Regional Report

Regional Process Commission

Region: Asia-Pacific

ANNEX

Southeast Asia & South Asia Sub-Region

Coordinator: Asia-Pacific Water Forum

Asia-Pacific Water Forum

Pre-forum version
March 2018

Sub-Regional Report: Southeast Asia & South Asia

Southeast Asia Sub-Regional Coordinator: GWP Southeast Asia
South Asia Sub-Regional Coordinator: GWP South Asia

1. Overview of Southeast Asia

Southeast Asia is a highly diverse region consisting of 11 countries that registered a total population of 624.6 million in 2014, occupying roughly 4.5 million square kilometres of land. This translates to a high density of about 139 persons per square kilometre (Table 1) as compared to the world's population density of just 56 persons per square kilometre in 2014 (World Bank).

The sub-region includes Indonesia, which is one of the biggest countries in the world in terms of population (4th) and land area (15th), as well as Brunei, Singapore and Timor Leste, the three of the tiniest island states in terms of land area and population counts. Income and wealth are highly disparate as two of the wealthiest (Brunei and Singapore) and two of the poorest (Cambodia and East Timor) countries in the world are found in the subregion. The subregion's gross domestic product (GDP) has been growing fast and was placed at US$2.5 trillion in 2014. The GDPs per capita wildly vary, ranging from US$1,100 for Cambodia to US$41,000 for Brunei and US$56,300 for Singapore. The dynaminc of economic front is very high in this sub region, however, the social, environmental, political and other dimensions are not as dynamic and needing priority attention. The implementation of the global Sustainable Development Agenda up to year 2030 (2030 Agenda) provides the opportunity for getting this priority attention and responsive action.

Table 1: Key Characteristic of Southeast Asia (1)

Country	Population	GDP (Current US$B)		Per Capita GDP	GDP/PPP[2] 2014	HDI Rank
	(Million)	2014	2015	US$(000)	2014	2014
Brunei	0.4	17.1	12.9	41	4	31
Cambodia	15.3	16.8	18.1	1.1	143	143
Indonesia	254.5	888.5	861.9	3.5	103	110
Lao PDR	6.7	12	12.4	1.8	128	141
Malaysia	29.9	338.1	196.3	11.3	45	62
Myanmar	53.4	64.3	62.6	1.2	131	148
Philippines	99.1	284.8	292.5	2.9	118	115
Singapore	5.5	307.9	292.7	56.3	3	11
Thailand	67.7	404.8	395.2	6	80	93
Timor Leste	1.2	1.4	1.4	1.2	119	133
Viet Nam	90.7	186.2	193.6	2.1	126	116
TOTAL	**624.6**	**2,521.9**	**2,439.6**			

Source: World Bank Databank; UNDP - 2015 Human Development Report; Global Finance – "The World's Richest and Poorest Countries"

Related to inclusive water supply and sanitation development, overall, the region has improved access to household water supply and sanitation (Asia Water Development Outlook 2016). Yet, some countries, including Cambodia, and Timor-Leste, show an increased rural–urban gap in both improved and piped water supply. This suggests a government priority on urban areas over rural areas. Improved sanitation shows a similar picture with the same countries to that for water supply with a widening gap in access to sanitation. There is a need for a more equal and inclusive policy objective without which the Sustainable Development Goal for universal access to drinking water, sanitation, and hygiene cannot be achieved.

Solutions will vary across the region depending on a country's stage of economic development and extent of rural–urban integration. Countries with relatively low water endowment (e.g., Singapore with 110 cubic meters per capita per year) have been able to achieve high water security, while water-rich countries such as Cambodia (31,117 cubic meters per capita per year) and Myanmar (22,494 cubic meters per capita per year) still have quite a challenge ahead. This reinforces the continued need for major and fundamental changes in water governance practices in almost all Asian developing member countries.

Knowledge and information lead to sound policies to guide proper investments in water management, which subsequently lead to economic growth. Yet, data and information particularly for groundwater remain weak for making informed decisions on water resources allocation. More localized city and town data, data collection and maintenance of databases are urgently needed. Availability of data also provides a sound proxy indicator for water governance.

