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Developing a risk management approach to delivering climate security

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December 2009

Contents

- Introduction
- Defining a Risk Management Approach
- Uncertainties in climate science, impacts and mitigation
- Framing climate scenarios for security actors
- Risk management options

Why Risk Management?

- Work on climate security showed importance of considering the "worst case scenarios" of climate change for forward planning

- Current IPCC scenarios used by security actors do not reflect latest science or social science

- Need a decision framework to contain worst cases or risk **rejection** or **fatalism** by policy makers

Draw on established security planning and resource management techniques to develop approach

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Risk Management is...

- Not optimisation, cost-benefit, cost effectiveness, real options....
- Structural and quantitative assessment of:
  - Magnitude and characteristics of key risks and uncertainties, including threshold effects, positive feedbacks and irreversibility
  - Potential strategies for addressing risks
  - Who bears the risk and how they will react
  - Who is best placed to manage and mitigate risk
- About “who” as well as “what” and “how much”; reassigning risk management responsibilities is critical

Why use a Risk Management Approach for Climate Change?

- Explicitly addresses how climate change discontinuities and interdependencies should affect policy behaviour

- Addresses issues of policy failure that are currently underexplored both in the mitigation and adaptation debate

- Examination of perverse, unexpected and counter-intuitive behaviour driven by incorrectly managed and/or assigned risks

- Systematic discussion of how and by whom different risks should be monitored and managed

Useful when we must avoid crossing critical thresholds but there are high uncertainties in where they are

Elements of a Risk Management Approach

1. Defining Risks?
   - Uncertainty or scenario
   - Impacts
   - Reversibility/threshold effects
2. What likelihood?
3. Visibility and monitoring strategies
4. Current risk management strategy
   - What?
   - Who?
   - Consequences/effectiveness
5. Alternative risk management strategy

“Risk Management” of Climate Change

- Separate out the most important aspects of uncertainty based on management decisions; an applied approach.
- Not trying to produce an overall integrated assessment but identify critical implications for decision makers
- Identification of key information gaps a core part of exercise, including theoretical limits to possible knowledge
- Aim is to produce way of framing and handling risks which works for a policy and political audience

Practical risk management approaches are only relevant for a particular audience - in this case the security community

