IEc

Research Frontier Panel: Extending the Understanding and Usefulness of US National Economic Impact Analyses

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Three areas for frontier research (circa 2014)

1. Climate stressors – more focus on extreme events

2. Expand coverage of effects categories (e.g., health and ecosystem effects)

3. Address broader class of effects (indirect and inter-sectoral)

Source:
James E. Neumann and Kenneth Strzepek (2014). State of the literature on the economic impacts of climate change in the United States. *Journal of Benefit-Cost Analysis*, 5, pp 411-443 doi:10.1515/jbca-2014-9003

4. Address adaptation comprehensively, in economic terms

Methodology


Full probability distribution, tail risks


Market impacts


Quality of life


Biodiversity, ecosystem loss


Ecosystem services


International trade

Other Impacts


Water supply and demand


National Security


International civil conflict


Aid and disaster relief


Tourism, outdoor recreation


Fisheries


Forests


Wildfire

Impacts

Coastal Damages


Innundation from sea-level rise


Hurricanes and nor'easters


Changes in hurricane activity


Transportation


Infrastructure

Health


Heat/Cold-related mortality


Respiratory impacts


Extreme weather


Vector and water-borne disease

Agriculture


Grains, Soy, Cotton yields


Other crops: fruit, vegetables, nuts


Livestock

Energy


Energy demand


