

Climate change, crime and urban security – EFUS working Group

An evolving map of issues

Paul Ekblom

V5 06-07-22

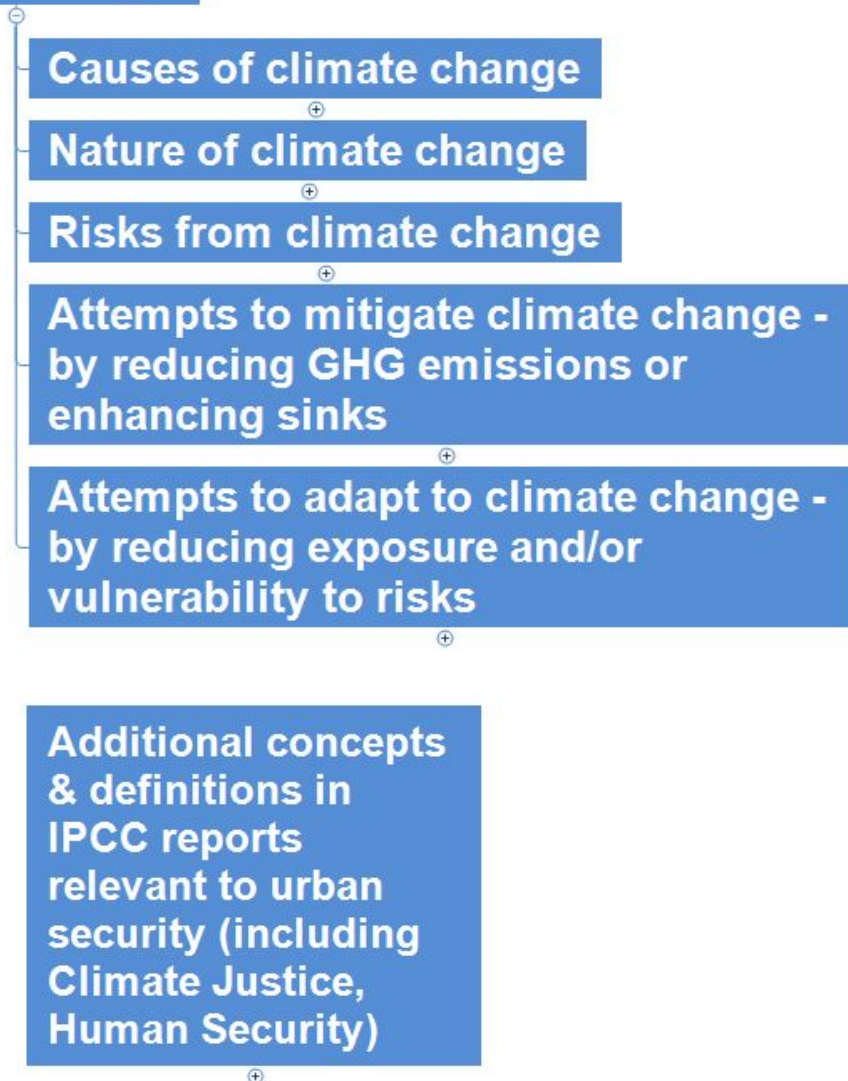
Notes

- This is a first attempt to sketch out in systematic detail the issues raised by climate change, mitigations and adaptations, for urban crime and provision of urban security; and vice-versa
- I have drawn on various sources, principally
 - Robert Agnew (2011). Dire forecast: A theoretical model of the impact of climate change on crime. *Theoretical Criminology*, 16:21–42
 - IPCC 2022 reports on Climate Change and Mitigation
 - Shoesmith et al (2022) Carbon Footprint of Security
- Material from the Defus padlet is yet to be incorporated
- Add wider PESHTELOMI changes influencing/influenced by climate change, crime, security?
- A possible way forward:
 - To further develop this sketch in discussion within the Working Group
 - To try to identify and/or design solutions to the problems identified
 - Then to convert it into a **toolkit** to help local/regional authorities to map out the possible problems they will face from CC and plan their responses to them

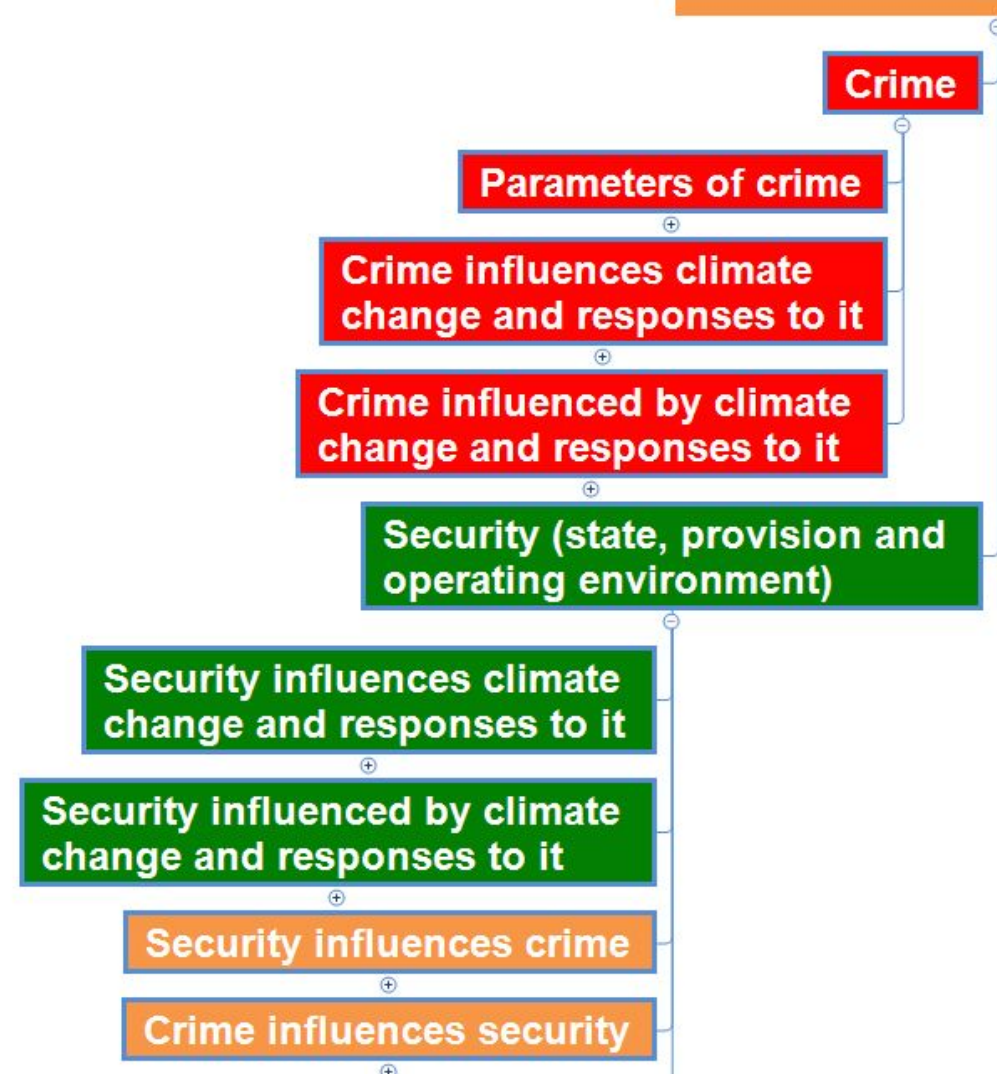
= expansion from
previous slide

Overview

Climate change



Issues for crime and security



Climate change

Causes of climate change

Increased anthropogenic emissions of CO₂, CH₄ etc

Reduced (natural) CO₂ sinks

Nature of climate change

Direct changes

+

Parameters of change

+

Interactions and linkages [see Mitigation D] 

Climate change

Causes of climate change

Nature of climate change

Direct changes

Temperature - atmospheric and oceanic

Sea level - coastal erosion and flooding

Ocean currents/circulation

Weather

Heatwaves

Drought

Wildfire

Windstorms

Heavy precipitation - rain, snow, ice

Flood - runoff, thaw, river, coastal

Longer-term climate

Temperature - overall hotter (colder)

Persistent drought

Ocean acidification and deoxygenation

Parameters of change

Timescale - sudden v slow

Permanent v reversible

Local v regional, global

Engendering feedbacks

Interactions and linkages with:

