

Platform on Disaster Displacement Advisory Committee Workshop

13-14 October 2016, Geneva, Switzerland



Mapping Climate Change Hotspots

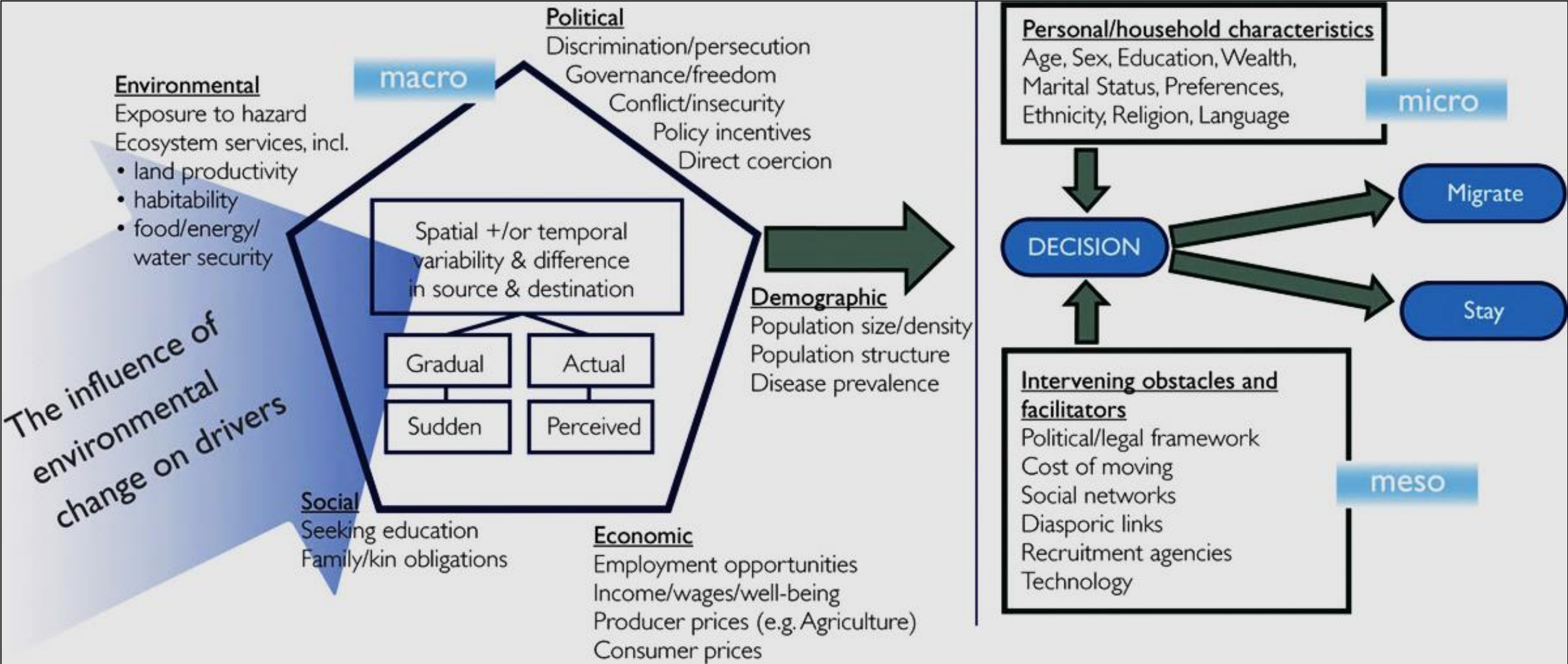
Alex de Sherbinin and Susana B. Adamo

Center for International Earth Science Information Network (CIESIN)

