3.1 CLIMATE-RELATED PHYSICAL RISKS

IPCC concepts of climate change impact and risk

Important notice
This unit is part of a package of learning materials designed to support understanding of foundational concepts relating to climate-related financial disclosures. These learning materials do not constitute application or regulatory guidance for the preparation of climate-related financial disclosures and are not intended to represent legal or professional advice. We encourage you to seek your own professional advice to find out how the Corporations Act 2001 (Corporations Act) and other relevant laws may apply to you and your circumstances, as it is your responsibility to determine your obligations and comply with them.

Key topics

- Climate change impact and risk
- Hazards, exposure, and vulnerability
- Adaptive capacity

Relevance for climate-related disclosures

It is useful to understand climate change risk and impact at a broader societal level, as defined by the Intergovernmental Panel on Climate Change (IPCC) to help build an understanding of climate-related risks and opportunities that may impact your entity.

In this unit, you will learn about a simple framework developed by the IPCC for understanding climate change impact and risk, along with the factors that influence them. The framework also highlights ways we can address the drivers of climate change impact and risk through climate change adaptation.

Overview

The IPCC is the United Nations (UN) body responsible for assessing climate science (see Module 2 Unit 3).

In IPCC terms, climate change risk results from a combination of:

- hazards, such as fires, floods, and storms
- our exposure to these hazards (that is, the presence of people or assets in harm's way), and
- the vulnerability of those exposed.

Climate change risk is the potential for harm. Climate change impacts are the actual harm resulting from these risks. These may be impacts on lives, livelihoods, health and wellbeing, ecosystems, businesses, infrastructure, and the economy.

Climate change risks and their likely impacts can be reduced through adaptation. Our ability to adapt is determined by our adaptive capacity.

Understanding climate change impact and risk

Climate change impact and risk are key concepts in understanding how climate change affects entities, communities, ecosystems and societies, and are central to Australia's climate-related disclosures.

The foundational science and concepts underpinning the new reporting regime align with the work of the IPCC, which provides a simple conceptual framework for understanding climate-related impact and risks (see Figure 1).

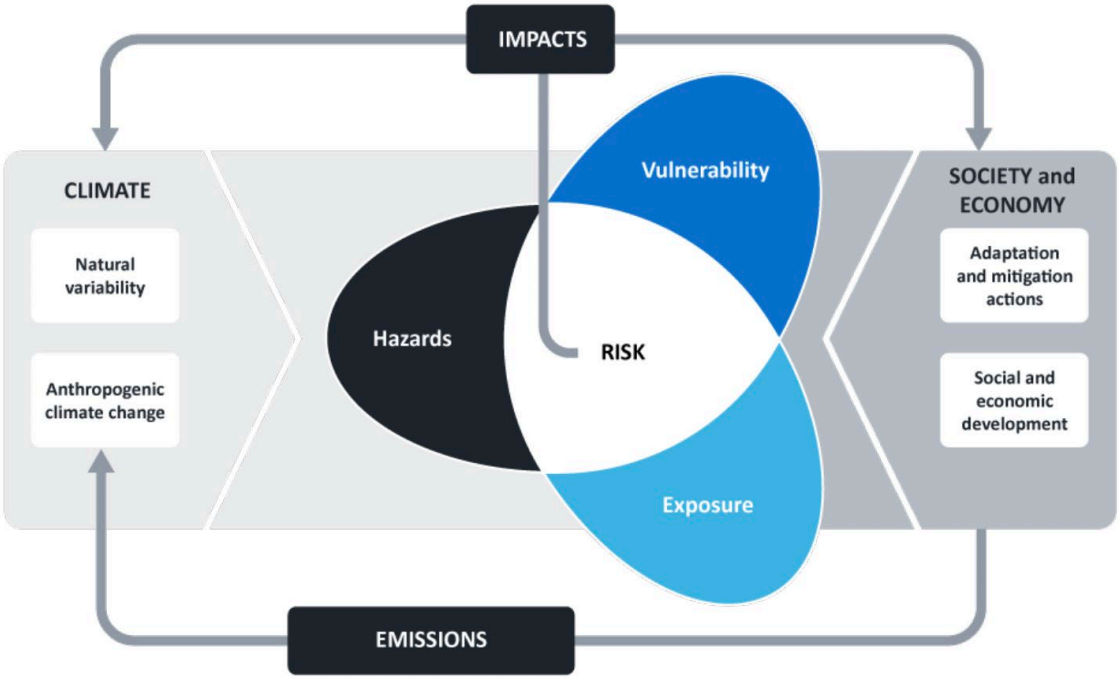

Figure 1: IPCC concepts of climate change impact and risks, and their determinants (IPCC's Fifth Assessment Report)[1]

The components of climate change risk: hazards, exposure and vulnerability

Climate change risk is the potential for harm caused by climate change. Climate change risk results from three factors working together: hazards, exposure, and vulnerability. These are shown as the three blades in the IPCC's 'risk propellor' (Figure 1).

