Modeling in Context

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GFDRR / World Bank

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Project A

Costs $100 million

Prevents on average $20 million of losses per year

Project B

Costs $100 million

Prevents on average $5 million of losses per year

Blue skies?

- Our capacity to model/predict/manipulate natural & social processes has never been greater.
  - Cheap computing power and new data streams.
- Expertise is still the scarce resource, but how soon until we're put out of business by machines?
- **What will be the value added by modelers to self-generating stochastic & agent-based models?**

What is a model?

- Fixed framework of observations, corollaries, best guesses, narratives, and biases.
- Even granting good science, bias can still be found in the boundaries & boundary conditions of the model…
  - Which processes and interactions are included, and in what detail?
- Scope and depth of model are functions of the questions asked, and of our expectations regarding the answers.
- Machine learning will do better.

What are models good for?

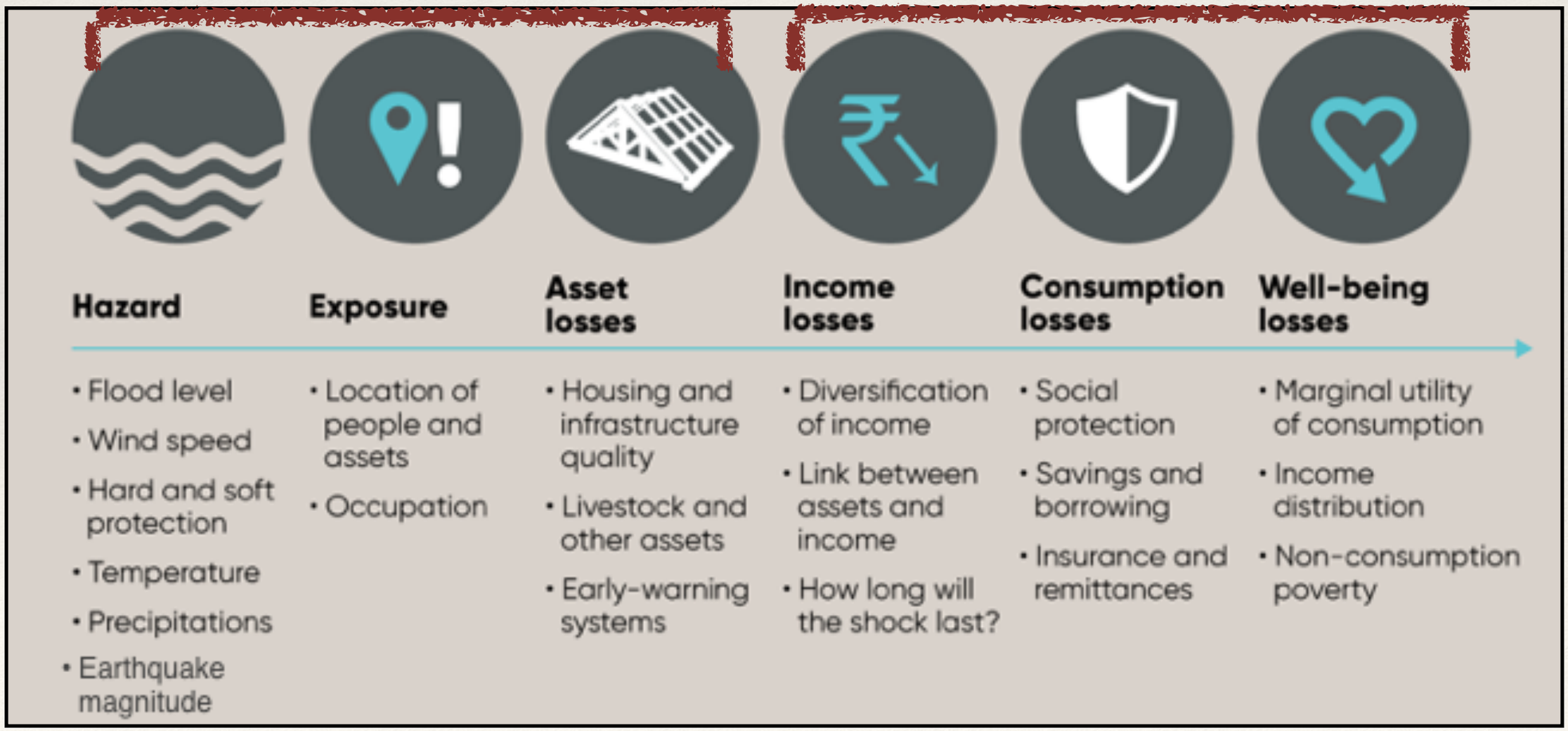
- Even if a model represents processes & makes predictions with accuracy…
  - utility is determined by the audience.
    - information about an ecosystem or process is for curiosity's sake if we (collectively) don't value the subject.
- **As we build and communicate models, we have to be aware of the values we're communicating, and know when to stop the facts from getting in the way of a true story.**

