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# Is Australia's proposed "domestic" climate risk assessment fit for purpose?

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## Summary


- To make a proper assessment of climate risks to Australia, it is necessary to first establish an understanding of the existential, systemic climate risks at a global scale.
- The Australian National Climate Risk Assessment (NCRA), currently underway, appears not to take this approach and is too narrowly based.
- As climate impacts occur faster than forecast, the NCRA is likely to underestimate the risks, fail to adequately consider the plausible worst-case scenarios, and not "see the wood for the trees".
- The assessment will not be a sound basis for developing efficacious adaptation and resilience policies. Its failure to consider mitigation options prevents it fulfilling its role in developing policy to safeguard Australia's future.
- The NCRA should be paused pending a review from an expert panel.


**Some tipping point thresholds have already been reached, while others are getting closer as global warming continues. Once tipped into a new state, many of these systems will cause further warming – and may interact to form cascades that could threaten the existence of human civilisations.**

**— Prof. Tim Lenton[1]**

1 actuaries.org.uk/media/qeydewmk/the-emperor-s-new-climate-scenarios.pdf

## Risk assessment in Australia

The Australian Government is in the middle of work to understand the climate risks (threats) to the future well-being of the Australian people, and country.

In mid-2022 and shortly after assuming offce, the Albanese government ordered a climate and security risk assessment, in line with a pre-election commitment. The analysis was undertaken by the Offce of National Intelligence (ONI) and delivered to the government in late 2022. The ONI analysis focussed on the region and did not specifically cover domestic risks.

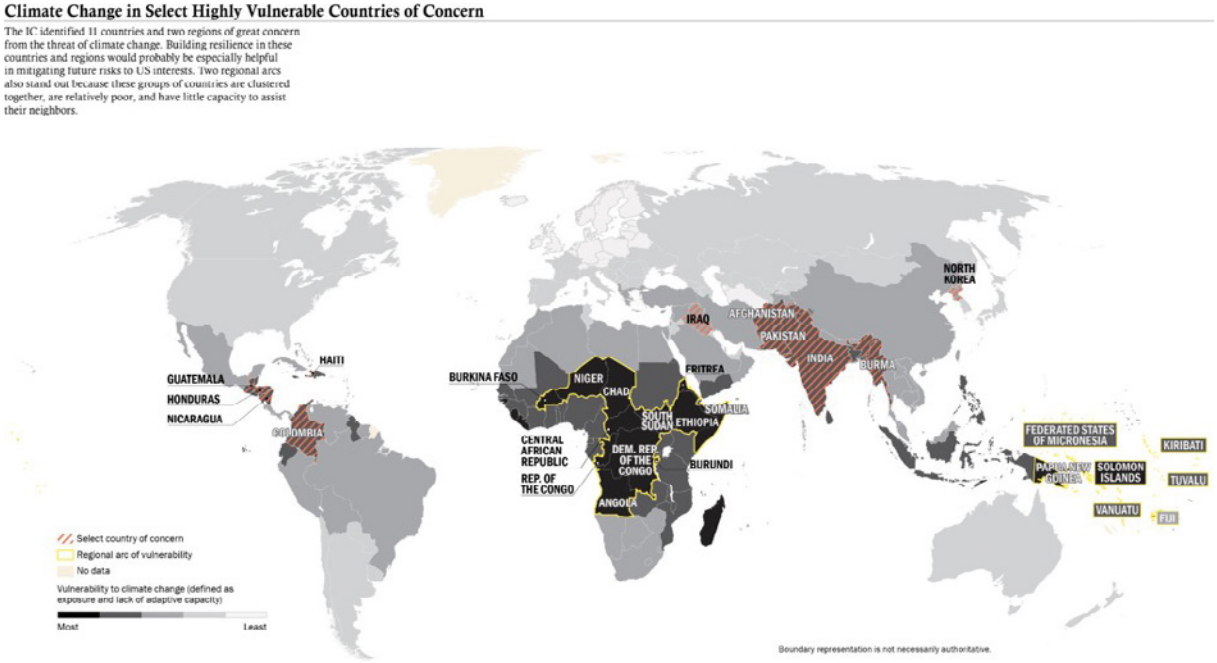
Since then, the government has barely said a word about the ONI findings or about climate–security risks, has not released the analysis in any declassified form, and has indicated it does not intend to do so.

