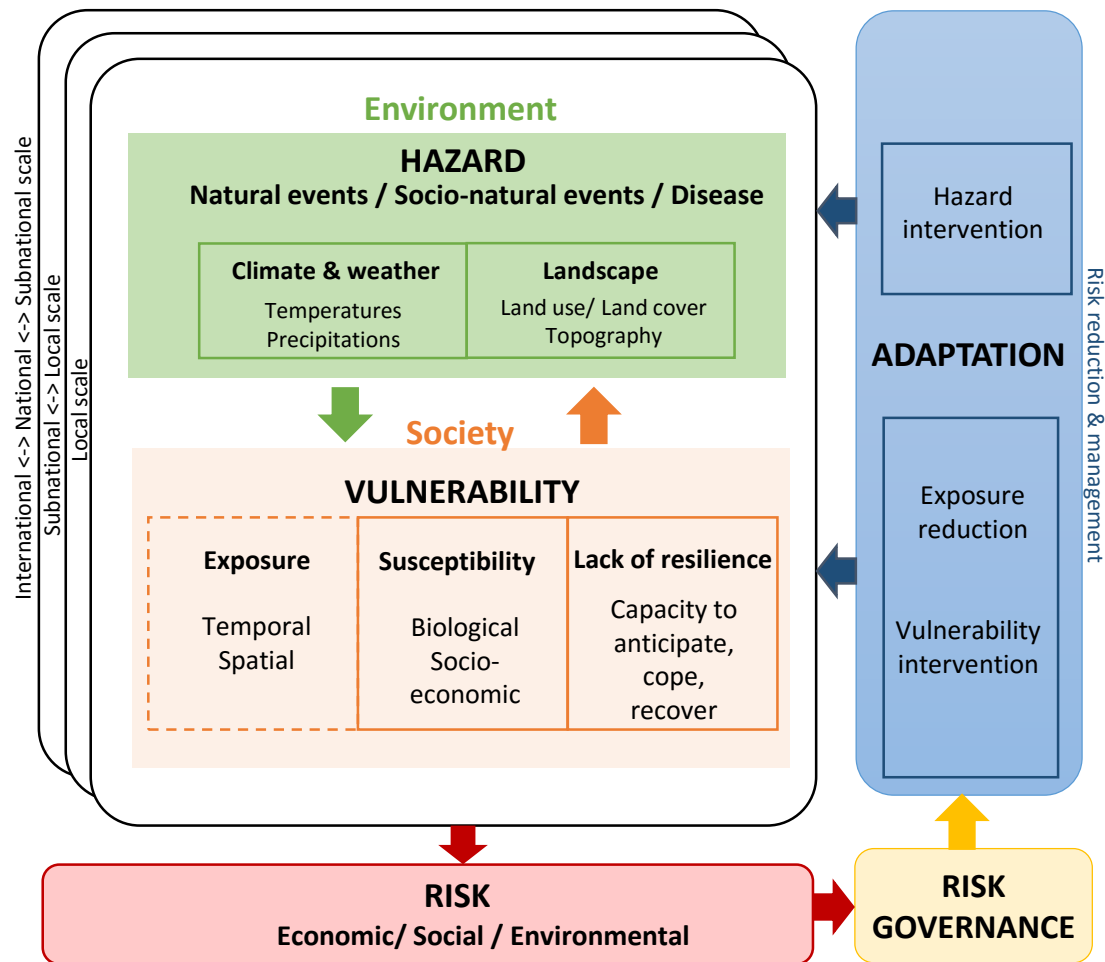


Environmental Impacts on Human Populations

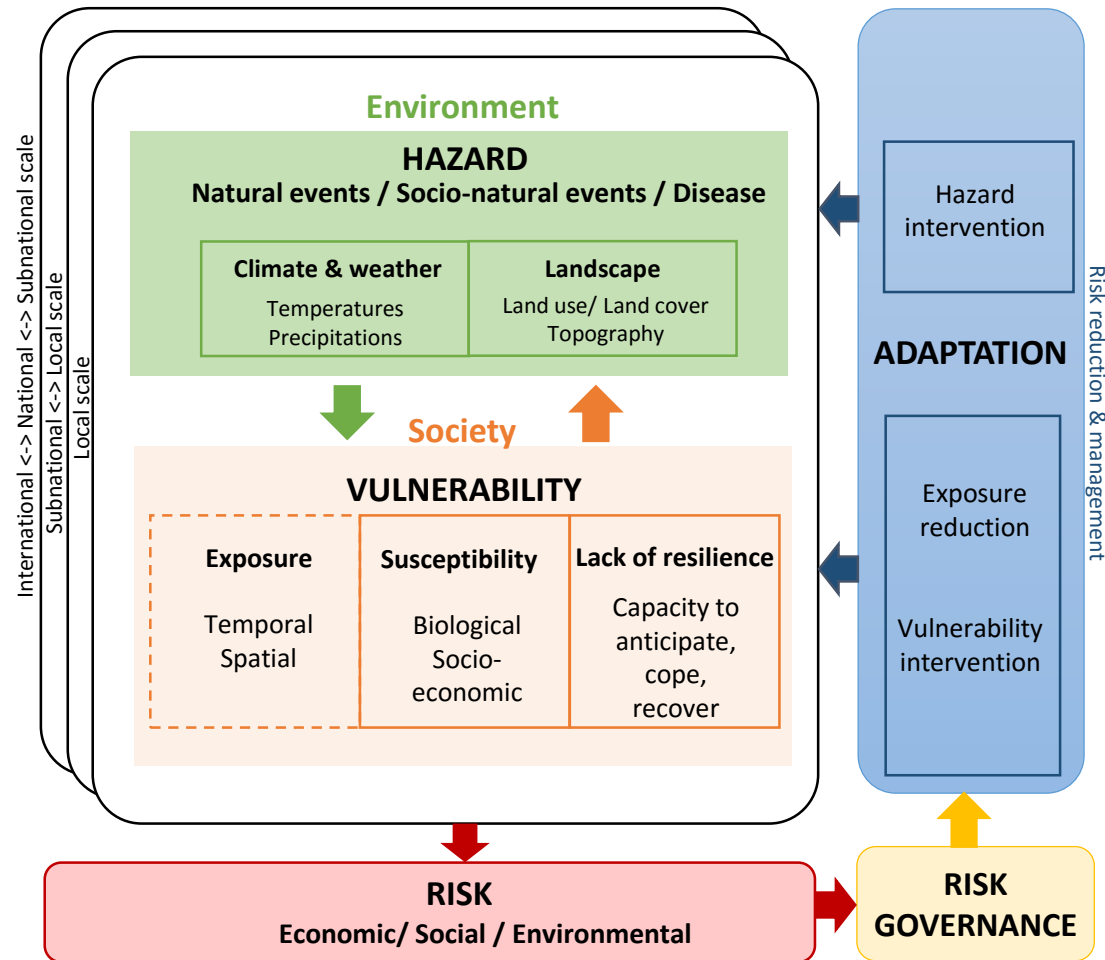
Sabine Henry & Catherine Linard

Département de Géographie



The impact of the environment on health

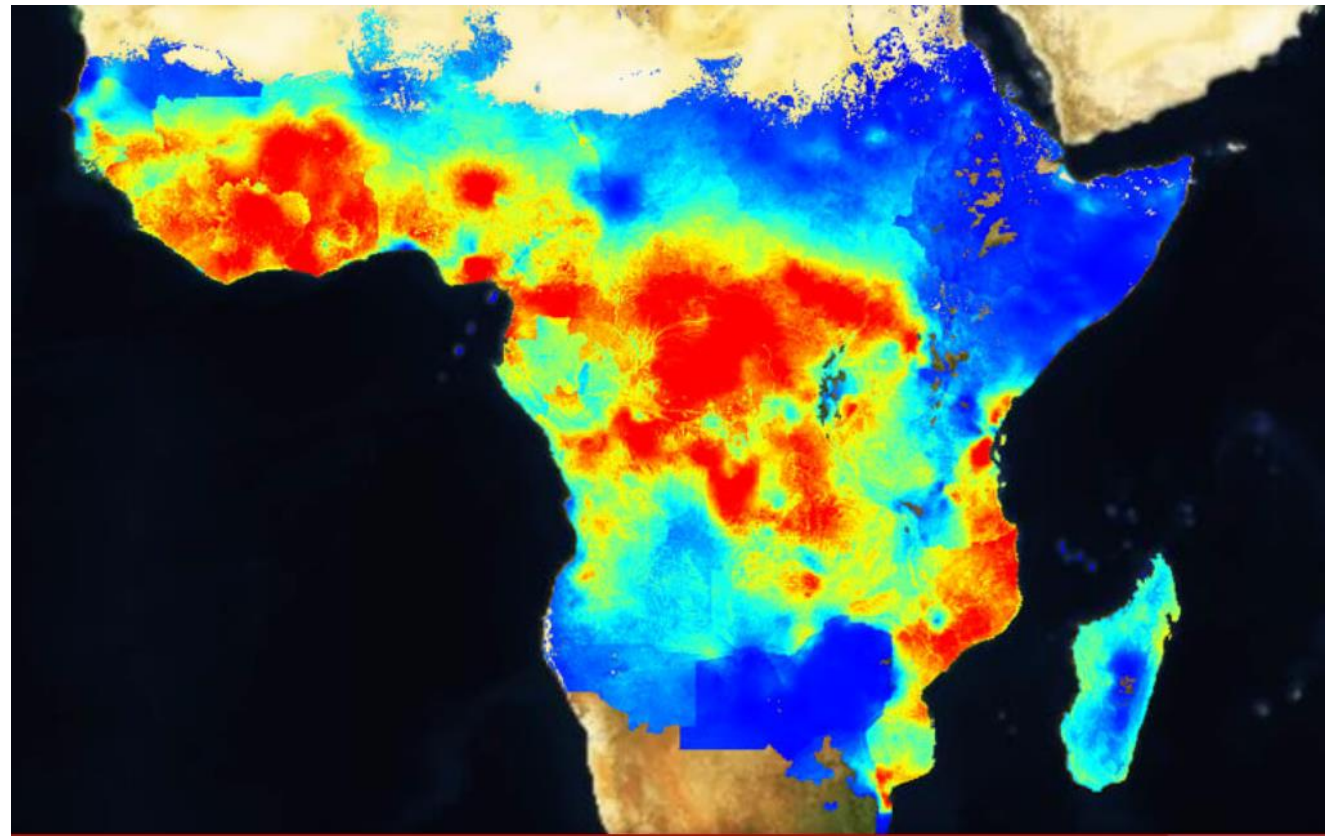
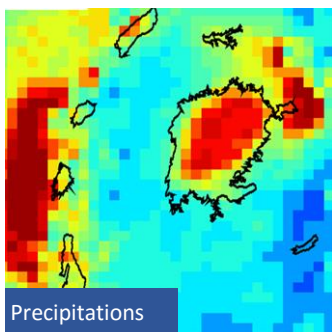
