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futurearth

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International Center for Tropical Agriculture
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CGIAR

RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security

CCAFS

Agriculture and food security in a changing climate: new evidence since AR5

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Key messages

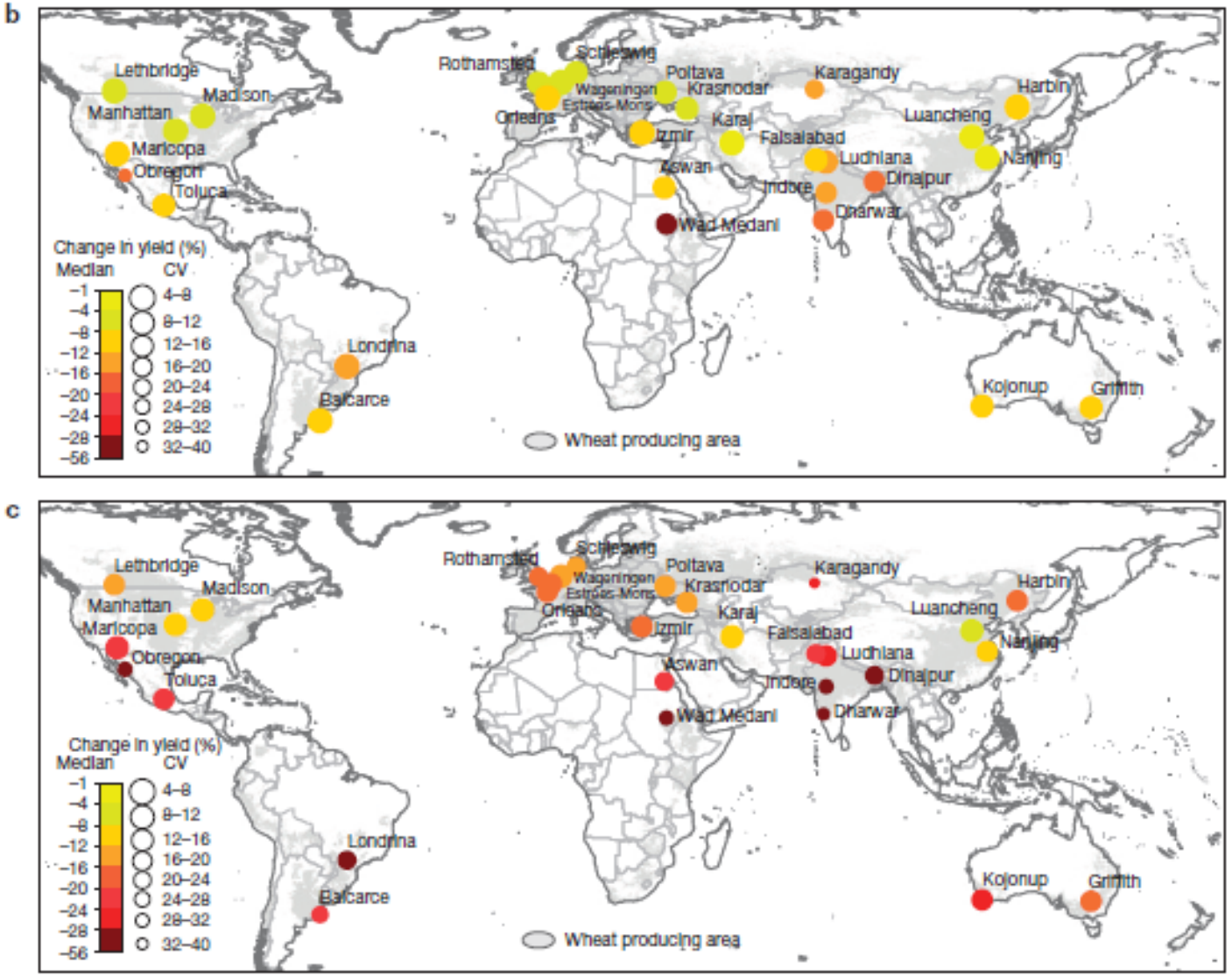
1. Recent results e.g. AGMIP **re-confirm AR5 findings on impacts** on crops, (pasture) and marine fisheries at global and regional levels
2. Less research has been done on **capacities** than on impacts (exposure & sensitivity)
3. Less research has been done on yield impacts of climate **variability and extremes**

1. Confirm AR5 findings on impacts

AGMIP results: wheat shows 6% yield loss for each degree C rise, equivalent to 42 Mt or ¼ of global trade