This is very different from the practice in the USA, where papers such as Climate Change and International Responses: Increasing challenges to US national security through 2040 are published by the National Intelligence Council (see vulnerability map below).[2] The US government seems to have no problem publicly and explicitly identifying countries and regions most vulnerable to climate change and discussing the security consequences.

A comparable analysis of climate risks to that completed by ONI is the one undertaken by the UK's premier, government-funded security think-tank, Chatham House, in its 2021 Climate Change Risk Assessment. At the very least, the ONI report would need to be consistent with the Chatham House conclusions which, in essence, were that the world is dangerously o track to meet the Paris Agreement goals, the risks are compounding, and without immediate action the impacts will be devastating in the coming decades. It concluded that cascading climate impacts will "drive political instability and greater national insecurity, and fuel regional and international conflict".[4]

More recently, the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) has initiated a domestically-focussed threat assessment, known as the National Climate Risk Assessment (NCRA).[5]

Climate disruption is the greatest threat to human civilisation, and to Australia. The US Defence Secretary calls the risks "existential".[6] There is a need for the NCRA to be effcacious, broad-ranging, informed by the most up-to-date science and be cognisant of the systemic risks. This must be the starting point for any sound analysis. It is of deep concern that this may not be the case.




**Climate change in select highly vulnerable countries of concern (US National Intelligence Council)[3]**

2 dni.gov/index.php/newsroom/reports-publications/reports-publications-2021/item/2253-national-intelligence- estimate-on-climate-change

3 dni.gov/index.php/newsroom/reports-publications/reports-publications-2021/item/2253-national-intelligence- estimate-on-climate-change

4 chathamhouse.org/2021/09/climate-change-risk-assessment-2021

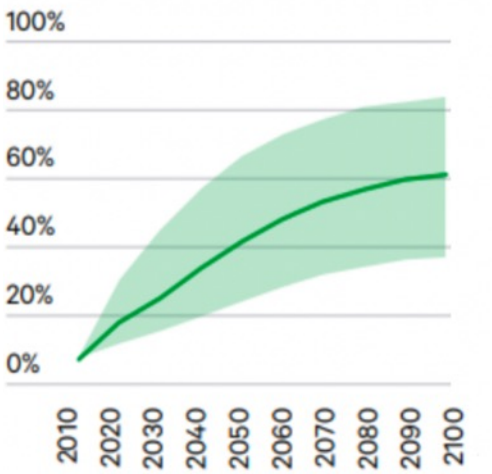
5 dcceew.gov.au/climate-change/policy/adaptation/ncra

6 defense.gov/News/News-Stories/Article/Article/2582051/defense-secretary-calls-climate-change-an-existential- vthreat/

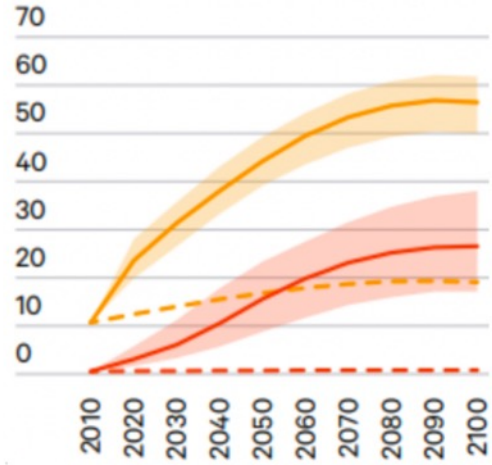
It is not possible to make a proper assessment of climate risks in Australia without first establishing an understanding of the systemic risks at a global scale. An outline of such risks is included here as an Addendum.

