

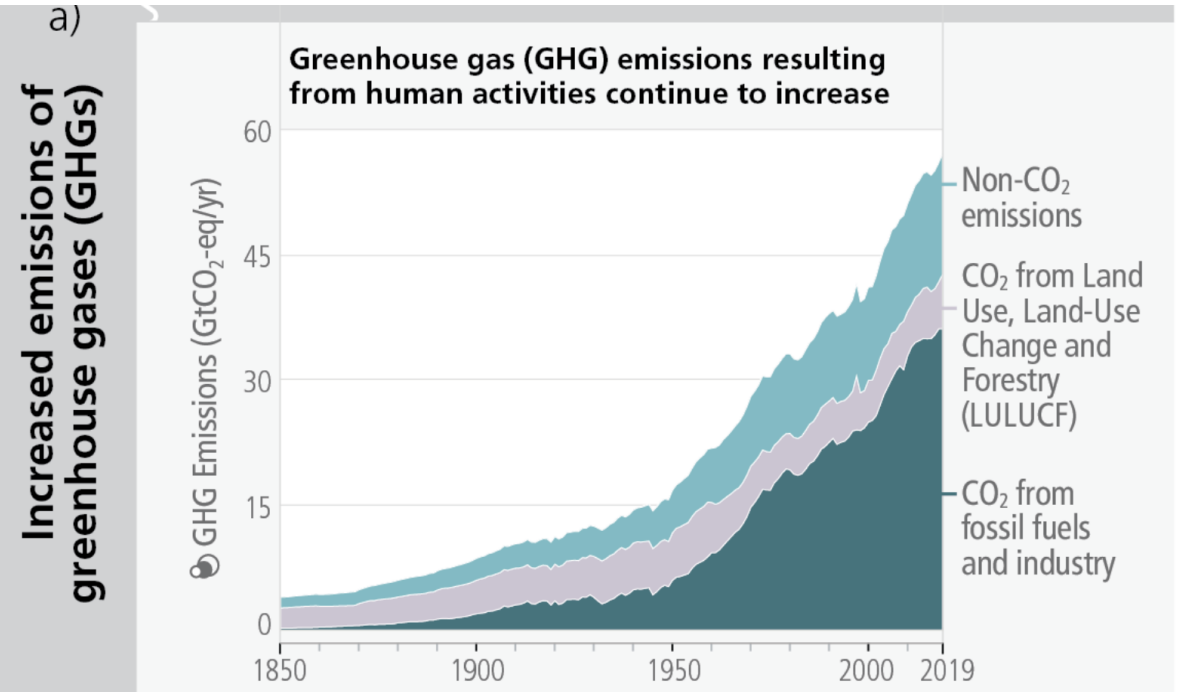
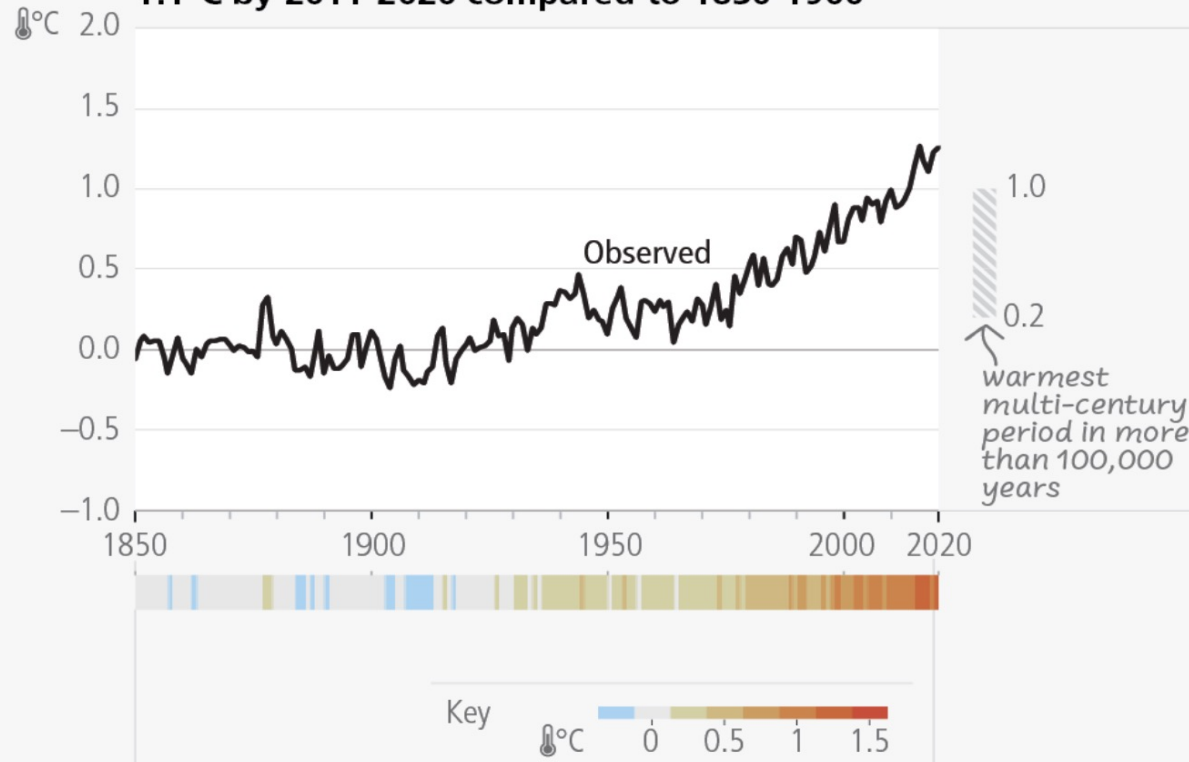
Climate Change: Adaptation and Resilience