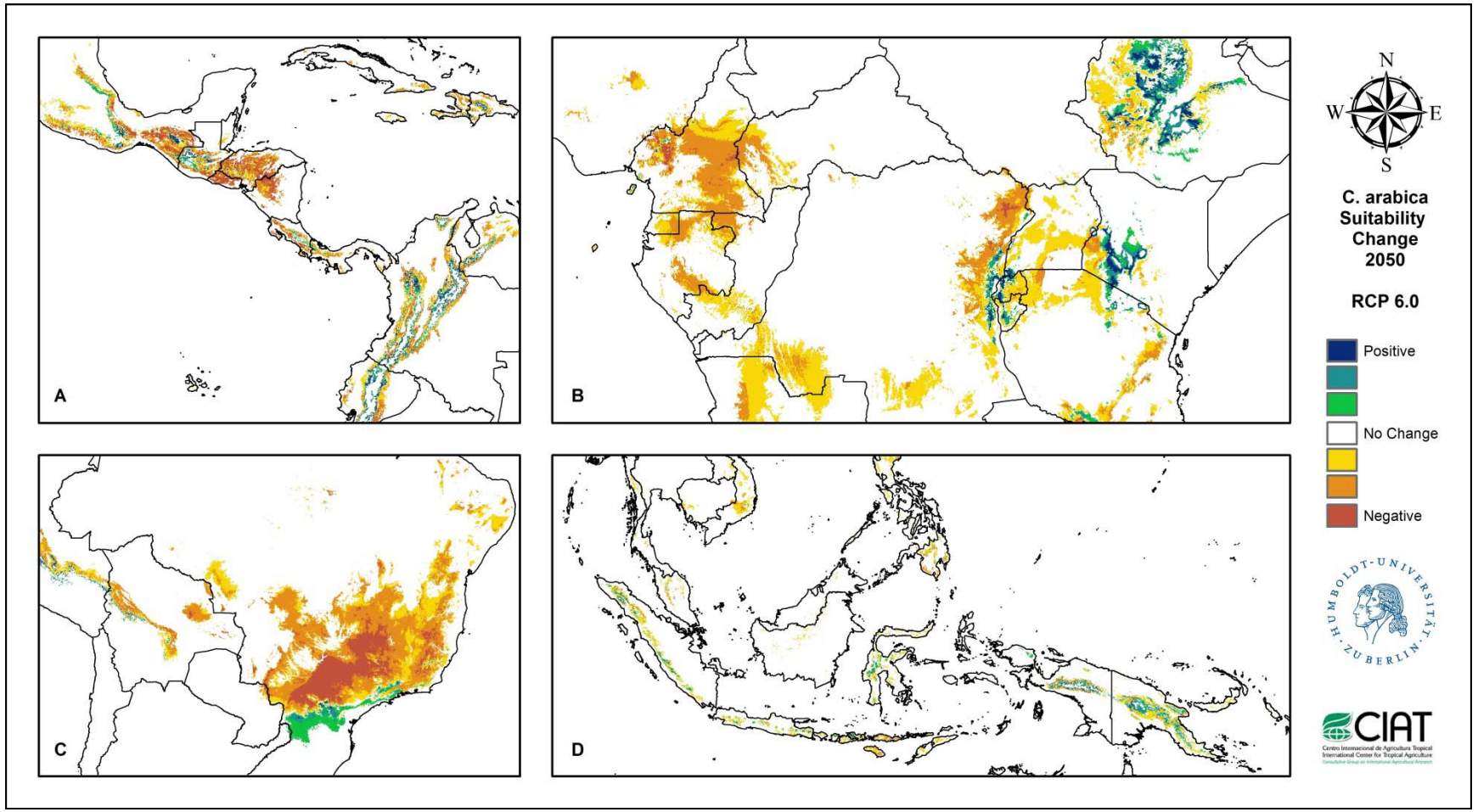
+2C

+4C



Asseng et al. 2014. Nature Climate Change

Cash crops also face major impacts and shifts in growing areas: regional changes in suitable growing areas for Arabica coffee in 2050



CIAT/Humboldt data presented at the 25th Annual Conference on Coffee Science 2014

