Photo: UNESCAP

3

ACTION FOR RESILIENCE IN AGRICULTURE

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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.

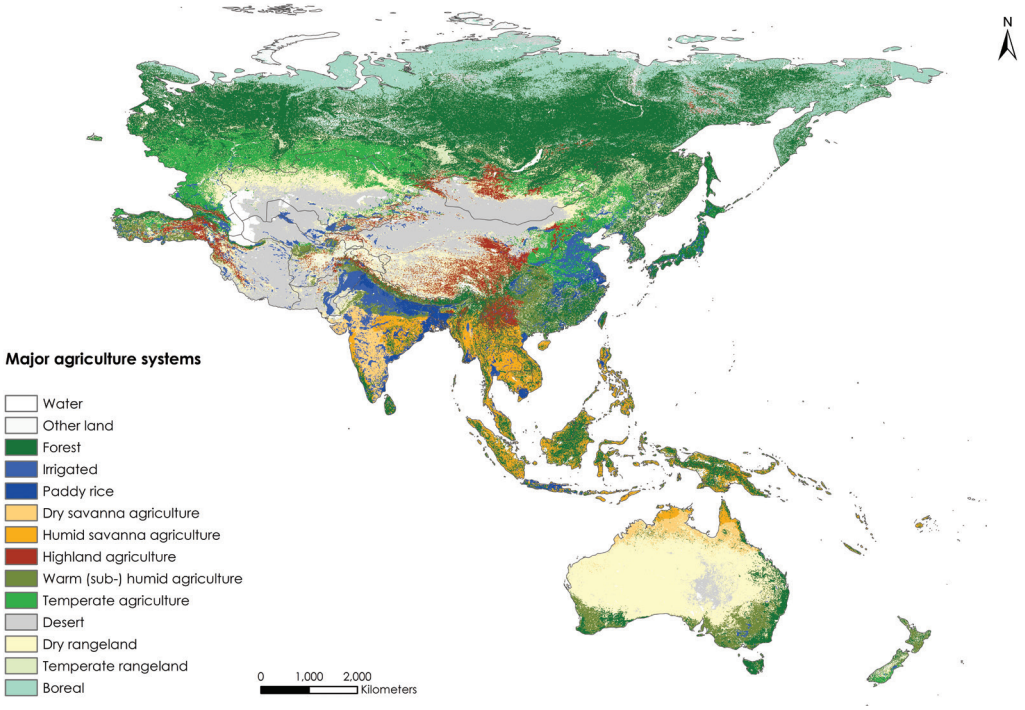
Over the past two decades, rapid economic growth and increased agricultural productivity have helped reduce hunger. Between 1990 and 2013, the value of food produced in Asia and the Pacific increased by more than 80 per cent. Nevertheless, of the world's 795 million undernourished people, 490 million 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.[1]

Around 40 per cent of the Asia-Pacific landmass is used for agriculture. The range of agricultural production systems is indicated in Figure 3-1, and the major crops in Figure 3-2. Agriculture is also a major employer. In Cambodia, India, Indonesia, Philippines, Sri Lanka, and Viet Nam, for example, agriculture employs over 30 per cent of the labour force.

However, the amount of land available for agriculture has been shrinking. Between 1993 and 2013, the region lost 5.3 per cent of its arable land – 35 million hectares– due to land degradation and conversion to other uses such as industrial parks and urban centres.[2] Between 1992 and 2014, the amount of arable land fell from 0.28 to 0.21 hectares per person – equivalent to every person losing a small garden, allotment or vegetable patch. Asia has less potential than other global regions for expanding arable land, so this will have major implications for future food security. Building disaster resilience for agriculture thus has greater significance beyond the economic impacts; it is also critical for improving livelihoods and reducing poverty.

Figure 3-1

Major agriculture systems in Asia and the Pacific



Source: FAO, the State of the World's Land and Water Resources for Food and Agriculture, 2011. Available from http://www.fao.org/geonetwork/srv/en/main.present?from=11&to=20 (Accessed August 2017).

Notes: Agricultural land is composed of dry rangeland (14 per cent), temperate agriculture (7 per cent), humid savanna agriculture (4 per cent), tem-perate rangeland (3 per cent) irrigated (3 per cent), warm (sub-) humid agriculture (3 per cent), highland agriculture (3 per cent), dry savanna agriculture (1 per cent) and paddy rice (1 per cent).

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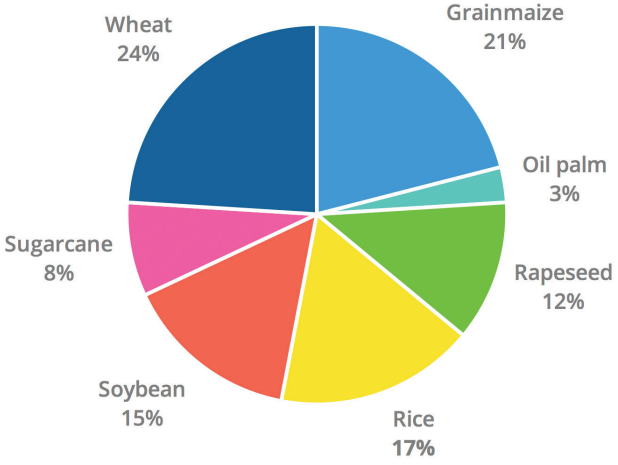
Figure 3-2

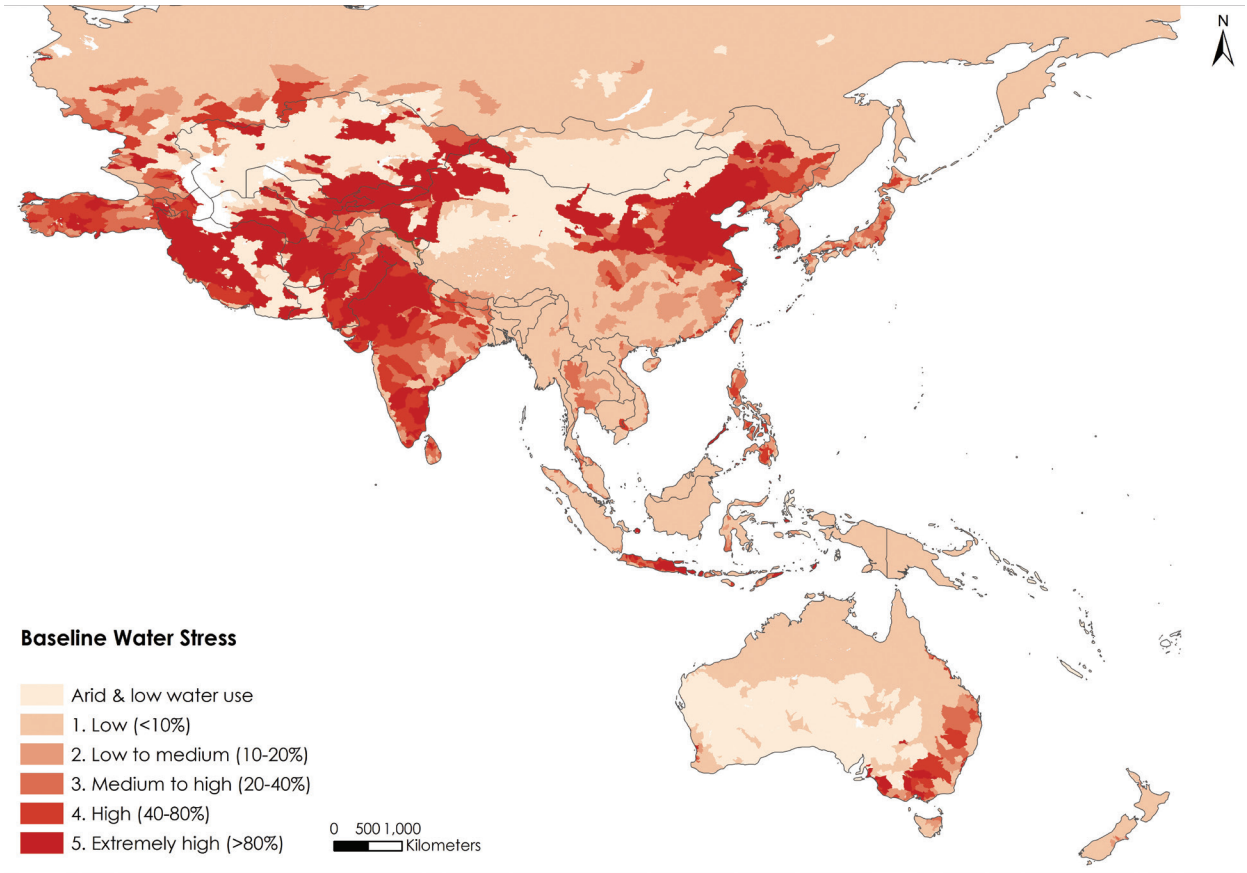
Major crops in Asia and the Pacific



Source: Based on data from Joint Research Center of European Commission (2016).

