



Food and Agriculture
Organization of the
United Nations

The impact of disasters on agriculture

Addressing the information gap



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Food and Agriculture Organization of the United Nations
Rome, 2017





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The impact of disasters on agriculture is severe, yet under-reported. FAO is bridging the knowledge gap by quantifying crop and livestock production losses from disasters in developing countries

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between 2005 and 2014,
approximately
USD 93 billion was lost
in crop and livestock
production due to natural
hazards and disasters in
developing countries



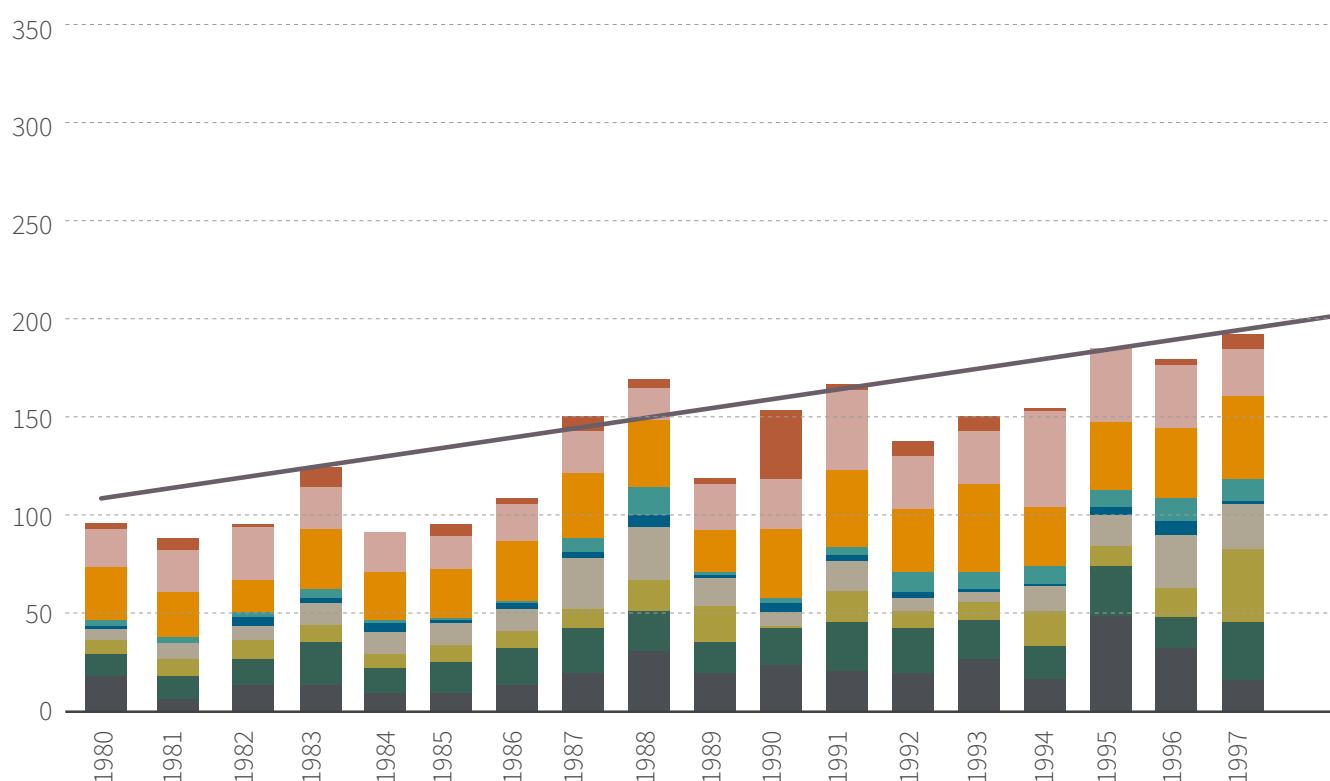
“ Drought continues to challenge agricultural systems across Africa – countries may lose up to 20 percent of potential agricultural production due to severe drought episodes

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More disasters, but dearth of information on damage and losses in agriculture

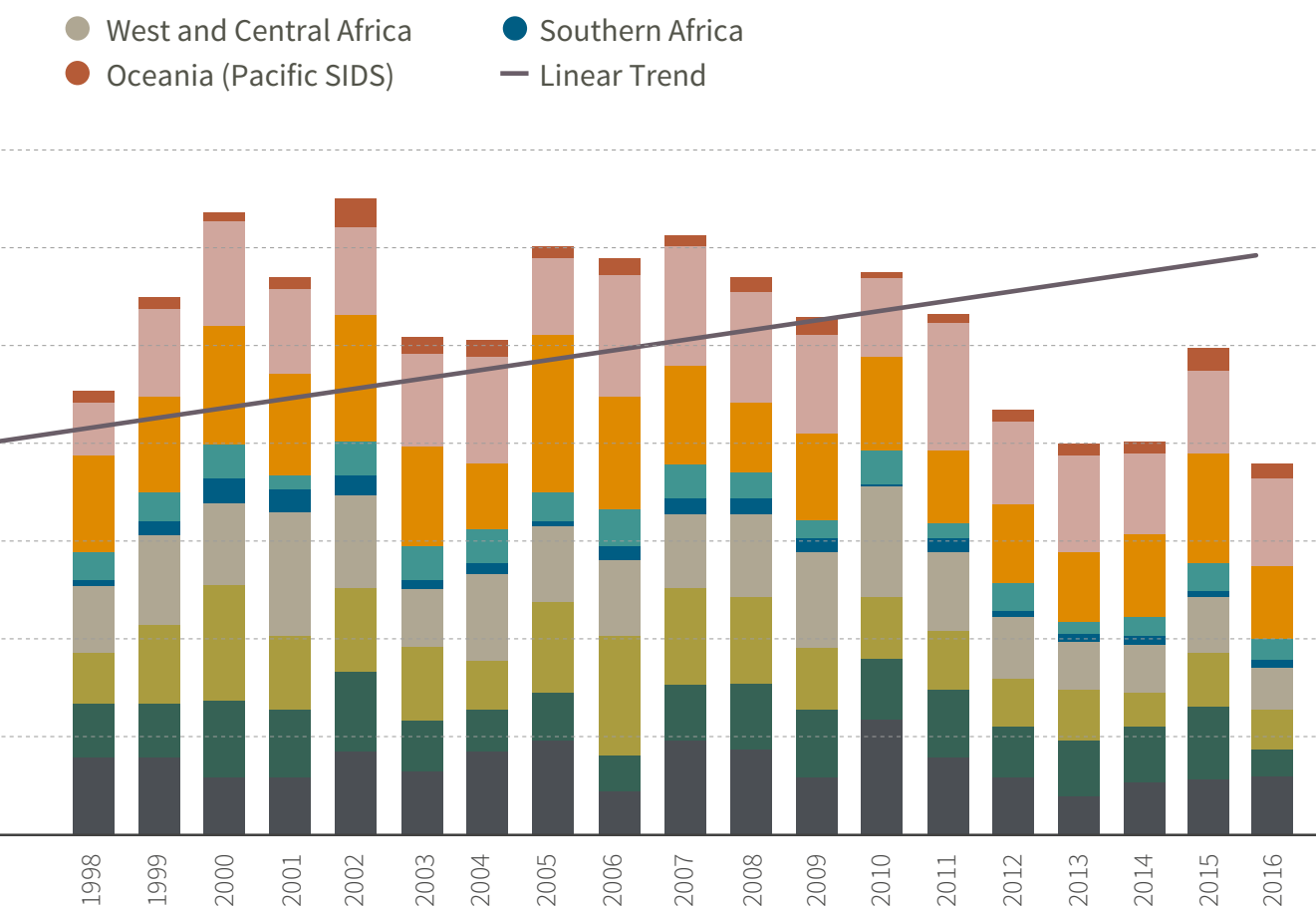
Figure 1. Occurrence of natural disasters (number per annum), 1980–2016

