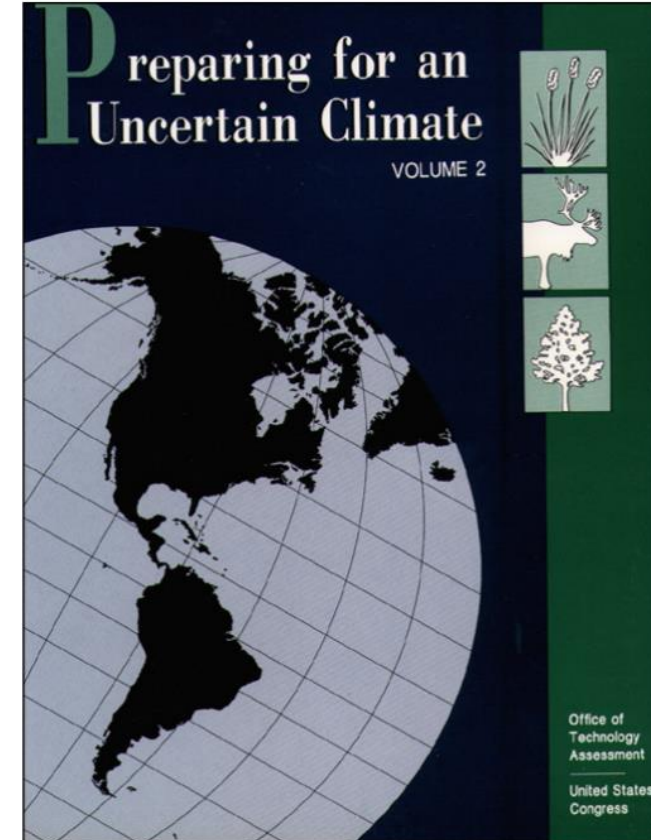
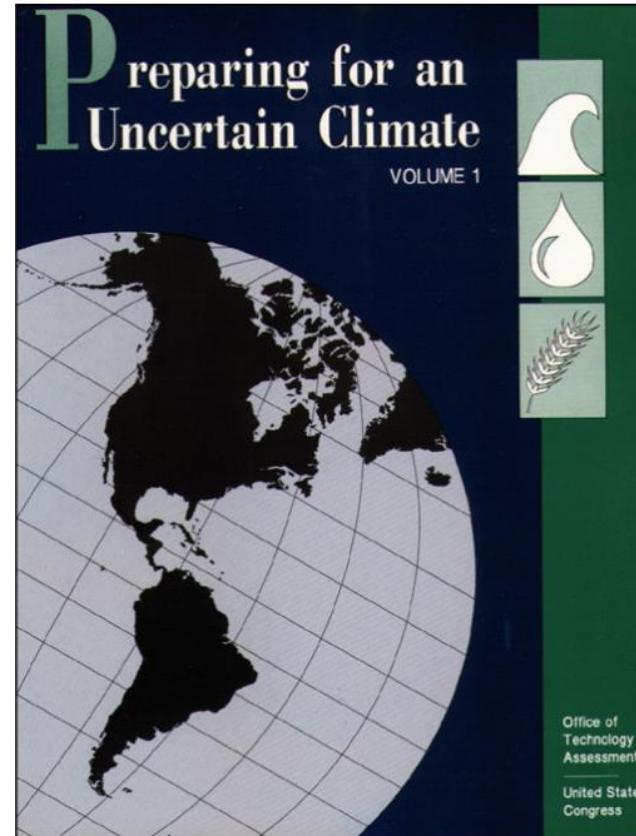


Delay and Pay... or Plan and Prosper

Adaptation is not a new concern.
Three Committee of the Congress
requested a report on how to
adapt to climate change
....in 1992.



