
| | | **400.5064** | **100.00** |

Source: R. B. Singh, 2011. Based on WECS Energy Synopsis Report 2010.

Nepal is far too inferior in terms of the energy resources generation and consumption structure in comparison to its immediate neighbors. The per capita energy consumption is just 15 GJ. But the important point to note is that we generate about 90% of the energy by utilizing renewable resources. A Least Developed Country like

Nepal, where the ratio of Renewable Energy/ Fuel Resources to Fossil Fuel Resources is around 9, it should be clearly classified as a least carbon emitting country. The gross energy resources generation and consumption structure of Nepal is illustrated in the above table.

In the year 2009, Nepal consumed 22.2 million metric tons of biomass for energy purposes alone. Major primary sources of energy in Nepal is undoubtedly the renewable biomass fuel generated within the nation.

About 14 different sources of energy is generated and consumed in the country. Out of that the most popular energy resources is still the solid biomass fuel. By assessing the origin of the fuel resources these can be classified into two:-

**Renewable Resources**: Fuel Wood, Cattle Dung, Agricultural Residues, Electricity (Hydro Power), Biogas, Micro hydro Power and Solar PV.

**Non-Renewable Resource**s: High Speed Diesel, Coal, LPG, Motor Spirit, Superior Kerosene Oil, Aviation Turbine Fuel, and Light Diesel Oil.

Nepal is equally dependent upon the natural as well as fossil fuel resources for energy generation purpose. But the relative share in energy generation purpose differs significantly.

We consumed 14 different energy resources during the fiscal year 2008-09 and generated 400 million 506 thousand and 400 GJ of energy. Energy resource wise only two types have been generated and consumed. The major one is the renewable resources and the minor is the fossil fuel resources. The renewable fuel resources are further classified under:

- Biomass Fuel Resource
- Physical Fuel Resource

The biomass fuel resource is composed of fuel wood, cattle dung and agricultural residues. The physical fuel resources are composed of macro and the micro hydro power and the solar PV.

The non-renewable fossil fuel resource is represented by petroleum products and coal. Petroleum products are HSD, LPG, MS, SKO, ATF, and LDO.

The country generated primary fuel resources made about 360 million GJ contributing 89.81 % of the total energy generation.

- Bio Resources 351.4625 million GJ 87.75 %
- Physical Resources 8.2788 Million GJ 2.06 %

Import assisted fossil fuel resources generated 40.7751 million GJ making just 10.15 % of the total energy consumed.

- Petroleum Products 33.0236 million GJ 8.22 %
- Coal 7.7515 million GJ 1.93 %

The relative ratio of in-house generated renewable energy resources to the imported fossil fuel resources for Nepal is 8.83. The resultant value should be a key basis to distinguish and classify the gross energy resources consumption in reference to the global climate change effect due to the green house gas emissions.

**Positive Advantages of the Use of Renewable Fuel Resources**

Renewable resources by virtue of their life cycle provides a safe way out in order to maintain the GHGs emission and the atmospheric concentration check and balance in its regulated close cycle operation system.

Renewable physical resources such as hydro, solar, wind, geothermal and tidal powered energy generated are non-carbon based. Resource based emission factor is just nullified.

The bio-resources based fuel system such as plant and animal originated resource is carbon based. But the combustion generated emissions of GHGs are almost totally neutralized by the natural

carbon cycle operation. All the biomass resource consumed for energy purpose doesn't generate the extended period effect of GHGs emission as long as it is regenerated sustainably. The carbon sequestration assimilated and retained by the growing plant species assist the CO2 emission from the biomass fuels.

### Energy Related Issues in Nepal

1. Nepal is one of the smallest consumers of the gross energy resources in the world. But it generates about 90% of the primary energy resources. Per capita energy consumption is around 15 GJ.
2. The energy consumption structure is dominated by our residential sector with about 89.07%. Transportation sector consumes 5.21% and the Industrial sector - 3.34%. The agriculture and commercial sectors consume just 0.91% and 1.27%.
3. There exists no energy policy or directives as regards to the residential sector energy profile or any other sector. The state so far has not realized the true contribution of the renewable energy resources from the in-house generated bio resources in the national energy scenario.
4. It is assumed that the contribution of the energy sector to natural disaster emanating from climate change is estimated to be about 25%, which has to be seriously reassessed and re-estimated as regards to Nepal's context.
5. The import bill of 10% of the nation's energy in the form of fossil fuel surpasses the national merchandise export earnings.
6. The per capita CO2 emission for Nepal is 0.1 MT and its share in the global scale is zero % (2000).
7. Nepal is one of the few countries in the world that stands clean even today in the energy application front.

8. The renewable energy resources particularly solid biomass has never been accepted by concerned institutions as a formidable energy commodity, which could be transformed into a tradable commercial fuel that could generate clean energy by approaching strategic development steps.
9. The nation's energy lobby is biased towards hydro-power from the business development point of view or the import facilitation of petroleum products.

## Conclusion

1. Nepal is well ahead among SAARC nations and in the world in the generation and application of 90% of its energy output from renewable resources.
2. Per capita energy consumption wise, it is one of the poorest nations in the world. But it can be considered that Nepal is one of the most successful cases as far as the per capita CO2 emissions scale is concerned.
3. Nepal contributes almost zero on Natural Disasters caused by the Climate Change Effect, which is directly linked with the GHGs emission.
4. Kyoto Protocol of 1997 has not been effectively and sincerely implemented to reduce the scale of worldwide GHGs emissions.
5. The choice of the energy resource is the primary factor for GHGs emission and the magnitude of load factor to Climate Change.
6. All countries should make a comprehensive energy profile depicting the types of the resources consumed for energy applications.
7. Renewable and the non-renewable energy resources should be distinguished and classified under world-wide acceptable ranges.
8. Until and unless the use of fossil fuels such as coal, petroleum products and gas cannot be diminished either by substitution or by replacement, the magnitude of global warming phenomenon

cannot remain in its balanced, natural state. It means, the positive effects of climate change will continue to grow and pose more serious consequences in the coming years.

9. The developed or the developing industrial countries consuming larger share of the fossil fuels must be brought under certain measured control level mechanism for which there is no existent operational process. Due consideration must be given to GHGs control and the minimization of the climate change effect at the global scale.
10. Only by verbal commitments bereft of implementation and the Earth summits will not be effective to reduce worldwide effects of climate change caused due to atmospheric concentration of carbon dioxide and other sources of GHGs.
11. Therefore, the use of the natural resources for energy application should be seriously revisited considering the emission factor and load neutralization as well.

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# Disaster Management and 2005 Earthquake

Salma Malik[1]

> *"The morning of 8th October started as a normal day but….what happened that morning …changed the lives of thousands of people, what was built in decades and generations was lost in seconds."*
>
> - Mr. Shaukat Aziz, Prime Minister of Pakistan, March 2006.