The Earth Institute at Columbia University

MacArthur
Foundation

A conceptual framework for migration, environment and climate change



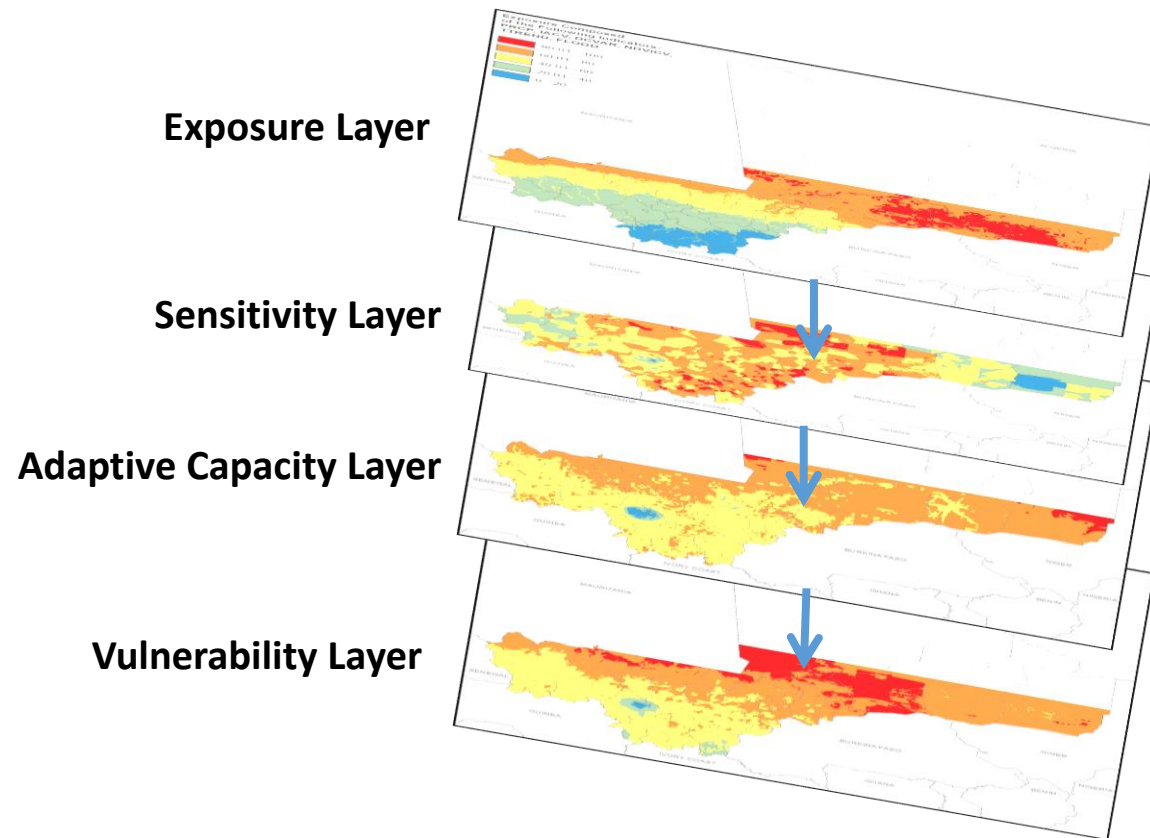
Source: Black, R., W. N. Adger, et al. (2011). The effect of environmental change on human migration. *Global Environmental Change-Human and Policy Dimensions* 21: S3-S11. Based on Foresight: Migration and Global Environmental Change (2011) Final Project Report The Government Office for Science, London https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/287717/11-1116-migration-and-global-environmental-change.pdf

Different Approaches to Understanding Climate Change Impacts on Migration (complementary, not exclusive)

- **Historical analog:** What is the empirical evidence for migration being induced by climatic changes or extremes? Can a separate “climate signal” be detected at all?
- **Livelihoods focus:** How will climate change impact the natural resources and productive systems upon which many poor people depend?
- **Future impacts:** What are likely impacts? How many people live in areas affected? What proportion of those affected will migrate? How will the proportion vary by impact type?
- **Migration systems:** how will existing migration systems and drivers of migration be impacted by CC? (push, pull, intervening variables)

