



**LEAVE
NO ONE
BEHIND**

Disaster Resilience for Sustainable Development

Asia-Pacific Disaster Report 2017

Summary for Policymakers



The shaded areas of the map indicate ESCAP members and associate members.

The Economic and Social Commission for Asia and the Pacific (ESCAP) serves as the United Nations' regional hub promoting cooperation among countries to achieve inclusive and sustainable development. The largest regional intergovernmental platform with 53 member States and 9 associate members, ESCAP has emerged as a strong regional think-tank offering countries sound analytical products that shed insight into the evolving economic, social and environmental dynamics of the region. The Commission's strategic focus is to deliver on the 2030 Agenda for Sustainable Development, which it does by reinforcing and deepening regional cooperation and integration to advance connectivity, financial cooperation and market integration. ESCAP's research and analysis coupled with its policy advisory services, capacity building and technical assistance to governments aims to support countries' sustainable and inclusive development ambitions.

The ESCAP office is located in Bangkok, Thailand. Please visit the ESCAP website at www.unescap.org for further information.

MAIN FINDINGS

DISASTER RISK IS OUTPACING RESILIENCE

Since 1970, natural disasters in Asia and the Pacific have killed two million people –contributing to 57 per cent of the global death toll. On average, the number of people killed annually was 43,000, though the number fluctuated considerably from year to year. As indicated in Figure 1, the principal causes of natural disaster deaths were earthquakes and storms, followed by floods. In the rest of the world the pattern was different: the death toll was lower and the principal killer was drought, followed by earthquakes.

Beyond the fatalities, many more people have been affected; since 1970 a person living in the Asia-Pacific region has been five times more likely to be affected by natural disasters than a person living outside the region.

Disasters also cause large-scale damage. Between 1970 and 2016, Asia and the Pacific lost \$1.3 trillion in assets.¹ Almost all of this was the result of

floods, storms, droughts and earthquakes including tsunamis. Such damage has steadily been rising. This is partly because as GDP increases there are more physical assets at risk.

2016: Fewer disasters but major impacts

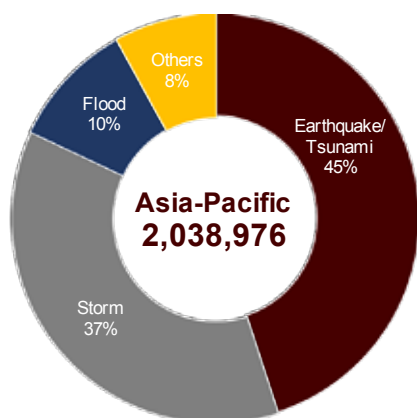
By historical standards, there were fewer disasters in the year 2016, but they still took a heavy toll – killing 4,987 people, affecting 35 million people and causing estimated damage of about \$77 billion. The greatest loss of life was through flooding, which caused 3,250 deaths. But droughts also affected 13 million people.

Disasters displace vulnerable people

Disasters displace many people, increasing socio-economic vulnerabilities. Between 2013 and 2015, for example, globally natural disasters displaced 60.4 million people, of whom 52.7 million were in Asia and the Pacific. The largest numbers were in Philippines (15 million), China (13.1 million), and India (9.2 million), followed by Nepal, Bangladesh, Pakistan and Myanmar.

Figure 1

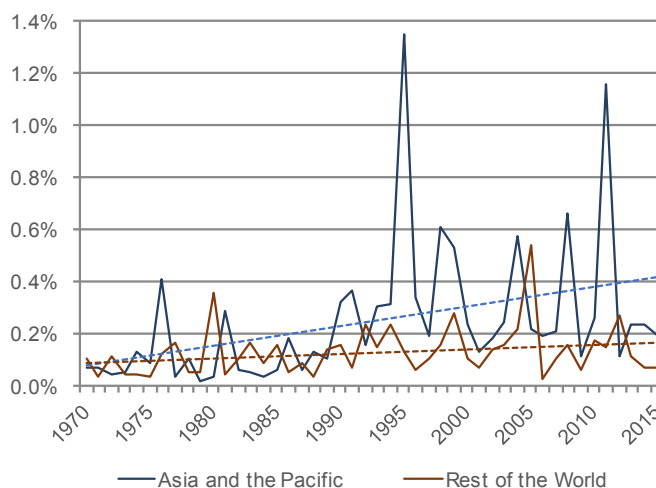
Asia-Pacific: Human cost of natural disasters, 1970-2016



- **2** million lives lost (56% of global)
- **88** per cent of people affected

Figure 2

Estimated damage, as % of GDP, is rising in the Asia-Pacific region



Economic cost: Asia-Pacific has lost \$1.3 trillion due to natural disasters (1970-2016)

Different impacts across sub regions

The Asia-Pacific region encompasses a vast geographical area – from the Russian Federation in the North, Australia and New Zealand in the South, Turkey in the West, to Japan and the Pacific SIDS in the East. Each sub region has its own vulnerabilities and hazards. Over the period 2000–2016, most of the damage was in East and North-East Asia, while a high proportion of the fatalities were in South-East Asia.

Identifying risk hotspots

INFORM is a global, open-source risk assessment index for humanitarian crises and disasters. INFORM is a collaboration of the UN Inter-Agency Standing Committee Task Team for Preparedness and Resilience and the European Commission. It is the first global, objective and transparent tool that includes the risk of humanitarian crises – simplifying crisis risk information so that it can be easily used for decision-making. The INFORM model envisages three dimensions of risk: hazards & exposure, vulnerability and lack of coping capacity dimensions.

As well as being exposed to natural hazards, countries are also at risk from man-made disasters through wars and violent conflicts. These broader risks have been incorporated into the INFORM index which includes the risks from both natural and man-made disasters. On this basis, the greatest risks are in South and South-West Asia and South-East Asia, largely because of natural hazards, for which the rating is higher than for man-made disasters. However, countries such as Afghanistan, have a higher rating for conflict.

Future losses expected to rise

Governments can anticipate future risks based partly on the historical record. Such analysis however faces several constraints. One is that disaster reporting lacks consistent international standards. Another is that the most catastrophic disasters are

infrequent – and thus likely to fall outside regular reporting periods. This was demonstrated by the 2015 earthquake in Nepal. *The World Risk Report 2014*, which provides a risk index for 171 countries, considered Nepal relatively safe and had ranked the country at number 108.² In 2015 however, the Ghorka earthquake killed close to 9,000 people and affected 8 million others, around one-third of the entire population, with economic losses of around \$7 billion, one-third of GDP (in 2015 US dollars).³ Disaster risks also change over time, for example, in response to climate change.

It is estimated that 40 per cent of global losses from disasters will be in Asia and the Pacific, with the greatest losses in the largest economies – Japan and China, followed by the Republic of Korea and India.⁴ However, when considered as a proportion of GDP the burden is likely to be greatest in Countries with Special Needs, and in particular, among the small island developing states, which are expected to have average annual losses close to 4 per cent of their GDPs. The least developed countries as a whole are expected to have annual losses of around 2.5 per cent of GDP.

HAZARDS ARE INTENSIFYING WITH TRANSBOUNDARY GEOGRAPHICAL SHIFTS

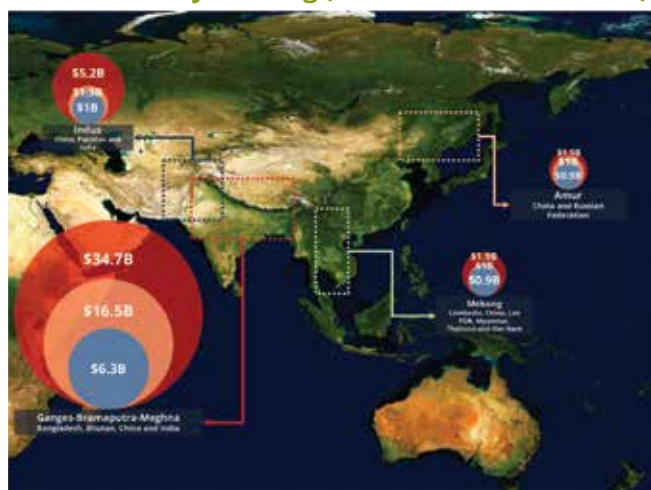
Projected transboundary flood risk

While flooding can be considered by country, in fact much of the excess water spreads across the region's major river basins and over national frontiers. ESCAP has developed flood risk projections for major transboundary river-basins (Figure 3). Flood losses in the basins of the Ganga Brahmaputra and Meghna are likely to increase 2 to 6 times; Indus 1.5 to 5 times, and Mekong -1.5 times, by 2030.

China, India, Bangladesh and Pakistan will experience losses two to three times greater than

Figure 3

Transboundary flooding (2010 and 2030 scenarios)



A substantial increase in flood losses under both moderate and severe climate scenarios.