Energy supply

Labor Productivity


Hours worked


Labor quality, health impacts

Crime


Property crime

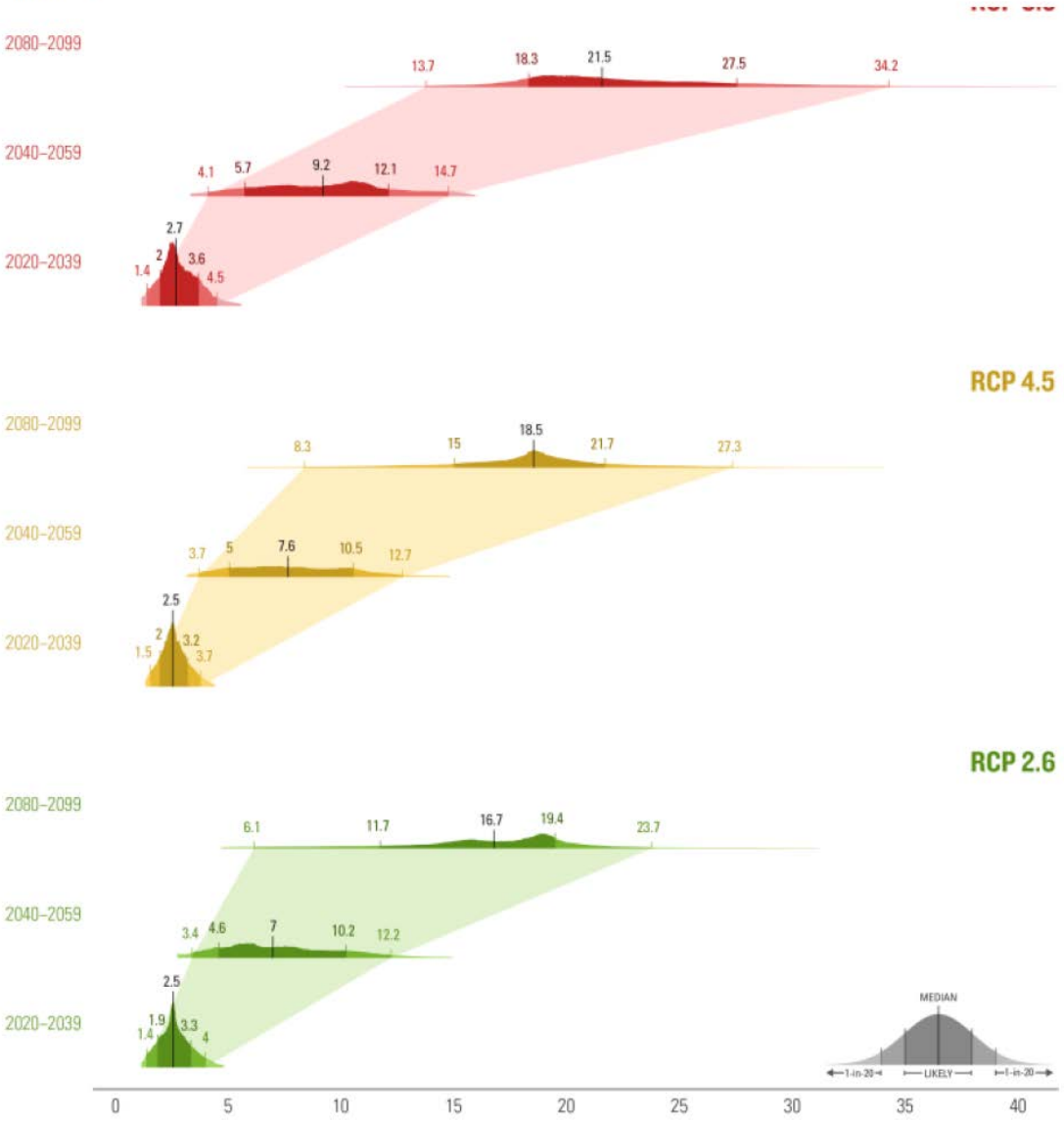

Violent crime


Included


Limited


Excluded

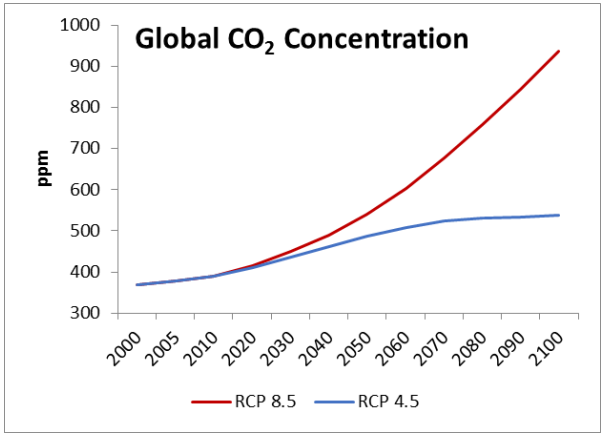
Risky Business – Probabilistic Results



Source: Rhodium Group (2014), *American Climate Prospectus*

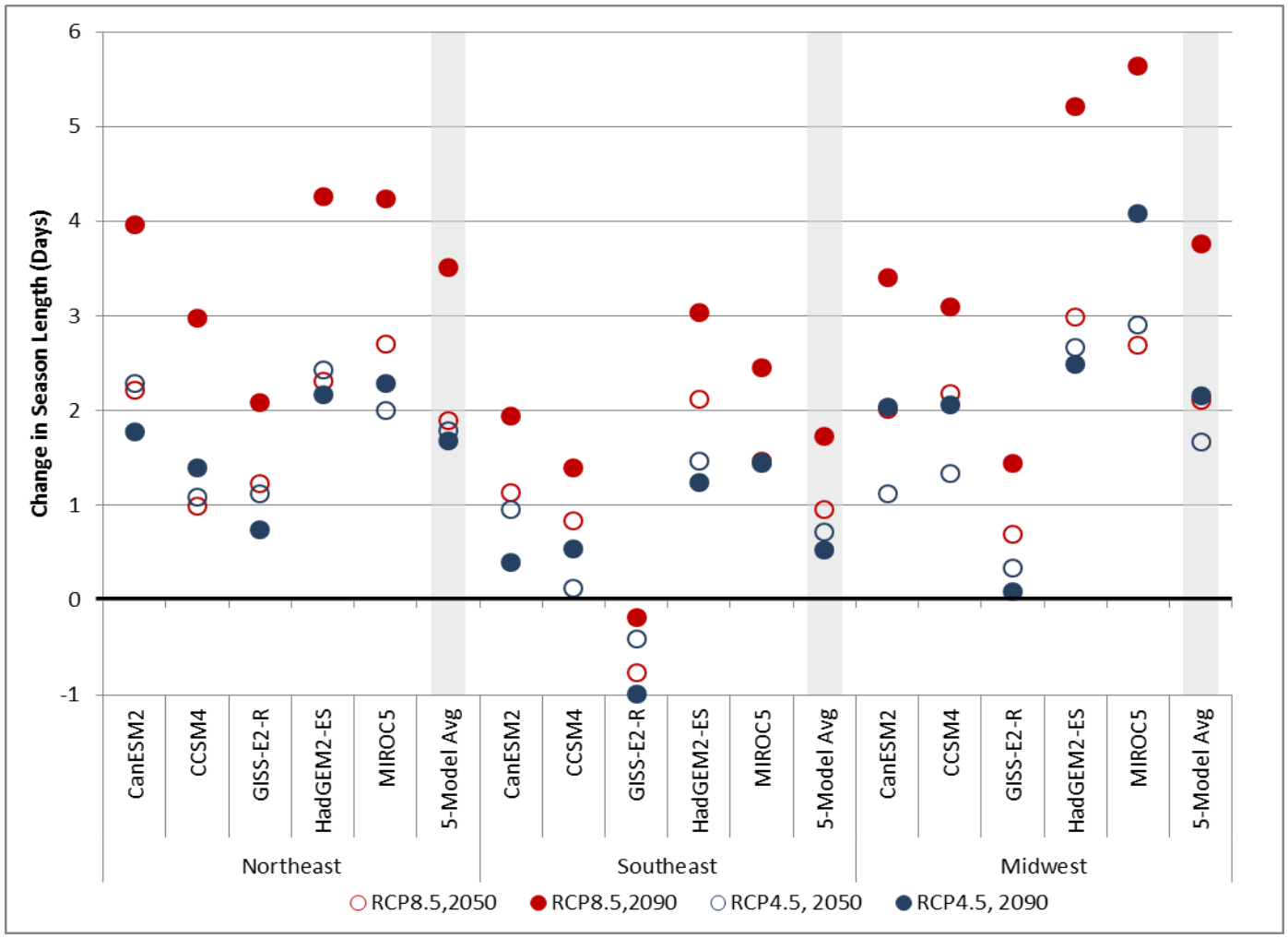
Latest NCA research employs best practices

- Coordinated, RCP emissions scenarios, using multiple GCMs chosen to reflect uncertainty
- Expanding coverage, especially in health
- Addressing extreme events to greater extent (coastal storm surge, extreme heat, various flooding and drought impacts)
- Adding more treatment of adaptation