"All societies are vulnerable to disasters, both natural and manmade,"[2] reads the course manual on disaster management, and thus require "a systematic and sustained process which involves coordination, planning, organizing as well as post disaster relief, settlement and rehabilitation," which by itself is a major task. Like all other countries, Pakistan has also faced and been carrying out management of wide scale calamities and natural disasters, whenever any such unfortunate situation occurred, whether in the shape of earthquakes, floods, drought or cyclones. However the October 2005 earthquake with its devastating 7.6 magnitude brought about a new dimension to the concept of disaster management as well as rehabilitation and settlement. The entire northern belt of the country spanning an area of 30,000 km from the Azad Kashmir to the Khyber

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2 Course Manual, "Introduction to Disaster Management," Virtual University for Small States of the Commonwealth (VUSSC) Disaster Management Version 1.0, http://www.col.org/SiteCollectionDocuments/Disaster_Management_version_1.0.pdf, accessed April 29, 2012

Pakhtoonkhwa province, including the capital territory was affected and not less than 73000 people lost their lives, a much bigger number facing injuries and loss of land, livelihood as well as displacement. The devastation resulting from the initial earthquake was compounded by hundreds of aftershocks, both of major and minor intensity, inhospitable and a total alteration in the topography of the affected terrain, as well as heavy rains, bringing in harsh winters. This resulted in the institutionalizing of mechanisms to deal with such disasters instead of relying on ad hoc need based commissions and monitoring bodies. Through this paper, an attempt is made to examine the steps taken by the Pakistan government in order to manage and mitigate the momentous 2005 earthquake, and how successfully have these mechanisms been placed to detect and handle future such crises and natural or man-made disasters.

According to the International Committee for the Red Cross, Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters. Where on one hand, no country is immune to disasters; vulnerability to a disaster may vary and is dependent on preemption, prevention and better preparedness against such occurrences. Disasters may range from man made to natural calamities, environmental, complex emergencies as well as pandemics and spread of contagious or infectious diseases. Mostly, it has been observed that ill planning, lack of preparedness and poor management tools and strategy further worsen and exacerbate a disaster scenario and may end up turning it into a complex emergency, entailing a breakdown in law and order to civil strife.

Preemption or preparedness certainly cannot ensure the occurrence of a disaster, specially natural ones, but through better disaster management techniques, the risk of loss of life and injury can certainly be mitigated, and thus lessen the overall impact of disasters. For instance ensuring and compliance with better safety and building

standards, timely evacuation or moving away from disaster prone areas susceptible to floods, earthquakes, hurricanes etc. and most of all community-based preparedness and management is a necessary prerequisite in disaster management. Where prevention and preparedness are the necessary prerequisites of a well articulated and institutionalized strategy, post-disaster, relief, recovery, rehabilitation and sustainable development are equally critical in ensuring viable disaster risk reduction and management.

Whether they are mono-causal issues such as a natural disaster, which together with a pre-existing protracted crisis makes accommodation and handling of the problem very difficult, to complex emergencies, which at best are a combination of man-made as well as natural disasters, that could manifest as an internal war, with issues such as mass scale population displacement, targeting of civilians, economic and political repercussions, mobilization of military and para military forces are few of the complicating factors. These problems and challenges have been at various levels, from the impact of a complex emergency such as the earthquake to the immediate rescue and relief of the affected population, accessing and responding to worst hit areas in the remote localities. Who were the early responders, and ran the relief operations and what past experience did the country have in disaster management, the very crucial role played by donor agencies as well as who all contributed and responded to the event, ranging from domestic actors, that included NGOs, volunteers, civil and military administration, political representatives, aid agencies and non-state actors to the external support rendered by state actors, international organizations, donor agencies etc. need to be analyzed carefully. Another important question to examine is what impact such events have on the civil military relations of the country as well as its governance capacity. What problems were faced in the rehabilitation and reconstruction of affected population and areas, and last but not least what steps were or should have been ensured by the government to face future emergencies more effectively, such as early warning mechanisms,

best practices adopted and establishing of coordinating bodies tailored to face and handle such emergencies in future.

## 2005 Earthquake: Internal Challenges & Impediments

The 2005 earthquake not only affected 73,000 people, but covering an area of 30,000 square kilometers, it wreaked a complete havoc in nine out of 120 districts of the country, these being the northern districts and some of them falling in the territory of Azad Kashmir. Not only was the physical trauma to the earthquake very severe, but worst was the immediate impact of the main tremor and its approximate 1300 aftershocks. Although the earthquake impacted both rural and urban city centers equally but amongst the most badly hit areas was the northern city of Balakot, which was totally obliterated, whereas the state capital of Kashmir Muzaffarabad had a large population and infrastructural damage.

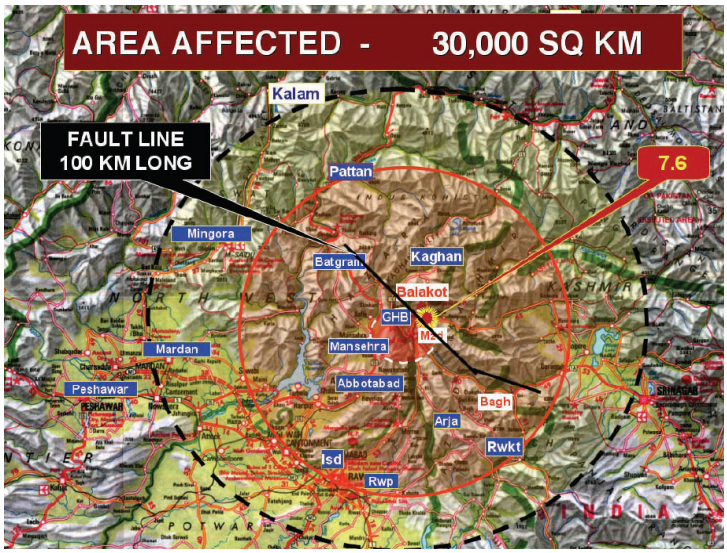


Figure 1: Epicenter of the Earthquake & Area Affected. Source: NDMA 2007[3]

3 Iffat Idrees, "Earthquake – 8/10 Learning from Pakistan's Experience," Report by National disaster Management Authority, Prime Minister's Secretariat, Government of Pakistan, October 2007. P. xi.

What worsened the impact of the quake was that majority of road links and access routes were blocked or washed away as a result of the massive land slide that continued even after the main tremors, making rescue and relief operations difficult and risky at the same time. Immediately after the earthquake the weather turned cold and rains set in, which further worsened the situation.

The bulk of the administrative districts affected were open countryside, and 80% of their population was widely spread out, as well as located in the mountainous areas. With Muzaffarabad as one of the worst hit areas, there was no central administration authority left and local government's structures were completely left paralyzed. As the civil administration had neither the means nor the capacity to cater to such a wide scale emergency, the military had to step in and lead the rescue, relief and finally the rehabilitation efforts. The military units deployed alongside the line of control[4] also suffered serious damage.