● Caribbean and Central America ● South America ● East Africa
● North Africa and Western Asia ● South Asia ● Southeast Asia



The number and frequency of recorded natural disasters, along with the associated impact and damage to livelihoods and economies (local and national), are increasing significantly. Natural disasters often destroy critical agricultural assets and infrastructure, disrupting production cycles, trade flows and livelihoods means. This affects food security and causes additional disruptions throughout the value chains. Such disasters may slow overall economic growth, especially where agriculture and food production still account for a large share of gross domestic product and employment.

Notwithstanding the many efforts at national and international level, there is limited systematic data and information on the impact of disasters and hazardous events in agriculture and its subsectors – crop, livestock, fisheries, aquaculture and forestry.



FAO, based on the Emergency Events Database of the Centre for Research on the Epidemiology of Disasters (EM-DAT CRED)

The 2030 Agenda for Sustainable Development stipulates that all countries, irrespective of their income level, are prepared to effectively prevent and mitigate any disaster impacts. Where disasters cannot be avoided, countries should act to minimize the devastating effects on livelihoods and the economy. Agriculture must be at the centre of these efforts, given its wide interactions with the environment and direct reliance on natural resources for production.

Disaster risk reduction (DRR) strategies are essential, so that increasingly frequent hazardous events¹ do not push countries and communities into poverty loops. Political and financial backing for DRR must be mobilized through adequate policy frameworks.

This calls for the establishment of a robust evidence base. A thorough analysis of existing trends in agricultural production and related distortions in production volumes and patterns due to disasters is a key starting point². Such analysis can bridge the information gap and inform decision-making for DRR, sustainable development and emergency response planning.

In 2015, the Food and Agriculture Organization of the United Nations (FAO) launched the first report entitled “The impact of disasters on agriculture and food safety.” It showed that a staggering 22 percent of total damage and losses from natural hazards in developing countries were absorbed by the agriculture sector alone. The report also highlighted the need for deeper analysis, more thorough data and the construction of a coherent information system. A better understanding of the sector-specific magnitude and nature of disaster impact is crucial for informing adequate risk reduction policy and practice, as well as for guiding investment in climate-resilient agricultural systems.

As part of an ongoing effort to fill the knowledge gap and foster a better understanding of how the agriculture sector is affected by disasters, FAO is releasing the second periodic report in 2017.

¹ According to the UNISDR terminology, a disaster is “a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.”

² Agricultural production in the FAO context refers to: crop, livestock, aquaculture and forestry production as well as fisheries capture.

The second report includes analyses of impacts from natural hazard-induced disasters³, namely:

- **drought and other meteorological and climatological disasters (extreme temperatures, storms and wildfires)**
- **floods**
- **geophysical (earthquakes, tsunamis and mass movements)**
- **biological disasters (epidemics, infestations and animal disease)**

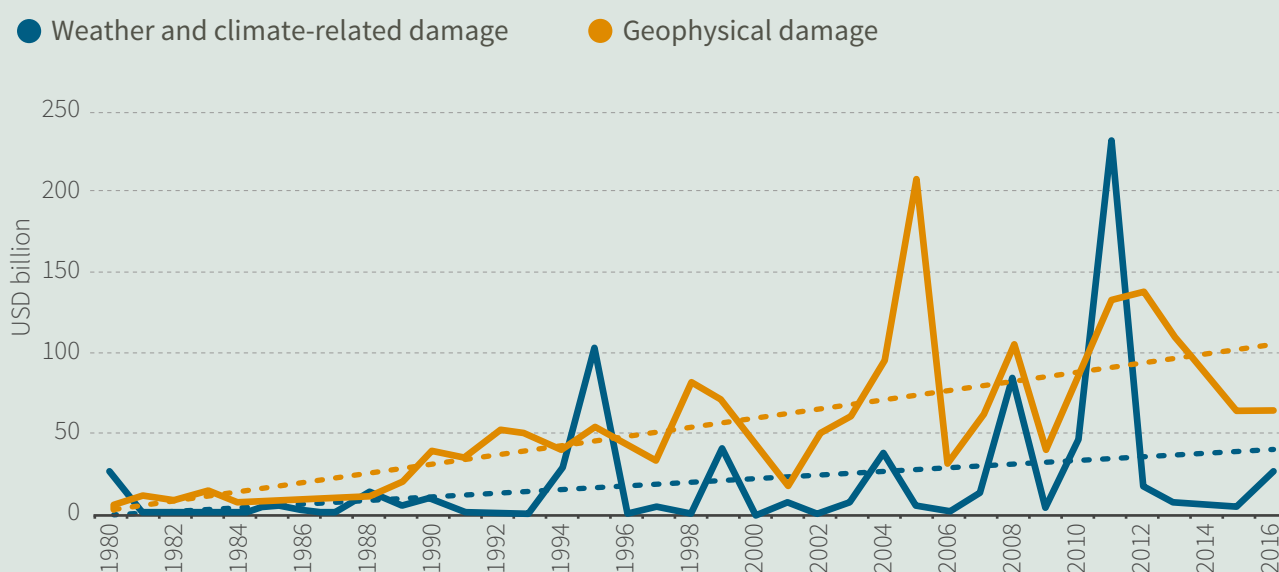
The report also includes a special focus on biological disasters, such as transboundary animal diseases as well as on protracted crises in conflict contexts.