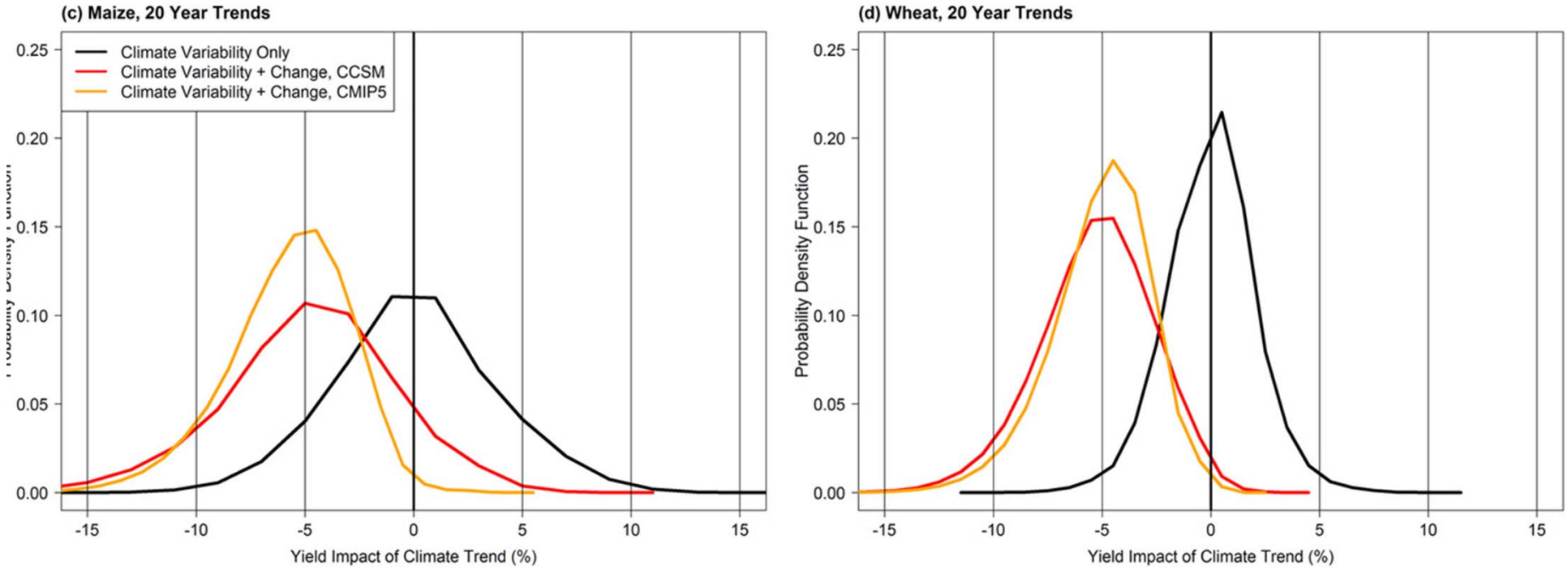
IPCC scenario RCP 6.0

Negative impacts are due in our generation

Likelihood of a 10% yield loss in next 20 years

Wheat: less than 1 in 200 chance without cc, 1 in 20 chance with cc

Maize: less than 1 in 200 chance without cc, 1 in 10 chance with cc



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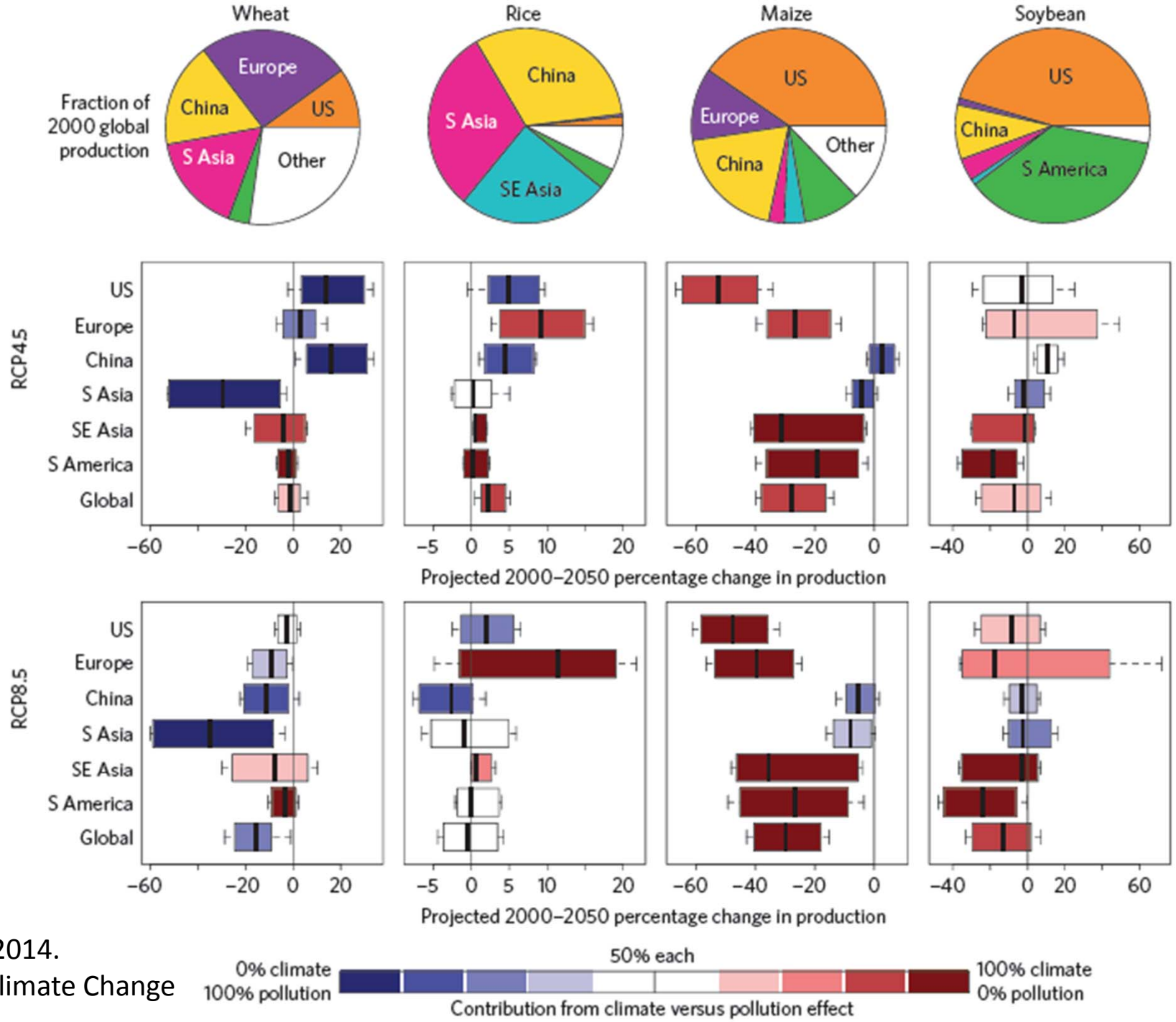
Lobell and Tabaldi 2014.
Environmental Research Letters