EESI
Environmental and Energy
Study Institute



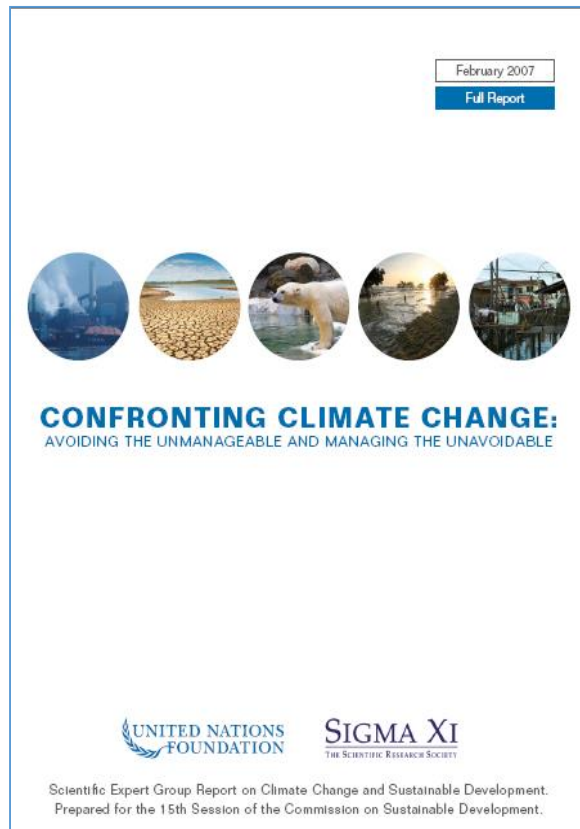
EESI Briefing, November 1, 2019
Rosina Bierbaum, Professor
University of Maryland; University of Michigan

Early Reports done for the UN & World Bank on the importance of Adaptation:

- Most impacts will be negative
- Water resources, coastal infrastructure, health, agriculture, and ecosystems will be challenged in virtually every region of the globe.
- Enhanced preparedness/response strategies are a global priority.
- Both mitigation and adaptation are needed because:

Done
for the
UN
and
Ban Ki
Moon

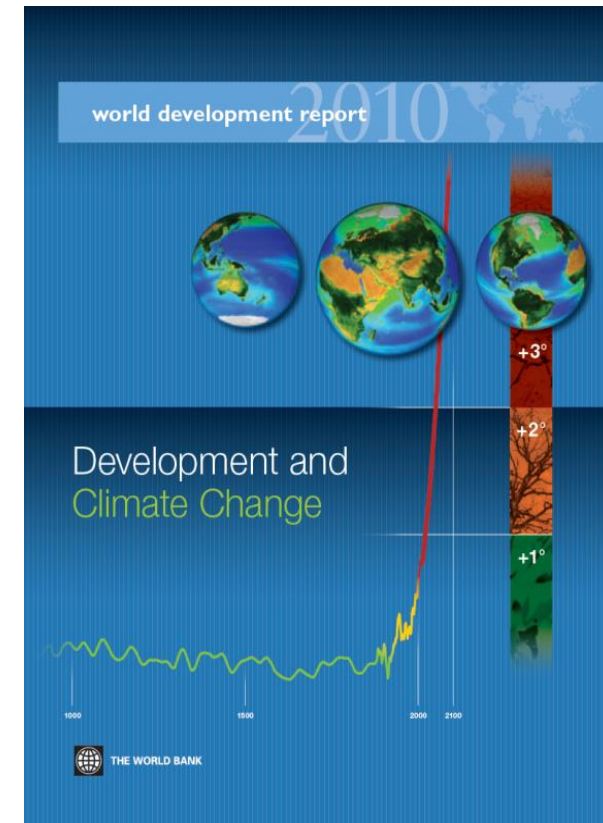
2007



- It's already too late to avoid substantial climate change.
- Most adaptation measures more costly and less effective as magnitude increases.