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What Has Already Happened?

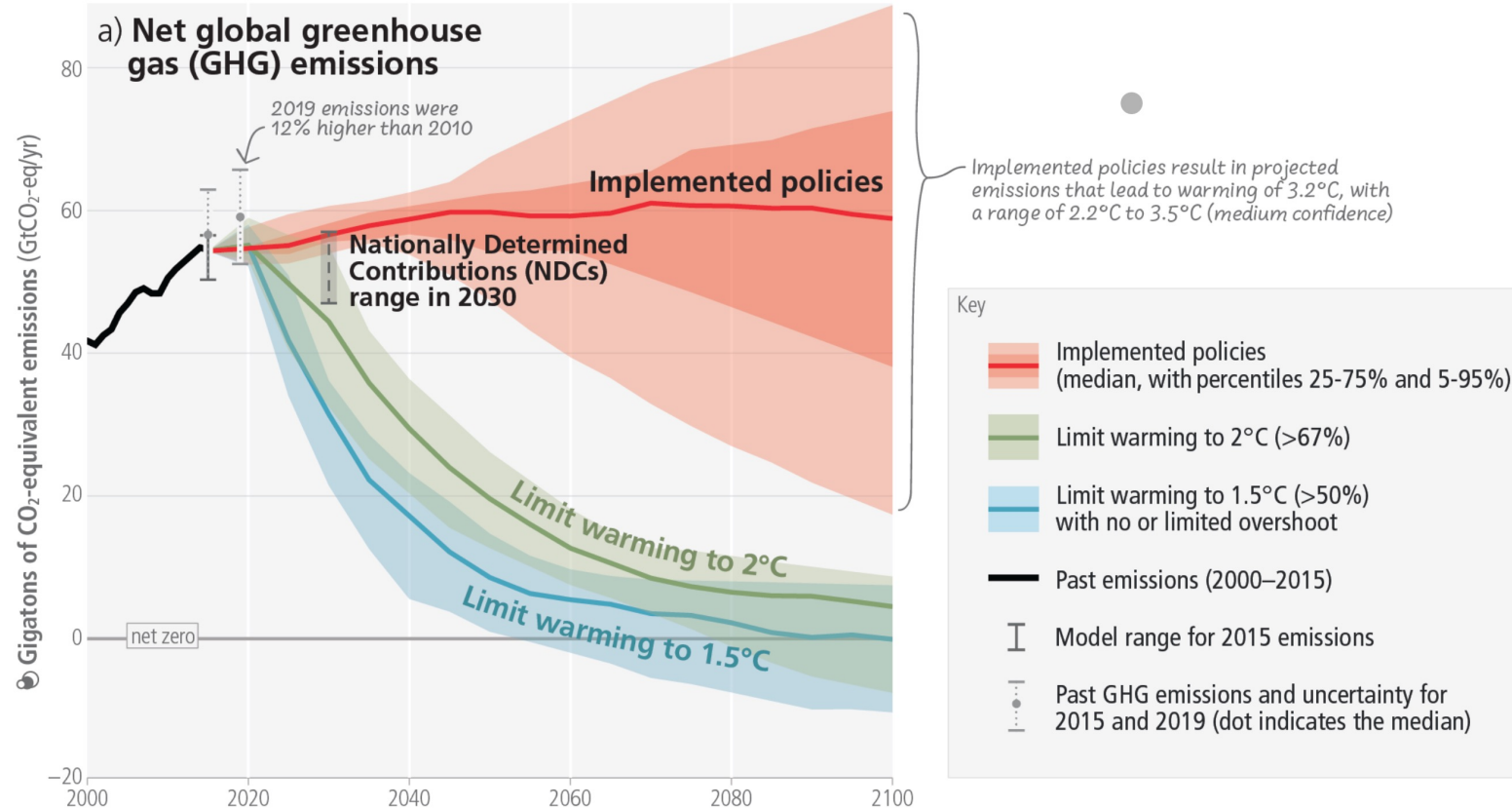
Global surface temperature has increased by 1.1°C by 2011-2020 compared to 1850-1900