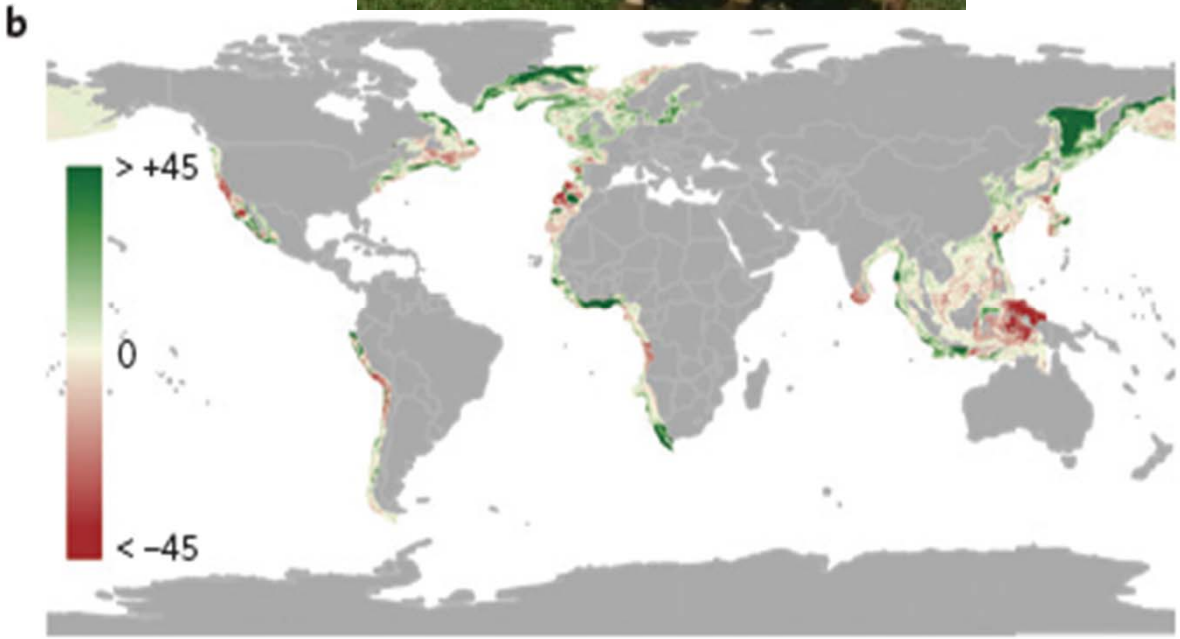
New findings on effects of ozone



Tai et al 2014.
Nature Climate Change

Livestock and marine fisheries

Yield outcomes for livestock dependent on complex factors, particularly availability of feed (e.g. crops, pasture). Expect regional projections of rangeland /pasture yields during 2015.

