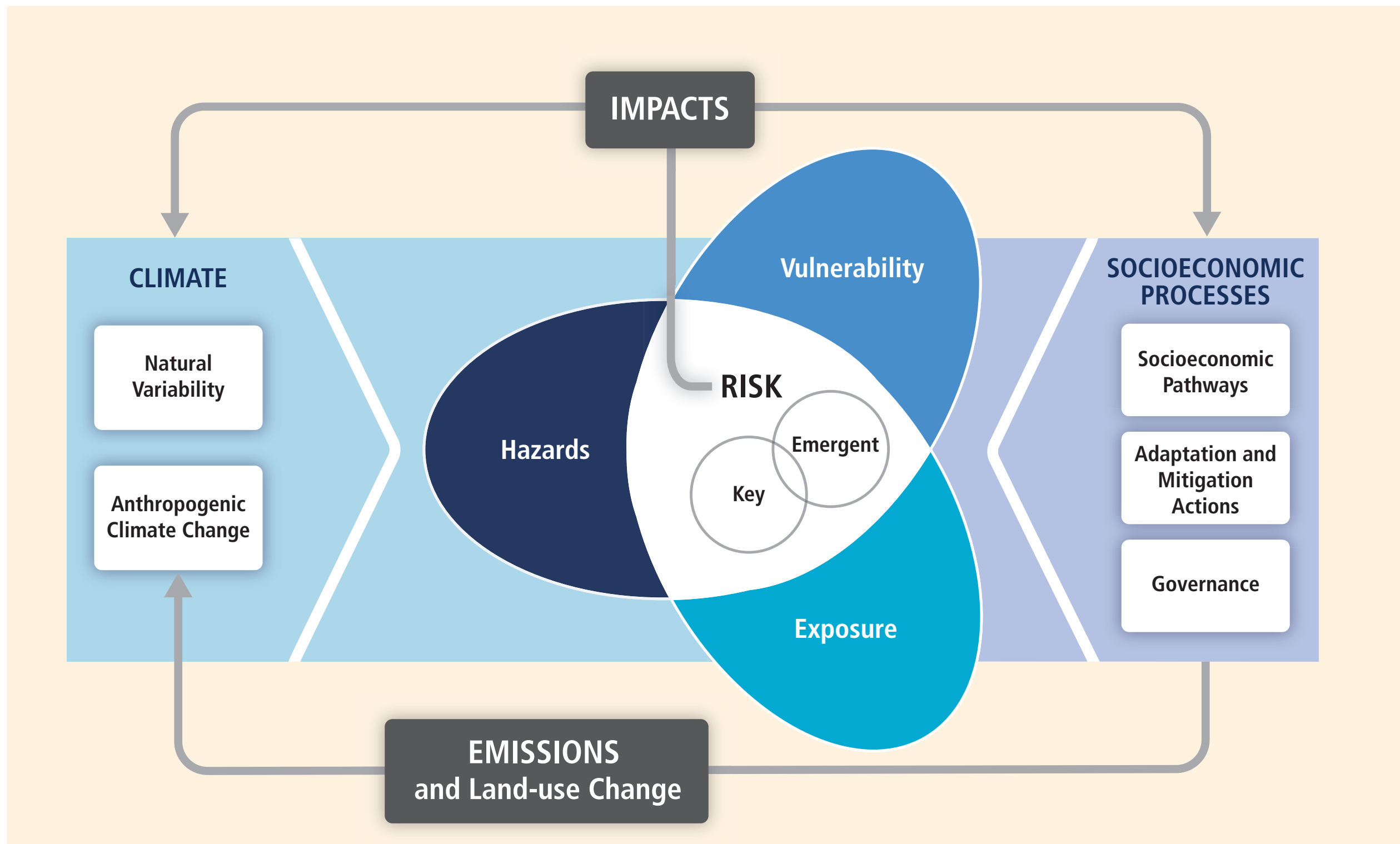


# **Key risks of climate change: Reasons for concern**

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Rutgers Energy Institute

May 4, 2016



**Figure 19-1** | Schematic of the interaction among the physical climate system, exposure, and vulnerability producing risk. The figure visualizes the different terms and concepts discussed in this chapter. Risk of climate-related impacts results from the interaction of climate-related hazards (including hazardous events and trends) with the vulnerability and exposure of human and natural systems. The definition and use of “key” and “emergent” are indicated in Box 19-2 and the Glossary. Vulnerability and exposure are, as the figure shows, largely the result of socioeconomic pathways and societal conditions (although changing hazard patterns also play a role; see Section 19.6.1.1). Changes in both the climate system (left side) and socioeconomic processes (right side) are central drivers of the different core components (vulnerability, exposure, and hazards) that constitute risk (modified version of SREX Figure SPM.1 (IPCC, 2012a)).

# Identifying key risks

**Key risks** are potentially severe adverse consequences for humans and social-ecological 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.

# Identifying key risks

**Key risks** are potentially severe adverse consequences for humans and social-ecological 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.

## **Criteria:**

1. Large magnitude, high probability, or irreversibility of impacts
2. Timing of impacts
3. Persistent vulnerability or exposure contribution to risks
4. Limited potential to reduce risks through adaptation or mitigation