Figure 3-3

Water stress in Asia and the Pacific



Based on World Resource Institute, 2016.

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Another concern is the availability of water. Most water in Asia and the Pacific is used for agriculture; in 13 predominantly agrarian countries in the region the proportion is more than 90 per cent. Among the most water-intensive crops are wheat and rice. 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. Between 1990 and 2010, per capita water availability dropped in many countries: for example by 42 per cent in the Solomon Islands; by 36 per cent in Malaysia, Nepal and Pakistan; by 29 per cent in India and Bangladesh, and by 23 per cent in Viet Nam.[3] Countries in South and South-West Asia and Central Asia are also facing high levels of water stress, primarily because of the demand from rising populations and other competing sectors (Figure 3-3).[4] Around 40 per cent of wheat, rapeseed and grain maize areas are under high to extremely high water stress.[5]

Impact of disasters on agriculture

Globally agriculture absorbs around one-fifth of the total economic impact caused by natural hazards.[6] A review of recent disasters in Asia and the Pacific indicated a similar outcome: on average, agriculture absorbed 17 per cent of the total economic impact.

- *Solomon Islands, flash floods, 2014* – In 2013, crops and livestock made up 15 per cent of GDP, forestry 15 per cent, and fisheries 6 per cent. Of the total damage and losses of $18 million for the three subsectors, 88 per cent was attributable to crops, 10 per cent to livestock, and 2 per cent to fisheries. Almost all of this was in the private sector. [7]

- *Myanmar, floods and landslides, 2015* – Agriculture accounts for around a quarter of GDP and employs around half the labour force. In the impacted regions, the disaster damaged around one-fifth of the cultivated area, of which one-third was totally lost for production in 2015, while the rest was damaged but still able to produce crops. Of the total cultivated area in the 12 affected states and regions, the floods destroyed 6.6 per cent. Total damages and losses to crop production amounted to $302,612. Total fishery-related damages and losses were $256,298. Around one-fifth of the total aquaculture area was damaged. [8]

- *Vanuatu, cyclone Pam, 2015* – Total agriculture damage and losses were $56 million, of which 69 per cent were for crops, followed by forestry (16 per cent), livestock (9 per cent), and fisheries (6 per cent). The greatest impact was on permanent crops, such as kava, banana, coconut, cocoa, and coffee, but seasonal crops (vegetables) and annual crops (cassava, taro) also suffered major losses. Livestock damage and losses were mostly for commercial poultry farms and for pigs and apiculture. There were also losses for forestry and fisheries. [9]

- *Fiji, cyclone Winston, 2016* – Total crop damage, for coconut, kava, cocoa and sugar cane was estimated at $3.9 million. The estimated damage and losses to livestock, mainly in the Western and Central Divisions, was $6.6 million. Fisheries production losses were over $82.9 million, because of extensive damage to assets and to the production capacity of coral reef ecosystems and other fish habitats. [10]

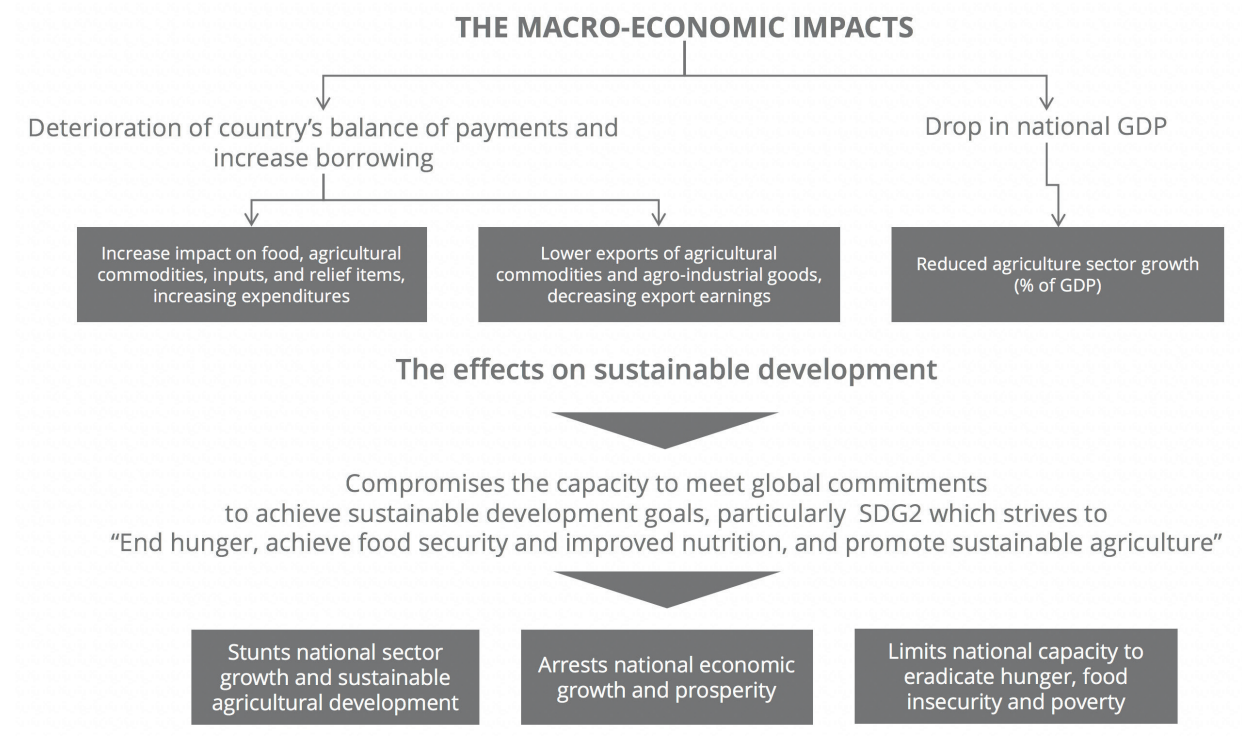
- *Nepal, Gorkha earthquake, 2015* – Total agricultural damages were $164 million while the total lost value of production was $119 million. The earthquakes increased the fragility of food production systems. Losses of farm land and other productive assets make poor and marginal farmers, including the elderly and women, more vulnerable to future disasters. [11]

- *Sri Lanka, floods and landslides, 2016* – Nearly two per cent of paddy cultivation area was affected, though fortunately the floods occurred early in the sowing season and many farming households were able to replant. The floods and landslides caused population displacements, damage to productive assets, loss of livelihoods, and reduced production for crops, livestock, fishery and aquaculture. The highest damage occurred to small-scale irrigation facilities, including the collapse of small-scale dams, the destruction of drainage systems and blockage of irrigation channels. [12]

These losses refer to direct costs for agriculture. But the agriculture sector is also linked with industry and services through both demand and production (Figure 3-4).[13] Reduced agricultural

Figure 3-4

Cascading disruption from disaster damage to agriculture



Source: Based on FAO, 2015.