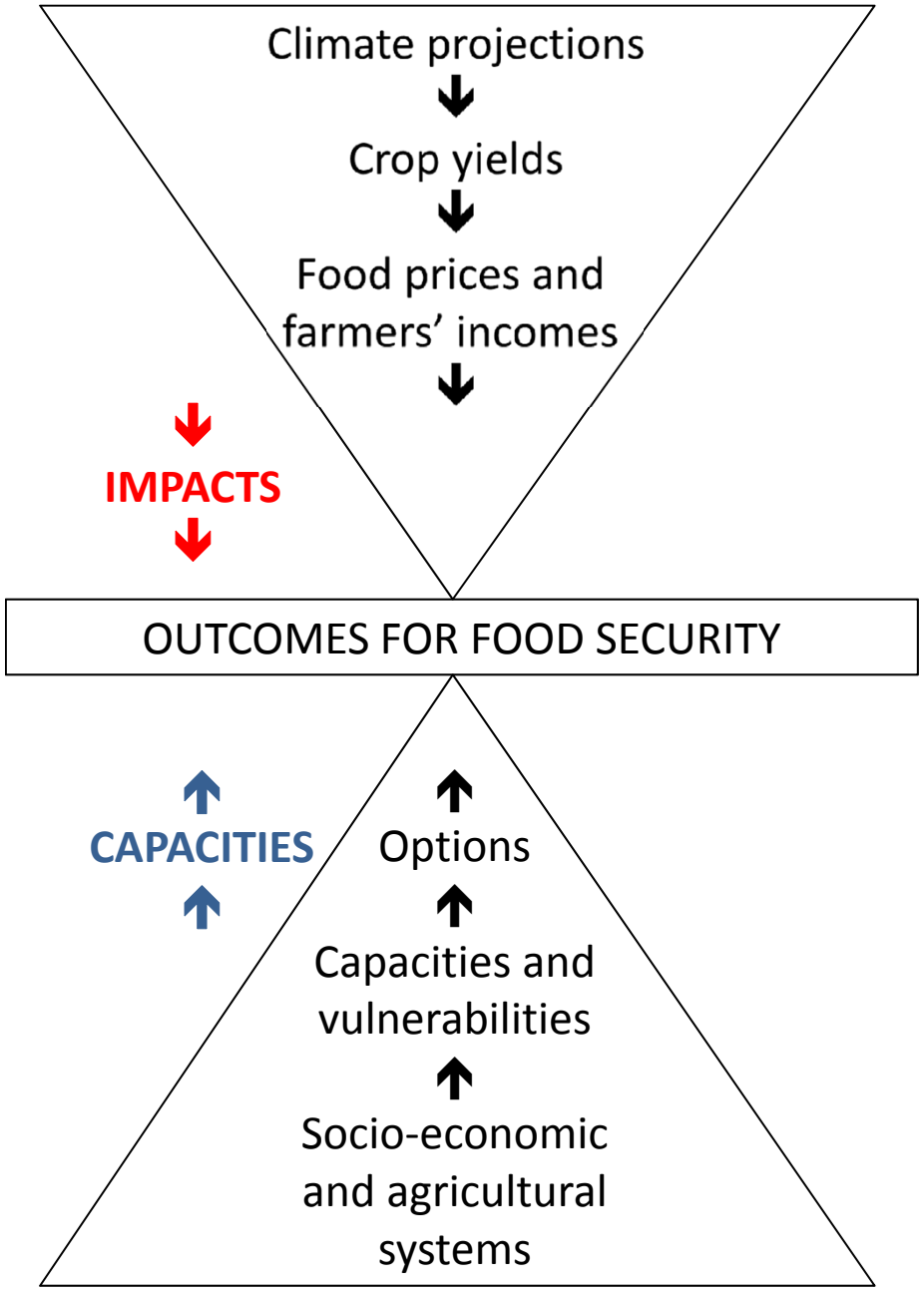


In a +2C world in 2050: global net yield growth of 3%

Marine fisheries in countries and regions with high economic dependency:
Likely yield losses in Southeast Asia, Sri Lanka, Angola and Namibia.
Likely yield gains in Iceland and the southern coast of West Africa.

Barange et al 2014.
Nature Climate Change

2. Capacities determine outcomes



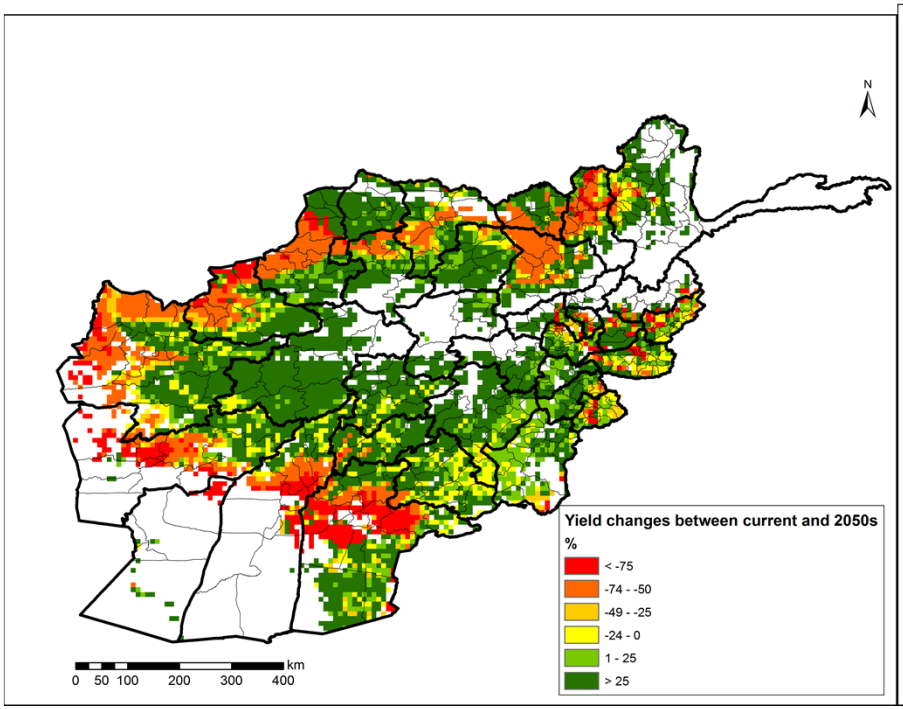
Adapted from Vermeulen et al. 2013.
Proceedings of National Academy of Sciences

Empirical evidence from USA, Mexico and Brazil shows that both **generic** and **specific** capacities matter