# Identifying key risks

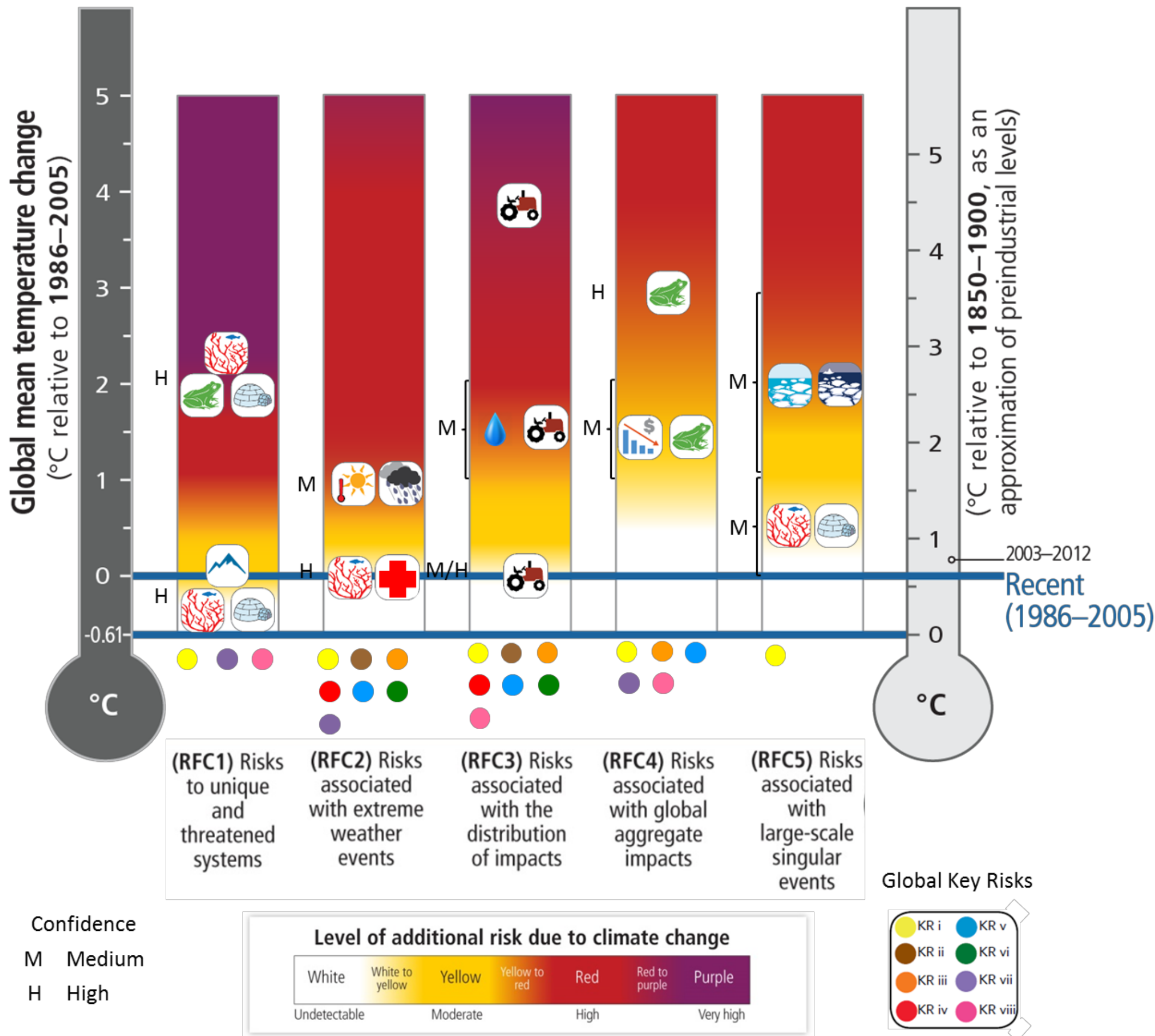
**Key risks** are potentially severe adverse consequences for humans and social-ecological systems resulting from the interaction of climate-related hazards with vulnerabilities of societies and systems exposed. Risks are considered “key” due to high hazard or high vulnerability of societies and systems exposed, or both.

## **Criteria:**

1. Large magnitude, high probability, or irreversibility of impacts
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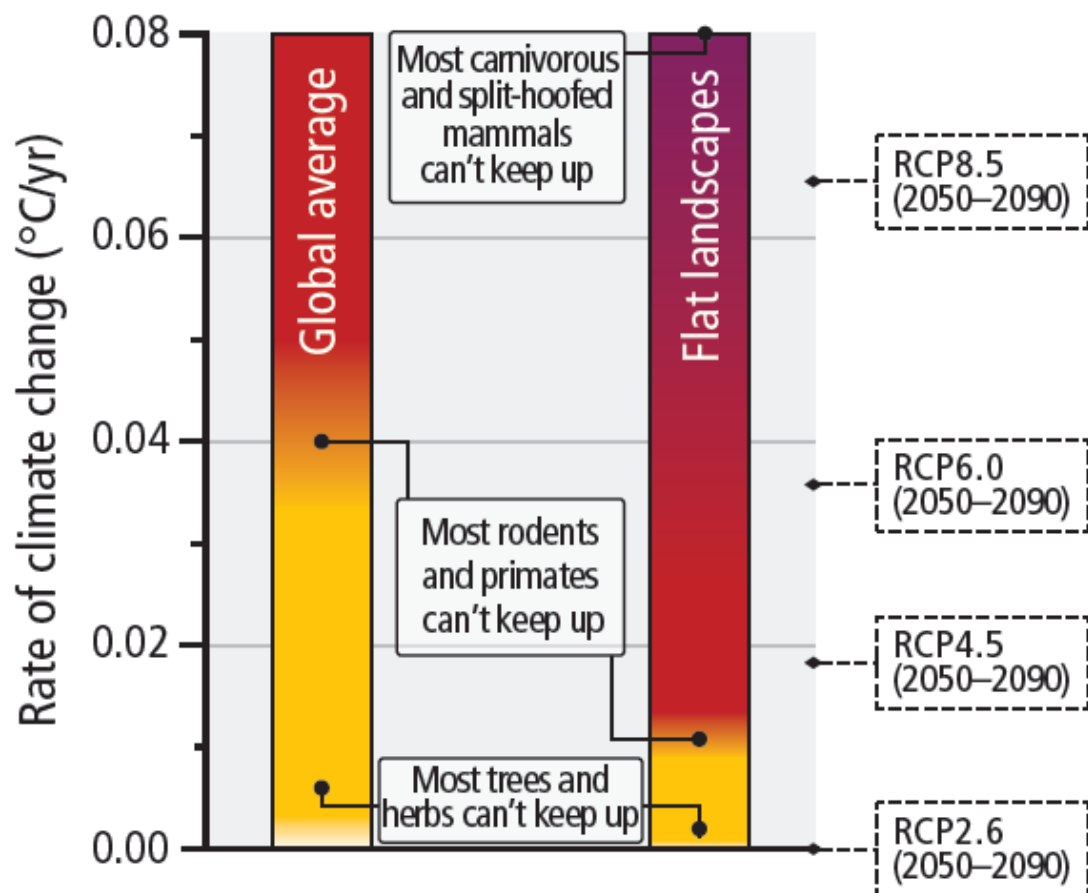
## **Reasons for Concern:**