FAO has applied a combination of methods, juxtaposing different information sources to gauge estimates of damage and losses incurred in crops, livestock, fisheries, aquaculture and forestry in the aftermath of hazardous events and crises.

In addition to large-scale events, medium- and small-scale disasters, despite their limited scale, can have a significant impact. The second report considers different types of disasters affecting over 100 000 people or more than 10 percent of the national population.

³ The classification of disasters adopted here draws on the EM-DAT CRED Guidelines.

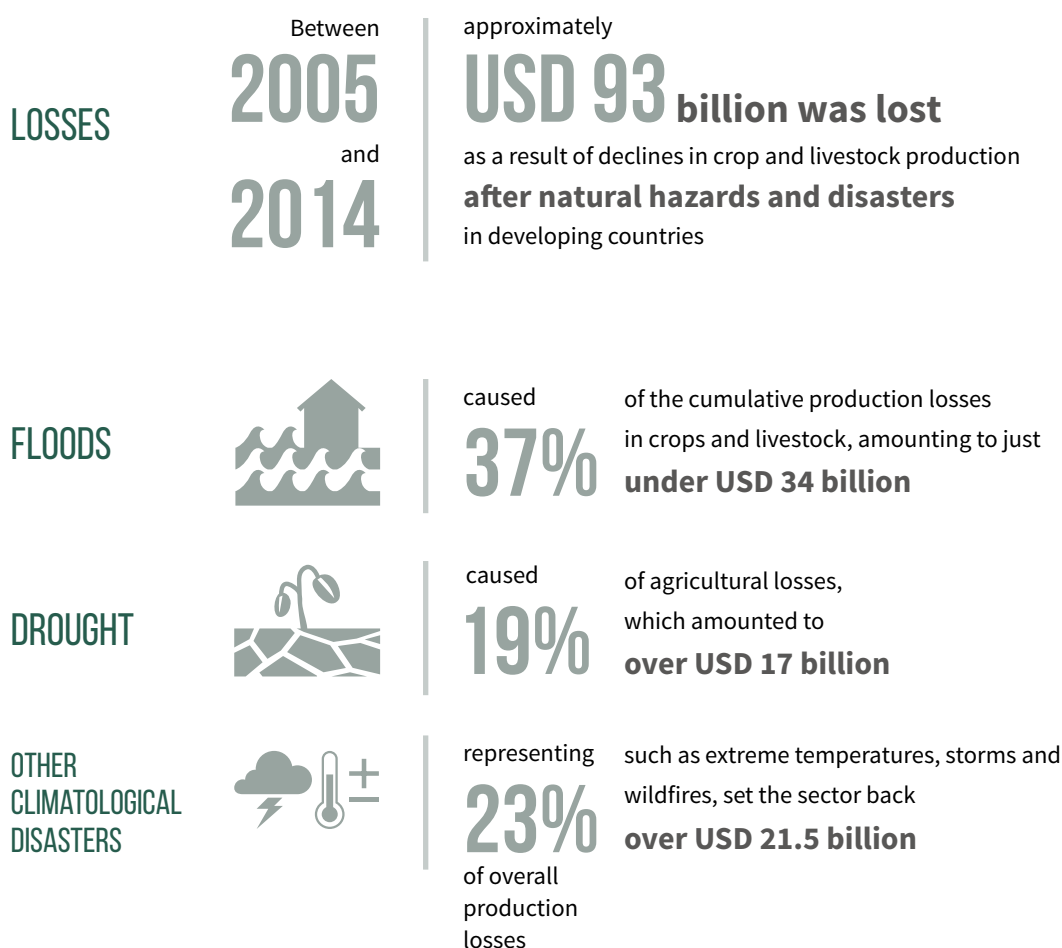
Figure 2. Economic damages of disasters triggered by natural hazards worldwide, 1980–2014



Source: EM-DAT CRED

Production losses: crops and livestock

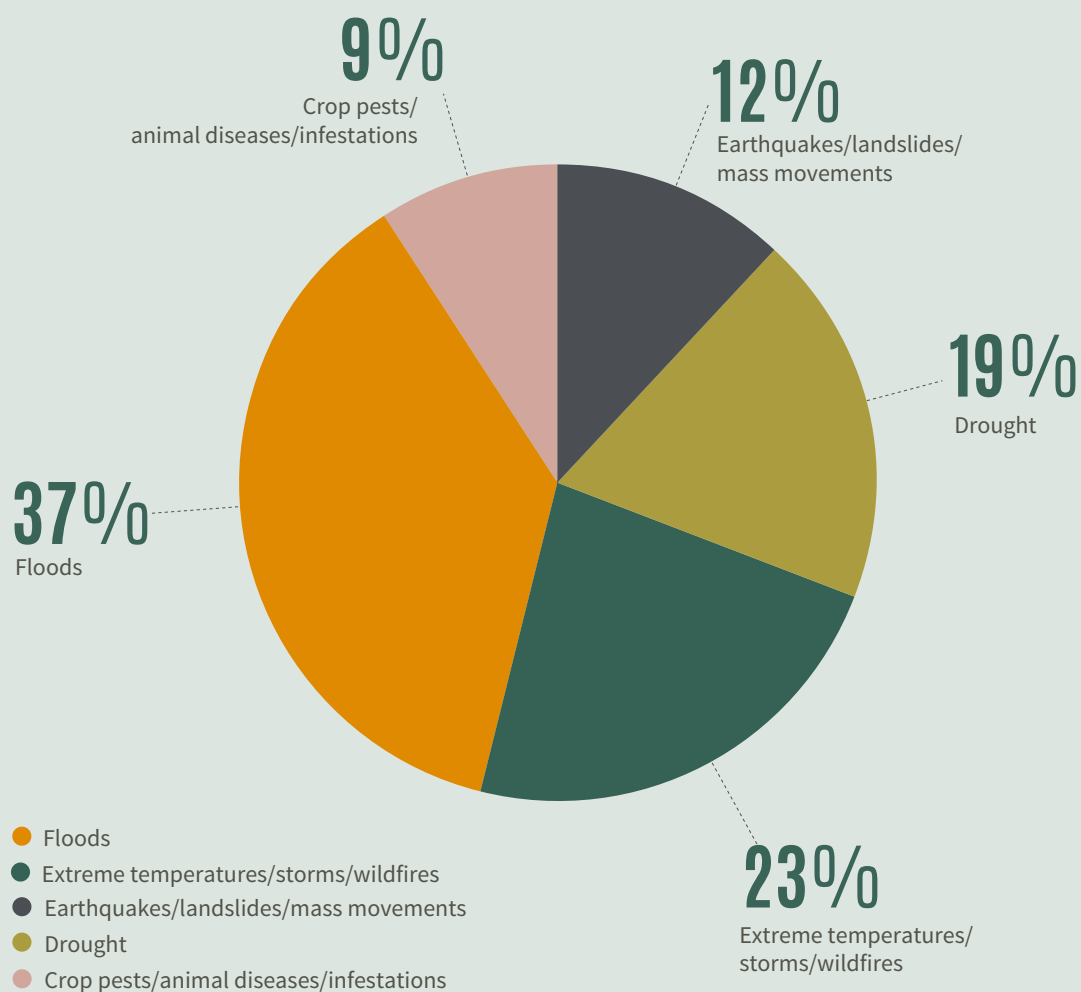
This brochure⁴ focuses on crop and livestock losses triggered by natural hazards and the spread of animal and crop pests and diseases in developing countries in sub-Saharan Africa, Asia, Latin America and the Caribbean, North Africa and western Asia⁵. Special emphasis is given to small island developing States (SIDS).