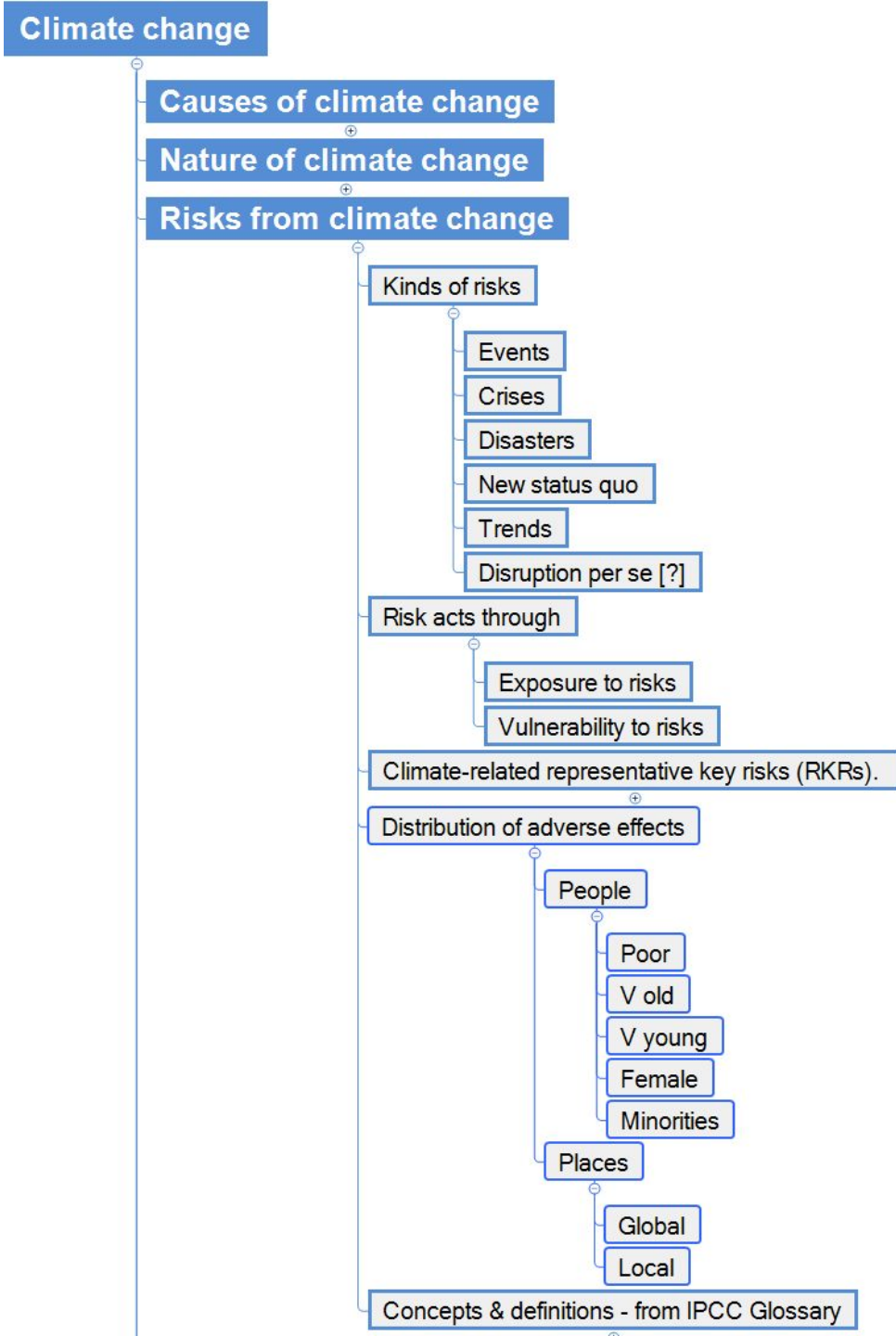
Pollution

Biodiversity

Disease

Resources

Feedbacks



Risks from climate change

Kinds of risks

Risk acts through

Climate-related representative key risks (RKR).

Table 16.6. Those immediately relevant to urban security:

RKR-C Risks associated with critical physical infrastructure, networks and services - Systemic risks due to extreme events leading to the breakdown of physical infrastructure and networks providing critical goods and services

RKR-D Risk to living standards - Economic impacts across scales, including impacts on Gross Domestic Product (GDP), poverty, and livelihoods, as well as the exacerbating effects of impacts on socio-economic inequality between and within countries

RKR-E Risk to human health - Human mortality and morbidity, including heat related impacts and vector-borne and water-borne diseases

RKR-F Risk to food security - Food insecurity and the breakdown of food systems due to climate change effects on land or ocean resources

RKR-G Risk to water security - Risk from water related hazards (floods and droughts) and water quality deterioration. Focus on water scarcity, water-related disasters and risk to indigenous and traditional cultures and ways of life

RKR-H Risks to peace and to human mobility - Risks to peace within and among societies from armed conflict as well as risks to low-agency human mobility within and across state borders, including the potential for involuntarily immobile populations

Distribution of adverse effects

Concepts & definitions - from IPCC Glossary

Risks from climate change

Kinds of risks

Risk acts through

Climate-related representative key risks (RKR).

Distribution of adverse effects

Concepts & definitions - from IPCC Glossary

Risks

The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change.

Key risks

Those risks that are especially relevant to the interpretation of 'dangerous anthropogenic interference with the climate system' (DAI) in the terminology of UNFCCC, Article 2, meriting particular attention by policy makers in that context. Key risks are potentially severe adverse consequences for humans and socialecological systems resulting from the interaction of climate related hazards with vulnerabilities of societies and systems exposed. Risks are considered key due to high hazard or high vulnerability of societies and systems exposed, or both.

Residual risks

The risk related to climate change impacts that remains following adaptation and mitigation efforts. Adaptation actions can redistribute risk and impacts, with increased risk and impacts in some areas or populations, and decreased risk and impacts in others. See also Loss and Damage.

Related concepts

Climate change impacts

In the context of climate change impacts, risks result from dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system to the hazards. Hazards, exposure and vulnerability may each be subject to uncertainty in terms of magnitude and likelihood of occurrence, and each may change over time and space due to socio-economic changes and human decision-making.

Climate change responses

In the context of climate change responses, risks result from the potential for such responses not achieving the intended objective(s), or from potential trade-offs with, or negative side-effects on, other societal objectives, such as the Sustainable Development Goals (SDGs). Risks can arise for example from uncertainty in implementation, effectiveness or outcomes of climate policy, climate-related investments, technology development or adoption, and system transitions.

Climate change

```
graph TD; A[Climate change] --> B[Causes of climate change]; A --> C[Nature of climate change]; A --> D[Risks from climate change]; A --> E[Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks]; E --> F[Climate Change 2022 - IPCC Mitigation of Climate Change, Summary for Policymakers]; E --> G[Mitigation options - see Figure SPM.7]; E --> H[Definitions - from IPCC Glossary]; E --> I[Background]; A --> J[Attempts to adapt to climate change - by reducing exposure and/or vulnerability to risks];
```

Causes of climate change

Nature of climate change

Risks from climate change

Attempts to mitigate climate change -
by reducing GHG emissions or
enhancing sinks

Climate Change 2022 - IPCC Mitigation of Climate
Change, Summary for Policymakers

Mitigation options - see Figure SPM.7

Definitions - from IPCC Glossary

Background

Attempts to adapt to climate change -
by reducing exposure and/or
vulnerability to risks

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Climate Change 2022 - IPCC Mitigation of Climate
Change, Summary for Policymakers

Mitigation options - see Figure SPM.7

Energy

- Wind energy
- Solar energy
- Bioelectricity
- Hydropower
- Geothermal energy
- Nuclear energy
- Carbon capture and storage (CCS)
- Bioelectricity with CCS
- Reduce CH₄ emission from coal mining
- Reduce CH₄ emission from oil and gas

Agriculture, forestry, land use

Buildings

- Avoid demand for energy services
- Efficient lighting, appliances and equipment
- New buildings with high energy performance
- Onsite renewable production and use
- Improvement of existing building stock
- Enhanced use of wood products

Transport

- Fuel-efficient light-duty vehicles
- Electric light-duty vehicles
- Shift to public transportation
- Shift to bikes and e-bikes
- Fuel-efficient heavy-duty vehicles
- Electric heavy-duty vehicles, incl. buses
- Shipping - efficiency and optimisation
- Aviation - energy efficiency
- Biofuels

Industry

- Energy efficiency
- Material efficiency
- Enhanced recycling
- Fuel switching (electr., nat. gas, bio-energy, H₂)
- Feedstock decarbonisation, process change
- Carbon capture with utilisation (CCU) and CCS
- Cementitious material substitution
- Reduction of non-CO₂ emissions

Other

- Reduce emission of fluorinated gas
- Reduce CH₄ emissions from solid waste
- Reduce CH₄ emissions from wastewater

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Climate Change 2022 - IPCC Mitigation of Climate Change, Summary for Policymakers

Mitigation options - see Figure SPM.7

Definitions - from IPCC Glossary and Mitigation report

Mitigation (of climate change)

A human intervention to reduce emissions or enhance the sinks of greenhouse gases. Note this is NOT mitigation of consequences of CC, including crime.

Mitigation measures

In climate policy, mitigation measures are technologies, processes or practices that contribute to mitigation, for example renewable energy technologies, waste minimization processes, and public transport commuting practices.

Mitigation scenario

A plausible description of the future that describes how the (studied) system responds to the implementation of mitigation policies and measures.

In this report, the term 'feasibility' refers to the potential for a mitigation or adaptation option to be implemented. Factors influencing feasibility are context-dependent and may change over time. Feasibility depends on geophysical, environmental-ecological, technological, economic, socio-cultural and institutional factors that enable or constrain the implementation of an option. The feasibility of options may change when different options are combined and increase when enabling conditions are strengthened.

In this report, the term 'enabling conditions' refers to conditions that enhance the feasibility of adaptation and mitigation options. Enabling conditions include finance, technological innovation, strengthening policy instruments, institutional capacity, multi-level governance, and changes in human behaviour and lifestyles.

The future feasibility challenges described in the modelled pathways may differ from the real-world feasibility experiences of the past.

Background

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Climate Change 2022 - IPCC Mitigation of Climate Change, Summary for Policymakers

Mitigation options - see Figure SPM.7

Definitions - from IPCC Glossary and Mitigation report

Background

C.3

All global modelled pathways that limit warming to 1.5°C (>50%) with no or limited overshoot, and those that limit warming to 2°C (>67%), involve rapid and deep and in most cases immediate GHG emission reductions in all sectors. Modelled mitigation strategies to achieve these reductions include transitioning from fossil fuels without CCS to very low- or zero-carbon energy sources, such as renewables or fossil fuels with CCS, demand side measures and improving efficiency, reducing non-CO₂ emissions, and deploying carbon dioxide removal (CDR) methods to counterbalance residual GHG emissions. Illustrative Mitigation Pathways (IMPs) show different combinations of sectoral mitigation strategies consistent with a given warming level. (high confidence) (Figure SPM.5) {3.2, 3.3, 3.4, 6.4, 6.6}

C.4

Reducing GHG emissions across the full energy sector requires major transitions, including a substantial reduction in overall fossil fuel use, the deployment of low-emission energy sources, switching to alternative energy carriers, and energy efficiency and conservation. The continued installation of unabated fossil fuel infrastructure will 'lock-in' GHG emissions. (high confidence) {2.7, 6.6, 6.7, 16.4}

C.5

Net zero CO₂ emissions from the industrial sector are challenging but possible. Reducing industry emissions will entail coordinated action throughout value chains to promote all mitigation options, including demand management, energy and materials efficiency, circular material flows, as well as abatement technologies and transformational changes in production processes. Progressing towards net zero GHG emissions from industry will be enabled by the adoption of new production processes using low- and zero-GHG electricity, hydrogen, fuels, and carbon management. (high confidence) {11.2, 11.3, 11.4, Box TS.4}

C.6

Urban areas can create opportunities to increase resource efficiency and significantly reduce GHG emissions through the systemic transition of infrastructure and urban form through low-emission development pathways towards net-zero emissions. Ambitious mitigation efforts for established, rapidly growing and emerging cities will encompass (i) reducing or changing energy and material consumption, (ii) electrification, and (iii) enhancing carbon uptake and storage in the urban environment. Cities can achieve net-zero emissions, but only if emissions are reduced within and outside of their administrative boundaries through supply chains, which will have beneficial cascading effects across other sectors. (very high confidence) {8.2, 8.3, 8.4, 8.5, 8.6, Figure 8.21, 13.2}