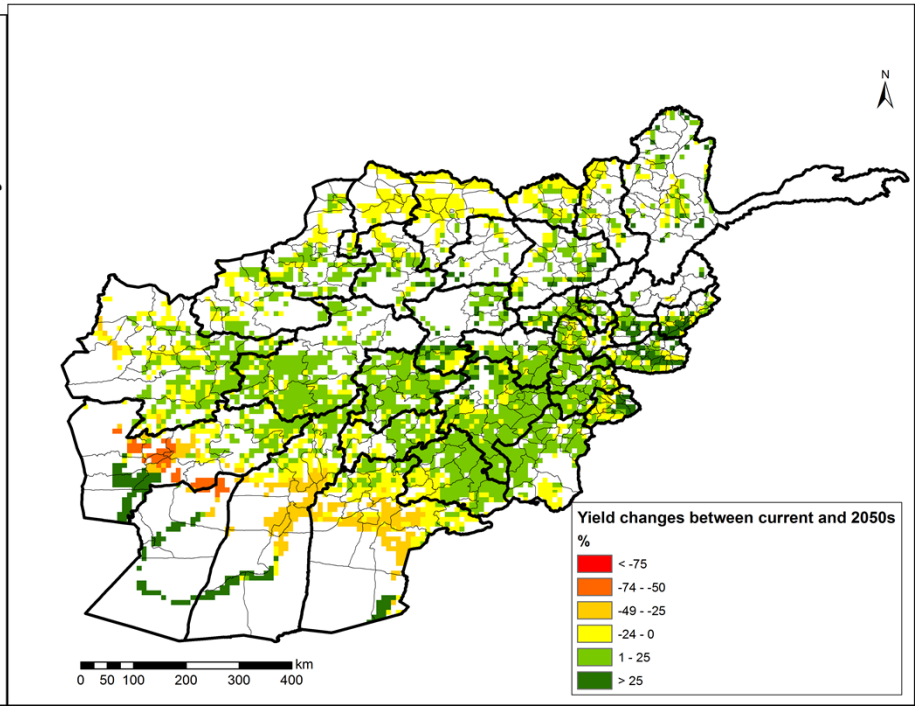
Eakin et al. 2014.
Global Environmental Change