Hazards are climate-related events or trends that can cause harm. They include heatwaves, droughts, extreme rainfall leading to flooding, severe storms including tropical cyclones, and bushfires.

As shown in Figure 1, these hazards are subject both to natural variability and to the effects of climate change. Tropical cyclones for example, are a hazard for many communities in Australia's northern coastal regions. The number of tropical cyclones in our region varies significantly from year to year, due in part to the influence of the El Niño Southern Oscillation and other large-scale drivers of our climate and weather. However, as with other climate-related hazards, we are also seeing long-term changes in tropical cyclone activity driven by climate change. According to the Bureau of Meteorology, there has been a decrease in the number of tropical cyclones in the Australian region since at least 1982. However, a greater proportion of tropical cyclones are projected to be of high intensity, with higher wind speeds, greater rainfall and higher storm surges due to rising sea levels.[2]

Exposure is another climate change risk factor. Continuing with the example of tropical cyclones, we have established that tropical cyclones are an increasing hazard in parts of Australia due to climate change. Exposure refers to the presence of people, facilities, infrastructure, or other things that could be affected by this hazard. In other words, who or what might be affected when a tropical cyclone occurs. This could include people living in coastal areas exposed to storm surges, or critical infrastructure in these regions including roads and power lines.

Finally, vulnerability refers to how likely someone or something is to be harmed or adversely affected.[3] For example, a facility that has been built to withstand winds from severe tropical cyclones is naturally less vulnerable than one which has not.

The difference between climate change risk and impact

Whereas climate change risk is used to describe the potential for harm, the IPCC defines climate change impacts as the actual harm resulting from these risks. In other words, the consequences that unfold as these climate change risks materialise. Climate impacts are wide-ranging, and can include damage to property and infrastructure, impacts on mental and physical health, loss of lives, effects on species and ecosystems, and more. When it comes to entities, it may include:

- direct impacts on assets
- disruption to power, transport systems and other infrastructure, and
- impacts on staff, the wider community and the economy as a whole.

In Modules 3, Units 5-7, we use hypothetical case studies to explore some of the ways in which entities may be affected by climate change impacts.

Reducing climate change risks and impacts

There are many ways to reduce climate change risks and its impacts. Returning to Figure 1, we see that all three blades of the risk propellor are affected by our own actions. The extent to which hazards are exacerbated by climate change depends, of course, on the extent to which greenhouse gas emissions can be collectively limited and tackle the root causes of climate change (see Module 2). Steps can also be taken to adapt to the increasing hazards that, owing to existing greenhouse gas emissions, can no longer be avoided. That is where adaptation comes in.

Adaptation

The IPCC defines adaptation (in human systems) as 'the process of adjustment to actual or expected climate and its effects, in order to moderate harm'.[3]

Adaptation may involve reducing the exposure of people and assets to hazards. For example, by relocating a facility from a location known to be at increasing risk of coastal flooding. Or it may focus on reducing the vulnerability of an exposed asset. For example, designing buildings that are elevated above projected flood peaks and using flood-tolerant building materials.

Not all adaptation solutions involve physical interventions. For example, having good early warning systems is key to reducing vulnerability as they enable people and entities to be better prepared when hazards strike. Adaptation may also involve nature-based solutions. For example, restoring mangroves can provide better protection from destructive waves and storm surges.

Adaptive capacity

The ability to adapt to climate change by reducing risks and the likely impacts faced is known as our adaptive capacity.

The level of adaptive capacity can vary widely across different communities, sectors and entities. It is driven by many factors, including access to knowledge and information, access to financial capital and insurance, and the kind of activities entities are engaged in.

Entities can increase adaptive capacity through, for example, conducting robust climate risk assessments and adaptation planning, and helping employees understand risks and their role in adaptation. However, adaptive capacity may also be limited by factors outside our control. For example, your entity may be closely tied to a particular location and one that is highly exposed to escalating climate hazards. This may limit your adaptive capacity compared to an entity that is more diversified.

Key takeaways

- Understanding climate change impact and risk is essential for understanding and identifying climate-related risks and opportunities.
- Climate change risk arises from a combination of hazards, exposure and vulnerability. Climate change impacts are the consequences of these risks being realised.
- We can reduce our climate change risks and their likely impacts through adaptation and by strengthening our adaptive capacity.

Sources and explanatory notes

[1] Intergovernmental Panel on Climate Change (2014) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (C.B. Field, V.R. Barros, D.J. Dokken, et al., Eds.). Figure SPM.1, p3, Cambridge University Press

Note: The IPCC expanded this framework in its Sixth Assessment Report to better accommodate the many ways we can address the determinants of risk. However, for educational purposes we have chosen to use this earlier and simpler version.

[2] Bureau of Meteorology and CSIRO (2024) *State of the Climate 2024*

[3] Intergovernmental Panel on Climate Change (2018) *Annex I: Glossary*