<http://www.unfoundation.org/global-issues/climate-and-energy/sigma-xi.html>

<http://worldbank.org/wdr/2010>



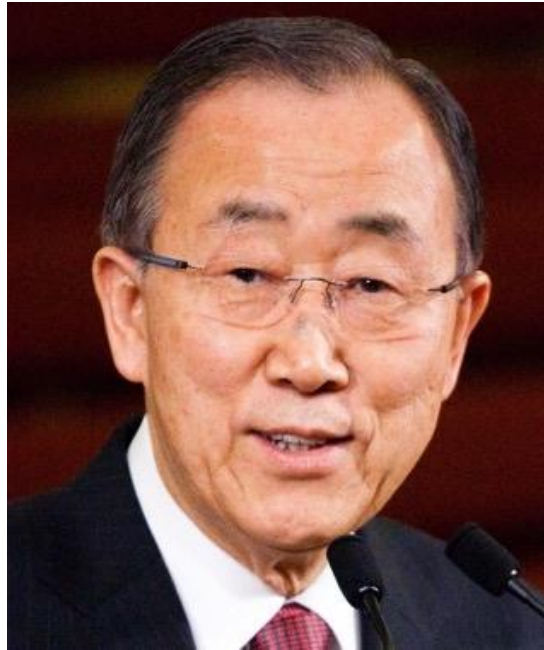
Done
for
WB
and
Jim
Kim

2010

THE GLOBAL COMMISSION



Kristalina Georgieva



Ban Ki-moon



Bill Gates

MANAGING PARTNERS:

