Ecosystem Services and Urban/Peri-urban Agriculture in São Paulo Metropolis

TEEBAgriFood

Uganda Scoping Workshop

Support:

This project is funded by the European Union

PORTICUS

Partners:

TEEB
The Economics of Ecosystems & Biodiversity

UN environment

Carried out by:

instituto Escolhas

Context

- In 2017, there were 821 million starvation victims worldwide (FAO et al., 2018).
- Obesity and overweight rates reached 30% of the global population (AFSHIN et al., 2017).
- Cities consummate 80% of energy production worldwide and produce almost the same share of GEE. (WORLD BANK, 2010).
- Projections points to 9 billion people to be fed by 2050, with 68% of this population living in urban areas (DESA/UN-WUP, 2018); 3 billion with no access to basic sanitation, health and electricity (UN, 2013).

Challenge:

To reduce the environmental impacts of cities, strengthen resilience on climate changes and pandemies, as well as to mitigate the negative impacts on biodiversity loss.

Study Area: Metropolitan Region of São Paulo

21 million inhabitants

7,946 km2

45% Forested areas

26% Urban areas

22% Pasture and Agriculture

TEEB
The Economics of Ecosystems & Biodiversity

instituto Escolhas

Medium and large commercial agriculture

Small commercial agriculture

Multifunctional Agriculture

Family commercial agriculture

TEEB
The Economics of Ecosystems & Biodiversity

instituto Escolhas

Vertical farm

Community gardens

Urban multifunctional agriculture

TEEB
The Economics of Ecosystems & Biodiversity

instituto Escolhas

Urban and Peri-urban Agriculture and Ecosystem Services

Which is the potential of urban and peri-urban agriculture to provide ecosystem services for São Paulo Metropolis?

TEEBAgrifood six steps

1) Refining the research objective
Engagement with stakeholders

2) Selection of Ecosystem Services
Erosion Regulation, Water Yield, Heat Mitigation, Flood Mitigation and Food Provision

3) Defining data demands and method
Public databases, field survey and literature review

4) Ecosystem Services Evaluation
3 periods of analysis:
1985 – 2019 – 2030

5) Police implementation in future scenarios
Indication of possible trade-offs, limits and possibilities for interventions in urban and peri-urban agriculture

6) Results outreach
Presenting on events and public sessions

Ecosystem Services	Indicator (unid)	Evaluation Method	Limitations
Food Provisioning	Total area of agricultural production, ha	Agricultural area is used as a *proxy*	This approach does not reflect the real area for agricultural production, showing limitations in capturing the heterogeneity of land use close to cities.
Flood Mitigation	Runoff retention, m^3/ha	Urban Flood Risk Mitigation Model - InVEST	Based on precipitation events of greater intensity. It does not reflect a possible previous accumulation of water caused by a sequence of rains.
Heat Mitigation	Heat Mitigation Index	Urban Cooling Model - InVEST	There are not yet enough applications to guarantee that the climatic parameters used are applicable to tropical conditions
Water yield	Water realized supply, m^3/ha/ano	Annual Water Yield - InVEST	It is based on the average annual precipitation, it does not take into account the seasonality of the regime, groundwater recharge or the full water cycle (after the export of humidity to the atmosphere).
Erosion Regulation	Sediment retention, ton/ha/ano	Sediment Retention Model InVEST	Based on annual soil loss, it considers only laminar and between-groove erosion

Scenarios

They are representations of possible futures for one or more components of the system. Particularly, in this study, for vectors of changes in nature and its benefits to people, including political alternatives and management options (IPBES, 2016). TEEBAgrifood generally focuses on intervention scenarios, that is, public policy alternatives.

