Drought Impacts Attribution

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Contribution to Session 1A: Methods, Tools, and Data

NAS Workshop: Extreme Event and Impact Attribution:
Challenges, Opportunities, and Applications

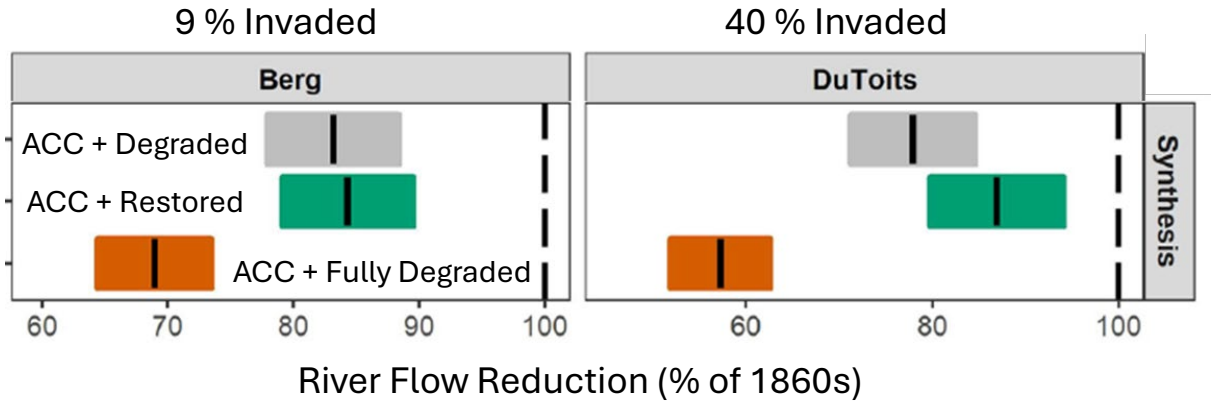
What impacts attribution we work on at UCT

- Drought (river flow and water management)
- Fire weather (no impacts yet)
- Health and health system (heat illness, emergency call outs, VBD, NCD)
- Biodiversity and ecosystem (mass die off events)
- Flooding (in progress)

Example 1: Hydrological Drought – Day Zero in Cape Town

Three successive low-rainfall years (2015-2017)

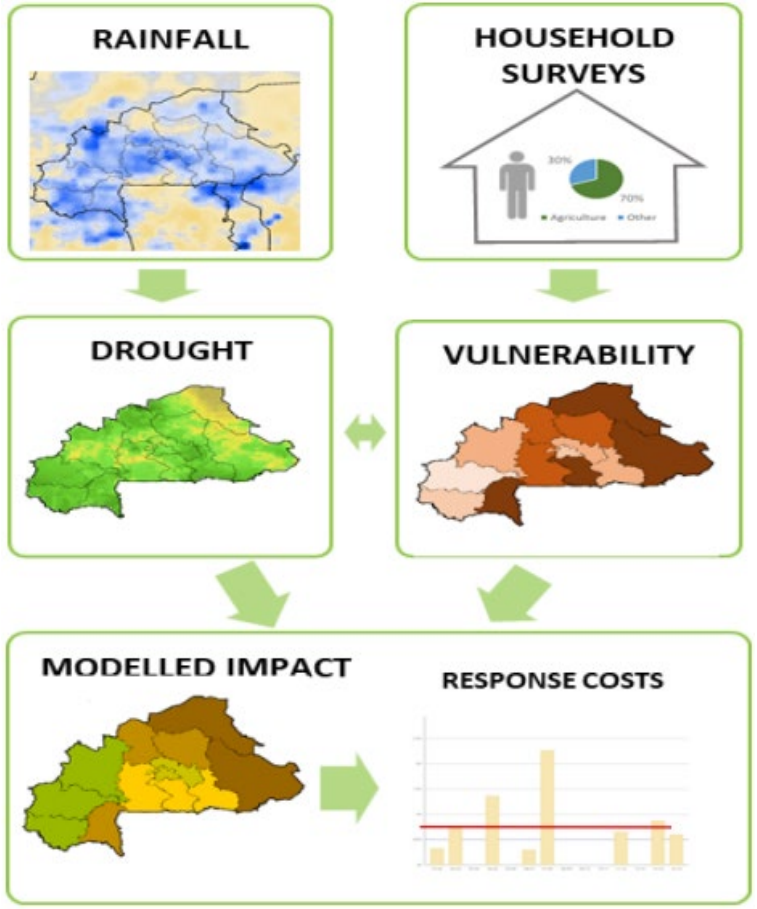
	Climate	Catchment
Factual	2015-2018	Degraded
Counterfactual	1860s	Natural or Restored
		Fully Degraded