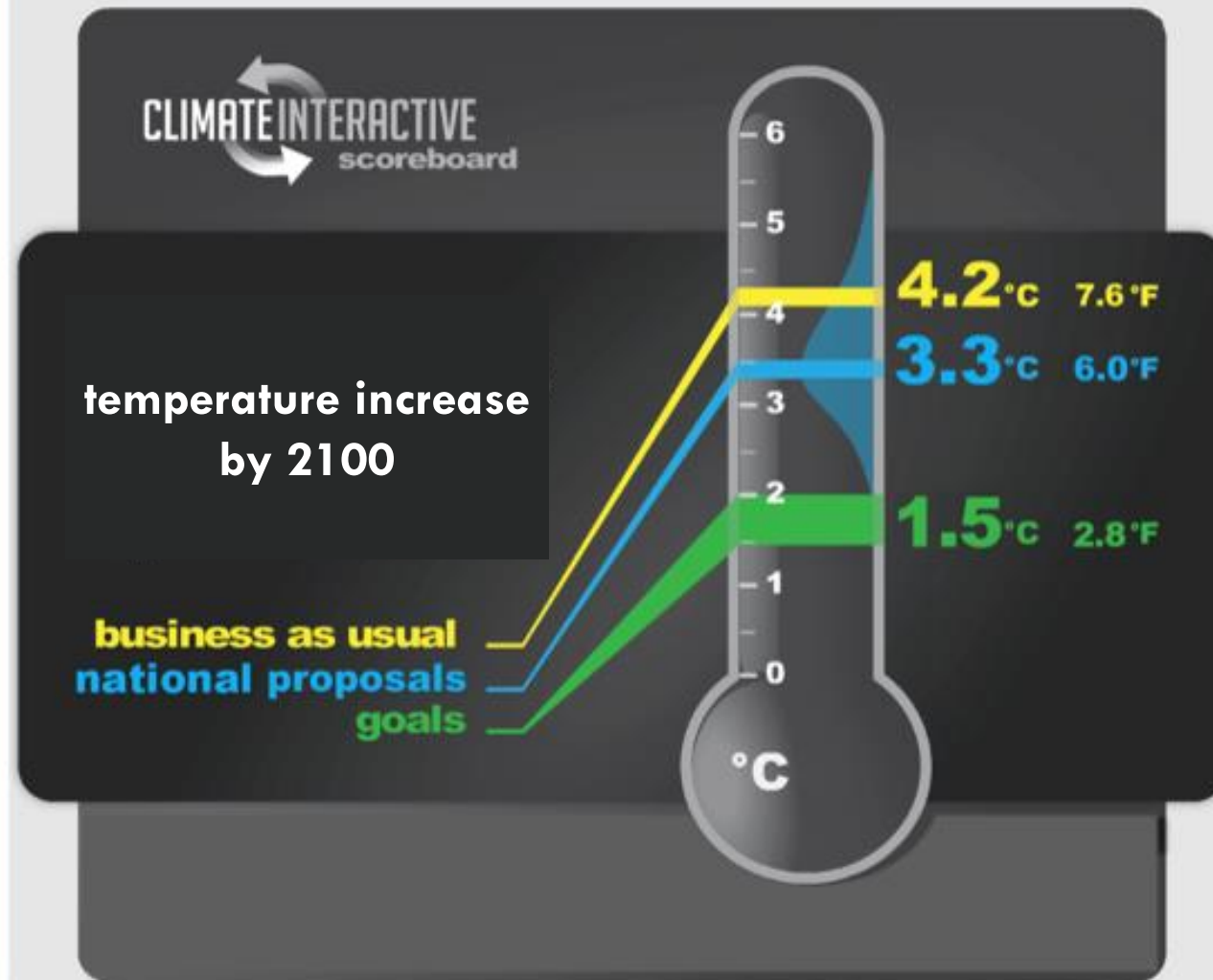


WORLD
RESOURCES
INSTITUTE

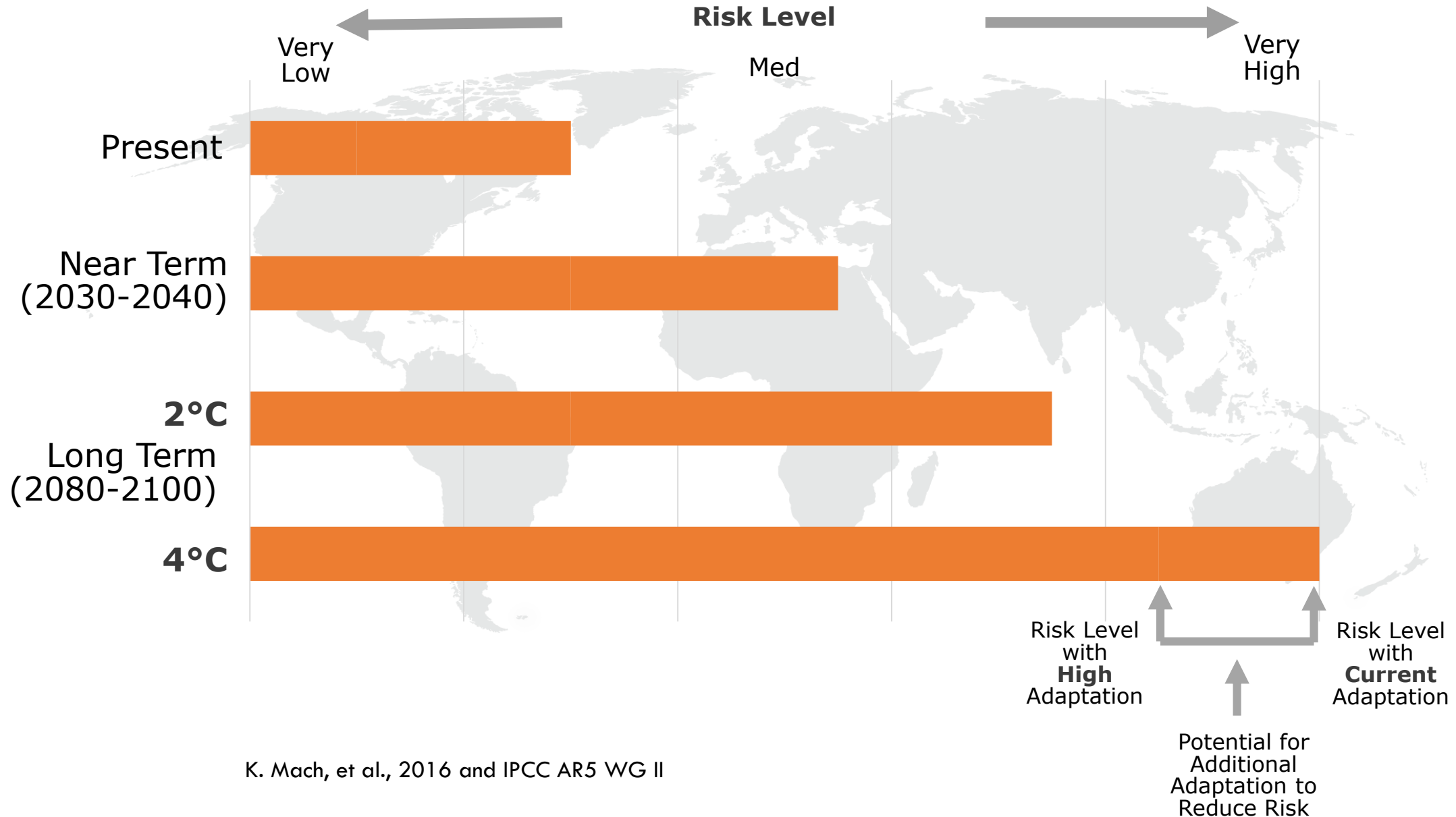


GLOBAL
CENTER ON