China, India, Bangladesh and Pakistan will experience two to three times more in flood losses

The transboundary flood losses will range from 1.2 to 6 times more in the major river-basins

in the reference year of 2010. Under the severe scenario in climate projections, India will be the country worst affected, with nearly \$50 billion annual losses, followed by China, Bangladesh and Pakistan.

Drought risk will increase substantially and there will be significant shifts in its geography. In South Asia, westward shift and in South East Asia, eastward. The new geography of drought will cause deep uncertainties on how to manage the risk.

Tropical cyclone – increasing complexity

Tropical cyclones will have shorter return periods with increasing storm surges and wind speeds. In the Pacific basin, the track of tropical cyclones may shift eastward or northward, resulting in three times increase in the number of people and economic assets exposed.

INCREASED SCALE AND MORE TRANSBOUNDARY IMPACTS ON VULNERABILITY AND HUNGER

Extreme weather and slow onset disasters are becoming more complex with large scale impacts. The 2015–2016 El Niño was one of the strongest episodes of the last 50 years. It triggered severe weather anomalies across Asia and the Pacific, including more frequent and intense floods and cyclones.

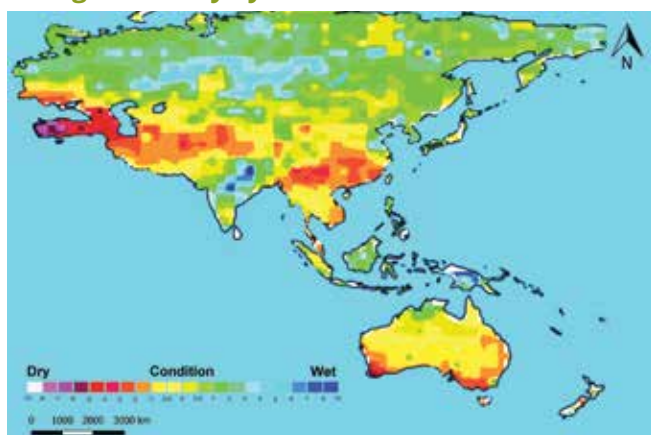
The 2015/2016 El Niño lasted for 2 years with multiple droughts, cyclones, and floods affecting 28 countries in the region. Induced by El Niño, Viet Nam, for example, experienced the worst drought in 90 years.

For agricultural production, much of the damage was caused by prolonged droughts which appeared in parts of the region at different times. The impact

Drought severity by 2030

Figure 4

Drought Severity by 2030



Source: ESCAP, based on Dai, A. (2011).

of the droughts can be captured in the FAO's agriculture stress index which is based on satellite data of vegetation and land surface temperature. This is illustrated in Figure 5 from the onset of El Niño in 2015 until its neutral phase in early 2017.

Region's hunger and climate variability is widespread and critical

The impact of, extreme weather events, which include slow onset disasters, on hunger and food security is spreading over wider geographical areas.

For example, the 2015-2016 El Niño was one of the strongest episodes of the last 50 years. Prolonged droughts which appeared in different parts of the region at different times resulted in increased farmer debts, the declaration of disaster zones in at least 10 countries of the region, with India bearing the brunt, and substantial land degradation.

The scenario will worsen significantly by 2050 if we continue with 'business as usual' (Figure 6).

Agriculture greatly affected by disasters

In many countries in Asia and the Pacific the poorest people are to be found in rural areas working in agriculture, where they are exposed to the elements and to the power of natural forces. The major risks are droughts and floods that destroy crops and livelihoods and undermine rural economies. Added to this is the impact of climate change which is likely to reshape agriculture and the prospects for food security.

In Asia and the Pacific over recent years, on average, agriculture absorbed 17 per cent of the total economic impact caused by natural hazards. But the agriculture sector is also linked with industry and services through both demand and production. Reduced agricultural output also therefore slows overall economic growth, leading to a deterioration of country's balance of payments and increased borrowing. Disaster damage to agricultural assets and infrastructure causes substantial disruptions

Figure 5

El Niño-related droughts in Asia and the Pacific, 2015-2016

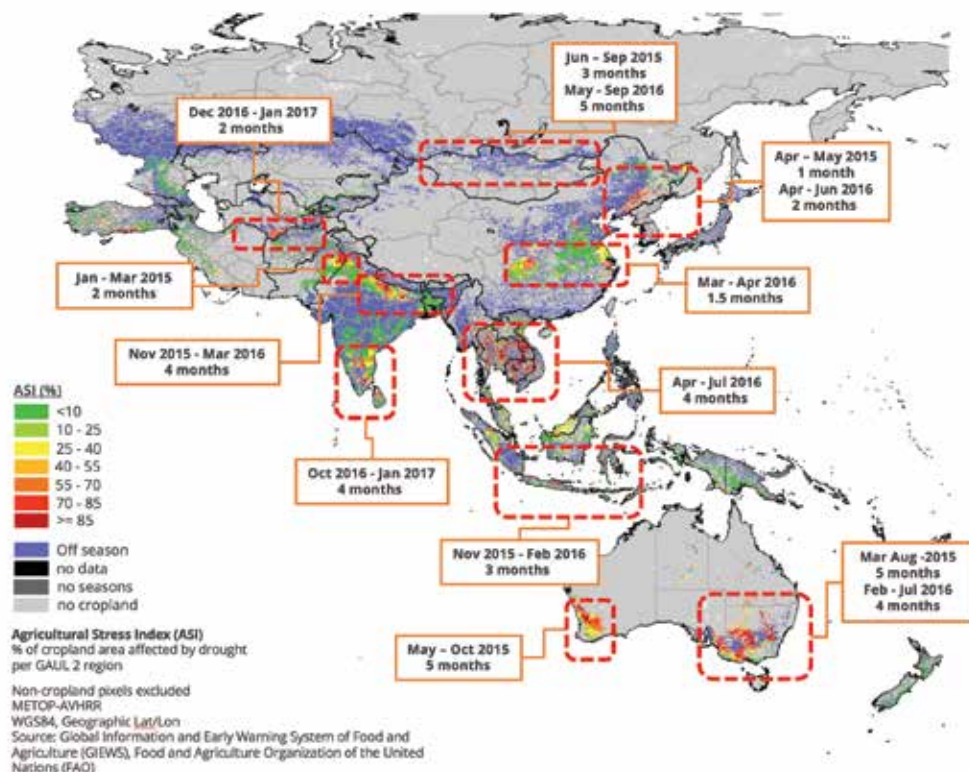
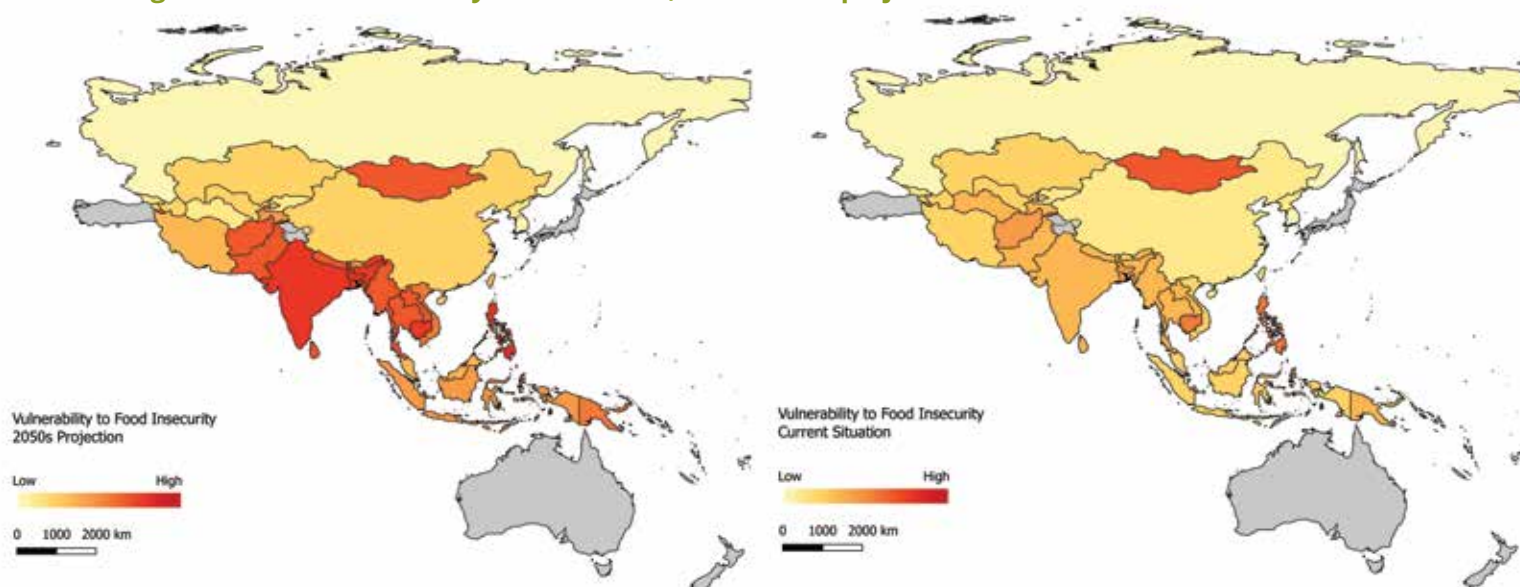


Figure 6

Hunger and climate variability in Asia-Pacific, current and projected to 2050



in production cycles, trade flows, as well as in and livelihoods and employment opportunities.