C.7

In modelled global scenarios, existing buildings, if retrofitted, and buildings yet to be built, are projected to approach net zero GHG emissions in 2050 if policy packages, which combine ambitious sufficiency, efficiency, and renewable energy measures, are effectively implemented and barriers to decarbonisation are removed. Low ambition policies increase the risk of locking-in buildings' carbon for decades, while well-designed and effectively implemented mitigation interventions (in both new buildings and existing ones if retrofitted), have significant potential to contribute to achieving SDGs in all regions while adapting buildings to future climate. (high confidence) {9.1, 9.3, 9.4, 9.5, 9.6, 9.9}

C.8

Demand-side options and low-GHG emissions technologies can reduce transport sector emissions in developed countries and limit emissions growth in developing countries (high confidence) Demand-focused interventions can reduce demand for all transport services and support the shift to more energy efficient transport modes (medium confidence). Electric vehicles powered by low-emissions electricity offer the largest decarbonisation potential for land-based transport, on a life cycle basis (high confidence). Sustainable biofuels can offer additional mitigation benefits in land-based transport in the short and medium term (medium confidence). Sustainable biofuels, low-emissions hydrogen, and derivatives (including synthetic fuels) can support mitigation of CO₂ emissions from shipping, aviation, and heavy-duty land transport but require production process improvements and cost reductions (medium confidence). Many mitigation strategies in the transport sector would have various co-benefits including air quality improvements, health benefits, equitable access to transportation services, reduced congestion, and reduced material demand (high confidence). {10.2, 10.4, 10.5, 10.6, 10.7}

C.10

Demand-side mitigation encompasses changes in infrastructure use, end-use technology adoption, and socio-cultural and behavioural change. Demand-side measures and new ways of end-use service provision can reduce global GHG emissions in end-use sectors by 40-70% by 2050 compared to baseline scenarios, while some regions and socioeconomic groups require additional energy and resources. Demand-side mitigation response options are consistent with improving basic well-being for all. (high confidence) (Figure SPM.6) {5.3, 5.4, Figure 5.6, Figure 5.14, 8.2, 9.4, 10.2, 11.3, 11.4, 12.4, Figure TS.22}

D.

Linkages between Mitigation, Adaptation, and Sustainable Development. Mitigation options have synergies with many Sustainable Development Goals, but some options can also have trade-offs. See Figure SPM.8. The synergies and trade-offs vary dependent on context and scale.

E.

Strengthening the Response

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Background

E. Strengthening the Response

E.1

There are mitigation options which are feasible to deploy at scale in the near term. Feasibility differs across sectors and regions, and according to capacities and the speed and scale of implementation. Barriers to feasibility would need to be reduced or removed, and enabling conditions strengthened to deploy mitigation options at scale. These barriers and enablers include geophysical, environmental-ecological, technological, and economic factors, and especially institutional and socio-cultural factors. Strengthened near-term action beyond the NDCs (announced prior to UNFCCC COP26) can reduce and/or avoid long-term feasibility challenges of global modelled pathways that limit warming to 1.5°C (>50%) with no or limited overshoot. (high confidence) {3.8, 6.4, 8.5, 9.9, 10.8, 12.3, Figure TS.31, Annex II.IV.11}

E.1.1

Several mitigation options, notably solar energy, wind energy, electrification of urban systems, urban green infrastructure, energy efficiency, demand-side management, improved forest- and crop/grassland management, and reduced food waste and loss, are technically viable, are becoming increasingly cost effective, and are generally supported by the public. This enables deployment in many regions (high confidence). While many mitigation options have environmental co-benefits, including improved air quality and reducing toxic waste, many also have adverse environmental impacts, such as reduced biodiversity, when applied at very large scale, for example very large scale bioenergy or large scale use of battery storage, that would have to be managed (medium confidence). Almost all mitigation options face institutional barriers that need to be addressed to enable their application at scale (medium confidence). {6.4, Figure 6.19, 7.4, 8.5, Figure 8.19, 9.9, Figure 9.20, 10.8, Figure 10.23, 12.3, Figure 12.4, Figure TS.31}

E.1.2

The feasibility of mitigation options varies according to context and time. For example, the institutional capacity to support deployment varies across countries; the feasibility of options that involve large-scale land-use changes varies across regions; spatial planning has a higher potential at early stages of urban development; the potential of geothermal is site specific and capacities, cultural and local conditions can either inhibit or enable demand-side responses. The deployment of solar and wind energy has been assessed to become increasingly feasible over time. The feasibility of some options can increase when combined or integrated, such as using land for both agriculture and centralised solar production. (high confidence {6.4, 6.6, Supplementary Material Table 6.SM, 7.4, 8.5, Supplementary Material Table 8.SM.2, 9.9, Supplementary Material Table 9.SM.1, 10.8, Appendix 10.3, 12.3, Tables 12.SM.B.1 to 12.SM.B.6})

E.1.3

Feasibility depends on the scale and speed of implementation. Most options face barriers when they are implemented rapidly at a large scale, but the scale at which barriers manifest themselves varies. Strengthened and coordinated near-term actions in cost-effective modelled global pathways that limit warming to 2°C (>67%) or lower, reduce the overall risks to the feasibility of the system transitions, compared to modelled pathways with relatively delayed or uncoordinated action. (high confidence) {3.8, 6.4, 10.8, 12.3}

**Attempts to mitigate climate change -
by reducing GHG emissions or
enhancing sinks****Background****E.
Strengthening the Response****E.2**

In all countries, mitigation efforts embedded within the wider development context can increase the pace, depth and breadth of emissions reductions (medium confidence). Policies that shift development pathways towards sustainability can broaden the portfolio of available mitigation responses, and enable the pursuit of synergies with development objectives (medium confidence). Actions can be taken now to shift development pathways and accelerate mitigation and transitions across systems (high confidence). {4.3, 4.4, Cross-Chapter Box 5 in Chapter 4, 5.2, 5.4, 13.9, 14.5, 15.6, 16.3, 16.4, 16.5}

E.2.1

Current development pathways may create behavioural, spatial, economic and social barriers to accelerated mitigation at all scales (high confidence). Choices made by policymakers, citizens, the private sector and other stakeholders influence societies' development pathways (high confidence). Actions that steer, for example, energy and land systems transitions, economy-wide structural change, and behaviour change, can shift development pathways towards sustainability (medium confidence) {4.3, Cross-Chapter Box 5 in Chapter 4, 5.4, 13.9}

E.2.2

Combining mitigation with policies to shift development pathways, such as broader sectoral policies, policies that induce lifestyle or behaviour changes, financial regulation, or macroeconomic policies can overcome barriers and open up a broader range of mitigation options (high confidence). It can also facilitate the combination of mitigation and other development goals (high confidence). For example, measures promoting walkable urban areas combined with electrification and renewable energy can create health co-benefits from cleaner air and benefits from enhanced mobility (high confidence). Coordinated housing policies that broaden relocation options can make mitigation measures in transport more effective (medium confidence) {3.2, 4.3, 4.4, Cross-Chapter Box 5 in Chapter 4, 5.3, 8.2, 8.4}

E.2.3

Institutional and regulatory capacity, innovation, finance, improved governance and collaboration across scales, and multi-objective policies enable enhanced mitigation and shifts in development pathways. Such interventions can be mutually reinforcing and establish positive feedback mechanisms, resulting in accelerated mitigation. (high confidence) {4.4, 5.4, Figure 5.14, 5.6, 9.9, 13.9, 14.5, 15.6, 16.3, 16.4, 16.5, Cross-Chapter Box 12 in Chapter 16}

E.2.4

Enhanced action on all the above enabling conditions can be taken now (high confidence). In some situations, such as with innovation in technology at an early stage of development and some changes in behaviour towards low emissions, because the enabling conditions may take time to be established, action in the near term can yield accelerated mitigation in the mid-term (medium confidence). In other situations, the enabling conditions can be put in place and yield results in a relatively short time frame, for example the provision of energy related information, advice and feedback to promote energy saving behaviour (high confidence). {4.4, 5.4, Figure 5.14, 5.6, 6.7, 9.9, 13.9, 14.5, 15.6, 16.3, 16.4, 16.5, Cross-Chapter Box 12 in Chapter 16}

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Background

E. Strengthening the Response

E.3

Climate governance, acting through laws, strategies and institutions, based on national circumstances, supports mitigation by providing frameworks through which diverse actors interact, and a basis for policy development and implementation (medium confidence). Climate governance is most effective when it integrates across multiple policy domains, helps realise synergies and minimise trade-offs, and connects national and sub-national policymaking levels (high confidence). Effective and equitable climate governance builds on engagement with civil society actors, political actors, businesses, youth, labour, media, Indigenous Peoples and local communities (medium confidence). {5.4, 5.6, 8.5, 9.9, 13.2, 13.7, 13.9}

E.3.1

Climate governance enables mitigation by providing an overall direction, setting targets, mainstreaming climate action across policy domains, enhancing regulatory certainty, creating specialised organisations and creating the context to mobilise finance (medium confidence). These functions can be promoted by climate-relevant laws, which are growing in number, or climate strategies, among others, based on national and sub-national context (medium confidence). Framework laws set an overarching legal basis, either operating through a target and implementation approach, or a sectoral mainstreaming approach, or both, depending on national circumstance (medium confidence). Direct national and sub-national laws that explicitly target mitigation and indirect laws that impact emissions through mitigation-related policy domains have both been shown to be relevant to mitigation outcomes (medium confidence). {13.2}

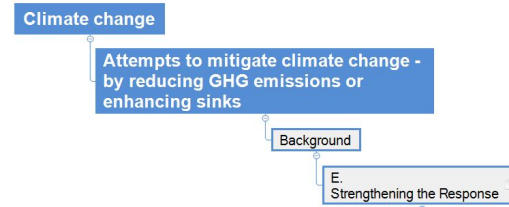
E.3.2

Effective national climate institutions address coordination across sectors, scales and actors, build consensus for action among diverse interests, and inform strategy setting (medium confidence). These functions are often accomplished through independent national expert bodies, and high-level coordinating bodies that transcend departmental mandates. Complementary sub-national institutions tailor mitigation actions to local context and enable experimentation but can be limited by inequities and resource and capacity constraints (high confidence). Effective governance requires adequate institutional capacity at all levels (high confidence). {4.4, 8.5, 9.9, 11.3, 11.5, 11.6, 13.2, 13.5, 13.7, 13.9}