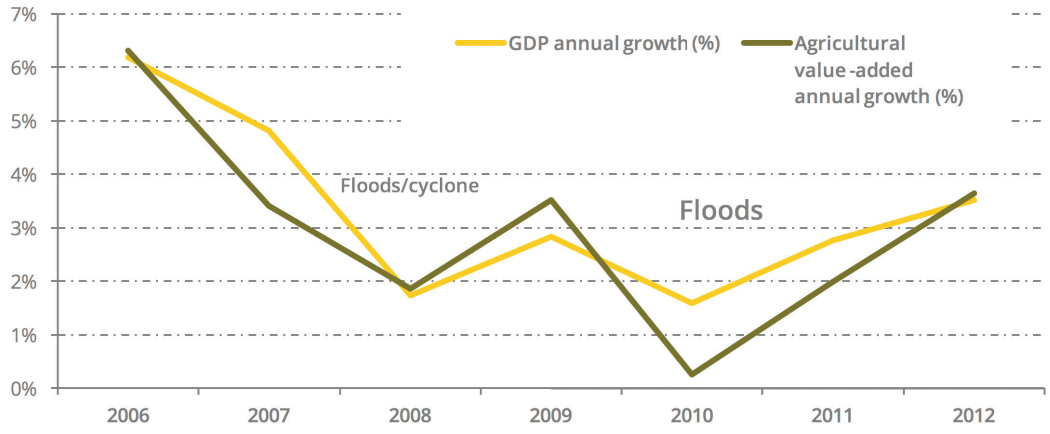
output therefore also slows overall economic growth, leading to a deterioration of a country's balance of payments and increased borrowing.

In India, for example, it has been estimated that a one per cent fall in agricultural output will decrease industrial output by 0.52 percentage points, and service sector output by 0.24 percentage points.[14] In Tamil Nadu, it has been estimated that the 2012-2013 drought caused a 32 per cent drop in agricultural output which further cascaded to a 17 per cent fall in industrial output and an 8 per cent fall in the service sector. [15] Similarly in Pakistan, where agriculture contributes about one quarter of GDP, floods in 2010 cut agricultural growth from 3.5 to 0.2 per cent, while GDP growth declined from 2.8 to 1.6 per cent. Agricultural and GDP growth in Pakistan, with disaster occurrences, is illustrated in Figure 3-5. [16]

In the Marshall Islands, the 2015–2016 drought resulted in a 12 per cent drop in agricultural production, including subsistence and commercial sales, amounting to $1.8 million. But this also triggered declines in output and higher production costs for other social and economic activities (Figure 3-6).

Figure 3-5

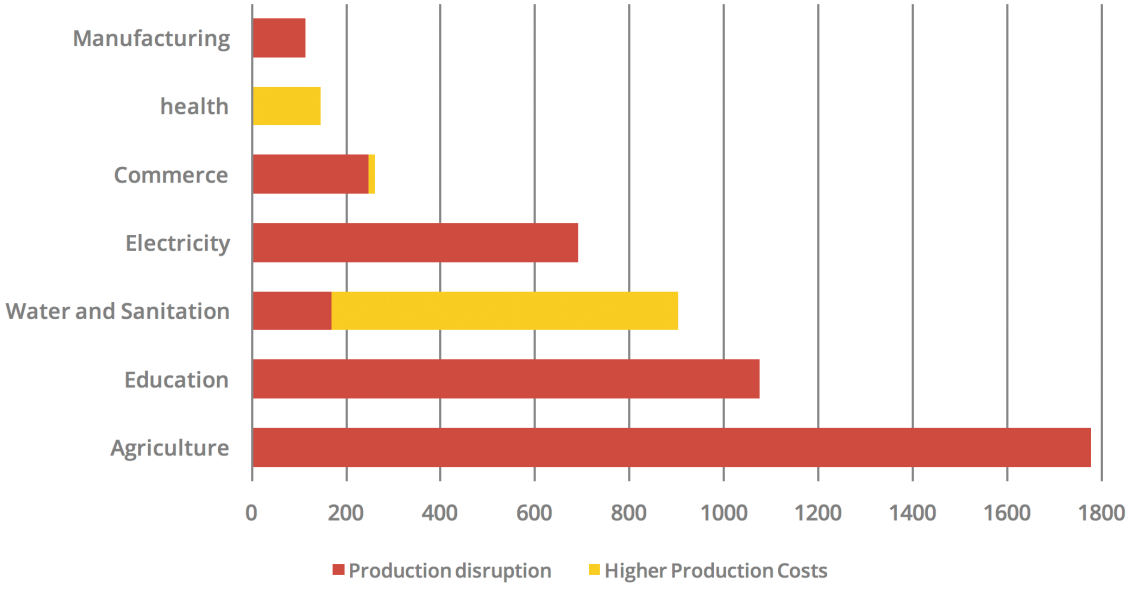
Agricultural value added and GDP in Pakistan, 2006–2012



Source: FAO, 2015.

Figure 3-6

Marshall Islands, costs of 2015-2016 drought cascading from agriculture, $ '000s

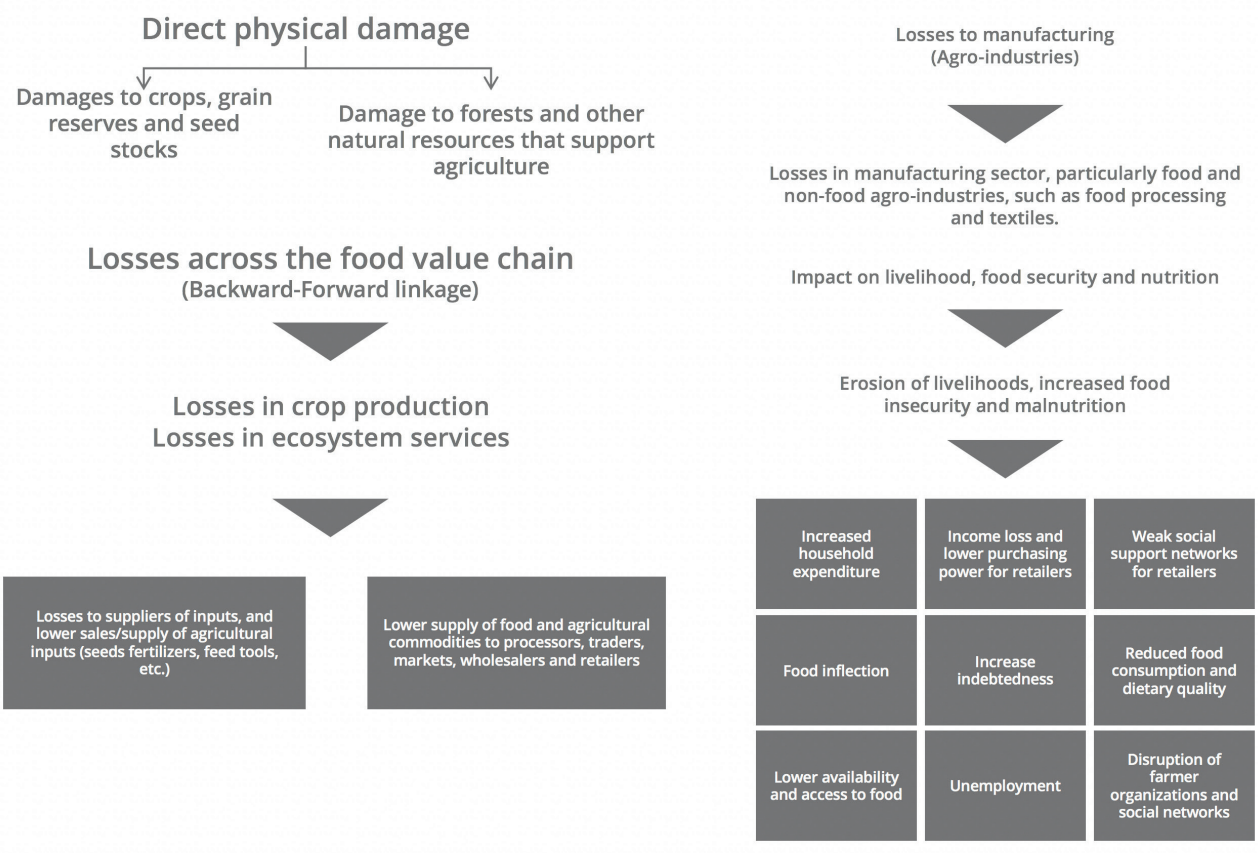


Source: Republic of Marshall Islands, 2017.