DRM in Developing Countries

- Goal: quantify resilience to natural disasters in the Philippines.
- Define resilience as ratio of asset losses to well-being losses after a shock.
- Traditional risk assessments combine hazard, exposure, & vulnerability.
- Look also at who is affected & quantify their capacity to cope with & recover from a shock.

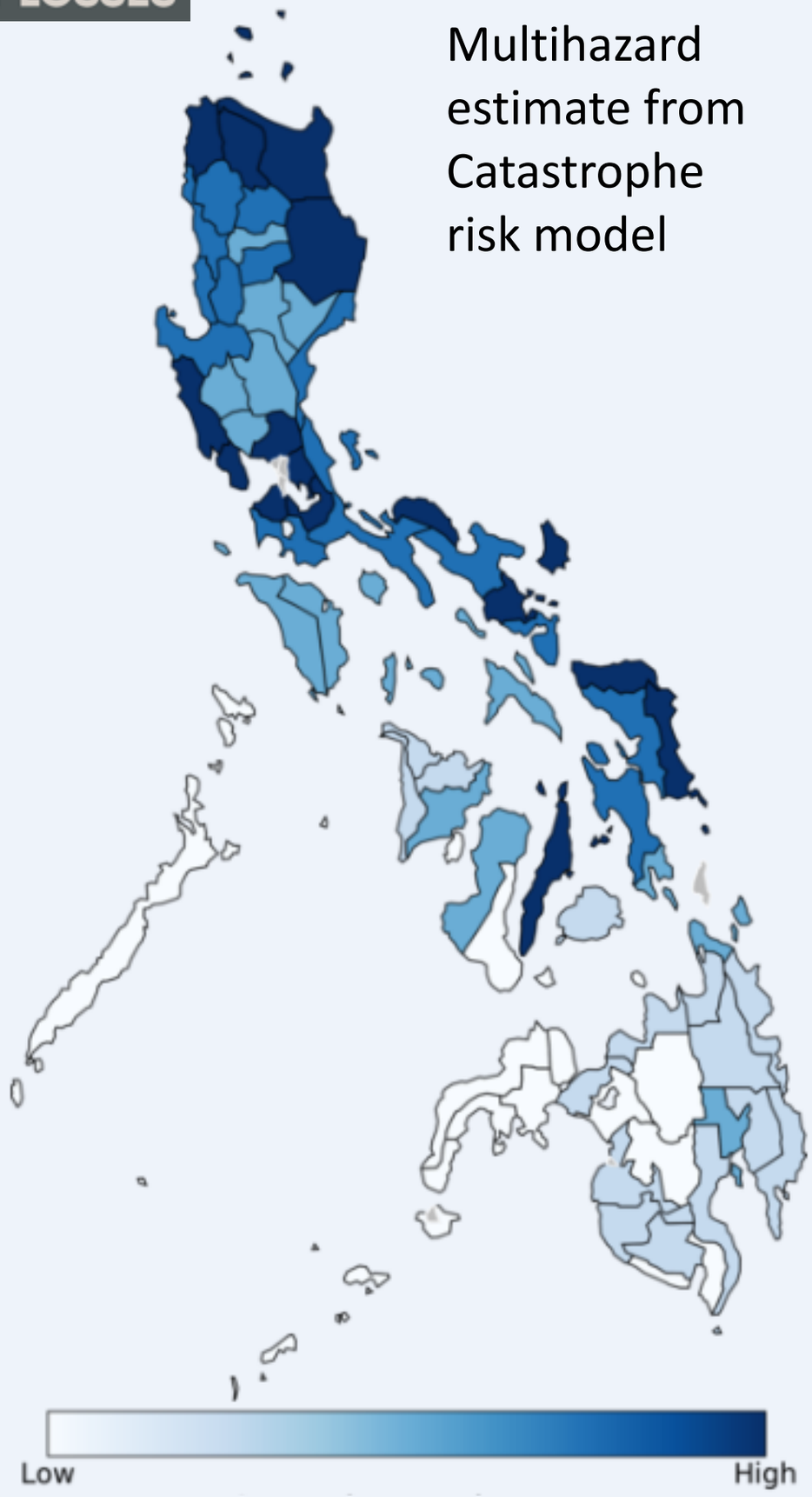
Modeling Resilience

- Build model incorporating hazards, asset type & vulnerability, poverty, financial inclusion, & social safety nets.
- Translate asset losses into well-being losses.



ASSET LOSSES

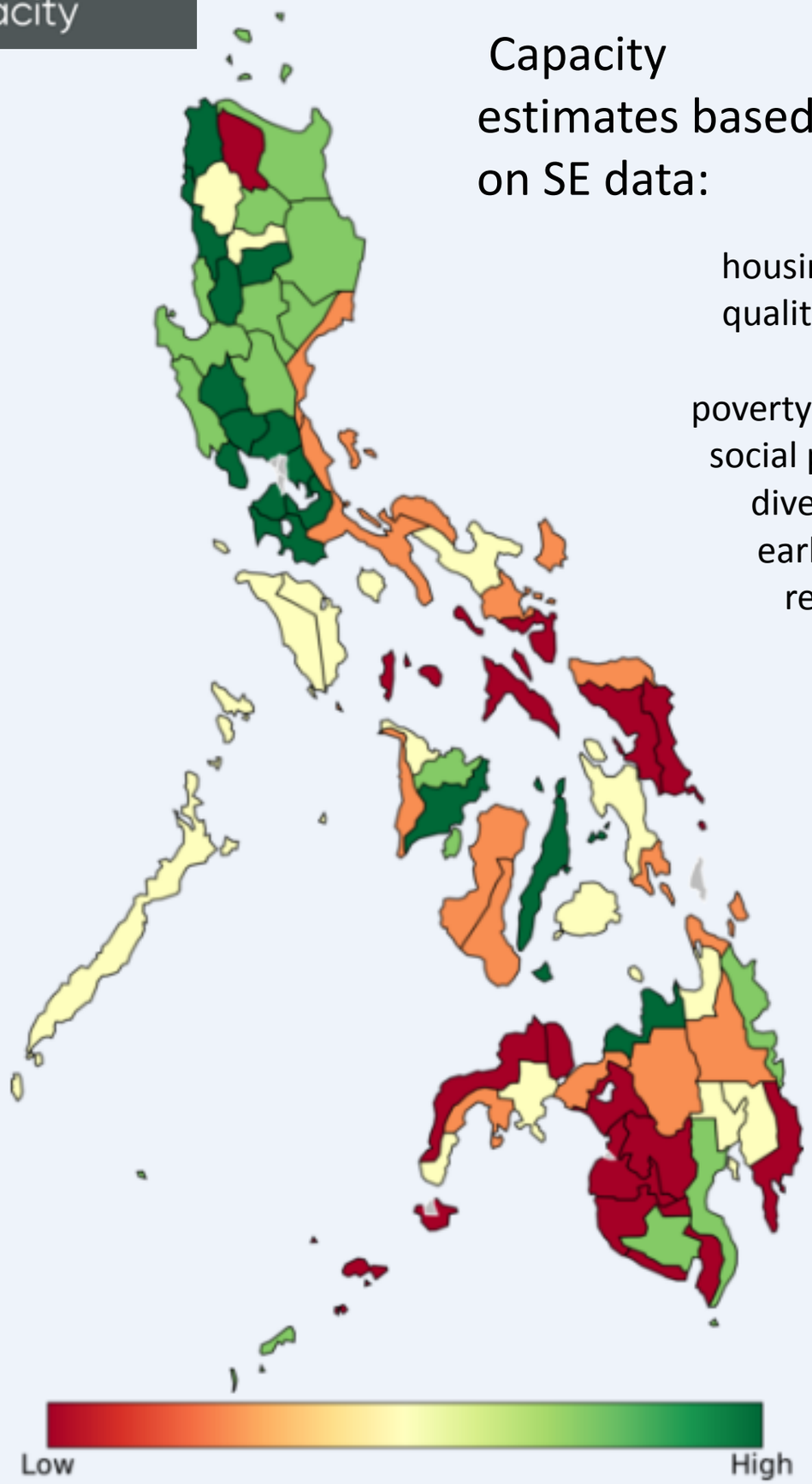
Multihazard estimate from Catastrophe risk model