Parliamentarians — and the Australian electorate — can only make informed decisions about climate's global, regional and human security implications if they are fully informed about the nature and scale of the risks, and the full range of responses. At the moment, this is far from the case.

**Some projected climate impacts for Australasia**




**Proportion of continental cropland experiencing drought of 3 months or more.** By 2050, the figure is 40%.




**Populations experiencing heatwaves and major heatwaves (in millions of people).** The central estimate is that 80% of population will experience such events by 2050.

**Projected impacts for Australia, "A Nation at Risk: Charting a course for an urgent climate risk assessment for Australia" presentation to ASLCG forum by Dr Daniel Quiggin, 3 August 2022**

## The "domestic" risk assessment

The National Climate Risk Assessment is described on the DCCEEW website as follows:

> "We are taking strong action to protect Australians from more frequent and devastating extreme weather events. We are investing in Australia's first National Climate Risk Assessment to better understand the risks and impacts to Australia from climate change.
>
> "The National Climate Risk Assessment is part of the $28m budget measure and will be delivered over 2 years from 2023 to 2024. The Risk Assessment will identify and prioritise things that Australians value the most that are of national significance and are at risk of climate change. These may include things that relate to Australia's environment, biodiversity, health, infrastructure, agriculture, and the economy.
>
> "This investment will give us robust and scientifically sound evidence. It will help governments, businesses and communities understand how climate risks will impact Australia's assets."[7]

[It should be noted here that some of the NCRA work has been contracted out to the management consulting firm Deloitte.]

The text starts with extreme weather events, not systemic risks. The politics of this may be that the previous conservative government was severely embarrassed by its failure to understand the risks and prepare, a failure graphically written onto the landscape during the Black Summer bushfires, and emergency preparedness is now the main political driver of this work.

The NCRA approach includes:

- **A complex "bottom-up" approach**, which starts by identifying what stakeholders most wish to avoid and then assessing the risks over time, requiring definition of risks to be avoided and their thresholds, and the development of damage functions, vulnerability, adaptation assumptions and assessment of climate changes within the defined risk sector. A simpler initial approach would be to use a "top-down" assessment for a given emissions trajectory of direct risks and a qualitative analysis of second-order, systemic and cascading impacts. A "top-down" assessment reverses the order (starts with emissions trajectory, leading to impacts) as compared to a "bottom-up" approach which starts with normative goals and works back to actions necessary and emission-reduction targets in order to protect.
- **Goals limited to adaptation/resilience responses** and explicitly excluding mitigation and other climate interventions. The DCCEEW website says that: "It will deliver a shared national framework to inform national priorities for climate adaptation and resilience actions." In this sense, the NCRA may appear less a comprehensive risk assessment than the accumulation of tools to stress-test various sectors, particularly emergency responses to extreme climate events.
- **A multi-scenario approach**, using a variety of climate scenarios and socio-economic scenarios.
- **Many stakeholders in a "bottom up" approach** involved in co-designing and co-delivering (Commonwealth, States and Territory governments and agencies, and other experts), with complex sharing of data and risk analysis, and multi-stakeholder management of the process.
- **A focus on Australia**, with seemingly an emphasis on extreme weather event risks, with very limited integration of global and regional climate system dynamics and impacts, and second-order effects.
- **A reliance on climate models and the work of the IPCC and its scenarios**, with no clear methodology for considering the "big picture" dynamics of the climate system, including tipping points, non-linear change, cascading risks and "Hothouse Earth" dynamics.

There are fundamental problems with the current approach to the NCRA:

- **In the first instance, a "top-down" analysis of system characteristics and risk is a necessary pre-requisite** for more detailed, fine-grained, micro ("bottom-up") analysis. By jumping straight into a bottom-up approach, there is a risk of not "seeing the wood for the trees".
  - The proposed methodology is process and procedural driven, focused on delivering a detailed micro-level assessment, which whilst comprehensive and important, will not provide the macro-level strategic framing with the urgency required.
  - Consistently, extreme climate events have been beyond model projections and expectations, of which the current (mid-2023) global surge in land and ocean temperatures and heatwaves to record levels is but one example, and an approach based on better understanding of systemic risk is required if adaptation and resilience plans are not to fall victim to risk underestimation.