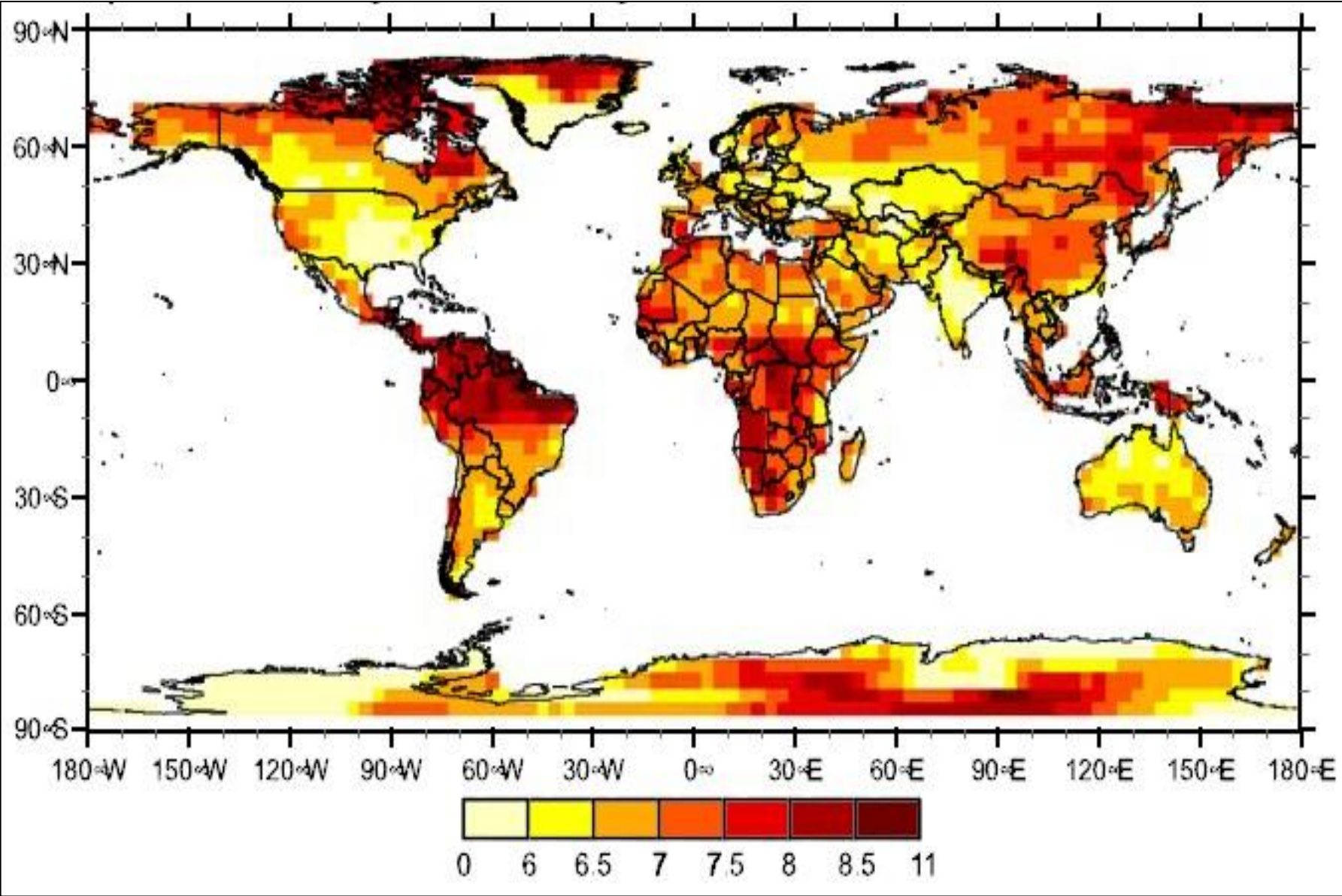
What is a climate change hotspot?

- Integrates *spatial variability* in Climate / biophysical changes, and Human / system vulnerabilities
- **Climate change impacts, vulnerabilities and adaptive/coping capacities are all spatially differentiated**
- **Mapping can illuminate key vulnerabilities in the coupled human-environment system and, in turn, inform where adaptation may be required**



