

Population Dynamics, the Environment, and Climate Change

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UN Commission on Population and Development
22 January 2015

Outline

1. Rural population-development-environment linkages in low income countries
2. Macro-level population-development-environment linkages
3. Population dynamics and climate change vulnerability and adaptation

Part 1: Local-level linkages

Situating this work within the SDGs

GOAL 14 **Conserve and sustainably use the oceans, seas and marine resources for sustainable development**

GOAL 15 **Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss**

Part 2: Macro-level linkages

GOAL 10 Reduce inequality within and among countries

GOAL 12 Ensure sustainable consumption and production patterns

Part 3: Population dynamics and climate change

GOAL 13 Take urgent action to combat climate change and its impacts

Population Change

Size, Density,
Growth, Age
structure and
Distribution

Mediating Factors

Institutional Factors

Functioning markets & legal system
Rights to organize, free speech
Common property regimes
Land tenure arrangements

Livelihood Assets

Natural Capital: the local resource base
Social capital: kinship networks, reciprocity

Key Findings on Link Between HH Demographics and Local Environmental Change

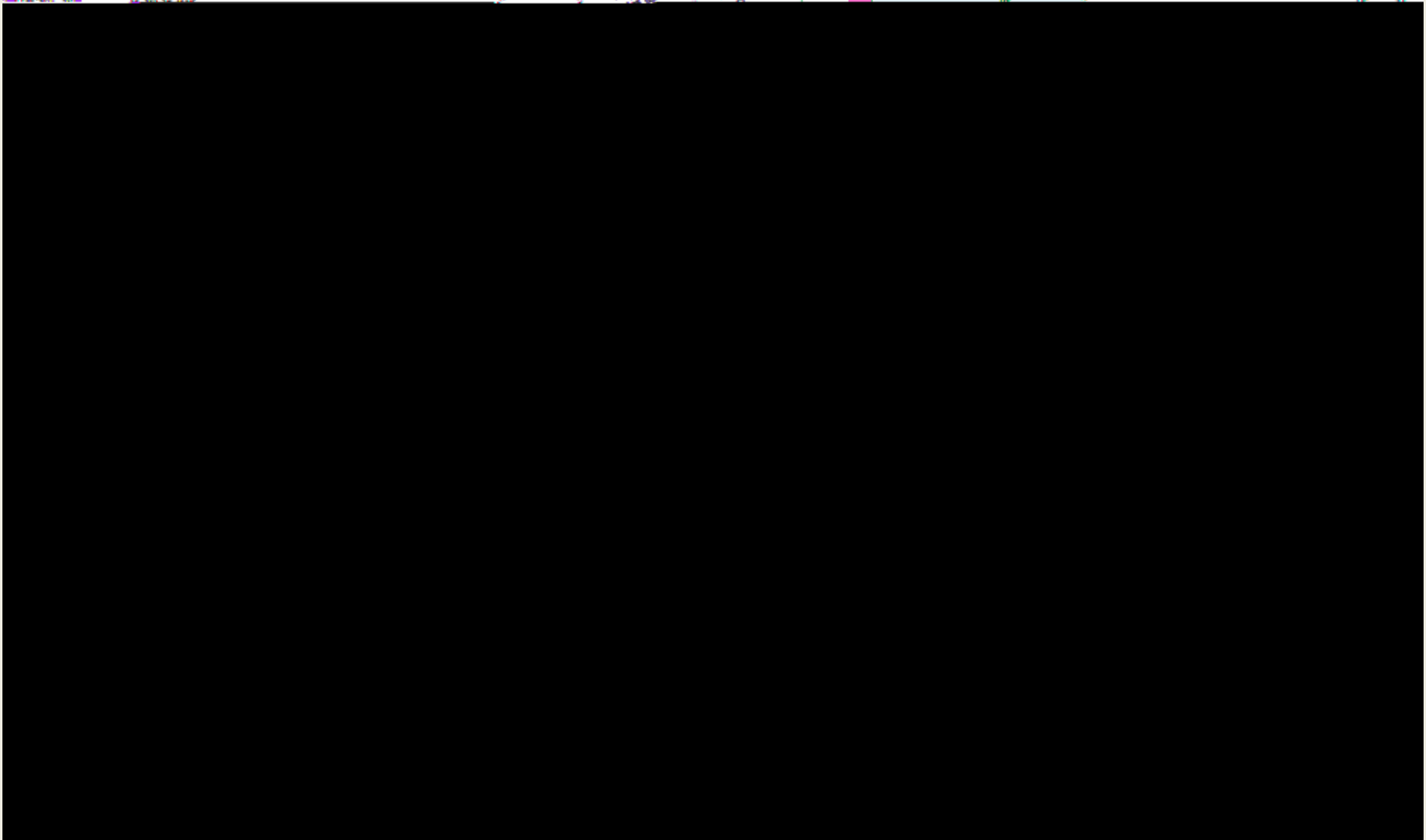
- Fertility
 - Limited support for the “vicious circle model” (VCM)
 - Improving women’s status is a “win–win” strategy for reducing fertility rates while improving incomes and the environment
- Morbidity/Mortality
 - Adult morbidity/mortality reduces HH wealth/income and increases dependence on natural resources
 - Timber, NTFPs, wildlife, etc., are an important “buffer” for poor HHs
 - Can result in a loss of local environmental knowledge