7 dcceew.gov.au/climate-change/policy/adaptation/ncra

— **Any risk assessment will fail to deliver desired outcomes that precludes mitigation actions** and focuses only on adaptation and coping responses, due to risk creation outstripping risk reduction.

  — The 2022 UN report, Our World at Risk: Transforming governance for a resilient future, concluded that despite commitments to build resilience, tackle climate change and create sustainable development pathways, current societal, political and economic choices are doing the reverse. It warns of the risk of collapse because risk creation is outstripping risk reduction: "Disasters, economic loss and the underlying vulnerabilities that drive risk, such as poverty and inequality, are increasing just as ecosystems and biospheres are at risk of collapse. Global systems are becoming more connected and therefore more vulnerable in an uncertain risk landscape." The report concludes that action can reverse this trend, but "only if systemic risk is better understood and risk reduction action is accelerated".[8]

  — The Chatham House risk assessment describes a scenario which is now very likely — a failure to radically reduce emissions globally by 2030 — which results in impacts likely to be locked in by 2040 that "become so severe they go beyond the limits of what nations can adapt to" (emphasis added).[9]9

  — Warming may also be approaching a decadal rate of around 0.3°C which will be beyond that adaptive rate of some ecosystems.

  — In this sense, the framing of the NCRA borders on the delusional because an adaptation-only methodology signifies a failure to understand the nature of the risks.

— **Climate risks are existential, with significant uncertainty, requiring an emphasis on the most damaging potential impacts**. It is now well-accepted, from the UN Secretary-General down, that climate risks are now existential, and scientists have been warning for years that insufficient action will lead to civilisation collapse.

  — In May 2018, an inquiry by the Australian Senate into national security and global warming recognised "climate change as a current and existential national security risk… defined as 'one that threatens the premature extinction of Earth-originating intelligent life or the permanent and drastic destruction of its potential for desirable future development'".[10]

  — Europe's most eminent climate scientist, who has advised the EU, the German Chancellor and the Vatican, Prof. Hans Joachim Schellnhuber, has warned that if we continue down the present path "there is a very big risk that we will just end our civilisation. The human species will survive somehow but we will destroy almost everything we have built up over the last two thousand years."[11]

  — When threats exist to the very foundation of modern human societies and the complex and fragile globalised network within which they co-exist, the normal approach to risk management is not appropriate.

  — The existential possibilities require a special emphasis on examining the plausible worst-case scenarios, which in turn define the actions to be taken to prevent, prepare and protect against their occurrence, to the extent that is possible, which is likely to be beyond adaptation and resilience measures. With a mandate for resilience and adaptation measures only, the NCRA will not do this.

8 undrr.org/gar2022-our-world-risk
9 chathamhouse.org/2021/09/climate-change-risk-assessment-2021
10 aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_A_airs_Defence_and_Trade/Nationalsecurity/Final_Report
11 theecologist.org/2019/jan/03/its-nonlinearity-stupid

— **An effcacious science base is required**. The NCRA method may be too dependent on the IPCC and its outputs, which are at times reticent, too model dependent and behind the most up-to-date observations and projections. Many climate change impacts and the character of extreme climate events are underestimated in climate models and the work of the IPCC, and are happening faster than forecast.[12]

  — Many system-level positive feedbacks are not fully accounted for in climate models,[13]13 and certain important consequences of warming, including ice sheet collapse, sea level rise, and the rise in extreme weather events are poorly represented in the models.[14]14

  — This deficiency covers the cryosphere and changes in some oceans and atmospheric circulatory systems, including in the Southern Ocean and the Arctic Jet Stream, and the Greenland and Antarctic ice sheets.