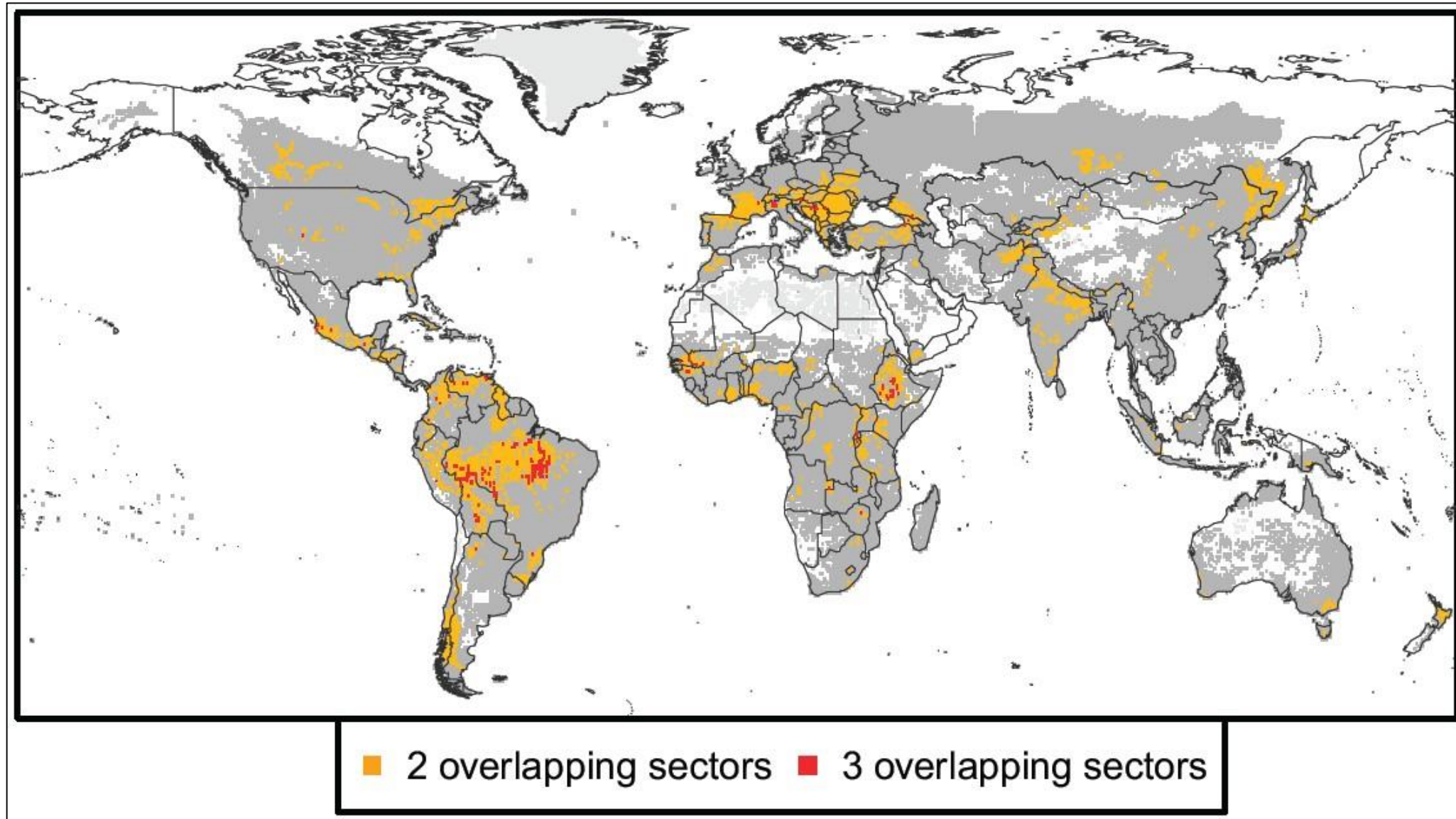
“In the past 5 years there has been a proliferation of efforts to map climate change “hotspots” — regions that are particularly vulnerable to current or future climate impacts, and where human security may be at risk. While some are academic exercises, many are produced with the goal of drawing policy maker attention to regions that are particularly susceptible to climate impacts, either to mitigate the risk of humanitarian crises or conflicts or to target adaptation assistance. Hotspots mapping efforts address a range of issues and sectors such as vulnerable populations, humanitarian crises, conflict, agriculture and food security, and water resources” (de Sherbinin 2014. Climate change hotspots mapping: what have we learned? *Climatic Change*. 123(1):23-37 DOI 10.1007/s10584-013-0900-7