ADAPTATION

Based on current commitments, global average temperatures will exceed 3°C, compared to preindustrial levels.



Risk levels and potential for risk reduction



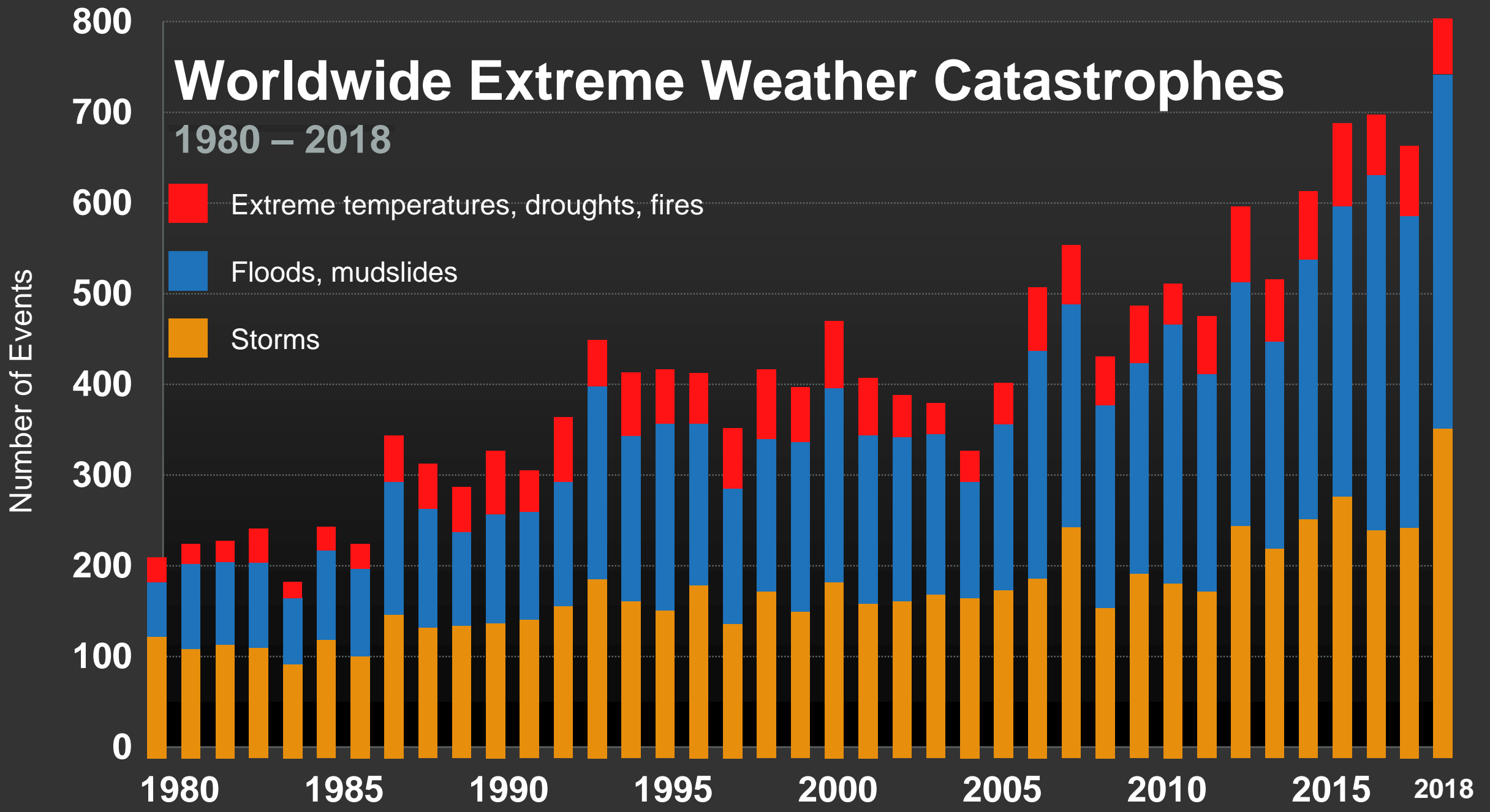
Physical Changes are causing societal impacts today

