

# EXECUTIVE SUMMARY

## Leave no one behind

**Asia and the Pacific is the region most affected by natural disasters. These disasters hit the poorest countries and communities hardest. The 2030 Agenda for Sustainable Development aims to reach everyone – to leave no one behind. If governments are to protect their most vulnerable people, they must ensure that national development strategies are firmly grounded in disaster resilience.**

By historical standards, there were fewer disasters in 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.

Since 1970, the number of people killed has fluctuated considerably from year to year but has averaged 43,000 annually, principally from earthquakes, storms, and floods. 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. 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.

## FUTURE DISASTER RISKS

One study on future impacts for the period 2020 to 2030 suggests, however, that at current rates of progress most Asia-Pacific countries at higher risk will make limited progress – in terms of reducing either fatalities or the number of people affected.

Beyond measuring the human costs, there have also been efforts to predict future economic costs. These indicate that 40 per cent of global economic 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. However, when considered as a proportion of GDP the burden is likely to be greatest in Countries with Special Needs, and in particular in 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.

Such estimates only consider losses in assets; not in people's socio-economic well-being – in their health, education and livelihoods. Well-being losses from disasters tend to be greater in the least developed countries because poorer people, with fewer assets and living close to subsistence cannot use savings to cope with the impacts and may need more time to recover and reconstruct.

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.

## **POVERTY AND INEQUALITY**

Human and asset losses tend to be greater in the poorest communities living 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, trapping them in poverty that can be transmitted from one generation to the next.

Typically, the greatest impacts are in countries which have the least capacity to prepare for disasters, or respond to them. These include the least developed countries, the landlocked developing countries and the small island developing States. 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 means 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. 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.

### ***Intensive and Extensive Disasters***

The 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.

As well as losing assets and income from disasters, poor households are also weakened in other ways. 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 socio-economic disparities.

Disasters will thus 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 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 worsening existing inequalities with the increase in Gini coefficient by 0.13.

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.

### ***Cities at risk***

Many cities are located in the areas where multi-hazard risks are growing rapidly. 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, and by 35 to 50 per cent in 72 cities. As a result, the number of city dwellers exposed to extreme and high risks is likely to increase significantly.

The trend of increasing disparities is particularly notable in the region's cities. Rural-urban migration is crowding people into slums with substandard housing that lack access to services and social protection. Urban growth is taking shape on vulnerable lands, along river banks, drainage channels and steep slopes that are exposed to hazards. If a disaster strikes these cities, the poor will be hit hardest and urban inequalities will widen.

However, there are also serious risks for other urban dwellers. 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.

Even the not-so-poor are living and working in buildings of suspect quality: many modern high-rise buildings may not be very robust. Construction workers often fail to understand or execute building drawings; contractors and designers may have a poor understanding of building codes and regulations; and city governments often lack the capacity to enforce them. Earthquakes in India, Nepal, Indonesia, and Taiwan, Province of China have clearly exposed such vulnerabilities. Compared with those in developed countries, disasters in urban areas of developing countries tend to be more destructive and much harder to recover from. The lack of resources and political

will add further layers of complexity. Disaster risk reduction is hampered by the complexities in land tenure, high densities and high-rise structures, as well as the need to support floating populations that arise from frequent migration.

Asia-Pacific cities have millions of people at risk, but they are also emerging as leaders for community-based disaster risk reduction, as well as for climate change mitigation and adaptation. In recent years, city-to-city partnerships have been sharing experiences and gaining access and knowledge to policy tools for risk sensitive and pro-poor urban development.

## **RESILIENCE IN AGRICULTURE**

In many countries in Asia and the Pacific the largest share of the poorest people are to be found in rural areas working in agriculture. 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. 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 available per person.

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

Disasters also undermine all aspects of food security, by reducing food supplies, and cutting the incomes of poor communities. The events can take several years to recover from trapping poor communities in a cycle of hunger and poverty.

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.

Building disaster resilience of agriculture thus assumes 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 if no one is to be left behind.

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. 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.

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 AND CLIMATE CHANGE

Climate change magnifies the risk of disasters and increases their costs. 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.