  — "Some of the impacts of climate change are playing out faster and with a greater magnitude than we predicted," says Prof. Michael E. Mann.[15]

— **Expertise deficit**. Australian government departments and climate agencies have been managed from 2013 to 2022 in such a way — and alarmingly stripped of expertise which by-and-large has not been replaced — that they may not be currently fit-for-purpose on climate risks. Wider questions of public service competency have been raised by the conclusions of the Robodet royal commission. The case of PWC has also provoked questions about the relationships between government and the large management consultancy firms.

  — Given the urgency, the climate risk assessment should draw upon the best available scientific and risk management expertise, both within and external to government.

  — An independent body and a strong management team are necessary to ensure an holistic approach across government and community which is not constrained by traditional silo-based thinking or a certain "business-as-usual" narrowness which often infects the work of management consultancy firms.

— **A multi-scenario approach adds complexity to the task**, takes more time and more resources.

  — A better approach, says the lead author of the Chatham House report, is to "nail your colours to the mast in terms of choosing an emissions pathway that is most likely (RCP4.5) meaning the complexity of information to be presented [is] narrowed and therefore made more accessible".[16]

  — That scenario, as elaborated by Chatham House, is now fairly obvious. All the recent data suggests that emissions are unlikely to plateau before 2030, that warming is accelerating and will reach a 1.5°C trend before or around 2030, and 2°C before 2050. This is a consequence of continuing high emissions, system inertia, the loss of aerosol temporary cooling, and a weakening of carbon sinks.

  — That scenario should be supplemented by recognition that triggering the Hothouse Earth scenario now looms as a mid-century possibility. The head of the Potsdam Institute, Johan Rockström warns that 2°C degrees is not a point of system stability: "If we go beyond 2°C, it's very likely that we have caused so many tipping points that you have probably added another degree just through self-reinforcing changes."[17]

  — The failure of the NCRA to consider the mid-century impact of this scenario for Australia would be an alarming failure.

12 breakthroughonline.org.au/whatliesbeneath
13 cell.com/one-earth/fulltext/S2590-3322(23)00004-0
14 insideclimatenews.org/news/20032023/ipcc-report-ar6-climate-change
15 japantimes.co.jp/opinion/2023/05/19/commentary/world-commentary/understanding-climate-change/
16 aslcg.org/forums
17 forbes.com/sites/davidrvetter/2021/10/22/with-one-week-till-cop26-climate-talks-experts-set-out-whats-at-stake

— **It is not possible to largely isolate domestic risks from regional and global processes**. Any large-scale risk assessment must be integrated and not siloed. The climate system is global, and economies and food production and distribution systems are globally-integrated. Climate-driven events can have second-order effects halfway around the globe.

  — A growing food crisis, especially in Asia, driven by increasing demand, chronic water shortages and climate-driven diminishing yields, will have a profound influence on food security within Australia as prices skyrocket.

  — Douglas Bardsley of the University of Adelaide says that climate change threatens to cause "synchronised harvest failures" across the globe, with implications for Australia's food security: "New research shows scientists have underestimated the climate risk to agriculture and global food production. Blind spots in climate models meant 'high-impact but deeply-uncertain hazards' were ignored. But now that the threat of 'synchronised harvest failures' has been revealed, we cannot ignore the prospect of global famine" (emphasis added)[18]

— **Systemic risks require a process of expert elicitation**. The Chatham House report, in chapter 4, explained the methodology as follows:

  — "Systemic risks stem from the consequence of direct impacts – materialising as a chain, or cascade, of impacts – compounding to impact a whole system, including people, infrastructure, the economy, societal systems and ecosystems. Quantifying the probability and severity of systemic risks is not possible due to their complex nature. However, an elicitation exercise was conducted with 70 experts to capture the major dynamics and impacts that climate scientists and sector risk experts are concerned will occur as direct climate impacts increase in prevalence and severity."[19]

— **Reliance on climate-economy-financial system models that are not fit-for-purpose and have been widely discredited would lead to chronic underestimation of the risks**.