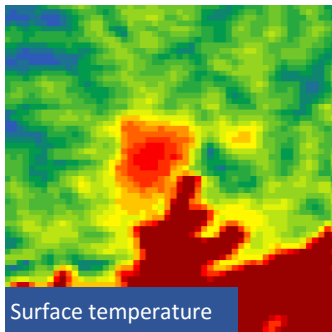
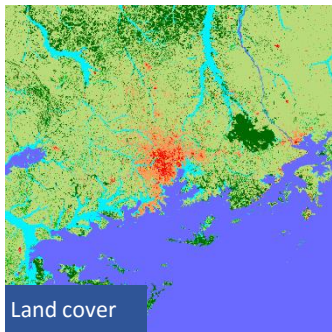
Hazard: disease
vectors, health
determinants



HAZARD = presence of (infected) vectors



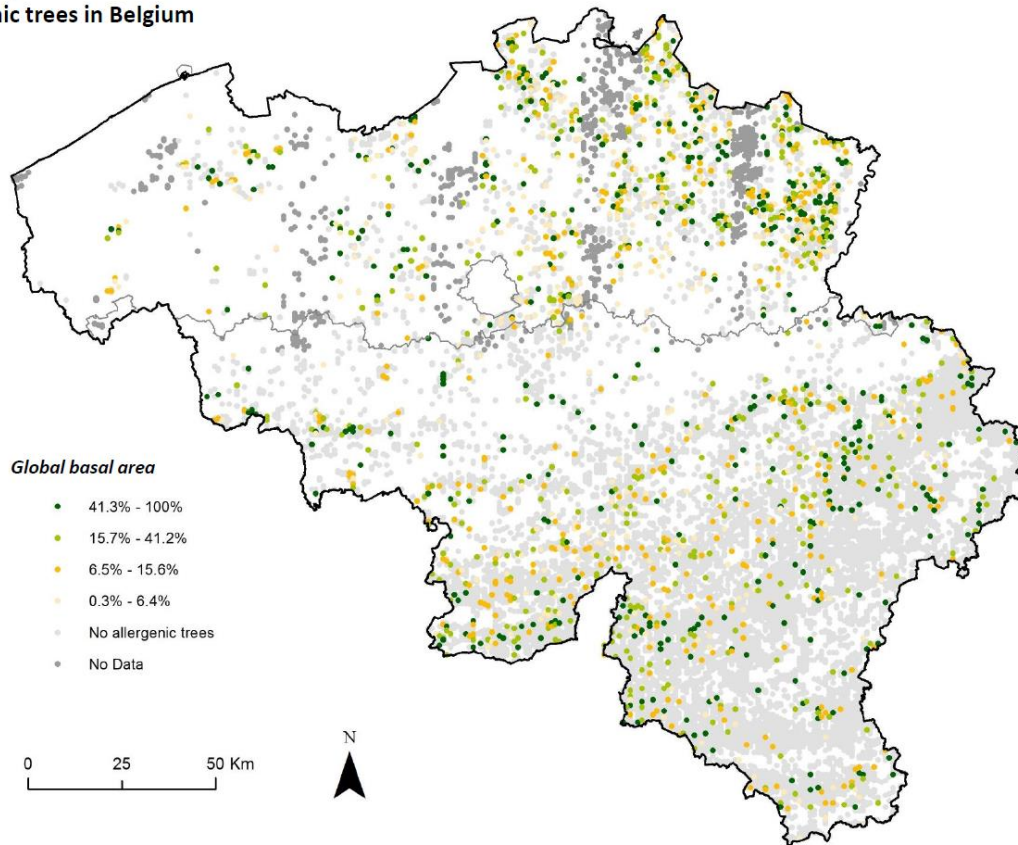
Plasmodium falciparum parasite rate in 2-10 year olds in Africa