In addition, there are longer-term impacts on agriculture. Prolonged drought contributes substantially to land degradation. Water and land scarcity, coupled with a succession of disasters, erodes traditional coping mechanisms, particularly for the poorest people who live on the most degraded land. Desertification, land degradation and drought, when compounded by poverty and inequality, can also affect political insecurity and conflict. Some of the world's most conflict-prone regions are drylands. Drought and degradation drive people off their land, creating economic migrants and environmental refugees.

Land and water for agriculture becoming increasingly scarce

Over the past two decades, rapid economic growth and increased agricultural productivity have helped reduce hunger. Nevertheless, agriculture is under strain. Between 1992 and 2014, the amount of arable land in Asia and the Pacific fell from 0.28 to 0.21 hectares per person.⁵ Another concern is the availability of water. Because of growing populations and economic development, nearly all

countries in the region are putting pressure on water resources and reducing the quantity per person.

Food insecurity expected to rise

Over the past two decades, rapid economic growth and increased agricultural productivity have helped reduce hunger. Between 1990 and 2013, the value of food produced in Asia and the Pacific increased by more than 80 per cent. Nevertheless, of the world's 795 million undernourished people, 490 million are in Asia and the Pacific. And 500 million people are expected to be added to the region's population by 2030, putting further pressure on food security.⁶

In its 2014 Assessment, the IPCC estimated that climate change could increase the risk of hunger and malnutrition by up to 20 percent by 2050.⁷ The evidence shows high correlation between hunger and climate risk in Asia-Pacific region affected by food insecurity. It illustrates further that South Asian countries are extremely vulnerable due to high population density in vulnerable settings.

Agriculture tools and solutions

Building disaster resilience to agriculture thus has greater significance beyond the economic impacts. It

is also critical for improving livelihoods and reducing poverty. Disaster risk reduction and resilience must be systematically embedded into agricultural development plans and investments – particularly in countries facing recurrent disasters and where agriculture is a critical source of livelihoods, food security and nutrition.

Making agriculture more resilient will mean preserving the productive base of natural resources and ecosystem services while increasing the capacity to withstand risks, shocks and climate variability. In addition to specific measures for disaster risk reduction, this will also require considerable changes in terms of governance, laws, policies, and private and public investment. Strategies for achieving resilient agriculture include: boosting agricultural productivity with stress-tolerant varieties; adjusting planting dates, expanding water harvesting, storage, and conservation; and insurance and social protection schemes for farmers.

There can also be measures at the regional level. Countries can reduce variability in food availability through food reserves and trade schemes. Asia and the Pacific can take advantage of its strength as a hub for knowledge and technologies. There have been initiatives, for example, to provide timely information for slow-onset disasters – such as forest fires, haze, droughts, floods, and cyclones. Coping with disasters in rural areas also opens up new opportunities. Many of the same measures that will make communities and households more resilient to disasters can also act as stepping stones out of poverty.

DISASTERS EXACERBATE POVERTY

Countries with special needs suffer more

Typically, the greatest impacts are the poorest countries which have less capacity to prepare for, or respond to, their high disaster risks. These include the least developed countries (LDCs), the landlocked developing countries (LLDCs) and the

small island developing States (SIDS). As a group, these are classified as countries with special needs (CSNs). Most exposed have been the SIDS which since 2000 have suffered damage from disasters of over 1 per cent of GDP, compared with 0.4% for non-CSN countries.

Between 2000 and 2015, in Asia and the Pacific the low- and lower middle-income countries experienced by far the most disaster deaths, and lost more people per disaster event: on average, more than 8,000 people died per disaster – almost 15 times the average toll in the region's high-income countries. In fact, the actual death toll in the poorest countries is probably even higher than these data suggest, since many of these countries lack the resources to record the number of deaths.

In all these countries, disasters can have complex and deeply disruptive effects on livelihoods – further disadvantaging those who are already in a vulnerable situation. In rural areas, people are likely to be dependent on agriculture and fragile ecosystems; and have less ability to cope and recover. In cities, they typically occupy low-value land that may be exposed to floods, landslides and other hazards. A high proportion of the victims are women and girls – who often have limited access to information, financial services, land and property rights, health and education – structural disadvantages that reduce their resilience.

Poor people impacted disproportionately

The extent of disaster damage is closely connected with poverty. The poorest communities tend to live in places and conditions that expose them to natural hazards so are least able to withstand disaster impacts. At the same time, disasters destroy many of their already meagre assets, increasing inequality and trapping people in poverty that can be transmitted from one generation to the next. As expressed in the Sustainable Development Goals, reducing disaster risk and reducing poverty and inequality are part of the same process.

Natural disasters hit poor people harder because they live in vulnerable overexposed areas, have lower-quality assets, and in rural areas that are more dependent on vulnerable agriculture and ecosystems; thus, they have less ability to cope and recover. In cities, poverty forces low-income households to occupy low-value land that may be exposed to floods, landslides and other hazards. Faced with recurring disasters, many households are often unable to break out of the poverty cycle.

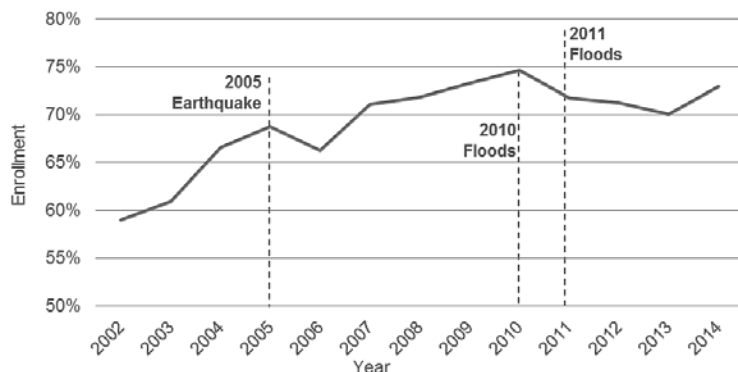
Poor people suffer higher well-being losses

In absolute terms, the rich may lose more because they have more to lose. What matters more, however, is the proportion of income or assets lost. The same absolute loss will matter more to a poor household than a rich one and widen existing disparities.

Poorer households have greater losses in well-being because they have fewer assets (which are worth more to them), their consumption is closer to subsistence levels, they cannot rely on savings to smooth disaster impacts, and their health and education are at greater risk.⁸ Poor households have less ‘socioeconomic resilience’ and are thus less able to minimize the impact of well-being losses. Figure 7 shows primary school enrollment rates falling after each major disaster in Pakistan between 2002 – 2014.

Figure 7

Primary School enrollment in Pakistan after disasters



Disasters can push people back into poverty

In addition to hitting the poorest, disasters can also cause the near poor – those living on between \$1.90 and \$3.10 per day – to fall into poverty.

Figure 8 provides estimates of numbers of people who fell back into poverty after disaster struck.

Extensive disasters contribute to poverty traps

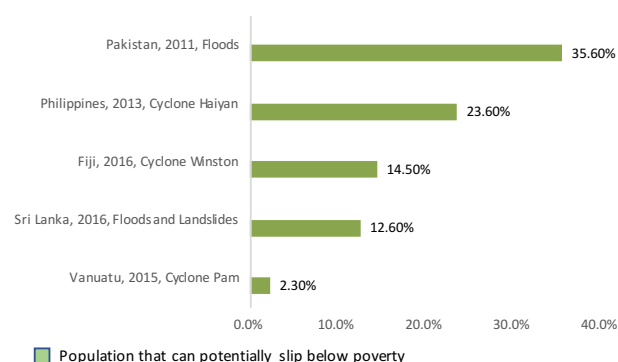
Most attention usually goes to ‘intensive’ disasters like earthquakes and cyclones, but the cumulative damage, particularly for the poor, is often greater for ‘extensive’ disasters such as droughts, persistent flooding, and small or medium-sized storms that deliver low-intensity but recurrent shocks. Severe storm damage to a poor household’s roof can, for example, ruin harvested grains but government support is often not forthcoming because the storm was not considered a disaster.