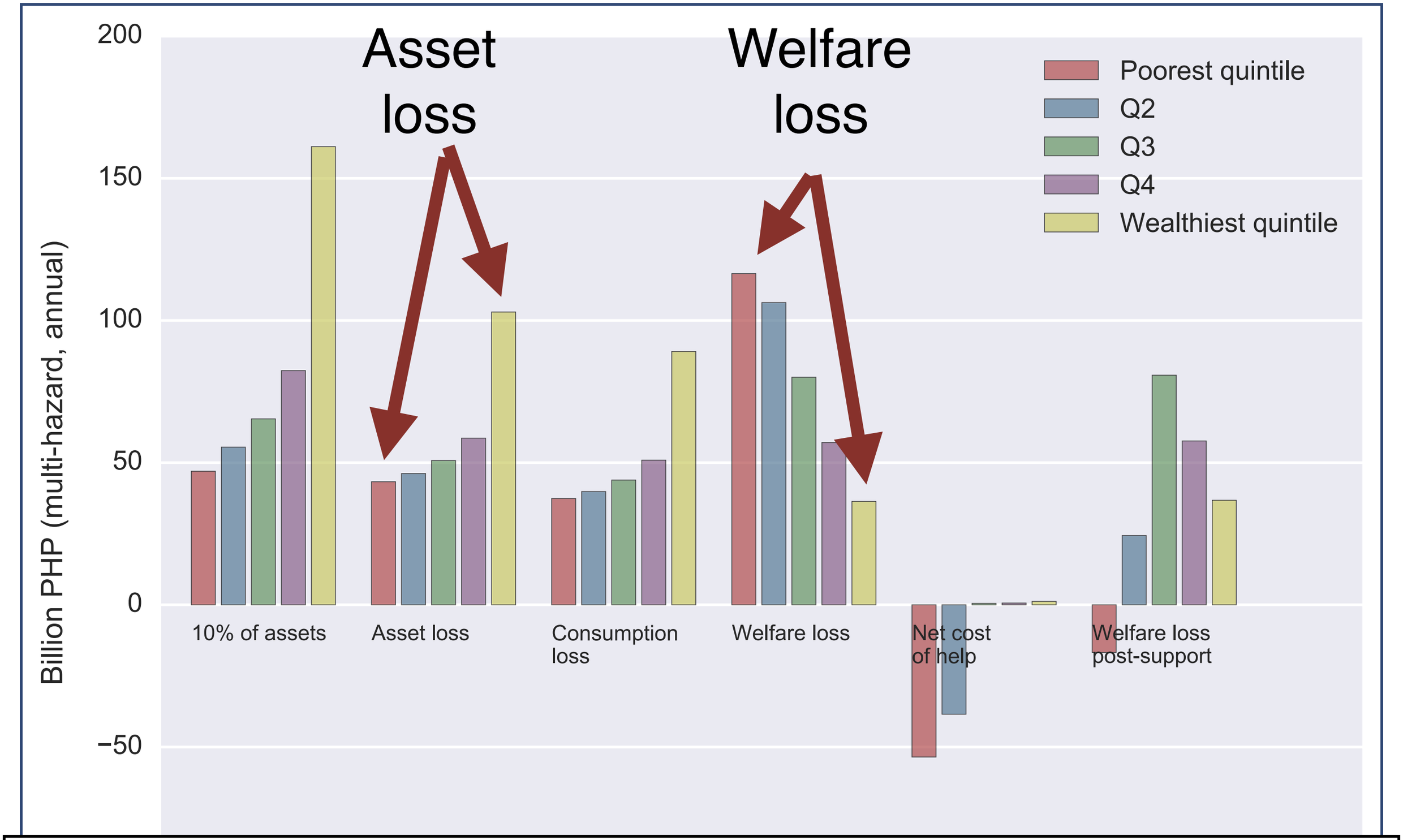


Socioeconomic capacity

Capacity estimates based on SE data:

housing & infra. quality financial inclusion
poverty incidence
social protection
diversification
early warning
remittances
insurance