Disaster damage to agricultural assets and infrastructure, causes substantial disruptions in production cycles, trade flows, as well as in and livelihoods and employment opportunities (Figure 3-7). For overall economic losses, a large part is in agricultural trade. Pakistan, for example, is one of the world's top five rice exporters. From 2009 to 2010 rice production fell from 10.3 million to 7.2 million tons and exports fell by 30 per cent. There was also a surge in rice imports – from 1,925 tons in 2010 to 21,052 tons in 2011.[17] Many of the losses were incurred by poor, small and marginal farmers who lacked insurance and the financial resources to regain lost livelihoods.

Figure 3-7

Disruptions of agricultural trade due to natural disasters



Source: ESCAP, based on FAO, 2015

Box 3-1

FAO report on disaster impacts on agriculture

FAO has estimated the impact on disasters on agriculture globally for the period 2003 to 2013. Most affected was the crop subsector with damages and losses of $13 billion, almost 60 per cent of which were caused by floods, followed by storms with 23 per cent. Livestock was the second most affected subsector, accounting for $1 billion, or 36 per cent, most of which resulted from drought. Around 6 per cent of all damage and losses within agriculture were for fisheries totalling $1.7 billion. Forestry was also damaged by natural hazards. Twenty-six disaster events that took place between 2003 and 2013 caused $737 million in damage and losses to forestry, which represents 2.4 percent of all damage and losses within the agriculture sector – the greatest impact was from hurricanes, typhoons and storms.

Source: The impacts of natural hazards and disasters on agriculture and food security and nutrition – A call for action to build resilient livelihoods, May 2015, Food and Agriculture Organization of the United Nations (2015)

However, the export crop most affected is rice. More than 50 per cent of global rice exports are produced in South-East Asia. The 2011 floods in Cambodia, Thailand and Viet Nam seriously disrupted rice supplies. Overall, South-East Asian rice exports decreased by three million tons, resulting in shortages of rice and increased prices internationally. [18]

Impact of the 2015–2016 El Niño

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 (Table 3-1).

For agricultural production, much of the damage was caused by prolonged droughts which appeared in parts of the region at different times. The impact 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 3-8 from the onset of El Niño in 2015 until its neutral phase in early 2017. [19]

South-East Asia – Many farmers faced substantial debt, and provinces across several countries were declared disaster zones during the El Niño period.[20] Drought affected large parts of the Mekong river basin.

Table 3-1

El Niño-related disasters, severity of impact, 2015-2016

Sub-region	Country	Flood & Landslide	Drought	Tropical Cyclone
Southeast Asia	Cambodia			
	Indonesia			
	Lao PDR			
	Malaysia			
	Myanmar			
	Philippines			
	Thailand			
	Viet Nam			
South Asia	Afghanistan			
	Bangladesh			
	Bhutan			
	India			
	Nepal			
	Pakistan			
	Sri Lanka			
North Pacific	Marshall Islands			
	Micronesia			
	Palau			
Central Pacific	Kiribati			
	Niue			
	Samoa			
	Tonga			
	Tuvalu			
South Pacific	Fiji			
	New Caledonia			
	Papua New Guinea			
	Solomon Islands			
	Vanuatu			

Source: Enhancing Resilience to Extreme Climate Events: Lessons from the 2015-2016 El Niño Event in Asia and the Pacific - A multi-agency (UNDP, ESCAP, OCHA) study of lessons learnt 2017 –unpublished report.

Note: Classification based on number of deaths, number of people affected, and total economic damage.

- *Viet Nam* – suffered a severe drought in the South Central and Central Highlands regions and extended saltwater intrusion in the Mekong Delta. In 2015, the country experienced negative agricultural growth for the first time since records began. [21] The total economic impact was estimated at $674 million, or 0.35 per cent of GDP. [22]

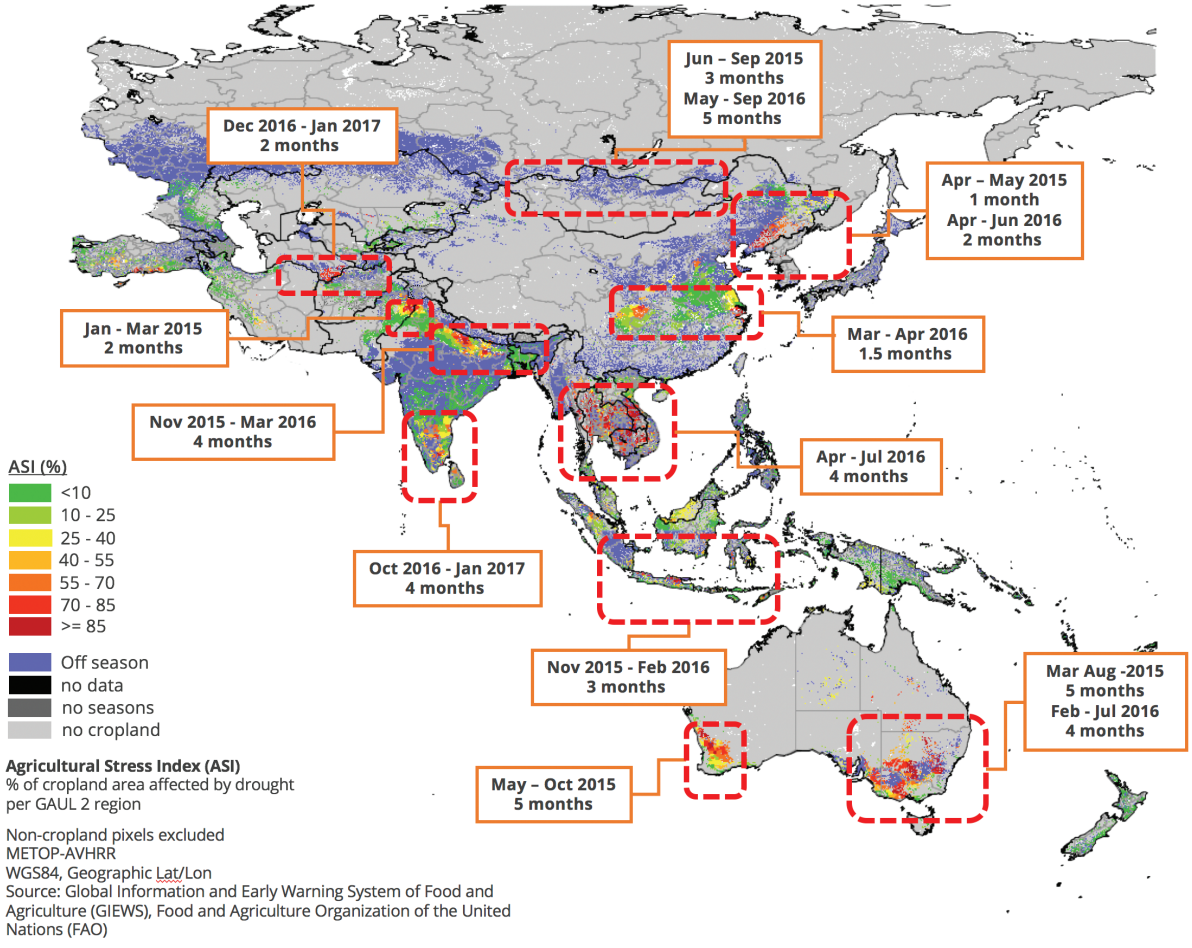
- *Cambodia* – an estimated 2.5 million people, were affected by drought, water shortages, land degradation, loss of livestock and reduced agricultural productivity. In 2015, the drought affected almost 250,000 hectares of cropland, and destroyed over 40,000 hectares of rice. [23]

- *Philippines* – 85 per cent of provinces were affected.