Future Impacts: Climate Change Index



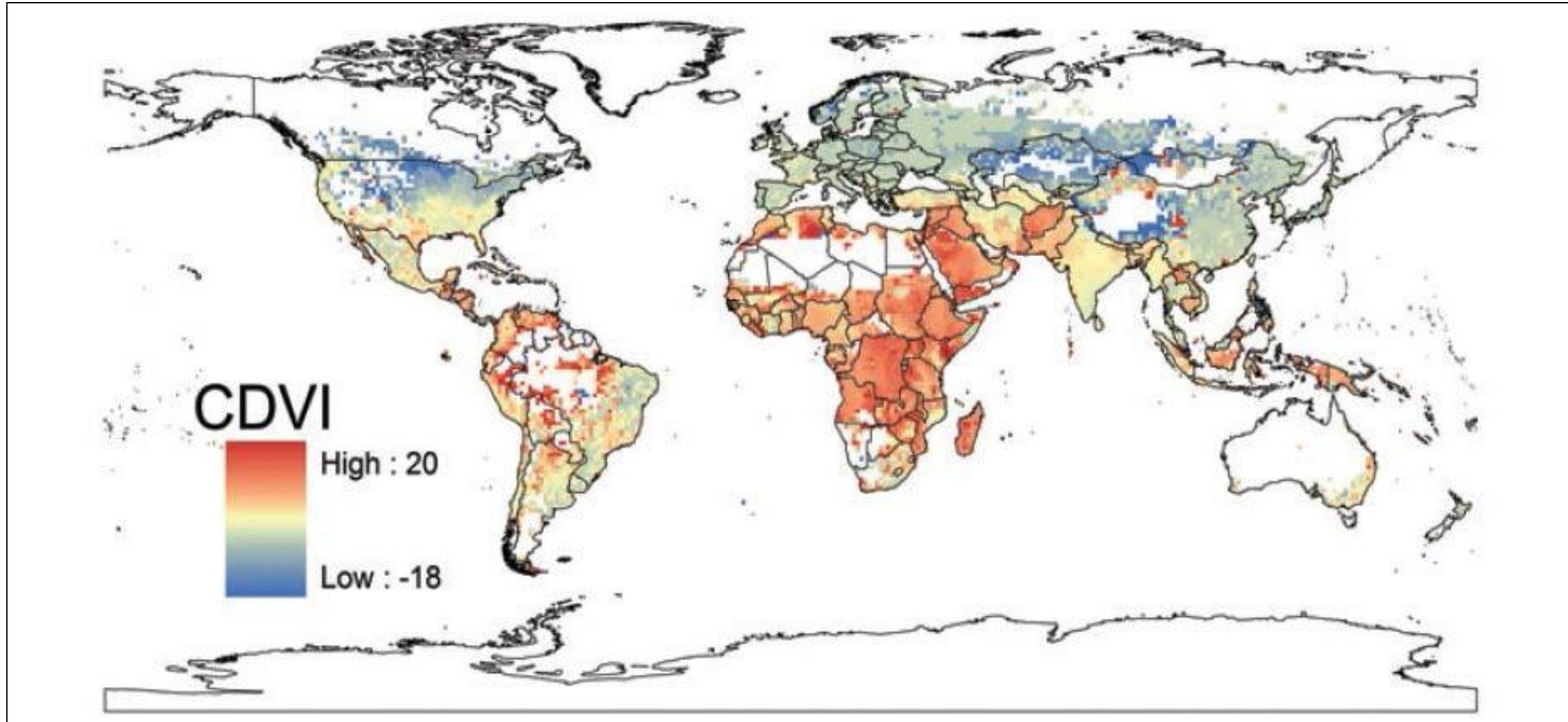
Source: Baettig, M.B., M. Wild, and D.M. Imboden. 2007. A climate change index. *Geophysical Research Letters*, 34, L01705.