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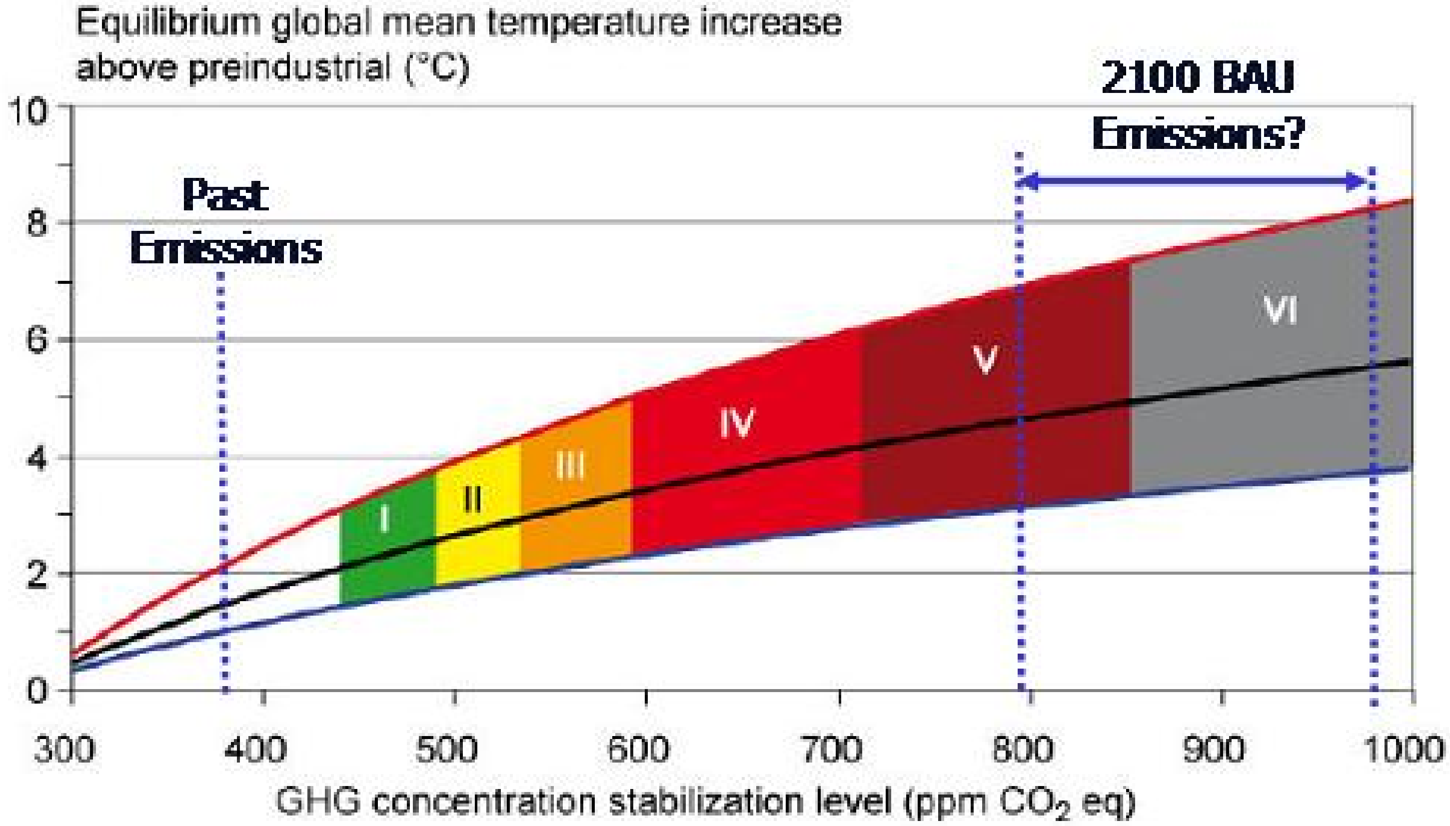
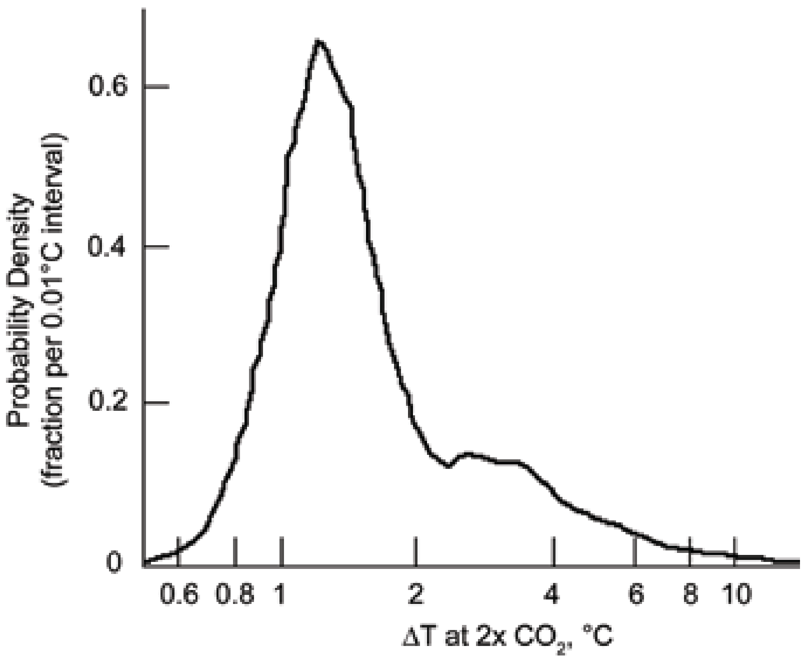
Scientific Uncertainty