- *Thailand* – insufficient rainfall depleted water levels in reservoirs, and farmers postponed, or avoided, planting crops. [24] [25]

Figure 3-8

El Niño-related droughts in Asia and the Pacific, 2015/16



Source: Based on FAO ASI data.

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- *Timor-Leste* – a prolonged drought severely affected food security.

South Asia – India bore the brunt of the drought impact, with a second year of sub-par rains, recording a 14 per cent deficit in the south-west monsoon; around 19 million hectares of crop area and 330 million people in seven states were affected. Large parts of South Asia were also exposed to changes in the frequency and intensity of tropical storms (cyclones). In May 2016, cyclone Roanu caused severe flooding in Sri Lanka and Bangladesh.

North-East Asia – Mongolia suffered a severe drought in 2015, which reduced wheat harvests by almost 50 per cent from 2014, and 40 per cent below the five-year average. [26] The country experienced a dzud – severe winter weather that leaves no fodder or pasture for livestock.

Pacific Islands – This subregion is very vulnerable to the effects of El Niño because of dependence on subsistence agriculture and local fisheries. In 2015 and 2016, there was a range of El Niño-related impacts including a shift in the paths of tropical storms. [27] El Niño conditions also altered the location of fish populations and their migration patterns, corresponding to the availability of phytoplankton (Box 3-2). Extreme weather patterns and rising sea surface temperatures affected coral reefs and the wider ecosystems that provide livelihoods and generate income from tourism.

Long-term impacts of disasters on food production

Disasters 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 Bangladesh, for example, following floods there was an increase in wasting and stunting among pre-school children, due to reduced access to food, increased difficulties in providing proper care and greater exposure to contaminants. In the Philippines over the last two decades, 15 times as many infants have died in the 24 months following typhoon events as have died in the typhoons themselves; most of the victims were infant girls. [28]

There are also longer-term impacts. 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. Water and land resources are scarce in certain parts of the region, especially in rice and maize cultivation areas (Figure 3-9). And the pressures are expected to increase with expanding irrigation systems.

The impacts of disasters on food security have been documented for several countries.

- *Sri Lanka* – Between 2012 and 2017, Sri Lanka was hit three times by droughts and twice by floods. As a result, the number of food insecure households tripled – from 66,550 to 227,500. Food insecurity was significantly higher among small and marginal farmers, landless labourers and female-headed households. Some households responded by selling livelihood assets, taking children out of school or reducing expenditures on health and hygiene.

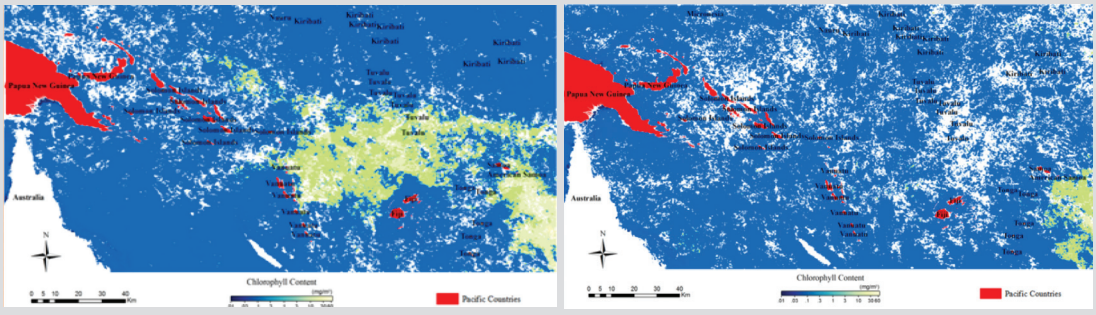
- *Philippines* – Between 2006 and 2013, the country was hit by 78 natural disasters (two droughts, 24 floods, 50 typhoons/tropical storms, one earthquake and one volcanic eruption). Total damage and losses for agriculture were $3.8 billion, with damage

Box 3-2

Impact of 2015–2016 El Niño on phytoplankton in the Pacific

One indicator of biological productivity in the oceans is the availability of phytoplankton which provide food for a wide range of sea creatures. A measure of the extent of phytoplankton is chlorophyll pigments which can be assessed through ocean colour monitor sensors. The maps below indicated the extent of chlorophyll during a normal year (2013) and the reduced amount in an El Niño year, 2015, due to the warming waters.

Impact of 2015–2016 El Niño on phytoplankton in the Pacific (2013 left, 2015 right)



2013 2015

Source: ESCAP based on the data from NASA on Chlorophyll Concentration (1 month - Aqua/MODIS)
https://neo.sci.gsfc.nasa.gov/view.php?datasetId=MY1DMM_CHLORA
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to over six million hectares of crops. Most of the losses were caused by typhoons/storms. [6]

- *Pakistan* – Because of a series of droughts in Sindh province, farmers who rely on seasonal monsoon rainfall have been abandoning wheat and cotton cultivation. [29]

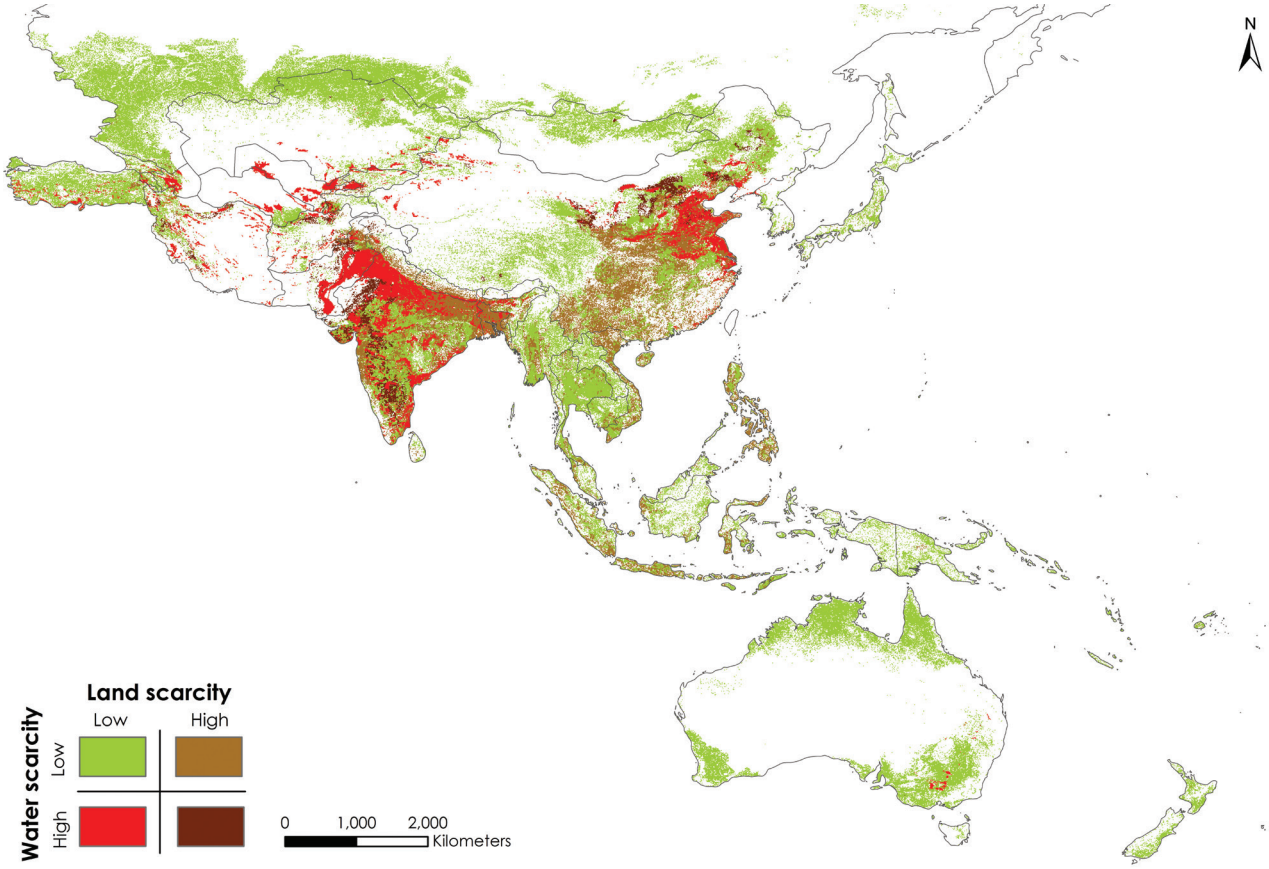
Desertification, land degradation and drought, when compounded by poverty and inequality, can also affect political insecurity and conflict. Some of the world's most conflict-prone regions are drylands. [30] Drought and degradation drive people off their land, creating economic migrants and environmental refugees. Temporary migration has long been an important element in rural livelihoods during times of stress, but more people are now migrating internationally, and for longer periods.