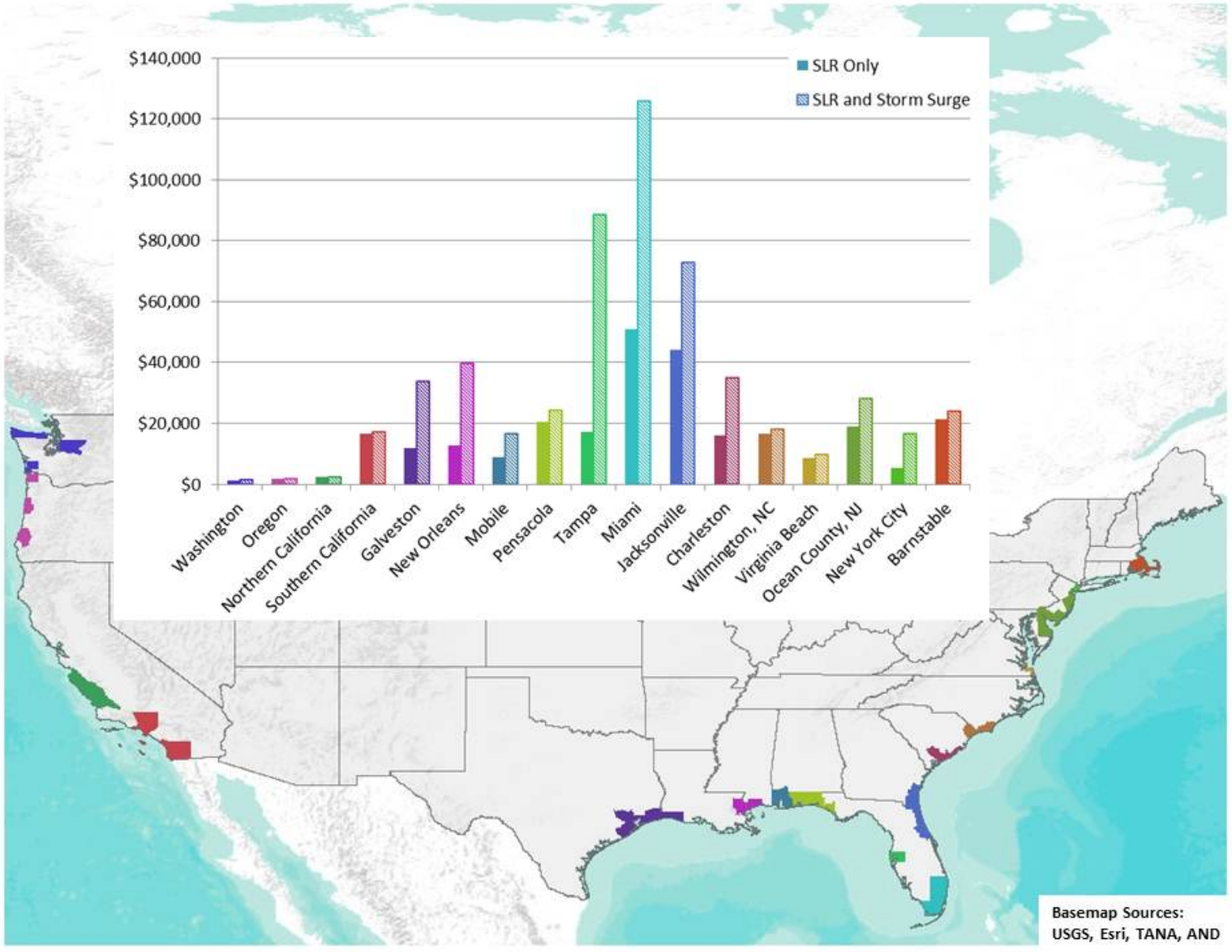


Center (Modeling Group)	Model Acronym	Availability		References
		LOCA	SNAP	
Canadian Centre for Climate Modeling and Analysis	CanESM2	X		Von Salzen et al. 2013
National Center for Atmospheric Research	CCSM4	X	X	Gent et al. 2011 Neale et al. 2013
NASA Goddard Institute for Space Studies	GISS-E2-R	X	X	Schmidt et al. 2006
Met Office Hadley Centre	HadGEM2-ES	X		Collins et al., 2011 Davies et al. 2005
Atmosphere and Ocean Research Institute, National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology	MIROC5	X		Watanabe et al. 2010

Expanded coverage: Aeroallergens (Oak Pollen Season)



Adding storm surge to SLR makes a large difference



Goal: to further integrate results of simulation modeling in IAMs

CLIMATE POLICY

Can Paris pledges avert severe climate change?