BEFORE
1985

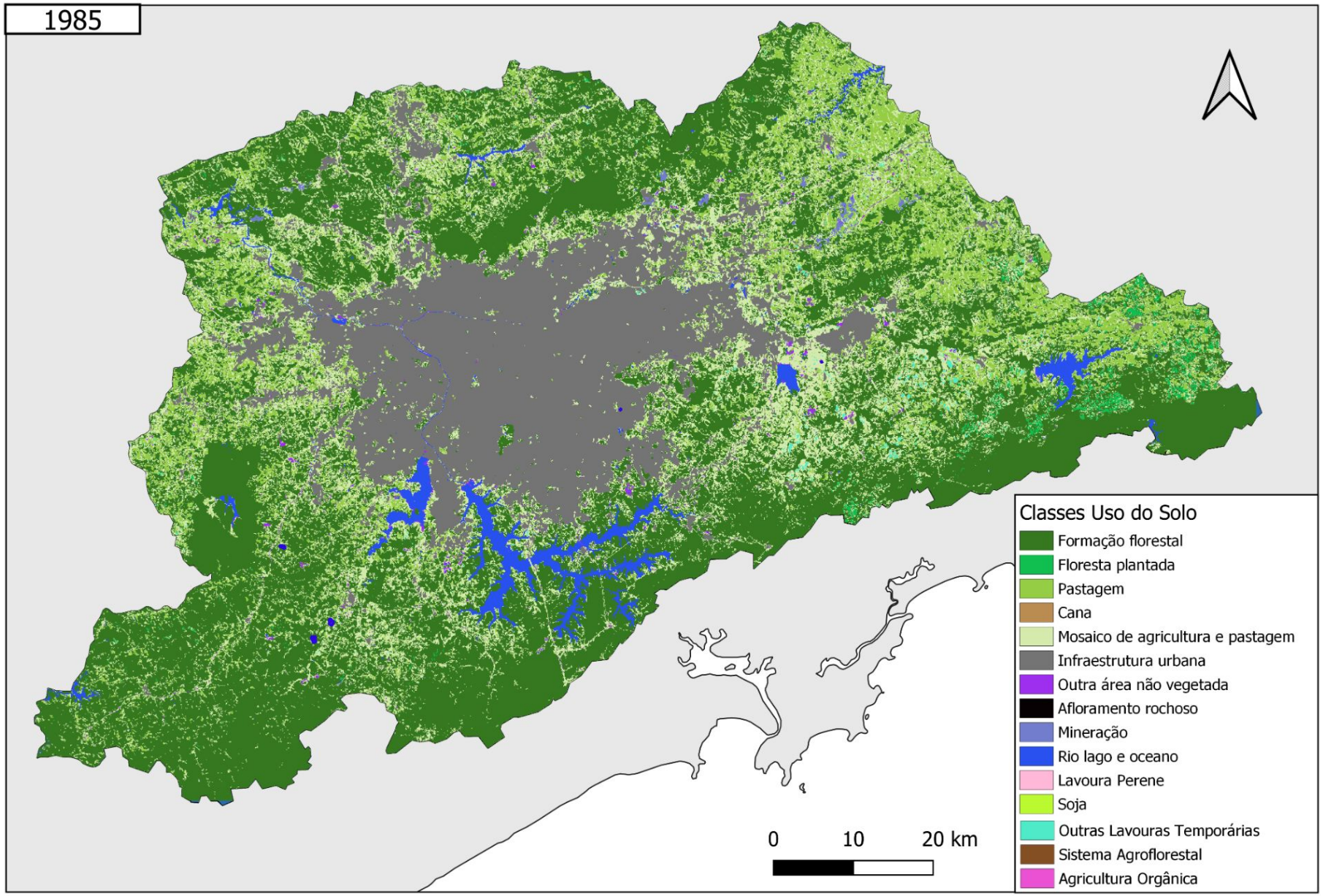
→

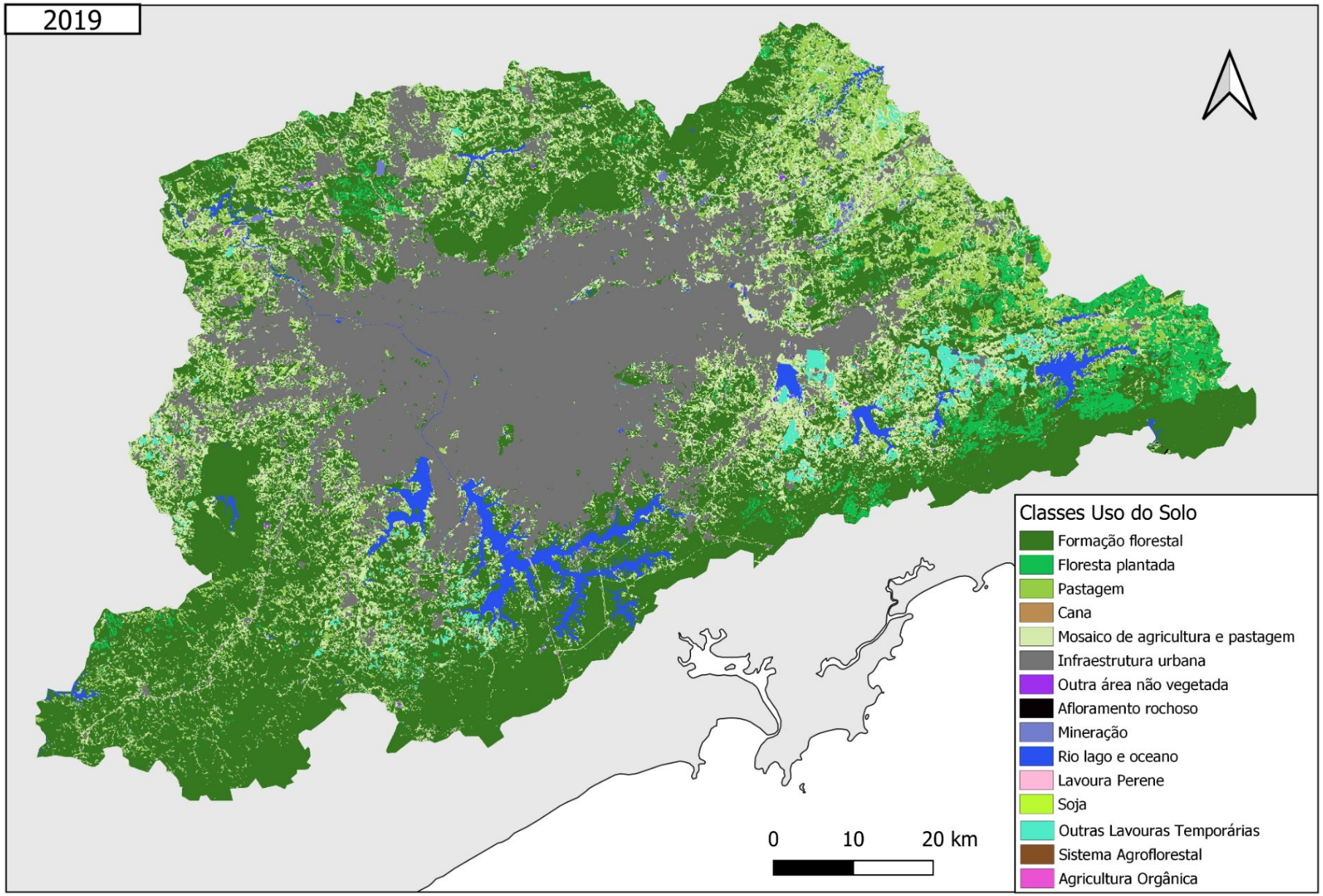
NOW
2019

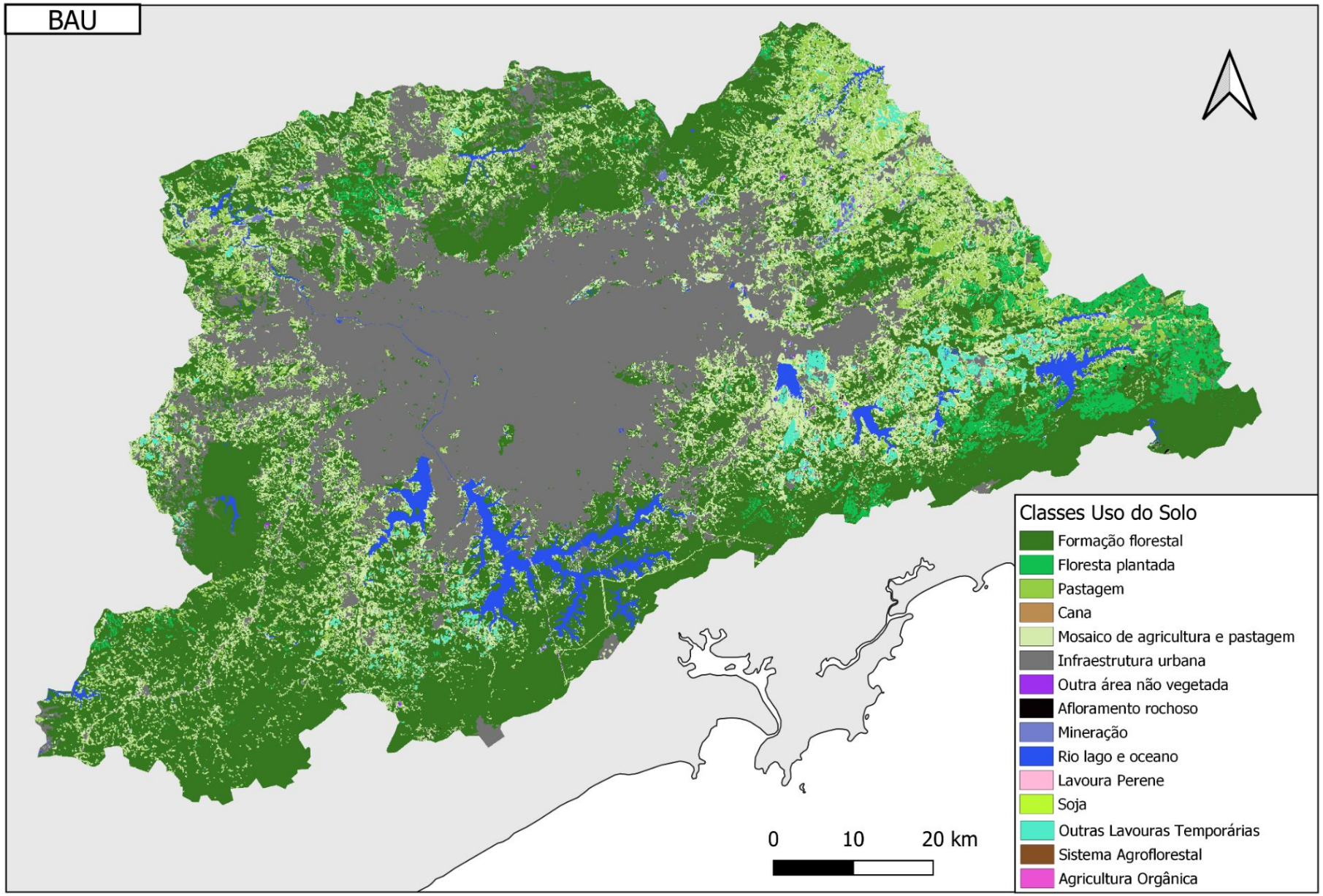
→

BAU

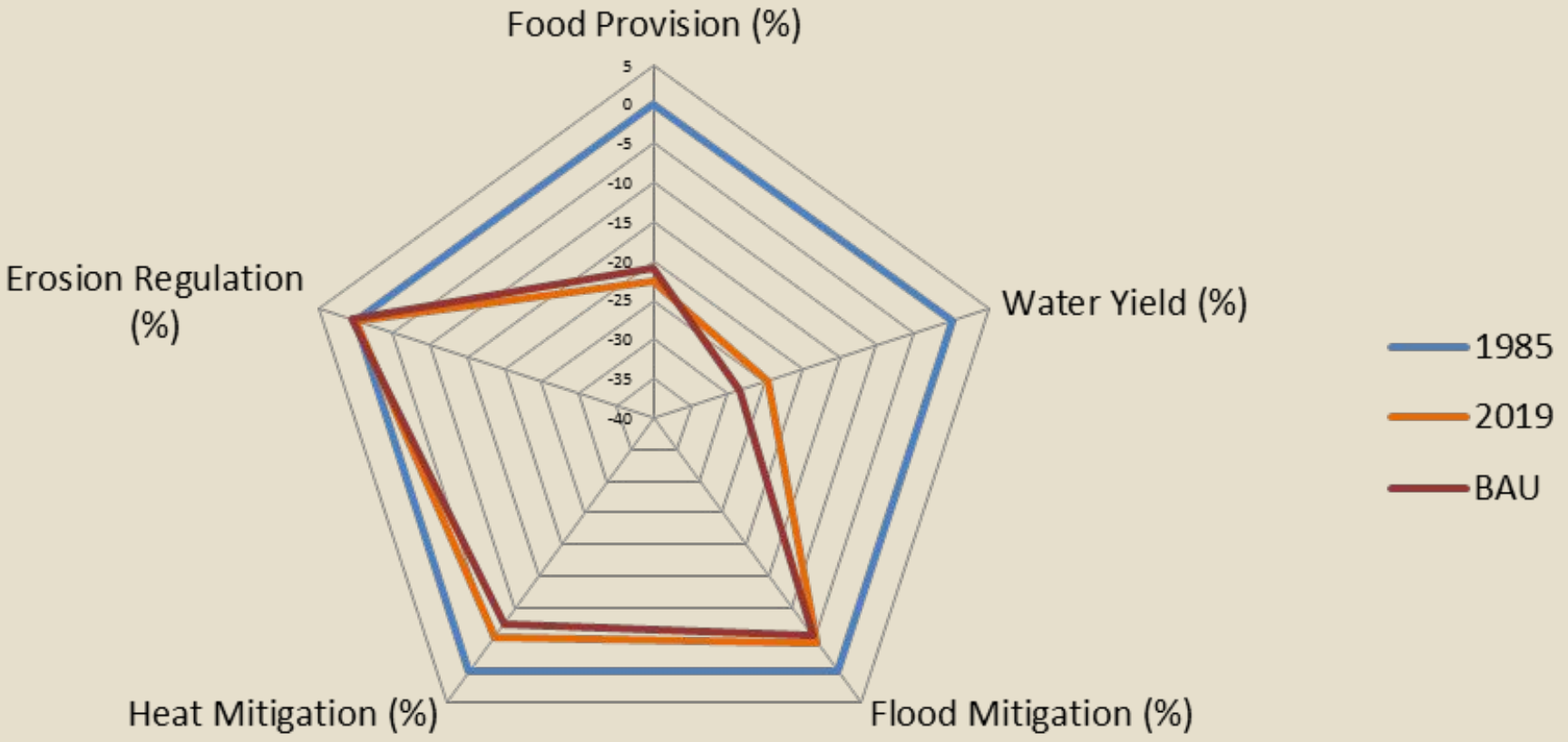
ALTERNATIVE SCENARIO
2030


1985
Classes Uso do Solo
Formação florestal
Floresta plantada
Pastagem
Cana
Mosaico de agricultura e pastagem
Infraestrutura urbana
Outra área não vegetada
Afloramento rochoso
Mineração
Rio lago e oceano
Lavoura Perene
Soja
Outras Lavouras Temporárias
Sistema Agroflorestal
Agricultura Orgânica
0
10
20 km


2019
Classes Uso do Solo
Formação florestal
Floresta plantada
Pastagem
Cana
Mosaico de agricultura e pastagem
Infraestrutura urbana
Outra área não vegetada
Afloramento rochoso
Mineração
Rio lago e oceano
Lavoura Perene
Soja
Outras Lavouras Temporárias
Sistema Agroflorestal
Agricultura Orgânica
0
10
20 km


BAU
Classes Uso do Solo
Formação florestal
Floresta plantada
Pastagem
Cana
Mosaico de agricultura e pastagem
Infraestrutura urbana
Outra área não vegetada
Afloramento rochoso
Mineração
Rio lago e oceano
Lavoura Perene
Soja
Outras Lavouras Temporárias
Sistema Agroflorestal
Agricultura Orgânica
0
10
20 km