DISASTERS WIDEN INEQUALITY

Disasters exacerbate inequalities. A common measure of inequality is the Gini index which ranges from 0 to 1, where 1 represents complete inequality. An analysis for 86 countries globally

Figure 8

Estimated percentage of people falling into poverty from selected disasters



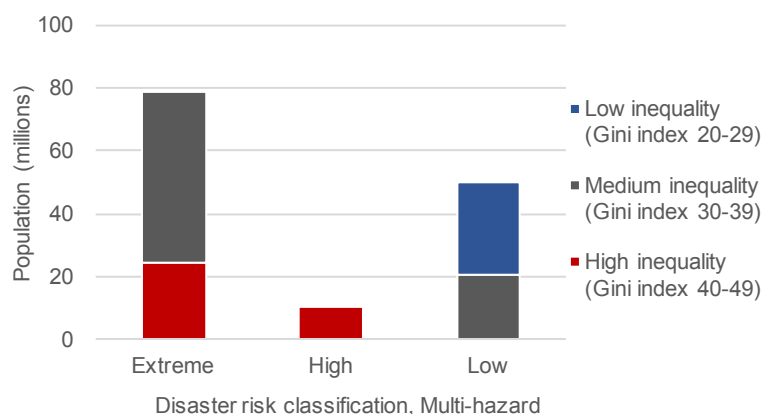
from 1965 to 2004 found that a natural disaster increased the Gini coefficient by 0.01 in the next year. An analysis by ESCAP among 19 countries in Asia and the Pacific suggests a similar relationship, with disasters worsening existing inequalities.⁹ Poverty, like wealth, is often transmitted from one generation to the next. This process will be sustained by disasters that deplete or destroy the assets and resources of the poor. Extensive disasters are particularly insidious. Droughts, for example, can last for years, even a decade, and lead to chronic, persistent malnutrition.

The disproportionate impacts of disasters on income, assets and well-being losses on poorer countries and people widen inequalities. In megacities in the Asia-Pacific, 56 per cent of the populations with medium or high levels of inequality are located in extreme disaster risk areas. The results are similar for smaller cities.

Disasters are especially likely to widen inequalities in urban areas. The region's cities already have striking disparities between rich and poor, but disasters are likely to increase these still further. Based on the UNEP/UNISDR multi-hazard risk index, 170 cities across Asia and the Pacific are located in areas of extreme risk, while 314 are in

Figure 9

Megacities of 10 million or more



high-risk areas and 154 are in medium-risk areas.¹⁰ This risk emanates from tropical cyclones/typhoons, earthquakes, floods and landslides. Because of the opportunities for trade, many of these cities have developed from ports, and these infrastructure links make coastal areas attractive even today for new economic zones.

Many cities are located in the areas where multi-hazard risks are growing rapidly (Figure 10). In the Asia-Pacific region by 2015-2030 it is estimated that the population in the 'extreme-risk' areas, is expected to grow more than 50 per cent in 26 cities located in extreme risk areas (dark purple dots),

Figure 10

Multi-hazard disaster risks in cities in Asia-Pacific



and by 35 to 50 per cent in 72 cities in high risk areas (dark pink dots). As a result, the number of city dwellers exposed to extreme and high risks is likely to increase significantly, particularly in East and North-East Asia, South and South-West Asia, and South-East Asia.

The increase in the population is expected to be from poor and vulnerable populations living in cities that also suffer from high levels of inequality.

Unplanned urban areas heighten risk

Outside city limits, there are also risks in peri-urban areas. These are attractive for residents because they have low land and rental rates, but they also lack municipal building and development regulations and, as a result, often have unsafe buildings and inadequate infrastructure. In practice, they usually operate as extensions of cities, whose services are still called upon to respond to emergencies. These transitional zones between urban areas and rural zones provide critical ecosystem services that if eroded or mismanaged can heighten the risks of floods, droughts and landslides.¹¹ Even when peri-urban areas are formally subsumed into cities it is difficult to correct constructions or rebuild to meet planning and safety standards. In Ho Chi Minh City, for example, land and markets pushed the poor and vulnerable to settle in peri-urban areas with higher risk and exposure to floods. As a result, the area exposed to flood increased by more than 24 times between 1989 and 2015.¹²

CLIMATE CHANGE MAGNIFIES DISASTER RISK

In future, the risks and scale of natural disasters will be heightened and reshaped by climate change. Building resilience to disasters and adapting to climate change should therefore go hand in hand.

Climate change magnifies the risk of disasters and increases their costs.¹³ As the climate system has

warmed, the number of weather-related hazards globally has tripled, and the number of people living in flood-prone areas and cyclone-exposed coastlines has doubled – and this trend is expected to increase.¹⁴

Climate change could also bring huge economic losses.¹⁵ For South-East Asia, for example, it has been estimated that climate change may reduce the region's gross domestic product (GDP) by up to 11 per cent by 2100.¹⁶ Increases in floods and droughts that affect rice crops will increase food prices. By 2030, climate change could force more than 100 million people into extreme poverty.

Over the past century, most of the Asia-Pacific region has seen warming trends and greater temperature extremes. The impact of climate change will be felt particularly through periodic weather events that can be considered as climate risk fault-lines – monsoon rainfall and El Niño/La Niña events – as well as through heat waves, sand and dust storms, floods cyclones and droughts.

- Monsoons – For East Asia, most models show an increase in mean precipitation in the summer monsoons and an increase in heavy precipitation events. For India, all models and scenarios project an increase in both mean and extreme precipitation in the summer monsoon
- El Niño/La Niña – It is not clear whether rising global and ocean temperatures will intensify El Niño events – though they could affect their frequency: some modeling suggests that over the next 100 years extreme El Niño events could occur roughly every 10 years instead of every 20.¹⁷
- Heat waves – Climate change can increase the number of heat waves that cause substantial mortality.¹⁸
- Dust storms – Higher temperatures reduce soil moisture which, combined with higher wind speeds, trigger large-scale sand and dust storms – especially in South-West Asia, and North and East Asia.
- Floods – ESCAP has developed flood risk projections that indicate substantial increase in flood losses, particularly in East, South,

South-West and South-East Asia with the problem becoming worse by 2030. China, India, Bangladesh and Pakistan will experience losses two to three times greater than in the reference year of 2010.

- Cyclones – Climate change is predicted to increase the frequency of high-intensity storms in ocean basins. Future climate scenarios also suggest that tropical cyclones will have shorter return periods and be increasingly destructive.¹⁹
- Drought – By 2030, drought risk will have increased substantially. There will also be a shift in the geography of drought: in South Asia towards the west; in South-East Asia towards the east.

Climate risk hotspots

Climate risks are widespread across the region, but there are also hotspots where greater likelihood of change coincides with high concentrations of vulnerable, poor or marginalized people. Generally, these cut across national boundaries.

- River deltas – The Mekong and the Ganges–Brahmaputra–Meghna deltas will be affected by sea-level rise due to subsidence, decreases in sediment supply, increase in groundwater salinity, and deteriorating water quality. They will also suffer loss and erosion because of floods, storm surges, and extreme cyclonic events, exacerbated by the loss of protection from mangrove forests and sand dunes.
- Semi-arid regions – These areas are likely to experience more frequent and intense droughts – and as a result will become more extensive.
- Glacier- and snowpack-dependent river basins – More than 1.5 billion people living in the floodplains of the Ganges, Indus, and Brahmaputra depend on the Himalayan water system. Based on a projected glacier area in 2050, declining water availability could eventually threaten some 60 million people with food insecurity.²⁰

Adaptive capacity for climate resilience

A system's adaptive capacity is the set of resources available for adaptation, as well as the ability of

that system to use these resources effectively. The IPCC's Fifth Assessment Report set out a range of interventions and policy responses.

- Low-regrets measures – These provide large benefits but at low-cost – and thus cause low regrets should they prove to have been unnecessary. Measures include: early warning systems; risk communication between decision makers and local citizens; and sustainable land management and ecosystem management and restoration.
- Integrated approaches – A portfolio of actions that are most effective when customized to local circumstances. They could involve hard infrastructure combined with building individual and institutional capacity and improving ecosystems.
- Multi-hazard risk management – This reduces the likelihood that reducing the risk for one type will increase exposure and vulnerability to others.
- Synergies with disaster risk management – Greater coordination is needed between technology transfer and cooperation on disaster risk reduction and climate change adaptation
- Community-based adaptation – This can be supported with human and financial capital and information that is customized for local stakeholders.
- Effective risk communication – Appropriate and timely risk communication among all stakeholder groups should also clarify the degrees of uncertainty and complexity.
- Iterative management – The complexity and uncertainties, and the length of the time frames associated with climate change, require iterative processes of monitoring, research, evaluation and learning

Many adaptations can be implemented at low cost. It has been estimated that transitioning to a low-carbon pathway would cost the region 1.4 to 1.8 per cent of GDP by 2050. This is lower than the costs of inaction; without action, the region could see GDP decrease over this period by 3.3 per cent.