Table 2: Key Characteristics of Southeast Asia (2)

Country	Population	Population with Improved Water Supply	Population with Improved Sanitation	Renewable Water (2014)	Renewable Water per Capita (2014)
	(Million)	%	%	Billion m^3 per year	m^3 per capita per year
Brunei	0.4	99	96	8.5	20,645.9
Cambodia	15.3	75	49	476.1	31,117.2
Indonesia	254.5	90	68	2,019.0	7,913.6
Lao PDR	6.7	82	72	333.5	50,711.7
Malaysia	29.9	97	100	580.0	19,187.5
Myanmar	53.4	80	64	1,168.0	22,494.3
Philippines	99.1	83	75	479	4,785.1
Singapore	5.5	100	100	0.6	110.1
Thailand	67.7	95	92.97	438.6	6,410.7
Timor Leste	1.2	43	40.63	8.2	6,773.5
Viet Nam	90.7	78	77.99	884.1	9,553.2
TOTAL	**624.6**			**6,395.6**	**10,196.0**

Source: JMP 2017 Report; Data Portal[1]

[1] http://data.unescap.org/escap_stat/#data/

2. Facing Climate Change in Southeast Asia: Flood and Drought

Climate change is real, and we have passed the point where we can prevent all its effects. Southeast Asia is already experiencing these effects-shifting monsoon seasons, more intense storms, and increased flood risks in coastal zones and major river basins. These new climate trends will become more pronounced in coming years. Acting to adapt to climate change needs to begin now. Adapting to climate change means adjusting plans and activities to account for new climate trends. It means changing the way businesses, governments, and other organizations operate, so that people can thrive in a warming world.

Southeast Asia is particularly vulnerable to climate change for several reasons. First and foremost, in many of these countries large portions of the population live in poverty. The proportion of the population living below the poverty line of US$1.90 reaches 36 million - 90 percent of whom are in Indonesia and Philippines[2]. The poor are particularly vulnerable to climate change, as they lack the resources necessary for many types of adaptive actions. With its extensive coastlines, Southeast Asia is also home to many millions of people living at low elevations that are at risk from sea level rise. Moreover, ongoing social and environmental challenges in the region – notably growing income inequality, rising food prices, and widespread deforestation – contribute to social vulnerability and make climate change more likely to bring significant harms.

Weather-related disasters are already common in Southeast Asia and will likely increase in frequency and intensity. As reported through Insurance Journal, it is estimated around $10 Billion economic damages was brought by Asia floods in july 2017 alone [3].

Across in Indonesia, floods are the most common natural disaster – 97% of disaster events between 2012 and 2014 were hydro meteorological, with floods the most frequent. Then there's the economic impact, to some degree during every rainy season and these events hit the country economy to the tune of more than USD 2 billion a year.

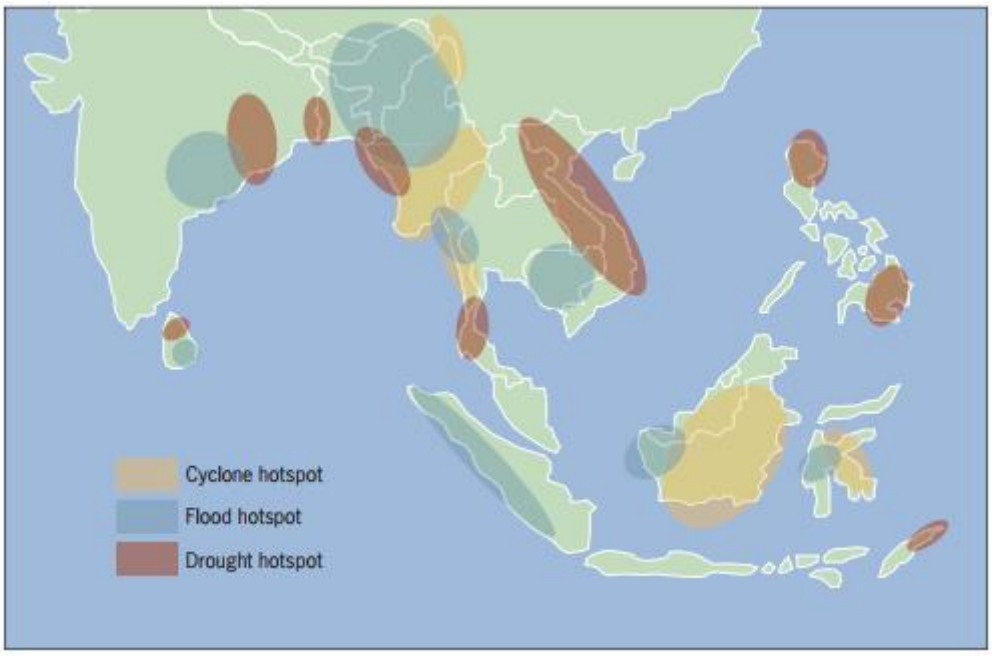
From 2005 to 2013, the Office of Civil Defense (OCD) recorded 482 flooding incidents in the Philippines affecting more than 4.4 million populations (of about a million families) claiming a total of 316 lives and injuring 109 persons. More than 5,000 houses were totally damaged while more than 70,300 houses were partially damaged. Total value of damages to agriculture, public infrastructures and private properties over the last nine years due to flooding were estimated at about *Php* 4.8 billion.