⁴ Within this broad (macro-level) analysis of agricultural impact from disasters, only production losses in the crop and livestock sectors are considered; this is mainly due to data availability and compatibility with the type of analysis employed. The upcoming report, however, contains both sector-specific analysis and targeted case studies on each subsector, namely fisheries, aquaculture and forestry, as well as crops and livestock, and therefore provides a thorough overview of how each subsector is impacted by disasters and natural hazards.

⁵ Including Armenia, Georgia, Lebanon, Syria and Yemen.

Figure 3. Crop and livestock production losses per disaster type, 2005–2014



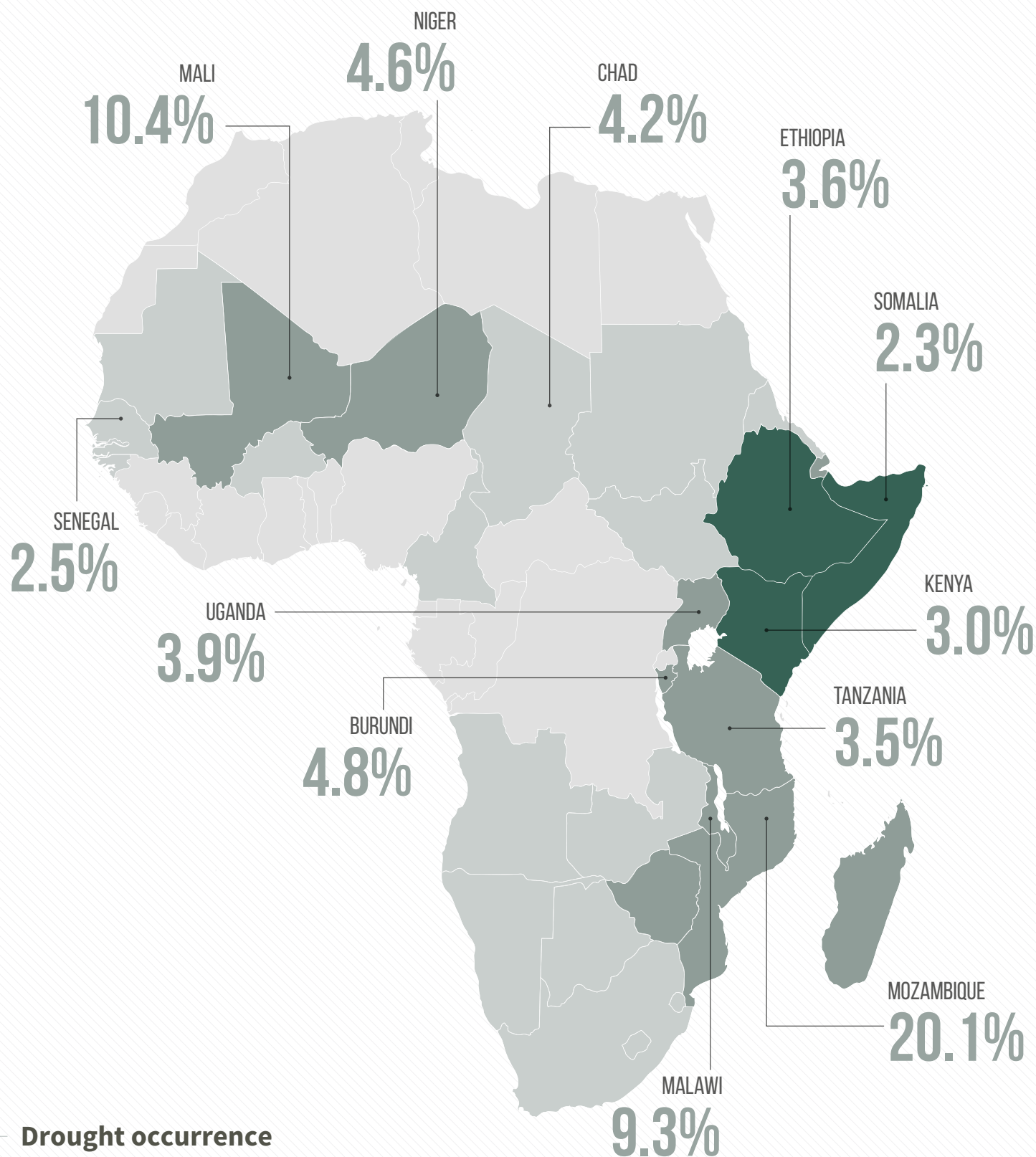
A focus on drought

Drought continues to challenge agricultural systems across Africa. The extreme vulnerability to rainfall variability in the arid and semi-arid areas of the continent and the poor capacity of many soils to retain moisture result in an often devastating impact on the sector. Between 2004 and 2015 droughts have been frequent and severe in many African countries (Figure 4). There were 84 reported drought occurrences in 30 countries, which have led on average to a loss of 3 to 4 percent from potential agricultural production; this number can go up to 10 and even 20 percent in certain cases.