What May Happen?

Limiting warming to 1.5°C and 2°C involves rapid, deep and in most cases immediate greenhouse gas emission reductions

Net zero CO₂ and net zero GHG emissions can be achieved through strong reductions across all sectors



Substantial global warming is going to occur.

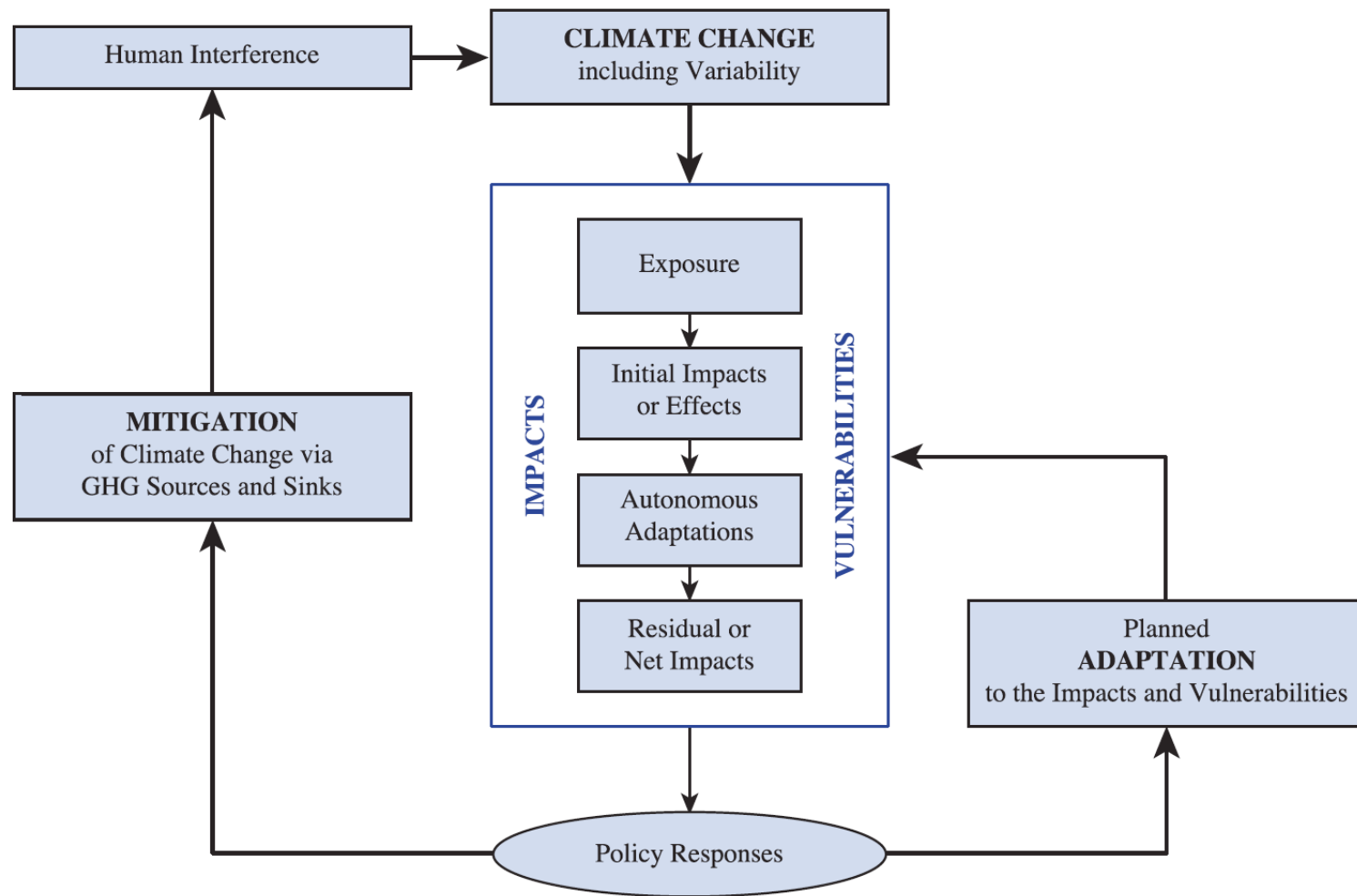


Figure 1

Scope of the Working Group II assessment of the Intergovernmental Panel on Climate Change's Third Assessment Report, Technical Summary. Abbreviation: GHG, greenhouse gas. Figure reprinted from Reference 2.

Impacts of Climate Change

a) Observed widespread and substantial impacts and related losses and damages attributed to climate change

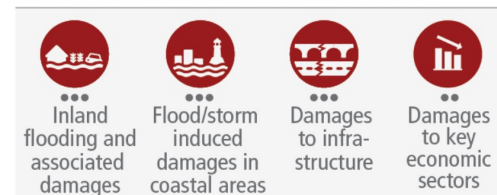
Water availability and food production



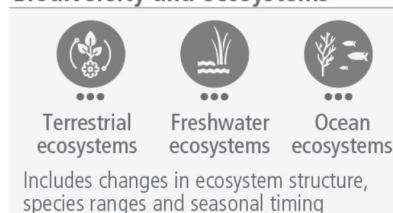
Health and well-being



Cities, settlements and infrastructure



Biodiversity and ecosystems



Key

Observed increase in climate impacts to human systems and ecosystems assessed at **global level**

- Adverse impacts
- Adverse and positive impacts
- Climate-driven changes observed, no global assessment of impact direction

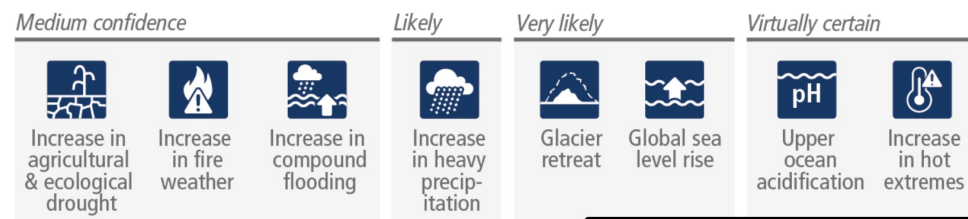
Confidence in attribution to climate change

- High or very high confidence
- Medium confidence
- Low confidence

Adaptation and resilience are crucial

b) Impacts are driven by changes in multiple physical climate conditions, which are increasingly attributed to human influence

Attribution of observed physical climate changes to human influence:



- Increase in hot extremes
- Increase in heavy precipitation
- Increase in wildfires
- Increase in droughts
- Ocean acidification
- Sea level rise