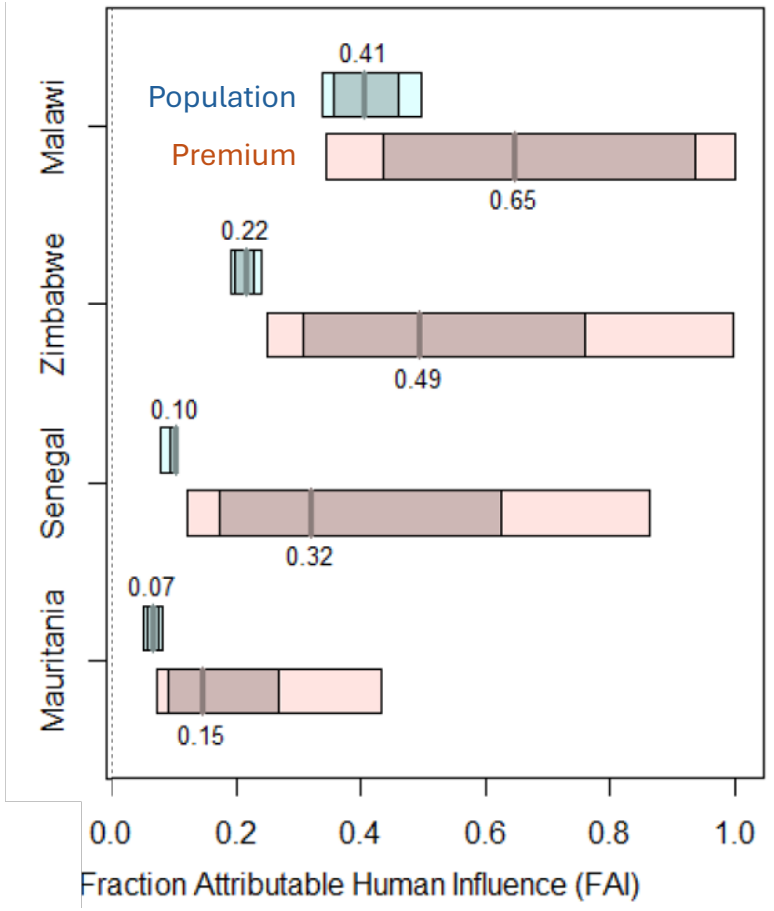


- 17-22% flow reduction (FR) attributable to CC
- Restoration offsets FR by 3-10%
- Full degradation exacerbates FR 15-22%

Example 2: Agricultural Drought Impacts

Use of insurance agricultural risk model (Africa Risk View / ARC)





Challenges

Note: these are generally exacerbated in Africa

- *Detection of impact* – often hard to quantify or not observed
- *Model specificity* – generic gridded hydrological models are rubbish at catchment scale; calibrated catchment models are time-consuming to set up and validate
- *Climate model biases* - impact models usually calibrated using observational climate; need to bias correct attribution simulations
- *Vulnerability (sensitivity and exposure)* – state of receiving environment; exposure of population (or infrastructure, etc.); not easy to get data on; extra work to incorporate into impact models
- *No multi-impact-model analyses* – missing key aspect of uncertainty quantification to apply a probabilistic approach

Opportunities

- Many potential impact models (at different scales) – need to connect attribution and impact community
- Make it easier for impact modelers to access climate model attribution simulations
- Bias-correct climate model attribution data onto commonly used observational datasets
- Provide basic climate model performance metrics to inform climate data choice
- Develop guidance on impact attribution modelling