In mid-2015, Myanmar had bitter experienced again with abnormal condition of climate condition such as heavy rainfall and landslide in *Rakhine* State, *Magway* Region, *Sagaing* Region and hilly region of Chin State because of Cyclone Komen. Most of the areas in these regions were devastated and loss of lives and properties with occurrence of severe floods. Also agriculture lands were silted and covered up by silt and sand. In the last decades, rainfall patterns variations caused climate-driven migration and increased occurrences of drought which affected on the socio-economic conditions of dry regions. In addition, for the future,

[2] ASEAN – China UNDP Report on Financing the Sustainable Development Goals (SDGs) in ASEAN

[3] www.insurancejurnal.com/news/international/2017/08/09/460649.htm

further sustained impacts from climate change is predicted with climate models which will further expose Myanmar to the negative impacts of climate change.
Rising sea levels, caused by the melting of glaciers and expansion of warmer water, threatens the coastlines of many Southeast Asian countries. Displacement of millions of people, loss of millions of hectares of arable land, and billion dollarsin economic cost are the impacts that already felt accros the region.



Source: Adapted from CARE 2008a: 31.

Climate change may also make water scarcer during the dry season for household use, energy, and irrigation. This will force governments and consumers to prioritize water uses and improve efficiency of water use. In some cases, there may be increased competition for access to water sources. Today's drought in parts of Southeast Asia is the worst in decades. Among the hardest-hit areas are the Vietnam's Mekong Delta and Cenrtal Highlands; 27 of 76 Thailand's provinces; parts of Cambodia; Myanmar's largest cities, Yangon and Mandalay[4].

As temperatures rise, flooding increases, and water quality decreases, disease vectors (e.g. mosquitoes) across Southeast Asia will change. Outbreaks of diseases – especially waterborne diseases – may become more severe, affecting people's health and productivity.

Based on the knowledge exchange and consultation that has been conducted with all eight[5] (8) countries in Southeast Asia (Indonesia, Malaysia, Vietnam, Thailand, Myanmar, Lao, Cambodia, Philippines), it was agreed that related to water sector, flood and drought is considered as the major concern due to climate change and therefore should be prioritized in term of water security in South East Asia.

[4] gulfnews.com/opinion/thinkers/water-scarcity-asia-s-ticking-time-bomb-1.1814442

[5] Singapore is part of GWP Southeast Asia Network but was not involved during the sub-regional consultative meeting both in Manila and Bangkok. As for in Brunei and Timor Leste, these two countries are currently not part of GWP Network and were not involved during the sub-regional consultative meeting both in Manila and Bangkok

3. Case studies to overcome the situations, and the lessons learned: What works and does not works, where, and why

The following case studies focus on how countries in Southeast Asia have prepared for and managed climatological and hydro-meteorological hazards, particularly floods and drought, over period of 2004 - 2014[6].

2011 Bangkok Floods and 2008 Cyclone Nargis

Case studies on the Bangkok floods of 2011 and Cyclone Nargis, which hit Myanmar in 2008, provide a good initial overview of the types of challenges faced by Southeast Asian countries when dealing with natural hazards. As suggested in table below, whether it was an improper land use issue or general misinformation amongst government officials and the public, both Thailand and Myanmar were caught ill prepared for these climate change-related disasters. The absence of a systematic, strategic approach to disaster risk reduction left much lacking in the areas of aid material coordination, clear delegation of responsibility to disaster workers, a skilled local emergency response workforce, and an informed public confident of their disaster response and preparedness options.

In the case of Myanmar, the political environment played another key role in restricting aid delivery to communities in most need. In an effort to deter foreign influence and civil unrest, the military junta did more harm than good by interfering with the free movement of aid to communities (Armstrong, 2008; Aung, 2009; Htet, 2009; Peck, 2008; Naing, 2008; Seekins, 2009; The Associated Press, 2008; The Globe and Mail, 2008). However, the ability of communities to recover was more evident in this case, as communities made desperate attempts at survival.