1. Risks to unique, threatened systems
2. Risks associated with extreme weather events
3. Risks associated with distribution of impacts
4. Risks associated with global aggregate impacts
5. Risks associated with large-scale singular events

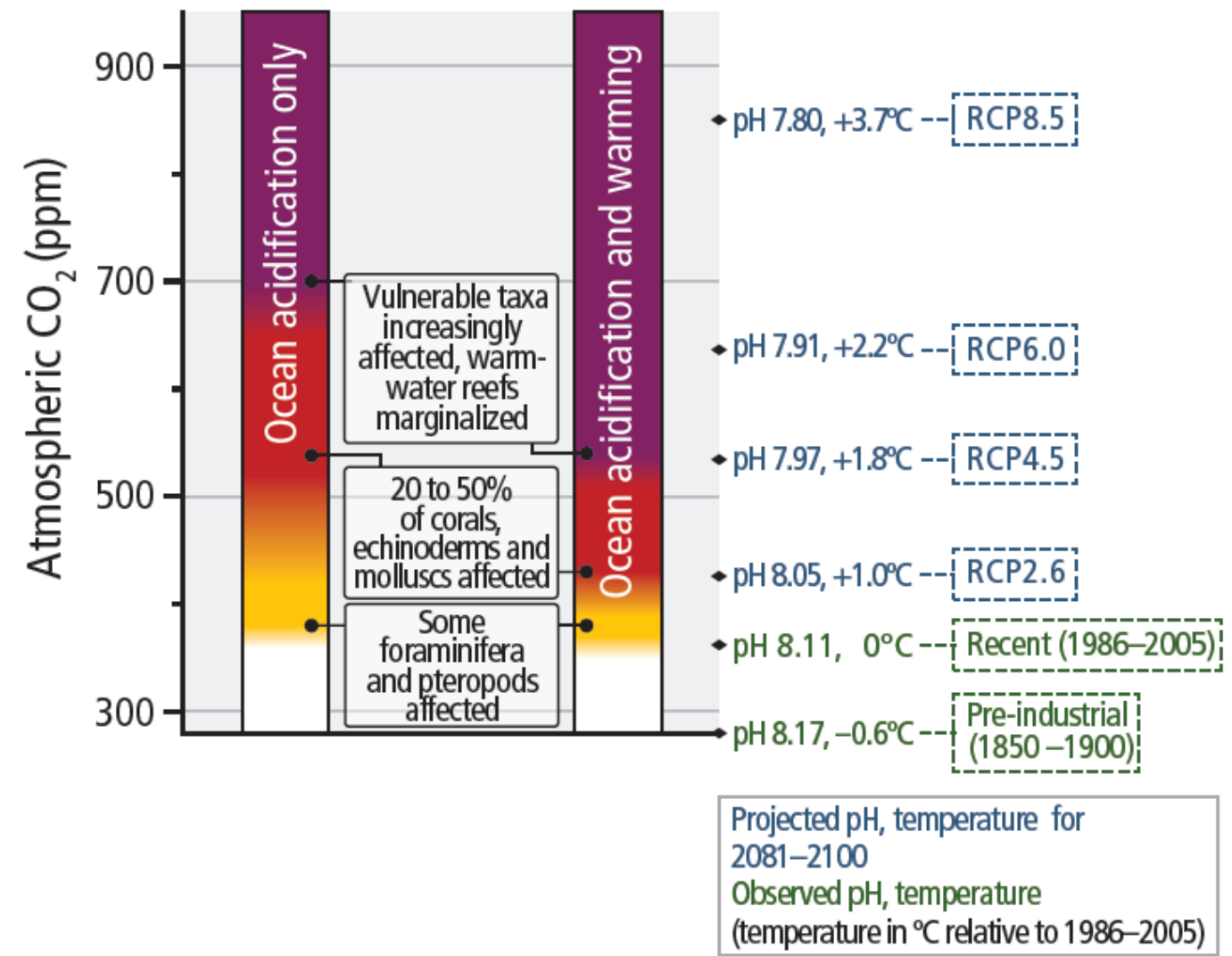


# It's not just temperature

(a) Risk for terrestrial and freshwater species impacted by the rate of warming



(b) Risk for marine species impacted by ocean acidification only, or additionally by warming extremes