PART 2. MACRO-LEVEL PDE LINKAGES

EPI Framework

ENVIRONMENTAL HEALTH



EPI and Population Density & Change

		PopGrwth201	PopDens201	Pearson Correlat
		0.000	0.070	0.000
		178	171	172
		.598**	.790**	.57
		0.000	0.000	0.48
		178	171	172
			.328**	
		0	0.000	.12

Model	Variable	Estimate	Std. Error	z	Sig.	Lower Bound	Upper Bound
Model 1	(Constant)	.000	.170				
	PopGrwth201	.812**	.170	4.78	.000	.472	1.152
Model 2	(Constant)	.000	.170				
	PopDens201	.487**	.170	2.87	.004	.147	.827



PART 3. CLIMATE CHANGE VULNERABILITY AND ADAPTATION

Population Dynamics and Climate Change Vulnerability & Adaptation

“Vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.”

$$\text{Population's Vulnerability} = f(\text{E}, \text{S}, \text{A})$$

Where

- E = exposure — the location of occurrence of certain kinds of hazards and their magnitude
- S = sensitivity — the intrinsic characteristics of a population and institutions that influence abilities to withstand stressors; in mode9T EMCe 739e,5(hat)-13.Td [(t)-dx

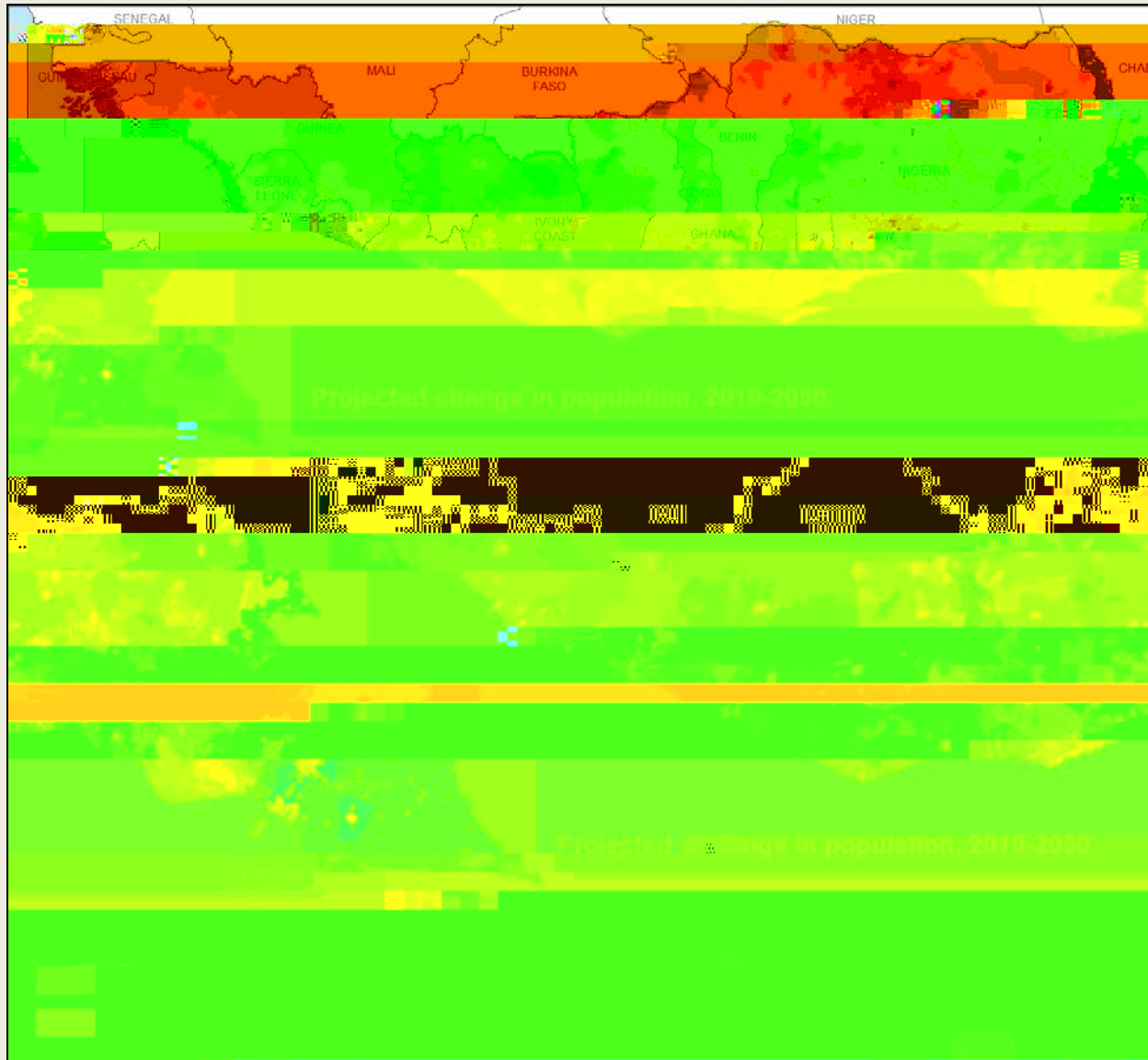
Identifying Exposed Populations



Projected Population Exposure

>40m
people in
the 0-5m
LECZ of
Nigeria by
2050

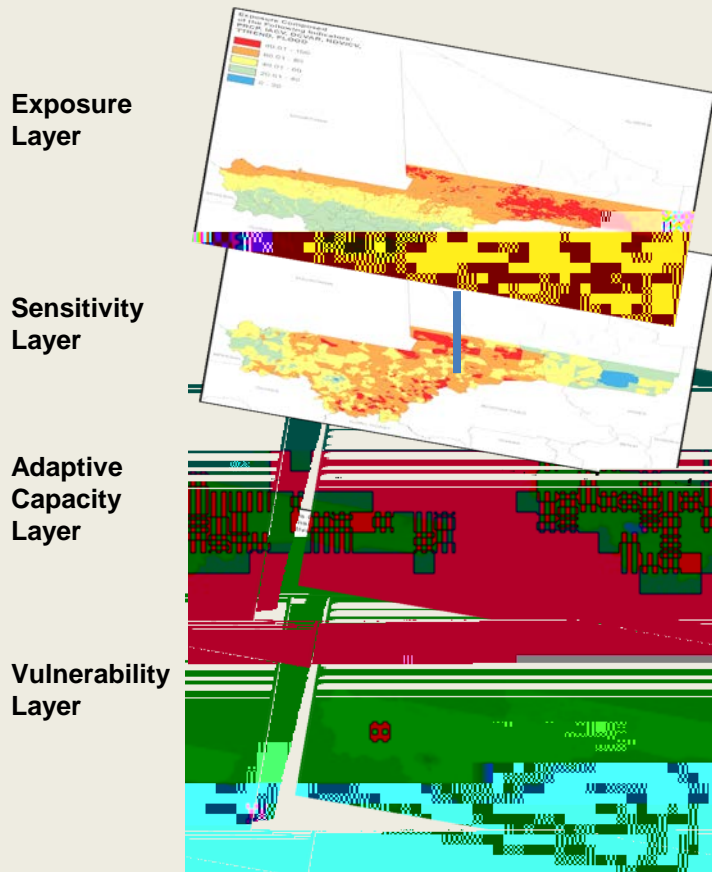
~5m people
in the 0-5m
LECZ of
Liberia by
2050



Source: CIESIN. 2014. Mapping the Exposure of Socioeconomic and Natural Systems of West Africa to Coastal Climate Stressors. Report of the USAID African and Latin American Resilience to Climate Change project.