In a study carried out with regards the damage assessment, following statistical observations were made: "Most of the affected people lived in mountainous regions with access impeded by landslides that blocked the roads, leaving an estimated 3.3 million homeless in Pakistan alone. The total area affected was 30,000 km,

4 The *line of control* refers to the military control line between the Indian- and Pakistani-controlled parts of the former princely state of Jammu and Kashmir—a line which, to this day, does not constitute a legally recognized international boundary but is the de facto border. Originally known as the "Cease-fire Line", after the September 1965 war between India and Pakistan, it was re-designated as the "Line of Control" following the Simla Agreement, a ceasefire agreement signed on 3 July 1972 signed between India and Pakistan after their third military exchange that also led to the dismemberment of Pakistan and creation of independent Bangladesh. The part of the former princely state that is under Indian control is known as the State of Jammu and Kashmir and also consists of Ladakh a predominantly Buddhist area. The areas that fall under Pakistani control are known as Gilgit-Baltistan and Azad Jammu and Kashmir (AJK).

included a range of unprecedented damage and destruction, such as: Houses: 500,000 (56%), Medical facilities: 365 (65%), Telecommunications: Exchanges (86-34%); Power lines (33,225-13%), Schools/ colleges: 6083 (50%) and over 1000 hospitals. Due to the earthquake, there was a significant loss to Pakistan's infrastructure. There were collapsed and blocked roads, a total loss of clean water supply, partial loss of telecommunications infrastructure, partial loss of UN VHF system, and in some cases hospitals were non-functional."[5]

Whereas, the Pakistan military data yields more or less the same statistics, but with slight variations, with 73,338 people dead which include 18,095 children of school going age, who died as a result of collapsed school buildings, around 1,28,304 injured, including those with lasting bodily injuries. Houses (600152 - 76%), educational institutions (7669 -67%), health facilities (574 -63%), roads damaged 4,429 km (37%), electricity 60-70%, disruption in water supply 30-40% and lastly telecommunication 35-40% were either totally destroyed or severely damaged. A total of 500,000 families were directly affected.[6] Such statistical assessments of course do not take into account the loss of income and source of livelihood for individuals, commercial enterprises and the total abolishing of income generating assets, which compound the mental stress and trauma suffered by the victims. In a study carried out on the psychological effects of the earthquake in Turkey, it was said, that "survivors show various post-traumatic stress reactions, such as fear, anxiety, sadness, bereavement, anger, memory and concentration problems, irritability, sleep and appetite problems, flashbacks related

5 Paul Phister, Dave Allen et al, *Pakistan Earthquake Case Study*, www.dodccrp.org/files/case_studies/Pakistan_EQ_case_study.pdf

6 Tahir Raza Naqvi, *Role of Pakistan Military 8th October 2005 – Earthquake*, Regional Network for Security Studies Center – Non Traditional Security Issues, Near East and South Asia (NESA) conference, Colombo, June 22-23, 2009.

to the event, unwanted intrusive thoughts and images and avoidance of quake reminders."[7]

The National Disaster Management Authority in its 2007 follow up study of the quake enlisted various challenges faced by relief and disaster management bodies, starting with extensive damage and destruction of road network, water and sanitation pipelines, breakdown of power supplies as well as other basic amenities, extensive environmental damage along with a complete breakdown of civilian infrastructure, also the military barracks and regiments present in Khyber Pakhtoonkhwa and Azad Kashmir were decimated.

| Housing Units | | | |
|---|---|---|---|
| No. Destroyed | Pre-Quake Total | % of Total Destroyed | Population Affected (mn) |
| 600,152 | 787,583 | 76.2% | 3.5 |
| **Schools and Colleges** | | | |
| | Destroyed/ Damaged | Pre-Quake Total | % Destroyed/ Damaged |
| AJK | 3,685 | 3,879 | 95% |
| NWFP | 3,984 | 7,577 | 53% |
| TOTAL | 7,669 | 11,456 | 66.94% |
| **Health Care Facilities** | | | |
| Destroyed/Damaged | Pre-Quake Total | % Destroyed/Damaged | |
| 574 | 782 | 73.4% | |
| **Roads: Length Affected/Total Length (km)** | | | |
| | Damaged | Pre-Quake Total | % Total |
| AJK | 2,366 | 5,305 | 45% |
| NWFP | 2,063 | 6,658 | 31% |
| TOTAL | 4,429 | 11,963 | 37.02% |
| **Telecommunications** | | | |
| | Exchanges | Lines | |
| | Installed | Disrupted | Installed / Disrupted |
| AJK (SCO) | 132 | 48 | 134,841 / 114,404 |
| NWFP (PTCL) | 119 | 38 | 20,294 / 12,902 |
| TOTAL | 251 | 86 | 249,245 / 34,196 |

**Figure 2: Damage to physical Infrastructure by the 2005 earthquake. Source NDMA Report 2007.**

The challenges faced in the rescue and relief operation were manifold. As mentioned above, the enormity and scale of destruction

7 Mehmet Ecevit, Nuray Karancı and İlknur Öner, *March 08, 2010 Başyurt Karakoçan (Elazığ) Earthquake: Psychosocial Evaluation Report*, April,12, 2010.

and damage to both humans and infrastructure was of such a nature, that entire administrative machinery of the North belt of the country was rendered virtually ineffective. The immediate challenges faced ranged from an institutional as well information vacuum, rescue and removal of the injured, trapped and dead people, accessing and reaching out to remote localities, and immediate provision of relief operations. The first respondents to observe and assess the damage was the military, as there existed a lack of adequate civilian facilities, and this also brought to focus the question of disaster preparedness as well as early warning. Despite being on major tectonic fault line, and with past experience of major earthquakes causing severe damage to the area concerned, over the years, there had been no adequate safe guards and protective mechanisms. Given the intensity of the quake, the scale of the damage and destruction could not have been prevented, yet public education and sensitization towards facing such calamities is a necessary prerequisite, as witnessed in the recent tsunami resulting from Japan earthquake, where weekly drills and public awareness programs, helped in preventing a lot of human loss.

Compounded with this was the near absence of early respondents, who ideally should have been from the civic infrastructure and public governing bodies, yet as described earlier, neither did they exist in such an organized and disciplined force, nor after the devastation were they in a position to respond fully. In this capacity the military stepped in, as not only was it, the most well trained, disciplined, well equipped force, but also had a full knowledge and awareness of the affected areas. Given the inaccessibility to some of the worst hit areas, it was the military aviation wing, later helped out by helicopters and rescue teams sent by various countries that proved critical in rescue, relief and evacuation process. The military given their expertise, high discipline and organizational strength was the only well equipped force to take the initiative in rescue and relief, and with the blessings of the government and popular support, the ownership of the entire operation "lifeline" fell into the hands of the military. Any citizen led relief activity would feed into and work at

tandem with the military effort, and the international donor community also owing to a pattern established by the military synchronized their efforts accordingly. The impact on civil military relations, although not manifest at the time emerged much later, when during the year 2010 floods, the general population as well as donor communities, both local and international relied on the military's potential to deliver and perform far more than the civil administration, thus indirectly undermining the credibility of the latter.

