



Modeling Wildlife Roadkill Risk on São Paulo Highways Amidst Sugarcane Area

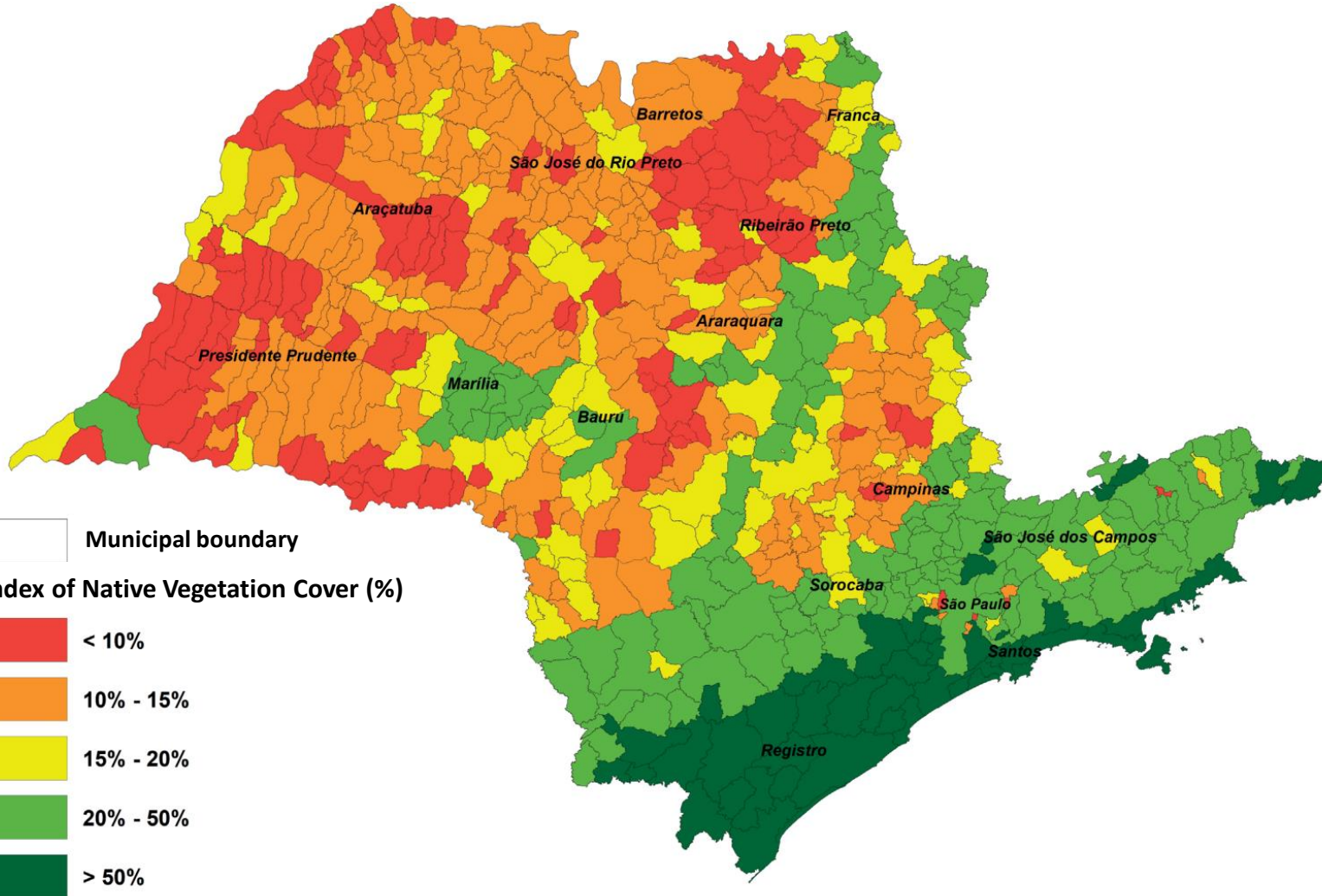
About São Paulo State

- Economy: 31.5% of Brazil's GDP (644 billion USD)
- Population: 44 million inhabitants (21.5% of the Brazilian population)
- Environment: 22.9% of the territory covered by native vegetation
- Not in the Amazon biome
- In the biomes of the Atlantic Rainforest and Cerrado (tropical savannah-like)