Future Impacts: Multisectoral Hotspots of Impacts



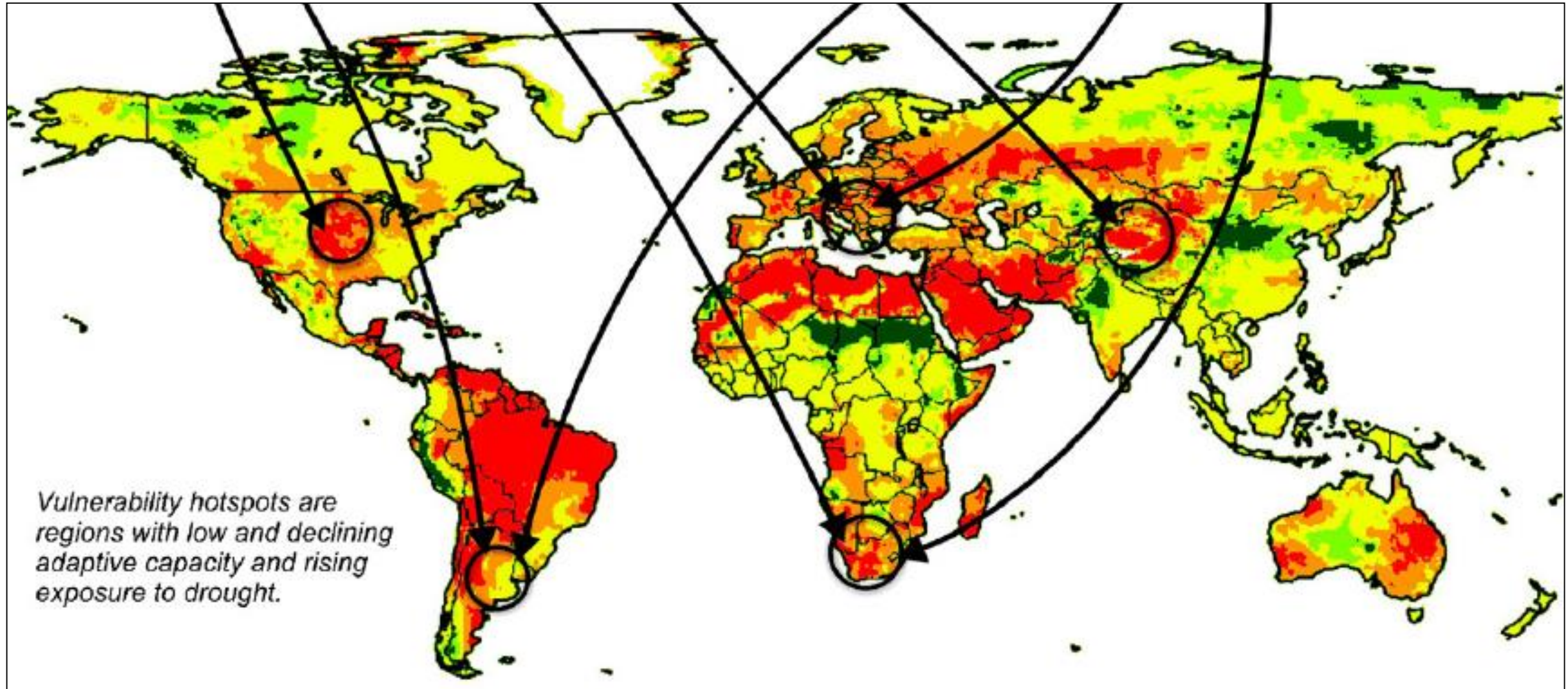
Source: Piontek F, Müller C, Pugh TAM et al (2013) Multisectoral climate impacts in a warming world. *Proceedings of the National Academy of Sciences*. doi:10.1073/pnas.1222471110.

Future Impacts: Climate - Demography Vulnerability Index



Source: Samson, J., D. Berteaux, B.J. McGill and M.M. Humphries. 2011. Geographic disparities and moral hazards in the predicted impacts of climate change on human populations. *Global Ecology and Biogeography* doi:10.1111/j.1466-8238.2010.00632.x

Future impacts: Vulnerability hotspots for wheat and maize



Source: Fraser, E.D.G., E. Simelton, M. Termansen, S.N. Gosling, and A. South. 2012. "Vulnerability hotspots": Integrating socio-economic and hydrological models to identify where cereal production may decline in the future due to climate change induced drought. *Agricultural and Forest Meteorology*, in press.

Some (miscellaneous) issues

- Demand for hotspots maps will likely increase as decision makers seek to identify where impacts will be greatest and what adaptation measures, if any, are possible.
 - “Seemingly innocent and value neutral, maps could play an important role in framing societal responses to climate change and its impacts in ways that are surely not neutral” (de Sherbinin 2014:34)
- More questions after the mapping results:
 - What proportion of the affected population will leave?
 - Current migration dynamics, migration systems and hotspots mapping results;
 - Can we accurately predict large scale crisis migration?
- Often not addressed:
 - Multiple stressors beyond climate change -- economic downturn, commodity prices, HIV/AIDS, disease outbreaks, political instability, and conflict -- are generally not taken into account
 - Potential direct displacement from major infrastructure projects and their environmental impacts
- Ideally, developing future *scenarios* of *possible* migration flows would emphasize the need for preventive mechanisms.
 - *As weather and climate-related disasters are becoming more frequent and destructive in Mexico, the model suggests that out-migration will continue to rise in the coming years **if an active disaster prevention strategy and structural adaptation measures are not duly implemented*** (Saldaña-Zorrilla & Sandberg 2009)

THANK YOU

Alex de Sherbinin adesherbinin@ciesin.columbia.edu

Susana B. Adamo sbadamo@ciesin.columbia.edu