# Climate Change Adaptation

## Reporting Guidance for Public Bodies

**Annex C:** Key Concepts of Climate Change Risks and Impacts

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# Key Concepts of Climate Change Risks and Impacts

## Introduction

This annex provides a summary of key concepts in adaptation reporting, which a reporting organisation should familiarise itself with, before carrying out a climate change impact assessment.

This annex contains information and guidance under the following headings:



These are essential for understanding the potential impacts of climate change on an organisation, to inform robust decision-making, and these need to be understood in an organisation's own, specific context.

## Components of climate change risk

According to the Intergovernmental Panel on Climate Change (IPPC), climate change is the potential for adverse consequences for humans (such as people community, services or infrastructure, etc.) or ecological systems, resulting from the interaction of climate-related hazards or weather events with the exposure and vulnerability of those systems.

**Risk is often represented** as probability of occurrence of hazardous events (likelihood) multiplied by the impacts (or consequences) if these events occur.

**Risk comes from** the interaction between three components: hazard, exposure, and vulnerability, as illustrated in the simplified diagram of the relationship between risk, hazard, exposure and vulnerability, at figure 1 below.[1]

**Figure 1: The Three Components of Risk - Hazard, Exposure, and Vulnerability***


[*Diagram is adapted from the IPCC]

**Hazards** are physical events or trends (e.g. extreme weather events such as heatwaves, droughts, floods, or gradual changes such as sea level rise) that can cause harm to health, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.

**Exposure** refers to the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected or exposed to a hazard. For example, an organisation's buildings or infrastructure located in a floodplain, are more exposed to flooding than those located further away. Mapping exposure to hazards can increase understanding of where the risks lie.

[1] IPCC AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability (Fifth Assessment Report, Working Group 2)

**Vulnerability** can be thought of in the following two aspects:

(i) Sensitivity to hazards.

(ii) Adaptive capacity, which is the ability to adjust to negative impacts or take advantage of opportunities or respond to consequences. It is a measure of how a system (such as a service, function, asset, community, ecosystem, or infrastructure) is susceptible to, or unable to cope with, the effects (either negatively or positively) of climate change.

This concept focuses not only on physical exposure to climate driven events but considers socio-economic factors like poverty, inequality and access to resources. Therefore, understanding the vulnerability of an organisation or its system of concern (e.g. assets, communities, etc.) can help it analyse the possible consequences of a potential hazard, which eventually will lead it to understand its risks.

## Types of climate change risks and impacts to consider

Public body organisations face a wide range of climate change risks and impacts. With climate change already being experienced and set to increase, climate-related risks should be considered with the same rigour as any other organisational or business strategic risk. Climate change risks and impacts should also not be considered in isolation and should be clearly integrated into the strategy of an organisation.

Risks and impacts fall into the following types:

- Physical risk (see heading below).
- Transition risk (see heading below).
- Financial risk - climate change can impact public finances, e.g. through increased costs for infrastructure repair.
- Direct impacts (see heading below).
- Indirect impacts (see heading below).
- Cascading impacts (see heading below).
- Supply chain disruptions (further information below, under heading ‘Indirect Impacts’) - extreme weather events and other climate impacts can disrupt supply chains for essential goods and services, impacting public service).

- Social impacts (further information below, under heading ‘Indirect Impacts’) - displacement of communities, increased inequality, and potential for social unrest).
- Health impacts (further information below, under heading ‘Direct Impacts’) - climate change can exacerbate existing health problems and create new ones, putting a strain on healthcare systems and impacting public health.

Additionally, if reporting organisations are using external adaptation resources, it could be helpful to be aware that the following terms are often used to refer to risks at different stages in the adaptation process, as follows:

- **Inherent Risk** - the baseline risk associated with climate change, assuming no actions are taken to address it.
- **Residual Risk** - the remaining risk after implementing measures to reduce the inherent risk.

## Physical risks

Physical risks of climate change stem from changes in the frequency and intensity of climatic events and are divided into acute and chronic. Physical risks are as follows:

- **Acute risks** are those triggered by extreme weather events - like floods and heatwaves, storms, droughts impacting infrastructure, supply chains, and human health.

- **Chronic risks**, on the other hand, are related to long-term consequences, such as the progressive rise in sea levels, temperatures, the gradual change in precipitation patterns and changes in pest and disease patterns.

## Transition risks

Transition risks involve the challenges and opportunities associated with moving to a low-carbon economy, technology, market-risks such as demand for low carbon services / consumer preferences and reputational risks (damage to public image and trust if a public body is perceived as not taking sufficient action on climate change). Consideration of transition risks can be very complex. An organisation could work

towards considering and addressing these, under future reporting rounds under the Regulations, if they do not already consider these risks within their current assessments.

## Direct impacts

- **Physical damage** - climate change, particularly extreme weather events like floods and heatwaves, can directly damage public infrastructure like buildings, roads, and utilities.

- **Operational Disruptions** - changes in temperature and precipitation patterns can disrupt public services, including transportation, energy, and water supply.

- **Health Impacts** - climate change can exacerbate existing health problems and create new ones, putting a strain on healthcare systems and impacting public health; increased temperatures, air pollution, and changes in disease patterns can lead to health problems for the public and public sector workers.

## Indirect Impacts

- **Infrastructure damage** - damage to critical infrastructure like transportation networks, ICT communication systems, and energy grids can have far-reaching consequences for public services and the economy. Multiple infrastructures can rely on each for continued service provision.  Extreme weather events such as flooding or storms can block access to sites, making emergency response more difficult. Power failure caused by cables or transmissions overheating or damage from high winds or falling trees. This can also hinder co-ordination between public bodies, such as emergency response services, and also effected service users.

- **Supply chain disruptions** - extreme weather events can disrupt supply chains for essential goods and services, affecting public bodies' ability to deliver services and maintain operations.

- **Economic impacts** - climate change can lead to increased insurance premiums, changes in customer/service user behaviour, and shifts in public body spending priorities, impacting public finances and services.

- **Social impacts** - climate change can exacerbate social inequalities, leading to increased poverty, displacement, and migration, which can put further strain on public services.

- **Reputational impacts** - public bodies that fail to address climate change risks, which lead to failure in delivering or lowering of quality of services, may face reputational damage and loss of public trust.

## Cascading Impacts

Climate change impacts can trigger a chain reaction of interconnected and potentially amplifying adverse impacts, i.e. impacts which go beyond the immediate effects of a hazard.

Examples include:

- **Physical cascades** - where one event leads to another, e.g. heavy rainfall leading to river overflow which in turn could trigger landslides, dam failures and local flooding leading to supply chain issues and economic losses.

- **Social cascade** - where societal responses amplify risks, e.g. panic worsening evacuation efforts, overwhelming emergency services and hindering an effective response.

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