E.3.3

The extent to which civil society actors, political actors, businesses, youth, labour, media, Indigenous Peoples, and local communities are engaged influences political support for climate change mitigation and eventual policy outcomes. Structural factors of national circumstances and capabilities (e.g., economic and natural endowments, political systems and cultural factors and gender considerations) affect the breadth and depth of climate governance. Mitigation options that align with prevalent ideas, values and beliefs are more easily adopted and implemented. Climate-related litigation, for example by governments, private sector, civil society and individuals, is growing - with a large number of cases in some developed countries, and with a much smaller number in some developing countries - and in some cases, has influenced the outcome and ambition of climate governance. (medium confidence) {5.2, 5.4, 5.5, 5.6, 9.9, 13.3, 13.4}

Many regulatory and economic instruments have already been deployed successfully. Instrument design can help address equity and other objectives. These instruments could support deep emissions reductions and stimulate innovation if scaled up and applied more widely (high confidence). Policy packages that enable innovation and build capacity are better able to support a shift towards equitable low-emission futures than are individual policies (high confidence). Economy-wide packages, consistent with national circumstances, can meet short-term economic goals while reducing emissions and shifting development pathways towards sustainability (medium confidence). {Cross-Chapter Box 5 in Chapter 4, 13.6, 13.7, 13.9, 16.3, 16.4, 16.6}



E.4.1

A wide range of regulatory instruments at the sectoral level have proven effective in reducing emissions. These instruments, and broad-based approaches including relevant economic instruments, are complementary (high confidence). Regulatory instruments that are designed to be implemented with flexibility mechanisms can reduce costs (medium confidence). Scaling up and enhancing the use of regulatory instruments, consistent with national circumstances, could improve mitigation outcomes in sectoral applications, including but not limited to renewable energy, land use and zoning, building codes, vehicle and energy efficiency, fuel standards, and low-emissions industrial processes and materials (high confidence). {6.7, 7.6, 8.4, 9.9, 10.4, 11.5, 11.6, 13.6}

E.4.2

Economic instruments have been effective in reducing emissions, complemented by regulatory instruments mainly at the national and also sub-national and regional level (high confidence). Where implemented, carbon pricing instruments have incentivised low-cost emissions reduction measures, but have been less effective, on their own and at prevailing prices during the assessment period, in promoting the higher-cost measures necessary for further reductions (medium confidence). Equity and distributional impacts of such carbon pricing instruments can be addressed by using revenue from carbon taxes or emissions trading to support low-income households, among other approaches (high confidence). Practical experience has informed instrument design and helped to improve predictability, environmental effectiveness, economic efficiency, distributional goals and social acceptance (high confidence). Removing fossil fuel subsidies would reduce emissions, improve public revenue and macroeconomic performance, and yield other environmental and sustainable development benefits; subsidy removal may have adverse distributional impacts especially on the most economically vulnerable groups which, in some cases can be mitigated by measures such as redistributing revenue saved, all of which depend on national circumstances (high confidence) fossil fuel subsidy removal is projected by various studies to reduce global CO₂ emissions by 1-4%, and GHG emissions by up to 10% by 2030, varying across regions (medium confidence). {6.3, 13.6}

E.4.3

Low-emission technological innovation is strengthened through the combination of dedicated technology-push policies and investments (e.g., for scientific training, R&D, demonstration), with tailored demand-pull policies (e.g., standards, feed-in tariffs, taxes), which create incentives and market opportunities. Developing countries' abilities to deploy low-emission technologies, seize socio-economic benefits and manage trade-offs would be enhanced with increased financial resources and capacity for innovation which are currently concentrated in developed countries, alongside technology transfer. (high confidence) {16.2, 16.3, 16.4, 16.5}

E.4.4

Effective policy packages would be comprehensive in coverage, harnessed to a clear vision for change, balanced across objectives, aligned with specific technology and system needs, consistent in terms of design and tailored to national circumstances. They are better able to realise synergies and avoid trade-offs across climate and development objectives. Examples include: emissions reductions from buildings through a mix of efficiency targets, building codes, appliance performance standards, information provision, carbon pricing, finance and technical assistance; and industrial GHG emissions reductions through innovation support, market creation and capacity building. (high confidence) {4.4, 6.7, 9.9, 11.6, 13.7, 13.9, 16.3, 16.4}

E.4.5

Economy-wide packages that support mitigation and avoid negative environmental outcomes include: long-term public spending commitments; pricing reform; and investment in education and training, natural capital, R&D and infrastructure (high confidence). They can meet short-term economic goals while reducing emissions and shifting development pathways towards sustainability (medium confidence). Infrastructure investments can be designed to promote low-emissions futures that meet development needs (medium confidence). {Cross-Chapter Box 5 in Chapter 4, 5.4, 5.6, 8.5, 13.6, 13.9, 16.3, 16.5, 16.6}

E.4.6

National policies to support technology development and diffusion, and participation in international markets for emission reduction, can bring positive spillover effects for other countries (medium confidence), although reduced demand for fossil fuels could result in costs to exporting countries (high confidence). There is no consistent evidence that current emission trading systems have led to significant emissions leakage, which can be attributed to design features aimed at minimising competitiveness effects, among other reasons (medium confidence). {13.6, 13.7, 13.8, 16.2, 16.3, 16.4}

Climate change

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Background

E. Strengthening the Response

E.5

Tracked financial flows fall short of the levels needed to achieve mitigation goals across all sectors and regions. The challenge of closing gaps is largest in developing countries as a whole. Scaling up mitigation financial flows can be supported by clear policy choices and signals from governments and the international community (high confidence). Accelerated international financial cooperation is a critical enabler of low-GHG and just transitions, and can address inequities in access to finance and the costs of, and vulnerability to, the impacts of climate change (high confidence). {15.2, 15.3, 15.4, 15.5, 15.6}

E.5.1

Average annual modelled investment requirements for 2020 to 2030 in scenarios that limit warming to 2°C or 1.5°C are a factor of three to six greater than current levels, and total mitigation investments (public, private, domestic and international) would need to increase across all sectors and regions (medium confidence). Mitigation investment gaps are wide for all sectors, and widest for the AFOLU sector in relative terms and for developing countries (high confidence). Financing and investment requirements for adaptation, reduction of losses and damages, general infrastructure, regulatory environment and capacity building, and climate-responsive social protection further exacerbate the magnitude of the challenges for developing countries to attract financing (high confidence). {3.2, 14.4, 15.1, 15.2, 15.3, 15.4, 15.5}

E.5.2

There is sufficient global capital and liquidity to close global investment gaps, given the size of the global financial system, but there are barriers to redirect capital to climate action both within and outside the global financial sector, and in the macroeconomic headwinds facing developing regions. Barriers to the deployment of commercial finance from within the financial sector as well as macroeconomic considerations include: inadequate assessment of climate-related risks and investment opportunities; regional mismatch between available capital and investment needs; home bias factors; country indebtedness levels; economic vulnerability; and limited institutional capacities (high confidence). Challenges from outside the financial sector include: limited local capital markets; unattractive risk-return profiles, in particular due to missing or weak regulatory environments consistent with ambition levels; limited institutional capacity to ensure safeguards; standardisation, aggregation, scalability and replicability of investment opportunities and financing models; and, a pipeline ready for commercial investments. (high confidence) {15.2, 15.3, 15.5, 15.6}

E.5.3

Accelerated financial support for developing countries from developed countries and other sources is a critical enabler to enhance mitigation action and address inequities in access to finance, including its costs, terms and conditions, and economic vulnerability to climate change for developing countries (high confidence). Scaled-up public grants for mitigation and adaptation funding for vulnerable regions, especially in Sub-Saharan Africa, would be cost-effective and have high social returns in terms of access to basic energy (high confidence). Options for scaling up mitigation in developing regions include: increased levels of public finance and publicly mobilised private finance flows from developed to developing countries in the context of the USD100 billion-a-year goal; increase the use of public guarantees to reduce risks and leverage private flows at lower cost; local capital markets development; and building greater trust in international cooperation processes (high confidence). A coordinated effort to make the post-pandemic recovery sustainable and increased flows of financing over the next decade can accelerate climate action, including in developing regions and countries facing high debt costs, debt distress and macroeconomic uncertainty (high confidence). {15.2, 15.3, 15.4, 15.5, 15.6, Box 15.6}

E.5.4

Clear signalling by governments and the international community, including a stronger alignment of public sector finance and policy, and higher levels of public sector climate finance, reduces uncertainty and transition risks for the private sector. Depending on national contexts, investors and financial intermediaries, central banks, and financial regulators can support climate action and can shift the systemic underpricing of climate-related risk by increasing awareness, transparency and consideration of climate-related risk, and investment opportunities. Financial flows can also be aligned with funding needs through: greater support for technology development; a continued role for multilateral and national climate funds and development banks; lowering financing costs for underserved groups through entities such as green banks existing in some countries, funds and risk-sharing mechanisms; economic instruments which consider economic and social equity and distributional impacts; gender-responsive and women-empowerment programmes as well as enhanced access to finance for local communities and Indigenous Peoples and small land owners; and greater public-private cooperation. (high confidence) {15.2, 15.5, 15.6}

Climate change

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Background

E. Strengthening the Response

E.5

Tracked financial flows fall short of the levels needed to achieve mitigation goals across all sectors and regions. The challenge of closing gaps is largest in developing countries as a whole. Scaling up mitigation financial flows can be supported by clear policy choices and signals from governments and the international community (high confidence). Accelerated international financial cooperation is a critical enabler of low-GHG and just transitions, and can address inequities in access to finance and the costs of, and vulnerability to, the impacts of climate change (high confidence). {15.2, 15.3, 15.4, 15.5, 15.6}

E.5.1

Average annual modelled investment requirements for 2020 to 2030 in scenarios that limit warming to 2°C or 1.5°C are a factor of three to six greater than current levels, and total mitigation investments (public, private, domestic and international) would need to increase across all sectors and regions (medium confidence). Mitigation investment gaps are wide for all sectors, and widest for the AFOLU sector in relative terms and for developing countries (high confidence). Financing and investment requirements for adaptation, reduction of losses and damages, general infrastructure, regulatory environment and capacity building, and climate-responsive social protection further exacerbate the magnitude of the challenges for developing countries to attract financing (high confidence). {3.2, 14.4, 15.1, 15.2, 15.3, 15.4, 15.5}