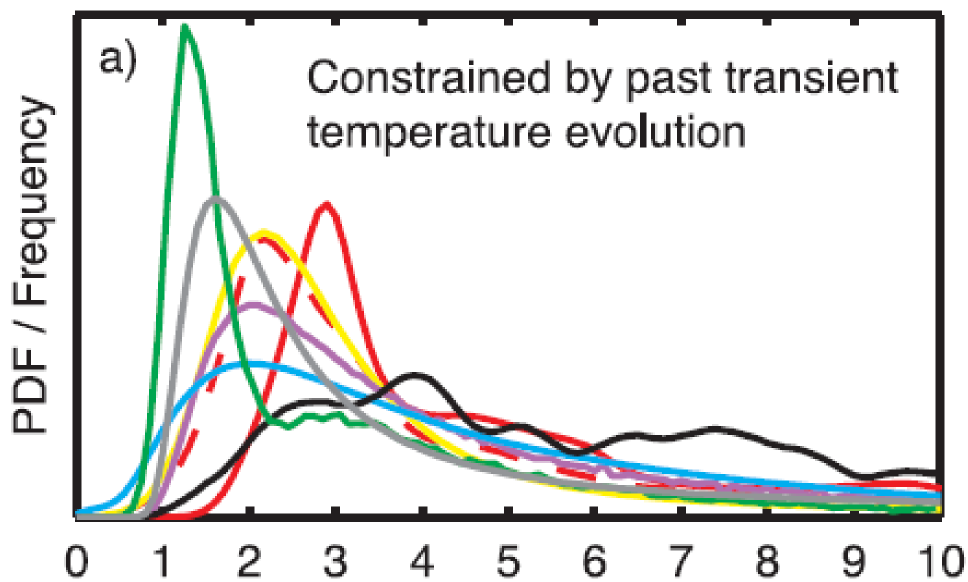
Source: IPCC, 2007

Uncertainty around Climate Sensitivity

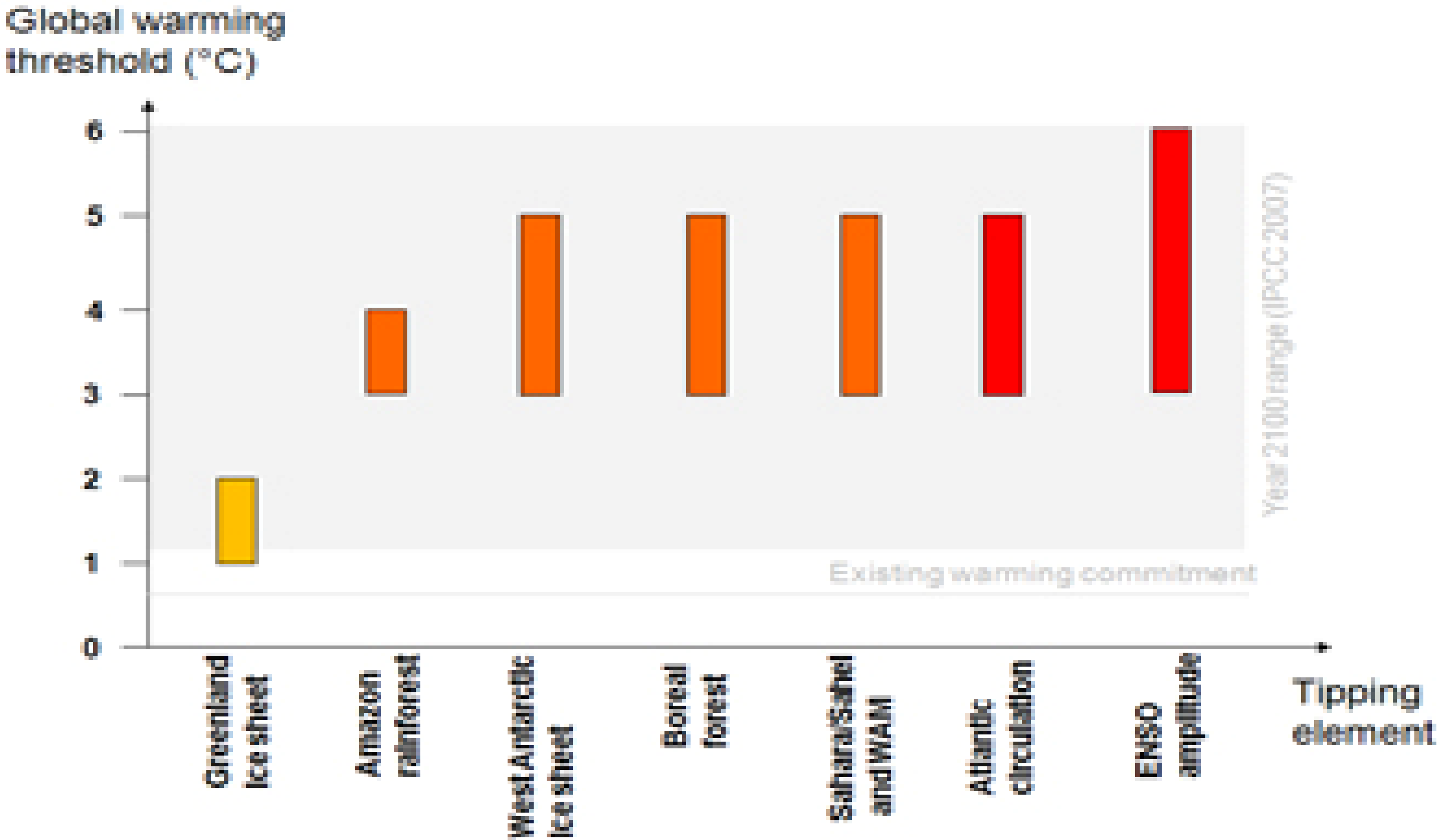


Source: NOAA, 2009

Source: UK CCC, 2008

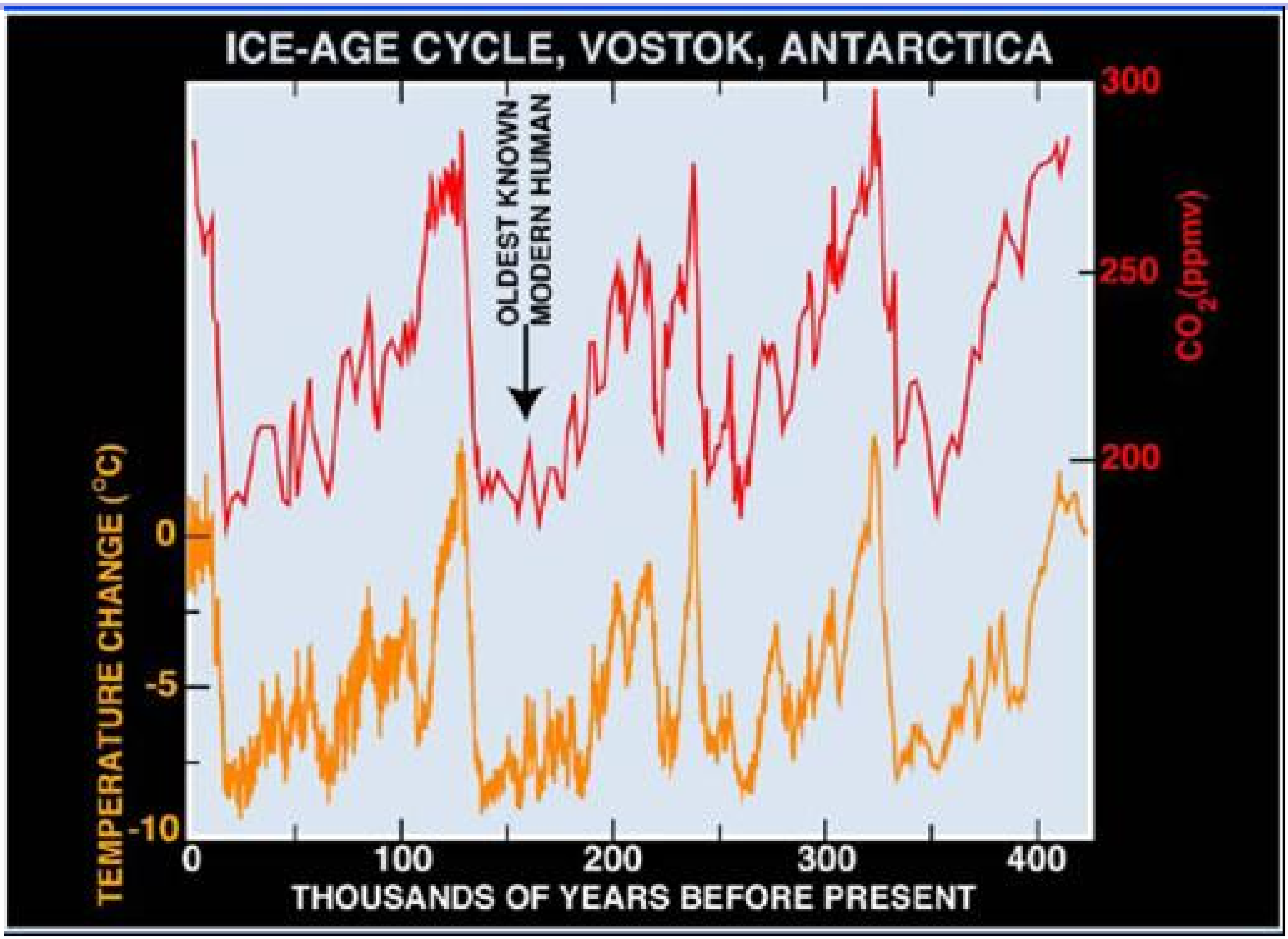


Threshold Estimates?



Source: Lenton (2009) http://researchpages.net/ESMG/people/tim-lenton/tipping-points/

The Climate System is Historically Volatile



Source: Hansen (2005)

Key Uncertainties

Normal Uncertainty?

- Rate of GHG accumulation in Atmosphere
  - Terrestrial and oceanic sinks
- Radiative forcing impact of GHGs
  - Ozone, CH4 and Ch2 Forcing
  - Aerosol Forcing
- Climatic impact of radiative forcing
  - Cloud behaviour
  - Albedo effects

} Climate Sensitivity?

Extreme Impacts

- Tipping point positive feedback loops
  - Methane hydrates
  - Permafrost methane
  - Boreal and Tropical Forest dieback