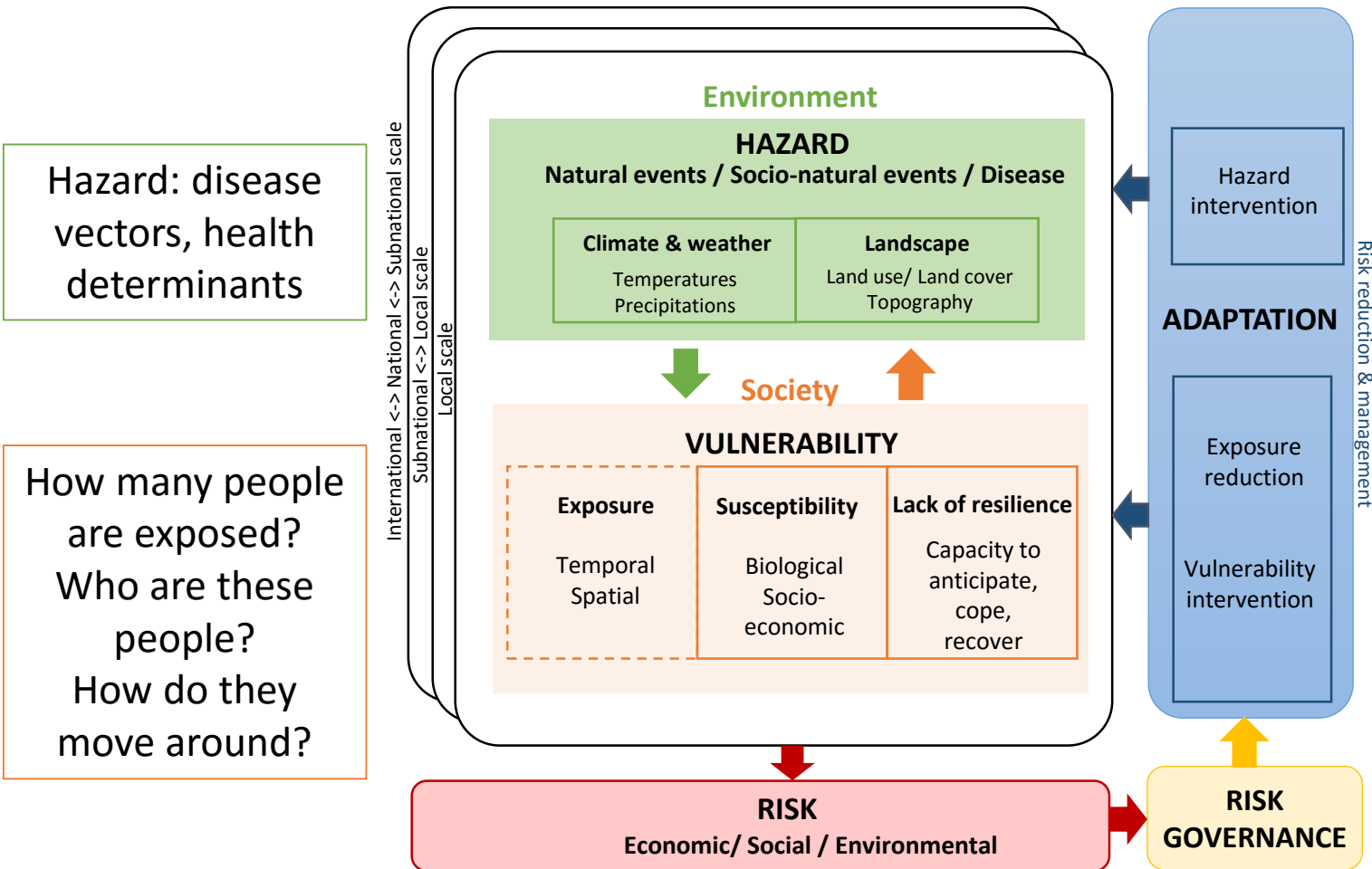
Malaria Atlas Project (<https://map.ox.ac.uk/>)

HAZARD = presence of allergenic species & pollution

Relative presence of 3 selected allergenic trees in Belgium

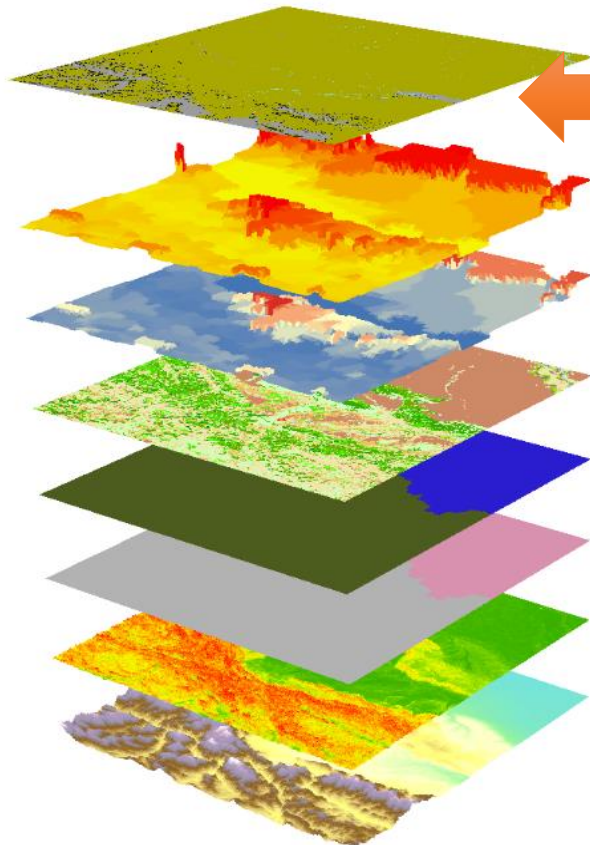


The impact of the environment on health

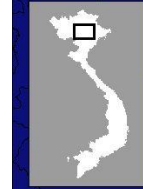


EXPOSURE: spatial distribution of human population

world
pop



Aggregate census counts



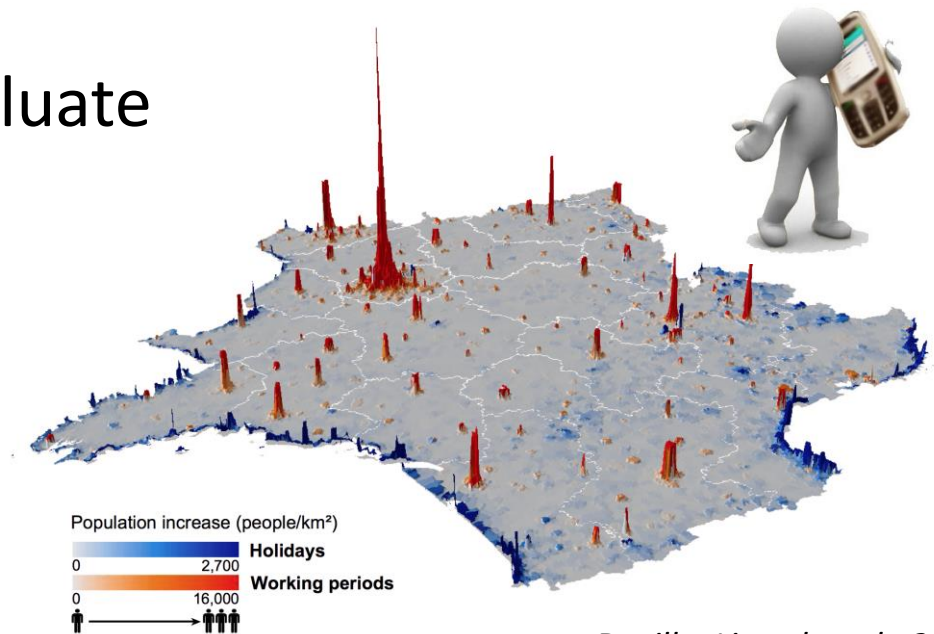
> 30 People Per Ha

100x100m gridded counts

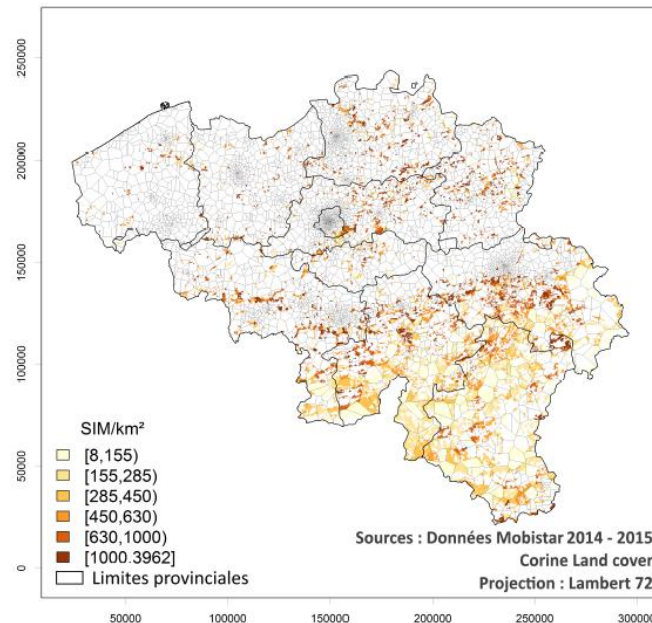
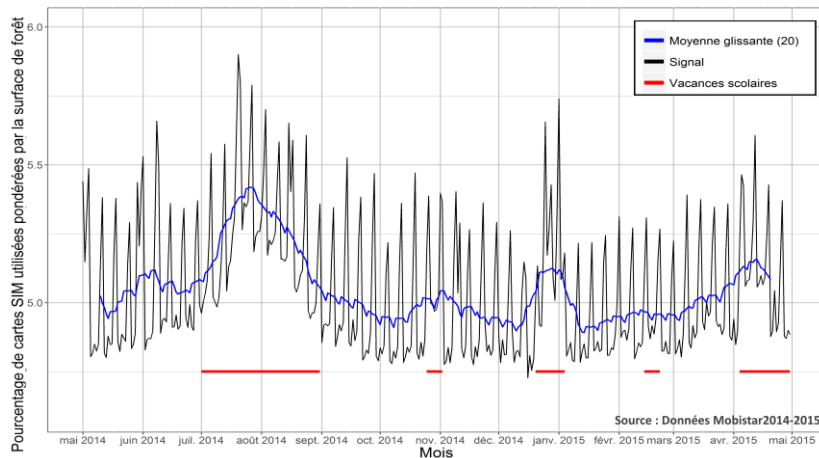
> 30 People Per Pixel