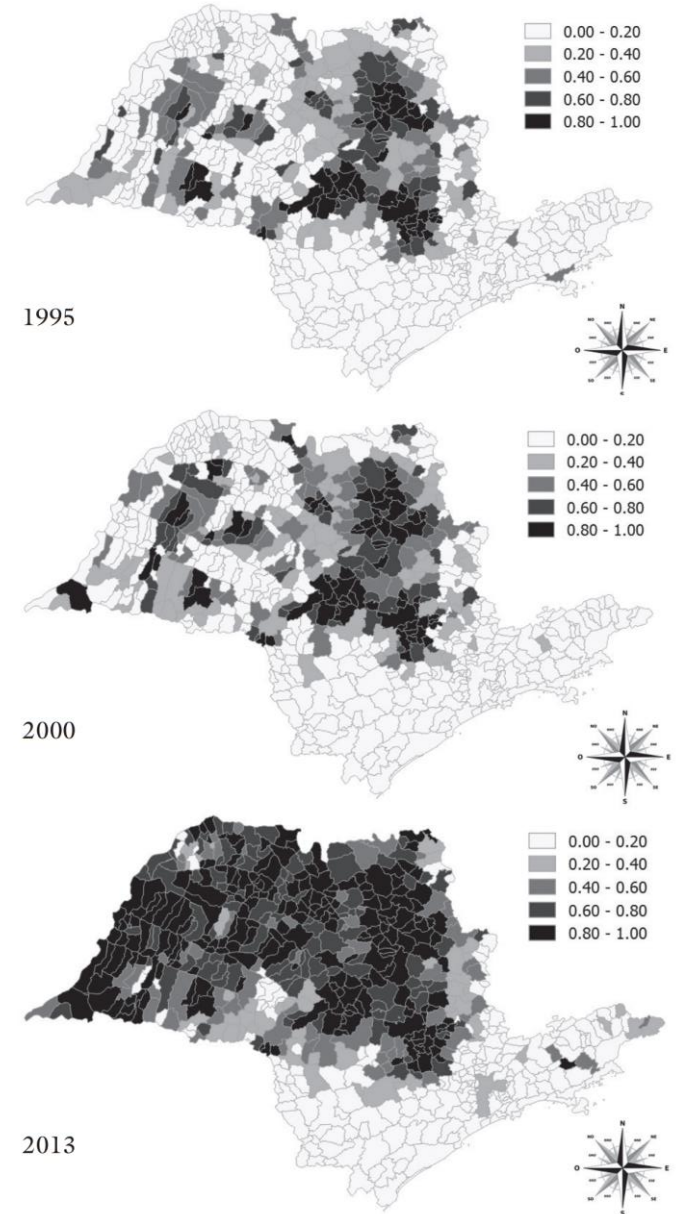


Study Area: Northwestern São Paulo State

Forest Inventory of São Paulo State (2020)