Risk Management Table

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Risk	Impact	Dynamics	Likelihood	Visibility	Current Risk Mgt	Alt. Risk Management
Sinks	Double CO2 accumulation rate	Gradual and irreversible	?	Immediate impact on GHG rates	2C target	Crash GHG reduction Artificial sinks
Climate Sensitivity	2-3 C?	NA	NA	Modelled quantity	2C target	Crash GHG reduction Geoengineering 4C Adaptation
Methane Hydrates	Catastrophic	Threshold and irreversible; gradual impact?	Unknown threshold	Thresholds not monitorable	2C target	?
Forest Dieback	2C additional?	Gradual and irreversible	From 2-3C onwards?	Early signs observable	2C target	Crash GHG reduction Geoengineering 4C Adaptation
Permafrost Methane	Low	Gradual and irreversible	Occurring now?	Observable	2C target	

Key risk management conclusions

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- Need to redefine “climate sensitivity” to make this useful for decision makers. Minimising risk of triggering tipping point effects is critical for maintaining security objectives. Need for “post-IPCC” structure to drive science?
- Monitoring of key tipping points events is very unsystematic giving little early warning of approaching thresholds. Cooperative action could improve this.
- Underlying instability of climate system suggests that emission cuts will need to be far steeper than current trajectories
- Significant probability of a crash GHG reduction programme in next decades.
  - Need for contingency planning to make this feasible, including geo-engineering.
  - The implications of rapid global nuclear fission build for proliferation and safety need immediate consideration.