Low : 0

Mobile phone data to evaluate the exposition to spatio-temporal health risks

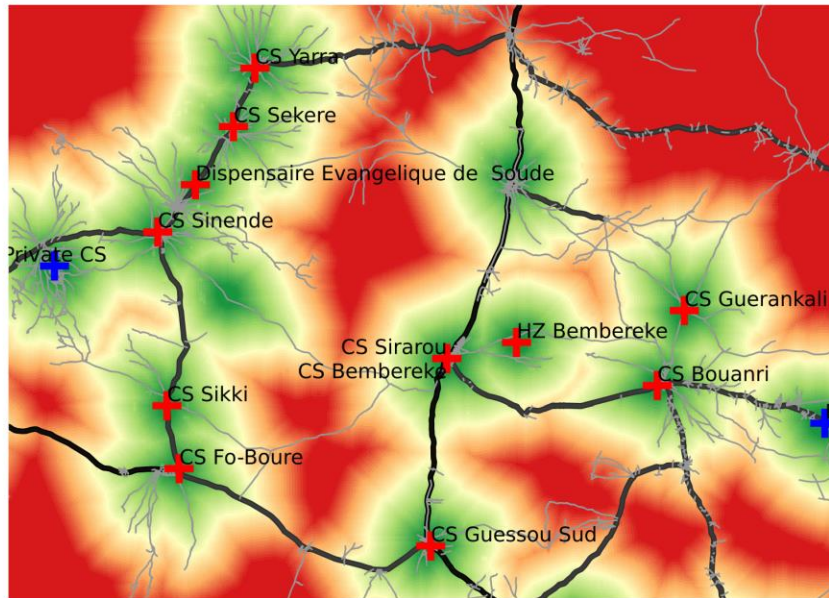


Deville, Linard et al., 2014

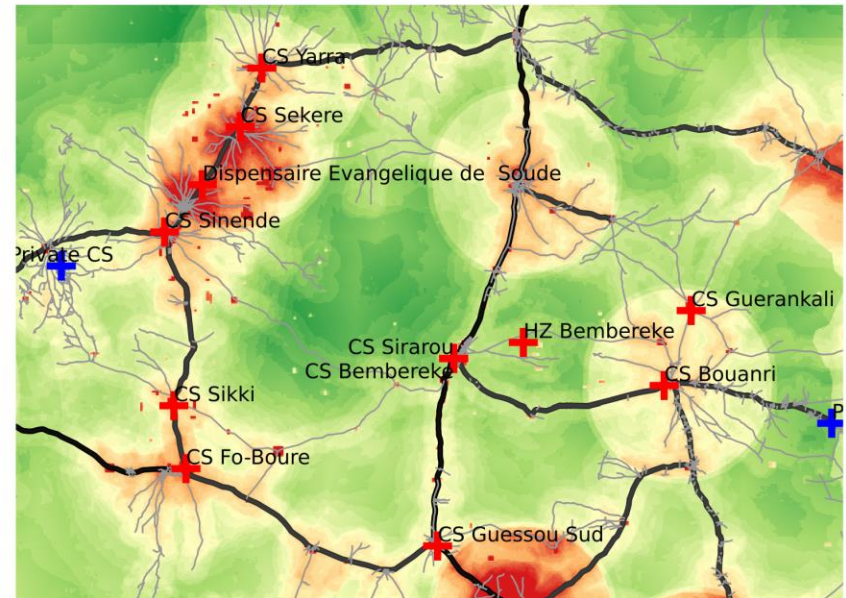


Allaer 2016

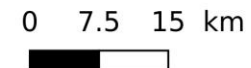
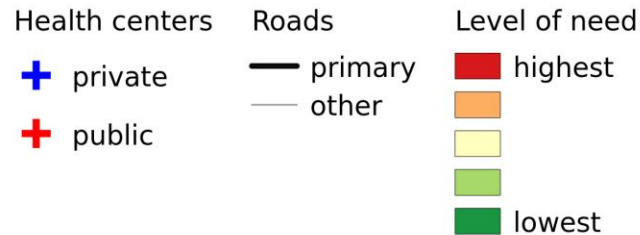
Multicriteria analysis of places in need of health centers