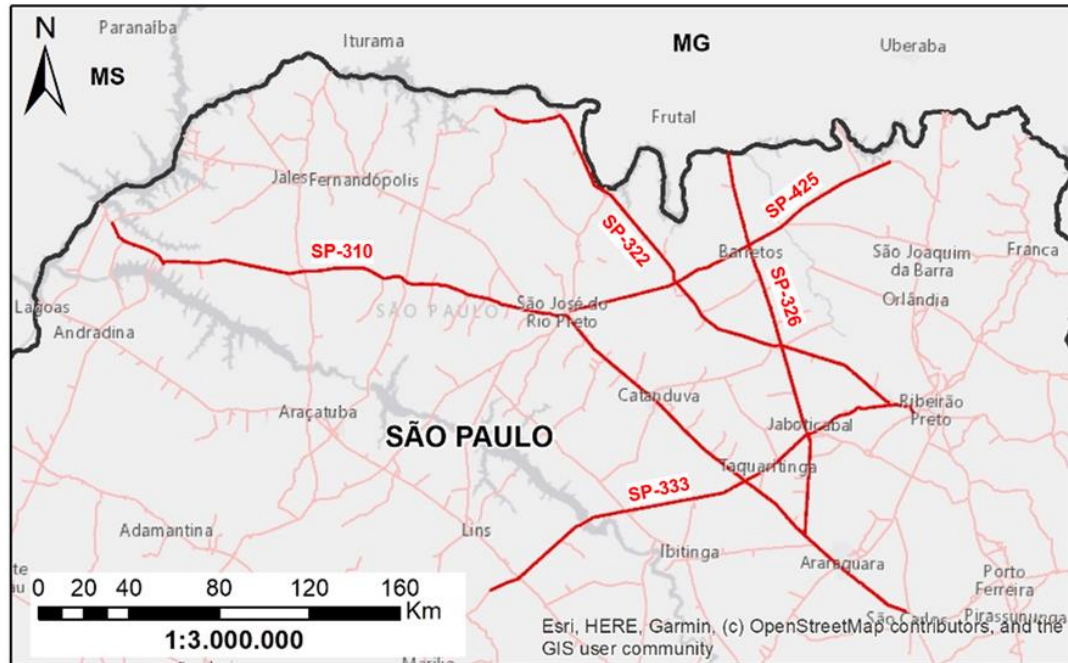


Share of sugarcane plantations in São Paulo municipalities (% of total). Camara et al. 2016



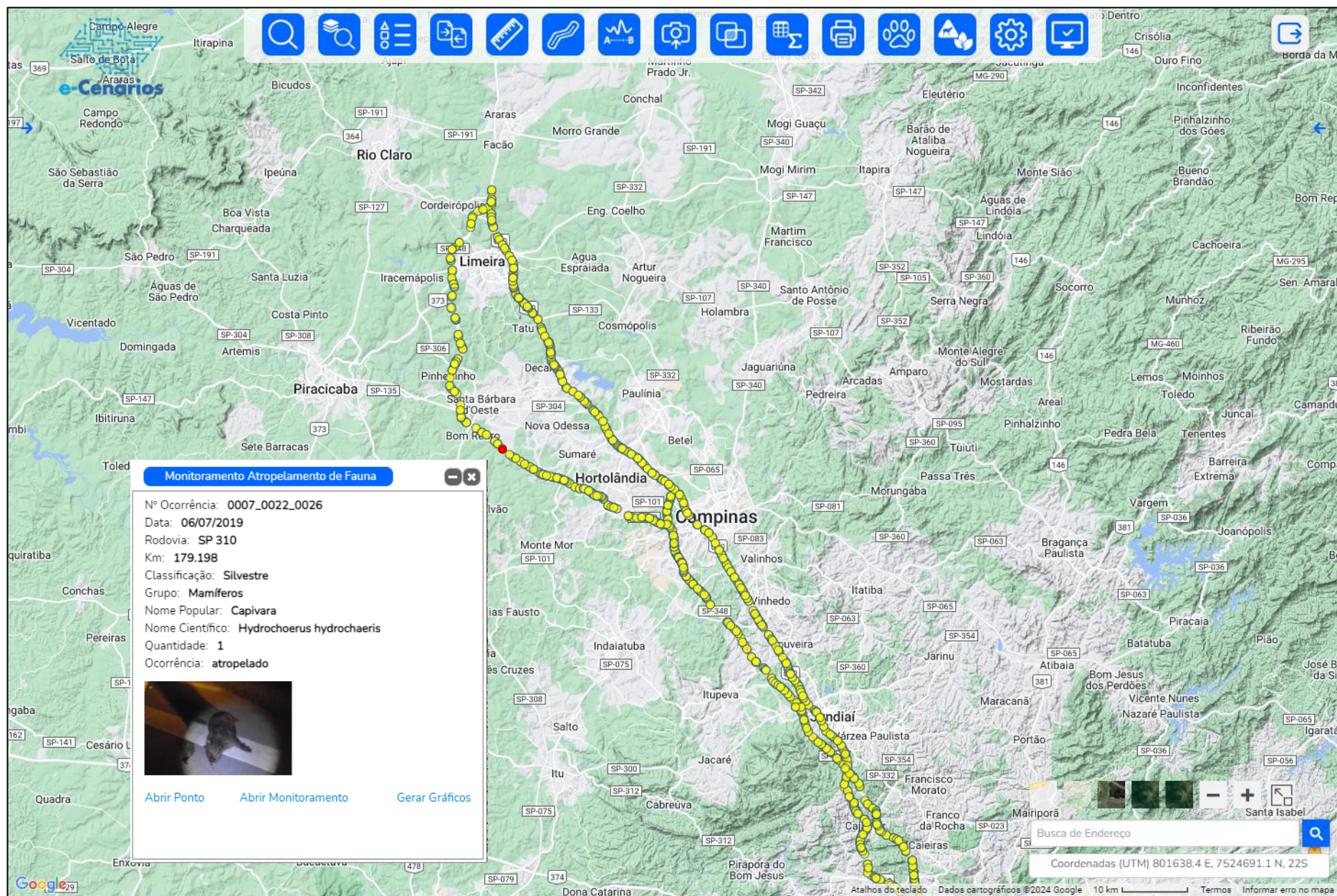
Study Area: Northwestern São Paulo State