There is no denying the fact that natural disasters are inevitable, unavoidable, and entail a high risk inherently. However, risks can be significantly reduced, if there is a better preparedness, which in turn stems from the ability to predict, prevent and lessen the impact of disasters requiring a multi disciplinary and multi sectoral approach to provide protection and relief to the vulnerable people. Amongst the most vulnerable groups were and remain women and children. According to a UNICEF estimate, half of the population killed directly and affected in consequence to the earthquake were children. The disaster has claimed a "lost generation." Stated the UN report "Pakistan Earthquake 2005: Rescue, Relief, Rehabilitation and Reconstruction," which was later confirmed by the Pakistan military spokesperson Major Gen. Shaukat Sultan two days after the quake that, "a whole generation has been lost" in Kashmir and the Khyber Pakhtoonkhwa. The local government gave a figure of around 17,000 students dying, which is independent of many other young people who were not in school at the time. The UN spokesperson Omar Abidi said, that "they have also been affected emotionally. Those that were going to school now find that there are no schools. They are at risk of diseases. As for the impact on children, it is significant. Nearly four-fifths of all schools and public buildings collapsed in the quake."[8]

8 AFP, "Half of Quake Dead were Children: UNICEF," *Dawn*, 12 November 2005.

As mentioned above, that the success of disaster risk reduction and preparedness relies very much on community sensitization and education, however in case of the 2005 earthquake, the complete destruction of local government machinery, made the immediate response to disaster management very difficult. Although the military took the lead through its three pronged disaster relief operation in both instances, but the civilian vacuum also provided a space for non state actors such as ideologically driven elements to establish their presence in these far flung localities. Organizations such as Jammat u Dawah (JuD), gained a lot of public support and popularity after the earthquake, by proving itself as one of the only groups operating an effective aid and relief service in the affected region. The JuD established 13 relief camps in the affected districts, providing food to the displaced and running an ambulance service, and at one time had not less than 2000 members working in the region. [9]

With a wide range of actors to deal with both from the affected and vulnerable groups as well as disaster respondents, local and foreign, the additional problem relief operators had to cater to was, the refusal by certain percentage of victims from leaving their households, despite the rain, harsh winters as well as non-existent and very dangerous living conditions. This is an established fact that owing to the rapid, timely and systematic response despite the nature of the emergency, primarily by the military and reinforced by the foreign relief troops and teams, there are no post-disaster casualties or deaths recorded which could occur during rescue or relief operations. In areas such as the Allai valley, people despite warnings of worsening conditions, chose to remain back in their shanty homes and croplands, than shift in to camps, making the relief work much more difficult and spread out. The aid workers alongside evacuation, relief and sustenance provision, now had to develop plans to provide families with roofing material and other supplies that "will allow them

9 Reza Jan, "After the Flood, A Stream of Radical Islamists," http://american.com/archive/2010/august/after-the-flood-a-stream-of-radical-islamists/ Tuesday, August 10, 2010

to repair damaged homes or build temporary winterized structures that—especially at higher altitudes—are considered preferable to tents, which in any case are in short supply. Provided that such shelters can be built before winter sets in, many relief officials say, the approach is preferable over the long run to housing victims in squalid tent cities where they run the risk of losing touch with communities and livelihoods." [10]

As a remedial measure, the government immediately clamped down on any construction activity taking place throughout the country and more so in the traditional seismic zones, to make them compliant to new building codes and to be able to withstand strong tremors, as part of a disaster management and preparedness strategy. This was more in response to the collapse of a residential tower complex in the heart of the capital city which claimed many lives and minor to heavy structural damages to other high rise buildings. As stated by Saleem Altaf, chairman of Earthquake Reconstruction and Rehabilitation Authority that sprouted as a result of the quake, "earthquakes don't kill people, poorly constructed buildings do. Construction regulations have to be robust, and they must be strictly implemented." [11]

**National Level Efforts and Conduct of Relief Operation:**

At the domestic level, after taking a damage assessment as well as prioritizing the challenges and issues concerned, a two pronged strategy was adopted. Two new institutions were established which would plan, coordinate, supervise, and execute relief, rescue, rehabilitation as well as reconstruction activities. The first of these being the *Federal Relief Commission (FRC)* on October 10, 2005,

10 John Lancaster, "For Pakistani Villagers, A Risky Decision To Stay As Winter Looms, Quake Victims Resist Evacuation to Camps," *Washington Post*, Foreign Service, 1 November 2005, http://www.washingtonpost.com/wp-dyn/content/article/2005/10/31/AR2005103101564.html?referrer=email&referrer=email

11 *Newsweek Pakistan*, October 11, 2010, pp. 30-31.

and second the *Earthquake Reconstruction and Rehabilitation Authority (ERRA)*, established on October 24th, 2005. Furthermore at the national level, these organizations channelized donors, international relief efforts, non-governmental and civil society organizations, individual donors as well as philanthropists, with media running donation campaigns, being provided access to affected areas and garnering support for the quake victims. The president and prime minister both made personal appeals to the nation as well as international community to provide all types of relief and assistance work.

The FRC was created to manage and coordinate the entire relief operation post earthquake, and comprised of a civilian and a military wing, each headed by a chief coordinator. The civilian wing incorporated all key civil institutions, that had any relevance to the earthquake, ranging from ministries to institutions such as the National logistics cell, utility store cooperation, national databank and registration authority (NADRA) etc. whereas the military wing had to supervise, coordinate, monitor, lead the administrative and all related aspects of search, rescue and relief operations.

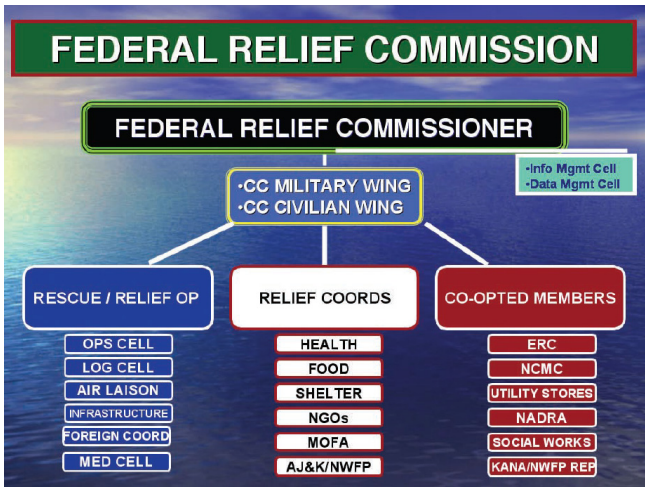


Figure 3: Organizational Structure of Federal Relief Commission, NDMA Report 2007.