Weight of distance : 90%
Weight of number of WOCBA: 10%

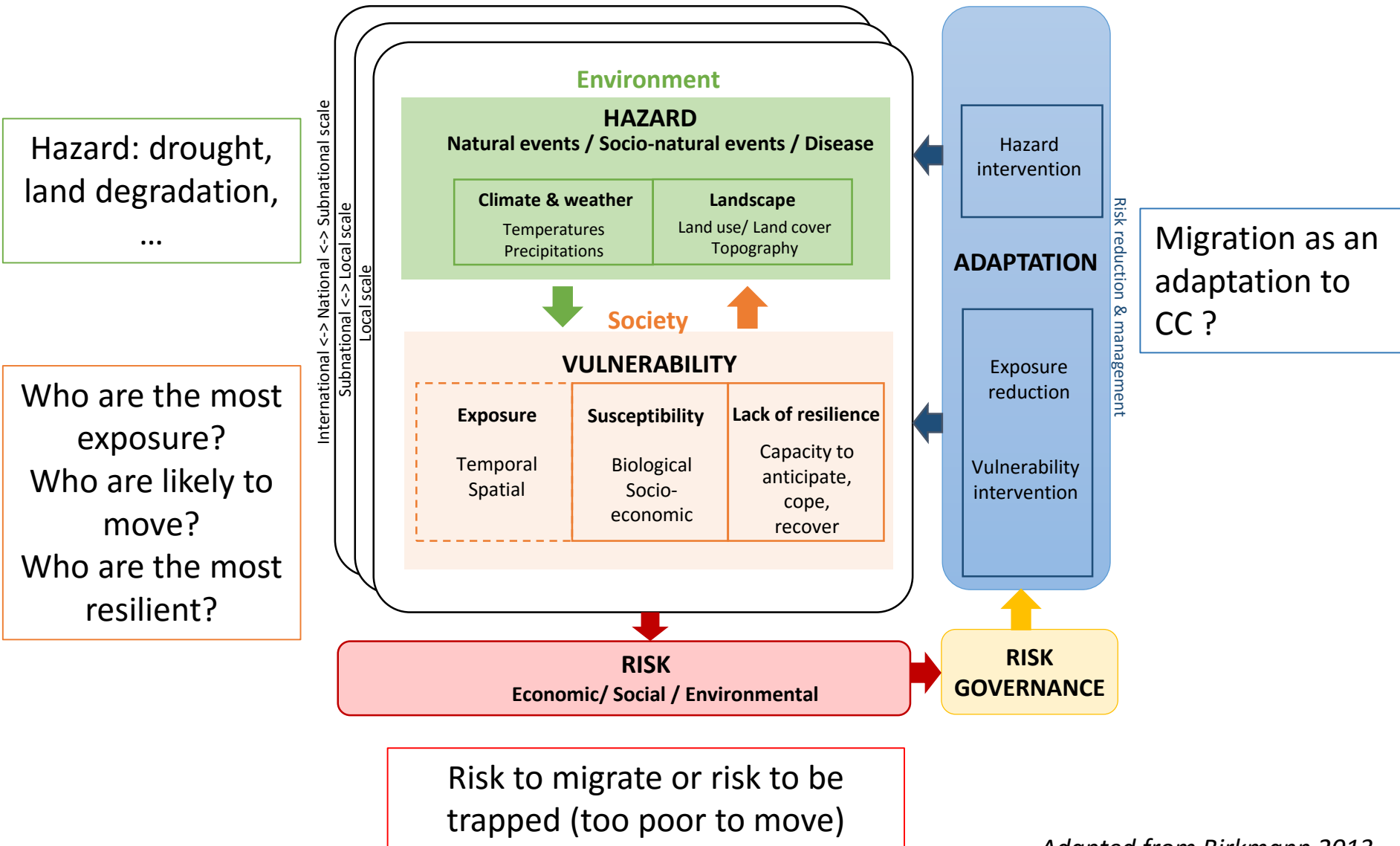


Weight of distance : 10%
Weight of number of WOCBA: 90%



Health centers: © Bluesquare
Demographic data: © worldpop.org
Roads: © OpenStreetMap contributors

The impact of the environment on migration



The environment is a source of confusion in migration-environment research

How to measure the environment?

- based on rainfall data
- Based on perceptions
- Based on emotions

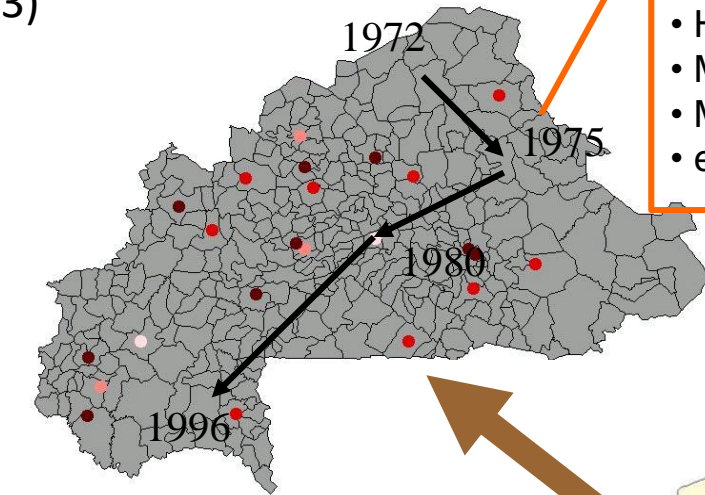
Burkina Faso (Henry, 2003)

Rainfall data

- Male, born in 1966, farmer
- House characteristics
- Migration purpose
- Matrimonial status
- etc.

- Distance to market
- Presence of primary school
- Migration history
- Ethnic groups
- Crops
- etc.

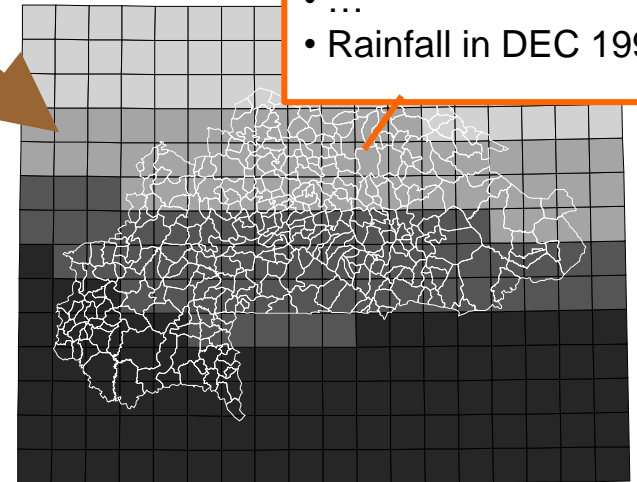
- Rainfall in JAN 1960
- Rainfall in FEB 1960
- ...
- ...
- Rainfall in DEC 1998



S. HENRY
Géographie
Université catholique de Louvain

GIS

Migration model estimated by a discrete-time event history model



Comparison between perceptions and observations of rainfall change

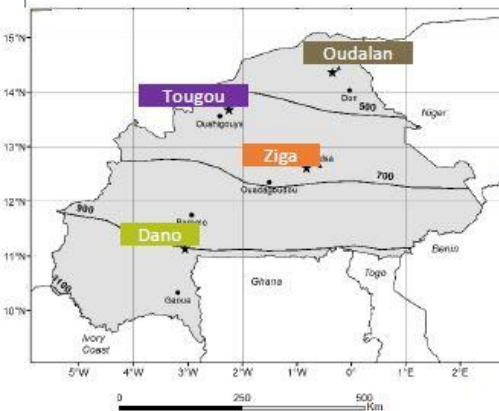
AMMA parameter	Climate index	Oudalan		Tougou		Ziga		Dano	
		Perc	Obs	Perc	Obs	Perc	Obs	Perc	Obs
Total rainfall during the wet season	TOTRws	-	= (+)	-	= (+)	-	= (+)	-	= (+)
	TOTR		+**		= (+)		= (-)		= (+)
Length of the wet season	Lws	-	= (+)	-	= (+)	-	= (+)	-	= (+)
Rainfall events during the dry season	RDds	-	= (-)	-	= (-)	-	= (-)	-	= (-)
	TOTRds		= (+)		= (+)		= (-)		= (-)
Dry spells during the wet season	DDws	+	= (+)	+	= (+)	+	= (-)	+	= (+)
Rainfall intensity	SDII	-	+**	+	= (+)	-	= (-)	-	= (+)
	R10		= (+)		= (+)		= (-)		= (+)
	R10p		+*		= (+)		= (+)		= (+)
	R20		+**		= (+)		= (-)		= (+)
	R20p		+*		+*		= (+)		= (+)
	RMax		= (-)		= (-)		= (+)		= (-)