Disaster risk reduction and agriculture

Productive and efficient agricultural systems will need to preserve the productive base of natural resources and ecosystem services while increasing the capacity to withstand risks, shocks and climate variability. This will

Figure 3-9

Land and water scarcity in Asia and the Pacific



Source: FAO, 2011.

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require specific measures for DRR, as well as considerable changes in terms of governance, laws, policies, and private and public investment. These priorities are emphasised in the Sendai Framework which indicates a paradigm shift for agriculture – from reducing risk to managing risk for disaster prevention – and identifies the significance of slow onset and extensive disasters, such as drought, and the impacts of climate variability and drought that year after year erode the livelihoods of smallholders (Box 3-3).

Building climate-resilient agriculture

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. [31] The evidence shows the high correlation between hunger and climate risk in Asia-Pacific region affected by food insecurity (Figure 3-10). It illustrates further that South Asian countries are extremely vulnerable due to high population density in vulnerable settings. [32]

Box 3-3

Sendai Framework priorities for agriculture

For agriculture, the Sendai Framework of Disaster Risk Reduction has the following priorities:

Priority 1: Understanding disaster risk in the agriculture sector that requires

- Capacities for the multi-threat assessment of risks and vulnerabilities especially those related to weather and climate in the agriculture sector.
- Information systems that gather, monitor and share, periodically, information on disaster risk for the agriculture sector.

Priority 2: Strengthening risk governance in the agriculture sector with following key activities:

- National legal frameworks, policies, strategies and plans for DRM include the different sub-sectors of the agriculture sector.
- Participation of the agriculture sector in the governmental mechanisms for inter-sectoral coordination for disaster risk reduction and resilience.

Priority 3: Investment in disaster risk reduction for the resilience of the agriculture sector:

- Systematic planning of the use of natural resources and promotion of sustainable productive systems in all government interventions in the agriculture sector.
- Availability of formal mechanisms for risk retention and transfer (funds, insurance and social protection) adapted to the needs of the different types of smallholders.

Priority 4: Response preparedness and "build back better" in the agriculture sector

- Risk monitoring systems and multi-hazard early warning systems adapted to the different sub-sectors: agriculture, livestock, forestry, fisheries and food security.
- Inclusion of risk prevention and mitigation aspects in programmes and plans for the rehabilitation of livelihoods and development, as well as for sustainable development programmes.

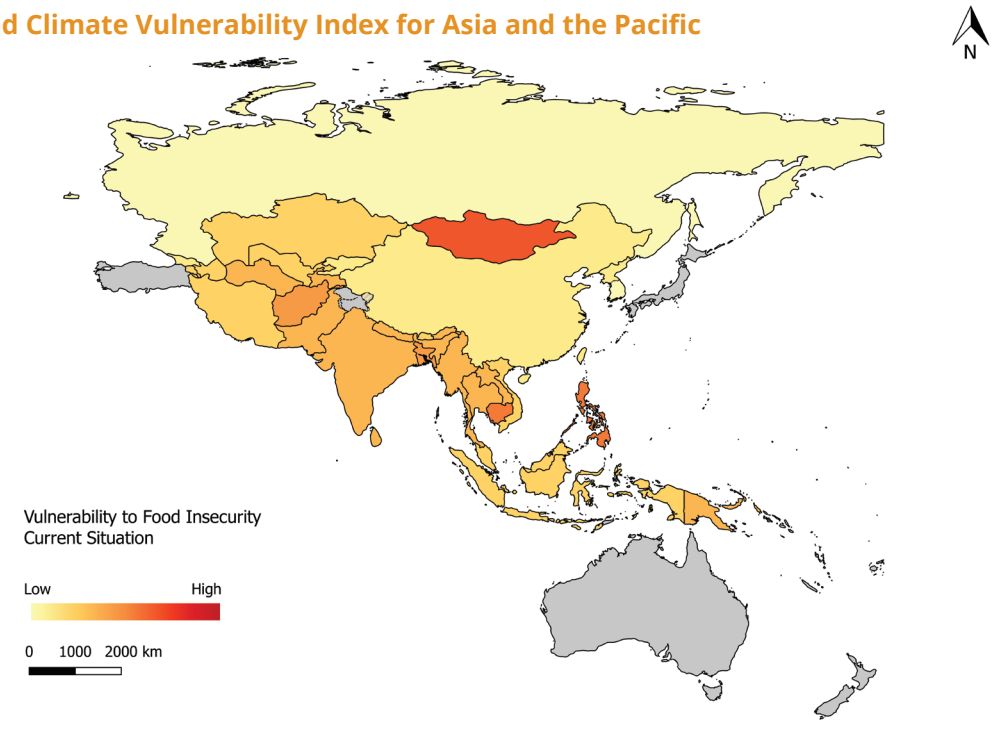
Source: Guidelines and Recommendations for the Implementation of the Sendai Framework for Disaster Risk Reduction in the Agriculture and Food Security and Nutrition Sector. Latin America and the Caribbean, Food and Agriculture Organization of the United Nations United Nations Office for Disaster Risk Reduction Santiago, 2016

For example, ten out of the top 15 countries in the world with the most people and economic output exposed to annual river floods are in the Asia-Pacific region.[33] The transboundary river-basins in the region are also home to a large number of poor and vulnerable populations dependent on agriculture (Figure 3-11). Around 40 per cent of the world's poor live on or close to the major transboundary river-basin systems in South Asia.[34] Climate variability and change often manifest themselves in monsoon variability, incidence of El Niño and La Niña, and other extreme weather events - resulting in large-scale frequent flooding and increasing vulnerability of populations in South Asia.

Further, South Asian countries have very low adaptive capacity (Figure 3-12). While

Figure 3-10

Hunger and Climate Vulnerability Index for Asia and the Pacific



Source: ESCAP based on the data from P.K. Krishnamurthy, K. Lewis, R.J. Choularton, Office for Climate Change, Environment, and Disaster Risk Reduction, United Nations World Food Programme, Via C.G. Viola 68/70, Rome, 00148, Italy UK Met Office Hadley Centre, Fitzroy Road, Exeter, EX1 3PB, United Kingdom, 2014 http://www.metoffice.gov.uk/food-insecurity-index/

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subnational empirical analysis is needed to assess and identify the pockets of vulnerability hotspots, at country-level, it is evident that the most food insecure countries are also the most vulnerable to climate risk.

