








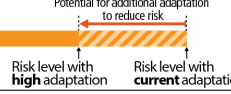


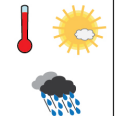


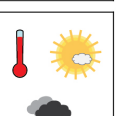
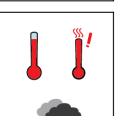


# Climate Changes Risks to Infrastructure






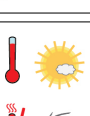
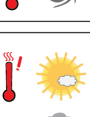


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**Table 8-3 | Urban areas:** Current and indicative future climate risks. Key risks are identified based on an assessment of the literature and expert judgments by Chapter 8 authors, with the evaluation of evidence and agreement presented in supporting chapter sections. Each key risk is characterized as very low to very high. For the near-term era of committed climate change (2030–2040), projected levels of global mean temperature increase do not diverge substantially across emission scenarios. For the longer-term era of climate options (2080–2100), risk levels are presented for global mean temperature increases of 2°C and 4°C above pre-industrial levels. For each time frame, risk levels are estimated for a continuation of current adaptation and for a hypothetical highly adapted state.

Climate-related drivers of impacts									Level of risk & potential for adaptation		
											
Key risk	Adaptation issues & prospects							Climatic drivers	Timeframe	Risk & potential for adaptation	
Modal urban (medium confidence) [8.2, 8.3, 8.4]	Climate change will have profound impacts on urban infrastructure systems and services, the built environment, and ecosystem services and hence on urban economies and populations. This could exacerbate existing social, economic, and environmental drivers of risk, especially for vulnerable groups who lack essential services. An appropriate urban governance frame and coordinated urban adaptation focused on the built environment, improved infrastructure, and services and risk reduction has significant potential for reducing key climate risks in the medium term and especially in the long term.								<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Coastal zone systems (medium confidence) [8.2, 8.3]	Coastal cities with extensive port facilities and large-scale industries are vulnerable to increased flood exposure. High-growth cities located on low-lying coastal areas are also at greater risk. There is a possibility of nonlinear increase in coastal vulnerability over the next two decades.								<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Terrestrial ecosystems and ecological infrastructure (medium confidence) [8.2, 8.3]	Ecosystem services will be impacted by altered ecosystem functions such as temperature and precipitation regimes, evaporation, humidity, and soil moisture levels, indicating close links with sustainable water management. Knowledge gaps exist with respect to thresholds to adaptation of various ecosystems.								<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Water supply systems (high confidence) [8.2, 8.3]	Adaptation response requires changes to network infrastructure as well as demand side management, to ensure sufficient water supplies, increased capacities to manage reduced freshwater availability, flood risk reduction, and water quality.								<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Waste water system (high confidence) [8.2, 8.3, 8.4]	Managing waste water flows improves water supply and ecosystem services. Reducing vulnerability of infrastructure may be easier in new areas, well-funded local bodies, or as part of scheduled interventions.								<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Green built infrastructure (medium confidence) [8.3]	Green infrastructure not utilized sufficiently in most cities. Climate change impacts can bring attention to the dual benefits of green infrastructure for climate change mitigation and impact management.								<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Energy systems (high confidence) [8.2, 8.4]	Most urban centers are energy intensive, with energy-related climate policies focused only on mitigation measures. A few cities have adaptation initiatives underway for critical energy systems. There is great potential for non-adapted, centralized energy systems to magnify and cascade impacts to national or transboundary consequences from localized extreme events.								<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		

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Table 8-3 (continued)

Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation	
Food systems and security (high confidence) [8.2, 8.3]	Urban food sources are dependent on local, regional, and often global 8.2, 8.3 supplies. Climatic drivers can exacerbate food insecurity, especially of the urban poor. Enhanced social safety nets can support adaptation measures. Urban and peri-urban agriculture, local markets, and green roofs hold good prospects as adaptive measures, but are under-utilised in rapidly growing cities.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Transportation systems (medium confidence) [8.2, 8.3]	A difficult sector to adapt due to large existing stock, especially in developed country cities, leading to potentially large secondary economic impacts with regional and potentially global consequences for trade and business. Emergency response requires well-functioning transport infrastructure.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Communication systems (medium confidence) [8.2, 8.3]	Resilient communication systems are a critical component of emergency response, and therefore adaptation. The rise of decentralized and networked mobile communications offers great potential for real-time and easily accessed information dissemination and communication systems. Information quality control is a key element in realizing the potential of communications systems for early warning and adaptation.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Urban risks associated with housing (high confidence) [8.3]	Poor quality, inappropriately located housing is often most vulnerable to extreme events. Adaptation options include enforcement of building regulations and upgrading. Some city studies show the potential to adapt housing and promote mitigation, adaptation, and development goals simultaneously. Rapidly growing cities, or those rebuilding after a disaster, especially have opportunities to increase resilience, but this is rarely realized. Without adaptation, risks of economic losses from extreme events are substantial in cities with high-value infrastructure and housing assets, with broader economic effects possible.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Human health (high confidence) [8.2, 8.3, 8.4]	Health is a higher order risk impacted by key developmental issues including water supply, water and air quality, waste management, housing quality, sanitation, food security, and provision of health care services and insurance. Certain groups of people are particularly vulnerable, such as the elderly, the chronically ill, the poor, and the very young, and require targeted social care interventions. Longer term developmental improvements need considerable financial resources and coherent intergovernmental action, limiting prospects for near-term adaptation.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Human security and emergency response (medium confidence) [8.3, 8.4]	Security is linked to key developmental issues such as income, housing, health care, education, and food security. Moderate prospects as city governments can enhance emergency response services, to significantly reduce vulnerability for those who are most at risk. Where security and emergency forces have limited public trust, and especially with regard to gender issues, scope for supporting adaptation and risk management is considerably constrained.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Key economic sectors and services (medium confidence) [8.2, 8.3]	Large diversity across cities in terms of key economic sectors and adaptive capacity to disruptions in city services. Cities reliant on climate-sensitive tourism or agriculture may require economic diversification. Good prospects for advancing co-benefits through "green" and "waste" economy.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Livelihoods (medium confidence) [8.3]	Informal economy is more vulnerable, and often less adaptive in the short term. Social protection measures, in the specific context of urban livelihoods, are required.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		
Poverty and access to basic services (high confidence) [8.3]	Reducing basic service deficit could reduce hazard exposure, especially of the poor and vulnerable, alongside upgrading of informal settlements, improved housing conditions and enabling the agency of low-income communities. Significant prospects where adaptation is already being implemented as part of human development or social protection.		<div> <div>Very low</div> <div>Medium</div> <div>Very high</div> </div> <div> <div>Present</div> <div>Near term (2030–2040)</div> <div>Long term 2°C (2080–2100)</div> <div>4°C</div> </div>		