** Significant at $p < 0.05$

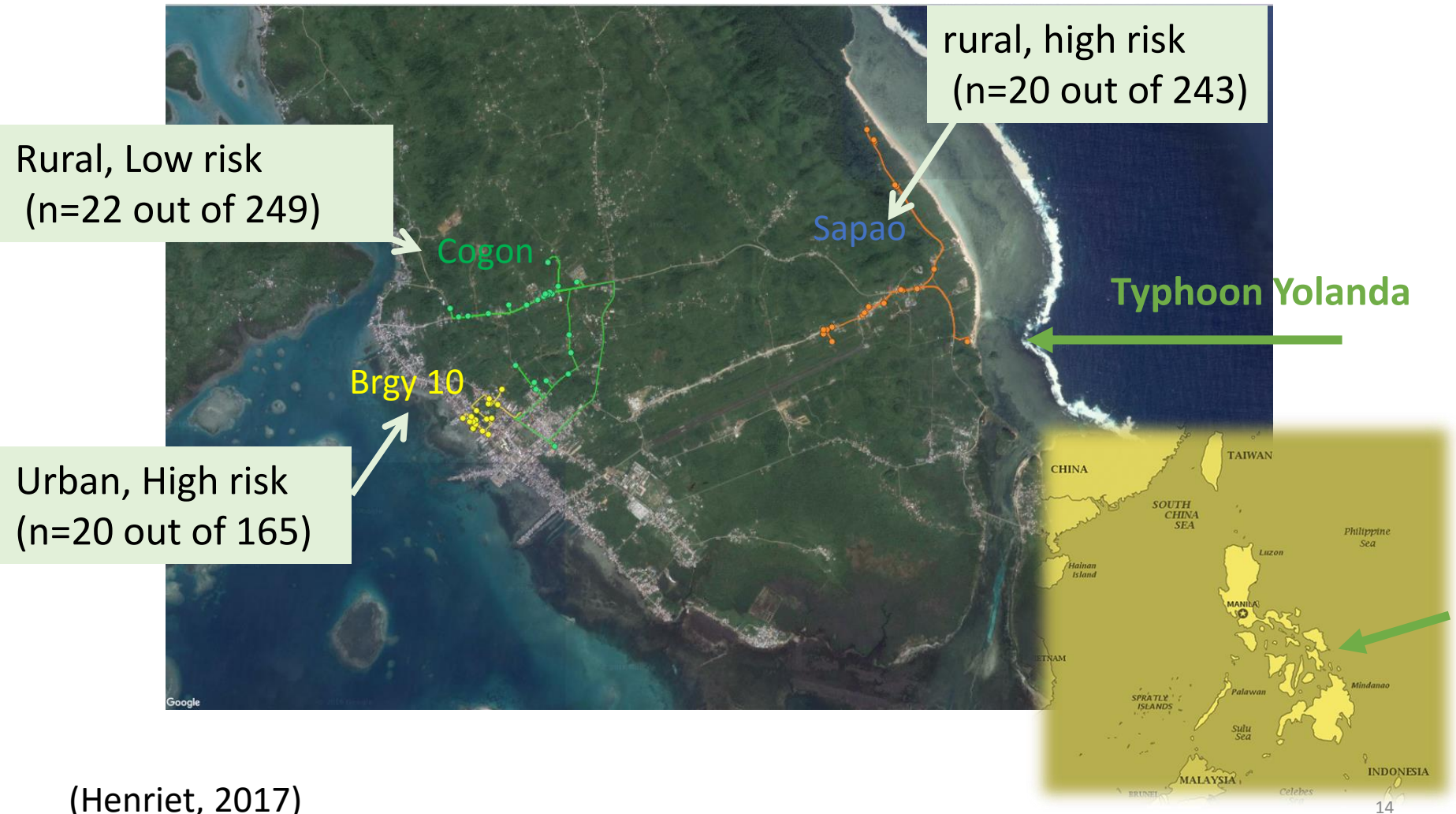
* Significant at $p < 0.1$

Opposition

Consistency



Impact of typhoon on migration in the Philippines (Henriet)



Use of a board game to collect information about **emotions** related to the environment

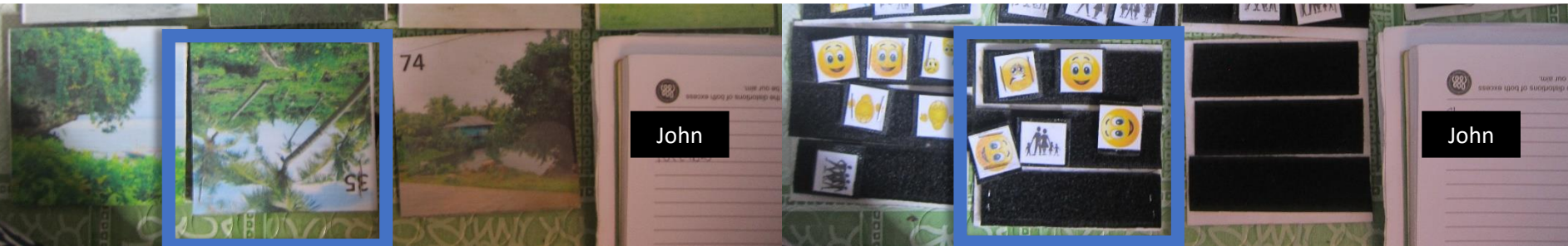
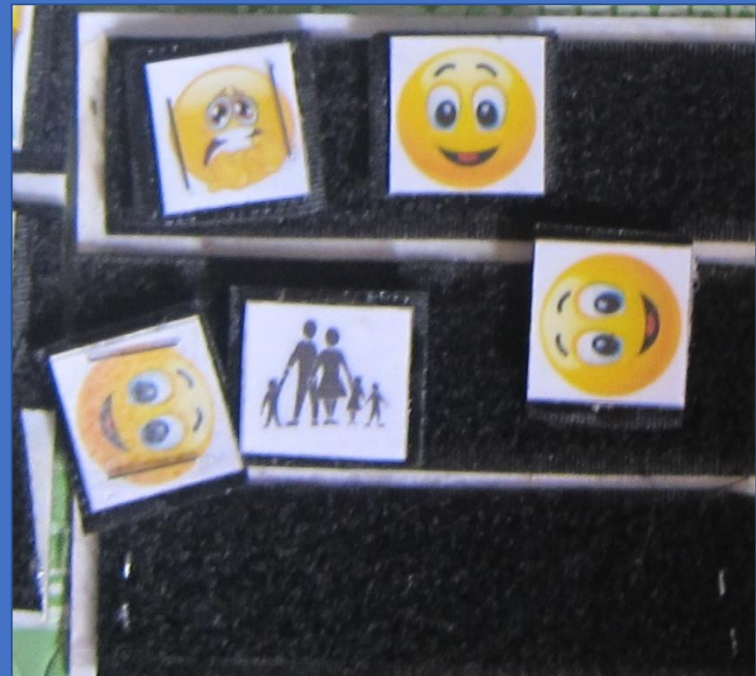


(Henriet, 2017)

Game database

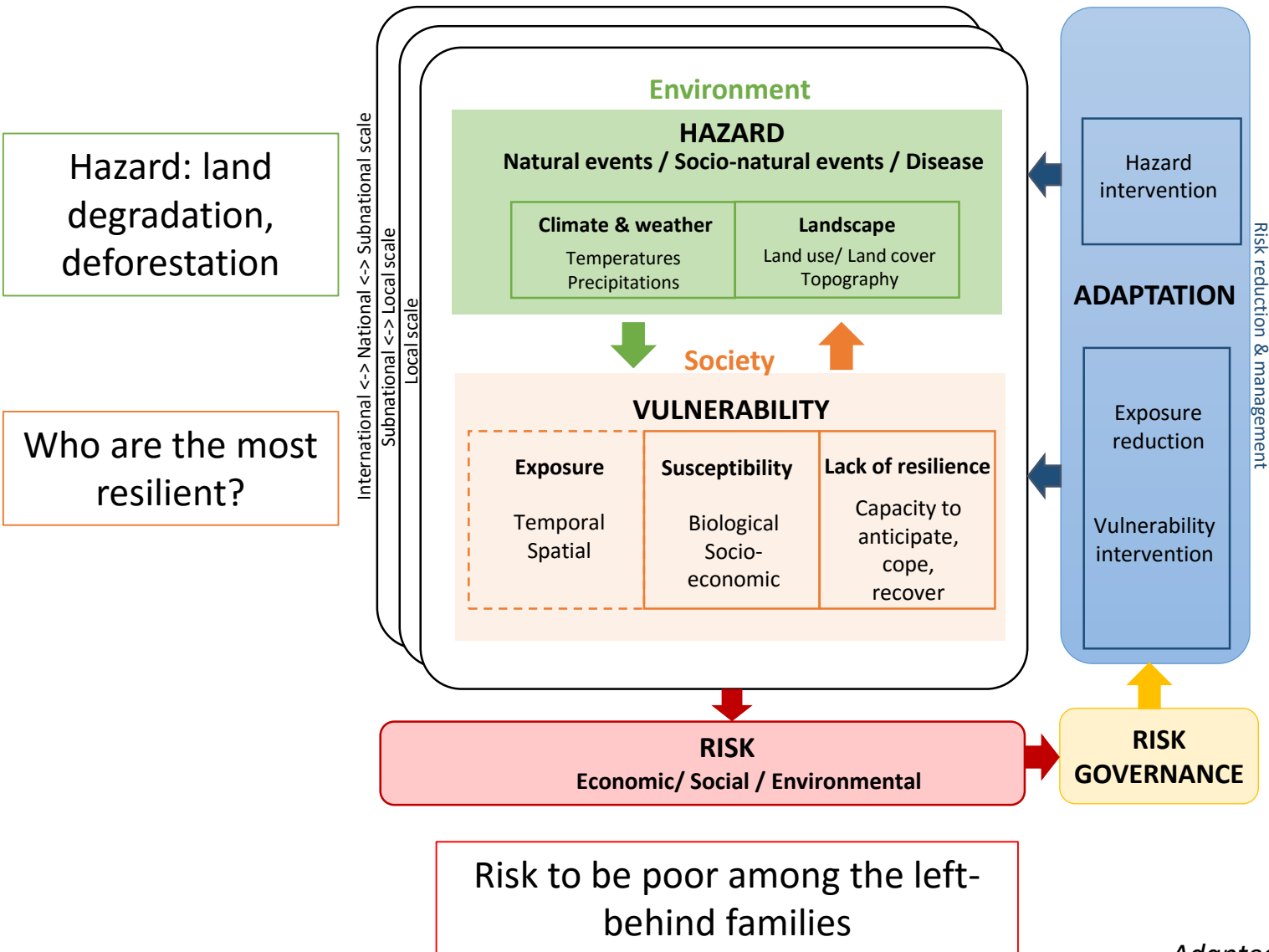


(Henriet, 2017)