Despite the importance of these losses, a persistent limited availability of data and information is hampering proper understanding of the economic consequences of drought in the agriculture sector. The case for investing in drought risk reduction, including in data and information generation, is very strong. The agriculture sector – which contributes an average of 25 percent to gross domestic product (GDP) – must take the lead in placing drought mitigation at the centre of DRR.

Drought occurrence data is based on EM-DAT CRED, including all reported drought occurrences between 2004 and 2015. Agricultural losses from drought, expressed percentage of potential production are calculated based on FAOSTAT production data for droughts affecting over 100 000 people or 10 percent of the national population.

Figure 4. Drought losses as a percentage of potential production



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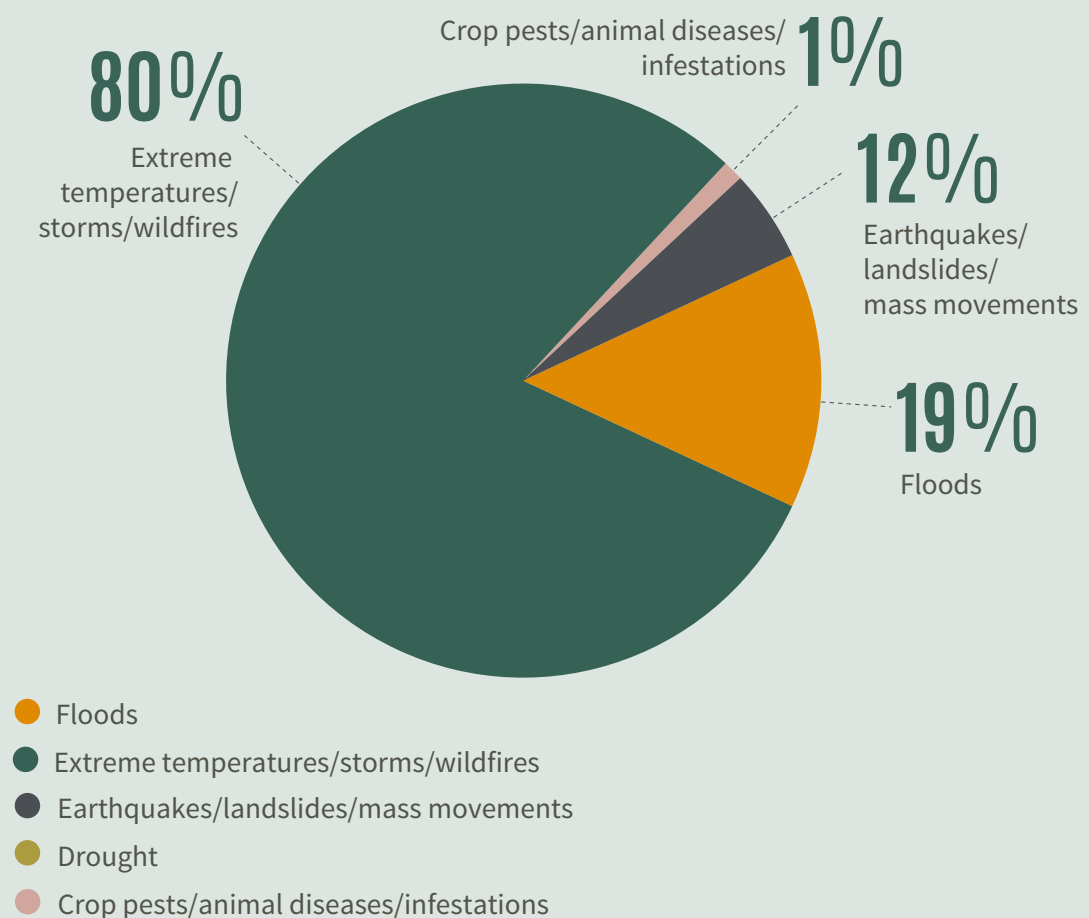
*In 2015,
Tropical Cyclone Pam
caused important
damage to agriculture
throughout Vanuatu*

”

A focus on small island developing States

While comparatively small in magnitude, the production losses attributed to disasters in these countries over the past decade have been significant. The most prominent disasters to hit SIDS are sea surges and storms (up to 80 percent of impact is from climatological and meteorological disasters), followed by floods, tsunamis, earthquakes and landslides.

Figure 5. Crop and livestock production losses per disaster type, 2005–2014

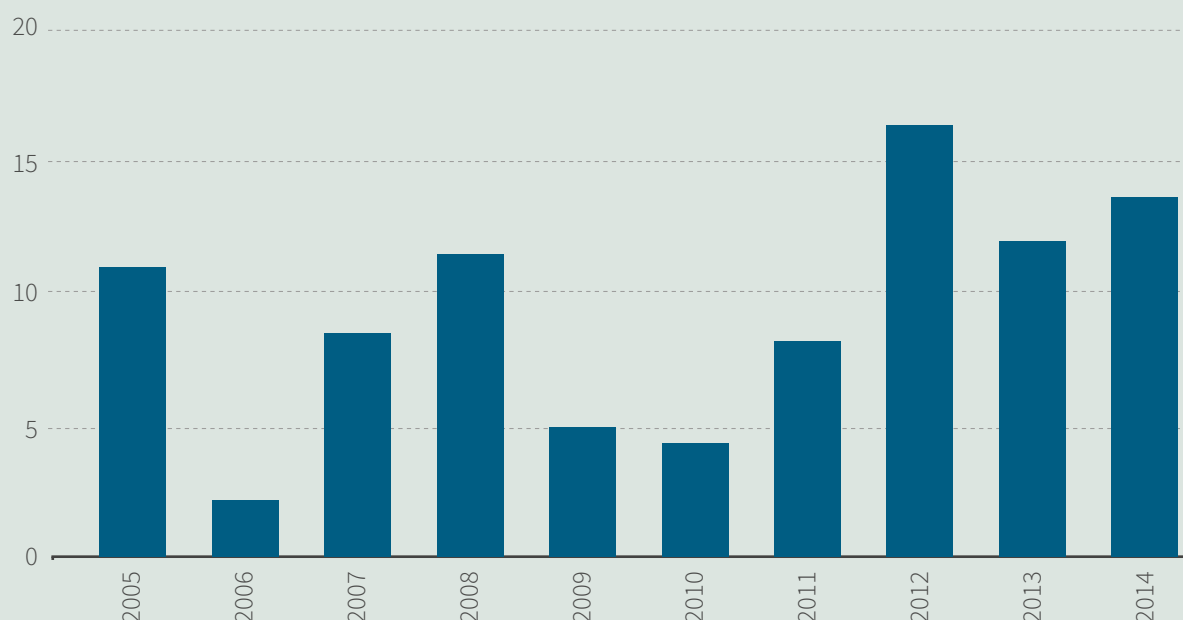


Crop and livestock production losses

During the last decade, hazardous events have inflicted significant losses on crop and livestock production in developing countries. In five out of the last ten years, losses were estimated to be higher than USD 10 billion per year, and the overall trend points to an increase.