Disaster Response for Bangkok Floods, Thailand (2011) and Cyclone Nargis, Myanmar (2008)

Event	**Bangkok Floods, Thailand (2011)**
Date	Late July-early December 2011
Extent of damage	• Widespread damage, affecting 65 provinces • 10 million people affected • Over 800 fatalities • World Bank estimated economic loss at USD 45.7 billion (AON Benfield, 2012)
Disaster Response	**Pre-Disaster** • Information sent out to the public by the Government was incorrect; therefore, people and private sector stakeholders were not adequately prepared. • There was therefore a spirit of panic in many areas. • The rainfall forecast was inaccurate. • A web-based information system was developed and used to disseminate real time information. (Alternative sources of information and media became more trusted than those of the state).

[6] These case studies were originally developed and documented by Esther Lambert from University of Toronto for Urban Climate Resilience Southeast Asia Partnership (UCRSEA).

	• There was a combination of technological, institutional and political challenges with managing large-scale reservoir systems for different purposes amidst unpredictable precipitation patterns. Consequently, there was significantly more flooding after two storms. • Increased deforestation and indiscriminate building due to the absence of a master plan for land use zoning for the upper river basin created the conditions for a decreased lag time and greater peak flows. (Chinnarasri, 2012:173-74). • Expansion of industrial, residential sites (and the international airport) in flood prone land, against earlier land use plans, and against scientific evidence and common knowledge. **<u>During Disaster</u>** • Government set up an ad hoc care center, which had to be relocated to safer (unflooded) sites. • Tension and conflict between different administrations and tiers of government. • Some residents from areas outside the flood protection zone destroyed flood protection barriers, with the intention to reduce the extent of flooding in their areas. • There was a lack of a systematic, collaborative approach to flood control amongst local administrative authorities. • Some government employees charged with specific emergency duties lacked the expertise to execute their duties successfully. • The guidelines set out in the Act on Disaster Prevention and Mitigation (2007) were not enforced. (Chinnarasri, 2012:174-75). **<u>Post-Disaster</u>** • National Disaster Fund of THB50.0 billion (USD1.6 billion) was set up by the Thai government to assist approximately 80,700 private homes, 229,300 small and medium sized enterprises and 15,600 large businesses. Compensation for households was set at 5000 Baht (USD 166). • With money coming from domestic sources and other external funders such as Japan, the Government also initiated a fund for various water management and flood projects such as the Chao Phraya River Basin project worth THB 300.0 billion (USD 9.7 billion) and similar projects in 17 other river basins. • Today the military government has announced a budget of THB 900 billion. • A THB 1.7 trillion (USD 55.0 billion) project was suggested by the Royal Irrigation Department (RID) to increase the country's water storage capacity ((AON Benfield, 2012: 25 • The Thai government, (for improvement of water resource manage ment in both the short and long term) created a number of committees. These include the Strategic Committee for Water Resources Management (SCWRM), the National Water Policy and Flood Committee (NWPFC) chaired by the Prime Minister and the Water and Flood Management

	Committee (WFMC). (Chinnarasri, 2012:175-76). In doing so, it by-passed two decades of IWRM institution building. • There was evidence for the use of social media such as Twitter for the dissemination and sharing of information during and after the disaster. (Kongthon et al., 2012).

Cyclone Nargis, Myanmar (2008)

Date	2-3 May 2008
Extent of damage	• Biggest recorded natural disaster in Myanmar • Approximately 84,537 fatalities, 53,836 missing, 19,359 injured, 800,000 displaced. • Approximately 2.4 million out of 7.35 million people occupying the townships of Labutta, Bogale, Pyinsalu, Yangon and others, were affected. (Lateef, 2009; United Nations, 2008). • If missing people considered, death toll exceeded 138,000 (Fritz, H.M., Blount, C.D., Thwin, S., Thu, M.K., Chan, N., 2009). Inundation of an estimated 404.858 hectares of cropland
Disaster responses	**Pre-Disaster** • Mangrove forests in the Ayeyarwady Delta were destroyed through the clearing of rice fields and creation of fish and shrimp farms. (Casey, 2008). • There was an absence of a country-specific contingency plan for disaster risk reduction. (Steele, 2013). **During Disaster** • Residents held on to trees and other objects, to avoid getting swept away by the storm surge. **Post Disaster** • Delivery of aid was possible through the Mingaladon International Airport; however, the distribution of aid throughout the Delta was challenging, as many areas were cut off by widespread inundation by storm waters. • Residents bought polluted water from the Inya Lake. Other desperate residents drank from contaminated ditches and streams (Seekins, 2009) and sought-after fish from creeks. • International aid came in from the United Nations, the British, French, and United States. • The Government (State Peace and Development Council- SPDC and the Union Solidarity and Development Association- USDA) seemed to take a passive role. • Local staff of humanitarian agencies lacked the expertise required to deal with such a catastrophe (Steele, 2013). • The SPDC's attempt to micro manage the delivery of aid resulted in the neglect of millions of cyclone survivors (Seekins, 2009). • Local residents and Buddhist monks got involved in the post-disaster recovery activities, such as the clearing of trees and utility poles (Naing, 2008; Irrawaddy, 2008).