Changes in the provision of Ecosystem Services



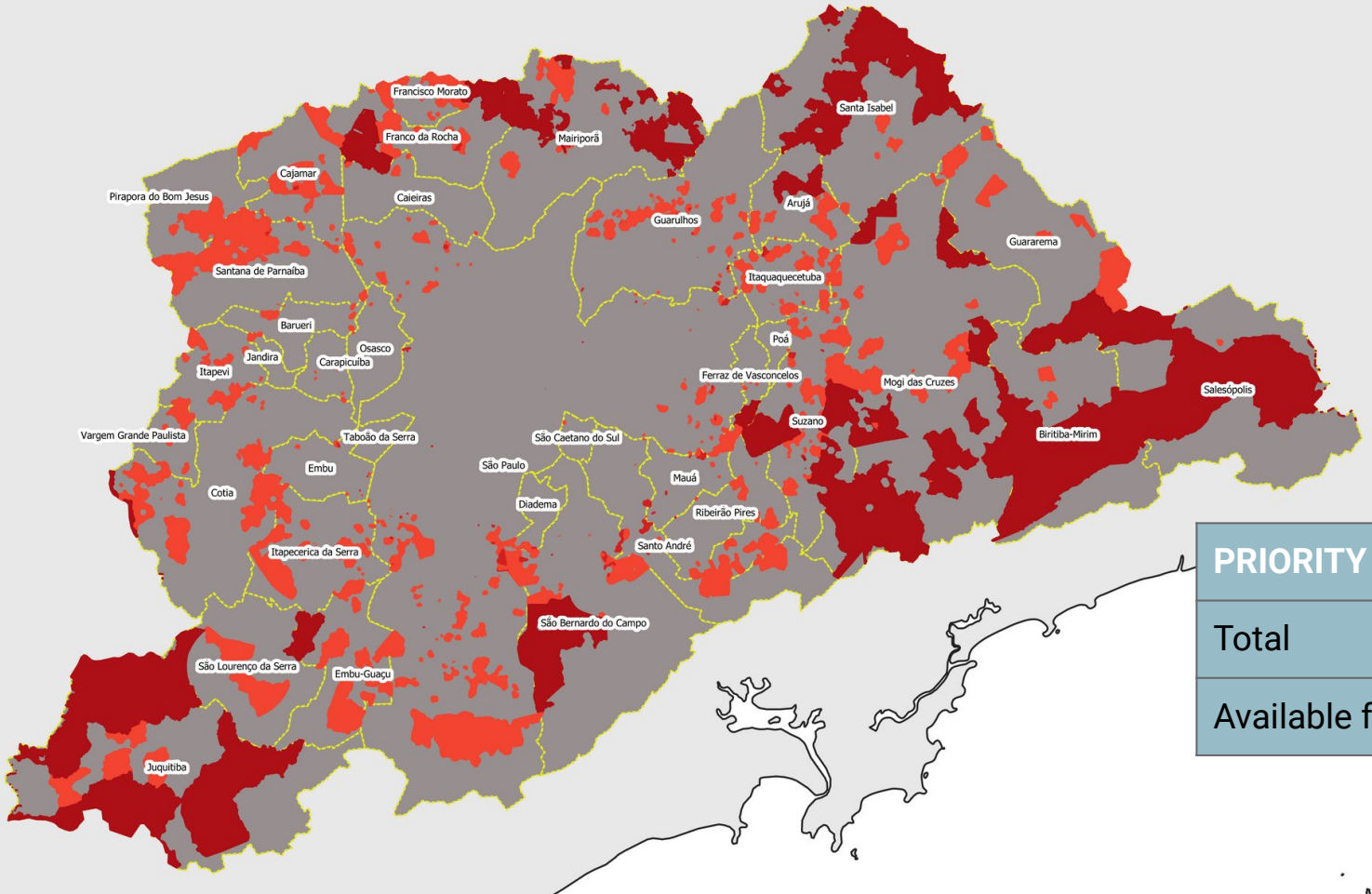
Alternative Scenario

Premise: provisioning with healthy foods for the population is a priority service provided by local agriculture, especially for those in situations of high social vulnerability, being simultaneously a possible source of income generation, in addition to providing environmental services.

1. Identify Priority Areas
2. Availability of area for urban and peri-urban agriculture
3. Calculate the potential for food and environmental services provisioning