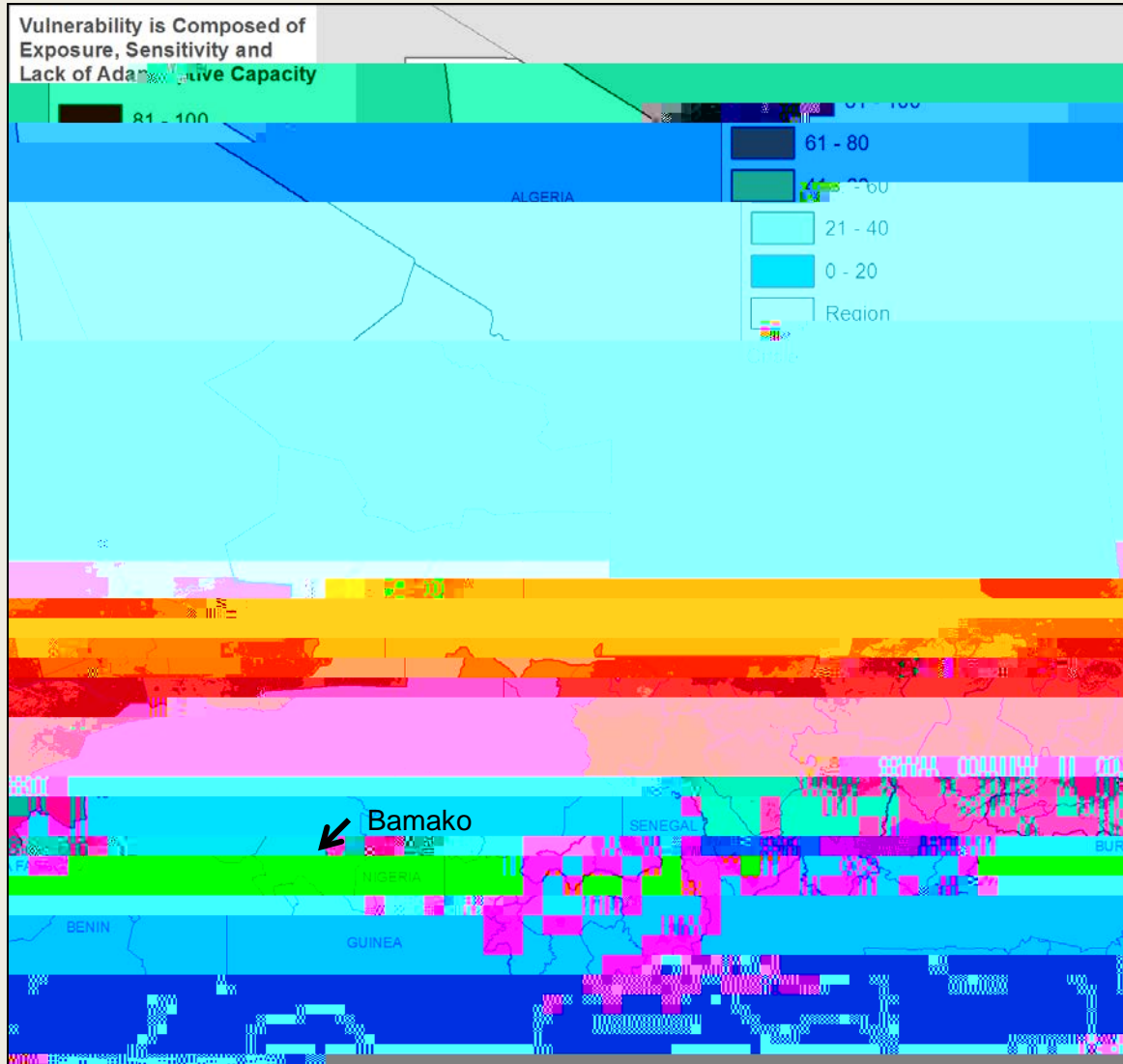
Vulnerability Mapping

- Integrates *spatial variability* in:
 - Climate / biophysical changes
 - Human / system vulnerabilities