Adaptation and Resilience

Adaptation

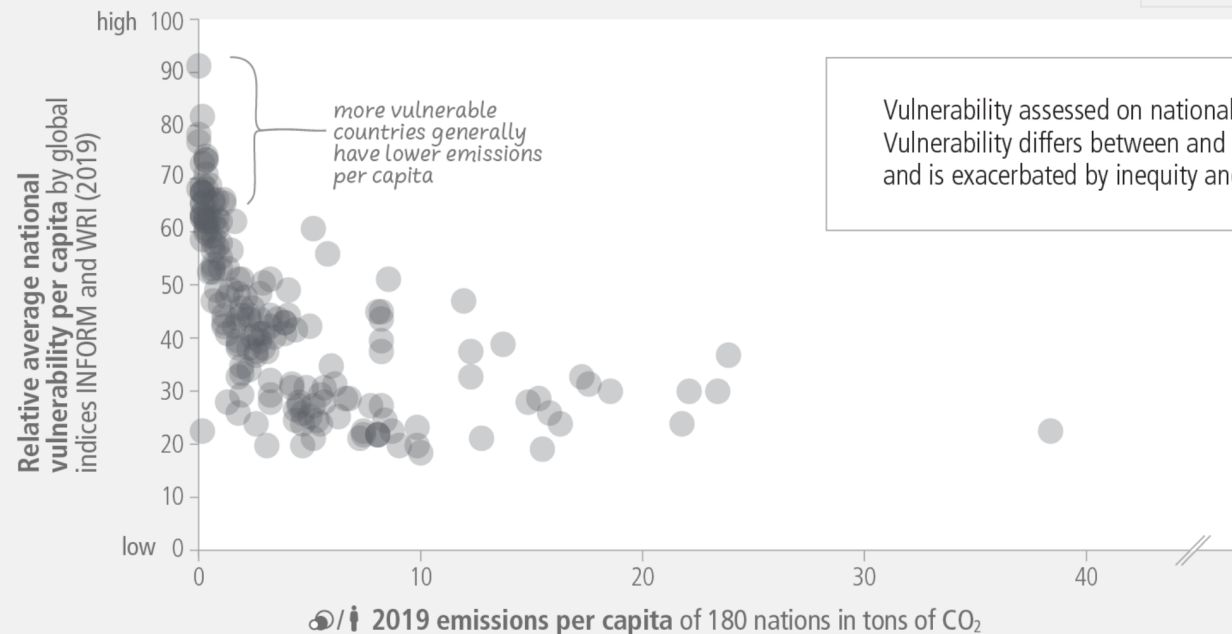
- The process of adjustment to actual or expected climate and its effects.
- In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities.
- In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Resilience

- The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure.
- Resilience is a positive attribute when it maintains capacity for adaptation, learning and/or transformation

Equity and Justice Issues are Central

b) Vulnerability of population & per capita emissions per country in 2019



Dimension of Risk:



Vulnerability

c) Observed impacts and related losses and damages of climate change


		Global	Africa	Asia	Australasia	Central & South America	Europe	North America	Small Islands
HUMAN SYSTEMS	Water availability and food production								
	Physical water availability								
	Agriculture/crop production								
	Animal and livestock health and productivity								
	Fisheries yields and aquaculture production								
HUMAN SYSTEMS	Health and wellbeing								
	Infectious diseases								
	Heat, malnutrition and harm from wildfire								
	Mental health								
CITIES, SETTLEMENTS AND INFRASTRUCTURE	Displacement								
	Inland flooding and associated damages								
	Flood/storm induced damages in coastal areas								
	Damages to infrastructure								
	Damages to key economic sectors								