Further, in order to understand future vulnerability, a projection of climate scenarios for the year 2050 highlights that there may not be a major shift in the spatial landscape of climate vulnerability and the South Asia sub-region continues to be the most vulnerable (Figure 3-13). The vulnerabilities to food security due to climate change are likely to remain largest in South Asian countries.

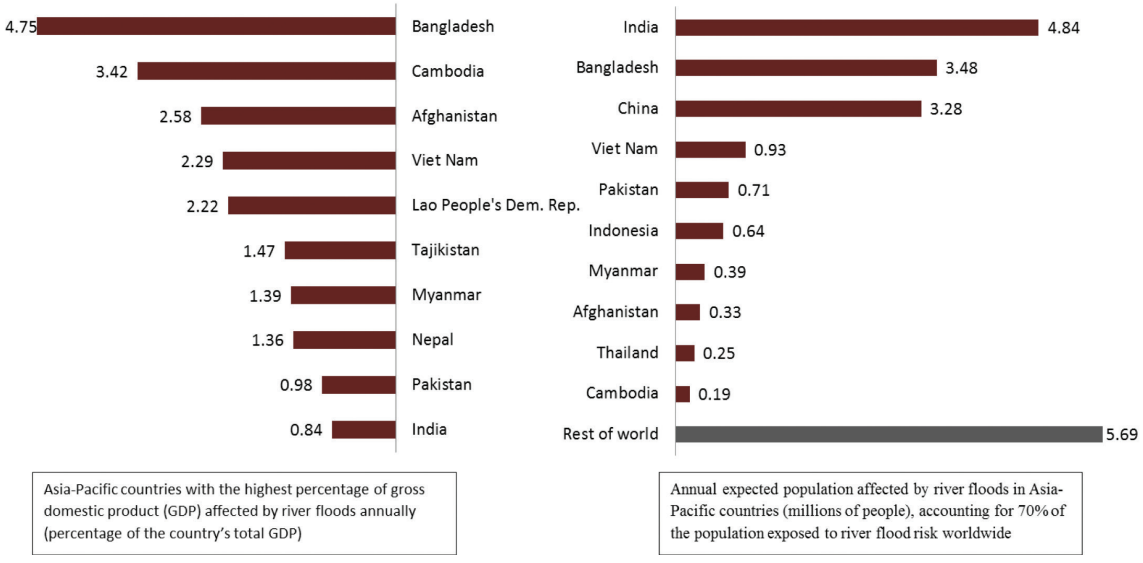
National strategies

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.

There are different strategies for achieving resilient agriculture. These include: boosting agricultural productivity with stress tolerant varieties; adjusting planting dates, expanding water harvesting, storage, and conservation to reduce land degradation; insurance and social protection schemes for farmers. At the regional level, countries can reduce variability in food availability through food reserves and trade

Figure 3-11

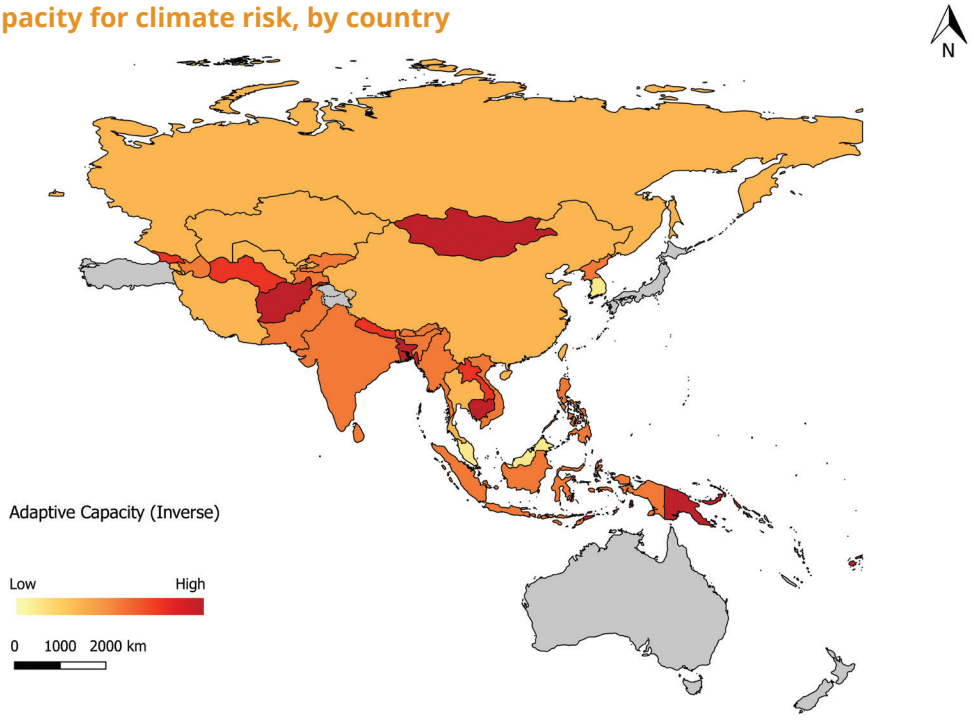
Asia-Pacific countries with highest percentages of GDP, and the number of people affected by floods



Source: ESCAP based on World Resource Institute Flood database, 2016.

Figure 3-12

Adaptive capacity for climate risk, by country



Source: ESCAP based on the data from P.K. Krishnamurthy, K. Lewis, R.J. Choularton, Office for Climate Change, Environment, and Disaster Risk Reduction, United Nations World Food Programme, Via C.G. Viola 68/70, Rome, 00148, Italy UK Met Office Hadley Centre, Fitzroy Road, Exeter, EX1 3PB, United Kingdom.

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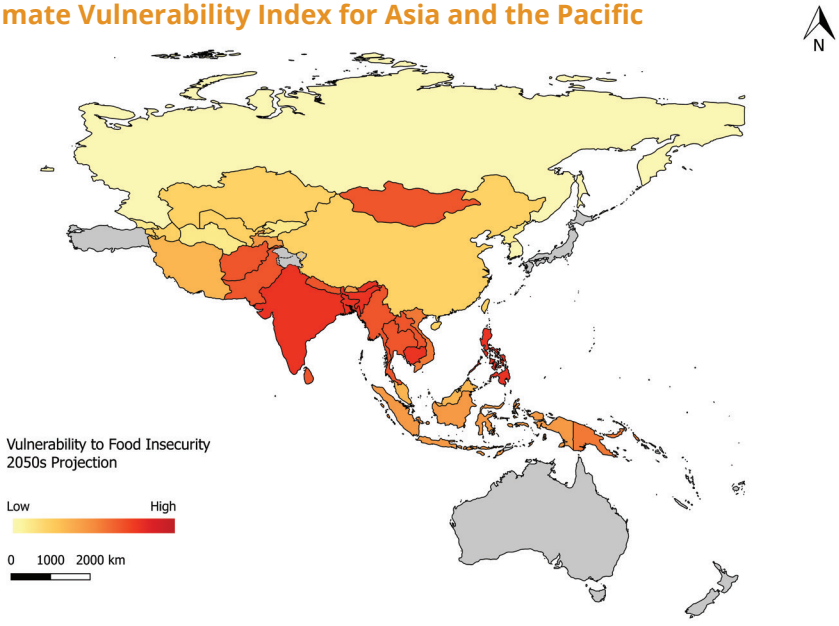
Figure 3-13

Projected 2050 Climate Vulnerability Index for Asia and the Pacific



Source: ESCAP based on the data from United Nations World Food Programme and the UK Met Office United Kingdom.

