

Ecosystem services for urban climate resilience in Brazil: opportunities and barriers

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Objective and contents for this talk

- Concern: ***current urbanization in Latin America may irreversibly reduce the capacity of ecosystem services to provide for climate adaptation and sustainable development co-benefits*** – in other words, affect the potential of ecosystems to contribute to sustainable urbanization (e.g. SDG #11)
- Here: discussion of social vulnerability, urbanization and ecosystem services, in the context of climate change, focusing on Brazil
- Work in progress – interest in collaborative work with other Latin American countries and partners

Vulnerability of Latin American cities

- Region is world's **most urbanized developing region** (90% expected 2050).
- Urban expansion and climate change **increase vulnerability of poor populations** – often in informal settlements –, which often do not benefit from disaster risk reduction (DRR), and suffer from weak urban planning capacities and inadequate provision of public services and infrastructure
- **Climate risk in LAC cities is real** and will increase even under 'low' 1.5°C warming scenarios. Risks affect not only the continents' eight megalopolises (> 5million people) but also some 16.000 small and medium sized cities
- **Urban development and management concerns of much of the region do not reflect lessons and experiences emerging from much of the European and North American cases** where urban resilience and green and blue infrastructure are being tested [e.g. Dutch flood and water management plans: [link1](#); [link2](#)]

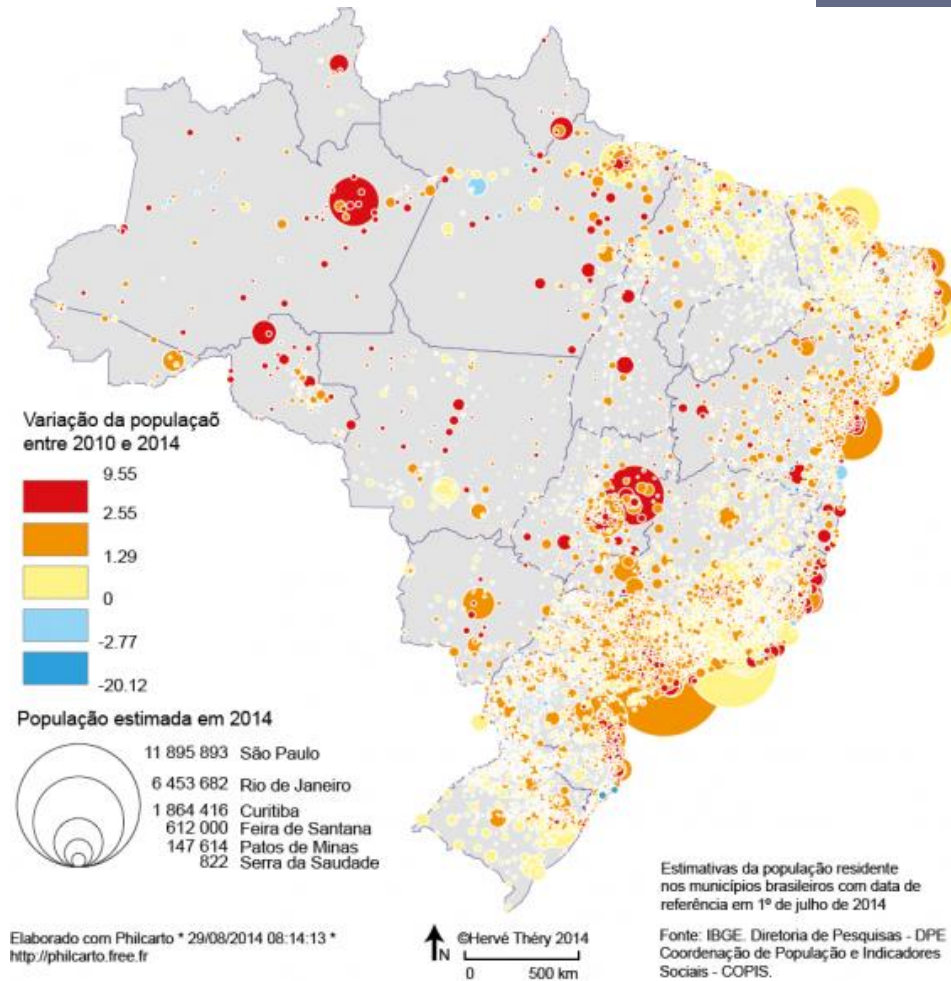
Example: floods and mudslides in Rio de Janeiro