E.5.2

There is sufficient global capital and liquidity to close global investment gaps, given the size of the global financial system, but there are barriers to redirect capital to climate action both within and outside the global financial sector, and in the macroeconomic headwinds facing developing regions. Barriers to the deployment of commercial finance from within the financial sector as well as macroeconomic considerations include: inadequate assessment of climate-related risks and investment opportunities; regional mismatch between available capital and investment needs; home bias factors; country indebtedness levels; economic vulnerability; and limited institutional capacities (high confidence). Challenges from outside the financial sector include: limited local capital markets; unattractive risk-return profiles, in particular due to missing or weak regulatory environments consistent with ambition levels; limited institutional capacity to ensure safeguards; standardisation, aggregation, scalability and replicability of investment opportunities and financing models; and, a pipeline ready for commercial investments. (high confidence) {15.2, 15.3, 15.5, 15.6}

E.5.3

Accelerated financial support for developing countries from developed countries and other sources is a critical enabler to enhance mitigation action and address inequities in access to finance, including its costs, terms and conditions, and economic vulnerability to climate change for developing countries (high confidence). Scaled-up public grants for mitigation and adaptation funding for vulnerable regions, especially in Sub-Saharan Africa, would be cost-effective and have high social returns in terms of access to basic energy (high confidence). Options for scaling up mitigation in developing regions include: increased levels of public finance and publicly mobilised private finance flows from developed to developing countries in the context of the USD100 billion-a-year goal; increase the use of public guarantees to reduce risks and leverage private flows at lower cost; local capital markets development; and building greater trust in international cooperation processes (high confidence). A coordinated effort to make the post-pandemic recovery sustainable and increased flows of financing over the next decade can accelerate climate action, including in developing regions and countries facing high debt costs, debt distress and macroeconomic uncertainty (high confidence). {15.2, 15.3, 15.4, 15.5, 15.6, Box 15.6}

E.5.4

Clear signalling by governments and the international community, including a stronger alignment of public sector finance and policy, and higher levels of public sector climate finance, reduces uncertainty and transition risks for the private sector. Depending on national contexts, investors and financial intermediaries, central banks, and financial regulators can support climate action and can shift the systemic underpricing of climate-related risk by increasing awareness, transparency and consideration of climate-related risk, and investment opportunities. Financial flows can also be aligned with funding needs through: greater support for technology development; a continued role for multilateral and national climate funds and development banks; lowering financing costs for underserved groups through entities such as green banks existing in some countries, funds and risk-sharing mechanisms; economic instruments which consider economic and social equity and distributional impacts; gender-responsive and women-empowerment programmes as well as enhanced access to finance for local communities and Indigenous Peoples and small land owners; and greater public-private cooperation. (high confidence) {15.2, 15.5, 15.6}

Climate change

Attempts to mitigate climate change - by reducing GHG emissions or enhancing sinks

Background

E. Strengthening the Response

E.6

International cooperation is a critical enabler for achieving ambitious climate change mitigation goals. The UNFCCC, Kyoto Protocol, and Paris Agreement are supporting rising levels of national ambition and encouraging development and implementation of climate policies, although gaps remain. Partnerships, agreements, institutions and initiatives operating at the sub-global and sectoral levels and engaging multiple actors are emerging, with mixed levels of effectiveness. (high confidence) {8.5, 14.2, 14.3, 14.5, 14.6, 15.6, 16.5}

E.6.1

Internationally agreed processes and goals, such as those in the UNFCCC, Kyoto Protocol, and Paris Agreement - including transparency requirements for national reporting on emissions, actions and support, and tracking progress towards the achievement of Nationally Determined Contributions - are enhancing international cooperation, national ambition and policy development. International financial, technology and capacity building support to developing countries will enable greater implementation and encourage ambitious Nationally Determined Contributions over time. (medium confidence) {14.3}

E.6.2

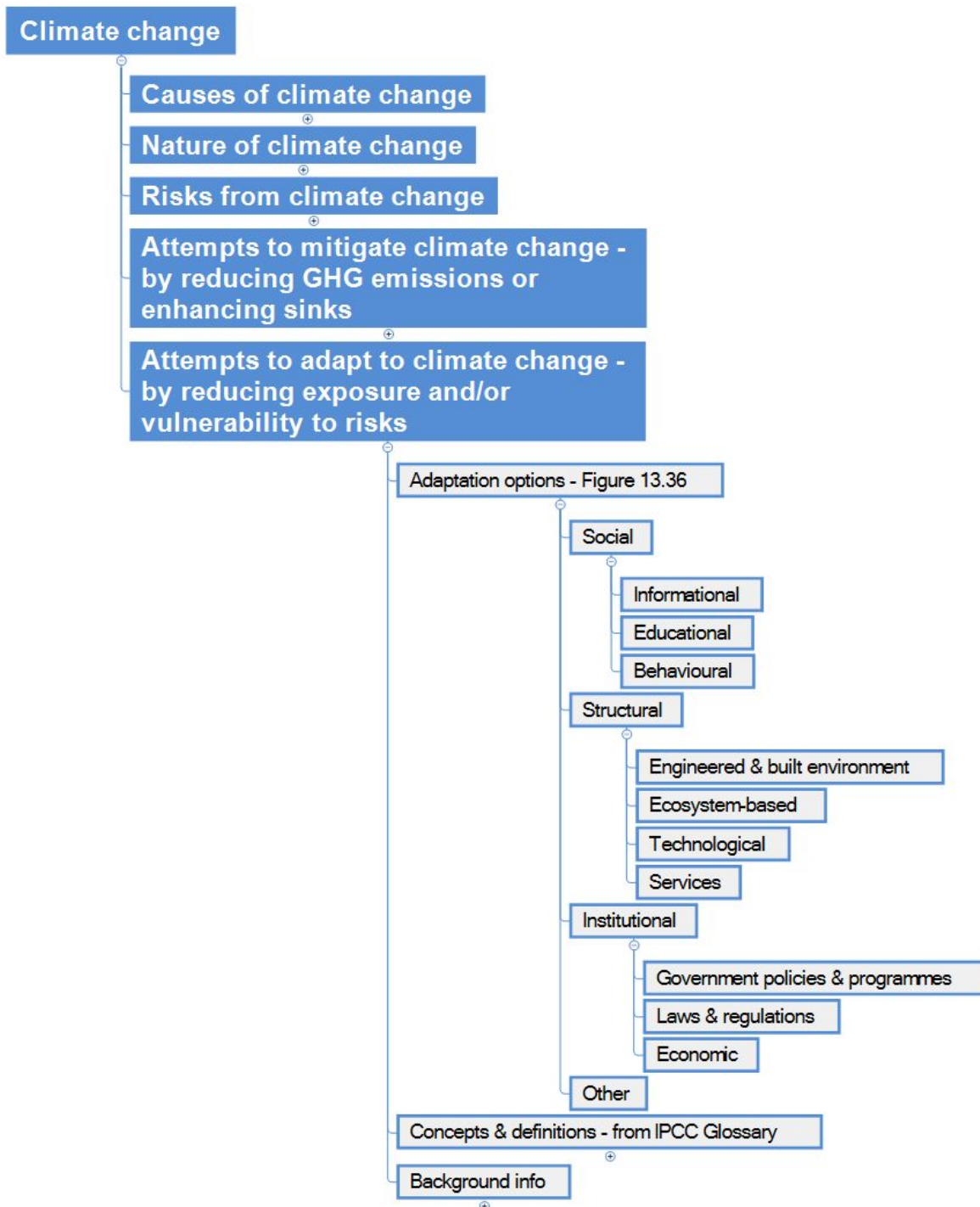
International cooperation on technology development and transfer accompanied by capacity building, knowledge sharing, and technical and financial support can accelerate the global diffusion of mitigation technologies, practices and policies at national and sub-national levels, and align these with other development objectives (high confidence). Challenges in and opportunities to enhance innovation cooperation exist, including in the implementation of elements of the UNFCCC and the Paris Agreement as per the literature assessed, such as in relation to technology development and transfer, and finance (high confidence). International cooperation on innovation works best when tailored to specific institutional and capability contexts, when it benefits local value chains, when partners collaborate equitably and on voluntary and mutually agreed terms, when all relevant voices are heard, and when capacity building is an integral part of the effort (medium confidence). Support to strengthen technological innovation systems and innovation capabilities, including through financial support in developing countries would enhance engagement in and improve international cooperation on innovation (high confidence). {4.4, 14.2, 14.4, 16.3, 16.5, 16.6}

E.6.3

Transnational partnerships can stimulate policy development, low-emissions technology diffusion and emission reductions by linking sub-national and other actors, including cities, regions, non-governmental organisations and private sector entities, and by enhancing interactions between state and non-state actors. While this potential of transnational partnerships is evident, uncertainties remain over their costs, feasibility, and effectiveness. Transnational networks of city governments are leading to enhanced ambition and policy development and a growing exchange of experience and best practices (medium confidence) {8.5, 11.6, 14.5, 16.5, Cross-Chapter Box 12 in Chapter 16}

E.6.4

International environmental and sectoral agreements, institutions, and initiatives are helping, and in some cases may help, to stimulate low-GHG emissions investment and reduce emissions. Agreements addressing ozone depletion and transboundary air pollution are contributing to mitigation, and in other areas, such as atmospheric emissions of mercury, may contribute to mitigation (high confidence). Trade rules have the potential to stimulate international adoption of mitigation technologies and policies, but may also limit countries' ability to adopt trade-related climate policies (medium confidence). Current sectoral levels of ambition vary, with emission reduction aspirations in international aviation and shipping lower than in many other sectors (medium confidence). {14.5, 14.6}



Attempts to adapt to climate change - by reducing exposure and/or vulnerability to risks

Adaptation options - Figure 13.36

Concepts & definitions - from IPCC Glossary

Adaptation

In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities.

Adaptation deficit

The gap between the current state of a system and a state that minimizes adverse impacts from existing climate conditions and variability.

Adaptation gap

The difference between actually implemented adaptation and a societally set goal, determined largely by preferences related to tolerated climate change impacts and reflecting resource limitations and competing priorities

Adaptation limits

The change in climate where adaptation is unable to prevent damaging impacts and further risk. Soft limits occur when additional adaptation may be possible if constraints are able to be overcome. Hard limits occur when no additional adaptation is possible.

Adaptation needs

The circumstances requiring action to ensure safety of populations and security of assets in response to climate impacts.