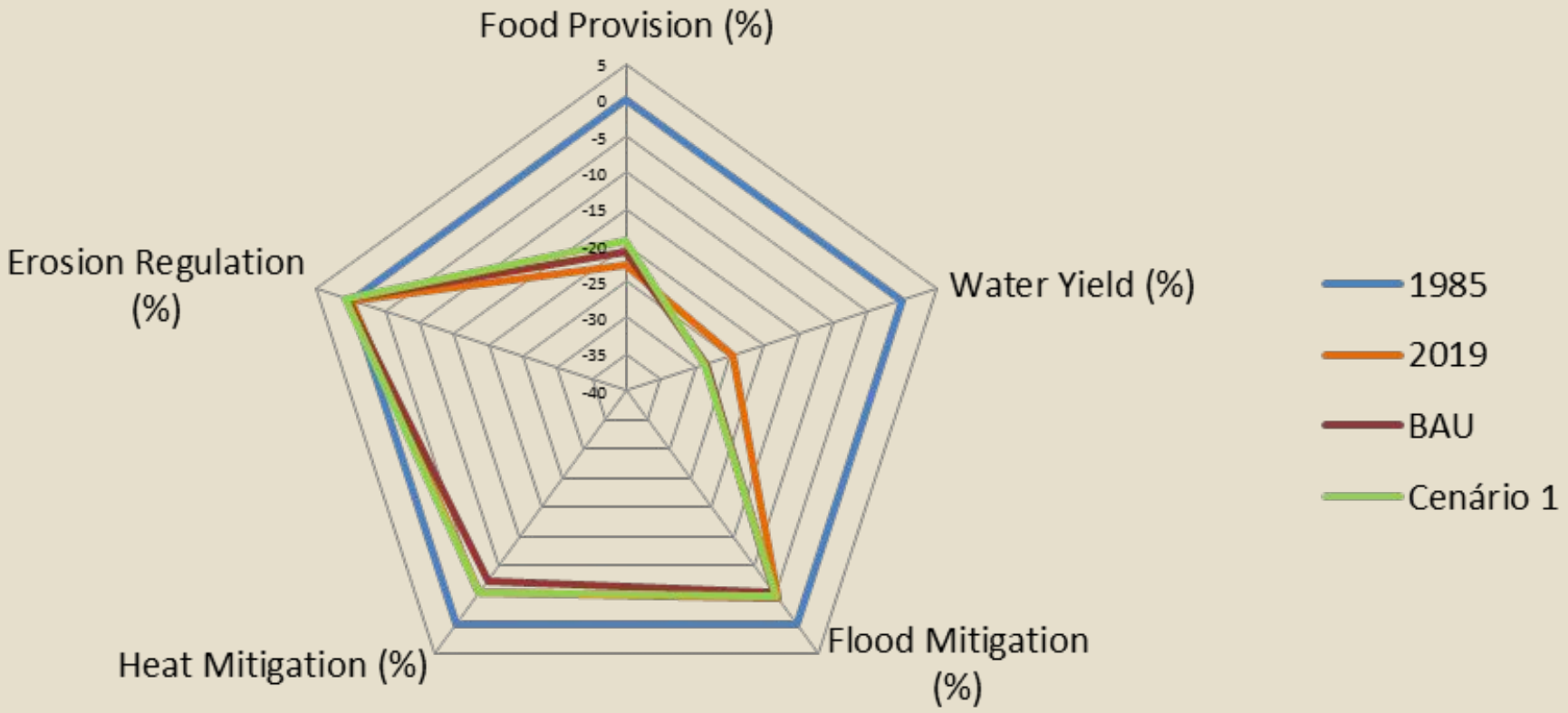
Priority Areas - Alternative Scenario

Areas without food supply and with high vulnerability



PRIORITY AREA	ha
Total	167.000
Available for UPA	52.360

Alterações na provisão de Serviços Ecossistêmicos



BAU *vs* Alternative Scenario

Ecosystem Services	BAU	Alternative Scenario
Food Provisioning	Follows trend of loss of agricultural area for urban expansion	Potential to supply 13 million people, mainly those without access and in vulnerability.
Heat Mitigation	Increase of 1.6oC in the average temperature in the hottest periods	The cooling capacity comes close to the 2019 levels. Decrease of almost 0.2oC in municipalities with more areas of SAFs
Flood Mitigation	In a 50mm rain there will be an additional 17 million m3 of water in the drainage	Sustainable agriculture would be responsible for an increase in water infiltration (almost 3 flood control pools)
Erosion Regulation	100,000 dump trucks with soil being dumped in bodies of water in one year	83,000 sediment dump trucks reaching bodies of water annually. (ecological soil management and conservationist practices)
Water Yield	Increase in water consumption by 25,000l / s, only this increase in consumption represents 63% of the total water available in drier seasons	Trade-off: the expansion causes an increase in water demand (600 l / s) for agriculture, which can be reversed with soil management and 34% more efficient irrigation systems.

Conclusions

It is possible to identify sustainable urban and peri-urban agriculture as part of a portfolio of alternatives to reshape the process of urban development, but it needs to be combined with a wider range of solutions in both the urban and peri-urban environments.

- Metropolitan regulatory framework that defines urban and peri-urban agriculture
- Strengthening of Land Use Regulation Policies (Metropolitan Development Plan; Land Regulation and Access to Land, Municipal Master Plans; and Watershed Protection Areas)
- Payment Programs for Environmental Services
- Access to credit, technical assistance, alternative water sources; to productive structures that enable greater efficiency, and incorporation of urban waste that can be used.

“The city has a lot of land ... here [the slum] is a granary of people from different regions, and people know how to crop because they already worked with that: orange, grape, cane, coffee” (Fernando, 2018 in Amstel, 2019).

Jay van Amstel

jayamstel@gmail.com

+55 21 98319-9743