Too Little, Too Slow

Climate adaptation failure
puts world at risk

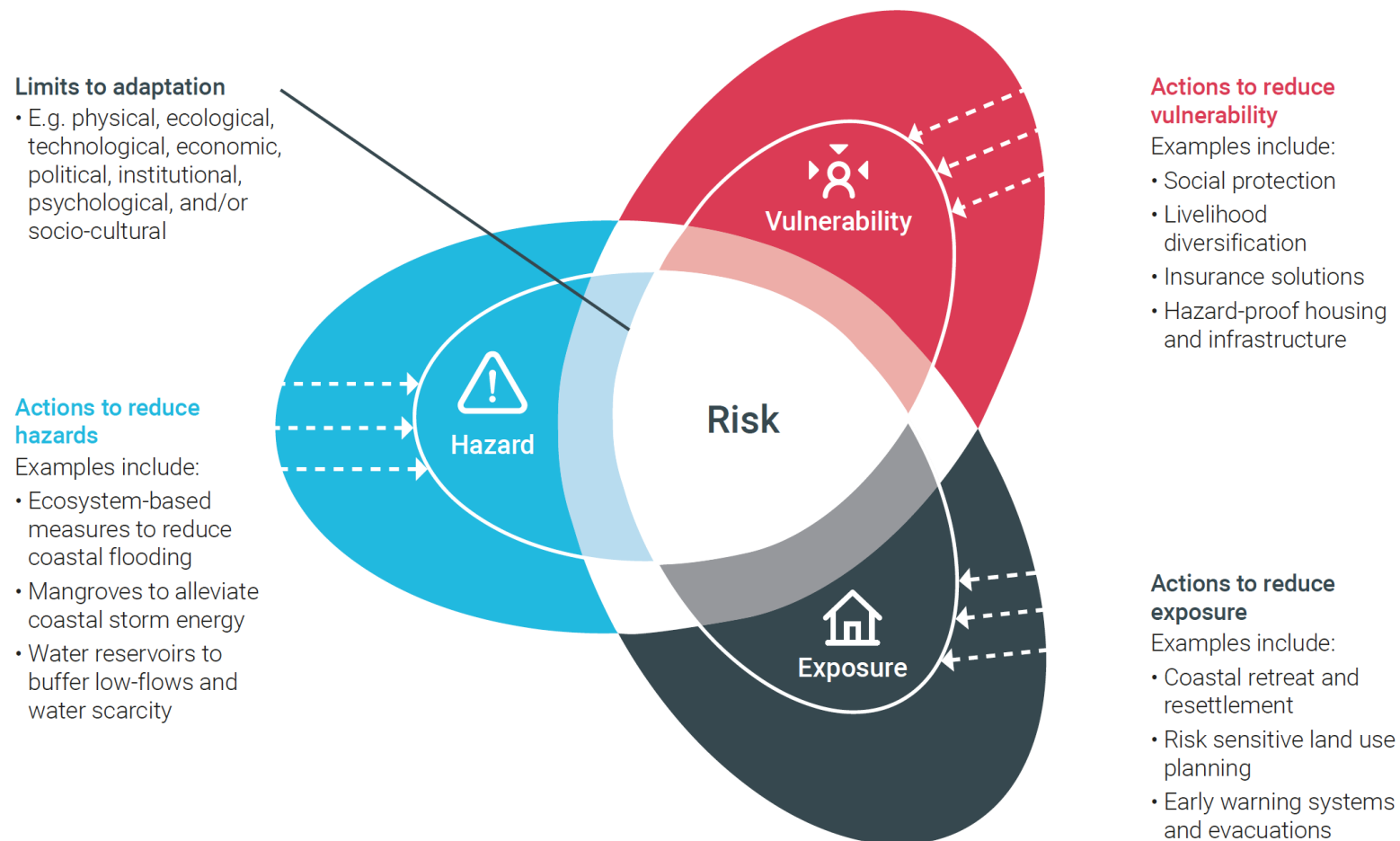
[Adaptation Gap Report 2022](#)

Scaling strategies
for Climate
Change Adaptation
and Resilience are
in their Infancy