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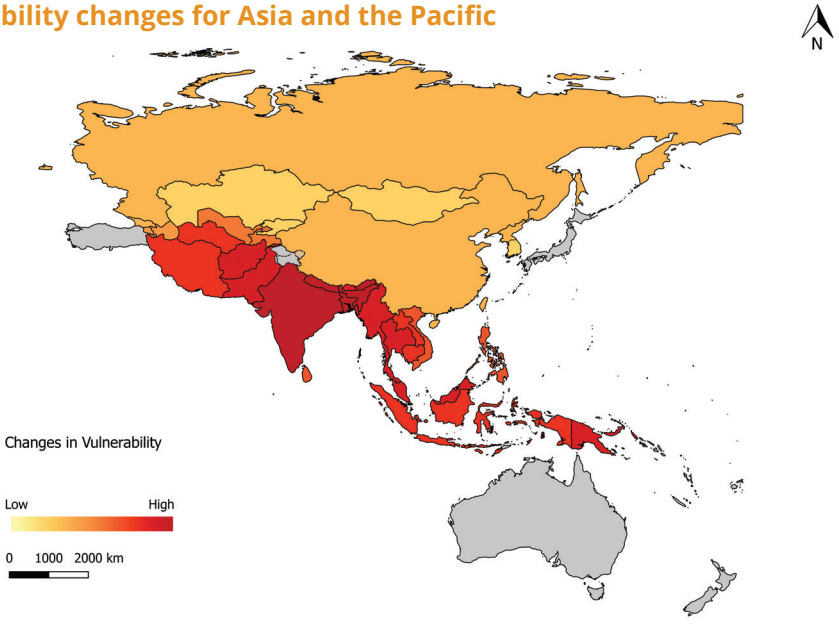
Figure 3-14

Projected vulnerability changes for Asia and the Pacific



Source: ESCAP based on the data from United Nations World Food Programme and the UK Met Office United Kingdom.

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

schemes. In addition, there are some specific measures that countries can take. Examples of programmes in Asia and the Pacific are:

- *Afghanistan* - The country has $280 million in agriculture losses due to disasters per year. It has been estimated that a severe (once in lifetime) drought could result in nearly $3 billion in agricultural losses. A one-metre high flood retaining wall in Kabul would cost approximately $180,000, but the net value of investing in a flood retaining wall would be $13.5 million. One new embankment in Kabul could reduce flood damages by $600,000 per year. [35]

- *Bangladesh* – Despite frequent floods, cyclones and droughts, Bangladesh has made commendable progress over the past 40 years in achieving food security; between 1972 and 2014 food grain production tripled. Bangladesh has invested more than $10 billion in enhancing community resilience, improving government response to emergencies, strengthening river embankments and coastal polders, building emergency cyclone shelters and resilient homes, adapting rural household farming systems, reducing saline water intrusion, especially in areas dependent upon agriculture, and implementing early warning and emergency management systems. In April 2017, the Government and the World Bank signed a $113-million financing agreement to modernize weather forecasting, early warning systems, and delivery of weather and climate services. [36]

- *India* – The Government has been taking measures to help the poor escape poverty and hunger and also adapt to risks, and withstand and recover from disasters. The National Rural Employment Guarantee Act (NREGA) has had positive effects in flood and drought-prone areas – increasing rural wages, reducing gender wage gaps, enabling better access to food, and reducing distress migration from rural areas. Between 2006 and 2008, about half of the total projects supported by NREGA were for water conservation to help build the resilience of poor farmers and landless labourers. [37]

- *Thailand* – In 2015/2016, Thailand experienced the worst drought in decades. However, the country was able to reduce the impact thanks to science-based actionable information. Government agencies used earth observation satellites, and monitored water levels in reservoirs to make seasonal forecasts and create climate scenarios. Farmers were warned about the emerging drought well in advance and advised not to plant a second crop because of water insecurity.

Regional strategies

There have also been measures at the regional level, particularly to provide timely information for slow-onset disasters – such as forest fires, haze, droughts, floods, and cyclones. Asia and the Pacific can take advantage of its strength as a hub for knowledge and technologies. This creates opportunities for using space technology, remote sensing and geographical information systems for assessing and monitoring impending disasters.

- In 2015, ESCAP and the Regional Integrated Multi-Hazard Early Warning System (RIMES) produced a joint report: 2015-2016 El Niño Impact Outlook and Policy Implications. This included regional and national and sector-specific risk profiles, and scientifically backed, customized country risk predictions. The outlook focused particularly on the imminent risk of the El Niño for Pacific SIDS.

An important adaption mechanism is weather insurance which can help farmers protect their investments against recurrent droughts.[38] With varying levels of support from their respective governments, farmers in China, India, and Thailand are at different phases of adopting weather insurance. Several ongoing pilot projects are using a combination of satellite technology and weather indices. However, some key issues remain to be addressed: reducing the basis risk; using risk-layered schemes; developing reinsurance markets; and targeting institutions as insurers instead of individual households (see Chapter 6 for more details on these tools and approaches).

Many disaster risks in Asia and the Pacific cut across national borders. On average, globally there are 86 tropical cyclones each year. Of these, 50 to 60 arise in three Asia-Pacific ocean basins whose coastlines are shared between countries.[39] A single cyclone can travel close to many countries, causing heavy rainfall and flooding, until it finally makes landfall. Similarly, drought and flooding can span river basins and agro-ecological zones beyond national boundaries. Many of the region's largest rivers emanate from the Tibetan Plateau and the Himalayas, fed by glacial and snow melting and monsoon rainfall. A total of 1.3 billion people in 15 countries depend on this natural 'water tower' which feeds into the Yellow, Yangtze, Mekong, Irrawaddy, Ganges, Brahmaputra, and Indus river basins, each of which is subject to severe flooding.

For transboundary river basins, recent advances in science and technology have enabled longer lead times of up to five to eight days for flood forecasts. However, these rarely reach the communities who live along these vast rivers. On average, communities receive only one day's notice for evacuation. ESCAP, in collaboration with RIMES, has therefore launched a toolkit that uses real-time satellite data and state-of-the-art flood modelling to enable a longer lead time in flood forecasting, and enhance end-to-end early warning systems.[40] ESCAP also has a regional drought mechanism to fill in the knowledge and capacity gaps in risk assessment, monitoring and early warning (Box 3-4).

In the Pacific, the SIDS in 2016 developed a Framework for Resilient Development in the Pacific 2017-2030. This is an integrated approach to guide resilient development and in particular to build resilience to climate change and disasters.[41] The framework recognizes that climate change and disaster risks cut across climate-sensitive sectors and thus require actions for the agriculture sector.

Cognizant of the importance of the resilient agriculture in Pacific SIDS and their sensitivity to climate-related risks, ESCAP has produced guidelines on disaster risk reduction and climate change adaptation in agriculture that will help share knowledge and good practices between Asia and the Pacific and vice versa.[42]

Stepping stones out of poverty

Across Asia and the Pacific, small farmers and poor agricultural communities are exposed to the ferocity of the elements and face both intensive and extensive disasters that can trap them in poverty. But coping with disasters also opens up new opportunities. Many of the same measures that will make them more resilient to disasters can also act as stepping stones out of poverty. They will also be closely connected with efforts to address climate change, which is the subject of the next chapter.

Box 3-4

ESCAP Regional Drought Mechanism

The ESCAP Regional Cooperative Mechanism for Disaster Monitoring and Early Warning, Particularly Drought, helps countries collaborate on space-derived information. Established under the Regional Space Applications Programme for Sustainable Development (RESAP), the mechanism uses data and imagery from the region's space-faring countries – China, India, Japan, Republic of Korea, Russian Federation and Thailand – and shares it with other countries, especially those prone to drought.

This service complements WMO's Global Framework for Climate Services by providing more detailed, localized forecasts that can be updated during the growing season to give more comprehensive real-time drought monitoring and early warning. Currently, the mechanism has two service nodes, in China and India, which provide space-based data, products, and capacity building. On request, experts from these nodes and ESCAP can work with member states to determine the most appropriate services, build their capacity to process and interpret the information, and disseminate the data to the people who need it most. Similar cooperative mechanisms could also be set up at the subregional level. The Pacific Island countries, for example, have the potential for establishing a subregional institution with the necessary technical capacity.

ENDNOTES

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3 ESCAP, ADB & UNDP, 2017.
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