	• The Free Funeral Service Society of volunteers buried the dead whose families could not afford a decent burial. (Los Angeles Times, 2008). • Survivors started re-building their homes (Peck, 2008). Burmese children were forced to steal for food. (Cho, 2008)

Typhoon Wutip – Hoang Mai Town, Vietnam

Date	30 September 2013
Extent of damage	There was extensive flooding in Hoang Mai Town, from the Vuc Mau Reservoir. About 20,000 houses were completely flooded and there were considerable damage costs of VND 800 billion in the Nghe An region.
During and Post-Disaster	The deputy director of the Nghe An Department lost his life while transporting relief supplies to flood victims. His car was flooded during the process. After the flooding, DTiNews collaborated with a local club (Rclub Nghe An) to start a drive called "Joining hands to support the flood victims" through which VND 320 million (USD 15,238) was raised for the flood victims of Hoang Mai Town. Also involved in the relief work was the Vietnam Red Cross, which also summoned further local and international support. As well, the Vietnam Buddhist Sangha Executive Council gave approximately VND 150 million to storm victims.
Stakeholders involved in preparedness and response	Nghe An Department of Industry and Trade; DTiNews; Rclub Nghe An; Vietnam Red Cross
Source of information	Chuthapdo Vietnam, 2013; Talkvietnam, 2013; Thanhnien News, 2013; Vietnam Breaking News, 2013; VietNamNet Online Newspaper, 2013

Drought – Krong Khemarak Phoumin (Koh Kong), Cambodia

Date	May 2013
Extent of damage	Hundreds of homes were left without water for weeks after a dry spell, which dried up the Cham Yeam reservoir in Mondol Seima district. The city relies heavily on this source of water.
During and Post-Disaster	Through a public-private sector initiative, further action was taken to secure a new reservoir location at the nearby Ta Phorn waterfall.
Stakeholders involved in preparedness and response	Department of Industry Mines and Energy; LYP Group, a company owned by Ly Yong Yong Phat; European Union; International Union for the Conservation of Nature
Source of information	Open Development, 2013

Typhoon Haima – Vientiane, Lao PDR

Date	24-26 June 2011
Extent of	Damages and losses have been estimated to be the most severe in Vientiane

damage	province. There was widespread damage to livelihoods, property, and to social and physical infrastructure, to include electricity, telecommunication facilities, irrigation systems, and animal farms. The estimated damage to the province was approximately 5 billion Kip (USD 620,000). The Xaysomboon district in the province of Vientiane suffered the most damage.
Pre-Disaster	There was a general lack of standardized operating procedures for preparedness.
During and Post-Disaster	The government activated existing Emergency Response Committees. Provincial and Central governments coordinated emergency response activities with the help of security personnel, youth volunteers, and non-governmental and international organizations. However, government officials and volunteers were reported as not having sufficient training and equipment to deliver emergency response services effectively. As a result, the government has been working towards improving its internal coordination and reporting mechanisms. Actions by government and non-government organizations are focused around improving planning, coping mechanisms, and building public awareness for effective adaptation. As a preventive approach, for instance, a riverbank protection project was started, to decrease flooding in Vientiane. Sand taken from the Mekong riverbed is being used to build up the Fa Ngum Road riverbank. On a more national level, the Government has drafted a Disaster Management Plan to aid in disaster management.
Stakeholders involved in preparedness and response	Emergency Response Committee (ERC); Provincial Disaster Management Offices (PDMOs); Security Personnel; Government of Japan; Asian Disaster Preparedness Centre (ADPC); International Federation of Red Cross and Red Crescent (IFRC); Oxfam Solidarity Belgium; Oxfam Australia; United Nations Development Programme (UNDP); Save the Children Australia; CARE International; World Vision; World Bank
Source of information	International Union for Conservation of Nature (IUCN), 2012; Government of Lao PDR, 2011; Lao News Agency, 201