Risk: Hazard, Exposure, and Vulnerability

Figure 5.1 Risk as defined by the IPCC



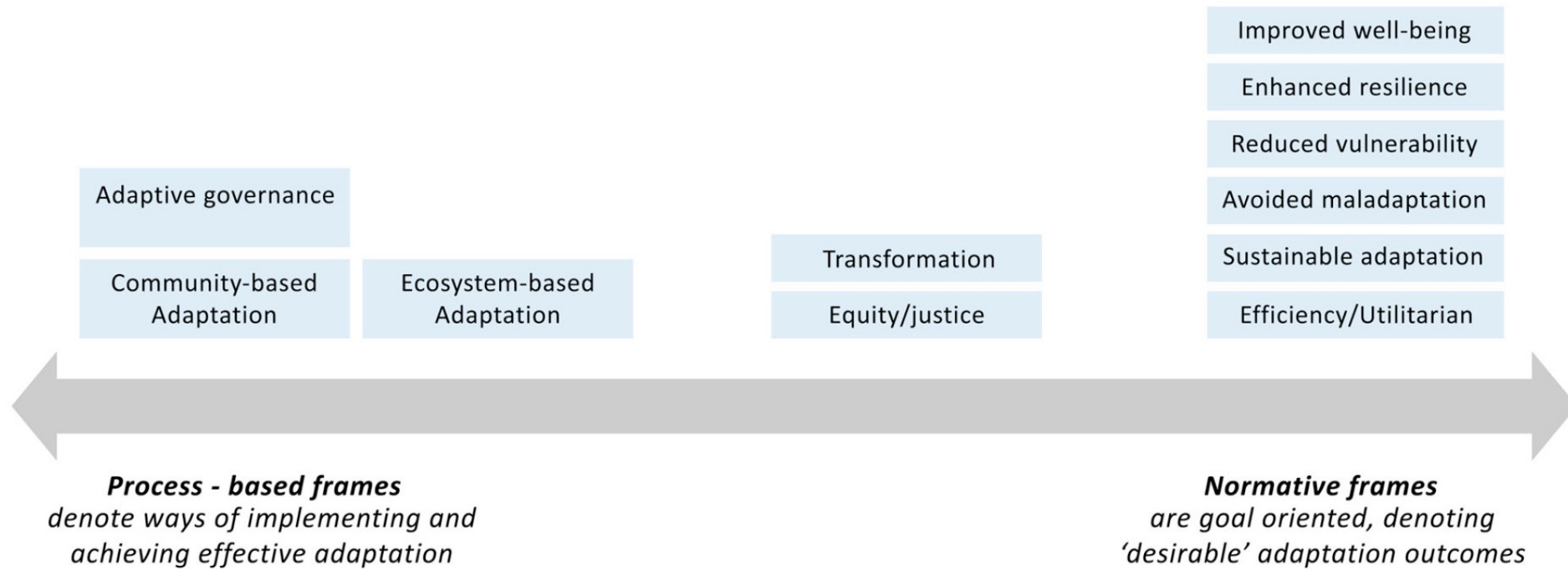


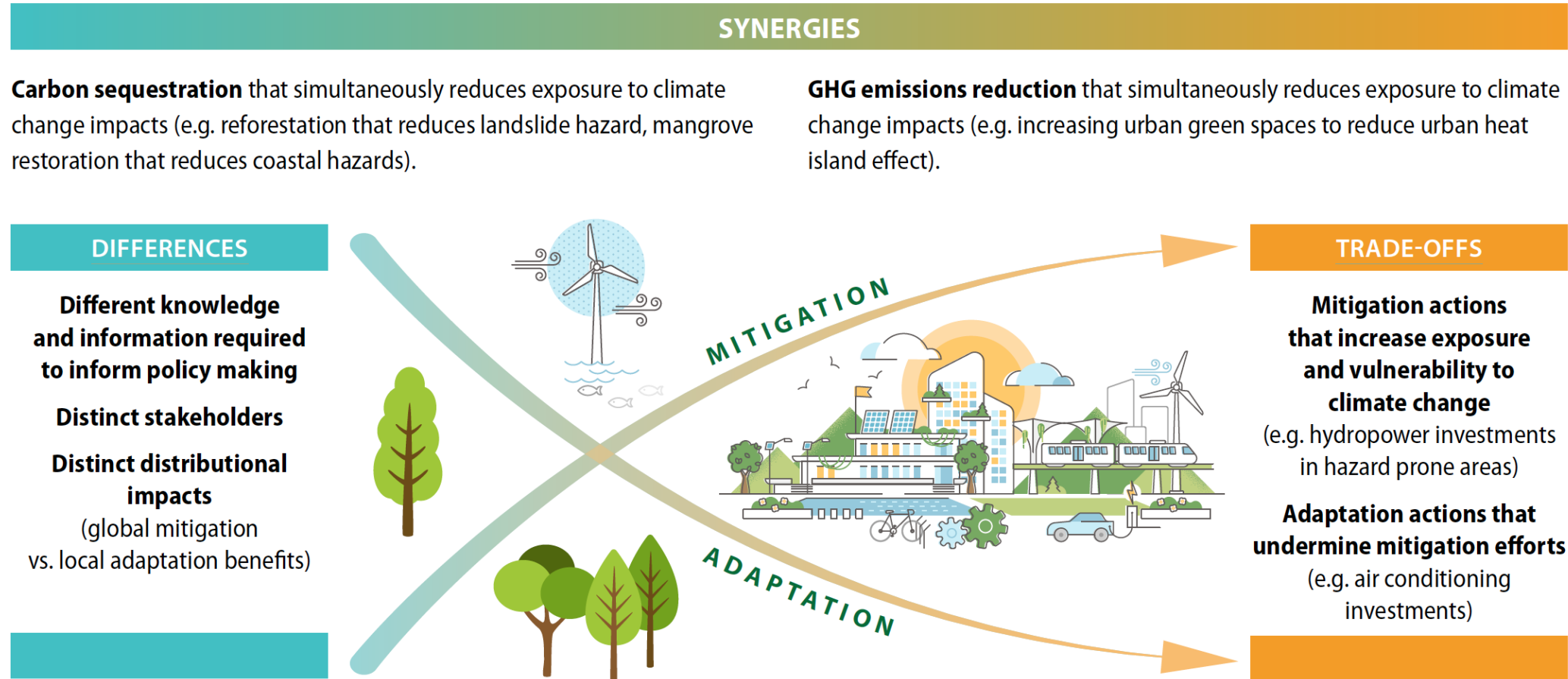
Figure 1. Frames to understand adaptation effectiveness range across a continuum of being process- or outcome-based. Source: authors, developed from the literature.