Adaptation options

The array of strategies and measures that are available and appropriate for addressing adaptation. They include a wide range of actions that can be categorised as structural, institutional, ecological or behavioural.

Autonomous adaptation

Adaptation in response to experienced climate and its effects, without planning explicitly or consciously focused on addressing climate change. Also referred to as spontaneous adaptation.

Community-based adaptation

Local, community-driven adaptation. Community-based adaptation focuses attention on empowering and promoting the adaptive capacity of communities. It is an approach that takes context, culture, knowledge, agency, and preferences of communities as strengths.

Incremental adaptation

Adaptation that maintains the essence and integrity of a system or process at a given scale. In some cases, incremental adaptation can accrue to result in transformational adaptation. Incremental adaptations to change in climate are understood as extensions of actions and behaviours that already reduce the losses or enhance the benefits of natural variations in extreme weather / climate events.

Adaptation that changes the fundamental attributes of a social-ecological system in anticipation of climate change and its impacts.

Adaptive capacity

The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences

Adaptive governance

Adjusting to changing conditions, such as climate change, through governance interactions that seek to maintain a desired state in a social-ecological system.

Adaptive management

A process of iteratively planning, implementing, and modifying strategies for managing resources in the face of uncertainty and change. Adaptive management involves adjusting approaches in response to observations of their effect and changes in the system brought on by resulting feedback effects and other variables.

Adaptation pathways

A series of adaptation choices involving trade-offs between short-term and long-term goals and values. These are processes of deliberation to identify solutions that are meaningful to people in the context of their daily lives and to avoid potential maladaptation.

Maladaptive actions

Actions that may lead to increased risk of adverse climate-related outcomes, including via increased greenhouse gas (GHG) emissions, increased or shifted vulnerability to climate change, more inequitable outcomes, or diminished welfare, now or in the future. Most often, maladaptation is an unintended consequence.

Resilience

The capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising 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. See also Hazard, Risk, and Vulnerability.

Climate change

Causes of climate change

Nature of climate change

Risks from climate change

Attempts to mitigate climate change -
by reducing GHG emissions or
enhancing sinks

Attempts to adapt to climate change -
by reducing exposure and/or
vulnerability to risks

Adaptation options - Figure 13.36

Concepts & definitions - from IPCC Glossary

Background info

Adaptation helps to manage key risks by reducing vulnerability or exposure to climate hazards. However, constraining factors make it harder to plan or implement adaptation and result in adaptation limits beyond which risks cannot be prevented.

Adaptation-related responses are the actions taken with the intention of managing risks by reducing vulnerability or exposure to climate hazards. Responses are increasing and expanding across global regions and sectors, although there is still a lot of opportunity for improvement. Examining the adequacy and effectiveness of the responses is important to guide, planning, implementation and expansion. Increasing the extent of adaptation-related responses will require more widespread implementation and coordination, more novel and radical shifts from business-as-usual practices, more rapid transitions, and challenging or surmounting limits -- key barriers -- to adaptation. This might include, for example, best practice programmes implemented in a few communities being expanded to a larger region or country, accelerated implementation of behaviours or regulatory frameworks, coordination mechanisms to support deep structural reform within and across governments, and strategic planning that challenges fundamental norms and underlying constraints to change. Ch16

**Additional concepts
& definitions in
IPCC reports
relevant to urban
security (including
Climate Justice,
Human Security)**

Justice

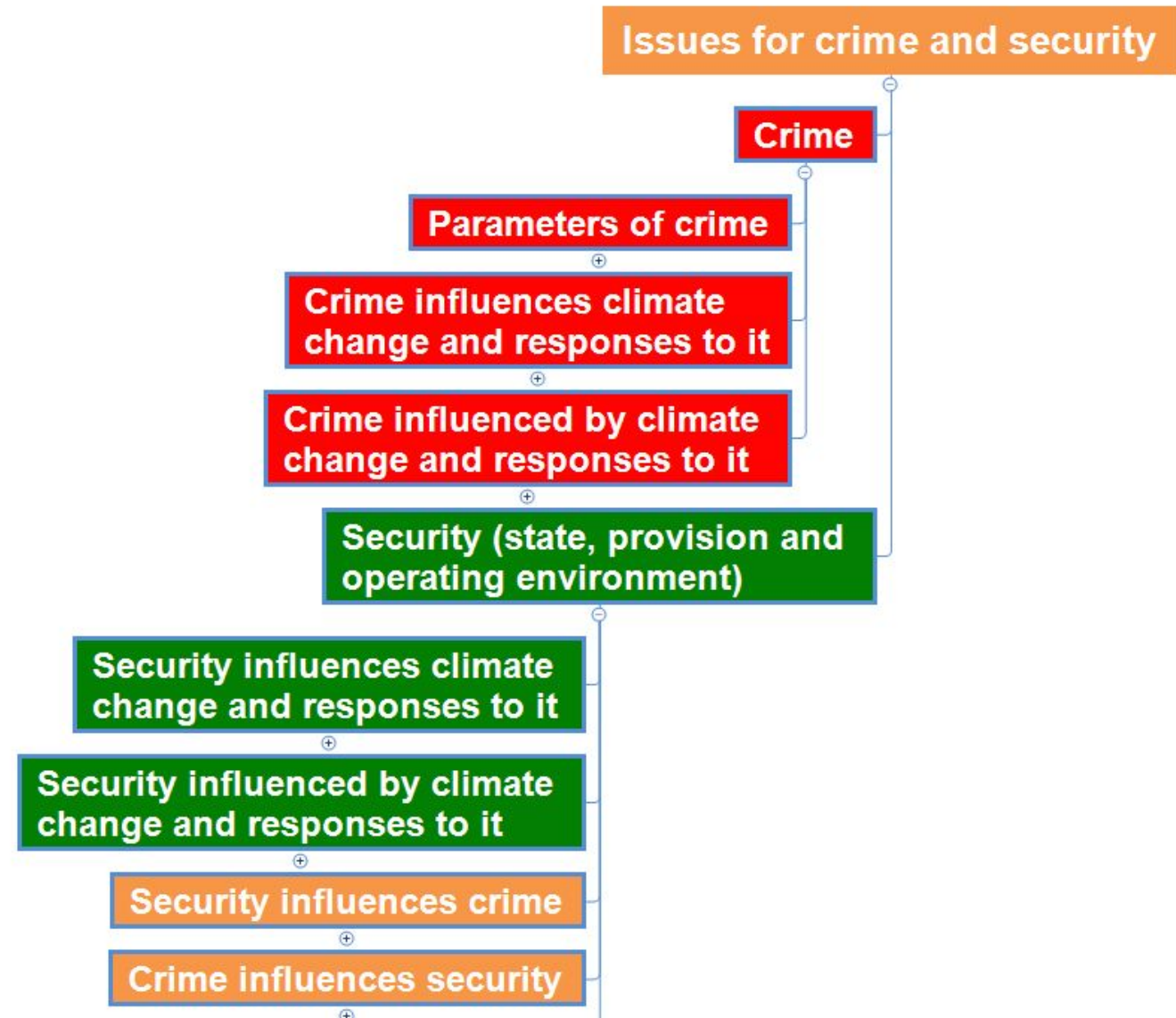
Justice is concerned with ensuring that people get what is due to them, setting out the moral or legal principles of fairness and equity in the way people are treated, often based on the ethics and values of society.



Human security

A condition that is met when the vital core of human lives is protected, and when people have the freedom and capacity to live with dignity. In the context of climate change, the vital core of human lives includes the universal and culturally specific, material and non-material elements necessary for people to act on behalf of their interests and to live with dignity.

Add Urban stuff



Issues for crime and security

Crime

Parameters of crime

Different types of crime

Offence type

Domain, eg violent, property, economic, corruption, criminal governance

Material v online

Misdeeds (misappropriation, mistreatment, misuse, misbehaviour, mishandling, misleading)