- Ideal ranges for **crops, forests, & pests** are shifting
- Timing, quantity and quality of **water** less predictable
- **Extreme weather events** are increasing costs:
 - ❖ crop losses from floods and droughts; forest die-offs
 - ❖ health problems from heat, smog & increased pest ranges
 - ❖ coastal erosion and infrastructure loss
 - ❖ increased energy disruption
 - ❖ global supply chain interruptions



Worldwide Extreme Weather Catastrophes

1980 – 2018



Current impacts on people and ecosystems

Hurricanes / typhoons getting stronger

- 10/12: Sandy, largest ever in Atlantic
- 11/13: Haiyan, strongest ever in N Pacific
- 10/15: Patricia, strongest ever worldwide
- 02/16: Winston, strongest ever in S Pacific
- 04/16: Fantala, strongest ever in Indian Ocean
- 10/17: Ophelia, strongest ever in E Atlantic
- 09/19: Dorian, strongest ever in N Atlantic

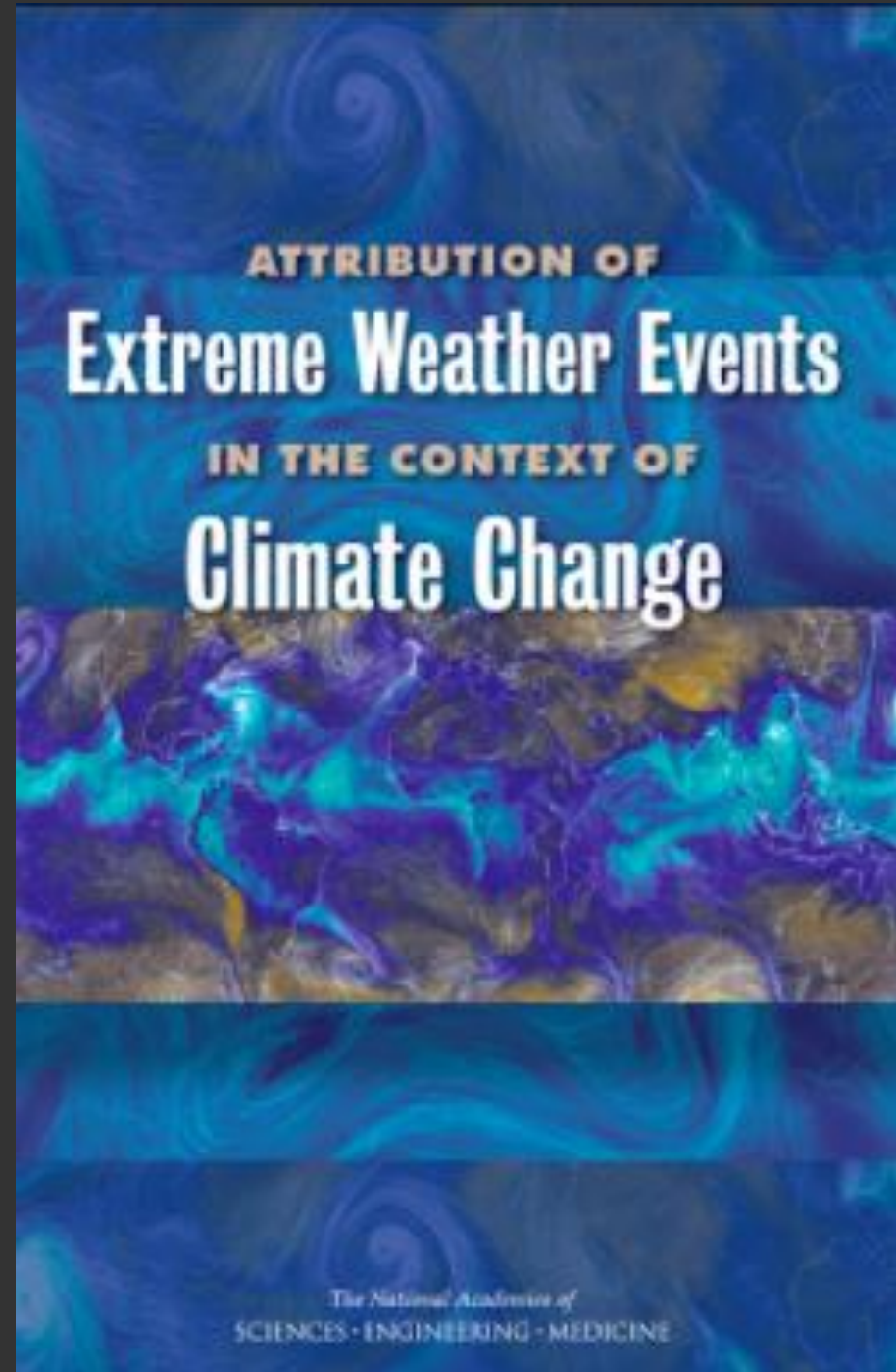


Their energy comes from the warming surface layer of the ocean.

NAS Report:

“In the past, a typical climate scientist’s response to questions about climate change’s role in any given extreme weather event was ‘we cannot attribute any single event to climate change.’ **The science has advanced to the point that this is no longer true as an unqualified blanket statement.**”

- *National Academies, March, 2016*



Louisiana Heavy Rainfall

- Heaviest rains August 11-13th. As much as **2 feet of rain** fell on parts of **Baton Rouge**.
- Worst U.S. natural disaster since **Superstorm Sandy**.
- **Attribution analysis** with NOAA and World Weather Attribution
- **Changed climate** made that event **40% more likely**



Baton Rouge, Aug. 2016

Recent Events Illustrate Energy Sector Vulnerabilities to Extreme Weather and Climate