The FRC was merged into the ERRA in March 2006, after successfully fulfilling its mandate and through the active assistance provided to it both in terms of human resources as well as infrastructural assistance from home and abroad.

The ERRA, was established as a central body to coordinate the efforts directed towards the reconstruction and rehabilitation activities in the affected areas, as well as connect with donors and sponsors to track the progress of the relief programmes, with a special emphasis on the utilization of funds and donations (around US$ 5 billion), transparently and judiciously. However with the FRC already performing most of the mandated tasks, it was not initially welcomed. The ERRA was assigned to carry out;

- Macro planning of the reconstruction and rehabilitation efforts in the earthquake affected areas.
- Development of Sectoral Strategies for the key sectors undertaken by ERRA.
- Financing of the projects.
- Approval of the projects, and the formulation of PC-1s.
- Monitoring and Evaluation of the completed as well as the under construction projects.
- Coordination with and facilitation to the implementing partners.
- Implementation of the projects in coordination with the local government authorities.[12]

At the operational level, a large scale deployment of army (amounting to three divisions) was carried out, which within twenty four hours, started to clear road blocks and landslides through its

12 Lt Gen. Sajjad Akram, Deputy Chairman ERRA, "Managing Earthquake Reconstruction and Rehabilitation Authority — Lessons Learnt," http://www.erra.pk/media/latestarticles/Managing%20ERRA/default.asp, accessed April 30, 2012

engineers to provide road link to affected areas. Muzaffarabad the state capital, was not only the second worst hit city after Balakot, but immediately after the earthquake its land access was blocked, which the military restored within the first 24-48 hours, as these were critical road links. The strategy to tackle the emergency was three pronged. The first phase spanning the initial fifteen days was the immediate rescue & relief phase (October 8-20), the next three months were dedicated to creation of stability (October to December 2005) and thereafter, maintenance of stability which went up to March 2006.[13] The first phase, dealt with the rescue of survivors, vulnerable people, search and removal of the dead as well as evacuation and treatment of the injured. The army was assisted by not less than sixteen foreign rescue teams. The search and rescue also involved the evacuation of the affected people to safe and secure localities and provision of food, water and shelter.

Lastly, keeping in mind the need for a permanent disaster management body to counter multipronged emergencies necessitated the establishment of the *National Disaster Management Authority (NDMA)*. In December 2006, through an Ordinance, the NDMA was established as a focal point and coordinating body to facilitate and implement disaster risk reduction and management strategies. The NDMA has the NDM Commission from the federal to the provincial to the District and Municipal level, for effective community and grass root participation and ownership. The NDMA is mandated to work as the apex singular body through which all stakeholders, including Government Ministries/Departments/Organizations, Armed Forces, INGOs, NGOs, UN Agencies would work. Its tasks include;

- Coordinate complete spectrum of disaster risk management at national level.
- Act as Secretariat of the NDMC to facilitate implementation of DRM strategies.

13 Naqvi, op cit.

- Map all hazards in the Country and conduct risk analysis on a regular basis.
- Develop guidelines and standards for national and provincial stakeholders regarding their role in disaster risk management.
- Ensure establishment of DM Authorities and Emergency Operations Centres at provincial, district and municipal levels in hazard-prone areas.
- Provide technical assistance to federal ministries, departments and provincial DM authorities for disaster risk management initiatives.
- Organize training and awareness raising activities for capacity development of stakeholders, particularly in hazard-prone areas.
- Collect, analyze, process, and disseminate inter-sectoral information required in an all-hazards management approach.
- Ensure appropriate regulations are framed to develop disaster response volunteer teams.
- Create requisite environment for participation of media in DRM activities.
- Serve as the lead agency for NGOs to ensure their performance matches accepted international standards, e.g. the SPHERE standards.
- Serve as the lead agency for international cooperation in disaster risk management. This will particularly include, information sharing, early warning, surveillance, joint training, and common standards and protocols required for regional and international cooperation.
- Coordinate emergency response of federal government in the event of a national level disaster through the National Emergency Operations Centre (NEOC).

- Require any government department or agency to make available such men or resources as are available for the purpose of emergency response, rescue and relief.[14]

The 2005 earthquake was not only a great tragedy, but also a lesson in human resilience and supreme humanitarian assistance, where people from all walks of life from both within the country and helping hands from abroad pitched in to help the affected people in their hour of need. However, the lesson learnt by this devastating emergency was to remain alive and prepared for any form of complex emergency. This may not preempt or prevent the occurrence of the problem, but help mitigate the risk, minimize and reduce it to a level where the impact of the disaster is not so intense. For this purpose the need is to implement, adequate safeguards, permanent and institutionalized disaster risk reduction mechanisms, adaption of best practices, early warning mechanisms, intergovernmental and inter institutional networking, public awareness, training and education to deal with such disasters, infrastructural and construction modifications and identifying as well as strengthening vulnerable communities from the grass roots level to comprehend the consequences of such complex emergencies and be able to self help and cope with them better.

14 Vision of NDMA, http://www.ndma.gov.pk/AboutNDMA.html, accessed April 30, 2012.

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# Managing Disasters in South Asia: Sri Lankan Experience

Chaminda Hettiarachchi[1]

## Introduction

Sri Lanka is not unfamiliar with natural disasters commonly caused by floods, cyclones, landslides, and droughts mainly due to the fact that the country is an Island in a complex geographic location. However, the Tsunami in 2004, took Sri Lanka by surprise showing that the country is vulnerable to low-frequency and high impact events. The Tsunami killed more than 35,000 Sri Lankans, damaged 100,000 houses and caused financial damage estimated at US$ 1.3 bln. an equivalent of 6% of the GDP of the country[2]. However, 2004 Tsunami also taught bitter lessons to Sri Lanka forcing all major stakeholders to act collectively for a comprehensive, long term and holistic disaster risk management framework. It is also important to note that Sri Lanka simultaneously suffered a man-made disaster. We experienced an ethnic war fought for more than three decades starting in 1983 that ended in 2007. Sri Lanka incurred significant losses because of the war with more than 100,000 deaths, a million refugees and internally displaced people (IDPs) and an economic loss estimated at one year GDP of the country[3]. Sri Lankan conflict was

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1 Author is Associate Director, Regional Centre for Strategic Studies (RCSS), Colombo.

2 ADB Institute Discussion Paper Series ,"Economic Challenges of Post-Tsunami Reconstruction in Sri Lanka" *Institute Discussion Paper No. 75* Asian Development Bank, August 2007.

3 Social Development Department of World Bank "The Cost of Violence" The World Bank, March 2009.

considered as "the bloodiest war in Asia" due to its long period, magnitude of the loss and the complexity of the issue. Sri Lankan government managed to end the war in 2009 by militarily defeating the "Tamil Tigers" rebel group. However, Sri Lanka has been accused of committing war crimes during the war by international community but the government denies all such charges. The country currently has a "no war situation" and trying its best on nation building and development in the post-war context.