  — A new report from the peak body for UK actuaries warns that: "Many climate-scenario models in financial services are significantly underestimating climate risk… There is a disconnect between climate science and the economic models that underpin financial services climate-scenario modelling, where model parsimony has cost us real-world effcacy."[20]

  — Initiatives which have been set up to address economic/finances sector climate risks, such as the Task Force on Climate-Related Financial Disclosures (TCFD) and the Central Bank's Network for Greening the Financial System (NGFS), are institutionalising risk under-estimation, and hence locking-in potential failure. Given that climate risk represents an existential threat to human civilisation as we know it, it is important that the NCRA methodology does not fall into the same trap.

18 theconversation.com/climate-change-threatens-to-cause-synchronised-harvest-failures-across-the-globe-with- implications-for-australias-food-security-209250

19 chathamhouse.org/2021/09/climate-change-risk-assessment-2021

20 actuaries.org.uk/media/qeydewmk/the-emperor-s-new-climate-scenarios.pdf

## Conclusion

Time is short, so an initial Australian risk assessment should be completed in six months, not in 18 months. Part of the work has already been done by ONI, and by Chatham House and others.

There is a need for a broad strategic assessment of the climate risks to Australia to be made available publicly as rapidly as possible, integrating both domestic and external threats. This must serve to inform national leaders and the community of the overall climate threat, leading to the policies to be adopted, and actions to be taken at a macro level in both mitigating and adapting to that threat. Sensible policy cannot be framed and debated in the absence of such a publicly-available assessment.

It is only on this basis that the micro assessment of climate risks can be properly undertaken.

Much of the official climate modelling, for example as reported by the IPCC, does not include the impact of currently unquantifiable factors such as tipping points. Thus the need to distinguish between risk and uncertainty, and the need to take precautionary action in handling the latter.

In conditions of deep uncertainty, risk analysis must account for system complexity and adopt an existential risk-management framework where attention is given to the question: what are the feasible, worse-case scenarios, and what actions are required to prevent, prepare and protect against their occurrence?

Chatham House analyst Daniel Quiggin says that systemic risks, driven by cascading climate impacts, are extremely diffcult (and nearly impossible) to quantify, in terms of future likelihood, frequency of occurrence and impact, based on an initial climate hazard trigger. Hence, expert elicitation is an important tool. The approach is to "aggregate the views of climate scientists, industry and academic experts as to future plausible risk cascades they are most concerned about, in order to build a comprehensive diagrammatic and narrative description of those systemic climate risks heads of state should be most concerned about, illustrating the mechanisms most likely to amplify those risks, and vulnerabilities and exposures that mediate a given climate hazard towards a systemic impact."[21]

Given the global nature of both the climate system and the human economy, a wholistic approach is necessary which addresses the broad risks and avoids siloed and/or narrowly-defined goals (adaptation only, for example) or narrow framing of human security and wellbeing (a defence-oriented national-security analysis only, for example).

Existential risk management requires brutally honest articulation of the risks, opportunities and the response time frame; new existential risk-management techniques outside conventional politics, and global leadership and integrated policy. Since it is not possible to recover from existential risks, "we cannot allow even one existential disaster to happen; there would be no opportunity to learn from experience",[22] but at the moment we are facing existential disasters on several climate fronts, seemingly without being able even to articulate that fact.

The National Climate Risk Assessment process is not fit-for-purpose and should not proceed in its present form. The NCRA should be paused pending advice from an expert panel drawn from outside current NCRA stakeholders, partners, contractors and departmental staff.