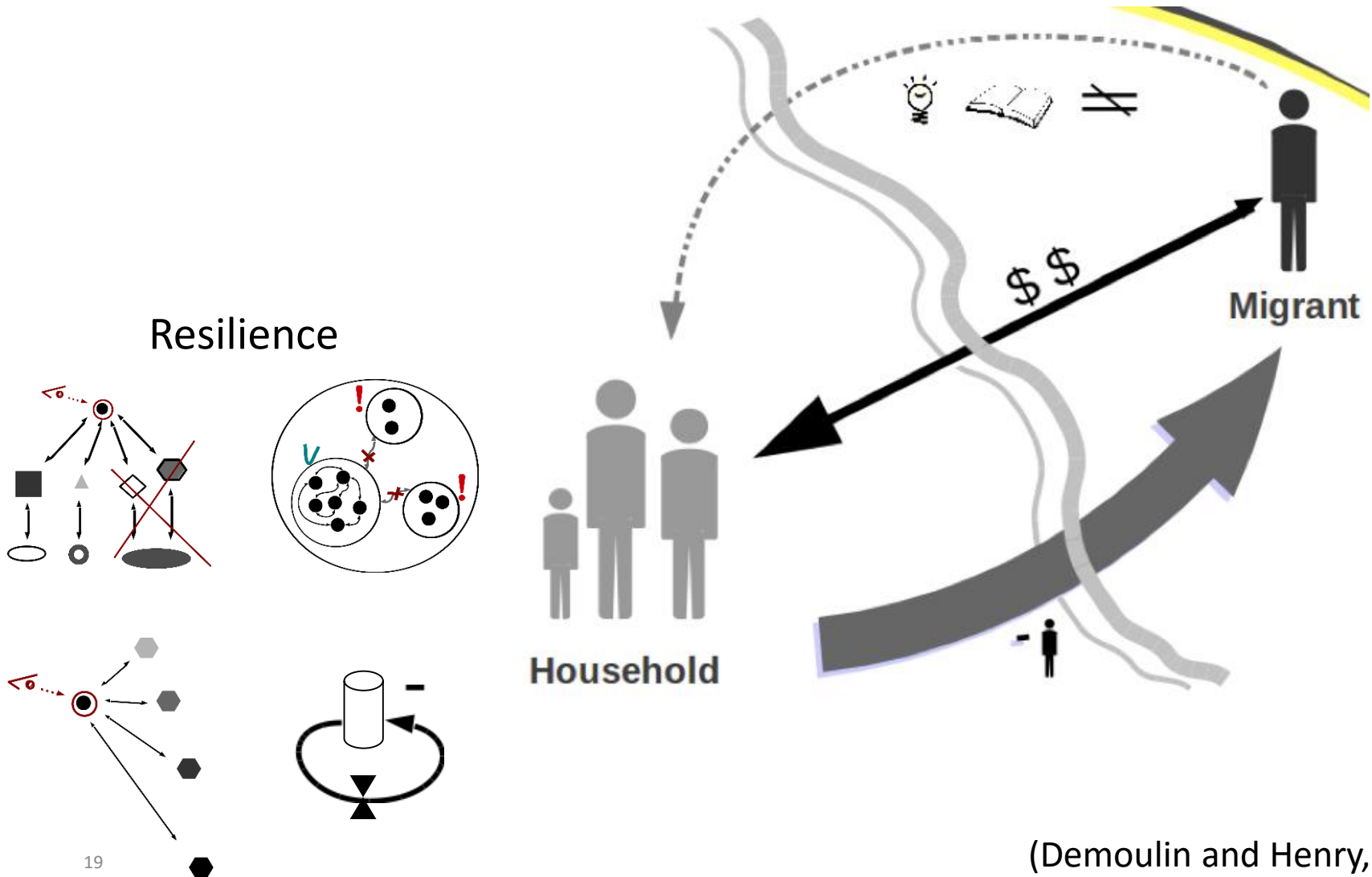


(Henriet, 2017)

The impact of the migration on the environment in Ecuador



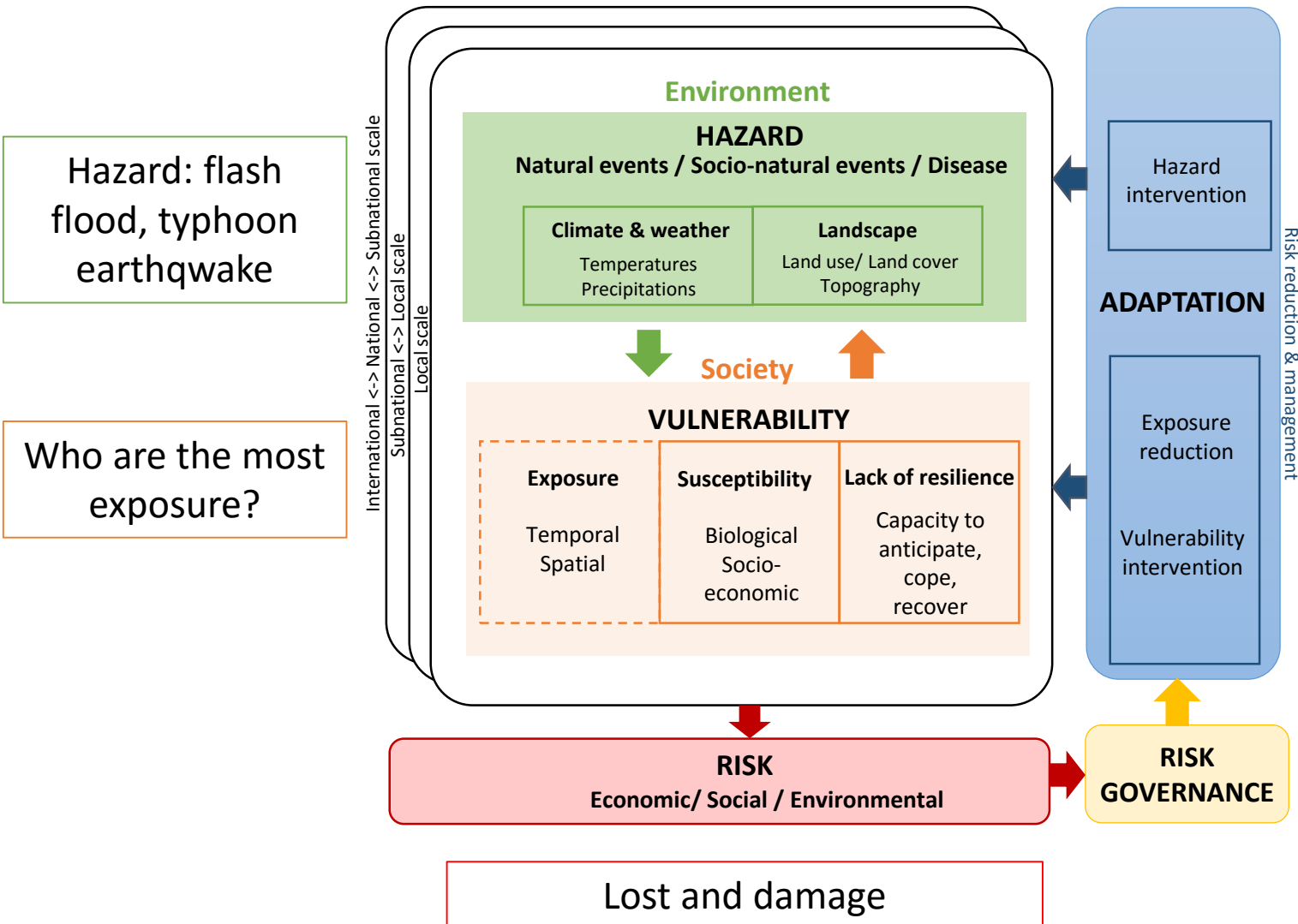
To analyze the effects of migration on the different factors of resilience at household level (rural Ecuador)



(Demoulin and Henry, 2015)

How to measure social vulnerability ?