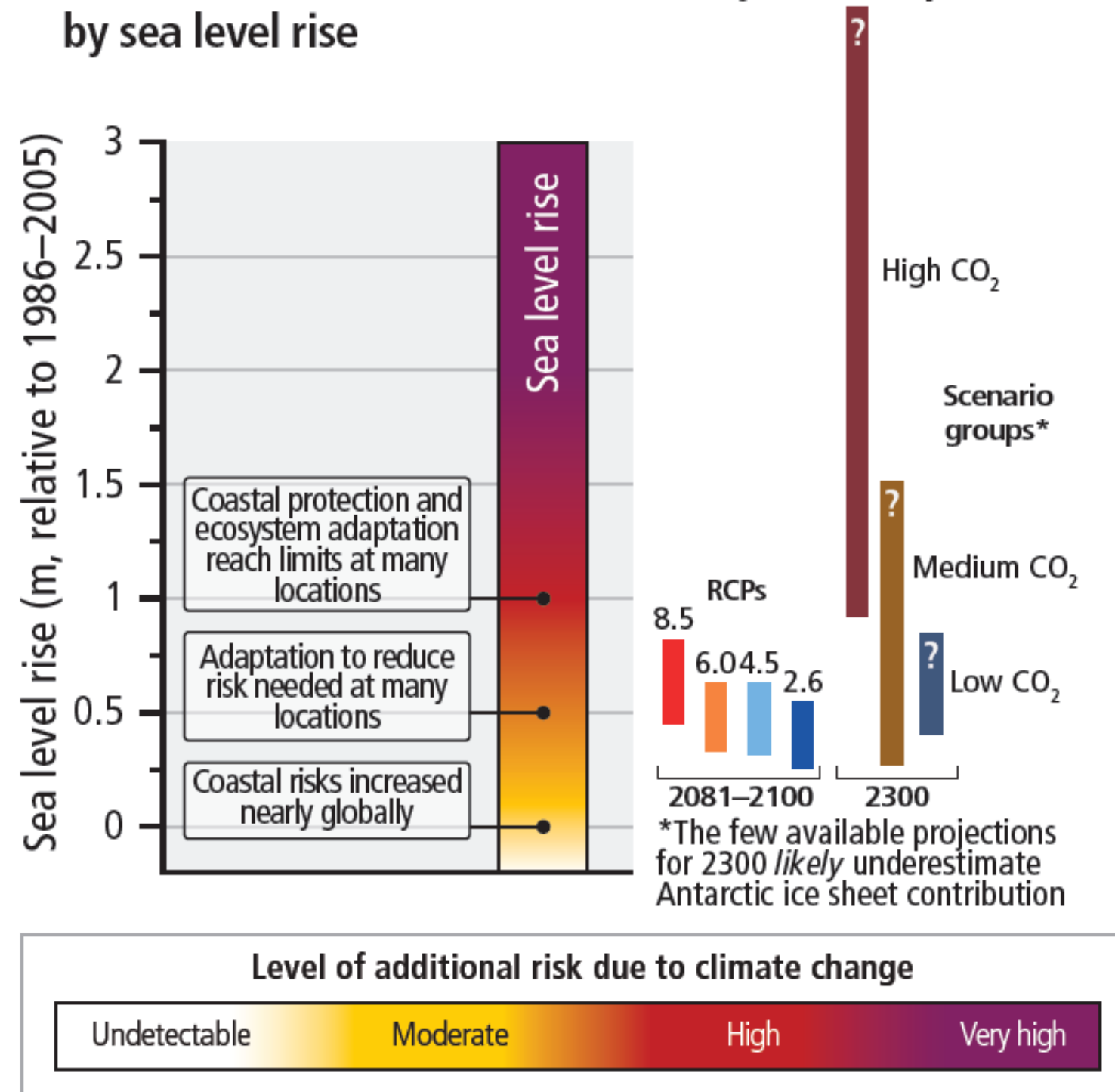




# It's not just temperature

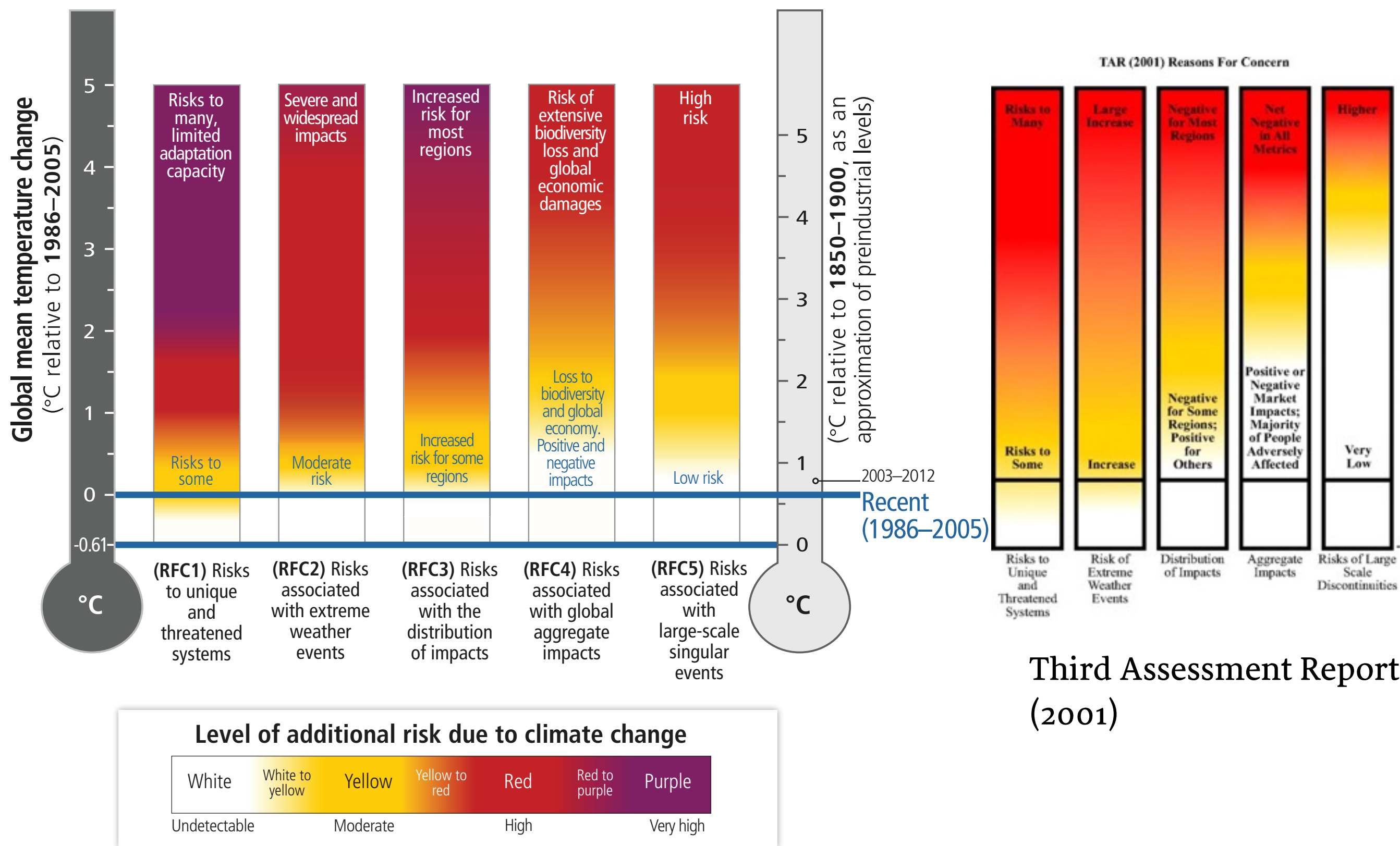
5.2.2.1

(c) Risk for coastal human and natural systems impacted by sea level rise