Table 2. Eleven principles for effective adaptation.

Adaptation should

- (1) minimize costs, and maximize benefits
- (2) support achievement of material, subjective, and relational wellbeing goals
- (3) reduce vulnerability and/or increase adaptive capacity, especially of the most vulnerable and those most at risk to climate change
- (4) increase resilience by building functional persistence over long timescales so that systems have the ability to bounce back from climatic shocks
- (5) be economically, ecologically, and socially sustainable, explicitly looking at longer-term, cross-generational viability of adaptation actions
- (6) take into account unintended negative consequences and explicitly look at the cross-scalar, long-term impacts of adaptation actions
- (7) invest in ecosystem conservation, management and restoration to enhance ecosystem services, and hence reduce impacts of climate change on human systems
- (8) be co-produced with communities to ensure inclusive and sustainable adaptation
- (9) be oriented towards achieving transparency, accountability and representation in governance through multi-scalar, participatory, and inclusive processes
- (10) be oriented toward socially just and equitable processes and outcomes
- (11) be a process that fundamentally changes human thinking and practices in the face of climate change and overtly challenge the power structures that generate vulnerability to its impacts

FIGURE 2. **Aligning climate change mitigation and adaptation policies: differences, synergies and trade-offs**



An aerial photograph of a dense, green forest covering a hillside. A white, vertical pole or structure is visible in the lower-left foreground, partially obscuring the forest. The text is overlaid on the right side of the image.

Strengthening Adaptation-Mitigation Linkages for a Low-Carbon, Climate- Resilient Future

POLICY PERSPECTIVES

OECD ENVIRONMENT POLICY PAPER NO. 23

TABLE 3. The multiple co-benefits offered by nature-based solutions (NbS)

Nature-based Solution	Associated ecosystem services							
	Coastal protection	Reduction in riverine flood impacts	Reduction in urban flood impacts	Filtering pollution	Carbon sequestration	Habitat creation	Heat mitigation	Recreational opportunities
Protecting/restoring coastal habitats	●			●	●	●		●
Protecting/restoring upland forests		●	●	●	●	●	●	●
Creating urban green spaces			●	●		●	●	●

Source: (OECD, 2020_[39])

TABLE 1. Adaptation-mitigation linkages in G20 members' NAPs and NDCs

Sector	Climate action	Mitigation benefit	Adaptation benefit	Trade-offs
Forestry	Forest conservation and rehabilitation	Carbon sequestration	Increase resilience to water-related risks (floods, landslides, mudslides, torrents)	Monoculture plantations can be susceptible to fire
Agriculture and land management	Use of crop varieties with higher drought and pest resistance; Sustainable land management practices (efficient nitrogen use and soil management)	GHG emissions savings from reduced energy consumption for irrigation and improved soil quality	Increase resilience to droughts and floods	Biofuel production in some context
Water management	Protect and restore marine ecosystems such as seagrass beds, mangroves, saltmarsh, coastal wetland; storm water management	Carbon sequestration	Enhance resilience to water-related risks (coastal floods and storms; droughts)	Solar water pumps in arid zones
Urban planning	Urban green space expansion (parks, green roofs)	Carbon sequestration, GHG emissions savings from reduced energy consumption for cooling	Increase resilience to extreme heat and urban floods (by decreasing urban heat island effect and increasing water absorption capacity)	Building less dense areas; use of air-conditioning

Source: Adapted from table 3 in (UNFCCC, 2016_[21]); presentations at the first G20 CSWG meeting in March 2020 by Dr. Taha Zatari (KSA) (Zatari, 2020_[22]), by Tarek Sadek from the ESCWA (Sadek, 2020_[23]), by JP Gattuso (Gattuso, 2020_[24]) and by David Thomas (Thomas, 2020_[25]).

Comments

Ideas

Questions?

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