Figure 6. Total crop and livestock production losses due to natural disasters in developing countries in Africa, Latin America and the Caribbean and Asia

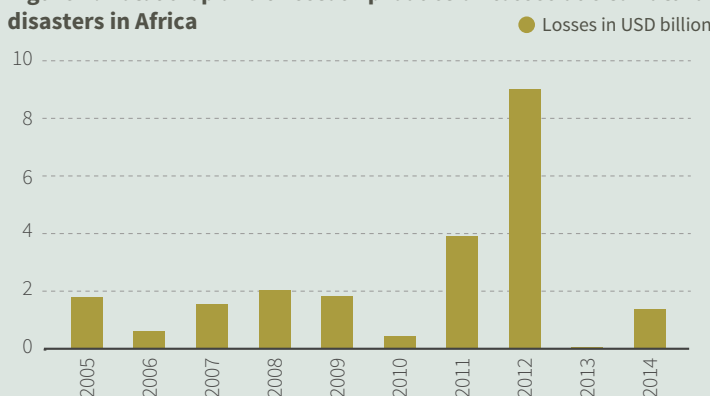
● Losses in USD billion



AFRICA

In Africa (both sub-Saharan Africa and North Africa), losses have fluctuated widely, with peaks in 2011 and 2012 driven by drought in the Sahel and Horn regions.

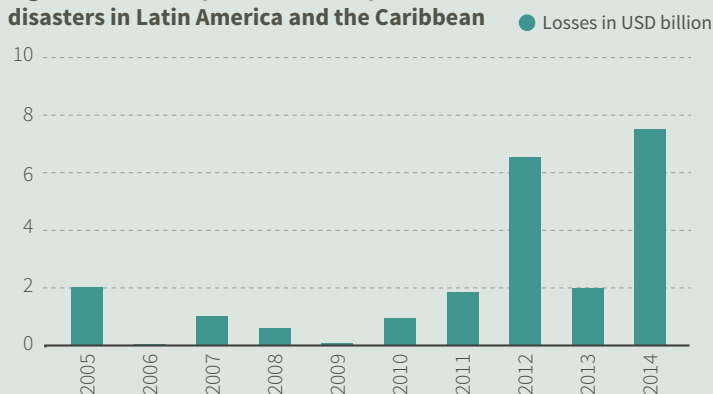
Figure 7. Total crop and livestock production losses due to natural disasters in Africa



LATIN AMERICA AND THE CARIBBEAN

In Latin America and the Caribbean, losses have increased considerably over the past five years, with peaks in 2011, 2012 and 2014. Radical increases in 2012 and 2014, in particular, reflect severe La Niña-related drought episodes, which ravaged crop harvests in Argentina and Brazil in 2012 and much of Central America in 2014, especially the crop and livestock sectors in El Salvador, Guatemala and Honduras.

Figure 8. Total crop and livestock production losses due to natural disasters in Latin America and the Caribbean

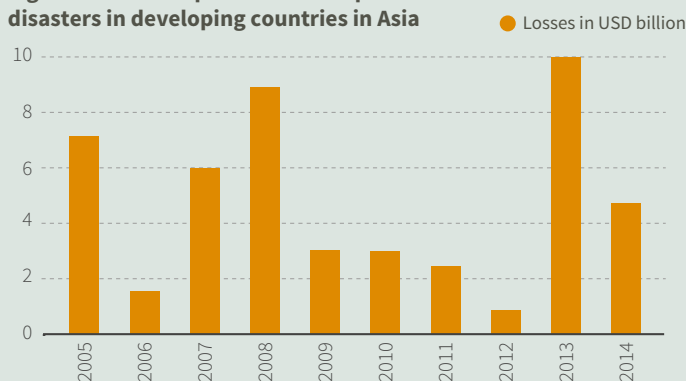


ASIA

In Asia, on the other hand, the overall level of losses in agricultural production is comparatively higher, peaking in 2013.

This increase was mostly observed in south Asia and attributed to the series of monsoon floods and earthquakes reported at the time.

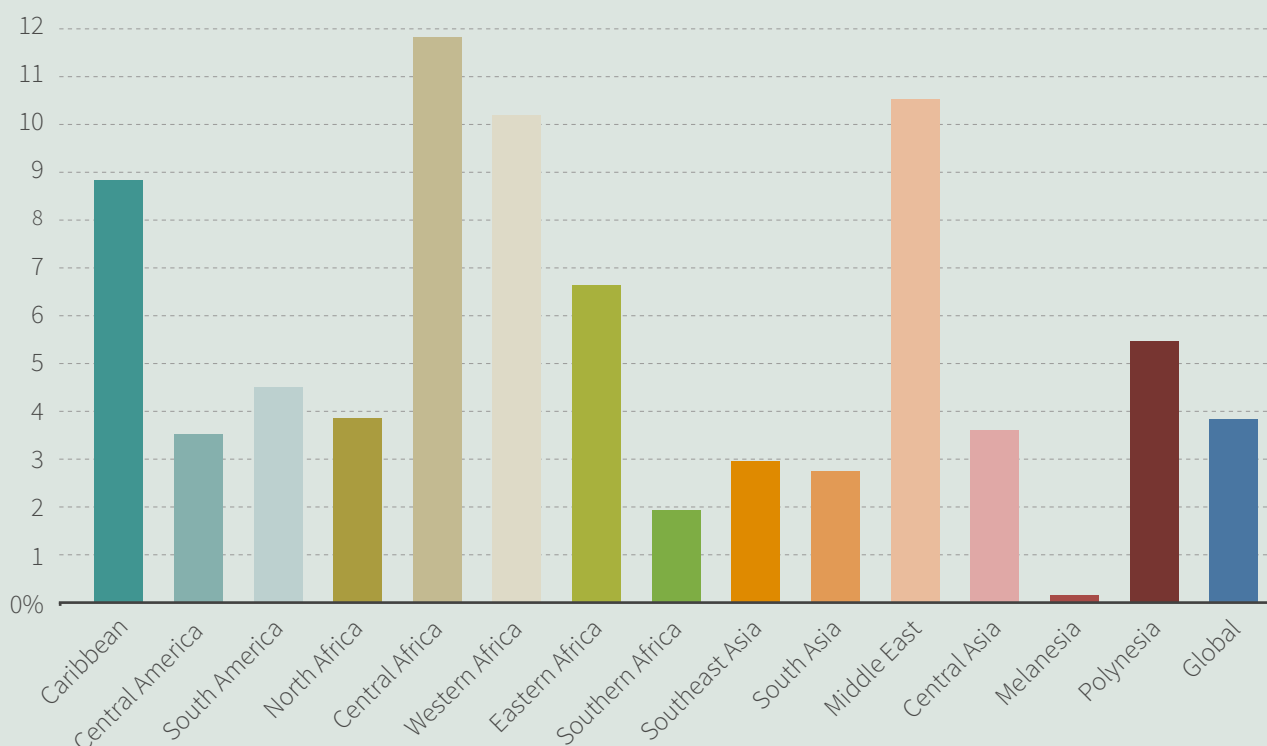
Figure 9. Total crop and livestock production losses due to natural disasters in developing countries in Asia