Modus Operandi

Offender types eg individual, organised, corporate, state actors

Motive eg instrumental, expressive, ideological

Causes of crime

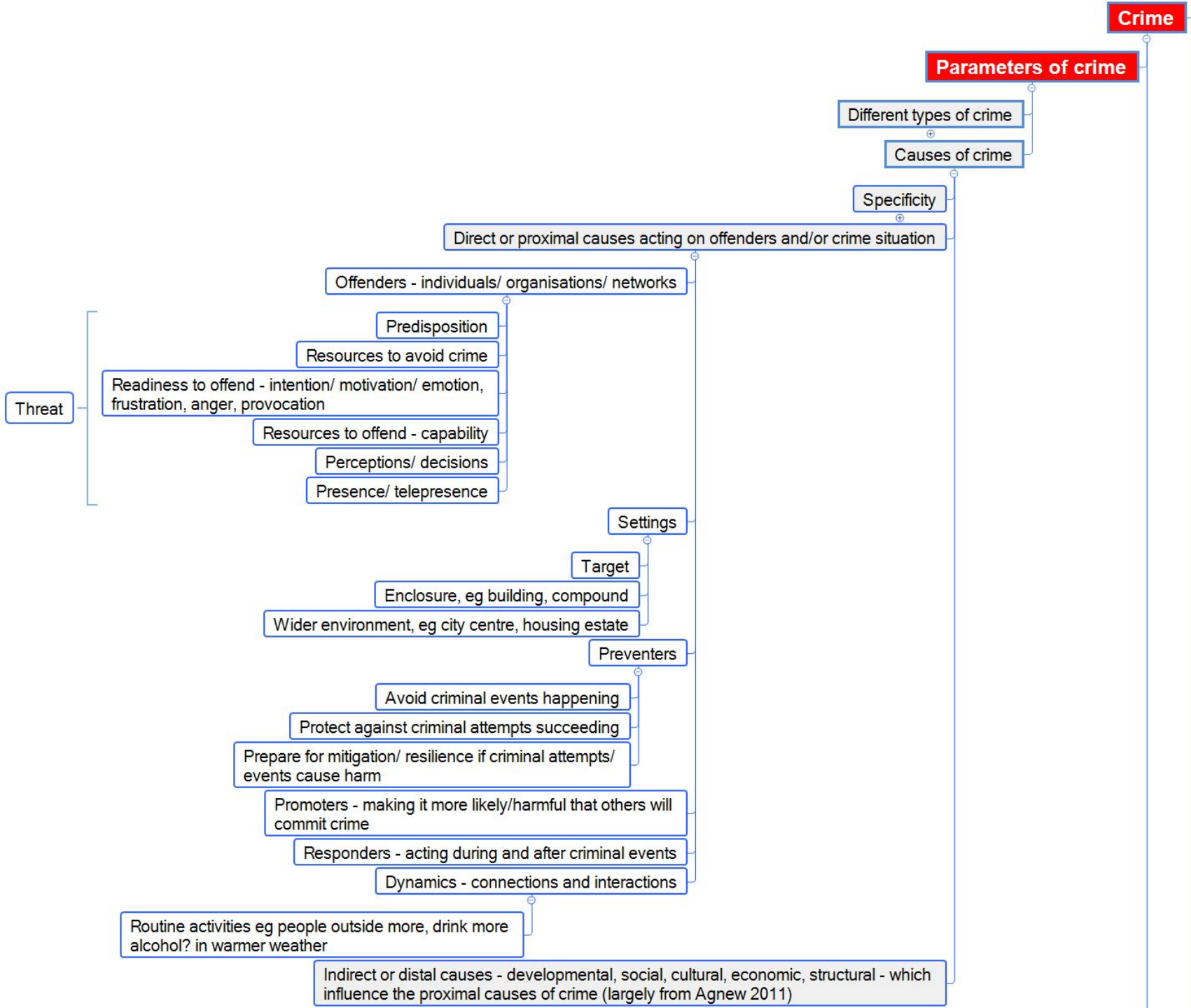
Specificity

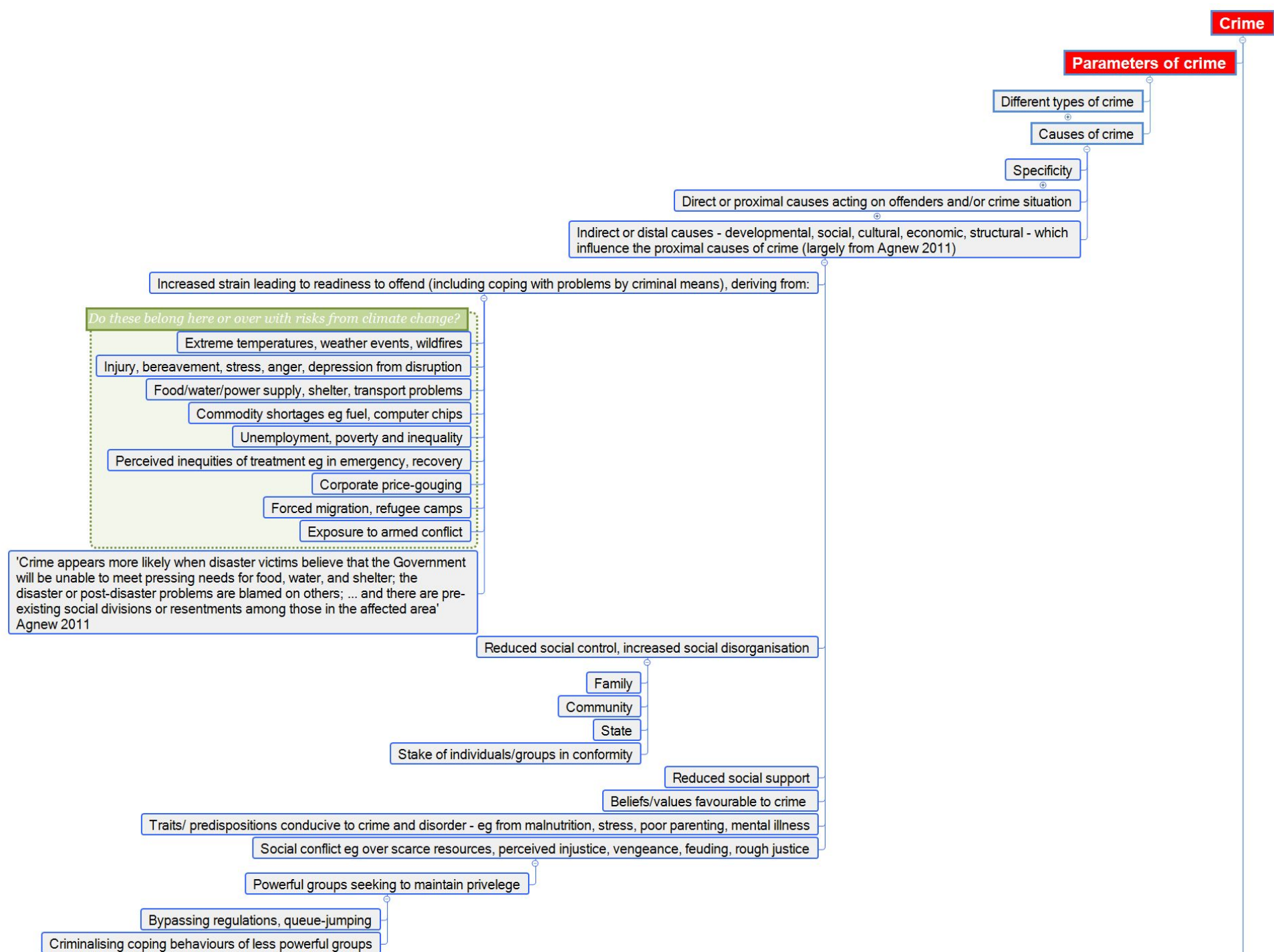
General

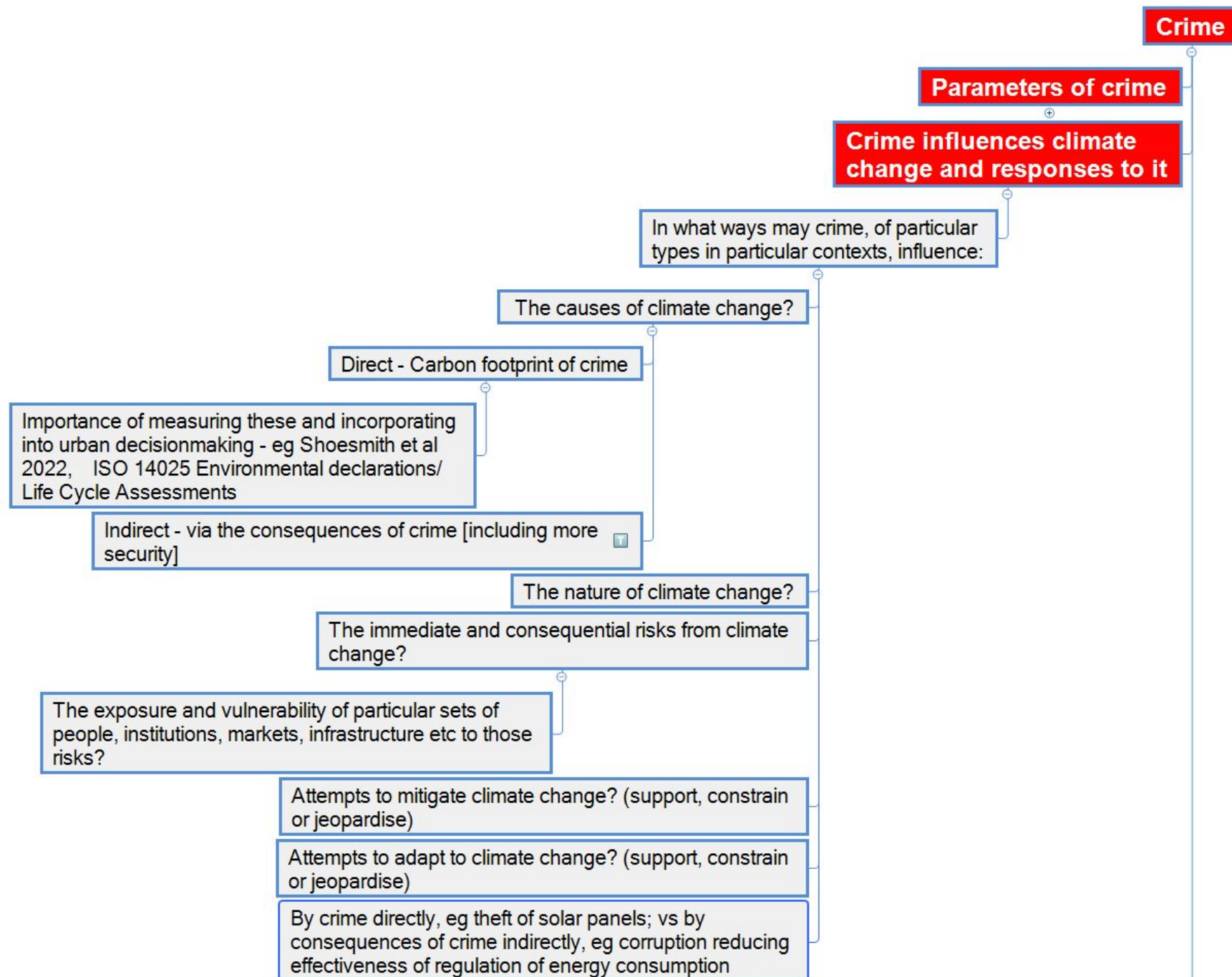
Crime-specific

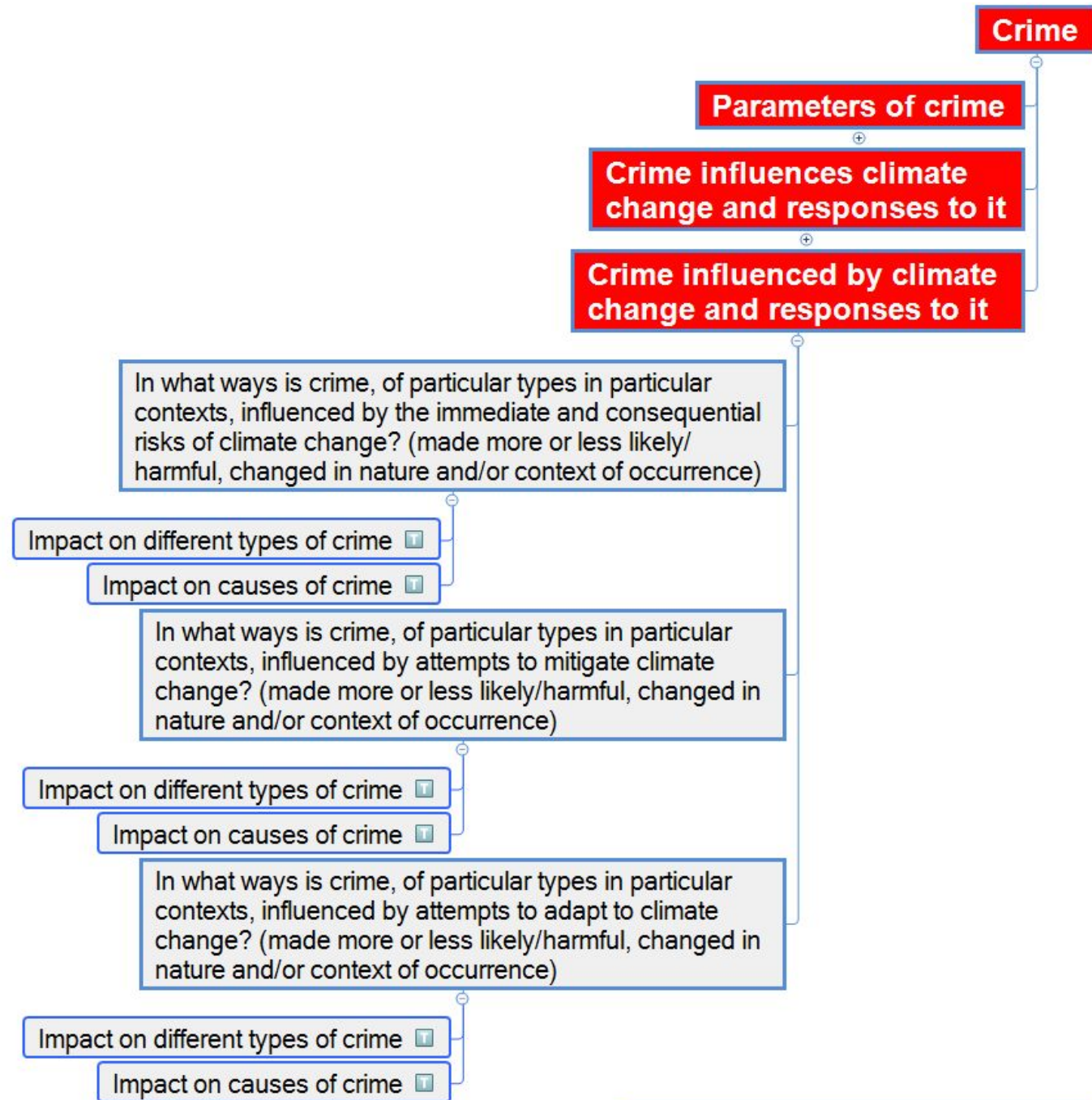
Direct or proximal causes acting on offenders and/or crime situation

Indirect or distal causes - developmental, social, cultural, economic, structural - which influence the proximal causes of crime (largely from Agnew 2011)









Security (state, provision and operating environment)

Security influences climate change and responses to it

In what ways may security, of particular types in particular contexts, influence:

The causes of climate change?

+

The nature of climate change?

The immediate and consequential risks from climate change? Nature/likelihood/harm or benefit

+

Attempts to mitigate climate change? (support, constrain or jeopardise)

+

Attempts to adapt to climate change? (support, constrain or jeopardise)

Security (state, provision and operating environment)

Security influences climate change and responses to it

Security influenced by climate change and responses to it

In what ways is security, of particular types in particular contexts, influenced by the immediate and consequential risks of climate change? (made more or less likely/implementable/effective/harmful, changed in nature, immediate context and wider operating environment)

In what ways is security, of particular types in particular contexts, influenced by attempts to mitigate climate change? (made more or less likely/implementable/effective/harmful, changed in nature, immediate context and wider operating environment)

In what ways is security, of particular types in particular contexts, influenced by attempts to adapt to climate change? (made more or less likely/implementable/effective/harmful, changed in nature, immediate context and wider operating environment)

Security influences crime

Via directly/indirectly intervening in the causes of crime/ criminal events

(Cost-)Effectiveness of security (Security Protection Factor)

Carbon payback ratio (footprint of crime over the footprint of the security intervention) alongside an effectiveness indicator (the Security Protection Factor). Shoesmith et al 2022

Resultant of effectiveness of design, suitability for context, proper operation etc

Crime influences security

Via demand

Eg more street lighting, more concrete fortifications - with carbon footprint consequences

Via Impact on performance

Eg corruption, intimidation, overload

Security (state, provision and operating environment)

Security influences climate change and responses to it

Security influenced by climate change and responses to it

Security influences crime

Crime influences security

Definition of security

Important to distinguish between Security Provision as the capability and actions of people/organisations seeking to maintain, extend or improve the state of security, and Security as a state (equivalent to community safety, wellbeing)