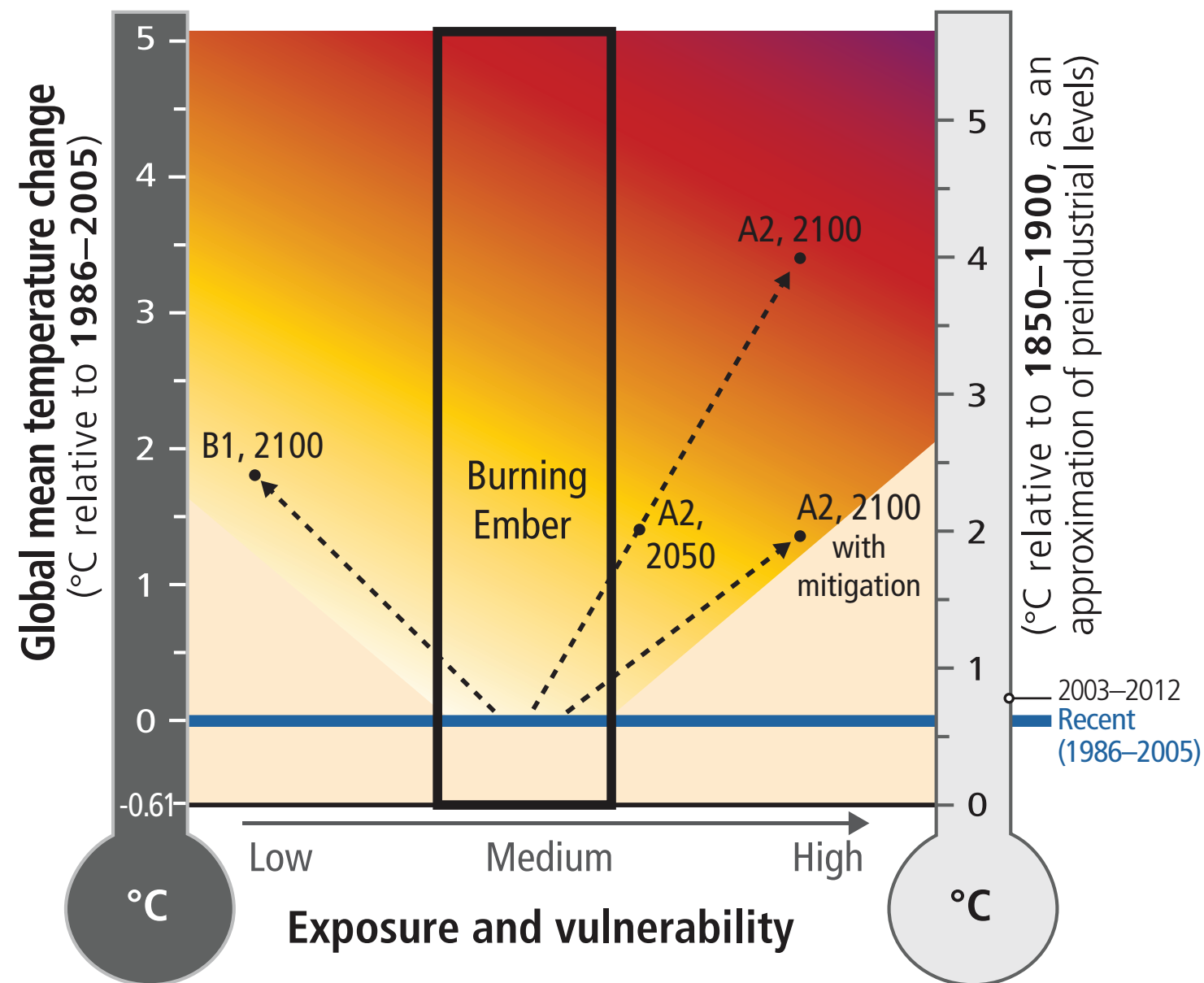


# As we've learned more, risks generally perceived as higher

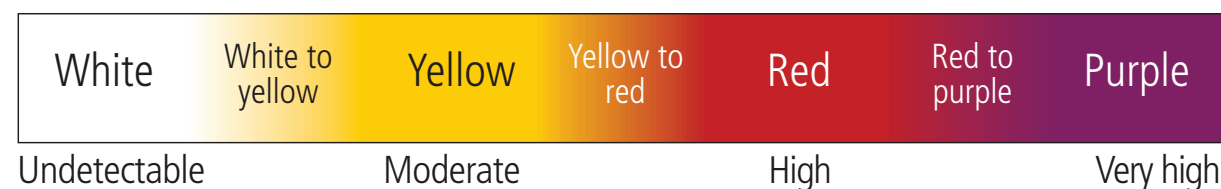


Third Assessment Report  
(2001)