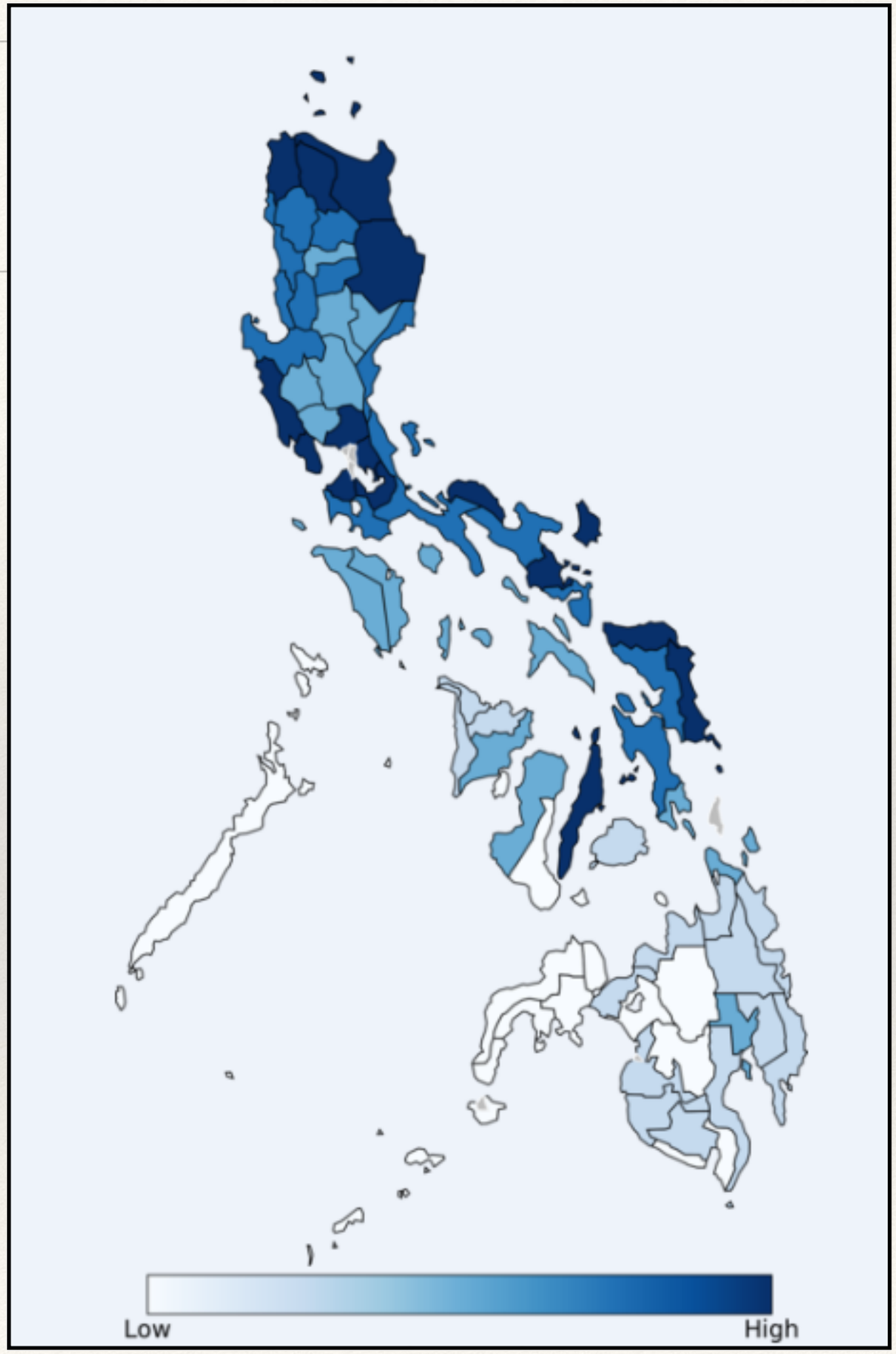




Even though (because) they have the least to lose, the poor are more affected by and take longer to recover from shocks.

How can it be used?

- To assess the benefits from national DRM policies.