The costs of adaptation are modest partly because of a steep drop in the cost of green technologies,

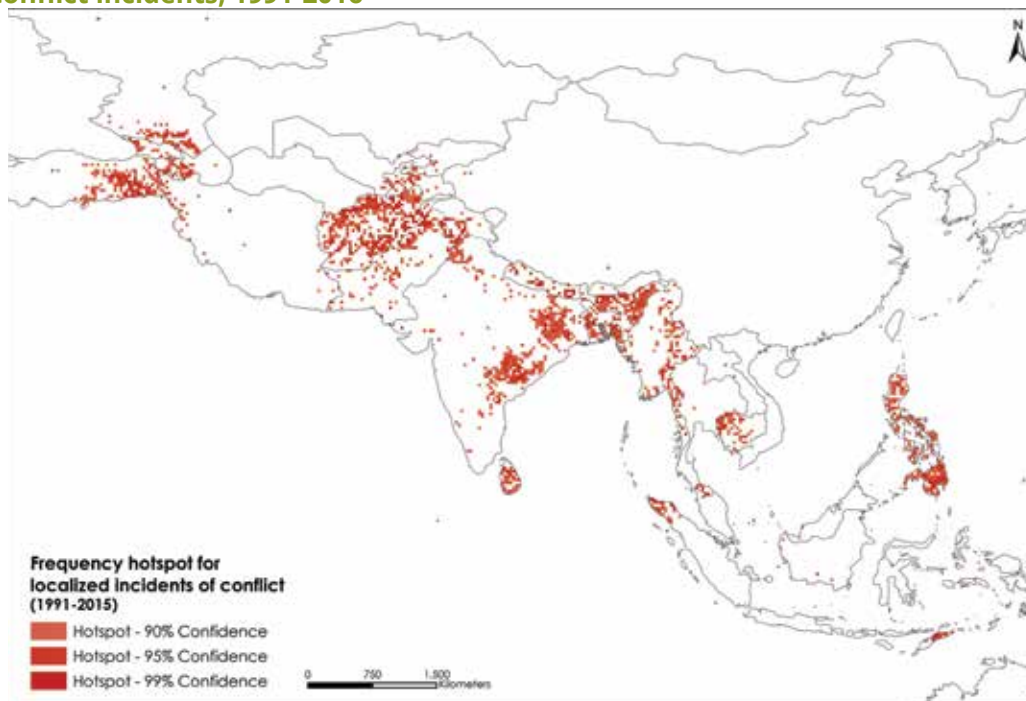
but also because of the potential for large efficiency savings and significant co-benefits. There are five priority areas for achieving a green transition: promote adaptation to climate change and improve resilience; implement effective carbon pricing; phase out fossil fuel subsidies; encourage renewable energy and energy efficiency; and expand climate finance.

Making policy decisions under deep uncertainty

For DRR to be successful, it needs to take account of the shifting risks associated with climate change and ensure that measures do not increase vulnerability to climate change in the medium to long term.²¹ Traditionally hazard analysis has been based on historical data, but this is no longer sufficient, because hazard characteristics are changing as a result of climate change. For instance, a 100-year flood or drought may become a 30-year flood or drought.²² Climate scenarios inevitably have ranges of uncertainty which increase as they project further into the future.²³ There are also issues of resolution, since the projections may be for areas broader than those required for local policy decisions.

Figure 11

Localized conflict incidents, 1991-2016



GROWING NEXUS OF DISASTER, POVERTY, INEQUALITY AND CONFLICT

There is often a close relationship between disasters and armed conflict. Conflicts undermine the capacity and commitment of states to prevent and respond to natural disasters and humanitarian crises. At the same time, disasters themselves can create unstable economic conditions, exacerbate social fault lines and heighten social exclusion – creating fertile ground for disputes. Reducing disaster-related risks can sometimes open paths for conflict prevention and developing more peaceful societies.

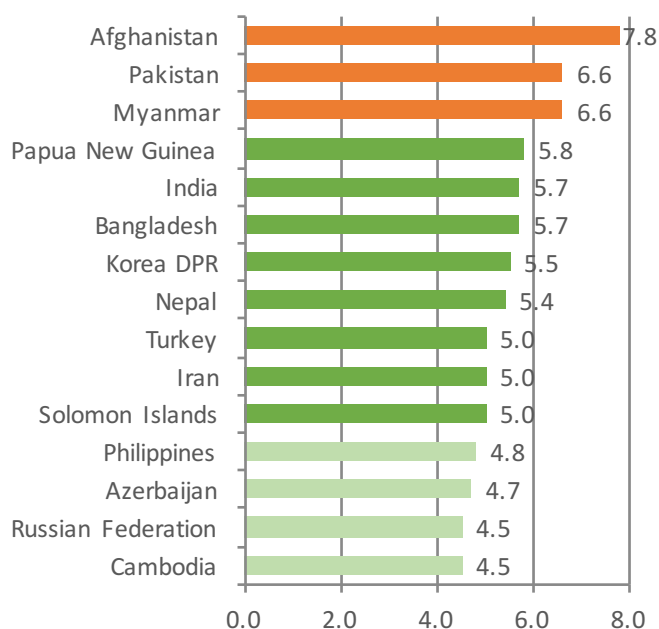
Fragile states affected by conflict find it more difficult to respond to disasters, as well as to protect communities from disaster, or to empower them for risk reduction. At the same time, disasters can also exacerbate conflict fault lines and social exclusion.²⁴ This is common where there is competition for natural resources, along with environmental stress, degradation and mismanagement.

Drought and desertification, for example, can exacerbate disputes where poor people are competing for limited land and water.²⁵ A severe drought threatens local food security, and livestock feeds, aggravates humanitarian conditions, and often triggers large-scale human displacement. It may also provide the breeding ground for sustained conflict.²⁶ Environmental shock and violent conflict thus create vicious circles. One global study has concluded, that around one quarter of conflicts in ethnically fractionalized countries coincide with climatic calamities.²⁷

As well as being exposed to natural hazards, countries are also at risk from man-made disasters through wars and violent conflicts. These broader risks have been incorporated into the INFORM index which includes the risks from both natural and man-made disasters. On this basis, the greatest risks are in South and South-West Asia and South-East Asia, largely because of natural hazards, for which the rating is higher than for man-made disasters. However, countries such as Afghanistan, have a higher rating for conflicts.

Figure 12

Conflict risk profiles (INFORM Risk Index)



Increasing disaster resilience can lower risk of conflict

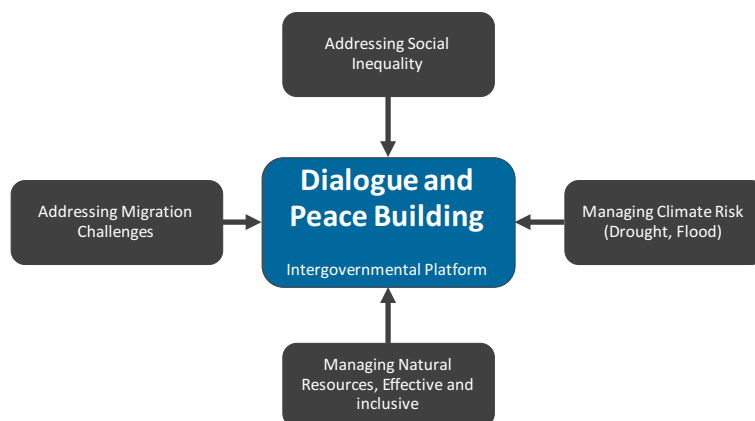
Communities in conflict-affected areas tend to have lower resilience to disasters. Similarly, community members affected by disasters can be more vulnerable to engaging in conflict. In these circumstances, in addition to more conventional peace-building approaches, climate adaptation and disaster risk reduction offer further entry points for preventing conflict.

In situations where conflict is based on competition for scarce resources, better management of natural resources, combined with climate change adaptation, can channel competing interests into non-violent resolutions. In a volatile situation where conflict is either brewing or in full swing, these interventions can offset or soften the impacts of a disaster.

The most dramatic windows of opportunity can be opened by large-scale, generally rapid onset disasters. In Indonesia, for example, the post-tsunami recovery in 2005 was seen as an historic opportunity to ‘build back better’ – addressing both tsunami recovery and post-conflict reconstruction in a more unified way. In 2005, after 29 years of war, the separatist movement signed a peace agreement with the Indonesian Government.²⁸

Figure 13

Climate adaptation and DRR are entry points to reduce conflict



Aid is not always so supportive, and in some cases, post-disaster responses can exacerbate conflict. If infusions of aid appear to favour some sections of society over others they may increase social tensions. Disaster management should therefore be conflict sensitive to guard against unintended harm, while peace-building should be hazard proof.

Environmental management, conflict prevention, disaster risk reduction and peace-building thus should not be seen as separate activities but as linked to each other, as well as to programmes for poverty reduction and improving livelihoods. Interventions to reduce disaster risk cannot prevent conflict, but they can be part of a larger, more integrated approach to conflict prevention and peace building.