- In April 2010 Rio de Janeiro metropolitan area experiences ***rainfalls of 323 mm within 24 hours***
- Landslides kill 233 people (903 in state) and leave 3,000 homeless and more than 11,000 displaced in RJ State – not only the poor affected
- High cost: emergency investments of US\$ 466.2 million for reconstruction
- Unclear if attributable to climate change, but consistent with climate model predictions



Diversification & complexity of 'metropolization' in Brazil

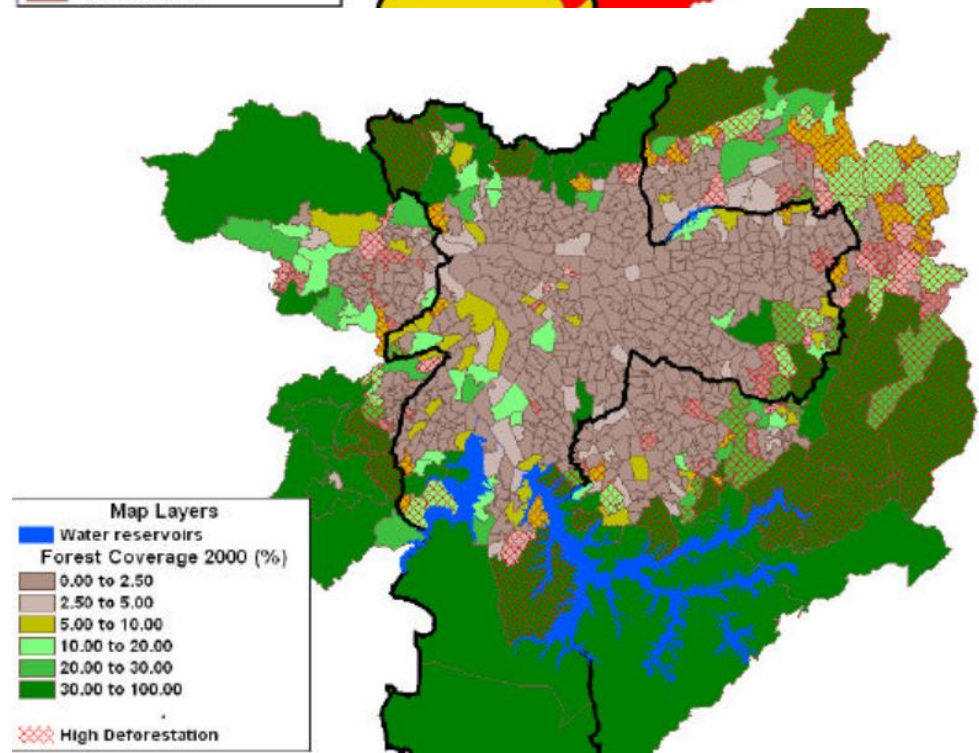
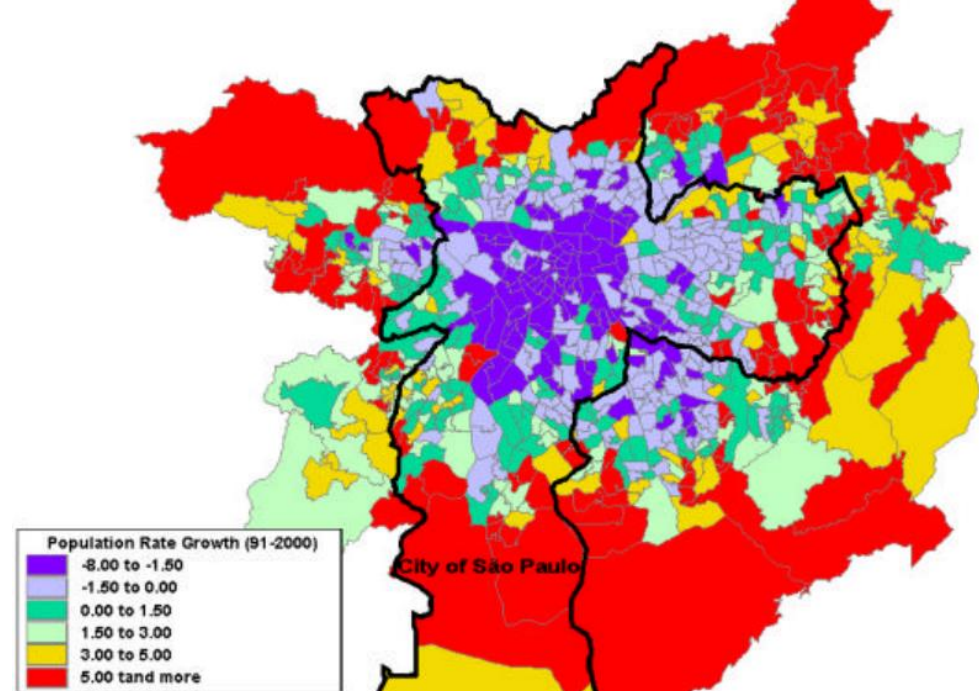
- 175 million Brazilians in urban areas, near to coast – jobs, health care and education, but cost of high pollution and habitat loss
- 'Ruralization' of urban spaces (e.g. services deficit) X urbanization of previously rural spaces.
- Informal settlements on the rise: in Rio de Janeiro 22% (up from 6% in 1948)
- < 50% Brazilian municipalities apply building codes; even less use master or zoning plans – important for ecosystem services and landscape management