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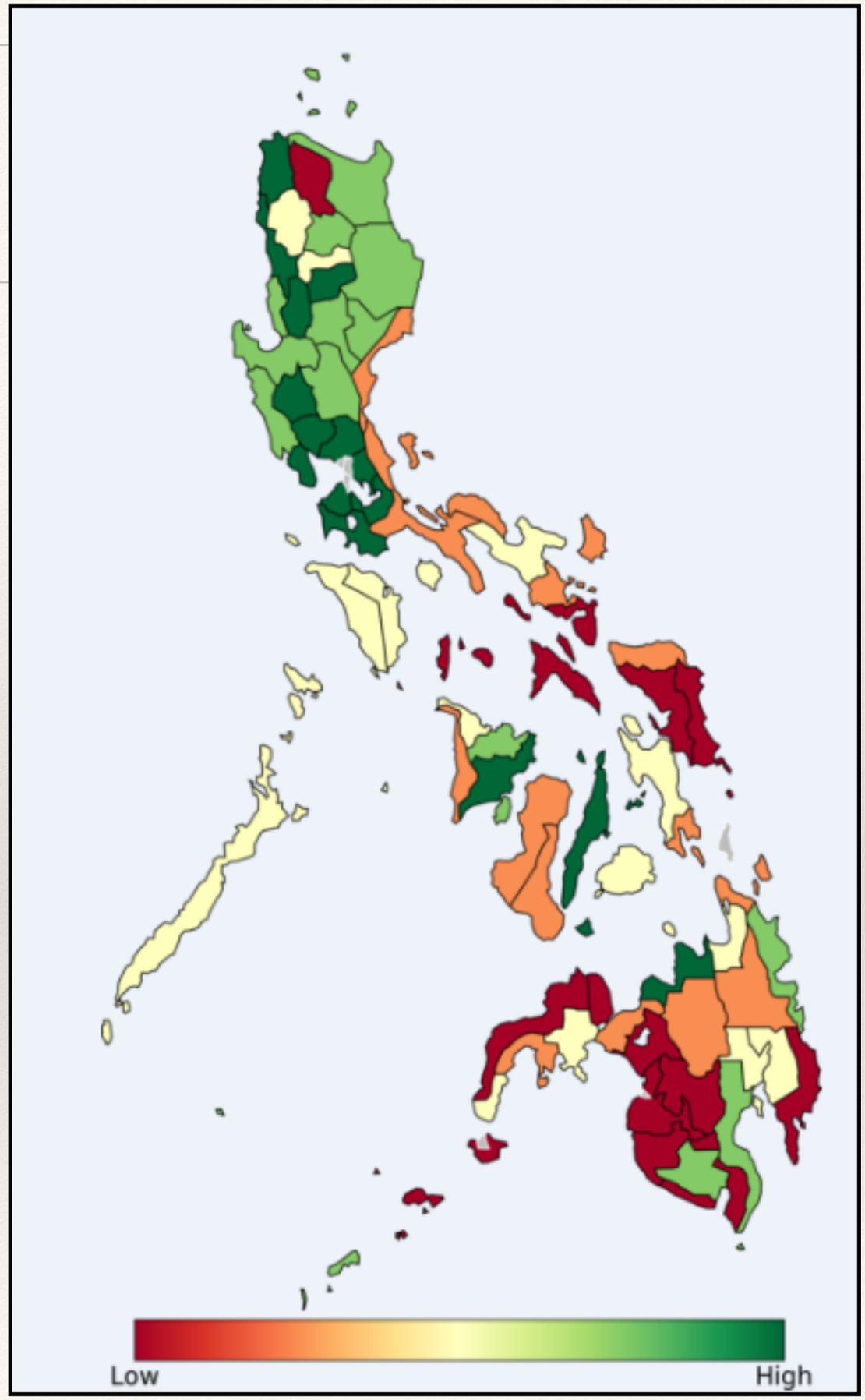