UNSG's prevention agenda

The UN Secretary General outlined his vision for the prevention of conflict and peace-building: "For all countries, addressing inequalities, strengthening institutions and ensuring that development strategies are risk-informed are central to preventing the fraying of the social fabric that could erupt into crises. We need to invest more to help countries build strong and inclusive institutions and resilient communities. Development is the key to prevention. Far from diverting resources or attention away from development, an effective and broad focus on prevention will generate more investment and concerted efforts to achieve the SDGs.

The SDGs and sustaining peace are complementary and mutually reinforcing. Sustainable development underpins peace, and sustained peace enables sustainable development. Implementation of both agendas will ensure that stable societies prosper and fragile societies become more resilient and can manage risks and shocks more effectively. Our prevention work seeks to shore up national and local institutions and capacities to detect and avert looming crises, sustain peace and achieve sustainable development."²⁹

POLICIES, ACTIONS AND TOOLS FOR RESILIENCE REINFORCE SUSTAINABLE DEVELOPMENT

The inclusion of a dedicated target to substantially increase the availability of and access to multi-hazard early warning systems in the Sendai Framework for Disaster Risk Reduction 2015-2030 is a strong endorsement of the value of early warning systems as a part of a broader disaster risk reduction strategy.

Furthermore, with disaster risk reduction and resilience embedded in the 2030 Agenda for Sustainable Development, early warning systems have a critical role to play in achieving the Sustainable Development Goals.

Actions need to be taken to increase the availability of and access to multi-hazard early warning systems.

The global development frameworks adopted in 2015 and 2016 established a mandate to 'leave no one behind'. These frameworks now need to be translated into resilience building programmes and actions. An important part of this will be regional cooperation which will enable countries to harness economies of scale, address shared vulnerabilities, and extend the strongest possible protection to high-risk, low-capacity countries and communities. The international community has placed disaster risk reduction at the heart of sustainable development. Over the period 2015-2016, governments established a comprehensive global framework. This comprised six separate but interrelated agreements:

- Sendai Framework for Disaster Risk Reduction 2015-2030
- 2030 Agenda for Sustainable Development
- Paris Agreement under the UN Framework Convention on Climate Change
- Agenda for Humanity

- New Urban Agenda
- Addis Ababa Action Agenda under the Third International Conference on Financing for Development

Resilience is the common thread connecting disaster risk reduction and sustainable development

Governments aiming to build resilience in line with this global framework need to continually re-learn and retool disaster risk reduction to meet new challenges, such as climate change, as well as new mandates, such as the SDG requirement to ‘leave no one behind’.

Countries need to ensure national policy coherence amongst the six global development frameworks, the 2030 Agenda for Sustainable Development, at its core, in order to maximize efficiency and minimize overlaps. Many countries have already begun to develop SDG implementation plans, so there is an urgent need to ensure that the relevant targets from the other agendas are also included, especially those from the Sendai Framework.

Figure 14

2030 Global Frameworks



The SDG goals related to disasters are not only compatible with the indicators of the Sendai Framework (Figure 15) but also allow for incorporating disaster risk reduction into other policy agendas such as poverty eradication, food security, infrastructure, and urban development –

Figure 15

Alignment between the Sendai Framework and SDG indicators



while also responding to climate change. Disaster risk reduction and resilience is not one of these goals, but it is embedded in the SDGs and explicitly so in at least four (1, 2, 11, and 13), with the aim of anticipating the potential creation of risks.

For example, achieving target G of Sendai Framework which aims to substantially increase the availability and access to multi-hazards early warning systems and disaster risk information and assessments to people by 2030, need various layers of processed data to produce actionable early warning information such as hazards characteristics, vulnerability, exposure, and potential impacts. While hazard data are widely available, vulnerability and exposure data are limited. Improving the availability of these data and information will help countries achieve the Sendai target and serve as inputs to monitoring the progress on Sendai and SDG indicators (Figure 16).

Countries have been talking about integrating Disaster Risk Reduction across all sectors for a few decades now, and while there have been some successes, on balance, the progress has been limited. DRR has risen in prominence to be sure, but it has been treated as yet another sector instead of an integral part of every sector, and much of the focus has been on disaster response and recovery, with insufficient investment in actual risk reduction measures. Yet, evidence shows that investment in DRR works (Figure 17).

Figure 16

Outcome of (SDG 1.5) to input indicators (Sendai target G)

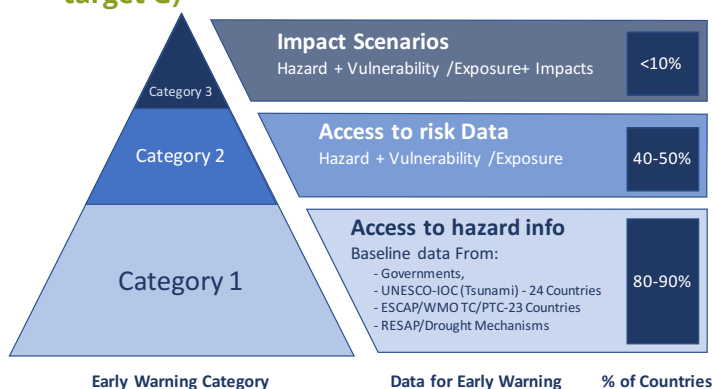
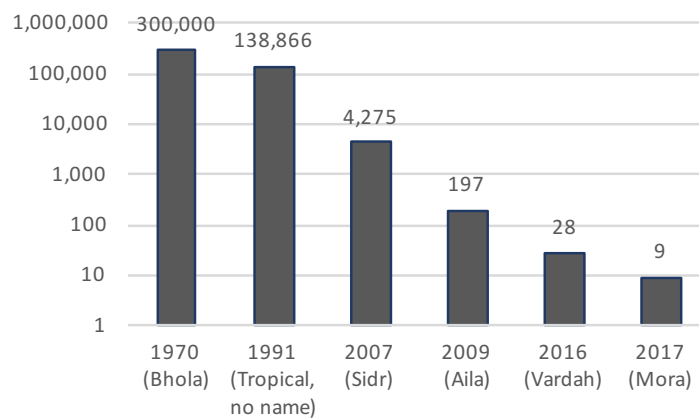


Figure 17

Investing in disaster risk reduction works

Deaths from tropical cyclones hitting Bangladesh (1970-2017)



Just as DRR is essential for achieving the 2030 Development Goals, the focus on achieving the goals is essential for DRR to be integrated across sectors. We have the opportunity to get it right and we cannot fail as millions of peoples' lives and livelihoods depend on it.

Some of the cross cutting measures include regional early warning systems, innovations in space applications, and improved forecasting ability.

One, early warning systems are a regional public good. Therefore, joint actions to improve existing early warning systems for tsunami, typhoons, and cyclones and establishing similar systems for shared hazards such as river-basin floods, flash floods and landslides that cut across national borders need to be strengthened.

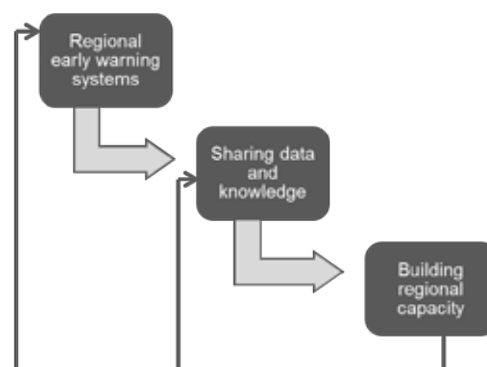
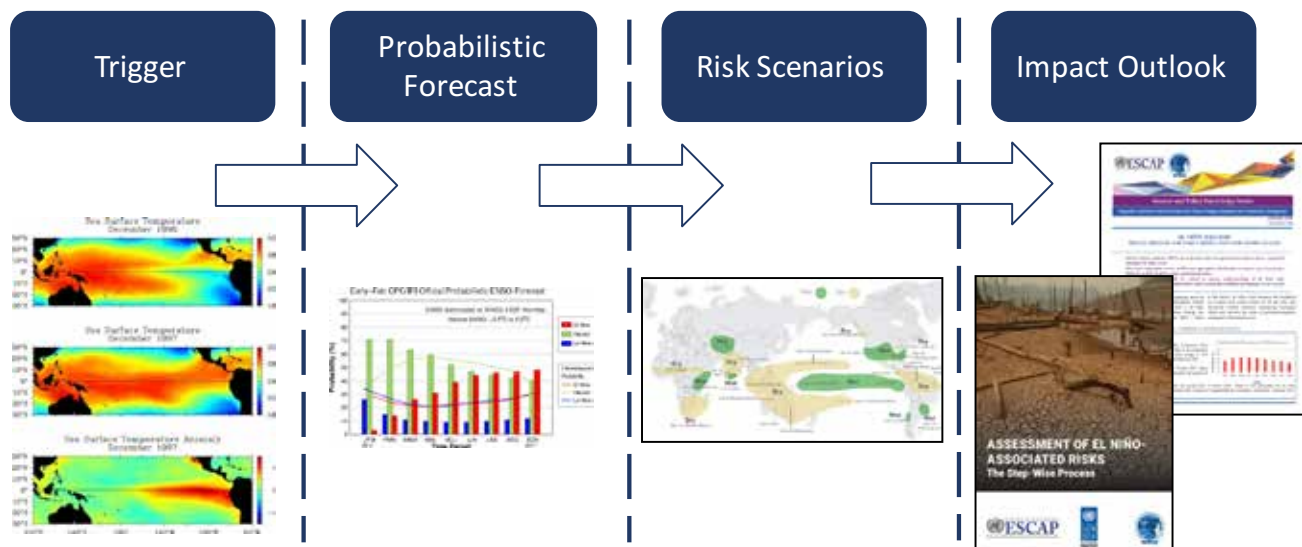


Figure 18

Early warning to early action: Impact based forecasts



Two, countries need to take advantage of new innovations, especially in space applications to access the most current knowledge and information. To achieve this, ESCAP supports the Regional Space Applications Programme for Sustainable Development in Asia and the Pacific, which provides low-capacity, high risk countries access to space-based data.