- **Lower water levels**
Reduced hydropower



- **Wildfires:**
Damaged transmission lines



- **Flooding:** Impacts on inland power plants



- **Water restrictions due to drought**
Limiting power, oil and gas production



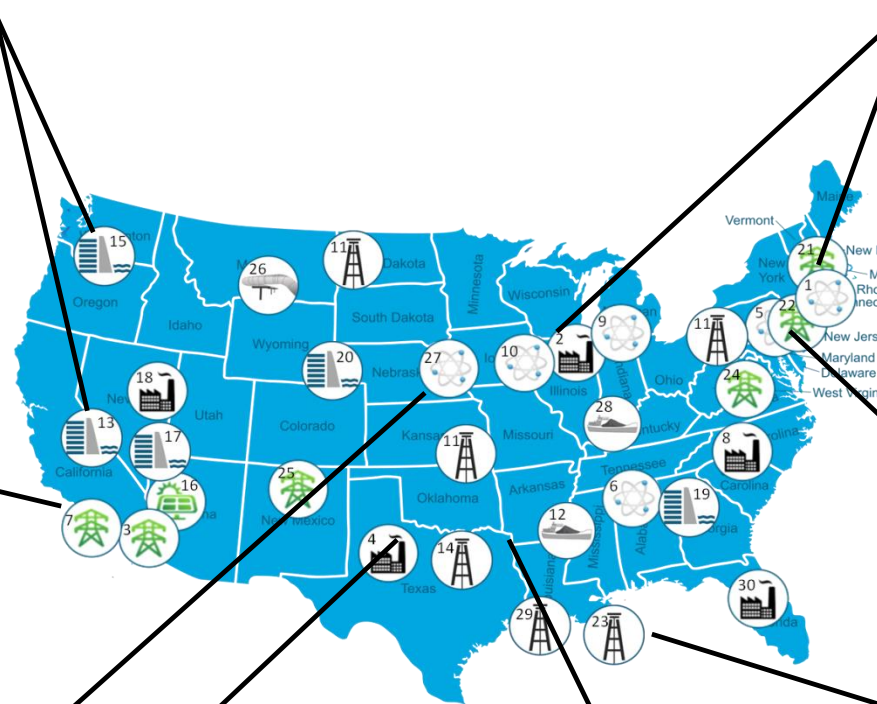
- **Cooling water intake or discharge too hot:** Power plants shutdown or power down



- **Intense storms:** Disrupted generation transmission/distribution, & oil and gas operations



- **Lower river levels:** Restricted barge transportation of coal and petroleum products



Pentagon warns of threat to bases from climate change

BY ELLEN MITCHELL - 01/18/19 02:39 PM EST

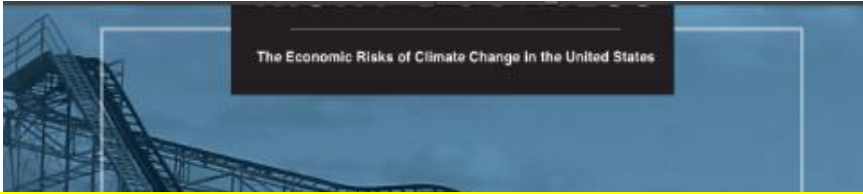
334 C

A Pentagon report reveals that more than two-thirds of operationally critical military installations are threatened by the effects of climate change over the next 20 years, including repeated flooding and wildfires.



▲ 'Climate change doubt would have burned with

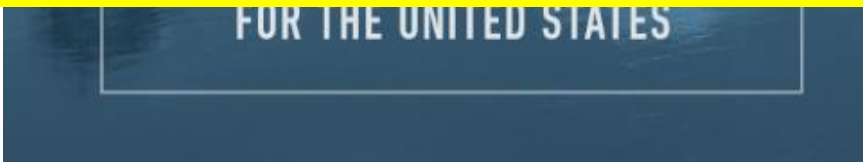
nd 2015, relative to what
er/Getty Images



Higher sea levels/storm surge increase the annual cost of coastal storms along the Eastern Seaboard & the Gulf by **\$2 billion to \$3.5 billion in another decade.**

By 2050, between **\$66 billion and \$106 billion** worth of property will likely be below sea level nationwide.

By 2100, that figure could be **\$238 billion to \$507 billion.**



Investors with \$32 trillion at stake sound the alarm on climate change

415 investors, including HSBC ([HSBC](#)), Nomura Asset Management and UBS Asset Management.

PG&E, utility tied to wildfires, will file for bankruptcy

EDITOR'S PICK | 12,282 views | Jan 18, 2019, 12:21pm

PG&E: The First S&P 500 Climate Change Casualty



Erik Kobayashi-Solomon Contributor ⓘ
Markets



January 15, 2019



Climate is the biggest risk to business (and the world)

By [Ivana Kottasová](#), [CNN Business](#) January 17, 2019 DAVOS