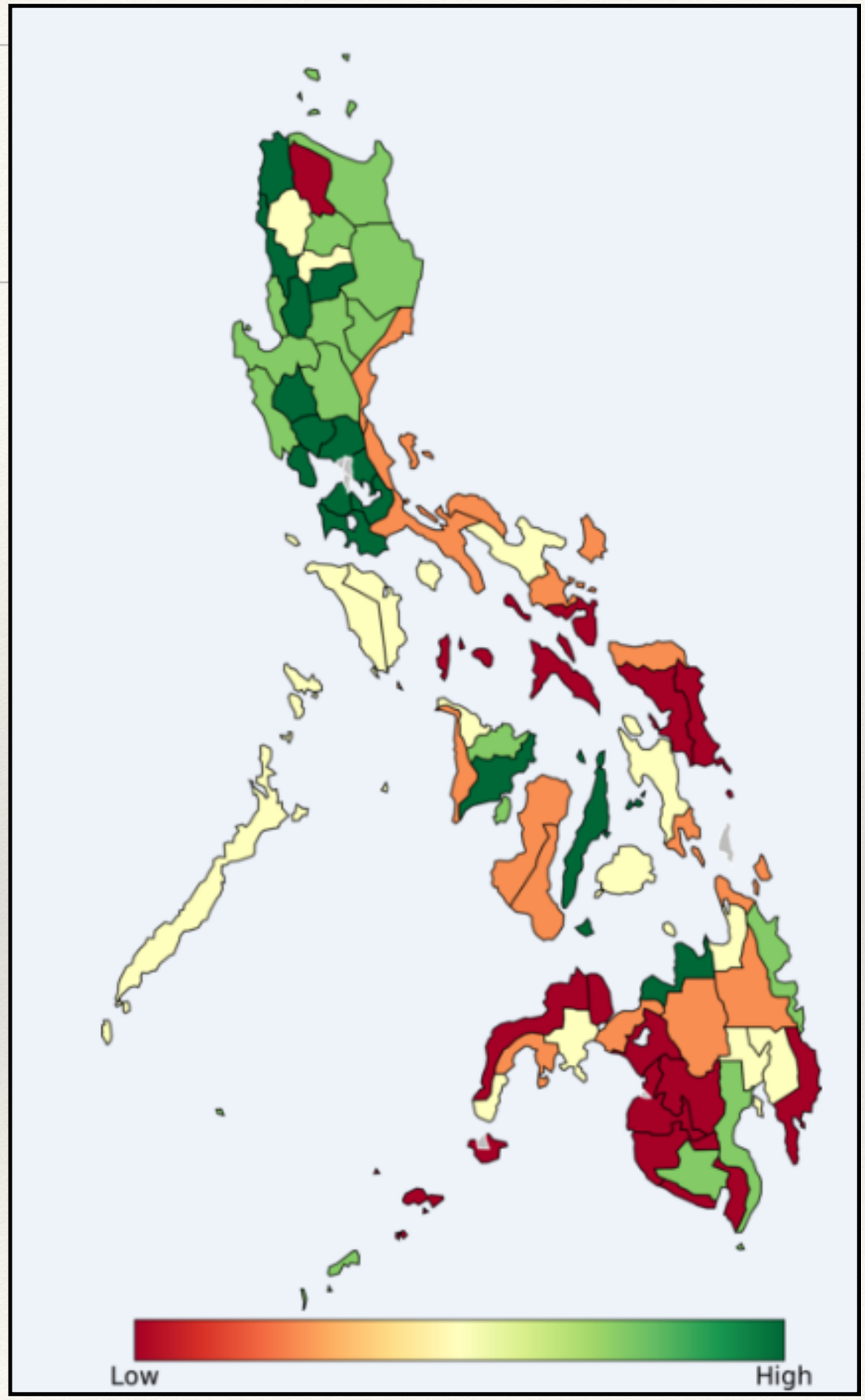
- Target resources & assess the benefits of regional/ provincial DRM policies.