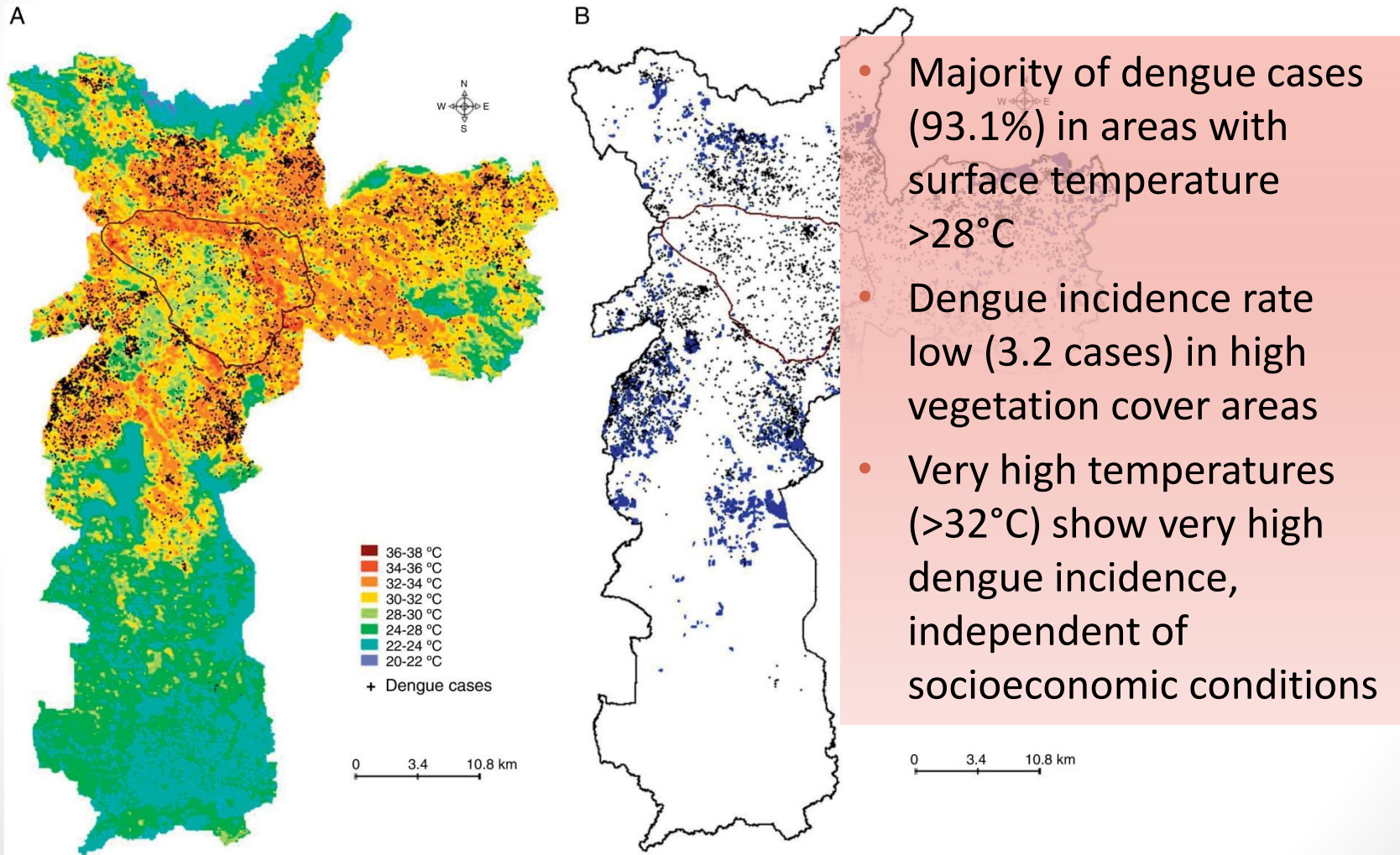
Urbanization and biodiversity

- Urban extend of Atlantic Rainforest hotspot expected to increase 160% from 2000 to 2030 (Seto et al., 2012)
- São Paulo: high deforestation in newly 'urbanized' areas, pollution of Billings and Guarapiranga reservoirs. Recent drought problems

Source: [Torres et al. \(2007\)](#)



Urbanization, climate and biodiversity: dengue distribution by heat islands and slum-like areas