The extent of disasters in agriculture is even more evident when losses are measured as percentages of the potential production. This is computed here as the difference between actual and expected production in the disaster years. The expected production is the amount that would have materialized in the absence of the hazardous events.

Despite the smaller global scale, several African regions – particularly central and western – show high production losses in these terms, along with western Asia, the Caribbean and Polynesia. In these regions, disasters seem to levy a toll of about 10 percent on potential production in disaster years; while on a global scale, disasters account for about 4 percent. This is not a small difference: smaller swings in global food supply do have significant impact on world markets.

Figure 10. Production loss due to natural disasters as percentage of potential production by region, 2004–2014



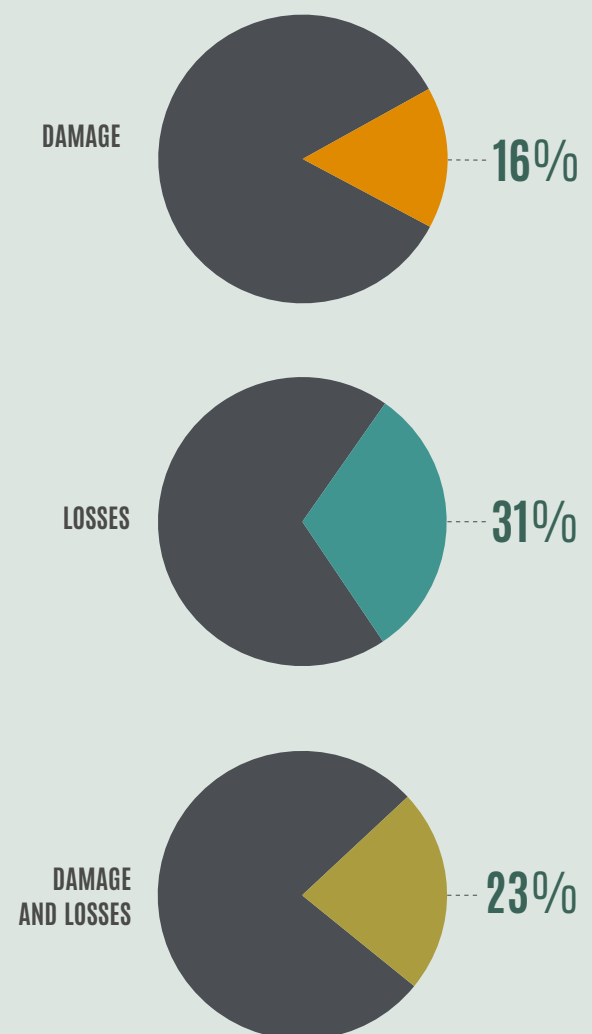
Where does agriculture stand?

In order to compare impacts of disasters across sectors FAO has reviewed 74 Post-Disaster Needs Assessments (PDNAs)⁶ conducted in 53 developing countries between 2006 and 2016. PDNAs distinguish damage – the total or partial destruction of physical assets – from losses, which are changes in economic flows.

The comparative analyses indicate that crops, livestock, fisheries, aquaculture and forestry activities absorbed 23 percent of all damage and losses caused by medium- and large-scale disasters between 2006 and 2016. This figure is consistent with the one calculated for the period of 2003–2013, when the sector absorbed 22 percent of total damage and losses (FAO, 2015).

The percentage increases to 26 percent for climate-related disasters – floods, drought and tropical storms – which highlights the vulnerability of smallholder farmers to hazardous events.

Figure 11. Share of disaster impact absorbed by agriculture in developing countries, 2006–2016



Source: FAO, based on data from PDNAs

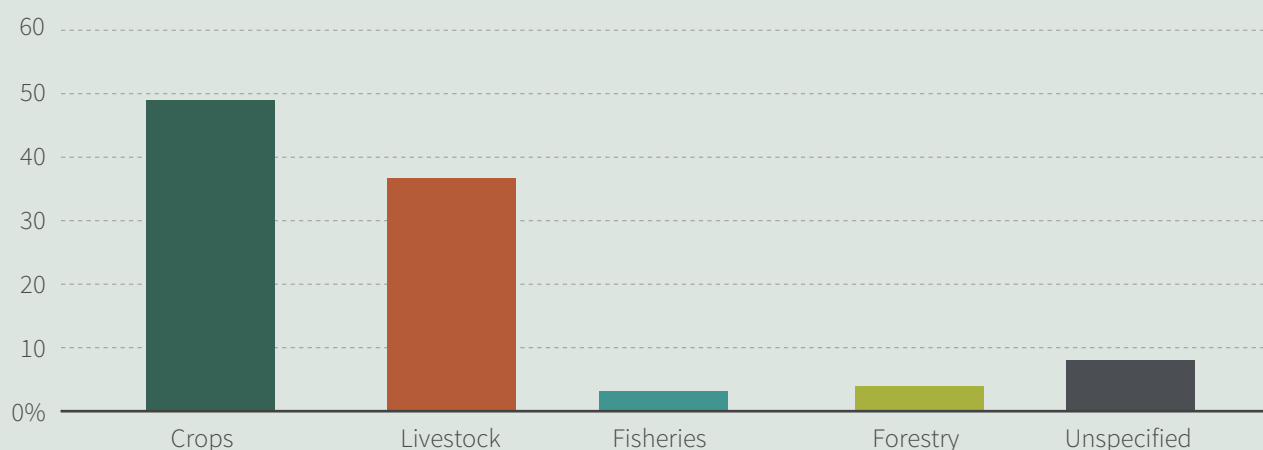
⁶ PDNAs are government-led exercises conducted after major disasters to define post-disaster recovery and reconstruction strategies. Most PDNAs are supported by the United Nations, the European Commission, the World Bank and other international and national actors.