How can it be used?

- To assess the benefits from national DRM policies.
- Target resources & assess the benefits of regional/ provincial DRM policies.
- Assess immediate & long-term benefits to resilience of specific projects.



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Disaster Risk Management

- **Explicit goal: quantify resilience to natural disasters in the Philippines.**

- **Given:** the mandate of the Bank is to reduce poverty.

- **Implicit agenda:** make case that assets of the poor (eg. urban slums & subsistence farmers) are at least as worthy of protection from hazards as central business districts & other major infrastructures.

DRM in context

- Value judgment based on a partial picture.
- Not a given in Manila:
  - Model seems like a trick if interlocutor isn't sympathetic to premise
    …more complexity is a clear negative.
  - Doesn't consider the constituencies & prerogatives of bureaucrats.
  - The poor are liabilities of the international community.
- **Govt. can reasonably reject our values & premises.**

GLOBIOM (IIASA)

- IAM of global competition for land (ag., livestock, bioenergy, & forestry) & trade.
- Several models stitched together (EPIC, G4M & others)
- Principal contributor of scenarios and analytics to several EC projects
  - REDD-PAC, IMPACT2C, GHG-Europe & AgMIP
- Move toward a stochastic model.

GLOBIOM

- **Trade secrets:** protect market share by discouraging competition
- **Black box:** not much in the way of error analysis

- But it's easy to publish! Even outside its intended use…

RESEARCH ARTICLE

ScienceAdvances

ENVIRONMENTAL ENGINEERING

Assessing the land resource–food price nexus of the Sustainable Development Goals

10.1126/sciadv.1501499

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Whither IAMs?

- **So why are IAMs so seductive?**
- Still trade in scenarios, which make for easy narratives.
- Probability-agnostic —> a scenario for everyone!
- Effective when we have a consensus on values…
  - eg. Norwegian govt. (REDD-PAC)
  - stochastic model = probably an improvement
- Otherwise, confusing or substance-free
  - Which fate is worse?

Whither modelers?

- Values & priorities may be more or less explicit, but they're always there.
- Even after we surrender policy control to the computers, we need modelers to advocate for those values (global poor, ecosystems, human well-being)
- Until then, emotional content motivates action more effectively than facts & figures.

Challenges to modelers

- Within the fields represented here…
- given the stakes of failing to adapt in the next decades…
- we have a moral obligation to consider and advocate more effectively for the values underpinning our work
- so to structure and package our models in a way that maximizes their real contribution to the SDGs, CBD, Paris, etc.