5Is definition - Security is deliberate action to reduce the risk of criminal events, taken before, during or after the event

- o Primary security - action eliminates possibility of harmful event; if event nevertheless remains possible, it reduces its probability
- o Secondary security - if event does happen, action limits harm as it unfolds
- o Tertiary security - action limits propagation of harm that may occur post-event, e.g. by preventing further offences such as identity theft following theft of credit cards
- o Mitigation attempts to repair harm already done, but may be prepared for in advance [note this is distinct from climate change meaning, which is about reducing CO2]
- o Together, the capacity to deliver secondary and tertiary security and mitigation are aspects of resilience.

Edwards (2009) defines this wider concept as the capacity of an individual, community or system to adapt in order to sustain an acceptable level of function, structure, and identity.

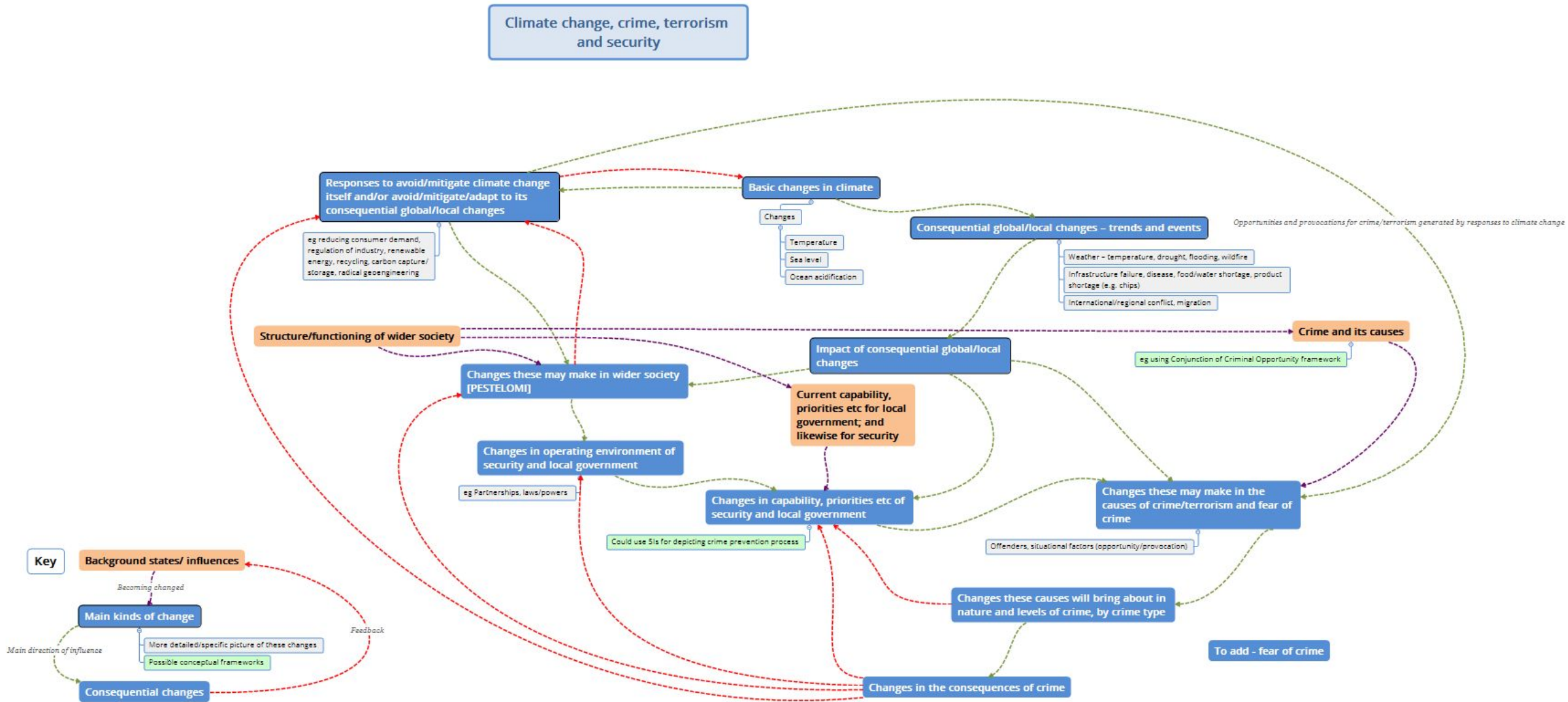
Community Safety - 5Is definition - an aspect of the quality of life, a state of existence in which people, individually, collectively and in organisations, and in public and private space, enjoy the following crime-related conditions:

- * Freedom from and/or reassurance about a range of real and perceived risks centring on crime, antisocial behaviour, disorder and drug dealing and abuse - including freedom from fear of crime
- * Ability to cope with the harmful consequences of those incidents they nevertheless experience, at reasonable cost (e.g. without curtailment of going out)
- * Help to cope if unable to do so alone, whether informally from the community, or more formally by, say, victim support or insurance
- * Confidence that the police, CJS and other agencies will if needed provide a responsive, fair and effective service that delivers justice and remedies to the problems and conflicts they experience or risks they perceive
- * Trust - within and across cultural boundaries - in neighbours, colleagues and passers-by to support them both morally and materially in terms of sympathy; existence of collectively-upheld moral order, social control and support; trust in police and other enforcement-empowered services, to behave fairly and decently towards those they must confront
- * Avoidance and resolution of civil conflicts with the potential to turn criminal

When all these conditions are sufficiently met, they enable individuals, families and, communities to enjoy these wider benefits:

- * Pursuing the necessities of cultural, social and economic life
- * Receiving adequate services
- * Exercising skills
- * Experiencing well-being
- * Engaging in community life
- * Creating wealth in the widest sense

An earlier version with influence and feedback links



Comments and suggestions please!

p.ekblom@ucl.ac.uk

Or via Working Group page on Efus website