21 aslcg.org/forums
22 global.oup.com/academic/product/global-catastrophic-risks-9780199606504

## Addendum

**Systemic climate risks**

**Climate risk** is a function of the probability of a given climate hazard (stressors or shocks), and how that hazard translates into impact via exposure (how, what, where is exposed) and vulnerabilities (coping mechanisms, or their absence) in a number of ways. Risk analysis methods may include: (emissions-trajectory-based) scenario analysis; normative approaches to identify "what is important" and then establishing risk thresholds and action necessary to protect it; and stress tests.

**Systematic risks** are those risks inherent to a system as a whole, rather to individual components of it. They are complex in their causes and effects, and often deeply uncertain, which occurs "when decision makers and stakeholders do not know or cannot agree on the likelihood that different future scenarios may occur. This happens if there's a lack of agreement, knowledge, or confidence in the future scenarios and/or when decision makers or stakeholders do not agree or do not know what consequences could result from their decisions."[23]

**Systemic climate risks** are risks triggered by one or more direct impacts caused by climate change, which then cascade through the physical climate and Earth systems, and/or create second-order cascading effects at the economic, social, political and cultural levels. An example is the epochal drought in Syria whose consequences became one of the drivers of the civil war, with a cascade of socio-political consequences including the displacement of half the Syrian population, a politically-charged refugee crisis in Europe, and as a driver of Brexit.

**System complexity**. Earth is a system with a 4.5-billion-year history that displays a variety of states and trajectories (following Lovelock's Gaia hypothesis). Complex systems like the Earth System exist in well-defined states with transitions between them; intermediate conditions/states are not possible. The mechanisms behind these behaviours are feedback processes internal to the system that can destabilise it and push it into another stable state, which may entail abrupt change.

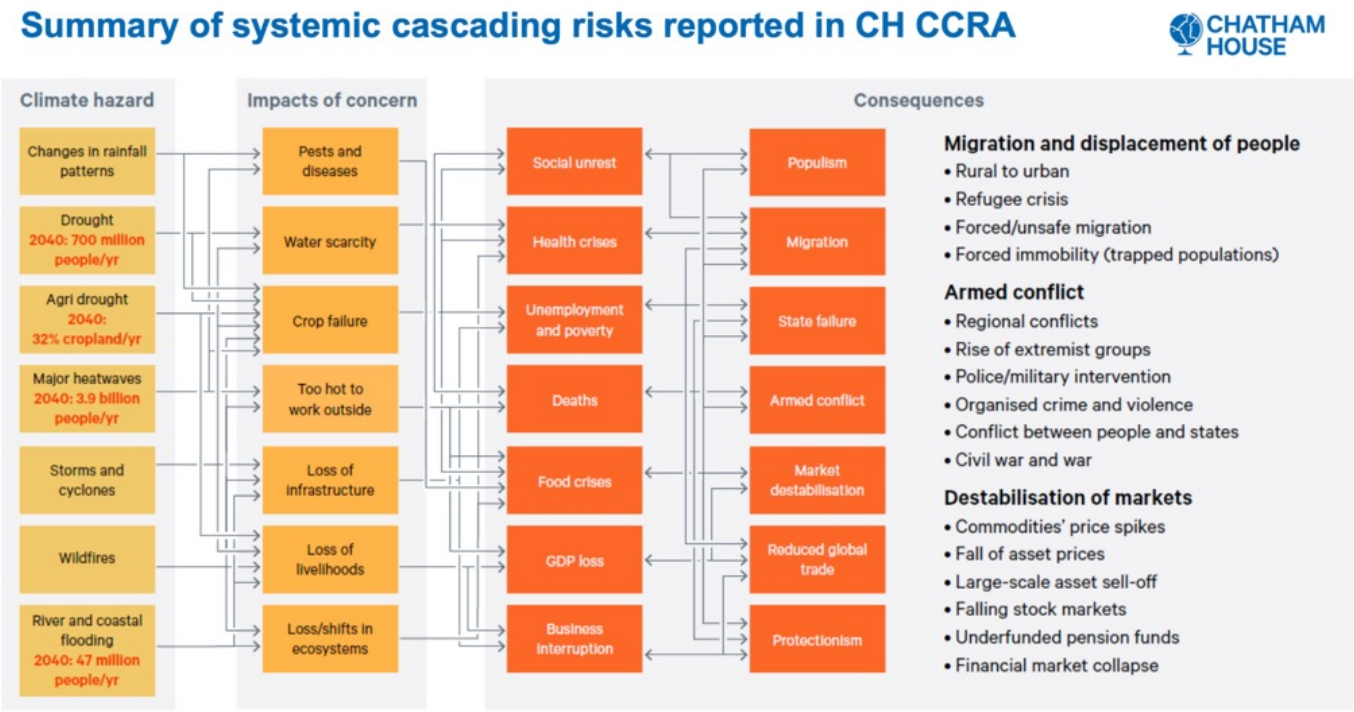
**Characteristics** of the Earth climate system and its component systems include:

