Opções metodológicas para identificação da vulnerabilidade as mudanças climáticas no Brasil

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INTRO: Why vulnerability assessment is needed?

- Identify **hotspots** of vulnerability to climate change

- Identify **weaknesses** in socioeconomic, productive sector, environmental, infrastructure... tissue at stake vs. climate changes

- Understand the **underlying causes** of high vulnerability values (explicative variables)

- In Brief, Point out “WHERE”, “WHAT” “WHY” and “WHO” is vulnerable to Climate Change

- **DEFINE PLANNING TARGETS** and **PRIORITIES**
INTRO: Outcomes of Vulnerability assessment

• Support Adaptation Policy (planned adaptation - selection of measures and investment)

• Justify the costs of adaptation vs. losses due to inaction (no adaptation measures) → How much to adapt?

• Increase Awareness about climate change impacts (spontaneous adaptation - people acting on their own)

• Reduce risk for Private sector investments (insurance, infrastructures) and foster resilience investments
The definition of vulnerability used here is based on that used by the IPCC: vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Additionally, vulnerability is a function of the character, magnitude, and rate of climate change and the variation to which a system is exposed (EX), its sensitivity (SE) and its adaptive capacity (CA) (glossary of IPCC AR4, [IPCC 2007]).

\[ V = f(EX, SE, CA) \]
INTRO: key-concepts

- **EXPOSURE**: parameters about magnitude, rate of change and variability of climate: temperature, precipitation, extremes (heavy rain, drought), heat waves...

- **SENSITIVITY**: degree of a system is affected by Exposure parameters. It includes natural and physical characteristics (slope, geology, land use, house adequacy, agriculture practices, water management...) and socioeconomic attributes (weakest population, mortality rate, % food insecurity, ...)

- **CAPACITY OF ADAPTATION**: ability of a system to adjust to climate change and react to stress to moderate the losses and cope with consequences (opportunities). It includes information about technological improvements, education (awareness on CC), income diversification, infrastructure development, governance (transparency of decision making, engagement...), gender rights
POTENTIAL IMPACTS: climate extremes (but also more gradual climate change) in combination with high sensitive areas lead to potential impact (direct or indirect) - Spatially defined
INTRO: Monitoring Vulnerability over time
• “FOCUS on current ‘adaptation deficit’—excessive vulnerability to current climate variability—is a good proxy of future vulnerability to climate change (short term). This motivates our focus on vulnerability to current climate variability, not only on projected future changes” (World Bank 2009, 2011)

• “...At the same time, steps must be taken to identify and help the poor and most vulnerable...Finally, given the uncertainty surrounding both climate outcomes and longer-term projections of social and economic development, countries should try to delay adaptation decisions as much as possible and focus on low-regret actions. They should also build the resilience of vulnerable sectors...” (World Bank 2010)
INTRO: Case study - Cities - Goiania - IADB project (UNFCCC PSI on adaptation)

- Vulnerability is highly dependent on context and scale (AR4)
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First deliverable

- Bibliographic revision outcomes
- Discussion
- Draft Proposal
“Vulnerability” in different thematic areas

• How to compare case-studies from different thematic areas in transparent and sound way? How to display the main outcomes in clear and useful way?
Study Theoretical framework

- Definition of OBJECTIVES and end-users
- EXPECTED RESULTS
- METHODOLOGICAL APPROACH (activities)
- DATA AVAILABILITY and INDICATORS
- RESULTS and FEEDBACKS
Comparison of methodological approaches

Vulnerability assessment to climate change

Hotspots of vulnerability to climate change and causes

1) Method 1 – case study 1
2) Method 2 – case study 2
3) .....
Comparison of methodological approaches

Definition of OBJECTIVES and END-USERS

EXPECTED RESULTS

METHODOLOGICAL APPROACH (activities)

DATA AVAILABILITY and INDICATORS

RESULTS and FEEDBACKS

Vulnerability assessment to climate change

Hotspots of vulnerability to climate change and causes

\[ V = f(P, I(E, S), C) \]

1) Method 1 - case study 1
2) Method 2 - case study 2
3) …...

1) INDs - case study 1
2) INDs - case study 2
3) …..
Vulnerability as Composite Indicator

Basis for the selection and composition of single indicators into a meaningful composite indicator under a fitness-for-purpose principle:

1. Soundness
2. Measurability
3. Relevance to phenomenon being measured
4. Country coverage (data availability)
5. Uncertainty (data quality)
### Thematic area: Agriculture and Food security

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<tr>
<th>Recorte Temático</th>
<th>Abordagem Metodológica</th>
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| Segurança Alimentar e Agropecuária | Exposição passada: especialmente nos estudos focados na região Nordeste, são analisadas as exposições à seca. Também há estudos relacionando os efeitos dos demais parâmetros climáticos (temp, precipitação) no desempenho produtivo das cadeias agrícolas. Sensibilidade: Mostra-se como as mudanças climáticas poderiam alterar as áreas aptas para o cultivo de cada cultura. O indicador de insegurança alimentar é integrado na análise da vulnerabilidade sócioclimatológica. Capacidade de adaptação: é analisado como o uso mais generalizado de certas alternativas tecnológicas (tais como irrigação) poderia proteger os agricultores dos efeitos das variações climáticas ou compensar suas perdas. Acesso à comida pode ser considerado como capacidade de adaptação. | - Acesso a assistência técnica e crédito/seguros;  
- Aptidão agrícola;  
- Aptidão agroclimatológica por sistema de manejo produtivo;  
- Confinamento animal;  
- % gastos com alimentação;  
- Decretos de emergência devido a secas;  
- Deficit hídrico;  
- Desnutrição crônica;  
- Evapotranspiração real;  
- Ingestão de comidas e água insalubres;  
- Insegurança alimentar;  
- Acesso água;  
- Mortalidade do gado;  
- Participação no valor agregado da agropecuária;  
- Perda de cultivos;  
- Pobreza;  
- Preços agrícolas de médio prazo (baseados na média dos anos anteriores);  
- Produtividade das culturas;  
- Risco de geadas;  
- Saque a mercados de alimentos;  
- Sensibilidade à aridificação (desertificação);  
- Uso da irrigação (censo agrícola);  
- Uso de ração animal industrializada;  
- Uso de transgênicos;  
- Uso de tratores;  
- Variação no consumo;  
- Variação no PIB setorial. | HADDAD et al. (2010); BARBIERI et al. (2008); ASSAD e PINTO (2008); ASSAD et al. (2013); FERNANDES et al. (2011); OBERMAIER e ROSA (2014); LINDOSO e RODRIGUES-FILHO (2014); LINDOSO et al. (2014); PRIORI e SILVA (2014); MINAS GERAIS (2014); MARGULIS e DUBEUX (2010); PEREDA (2012); OBERMAIER et al. (2014); Barbieri (2013); Burity (2010). |

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*SCVI* (Socio-climatic vulnerability Index) = f(RCCI, dens, IDHM)
From data to Vulnerability assessment

Literature revision (Brazil-EU) → Thematic Area: X Set of Indicators → Final Set of Indicators → Vulnerability Assessment of X → Adaptation Policy → Resilience and Adaptation investments

SISMOI Indicators for X

FEEDBACKS: • Research gaps • M&E
Progress, not perfection !!!

“perfection is attended by slow degrees, it requires the hand of time” (Voltaire F.).