Importance of water & water management capacities e.g. Afghanistan

Changes in wheat yield, **rainfed** wheat to 2050

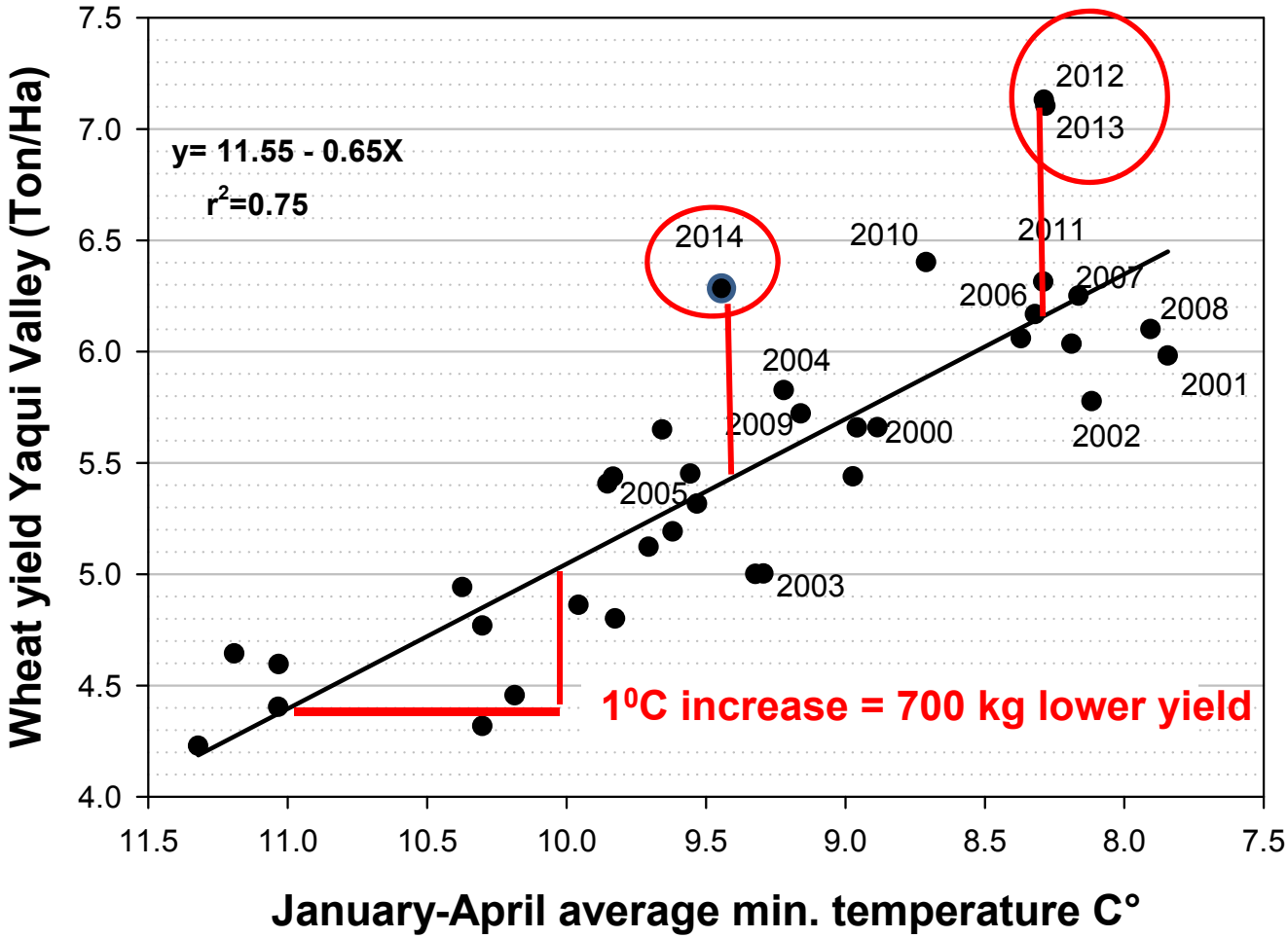


Changes in wheat yield, **irrigated** wheat to 2050

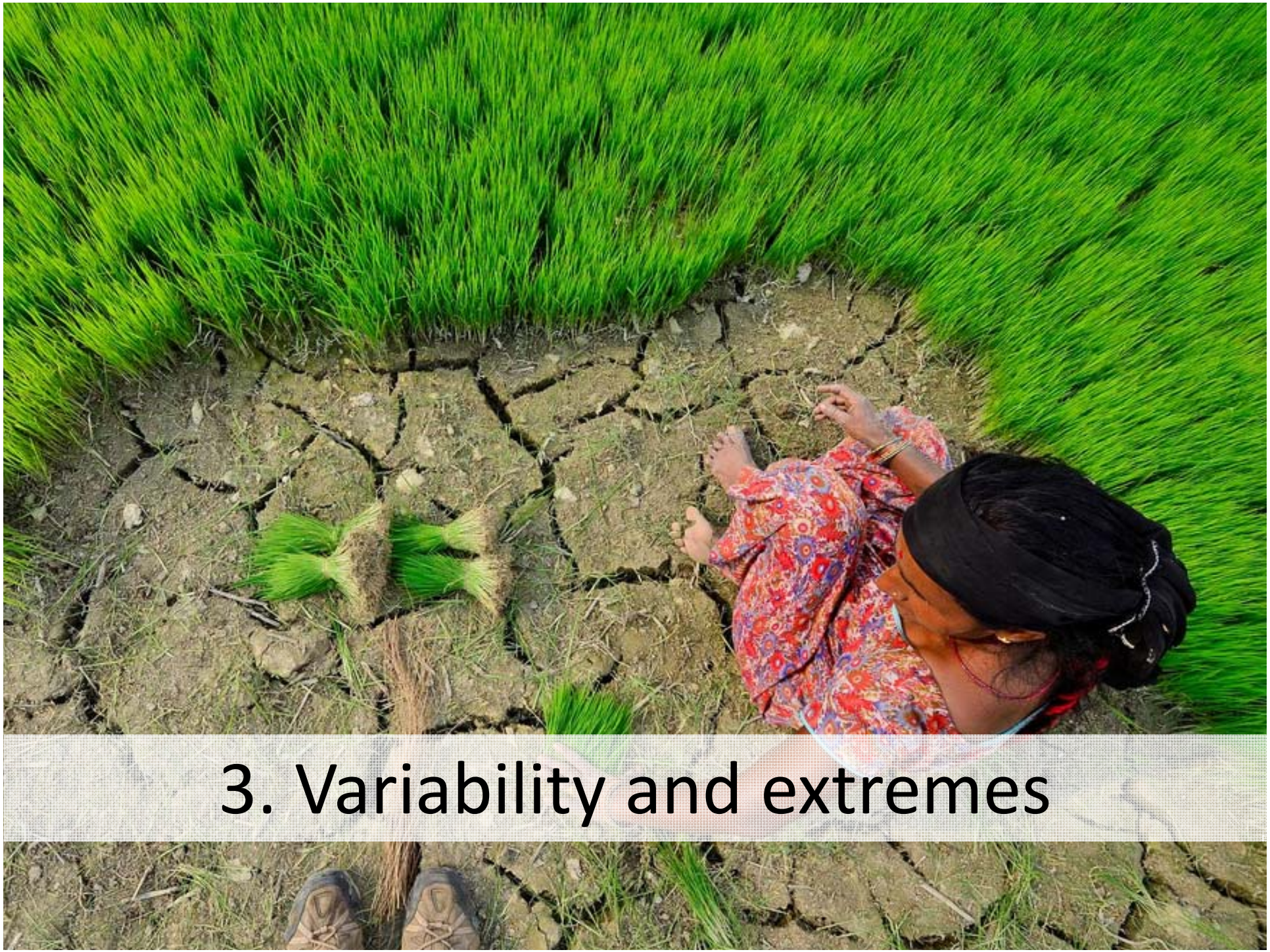


CIMMYT unpublished analysis 2015

New heat-tolerant wheats prove their value in farmers' fields in Mexico

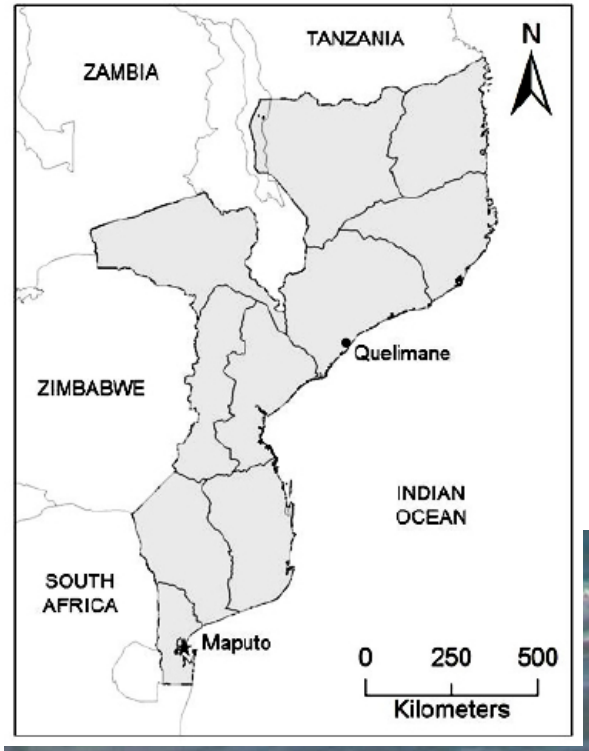


Data compiled by Braun and Oriz Monasterio 2015 CIMMYT



3. Variability and extremes

Farmers, herders and fishers experience climate change as variability & risk



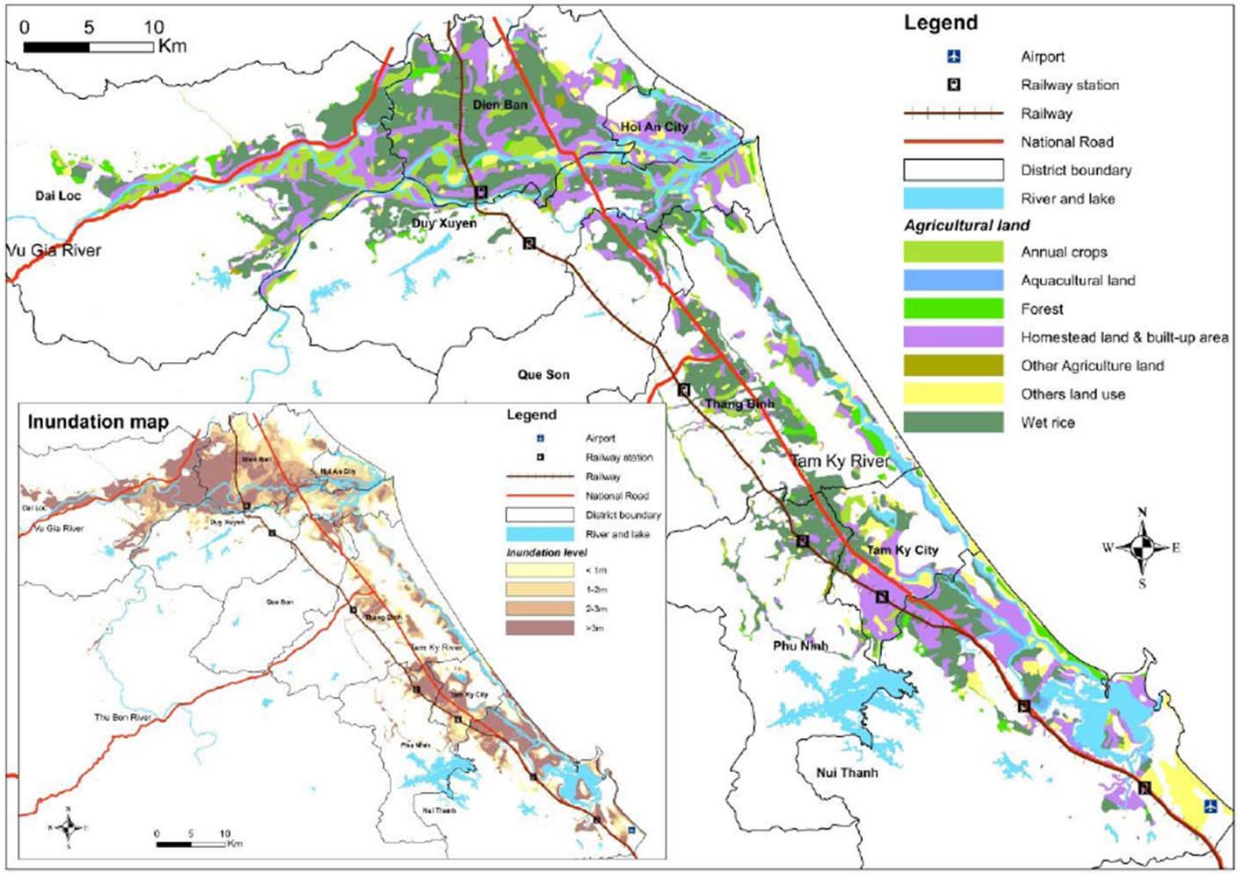
Central Mozambique example: small-scale fishers and coastal communities face increasing frequency and severity of coastal storms (attributed to climate change)

- Fishers operate small, non-powered vessels ill-suited for the open seas
- Declining fish stocks drive them further off shore
- Storms increase the number of deaths among fishers, leaving widows and orphaned children
- Storms damage homes of the poor, fishing gear and subsistence gardens (*machambas*)

Blythe et al 2013. Ecology & Society

Economic losses to small-scale farmers in Quang Nam province, Vietnam

Loss in agricultural value in the inundated areas for 1:10-, 1:20- and 1:100-year floods, of 12%, 56% and 62% (VND22 billion, VND115 billion and VND147 billion)



Chau et al. 2015.
Natural Hazards

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