Three, with the advances in climate science, it is now possible to provide climate forecasts for three to six months in advance and integrate these into early warning systems (Figure 18). Building regional capacity, with help of regional and technical cooperation mechanisms such as the ESCAP Trust Fund on Tsunami, Disaster and Climate Preparedness and the Asia-Pacific Centre for Development of Disaster Information Management can be effective vehicles to support sharing of data, tools, expertise, and advisory services for disaster resilience.

THE WAY FORWARD

Risk-informed development is sustainable development

There is an abundance of tools and approaches to incorporate risk into development planning. Some are already proven; others are emerging. Many are driven by technological advances in risk assessment, communication, and financing. But these science-based approaches need to be customized to national and local needs and should be sensitive to the differing circumstances of poor communities. The overall strategy should be to:

Make SDG implementation plans risk informed – Governments will need to assess the current risks, and the gaps in disaster risk reduction, with data disaggregated by gender, age, and income as well as by other social groups – capturing the complexities of the dynamic process of risk generation and accumulation over time. Another essential requirement is the establishment of multi-stakeholder platforms to gather and synthesize risk information and to translate it into risk reduction measures. A useful model has been demonstrated by national climate outlook forums.

Address the risks faced by different poor populations – Leaving no one behind means identifying the specific vulnerabilities of poor countries and communities. Several countries in the region are moving towards ‘impact-based’ forecasting – which combines hazard forecasts with data on risk to highlight how people in hazard exposed and marginal areas could be affected. The potential impacts to affected populations then need to be communicated. In rural areas, this can be part of agriculture extension systems – delivering weather and information along with a bundle of other advisory, financial, market, and rural extension services.

Strengthen risk governance at all levels – National strategic plans of action for disaster risk management need to be revised and aligned with the Sendai and other global frameworks and extended to the local level. Resilience is a cross-cutting issue and needs stronger political commitment and bureaucratic drive if it is to be extended across multiple disciplines and sectors

Invest in disaster risk reduction – Policy makers often fail to appreciate the economic value disaster risk reduction. Globally, disaster risk reduction interventions have an estimated rate of return of between four and seven times.³⁰ On this basis, to reduce the average annual loss for Asia and the Pacific of \$160 billion by 10 per cent by 2030 the average annual investment required would be between \$2.3 billion and \$4.0 billion. In the case of reducing risks from seismic hazards in urban areas, for example, it may not be feasible to be engaged in demolition and reconstruction, but there are affordable forms of retrofitting. Just as important, all new projects should be disaster resistant not only in their structural components, but also in their impacts on society, livelihoods and the environment

Manage the fiscal burden of disasters – Asia-Pacific developing economies typically struggle to finance reconstruction and relief and the already limited insurance penetration has not kept pace with economic growth. This can be offset to a certain

extent by international aid. One option is forecast-based aid financing. Other key risk-transfer instruments include: financial insurance, micro-insurance, and micro-financing, investment in social capital, government disaster reserve funds, and intergovernmental risk sharing. For individual farmers, for example, a useful option is parametric, weather-index insurance.

Monitor progress in resilience-building – Traditional statistics for disaster risk reduction can be complemented with earth observation data and geospatial information. However, taking advantage of these new data sources needs investments in staff training and in systems for integrating geospatial, and earth observation data and ensuring interoperability. Advances in technology or technical human capabilities will only deliver their potential as part of integrated systems that align the flow of information with the shifting needs and demands of users.

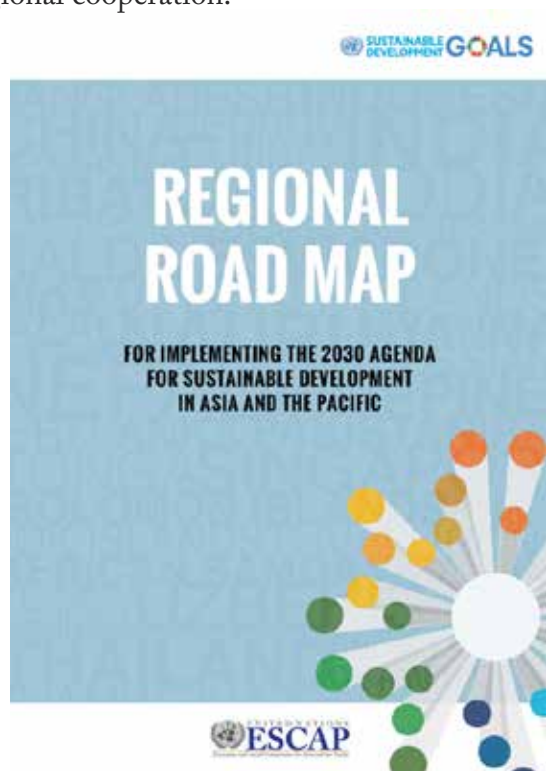
Countries are at various stages of developing strategies to build resilience to disaster across sectors. The development and implementation of these plans require guidelines across all relevant sectors of development with the means of implementation such as enabling technologies, finance and capacity development. This necessitated the establishment of the Asia-Pacific Disaster Resilience Network (APDRN) in ESCAP to support ongoing efforts to ensure coherence across the global frameworks.



Instituting APDRN as a means of implementation of ESCAP's initiatives on disaster risk reduction and resilience was one of the major decisions taken by its member States at the Committee on Disaster Risk Reduction on its fifth session.

Action for regional cooperation

Resilience can be facilitated and strengthened through international and regional cooperation. In March 2017 at the Asia-Pacific Forum on Sustainable Development, ESCAP member States adopted the *Regional road map for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific*. Priorities include strengthening regional cooperation; efficient and coordinated support to member States; and sharing knowledge and good practices more effectively. Disaster risk reduction and resilience is identified as one area for regional cooperation.



ESCAP member countries can ensure that populations and countries with low capacity can make use of technologies through partnerships and regional cooperation. Actions include:

Regional early warning systems – Joint action is needed to improve warning systems for shared hazards that cut across national borders. ESCAP and WMO have established the Typhoon Committee and the Panel on Tropical Cyclones.

There are also options for other hazards such as transboundary river-basin floods, flash floods and landslides. The costs of warning systems vary greatly among countries, each of which will need affordable and practical solutions. A major concern is sustaining the necessary funding, so it is important to emphasize the benefits of investing in a regional 'public good'. On average, over the next century the Indian Ocean Tsunami Warning System will save at least 1,000 lives per year. Countries can also work together to exchange experience and technical assistance – improving inundation maps and warning chains, for example, and developing evacuation plans.

Sharing data and knowledge – If countries are to take advantage of space applications they will need better access to information and knowledge. To achieve this, ESCAP's Regional Space Applications Programme for Sustainable Development in Asia and the Pacific (RESAP) supports low-capacity, high-risk countries.

One of the flagship programmes is the Regional Drought Mechanism. Another regional programme for enhancing access to space-based data is SERVIR which provides satellite-based earth observation data to the International Centre for Integrated Mountain Development and the Asian Disaster Preparedness Center.

Building regional capacity – It is now possible to provide climate forecasts for three to six months in advance and integrate these into early warning systems. For this purpose, countries can take advantage of initiatives such as the UN Global Education and Training Institute for Disaster Risk Reduction in Incheon. ESCAP has also recently established the Asia-Pacific Centre for Disaster Information Management to provide member countries with advisory services and technical

cooperation on building codes, seismic micro-zonation and retrofitting.

Reinforcing the future

The 2030 Sustainable Development Goals and the other global development frameworks and commitments aim to balance the economic, social and environmental dimensions of sustainable development – paying particular attention to the needs of vulnerable people – the poor, the excluded and those who are discriminated against. These frameworks share many common understandings:

Hazards are inevitable but disasters are not

Disasters are endemic in nature and in the process of social and economic development. Such risks cannot be prevented or preempted, but they can be assessed, anticipated, mitigated and adapted to.