This paper looks at natural disaster and its link to man-made disaster situation of Sri Lanka with the reference to lessons learnt in managing complex disasters and emergencies. It examines the nature of the natural disaster and stages of managing them paying attention to the roles played by various stakeholders, the process of institutional building in disaster management. The paper also discusses about lessons learnt in this process with the objective of improving disaster management programs in the future.

## Tsunami in Sri Lanka

The most destructive natural disaster of modern times occurred on 26th December 2004 in Southern Asia due to an earthquake that struck underwater close to Sumatra, Indonesia. Tsunami waves hit shores of several countries from Malaysia of East Asia to Kenya of Africa. It killed more than 200,000 people in the region. The Island nation of Sri Lanka in South Asia suffered second worst damage next to Indonesia[4]. According to Asian Development Bank (ADB) records, about 35,000 Sri Lankans lost their lives, 700000 people displaced and suffered damage of about US$1.3bn. It is the worst such destruction faced by Sri Lanka of its 2500 years of recorded history. It has changed lives of Sri Lankans forever. It is also important to understand the context in which that Tsunami affected Sri Lanka.

4 Wikipedia, viewed on 20th May,2012, http://en.wikipedia.org/wiki/2004_Indian_ Ocean_earthquake_and_tsunami.

### Immediate Relief work after Tsunami

Even as the very thought and experience of Tsunami was very negative and destructive, Tsunami also brought some positive learning for Sri Lankans. Just after the waves hit the Island, the courage and bravery Sri Lankans showed in facing the crisis was unimaginable. Some risked their lives to save victims who were not even known to them. Some supported the victims by donating their own meal, sheltering them in their houses and in various other ways. This level of cooperation and collaboration of different divisions of Sri Lankan society showed under the disaster was unheard before. In a country where people were divided on ethnicity, religion and along political ideologies this was very significant. During the disaster, people helped each other by disregarding their background, their ethnicity or their religion. There were even incidents where Sri Lankan military forces and Tamil rebels worked together to face Tsunami challenges. Situation proved that everyone could to work together against a common enemy.

It is commonly agreed that that the relief phase of the post Tsunami situation in Sri Lanka has been successfully managed. Sri Lanka reported no deaths after the disaster caused due to hunger, and no epidemic diseases as predicted by some disaster experts. The relief works just after the Tsunami disaster was carried out mainly by private individuals, civil society organizations and the business community. It is also important to note the great deal of solidarity shown by the international community. International community here means not only foreign governments and international donor agencies, but also international civil society organizations, corporations and foreign individuals. They helped by various ways such as sending emergency aid contributing with their diversified professional expertise, volunteering in assisting victims, and even showing their sympathy from their home countries.

However, Sri Lankan Government was not very active in the first phase of the disaster. For example, till 28$^{th}$ of December 2004, no

government institution functioned to help victims. The main reason was that Government of Sri Lanka (GOSL) was not prepared for such a catastrophe and it did not have expertise in managing such a situation. In addition, the bureaucracy was slow to react. Eventually, the pressure from the civil society and the international community influenced the political leadership to take action. GOSL took control over the situation by establishing three main government agencies namely:- Center for National Operations CNO, Presidential Task Force for Rebuilding the Nation (TAFREN), The Presidential Taskforce for Relief (TAFOR) for the disaster management.[5]

### Short Term Reconstruction

After four month of the Tsunami, TAFREN and TAFOR published the progress report of rebuilding the nation program by Sri Lankan Government.

According to progress report[6], reconstruction process has been categorized under 11 sectors namely Housing and Urban Development, Livelihood, Water Supply and Sanitation, Health, Education, Fisheries, Roads and Bridges, Power, Railways, Telecommunication and Tourism. In the report, the impact on the each sector has been compared with the actual reconstruction works carried out by the government. By analyzing the report, it can be clearly concluded that government has been able to successfully implement programs only on Livelihood Reconstruction. GOSL has paid monthly living allowances to affected families and it has offered subsidized loan facilities for small and medium enterprises affected. Not much work done in the sectors such as Roads and Bridges, Power,

5 "Post-Tsunami Recovery: Issues and Challenges in Sri Lanka" *The Institute of Policy Studies (IPS) of Sri Lanka and the Asian Development Bank Institute (ADBI), Tokyo, Japan in collaboration with The Asian Economics Centre, University of Melbourne, Australia*, October,2005.

6 ReliefWeb, Viewed on 31st May, 2012, http://reliefweb.int/sites/reliefweb.int/files/resources/E6B1DCBEF9FD8754C125723C003F788A-govt-slk-30jun.pdf

Telecommunication or Tourism. In sectors such as Health, Education, and Fisheries reconstruction works are dependent on pledges made by international donors. It was also possible to note that NGOs and INGOs have been assigned to carry out activities mainly in water supply and sanitation, housing and urban development and fisheries.

Basically, GOSL was trying to communicate to the national and international media that it was carrying carry out lot of work in the reconstruction process. However, on the ground level the situation was very different. People living in camps and other areas were complaining that they did not get anything from the government. For example, all the refugee camps located along the southern coast were looked after and maintained by NGOs and INGOs and no presence of government organizations. Basically, the government agencies could not carry out effective system of aid distribution to affected people at the village level. One basic reason for such a failure was the Sri Lankan government's highly centralized style of governance. For example, TAFREN and TAFOR were managed under the direct supervision of the Sri Lankan President. The management of these agencies was appointed by the President based upon personal relationships or political party affiliations. It was also possible to observe that these agencies are managed not by professionals in reconstruction or disaster management but mere business people. In brief, the short-term reconstruction has not been very effective due to the fact that the management process has been centralized and it has not consulted the all the stakeholders.

The selected theme by the TAFREN and TAFOR for the reconstruction was "Rebuilding the Nation". But major drawbacks of these plans were that they focused only on reconstruction of infrastructure not much emphasis was given to socio-psycho dimensions or human aspect of rebuilding. Even the reconstruction of infrastructure was not based on innovative or new approach rather restoring to the old conditions. Therefore, the theme on rebuilding the nation was only limited to its name.

## Medium Term and Long Term Reconstruction Process- Challenges Faced and Results Achieved

The Sri Lankan Development Forum: an international conference with the participation of all international donors to Sri Lanka was held in 16th and 17th of May, 2005 in Kandy, Sri Lanka[7]. During the sessions, government reviewed its reconstruction and development strategy for the country. At the conclusion of the event, the donors fledged more than 2 bln. Euros for reconstruction. In the Sri Lankan perspective, it was a great achievement. However, the event itself demonstrated problems in Sri Lankan reconstruction process. The entire program had been organized as a political maneuvering. All the main speakers were politically affiliated people with the government. No representation from the opposition, civil society, representative of the victimized community, etc. The Sri Lankan officers were making lot of exciting commitments about the future of the reconstruction works. However, average people of Sri Lanka were and still are wondering about the realization of such promises, as they have been quite familiar with such situations earlier.