Climate Change: high costs but not an existential threat for most countries?

- Stern Review estimates cost of climate change to be between 5-20% of global GDP from 2050
- World Bank estimates that 40% of development aid investment is at risk from climate change
- Humanitarian costs could rise by 200% by 2015
- Weather disasters could cost as much as a trillion dollars in a single year by 2040

Critical impacts for most countries come from reaching tipping points and large scale conflict /maladaptation?

Key Uncertainties

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Normal Uncertainty?

- River basin hydrological cycles
- Glacial melting changing major river flows
- Speed of Greenland ice-shelf melting
- Frequency of extreme weather events
- Ocean acidification/ecosystem impacts
- Impact of maladaptation and climate driven conflict

Tipping Point Impacts

- Indian Monsoon weakening/increased volatility
- Arctic Sea Ice Melting
- West Antarctic Iceshelf melting
- Atlantic circulation shifting

Risk Management Table

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Risk	Impact	Dynamics	Likelihood	Visibility	Current Risk Management	Alt. Risk Mgt
Hydrological cycles	High and variable	Gradual and unpredictable	High	Volatility masks shifts	Water management adaptation	
Glacier Melt	Reduction in river flows	Threshold and irreversible	High	Retreat monitorable	?	
Greenland Icesheet	1-2m rise by 2100; max 7m	Threshold and irreversible	High after 1.5C warming	Melting rate monitorable	Additional sea defences Migration	
Extreme weather events	High impacts	Gradual and irreversible	?	Volatility masks shifts	Preventive disaster relief planning	
Ocean ecosystem disruption	High but variable on fish stocks	Gradual and irreversible	High	Volatility masks shifts	None	Fisheries adaptation Migration
Climate driven conflict	High	Gradual	High but regional	Poor monitoring of impacts	None	Investment in resilience

Risk Management Table II

Risk	Impact	Dynamics	Likelihood	Visibility	Current Risk Management	Alt. Risk Manage ment
Indian Monsoon	Unclear		High above 3-4C?	Volatility mask shifts	?	
Arctic Sea Ice	Positive?	Gradual with possible threshold	High	Ongoing measurement	Resource agreements between Arctic powers	
West Antarctic Ice Shelf	1m by 2100? Maximum 7m	Threshold and irreversible?	High above 3-4C?	Unclear	2C limit	
Atlantic circulation	Large cooling in Europe	Threshold and irreversible?	High above 3-4C?	Weakening could be monitored	2C limit	

Key Risk Management Conclusions

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- Current approach of fragmenting impacts does not capture the elements of most interest of security actors; there is a need for new analysis frames.
- For near term security planning critical interest is "perfect storm" events where climate stresses/extreme events combine with water, food, energy and governance issues to drive emergencies and instability.
- Lack of practical tools to guide investment in resilience to climate change/resource pressures in unstable regions. Risk that adaptation funds will drive engineering response and may heighten instability e.g. on transboundary waterways
- Critical to understand how to reduce risk that countries will shift their adaptation strategies from a reliance on interdependence (e.g. food trade) to a focus on resource capture? Need for pre-emptive investment in cooperative frameworks.

Preserving Climate Security: Understanding Mitigation Policy Risks

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Normal Risks?

- Slower energy efficiency increases (reducing the 50% of planned reductions by 2050)

- Higher BAU projections (20-50% higher emissions)
  - Global GDP growth
  - Oil price/energy security politics
  - Transportation use in developing countries

- Slower reduction in deforestation rates (10-20% of emissions cuts)

- Underperformance/failure of new low carbon technologies
  - CCS (20% of 2050 reductions?)
  - Biofuels (10-20% of 2050 reductions?)
  - Nuclear (10% of 2050 reductions?)