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 heatwaves, 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.

**Heat waves** – Climate change can increase the number of heat waves that cause substantial mortality.

**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** – Risk projections indicate substantial increase in losses, particularly in East, South, South-West and South-East Asia with the problems becoming worse by 2030. China, India, Bangladesh and Pakistan would 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.

**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 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.

### **Coherence between climate change adaptation and disaster risk reduction**

For disaster risk reduction to be successful, it must 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. 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. Climate scenarios inevitably have ranges of uncertainty which increase as they project further into the future. Many buildings and critical infrastructure will have to cope in 2100 with conditions that, according to most climate models, will be radically different from current ones. Managing risks from long-term climate change should be viewed as part of a broader strategy for managing climate risks for all timescales. The aim should be to build climate resilience while adapting to climate change – and treat these as complementary processes.

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 due to climate change impacts. This has important implications for achieving the goal of eradicating poverty, in all its forms, by 2030.

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 four priority areas to promote climate change adaptation and improve resilience: implement effective carbon pricing; phase out fossil fuel subsidies; encourage renewable energy and energy

efficiency; and expand climate finance. All these efforts can take advantage of new tools that are becoming available.

## **PATHWAYS TO CONFLICT PREVENTION**

There is often a close relationship between armed conflict and disasters. 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 conflict.

In recent years, most conflicts in Asia and the Pacific have been within states – though the region also has around 15 potential areas of inter-state conflict. Compared with natural disasters, which are one-off and sometimes rapid events, conflicts tend to last longer. Nevertheless, conflicts and disasters both compound risks to create complex and converging crises, so they can be considered together.

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. A severe drought threatens local food security, aggravates humanitarian conditions, and often triggers large-scale human displacement. It may also provide the breeding ground for sustained conflict. Environmental shock and violent conflict thus create vicious circles.

### ***Building disaster resilience to reduce 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 peacebuilding 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 impact 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.

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.

## **LEAVE NO ONE BEHIND – POLICIES, ACTIONS AND TOOLS**

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 United Nations Framework Convention on Climate Change
- Agenda for Humanity
- New Urban Agenda
- Addis Ababa Action Agenda under the Third International Conference on Financing for 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’.

For this purpose, there is an abundance of tools and approaches. 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 monsoon outlook forums.

***Address the risks faced by different poor populations*** – Leave 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 of disaster risk reduction. Globally, disaster risk reduction interventions have an estimated rate of return of between four and seven times. 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 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. When a disaster has been forecast beyond an agreed threshold of probability, funds are released for disaster preparedness and response as well as for building resilience. Governments and other actors have also considered ways of sharing risks – both within and between countries. 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.

## **ACTION FOR REGIONAL COOPERATION**

Resilience can be facilitated and strengthened through international and regional cooperation. ESCAP member countries can ensure that populations and countries with low capacity can make use of technologies through partnerships and regional cooperation. 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.

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 through 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, ESCAP Trust Fund on Tsunami, Disaster and Climate Preparedness has been an effective vehicle for supporting regional cooperation and sharing of data, tools and expertise to support disaster resilience in high-risk, low capacity countries of Asia-Pacific. ESCAP has also recently established the Asian and Pacific Centre for the Development of Disaster Information Management to provide member countries with advisory services and technical cooperation on transboundary disasters such as earthquakes, droughts and sand and dust storms.

## REINFORCING THE FUTURE

Disasters may not be completely predictable, but they can be anticipated. Governments across Asia and the Pacific now have a greater understanding of how natural disasters unfold – exposing weaknesses in physical and social infrastructure and striking hardest at the poorest.

In response, governments have established the necessary policy frameworks. And scientific advances have enhanced tools for more effective action. But building resilience is not a job for the public sector alone, it must involve multiple stakeholders, from the private sector and civil society, to regional and international organizations. This requires ‘whole-of-government’ and ‘all-of-society’ engagements – to build more resilient structures and societies for current and future generations. This will be an essential basis for achieving the Sustainable Development Goals – for extending the benefits of human progress to everyone, with a resolute determination to leave no one behind.