Typhoon Ketsana – Siem Reap (Kampong Thom), Cambodia

Date	29 September 2009
Extent of damage	The Kampong Thom province was reported as the hardest hit. There was widespread flooding throughout the province, which delayed relief efforts. There were approximately 100 houses totally damaged, nine deaths, 32 injuries, and 1,014 evacuations. In Siem Reap, there was complete inundation of the entire downtown area. This was caused by the Siem Reap River, which had overflown its banks. It affected many parts of Cambodia and Laos.
Pre-Disaster	Prime Minister, Hun Sen, announced that the storm was approaching and asked responsible authorities to prepare accordingly.
During and Post-Disaster	Actions by government and non-government organizations were focused around improving planning, coping mechanisms, and building public awareness for effective adaptation.
Stakeholders involved in	Habitat for Humanity; European Union; International Union for Conservation of Nature (IUCN)

preparedness and response	
Source of information	British Broadcasting Corporation (BBC), 2009; International Federation of Red Cross and Red Crescent Societies (IFRC), 2009; Jakarta Post, 2009; Olszewski and Partland, 2009

Vietnam Floods of 2008 – Hanoi, Vietnam

Date	October 2008
Extent of damage	Widespread flooding occurred in Hanoi, killing 20 people. It affected agriculture, transportation, as well as physical infrastructure and social services including schools. The damage was estimated at greater than 3 trillion Vietnamese đồng (USD 177 million). This was the worst flood Hanoi had seen in over 20 years.
Pre-Disaster	No information
During and Post-Disaster	Residents used clothes, blankets, and other materials to prevent water from flooding their homes, but that was not effective. Many residents were stuck in their homes, unable to access food. Some taxis were still able to operate. Select members of the public blamed the Government for not investing in suitable roads and physical infrastructure. Hanoi authorities pledged USD 300 million to improve drainage in the city. The Government implemented a Community-Based Disaster Risk Management Program in 2009, focusing on 6,000 communities in the urban and rural regions. A research study revealed that there is a very low perception of flood risk amongst Hanoi communities (Hung et al., 2009: 217). Better coordination is needed between Central Government and the City People's Committee (CPC), and urban development and disaster management planning policies undermine each other.
Stakeholders involved in preparedness and response	World Bank; City People's Committee (CPC); European Union; International Union for Conservation of Nature (IUCN)
Source of information	Voice of America (VOA), 2009; World Bank, 2012

Laos August Flood of 2008 – Vientiane, Lao PDR

Date	Mid-August 2008
Extent of damage	Using sandbags at the riverbanks prevented extensive flooding in Vientiane. Flooding costs for Lao PDR were estimated at USD 55 million, much greater than the last major floods of 1966. Flooding in Vientiane was the highest since 1913 (the year of the first records).
Pre-Disaster	Emergency measures such as sandbagging were undertaken
During and Post-Disaster	The number of sandbags in the city was more than quadrupled from 400,000 to two million. Post-disaster analyses revealed that improper urban development eliminated many natural flood features. Emergency response agencies were not well equipped to effectively address the crisis situation
Stakeholders involved in	The Vientiane Flooding and Drought Prevention Committee; Department of Meteorology and Hydrology (DMH)

preparedness and response	
Source of information	Chineview, 2008; International Union for Conservation of Nature (IUCN), 2012; Mekong River Commission (MRC), 2009

Typhoon Xangsane – Danang, Vietnam

Date	1 October 2006
Extent of damage	Danang was the hardest hit area of Vietnam. Typhoon Xangsane was the most destructive storm to hit Danang in 70 years. The number of homes destroyed was in the thousands. There were approximately 22 fatalities and hundreds of people were injured. Damages were estimated at USD 200 million, with more than 12,000 houses destroyed, 113,000 damaged and 19 sunk vessels. Most schools were damaged, forcing students to remain at home.
Pre-Disaster	A steering committee formed by the Vietnamese government facilitated the evacuation of approximately 300,000 people along the coast from Hà Tĩnh to Phú Yên, and along areas prone to landslides. In Danang, 10,000 households were evacuated. The Government also ordered the return of 2,019 boats to port. Vietnam Airlines flights were cancelled.
During and Post-Disaster	The approximately 40,000 people from the 10,000 households were provided with food, shelter, medical services and other services such as childcare. Students remained at home or moved with their families. Ships and boats were returned to port safely.
Stakeholders involved in preparedness and response	The Government of Vietnam; Danang Health Department; Vietnam Airlines; European Union; International Union for Conservation of Nature (IUCN); police, military, and civilian forces in Danang
Source of information	British Broadcasting Corporation (BBC), 2006; Asian Urban Information Center of Kobe (AUICK), 2007; USA Today, 2006