Tipping Point Impacts

- Collapse in integrity of the climate change control regime
- Impact of serial nuclear accidents/terrorism
- Positive impact of development of surprise low carbon technologies (e.g. cheap solar)

Risk Management Table

Risk	Impact	Dynamics	Likelihood	Visibility	Current Risk Mgt	Alt. Risk Mgt
Efficiency	High – 50% abatement to 2050	Gradual	Medium	Visible but monitoring poor	Weak	Increased low carbon energy
BAU	High	Gradual	High	Monitored	Annex I caps	Increased low carbon energy
Deforestation	Move to 550ppm trajectory	Gradual except food /oil shock	High	Monitored but shocks not modelled	None	Increased low carbon energy
Technology failure	CCS failure 70% cost increase	Gradual through learning by doing	Medium	Unclear due to commercial interests	None	Increase RD&D/TAPs Flexible infrastructure
Integrity of Climate regime	10 year mitigation delay	Threshold	Medium		UN monitoring	
Nuclear accidents/ proliferation	Low on most scenarios	Shock	?	Only after event	NPT regime IAEA system	NPT review Gen IV

Key Risk Management Conclusions

- Mitigation risks are less examined than scientific risks, but are of similar or larger scale. General complacency among policy makers on the expected delivery of fundamental changes, especially in energy efficiency and forestry.
- There will be a need for more low carbon energy technologies much earlier than on current plans. Increased cooperative international RD&D is a vital risk management tool but track record of success is low.
- UNFCCC system is critical to set goals and monitor and verify progress. Need for effective and independent verification of country actions to make system resilient in face of shocks. Mixed record of trust in UN: IAEA vs Bioweapons
- Large oil price rises could stimulate more use of clean tech or a retreat to unabated coal; carbon capture and storage is a critical technology to hedge this eventuality. Understanding the real potential for nuclear energy is critical for understanding proliferation risks.

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Provisional Scenario Analysis 2050-2100

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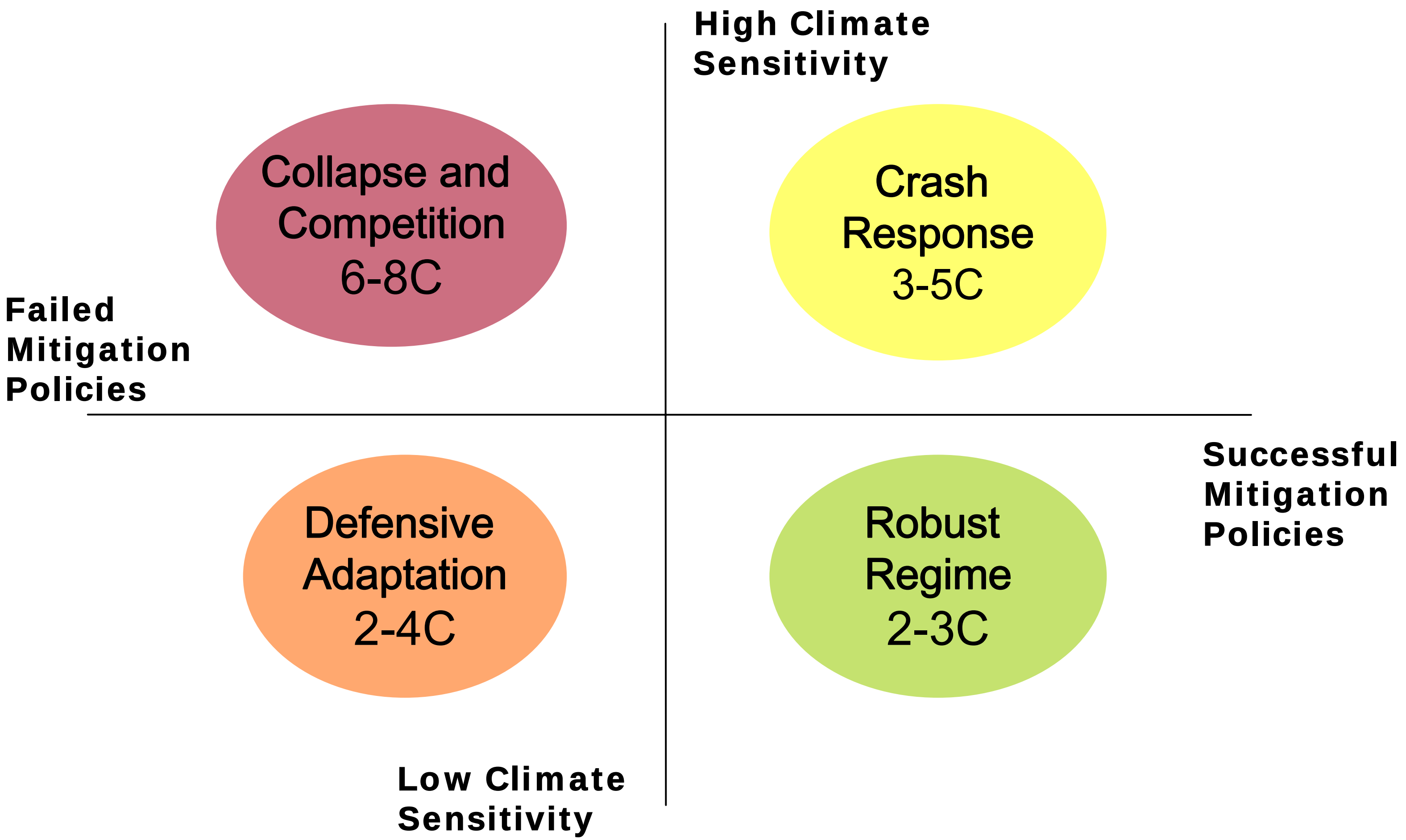