Mapping can illuminate key vulnerabilities in the coupled human-environment system and, in turn, inform where adaptation may be required

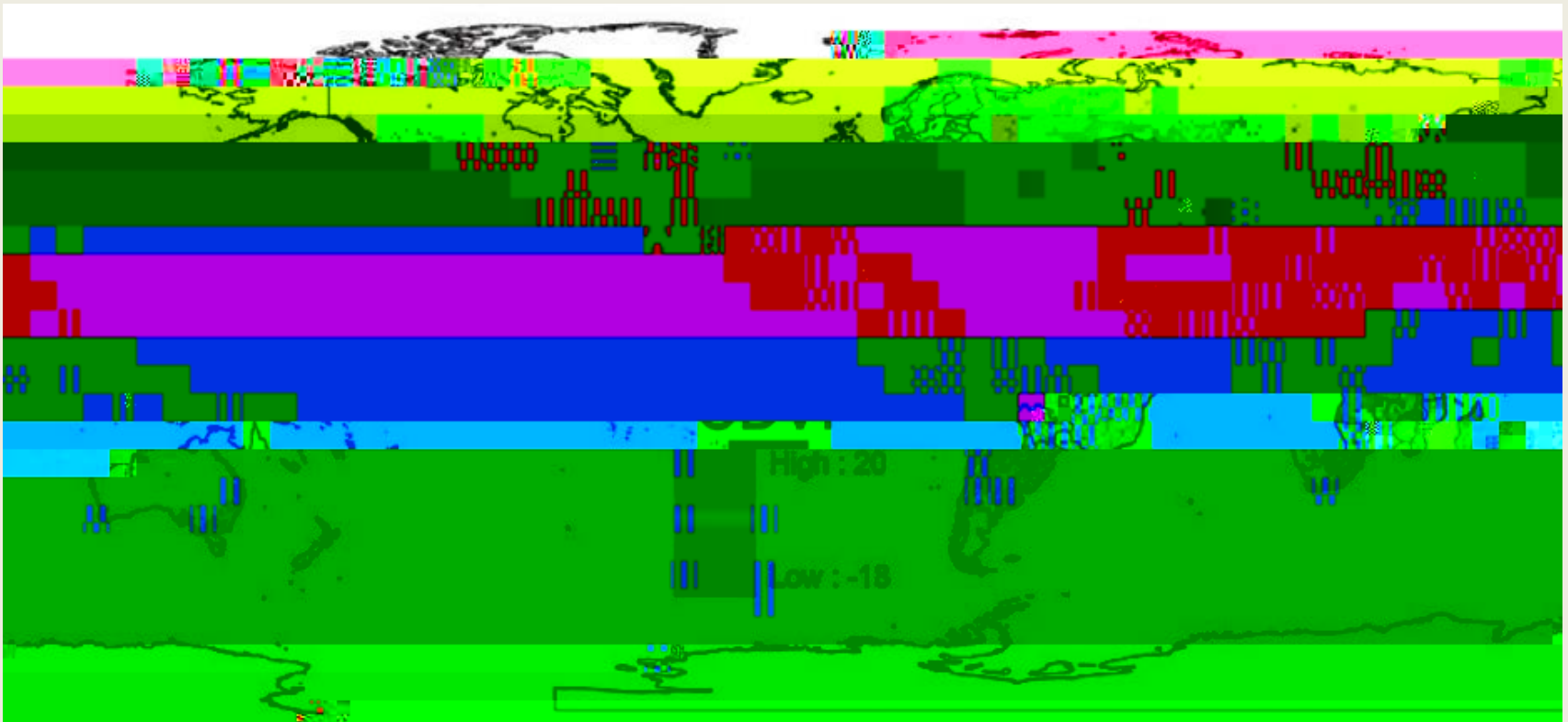
Mali Climate Vulnerability Mapping



- Baseline assessment using the IPCC definition of vulnerability
- Extensively used Demographic and Health Survey (DHS) data :
 - Child stunting
 - Infant mortality rate
 - Household wealth
 - Mother's education

Source: CIESIN. 2014. Mali Climate Vulnerability Mapping Preliminary Results. Report of the USAID African and Latin American Resilience to Climate Change project

Climate-Demography Vulnerability Index



Red areas = high vulnerability, where current demographic

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

THANK YOU!