# Climate-related drivers of impacts



Warming trend



Extreme temperature



Drying trend



Extreme precipitation



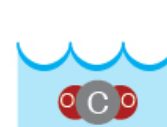
Snow cover



Damaging cyclone



Sea level



Ocean acidification



Flooding

Ecological infrastructure

Food systems

Water supply systems

Waste water systems

Energy systems

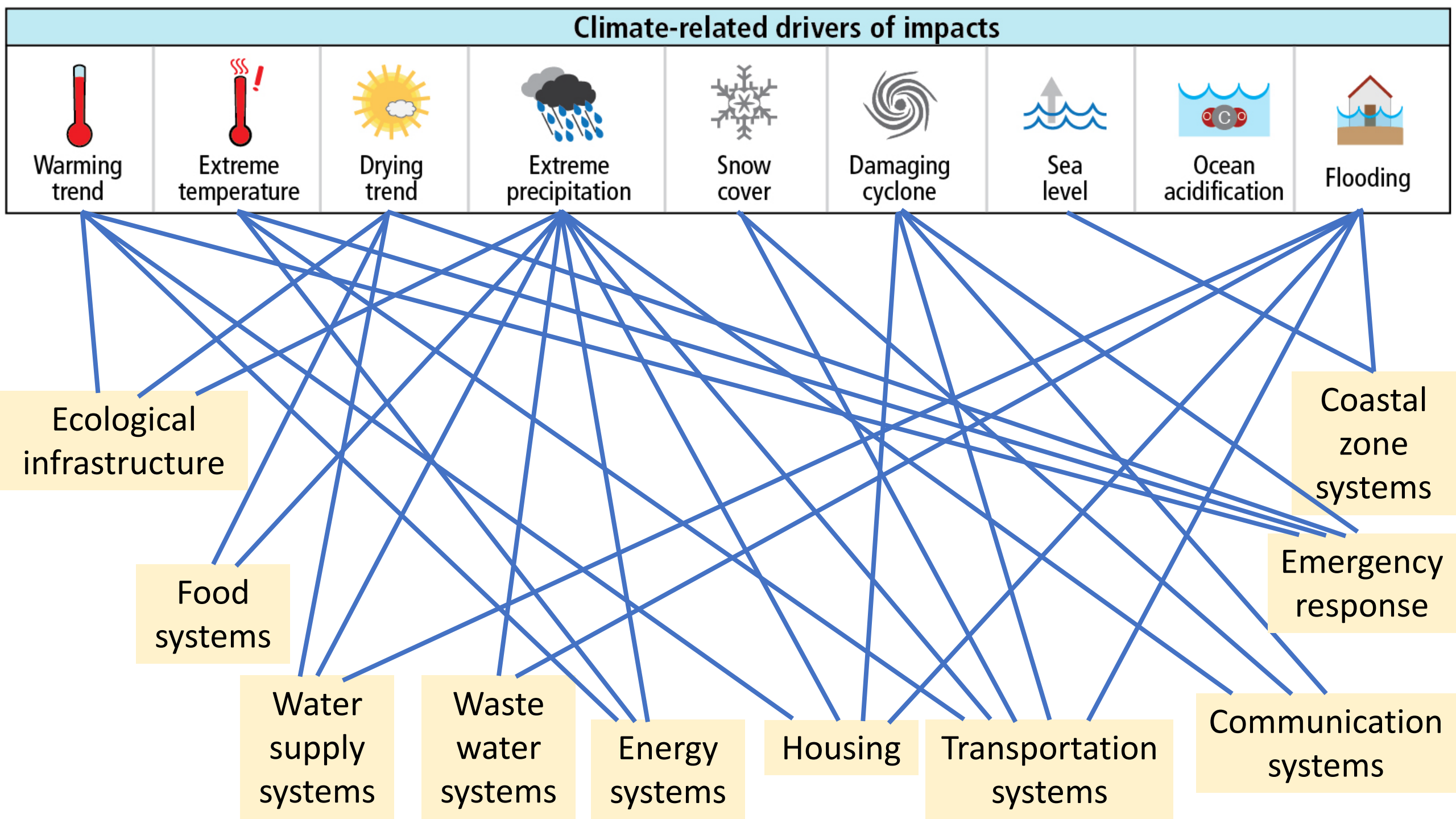
Housing

Transportation systems

Communication systems

Coastal zone systems

Emergency response



# Climate-related drivers of impacts



Warming trend



Extreme temperature



Drying trend



Extreme precipitation



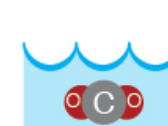
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Drying trend