Risk reduction is crosscutting

Resilience concerns multiple disciplines and sectors, including: natural resource management, food security, health, education, social safety nets, insurance, infrastructure, urban planning, housing, building codes and standards, the private sector, supply chain management, tourism, and livestock.

Work in concert

Coordination is needed within and across sectors, with the full engagement of all state institutions, executive and legislative, at national and local levels

Science can help

Advances in science and technology in areas such as earth observation systems, spatial planning, big data analysis, and ICT can help countries in understanding risks, and in forecasting and communications.

Finance needs to be mobilized

All frameworks highlight the need to tap into a variety of financing sources, including domestic public resources, private business and finance,

international development cooperation and international trade.

Learning by doing

Capacity needs to be developed across all sectors and at all levels. Given that countries are at different stages of developing resilience strategies across all sectors, regional coordination and collaboration can greatly assist in speeding up this process. For example, an Asia-Pacific Disaster Resilience Network could be established in ESCAP to ongoing efforts in member countries to ensure coherence across frameworks and strategies.

International opportunities

The small island developing states, the least developed and developing countries will need international cooperation to develop capacities, and acquire technologies and financial assistance.

Measure progress

Each of the global development agendas adopted in 2015 and 2016 has specific goals and targets that need to be consistently monitored.

Disasters may not be completely predictable, but they can be anticipated. Building resilience is not a job for the public sector alone. Fulfilling the 2030 Agenda will require ‘whole-of-government’ and ‘all-of-society’ engagements that can build a more resilient world for future generations.

ENDNOTES

- ¹ Data source: EM-DAT: The OFDA/CRED International Disaster Database. Available from <http://emdat.be/> (Accessed on 4 July 2017)
- ² Alliance Development Works and United Nations University (2014) World Risk Report 2014
- ³ Government of Nepal, National Planning Commission (2015) Nepal Earthquake 2015: Post Disaster Needs Assessment Vol A. Key Findings
- ⁴ UNISDR (2015) Making Development Sustainable: The Future of Disaster Risk Management. Global Assessment Report on Disaster Risk Reduction. Available at <https://data.humdata.org/>

- org/dataset/multi-hazard-average-annual-loss (Accessed on 20 March 2017).
- ⁵ ESCAP Statistical Year Book for Asia and the Pacific 2015, Sustainable Development Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- ⁶ ESCAP Statistical Year Book for Asia and the Pacific 2015, Sustainable Development Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- ⁷ IPCC. 2014. Assessment Report.
- ⁸ Patankar A et.al. (2016). Estimating the uninsured losses due to extreme weather events and implications for informal sector vulnerability. *Natural Hazards*, 80(1): 285-310.
- ⁹ See APDR 2017 Chapter 2, Appendix 1, for details on methodology.
- ¹⁰ Based on urban data from UN-DESA (2014). *World Urbanization Prospects: The 2014 Revision*, CD-ROM Edition; and multi-hazard risk index from UNEP/UNISDR (2013). *Global Risk Data Platform*. Available at <http://preview.grid.unep.ch/> (accessed on 7 August 2017).
- ¹¹ Urban, Peri-Urban and Ecosystems Working Group, ACCCRN <https://www.acccrn.net/wg/urban-periurban-and-ecosystems-working-group> accessed on 20 June 201
- ¹² Angel et al., *Atlas of Urban Expansion—2016 Edition, Volume 1: Areas and Densities*, New York: New York University, Nairobi: UN-Habitat, and Cambridge, MA: Lincoln Institute of Land Policy, 2016.
- ¹³ IPCC, 2012: Summary for Policymakers. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA
- ¹⁴ *Disaster Risk Reduction and Resilience in 2030 Agenda for Sustainable Development -A reflection paper prepared by the UN Office for Disaster Risk Reduction*, October 2015.
- ¹⁵ *Economics of Climate Change in Asia-Pacific region*, ESCAP Report 2016 <http://www.unescap.org/sites/default/files/The%20Economics%20of%20Climate%20Change%20in%20the%20Asia-Pacific%20region.pdf>
- ¹⁶ *Climate change losses for South East Asia*, ADB Report, December 2015 <https://www.adb.org/news/climate-change-losses-southeast-asia-well-above-previous-estimate-adb>
- ¹⁷ *El Nino and Global Warming – What's the connection?* State of the Planet, Earth Institute, Colombia University, Renee Cho, February 2016 (<http://blogs.ei.columbia.edu/2016/02/02/el-nino-and-global-warming-whats-the-connection/>)
- ¹⁸ Campbell-Lendrum, D., Holloway, T. & Foley, J. A. Impact of regional climate change on human health. *Nature* 438, 310–317 (2005).
- ¹⁹ The second assessment report on the influence of climate change on tropical cyclones in the typhoon committee region (2012) by Ming Ying, Thomas R. Knutson, Tsz-Cheung Lee, Hirotaka Kamahori and Wen-kun Leong, ESCAP/WMO Typhoon Committee Secretariat, Macao, China
- ²⁰ Immerzeel WW, Beek LPH, Bierkens MFP (2010) Climate change will affect the Asian water towers. *Science* 328(5984):1382–1385. doi:10.1126/science.1183188
- ²¹ http://www.pacificdisaster.net/pdnadmin/data/original/ConvergenceofDRRandCCA1_2008.pdf
- ²² *Climate information for disaster risk reduction, Global Framework for Climate Services for Disaster Risk Reduction*, WMO 2016
- ²³ *Investment decisions under deep uncertainty: Applications to climate change*, Stéphane Hallegatte, Ankur Shah, Robert Lempert, Casey Brown and Stuart Gill Policy Research Working Paper- 6193 (2012), Sustainable Development Network, World Bank, Washington DC
- ²⁴ GFDRR, GTZ. 2016. *Disasters, Conflict and Fragility: A Joint Agenda*
- ²⁵ UNDP 2011. *DISASTER-CONFLICT INTERFACE Comparative experiences*
- ²⁶ von Uexkul, Nina et al. Civil conflict sensitivity to growing-season drought. *PNAS* vol. 113 no. 44. 2016.
- ²⁷ Schleussner et al. 2016. Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries.
- ²⁸ <http://asiafoundation.org/resources/pdfs/AcehCaseStudyFullReport.pdf>
- ²⁹ The Vision of the UN Secretary General on Prevention
- ³⁰ Venton, C & P. Venton, (2004). *Disaster preparedness programmes in India. A cost benefit analysis*. Humanitarian Practice Network, London, ODI; IFRC, World Bank (2011). *Natural Hazard, Unnatural Disasters: Economics of Effective Prevention*. Available from <http://documents.worldbank.org/curated/en/2010/11/13066374/natural-hazards-unnatural-disasters-economic-effective-prevention>; Wilenbockel, Dirk. (2011). *A Cost-Benefit Analysis of Practical Action's Livelihood Based Disaster Reduction Project in Nepal*, Practical Action; IFRC. (2012). *The Long Road to Resilience: Impact and Cost-Benefit Analysis of Community Based Disaster Risk Reduction in Bangladesh*

Citation: ESCAP 2018: Summary for Policymakers. *In Asia-Pacific Disaster Report 2017: Leave No One Behind- Disaster Resilience for Sustainable Development.*

This Summary for Policymakers is based on the 2017 Asia-Pacific Disaster Report. The report, using the most recent data from a wide range of sources, shows that natural disasters in future may have greater destructive potential. The report also points out the scientific and technical advances in forecasting that can identify new risks and vulnerabilities, and anticipate extreme events. We hope that this summary of the main findings of the Asia-Pacific Disaster Report will help policy makers, in both public and private sectors, to better understand disaster risk and resilience, and proactively take the many opportunities for policy action.

The full 2017 APDR can be downloaded at <http://www.unescap.org/publications/asia-pacific-disaster-report-2017-leave-no-one-behind>

The background of the page is a complex, abstract pattern of irregular, multi-colored polygons. The colors include various shades of purple, blue, green, yellow, orange, and grey, creating a mosaic-like effect. The shapes are of different sizes and are arranged in a non-repeating, organic pattern.

Asia and the Pacific is the region most affected by natural disasters which hit hardest at the poorest countries and communities. And on present trends, as more migrants crowd into slums and shanty towns in Asia-Pacific cities, whole communities are likely to see their homes and livelihoods shattered or washed away by the wilder forces of nature.

This note summarizes the key messages from the 2017 Asia-Pacific Disaster Report which looks at the extent and impact of natural disasters across the region and how these intersect with poverty, inequality and the effects of violent conflict.

Disaster resilience is a key element of the 2030 Agenda for Sustainable Development. The Sustainable Development Goals are based on the premise of reaching absolutely everyone. When the drought is assessed, when the flood warnings are broadcast, when the tsunami siren sounds, the aim is to 'leave no one behind'. If governments are to fulfil this ambition, and protect their most vulnerable people, they will need to ground national development strategies firmly in disaster resilience.