Typhoon Damrey – Haiphong, Vietnam

Date	27 September 2005
Extent of damage	Approximately half of the 150 deaths in Vietnam occurred in Haiphong. This was the most destructive storm in Haiphong since the 1881 typhoon.
Pre-Disaster	On 26 September, approximately 2,000 people were evacuated to safer areas away from the coast and provided with essential supplies such as shelter and food.
During and Post-Disaster	During disaster: The Maritime Search and Rescue Center was destroyed, so people who may have been rescued were left stranded to fend for themselves. Post-Disaster: The deputy prime minister and other government officials conducted a damage assessment. The Government asked for international assistance in cash, goods, or on-site help (amounting to USD 1 million), to help 5,000 families for a year
Stakeholders	The European Union; International Union for Conservation of Nature (IUCN)

involved in preparedness and response	
Source of information	Gunn, 2011

4. Key messages and recommendable actions

Based on the case studies above, and the faster-than-expected impact of climate change, there are several lessons learned that must be taken on seriously:

1. **Preparedness is the mother of luck**
   Many efforts have been done to increase the preparedness of governments, communities and local organizations to anticipate hazards. However, those efforts have been heavily imposed to all of them from the perspective of outsiders. Preparedness must be developed based on insiders understanding of their own modality. Only then they will fully understand and willingly to take the lead.
2. **We must not let crisis go to waste**
   We cannot fully anticipate crisis. In every new crisis we need to learn something and improve ourselves from the lessons. **We repeat what we do not repair**.
3. **Linking the efforts at national level and local level**
   Many efforts focus too much on the national level, while crisis happens at local level. Focusing too much on policy development at the national level without piloting at the local level will risk the comprehensiveness of the policy that is being made. In addition to that, having a policy at national level does not mean local level are automatically ready for anticipating crisis or disasters. It is still long road ahead. The same thing applies for the other way around. Focusing too much on the local level will risk the potential of good practices and innovation to be supported both in term of regulatory, financial and institutional aspects; thus, limited contextual replication.
4. **Post-disaster management thinking mode**
   Thinking ahead in post-disaster management mode will help to better design the adaptation, anticipation and handling crisis/disaster plan. Climatological hazards scenario modeling will also help to at least prepare the community and governments to anticipate the unthinkable. Someone must think about the unthinkable. Scenario modelling helps a great deal.
5. **Building up enabling environment**
   The regulatory, financial, institutional, technological and human resources frameworks must be developed. Having policy or regulation in place does not really help when lack of human resources with the needed skills are not in place.

5. Overview of South Asia

South Asia region is surrounded by three water bodies; Bay of Bengal, Indian Ocean and Arabian Sea while the climate of the region varies considerably from area to area i.e. from tropical monsoon in the south to temperate in the north. It is home to an astounding variety of geographical features, such as glaciers, rainforests, valleys, deserts, and coastal area that are typical of much larger continents. The variety is influenced by not only the altitude, but also by the factors such as proximity to the coast and the seasonal impact of the monsoons. The region is probably the most diverse in the world in terms of ethnicity, religion, language, culture and governance systems.

South Asia Sub-Region is one of the most disaster-prone regions of the world while nearly 91 percent of these disasters are related to hydro-meteorological origin. Afghanistan, Bangladesh, India and Pakistan recorded significantly higher frequencies of natural disasters. Although no region of the world is completely spared by natural disaster, the poorest countries in South Asia are hit the most, due to poor coping capacity often compounded by high population densities. The vagaries of nature leave behind death and destruction with huge impact on developing economies.

Parts of the region face some of the greatest population pressures on the land in the world together with some of the highest economic growth rates in the world in the largest country of the region, India. This has resulted in unprecedented stress on natural resources and ecosystems, causing sustained degradation of forest, soils, wetlands, rivers and aquifers with nexus issues due to the needs of agriculture, energy and industry. With a three-fold increase in human population since 1950, South Asia's per capita water availability is down to one fifth of what it was 60 years ago.