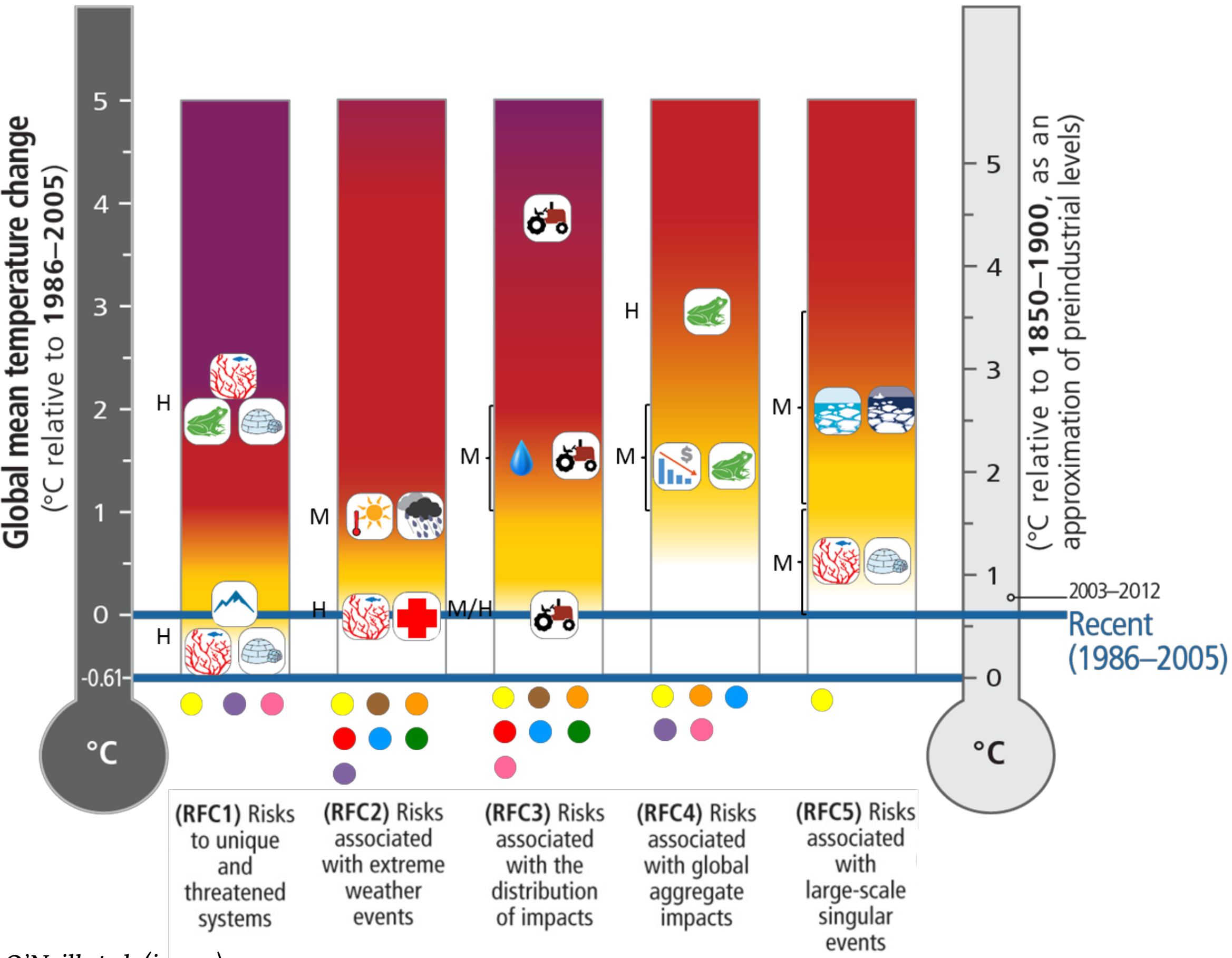
# Risks depend on vulnerability, not just on physical change



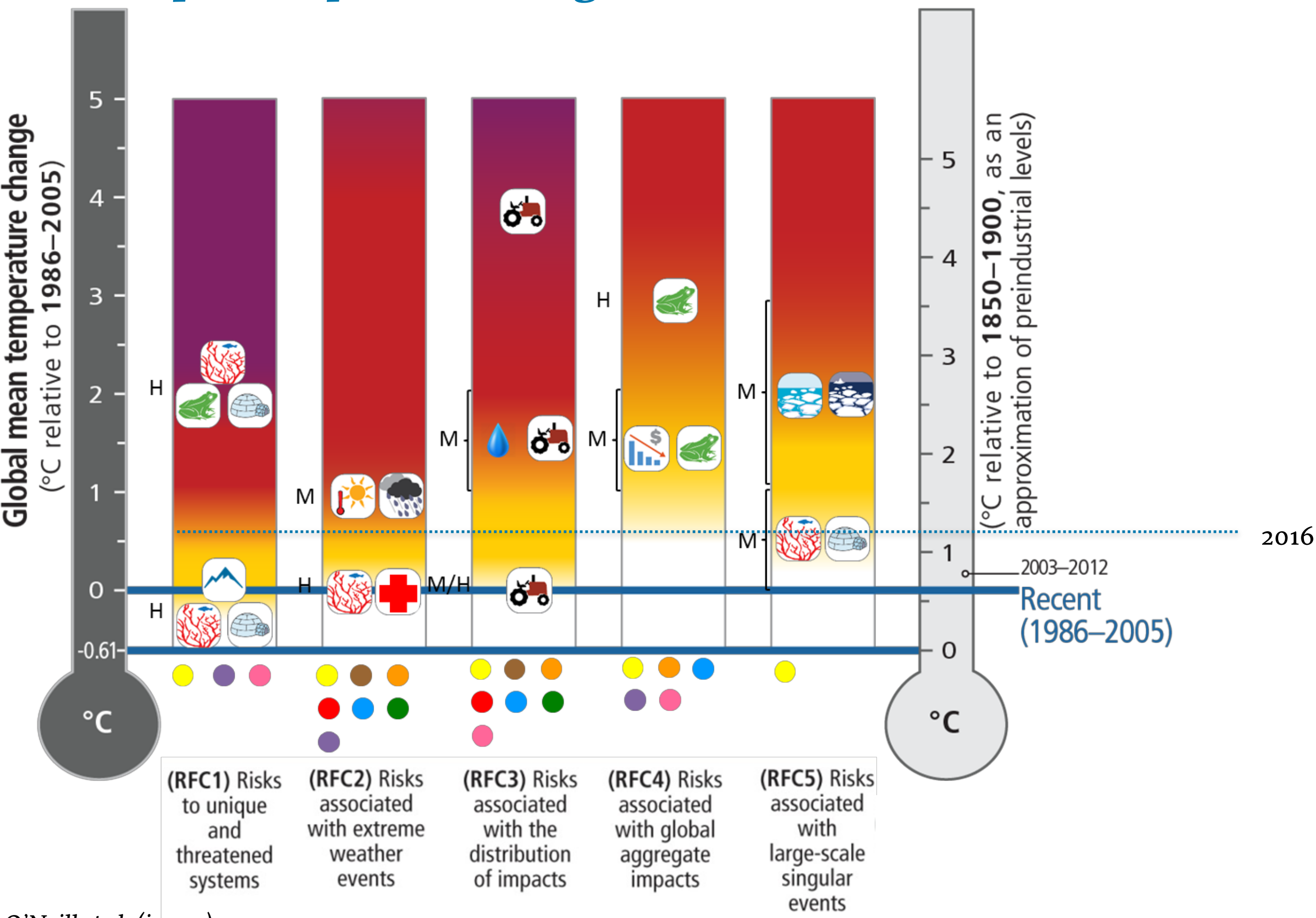
## Level of additional risk due to climate change