One of major problems faced by the NGOs and other international development agencies is the slow reaction by the government bureaucracy. Government organizations are known for their slow pace. The other major problem is the lack of policy orientation in dealing with post-tsunami problems at institutional level. It was very clear that Tsunami has created many challenges to Sri Lankan institutional framework which were governed by quite old laws. These can be varying from issues such as death certificates to approval of insurance claims. Therefore, many Sri Lankan institutions struggled to cope of with this sudden eventuality. It actually slowed down the reconstruction process.

The other relevant issue is the capacity and the skill levels of the officers at key institutions related with rescue and relief of the country. It is said that Sri Lanka has one of most respected

7 Sunday Observer 8th May, 2005

administrative officers in the region. But the issue here is that the typical training they get is outdated and non-relevant especially in relation with disaster management. Most of senior officers and managers are not trained in project management skills, poor in working with computers and digital technology. Lack of transparency and corruption in distributing aid in the reconstruction process was also a widely reported issue but this was applicable to both government as well as non-government agencies. International agencies, civil society activists demand the relevant authorities to disclose funds on how they were spent. Some organizations and institutions carried out the 'volunteer disclose' policies. However, lack of transparency and the possibility of corruption or misuse of funds were major concerns also with INGOs.

With all the above faults and weaknesses, Sri Lanka successfully implemented an effective and efficient Tsunami reconstruction process and a nation building exercise. The main driving force was the support and the attention by the donor countries and the international community. Even though there were some initial complaints against the government and against the NGOs, majority of Sri Lankans still supported and contributed for a shared nation building exercise. Professional organizations, business community, and various stakeholders contributed with different suggestions, plans and projects that were in their areas of expertise.

GOSL coordinated all such efforts and led them for a national program. One important aspect of the reconstruction process was linking it with the peace process and finding solutions to the ethnic conflict in Sri Lanka. Just after Tsunami, many believed that Tsunami opened a new avenue for collaboration between the Sri Lankan government and the Tamil rebels particularly against the common enemy of Tsunami. However, optimism did not last long. Therefore, war continued and Tsunami reconstruction process continued as a separate effort.

## Implementation of Disaster Management Institutional Arrangement in Sri Lanka

One of major achievements in post-Tsunami Sri Lanka was the strengthening of institutional arrangements. Most important aspect of this was the establishment of the National Disaster Management Centre (DMC)[8].

In 2005, the Sri Lanka Disaster Management Act No.13 of 2005[9] was enacted which provided the legal basis for instituting a disaster risk management system in the country. The National Council for Disaster Management (NCDM) is a high-level inter-ministerial body. The chairman and vice chairman of the NCDM are the President and Prime Minister respectively. Other members are Leader of the Opposition, Ministers in charge of 20 selected areas, Provincial Council Chief Ministers and five members of the Opposition. This multi-stakeholder politically powerful arrangement ensured that the actions are implemented fast with everybody's consultation. However, in real life this could also have negative aspects such as slow decision making, political interests in participation, etc.

This Act also provides for a framework for disaster risk management in Sri Lanka and addresses disaster management (DM) holistically, leading to a policy shift from response based mechanisms to a proactive approach towards Disaster Risk Management. During the same year, the Disaster Management Centre (DMC) was established under the National Council for Disaster Management (NCDM) to be functional under the President. In December 2005, a separate Ministry for Disaster Management was established and in February 2006, the Ministry for Disaster Management and Human Rights (M/DM&HR) was established with the subject of Human

8 Disaster Management Centre, on 20th May, 2012, http://www.dmc.gov.lk/ index_english.htm

9 *Ibid.*, on 20th May, 2012, http://www.disastermin.gov.lk/web/index.php?option=com_content&view=article&id=90&Itemid=83&lang=en%28%20Last%20accesed.

Rights listed under its purview. As per the gazette notification of February 2006, National Disaster Management Council, Disaster Management Centre and Department of Meteorology were placed within the purview of M/DM&HR.

The DM implemented through the DMC according to this gazette notification are initiating and coordinating foreign aided projects for disaster mitigation, response and recovery, liaising with Ministries, Government authorities and agencies, private sector agencies, NGOs and INGOs and all other relevant agencies to ensure timely execution of such responsibility, coordination and management of relief activities pertaining to natural and man-made disasters and coordinating awareness programs on natural disasters and man-made disasters. DM functions also include early warning systems, supervision of the activities of non-governmental organizations and social welfare voluntary agencies in relation to disaster management, provisions of relief and promotion of human rights and facilitation of and assistance to non-governmental organizations and social welfare voluntary agencies, in the fields of disaster management and human rights. This is to be done with the co-operation of other line ministries and provincial and local government institutions.

### Overall Assessment of Tsunami in Sri Lanka

After almost eight years of Tsunami, there are important lessons learnt from management of the Disaster in Sri Lanka. Such lessons are not all positive and some of them are context dependent. However, reflections are important as some of these can be useful in future disaster situations as well as for the entire South Asian region.

Tsunami in 2004 was an "eye opener" for Sri Lanka for its disaster management practices. Even as the Island nation had been facing various types of natural disasters; Tsunami completely changed the orientation and perception of all Sri Lankans about disaster management. Just after this catastrophic event, it was clear that the government and the state institutions were neither prepared nor capable of managing a disaster of such a magnitude. But at the

same time, the country realized the value and the power of the social capital in terms of community based relief activities. Relief phase was mainly managed by people across communities self helping each other, non-sate players such as volunteers, corporate sector organizations, NGOs, media institutions and even international community. Government however intervened later and it was able to manage the rehabilitation and reconstruction work "sufficiently well" with the support of the people, NGOs and international donors.

Following are some of the main issues and lessons learnt from Sri Lankan experience;

1. Tsunami and Ethnic War in Sri Lanka: Tsunami was seen by many as an opportunity for Sri Lanka to combine nation building along with the peaceful solution of the ethnic war. Government of Sri Lanka and the rebels tried to form joint collaboration mechanisms to carry out reconstruction activities. Post-Tsunami Operational Management Structure (P-TOMS), June 2005 was an ideal example of a failed attempt of such combined efforts[10]. It was designed as an agreement where Sri Lankan government could collaborate with LTTE to reconstruct the Tsunami affected areas with international donor funds. During this time, the country was going through national debate on how best to attract foreign aid, a competition for aid distribution mechanism, rivalry and an intensive competition among various political parties on campaigning for voters based on their ideological and political agenda based on post –Tsunami construction strategies and policies. Sri Lanka's Marxist, Nationalist political party JVP (Peoples' Liberation Front) went to the Supreme Court and the court decided that the P-TOMS agreement was null and void. In 2005, the ceasefire agreement became inactive and the two parties went technically back to war and finally LTTE was defeated by the government forces in 2009 in a bloody military campaign.