Could breach tipping points even if mitigation policy is successful

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Core Areas For Risk Management

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Monitoring Risks

- Defining critical climate security objectives against science-based scenarios
- New approaches to delivering up-to-date monitoring and analysis of critical risks at all levels: global, regional, national and local

Reducing Risks

- Investment in contingency plans to respond to worst case scenarios: technology and infrastructure programmes
- Strong system of international monitoring and verification of mitigation

Managing Risks

- Stronger international cooperation on transboundary issues
- Building effective shared approaches to improving resilience and response in conflict and instability prone areas

The Security Sector Priority Copenhagen Outcomes?

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- Clear understanding of the security consequences of worst case climate change scenarios
- Overall goal of maintaining a very high likelihood of avoiding temperature rise above 3C
- Strong mechanisms to monitor GHG emissions and mitigation actions
- Automatic review process responding to changes in climate science
- New mechanisms for ensuring more rapid and decision maker focused scientific assessment and monitoring of key tipping points
- Agreement on far higher investment in innovative and disruptive R,D&D in critical low carbon and adaptive technologies

Improving climate resilience

- Analysis of the proliferation implications of high nuclear build and any conditionality needed in the Copenhagen agreement on funding. Acceleration of Gen IV programme on lower risk technologies?

- Transatlantic agreement on how to handle key security related policy issues inside and outside UNFCCC framework:
  - Transboundary water management- adaptation funding conditionality?
  - Border issues – freeze at 1990 positions? Arctic and Law of the Sea?
  - Environmental refugees – framework for handling rights and responsibilities?

- Joint policy on response capability development and prevention of natural disasters in NATO; EU-AU; ASEAN; SAARC?

- Including conflict and security issues inside adaptation/conflict prevention programmes based on **4C warming scenario planning assumption**?

Security actors have strong interest in an effective climate regime

- The ambition and effectiveness of the global mitigation regime will determine climate change planning scenarios from 2030 onwards

- The use of adaptation funds could increase or decrease the risk of conflict in climate sensitive areas

- International treatment of border tensions, environmental refugees, transboundary resource issues, energy relationships

But need climate change discussions to address the worst case scenarios of most interest to security analysts