Reducing risks of severe outcomes and improving chances of limiting warming to 2°C

By Allen A. Fawcett,[1] Gokul C. Iyer,[2]† Leon E. Clarke,[2] James A. Edmonds,[2] Nathan E. Hultman,[3]* Haewon C. McJeon,[2] Joeri Rogelj,[4] Reed Schuler,[5] Jameel Alsalam,[1] Ghassem R. Asrar,[5] Jared Creason,[1] Minji Jeong,[2] James McFarland,[1] Anupriya Mundra,[2] Wenjing Shi[2]

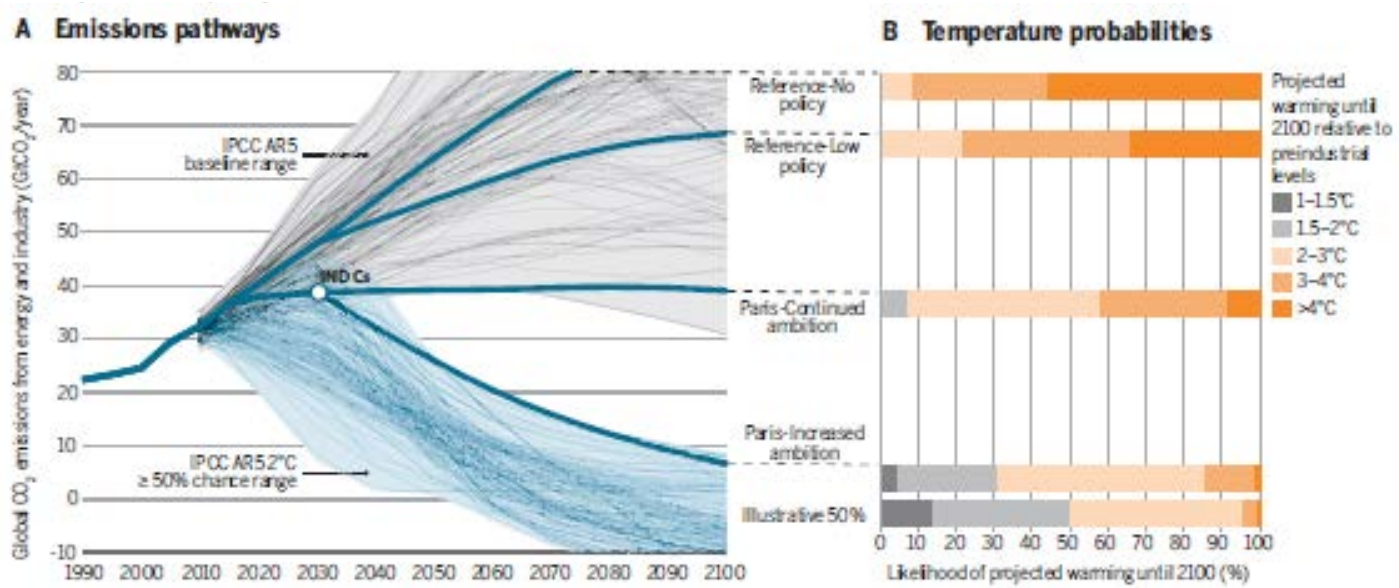
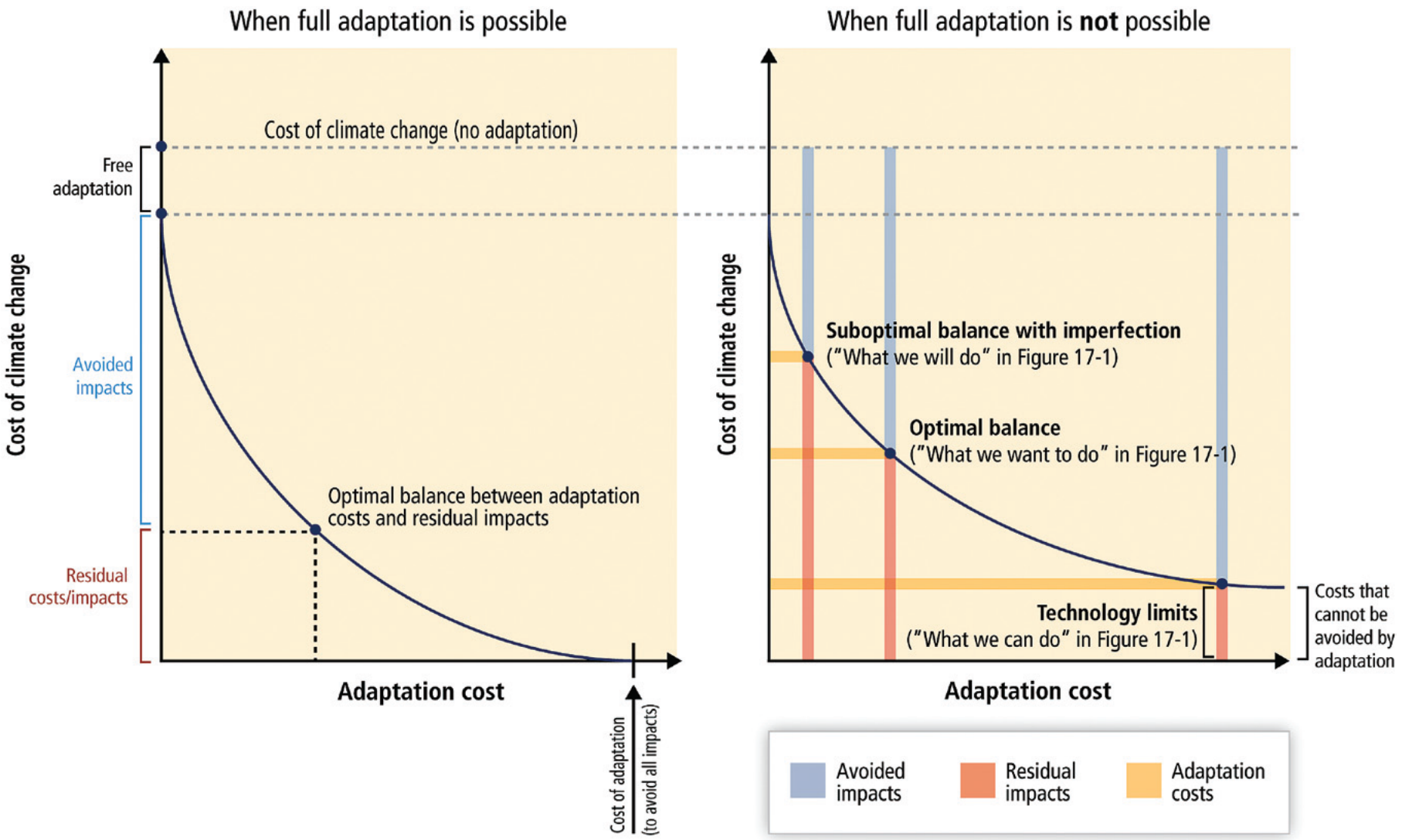