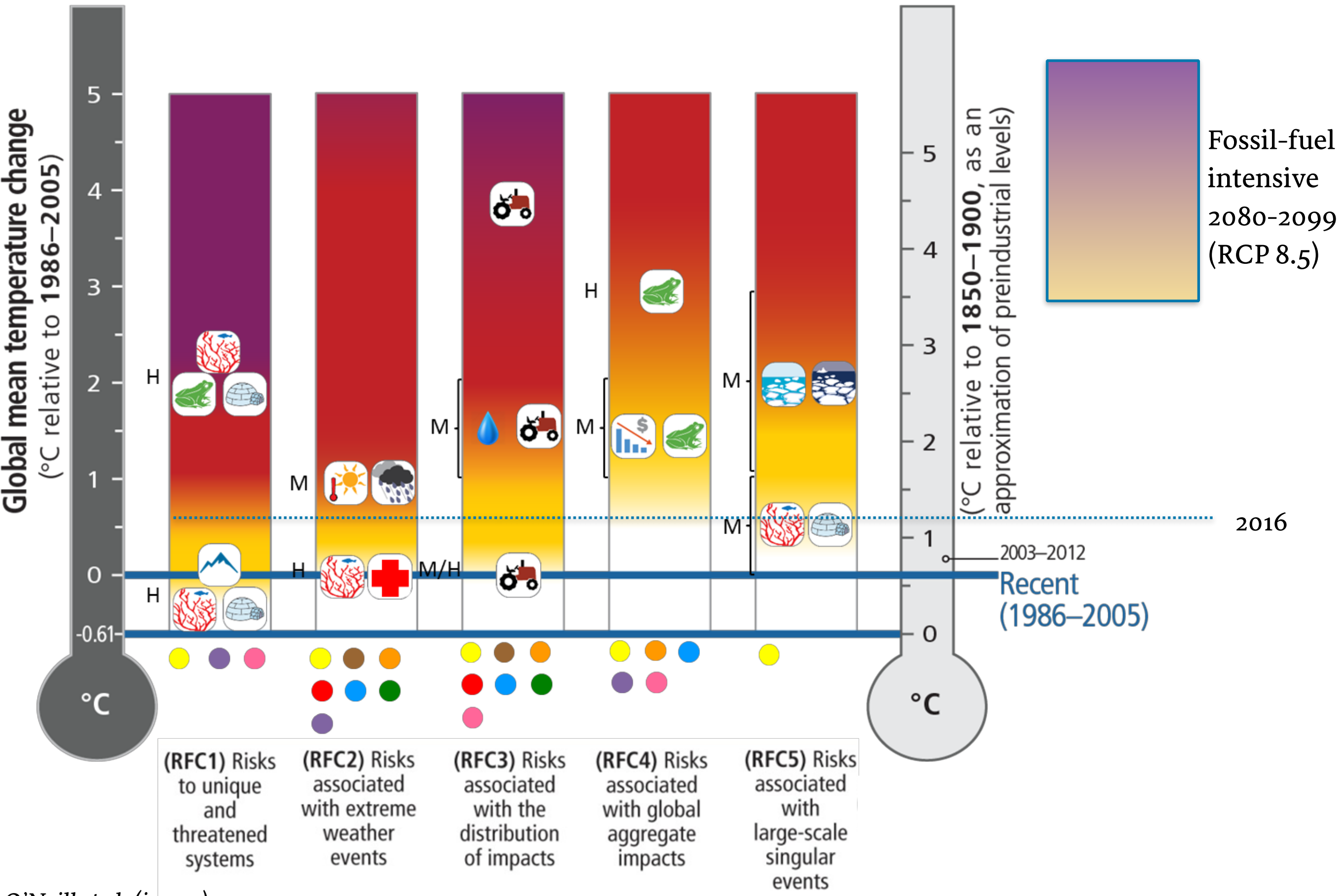
# Risk depends upon our mitigation choices