Philippines and Haïti



To develop and validate a high spatial resolution social vulnerability index (SVI) based on disaggregated census data for the Philippines (Ignacio, 2015)

Figure 4-23 Pre and post TS Washi flood satellite images for Cagayan de Oro City*



**Red marker indicates the point from where Figure 4-24 was taken
(Before images © Google; After images © Bing)*

Figure 4-24 Panoramic photo from the center of a former subdivision along the Cagayan River



(Ignacio, 2015)

Social vulnerability index

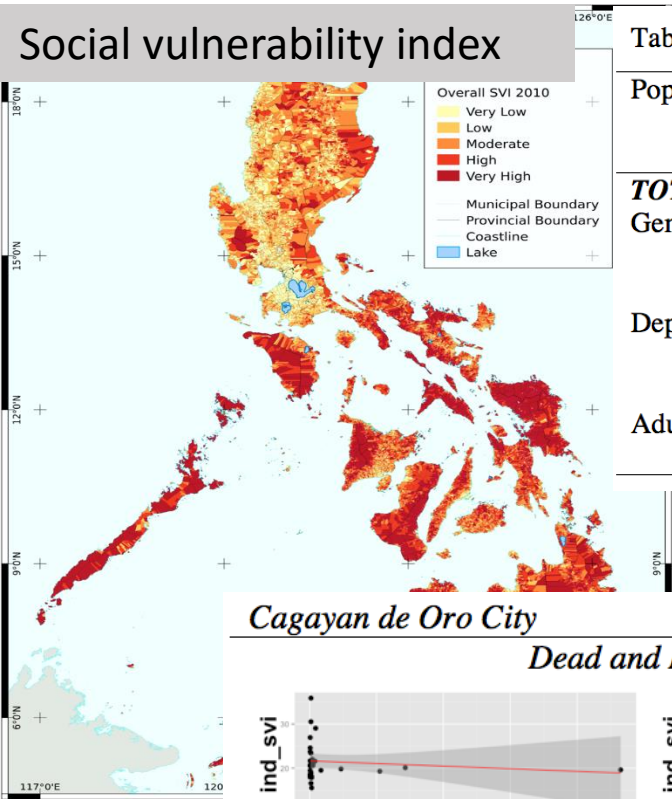
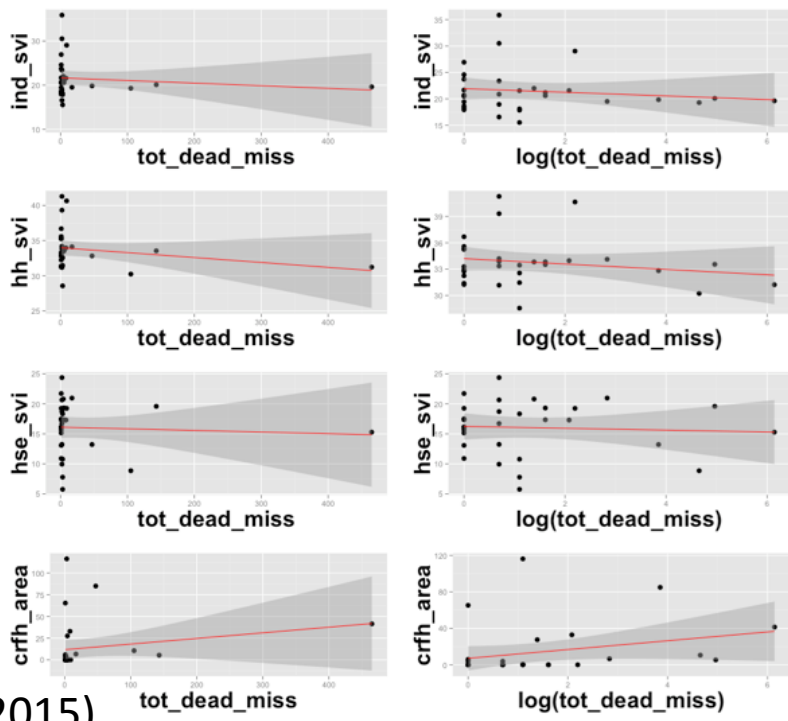


Table 2-6 Demographics of dead, missing and affected individuals for Cagayan de Oro City

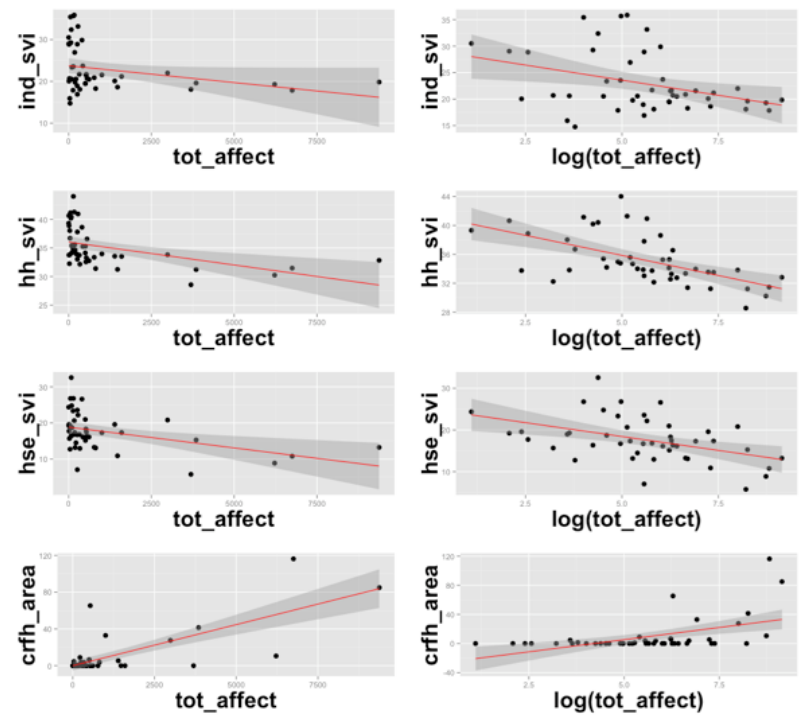
Population-related field	Dead		Missing		Affected	
	N	% of control*	N	% of control*	N	% of control*
TOTAL INDIVIDUALS	479	0.13%	363	0.13%	47,526	52.77%
Gender						
Male	218	0.12%	177	0.13%	No Data	-
Female	261	0.14%	186	0.24%	No Data	-
Dependent population						
Children (< 15 years)	162	0.14%	188	0.23%	No Data	-
Elderly (≥ 60 years)	114	0.56%	49	0.32%	No Data	-
Adult educational attainment						
Up to secondary only	No Data	-	No Data	-	No Data	-

Cagayan de Oro City

Dead and Missing



Affected



Summary

- The Department of Geography contributes to the transition towards sustainable and resilient environments in order to improve population well-being
- Links between environment and society is the core of our research
- We have expertise in the production, analysis and modelling of spatial data, in the construction of household survey, event-history models, board game, integration of environmental and population data.
- Sub-Saharan Africa, Haïti, Ecuador, Philippines