Fig. 1: **Global CO_2 emissions and probabilistic temperature outcomes of Paris.** (A) Global CO_2 emissions from energy and industry (includes CO_2 emissions from all fossil

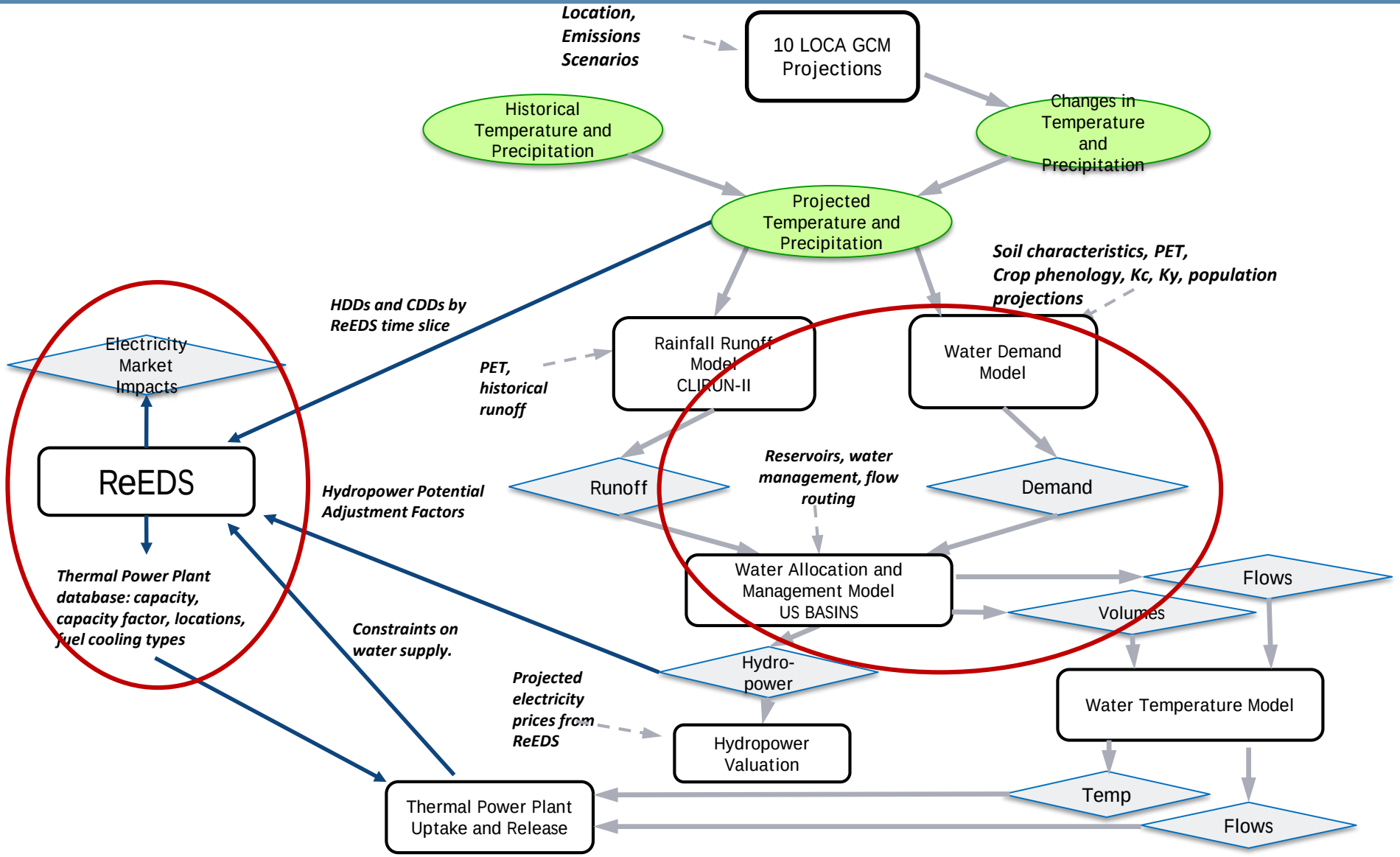
Source: Fawcett et al., 2015, *SCIENCE*, 4 DECEMBER 2015 • VOL 350 ISSUE 6265

Goal: to better implement a robust adaptation framework (beyond agriculture and sea-level rise)



Source: Chambwera (2014) Economics of Adaptation, in IPCC WGII AR5

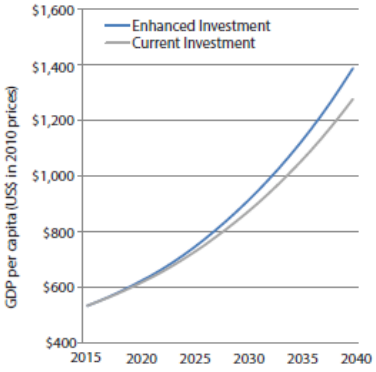
Key remaining gap – intersectoral assessment (Example: thermal power plant cooling water)