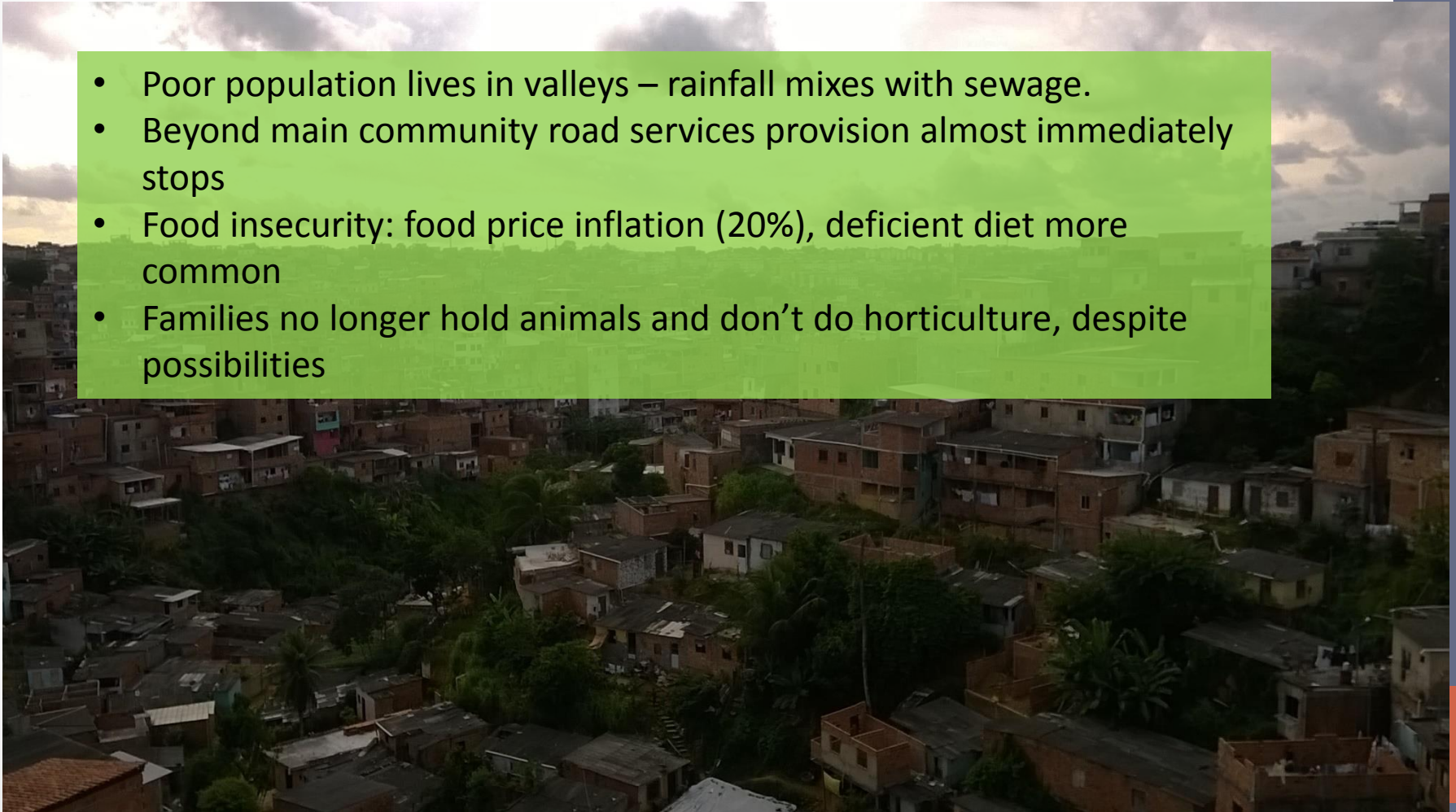


Ecosystem services in Brazil's urban environments

- Urban ecosystem services include ([Elmqvist et al., 2015](#)):
 - Microclimate regulation: parks and vegetation reduce urban heat island effect (3-4°C)
 - Water regulation: reduced flood risk, with perm soils – instead of asphalt road – minimize pressures on urban drainage systems after strong rainfalls
 - Pollution control: e.g. improved air quality, mental health
 - Habitat protection: inherent value of ecosystems
 - Cultural services: green or blue spaces contribute to community cohesion, well-being
- Idea: use these ecosystem functions to manage climate risks – i.e. **green Infrastructure** or **blue infrastructure** – and catalyze social, environmental and economic benefits with interventions, while reducing vulnerability of people and communities (ecosystem-based adaptation – EbA)

Example: urban agriculture in Salvador

- Poor population lives in valleys – rainfall mixes with sewage.
- Beyond main community road services provision almost immediately stops
- Food insecurity: food price inflation (20%), deficient diet more common
- Families no longer hold animals and don't do horticulture, despite possibilities



Barriers and opportunities, future steps

- Few experience with climate risk policy integration (São Paulo, Rio de Janeiro), even less with concrete policies and plans: urban mobility, waste management
- Deployment of urban ecosystem services, green and blue infrastructure and their role for climate adaptation is poorly understood. This lack of pilot studies, studies and knowledge products ***limits knowledge exchange, mutual learning and policy integration***
- Future steps:
 - Develop case studies (knowledge co-creation, action research) with stakeholders to understand potential of EbA + publish and discuss results
 - Understand how stakeholders in LAC cities understand the linkages between ecosystem services, human well-being and climate change adaptation

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