- Positive climate feedbacks, whereby an initial change in the climate system, for example warming generated by a climate forcing, causes a secondary change which in turn magnifies the initial effect and becomes self-reinforcing. An example is Arctic sea-ice, where increased melting in summer is exposing more dark water, which absorbs more heat than the reflective ice, thus reinforcing the process of ice loss.
- Tipping points or thresholds at which a small change causes a larger, more critical change to be initiated, taking the climate system from one state to a discreetly different state. The change may be abrupt and irreversible on relevant time frames, possibly leading to cascading events.
- Non-linear or abrupt change where change is sudden rather than smooth progress, often associated with a tipping point. Changes in the Arctic are presently characterised as abrupt.
- Cascading events where an unforeseen chain of events may occur when one event in a system has a negative effect on other related components. For example, the mutual interaction of individual climate tipping points and/or abrupt, non-linear changes, may lead to more profound changes to the system as a whole.

**Hothouse Earth** is a scenario where a planetary threshold is passed which results in a cascade of system changes that make warming self-sustaining, leading to conditions hotter than any experienced over the last few hundred thousand years by modern humans. The late Prof. Will Steffen explained it this way: "The current trajectory [of emissions and warning] is accelerating the system towards that bifurcation, with the increasing risk that our pressures will push the system onto the 'Hothouse Earth' trajectory. The critical point here is that there is a point beyond which we lose control of the system and its own internal feedbacks drive it past a global threshold and irreversibly into a much hotter state…"[24]

23 toolkit.climate.gov/course-lessons/decision-making-under-deep-uncertainty-dmdu

24 link.springer.com/book/10.1007/978-3-030-78795-0




**The Chatham House 2021 summary of cascading systemic risks[25]**

**Faster than forecast, risks cascade**. Changes in the climate driven by human emissions of Earth-warming greenhouse gases can echo around the world in ways that are often not easy to foresee or model:

- Climate impacts in many instances are happening faster than forecast. Australia's 2019-20 "Black summer" bushfires were of an intensity not projected to occur till late this century. Extreme events in Australia today are of an intensity that were not projected to occur till the 2030s.[26]26
- Climate models are poor at projecting abrupt, non-linear change, including the impact of diffcult-to-forecast tipping points. A number of systems have already passed their tipping points, many decades to a century ahead of model-based projections, especially polar sea-ice and glacial systems, and at less than the present 1.2°C of warming.
- Both oceanic and atmospheric systems are changing character and destabilising in ways that are diffcult to project and their behaviour has often shocked scientists. This includes the unexpected scale of Arctic polar jet stream destabilisation, and the slowing of the Atlantic meridional overturning circulation (AMOC), which extends from the Southern Ocean to the edge of a rapidly-melting Arctic.
- Such circulatory changes have profound effects on the climate, and on other Earth systems, from rainforests to the distribution and intensity of monsoons and hurricanes, the character of extreme events around the planet, and of temperature and precipitation patterns.

25 chathamhouse.org/2021/09/climate-change-risk-assessment-2021
26 cosmosmagazine.com/earth/australia-climate-at-worst-case-2030-scenarios/