Understanding indirect effects – insights from simpler contexts

ECONOMIC GROWTH, 2015-2040

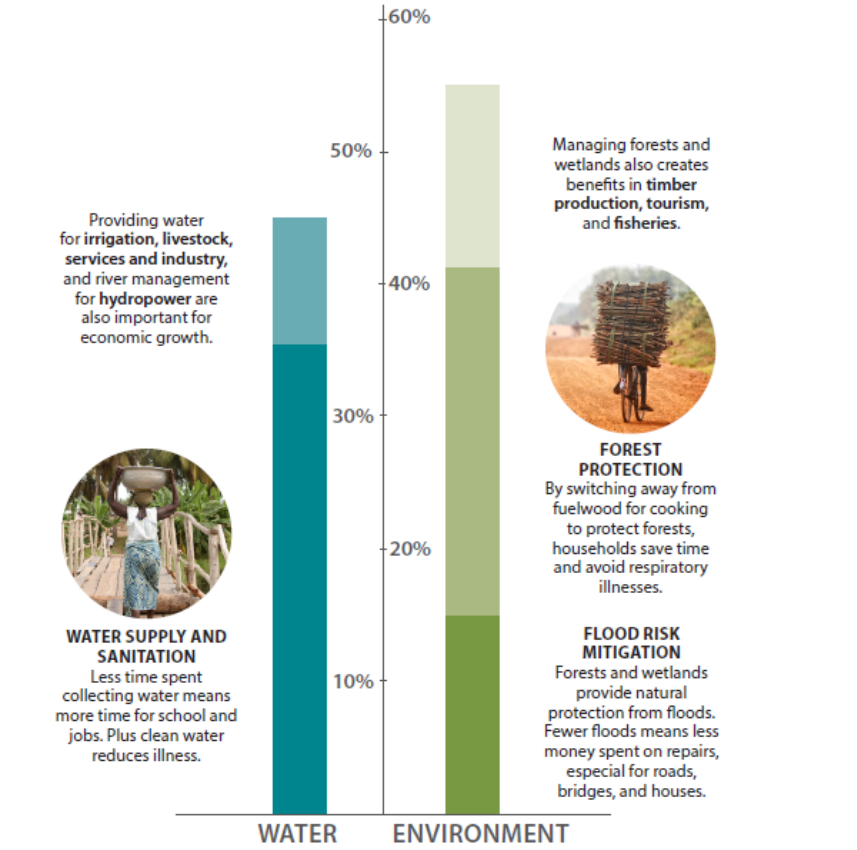
The lower line in the figure shows the modeled trajectory of per capita GDP growth under Vision 2040 conditions, but with Water and Environmental investments at lower, current growth rates. The upper line shows the same trajectory, but with MWE's Vision 2040 Water and Environmental investment scenario. The difference is 9% increase in per capita GDP by 2040.



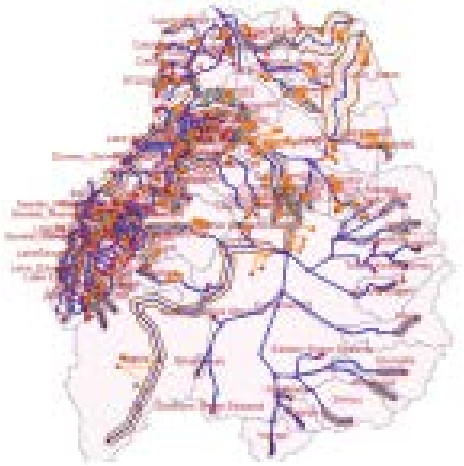
9%

GDP per capita is 9% higher in 2040 under enhanced investment in rural and urban water supply and sanitation, sustainable wetlands, and forest and catchment management. That is equivalent to an extra $111 per person in that year.

CONTRIBUTION OF MWE INVESTMENTS TO GDP GROWTH



Overview of Mike Hydro Model for Uganda



STRUCTURE OF PAYMENT FLOWS IN THE STANDARD CGE MODEL