# Risk depends upon our mitigation choices

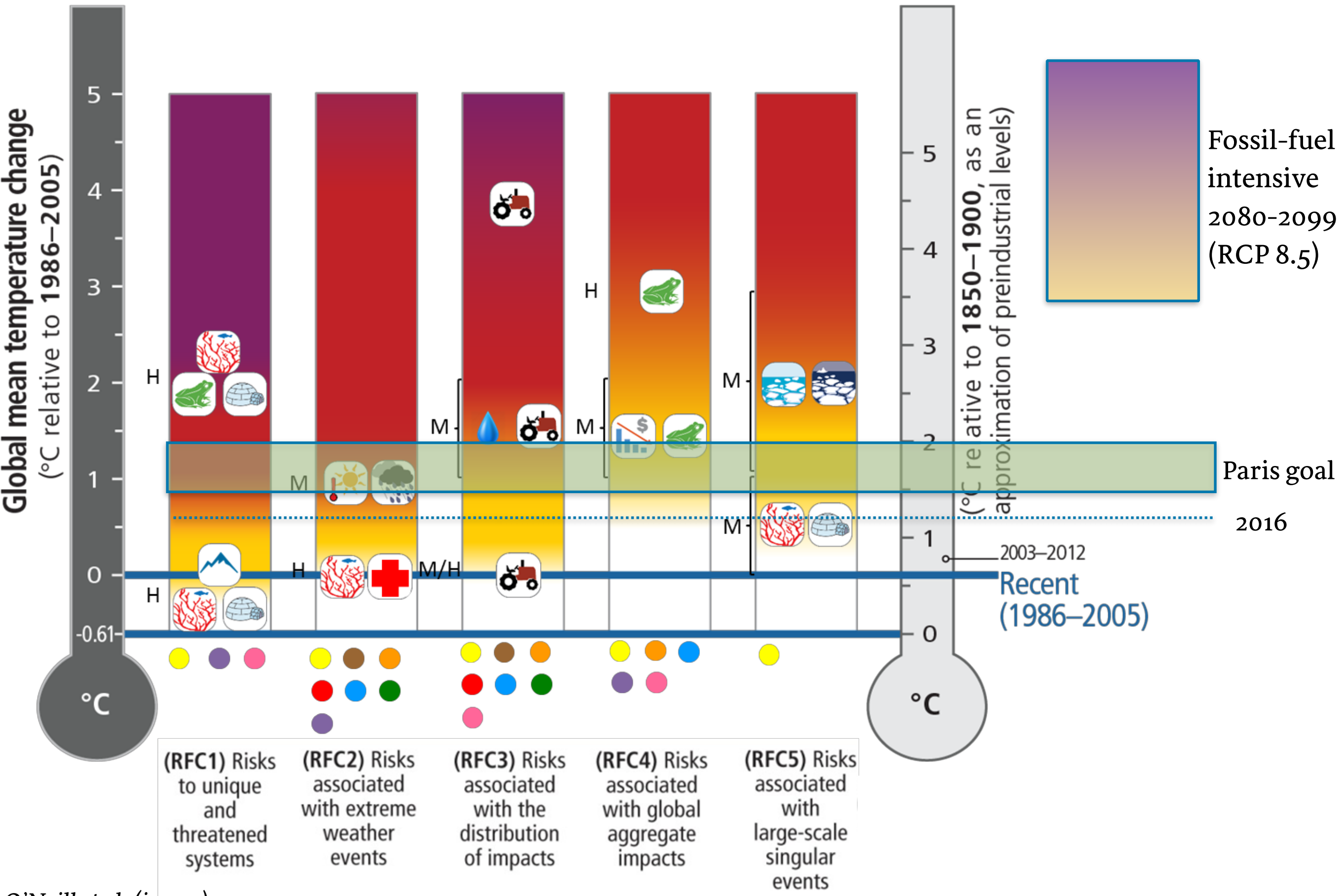


# Risk depends upon our mitigation choices





# Risk depends upon our mitigation choices



# Key risks of climate change: Reasons for concern

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May 4, 2016





		Reason for Concern				
Overarching Key Risk	Description	1	2	3	4	5
i	Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands, due to storm surges, coastal flooding, and sea level rise.	✓	✓	✓	✓	✓
ii	Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding in some regions.		✓	✓		
iii	Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services.		✓	✓	✓	
iv	Risk of mortality and morbidity during periods of extreme heat, particularly for vulnerable urban populations and those working outdoors in urban or rural areas.		✓	✓		
v	Risk of food insecurity and the breakdown of food systems linked to warming, drought, flooding, and precipitation variability and extremes, particularly for poorer populations in urban and rural settings.		✓	✓	✓	
vi	Risk of loss of rural livelihoods and income due to insufficient access to drinking and irrigation water and reduced agricultural productivity, particularly for farmers and pastoralists with minimal capital in semi-arid regions.		✓	✓		
vii	Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic.	✓	✓		✓	
viii	Risk of loss of terrestrial and inland water ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for livelihoods.	✓		✓	✓	

		Reason for Concern					<b>Reasons for Concern</b>  1: To unique, threatened systems  2: Associated with extreme weather events  3: Associated with distribution of impacts  4: Associated with global aggregate impacts  5: Associated with large-scale singular events
Overarching Key Risk	Description	1	2	3	4	5	
i	Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands, due to storm surges, coastal flooding, and sea level rise.	✓	✓	✓	✓	✓	
ii	Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding in some regions.		✓	✓			
iii	Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services.		✓	✓	✓		
iv	Risk of mortality and morbidity during periods of extreme heat, particularly for vulnerable urban populations and those working outdoors in urban or rural areas.		✓	✓			
v	Risk of food insecurity and the breakdown of food systems linked to warming, drought, flooding, and precipitation variability and extremes, particularly for poorer populations in urban and rural settings.		✓	✓	✓		
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vii	Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic.	✓	✓		✓		
viii	Risk of loss of terrestrial and inland water ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for livelihoods.	✓		✓	✓		

# Defining transitions in reasons for concern

**Undetectable** to **Moderate**: at least medium confidence that impacts are both detectable and attributable to climate change, while also accounting for the magnitude of the risk and the other criteria noted above

**Moderate** to **High risk**: impacts become severe and widespread

**High** to **Very High**: risk is high according to all criteria and in particular the ability to adapt is limited

# Risks depend on vulnerability, not just on physical change