Extreme precipitation



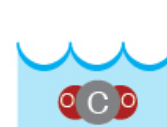
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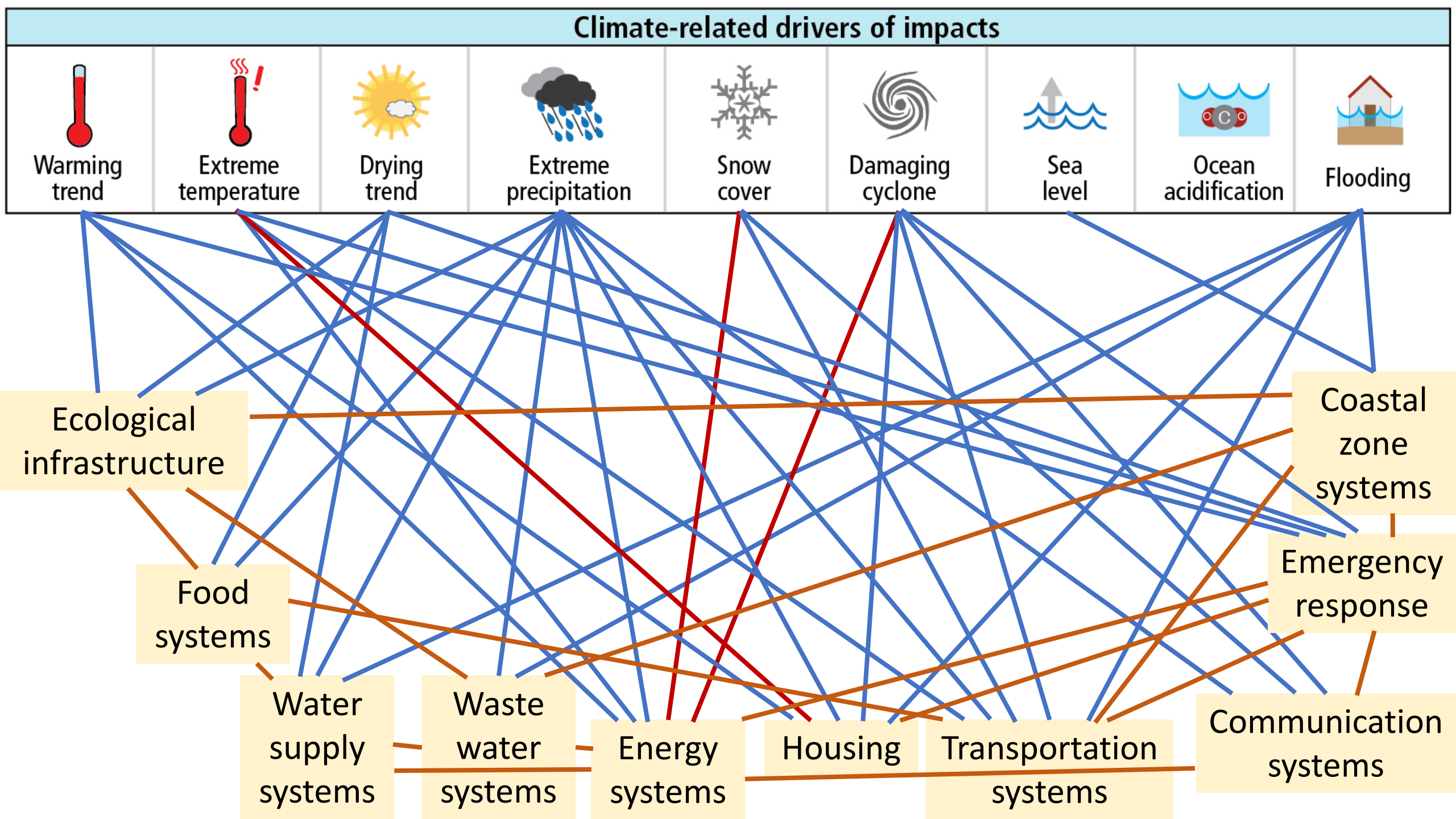
Housing

Transportation systems

Communication systems

Coastal zone systems

Emergency response



# Climate-related drivers of impacts