10 Peaceinsrilanka, Viewed on 20th May, 2012, http://www.peaceinsrilanka.org/_negotiations/ptoms

2. "Tsunami Economy": Tsunami was a very painful and an extremely destructive event for the Sri Lankan society. However, as in many other disaster situations, there were "some winners" created out of the situation. Some of our NGOs and individuals with local and international links gained out of the calamity. After a few years, these organizations disappeared. Sri Lankan government later tried to regulate this situation by establishing a NGO Secretariat [11] to register, regulate and monitor non-government organizations. Sarvodaya in a research study[12], notes that reconstruction programmes must take into account the socio cultural aspects when communities move through different phases of resettlement. More seriously they state that lesser understanding of socio cultural aspects by the providers further resulted in changes in the value system of the community. These have given rise to serious repercussions in these communities who were used to a dignified life.

3. Transparency and Accountability Issue: This remains one of the major issues of the donor related funding in Sri Lanka. As soon as Tsunami hit Sri Lanka, pledges for assistance came from all over the world for more than US$ bln. 1.8[13]. However, the funds did not come exactly as promised. This triggered then President Chandrika Kumaratunga to claim in late March 2005 that not even 'five cents' of promised official money had reached the Treasury"[14]. Even the funds received in Sri Lanka, did not fully reach people those whom were in real need. Poor fund management systems and pervasive corruption

11 National Secretariat for Non Governmental Organizations, Viewed on 20th May, 2012, http://www.ngosecretariat.gov.lk

12 Report on Post-Tsunami Voice of the Community Leaders For Sarvodaya *Research Consultancy Bureau*, Sri Lanka, October, 2005

13 Wikipedia, Viewed on 20th May,2012, http://en.wikipedia.org/wiki/Humanitarian_response_to_the_2004_Indian_Ocean_earthquake

14 Uyangoda, Jayadeva, (2005), "Ethnic Conflict, the State and Tsunami Disaster in Sri Lanka" *Dept. of Political Science, University of Colombo, Sri Lanka, 2005* <http://www.tamilnations.com/conflictresolution/ tamileelam/norway/uyangoda.pdf>

were main reasons for such failures. The infamous case of Helping Hambantoto[15] is an ideal example of malpractices prevailed in the management of Tsunami funds. Further, it is widely believed that Tsunami funding collected by Tamil Rehabilitation Organization (TRO), the development arm of Tamil tigers was used for terror financing[16]. The Tsunami also created a situation where INGOs raised more funds than governments and intergovernmental agencies. This led to a situation where INGOs had a substantial amount of money without necessarily the experience, the discipline, and/or the capacity to use the funds effectively, efficiently, or in a coordinated way. Even well-known NGOs had difficulty adapting to the context especially one where they were effectively donors as well as implementers. With the multiplicity of partners working within narrow confines in several cases it appeared that some INGOs were involved in unnecessary competition to spend money without taking into account the appropriateness of their approaches and the services and goods they were providing. This financial power combined with a significant degree of freedom and a low level of accountability has, in some cases, resulted in arrogance toward local NGOs and the inappropriate and ineffective use of resources.[17]

4. Tsunami as " a lost window of opportunity" for collaboration in nation building: Many including international community believed that Tsunami brought an opportunity for Sri Lankans to work

15 Lanka Standard, Viewed on 20th May, 2012, http://www.lankastandard.com/ vault/helping-hambantota-investigation/

16 The Sunday Times (Oct. 8, 2006) http://sundaytimes.lk/061008/News/nws1.html

17 Peter Bauman, Gazala Paul, Mengistu Ayalew, "Comparative Analysis of the Impact of Tsunami and Tsunami Interventions on Conflicts in Sri Lanka and Aceh/Indonesia Executive Summary", *The Mellon-MIT Inter-University Program on Non-Governmental Organizations and Forced Migration* United States, Viewed on 20th May, 2012, http://web.mit.edu/cis/www/migration/pubs/rrwp/34_ tsunami.pdf

together and shed their differences in rebuilding the nation[18]. This mentality prevailed dominant among politicians and policymakers for sometime but was only short lived. The defeat of P-TOMS agreement in the Supreme Court was the key event that changed the situation and the government and Tamil Tigers resorted back to war eventually. [19] This resulted in abandoning originally planned nation building plans and strategies and restart the nation building exercise with new ideas; starting from different sets of assumptions and working principles. Sri Lanka is still trying to reorient itself with new post-war development plans and policies.

## Conclusion

Tsunami forced Sri Lanka as a nation to review its institutional arrangements of managing Disasters. As a result of Tsunami, Sri Lanka was able to establish a comprehensive disaster management institutional framework and to come up as a better prepared nation. This has not only helped the country to carry out necessary nation building activities but also to take actions to prevent high scale catastrophes by implementing early warning systems, training and improving awareness and developing actions and procedures of disaster risk mitigation. The post-Tsunami experience (from 2005-2012) is too short for final conclusion of the success of institutional arrangements in place but it gives an indication that the disaster management strategies and policies adopted by Sri Lanka are effective at least in this short run. One such example is the response to Tsunami warning on 11th April, 2012 after a tsunami alert was triggered by an 8.6 magnitude earthquake off the west coast of

18 Jayasinghe, Namalie (2006), "Post-tsunami Sri Lanka and the Ethnic Conflict: A Critical Analysis of Vulnerability" *London School of Economics United Kingdom* August 2006

19 "War, Peace and Governance in Sri Lanka Overview and Trends in 2006 "*Centre for Policy Alternatives, Colombo, Sri Lanka* , 2007, <http://reliefweb.int/sites/reliefweb.int/files/resources/4285D085DBC93E04C12572AB0035B698- Full_Report.pdf>

Sumatra in Indonesia. Strong community awareness and preparedness are being cited for successful evacuation of more than one million Sri Lankans.[20]

A low frequent and high consequential event like Tsunami challenges the capacities, orientations and priorities of developing countries. However, they also give opportunities to "souls seek", define and reconstruct nations not only physically but also socially.

Sri Lankan experience of managing Tsunami disaster during and in the post event phase (both successes and failure) is a useful case study where other South Asian countries can refer and draw lessons from. Given the geography and the historical experience, South Asia has realized that most of major natural disasters are regional by nature and hence regional response is a must for disaster risk management. Countries in South Asia therefore should share their own experiences among each other and learn from best practises. Since disaster management is "less politically sensitive" domain for collaboration among nations, it is a good way of discussing possible regional collaborations in South Asia. Therefore, leaders and policymakers in South Asia should use 2004 Tsunami experience of Sri Lanka as a case study on how South Asian countries should develop their national disaster management strategies and possible regional collaborative efforts.

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# Introduction to Co-Editors

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