South Asian countries contribute to very little global warming, yet they are generally made to acknowledge as the most vulnerable countries to climate change and climate variability. The region is host to one of the most threatened eco-systems from the effects of the climate change.

Table 3: Key Characteristics of South Asia

Country	Territory (km2)	Population 2017 (Estimated)[7]	GDP per capita ($) estimated	Renewable internal fresh water resources per capita (2014)[8] (m3/year)	% access to improved* drinking water resources (2015)[9]	% People using Basic sanitation services** (2015)[10]
Afghanistan	652,864	35,530,000	1,888	1,439.3	55.3	39.2
Bangladesh	147,570	164,670,000	4,207	658.7	86.9	46.9
Bhutan	38,394	808,000	8,762	100,457.5	100	62.9
India	3,287,263	1,339,180,000	7,749	1,117.6	94.1	44.2
Maldives	298	423,000	9,948	78.4	98.6	95.9
Nepal	147,181	29,305,000	2,573	2,542.0	91.6	46.1
Pakistan	881,913	197,016,000	5,374	296.40	91.4	58.3
Sri Lanka	65,610	21,302,000	13,847	6,997.80	95.6	94.2

6. Selected case study: Nepal's Approach to Climate Change Adaptation with Local Adaptation Plans for Action (LAPAs): a Water Resource Perspective

Nepal is particularly vulnerable to climate change impacts for a variety of environmental, social, and economic reasons. Average temperatures have been rising steadily since the 1970s. Most of the mountain ranges within Nepal are home to extensive glaciers which are experiencing widespread retreat. Glacial discharge in turn impacts the hydrological regimes of rivers downstream and causes rapid growth of glacial lakes; glacier lake outburst floods (GLOFs) are one of many climate change phenomena with the potential to pose extreme risk to populations, infrastructure, etc.

Description

Nepal has been on the Least Developed Countries (LDCs) list since 1971 and their National Adaptation Programme of Action (NAPA) was submitted to UNFCC in 2010. Though Nepal was the 45th LDC to submit its NAPA, it has since become a pioneer in climate change adaptation

[7] http://databank.worldbank.org/data/reports.aspx?source=population-estimates-and-projections
[8] http://databank.worldbank.org/data/reports.aspx?source=1184&series=ER.H2O.INTR.PC
[9] http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on
[10] http://databank.worldbank.org/data/reports.aspx?source=311&series=SH.STA.BASS.ZS

planning. This is because, in 2011, it was the first LDC to issue a national framework on Local Adaptation Plans for Action (LAPAs) to strengthen and implement their NAPA prioritized adaptation actions. The Government of Nepal (GON) endorsed the National Climate Change Policy in 2011 that supports NAPA and LAPA implementation. The Policy specifies to "allocate at least 80% of available funds for field level climate change activities".

Action taken

Beginning in late 2015, JVS/GWP-Nepal began to design a study to further Nepal's understanding of the relationship between its climate change adaptation priorities and water resource management. 101 of the LAPAs produced were reviewed to identify adaptation actions and associated budgets related to water resources. The report preparation also required extensive consultation with community members and government agencies. Each LAPA includes detailed descriptions of the largest threats faced by their locality due to climate change. The first approach of the study was to examine these identified threats. JVS/GWP-Nepal grouped these into 8 of the most commonly identified potential impacts.

JVS/GWP-Nepal next categorized all the water-related adaptation actions proposed in the reviewed LAPAs into 7 categories: infrastructure; community protection; water resource conservation and rainwater harvesting; agriculture; landslide and flood control; Indigenous knowledge and water mill; and capacity building. These 7 water-related adaptation action categories were used to further observe the budget allocated for each one

Lessons learnt

- While it was discovered that adaptation actions related to water resources have already been given some priority, the focus on building water infrastructure may not be advantageous without adaptation actions focusing on capacity building as well.
- Monitoring and evaluating national initiatives, as they are developed and implemented, can reveal useful information. Reviewing these initiatives from a broad perspective allows reflection to ultimately improve outcomes.
- Strategic communication plans, which can for example include workshops and identification of key partners, should be paired with any study carrying important information in order to support evidence-based decision-making.
- Non-governmental organizations and other third-party organizations can be used to provide a critical and objective review of governmental initiatives.

For more details about the case study.....