Impacts of disasters by sector

Almost half of the impact of disasters on agriculture is absorbed by the crop sector, followed by livestock, while fisheries and forestry account for smaller shares.

More than 25 percent of disasters occurred in SIDS, where damage and losses in fisheries, albeit low in absolute terms, may have far-reaching consequences on fishery-based livelihoods.

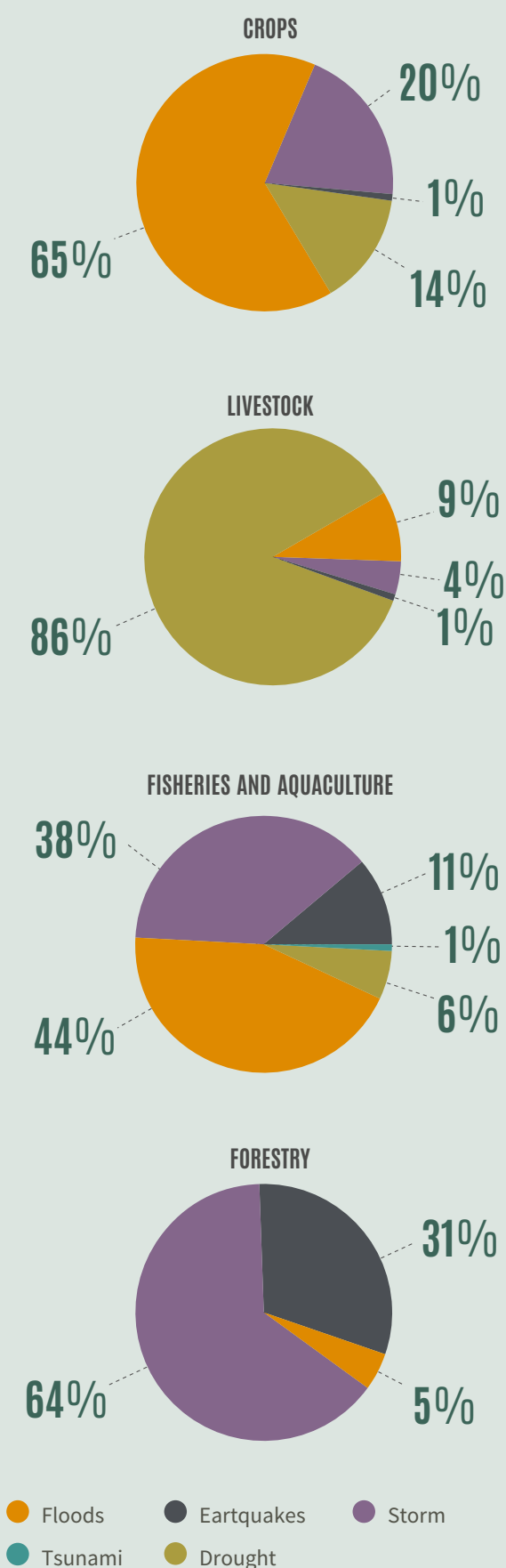
Figure 12. Share of disaster impact by agricultural subsector, percentage share of total impact



Source: FAO, based on data from PDNAs

It should be noted that the fisheries and forestry sectors are often underreported in PDNAs; the impact on forestry is often acknowledged, but seldom quantified in value terms.

Figure 13. Damage and losses to agricultural subsectors by type of hazard



FLOODS

caused almost two-thirds of crop losses and associated damage. In absolute terms, the most harmful disaster for crops was the 2010 flood in Pakistan (USD 4.5 billion), followed by the 2008–2011 drought in Kenya (USD 1.5 billion).



DROUGHT

was by far the most harmful disaster for livestock, causing 86 percent of total damage and losses in the sector, with the largest impact attributed to the 2008–2011 drought in Kenya (USD 8.9 billion).

Between 2014 and 2016, El Niño-related drought in the Marshall Islands mainly impacted livestock, causing many deaths related to water and feed shortages.



FLOODS AND STORMS

hit fisheries and aquaculture between 2006 and 2016. The floods in Myanmar in July and August 2015 and Tropical Cyclone Winston, which hit Fiji in February 2016, had the biggest impact.



STORM

caused about two-thirds of all disaster impacts on forestry recorded in the PDNAs between 2006 and 2016. This was especially due to the impact of Hurricane Felix in Nicaragua in 2007 and Cyclone Nargis in Myanmar in 2008. In recent years, the 2015 earthquake in Nepal had a major impact on forestry.

Improving information on damage and losses from disasters

developing a methodology to
**assess the extent
of damage and losses**

in agriculture and its subsectors – crop,
livestock, fisheries, aquaculture and
forestry – and testing and validating the
methodology on different hazards and
regions through case studies

**FAO
focusses on**

promoting systematic,
**harmonized data
collection and reporting**
on agricultural damage
and losses at national level

developing a **global information
system on damage and losses**
in agriculture and its subsectors – crop,
livestock, fisheries, aquaculture and
forestry – and linking it to existing
national and international disaster loss
databases, such as the EM-DAT CRED and
Desinventar

**collaborating with the United
Nations** International Strategy on
Disaster Risk (UNISDR) to monitor
Indicator C-2, – Direct Agricultural Loss
Attributed to Disasters – of the Sendai
Framework for Disaster Risk Reduction

By addressing the knowledge gap and providing systematic analysis and information
on the impact of disasters in agriculture

develop an understanding of
**how damage and losses can
be avoided or reduced**
by adequate investments and actions
in DRR and resilience

**FAO
aims to**

enhance country capacity
to collect disaster impact data
and use that data for DRR and
management planning

“

The greatest challenge lies ahead – to improve information systems at global, national and local levels and further strengthen resilience through higher investments in agriculture

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www.fao.org/resilience