- Extensive cultivation areas for sugarcane, citrus, and other crops
- Limited Forested Areas
- Expansion of cities
- Expansion of highways under concession

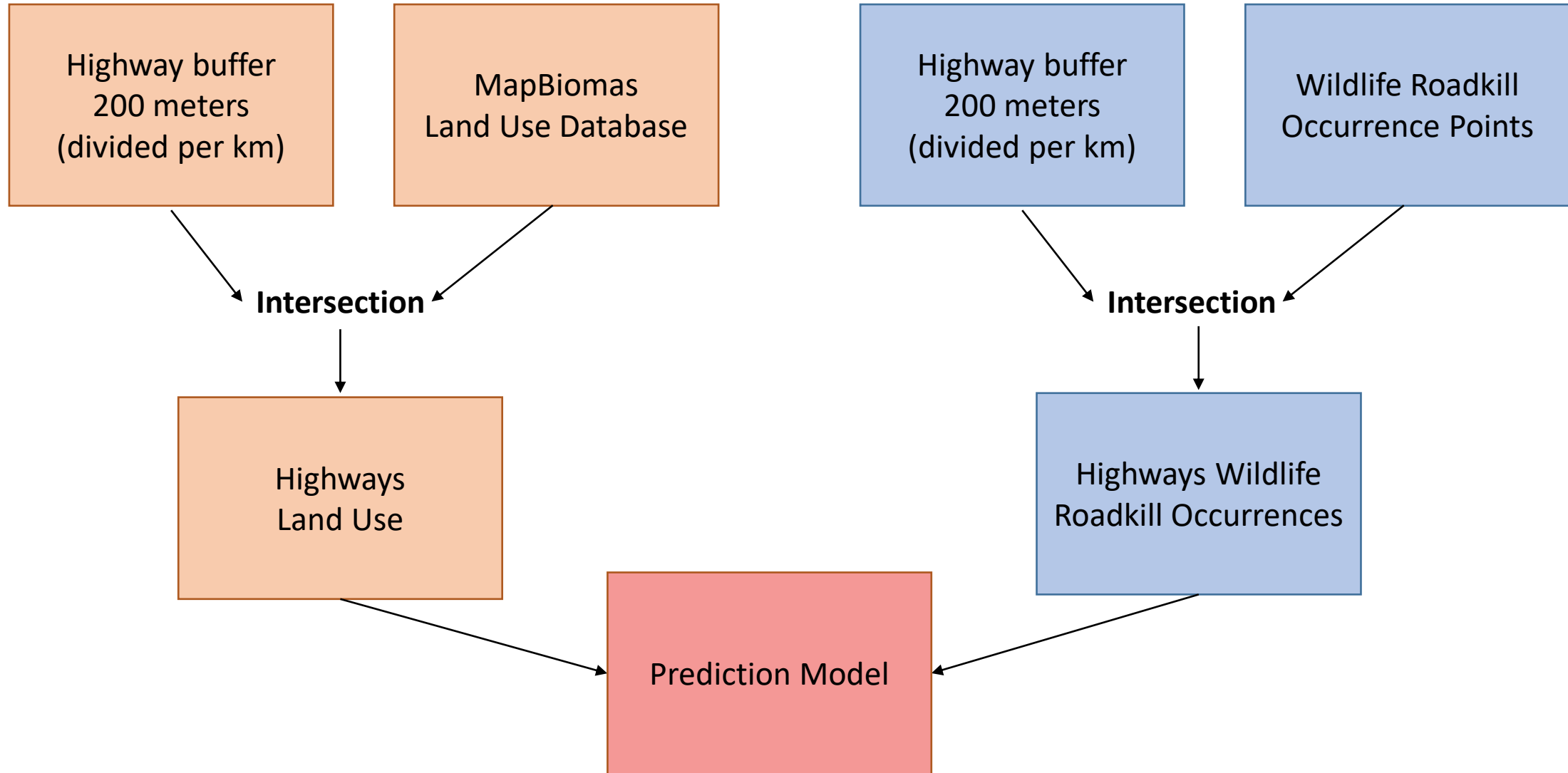


Use of Data at CETESB

- Use of organized data
- Geoportal e-Scenarios



Flowchart of cartographic database processing

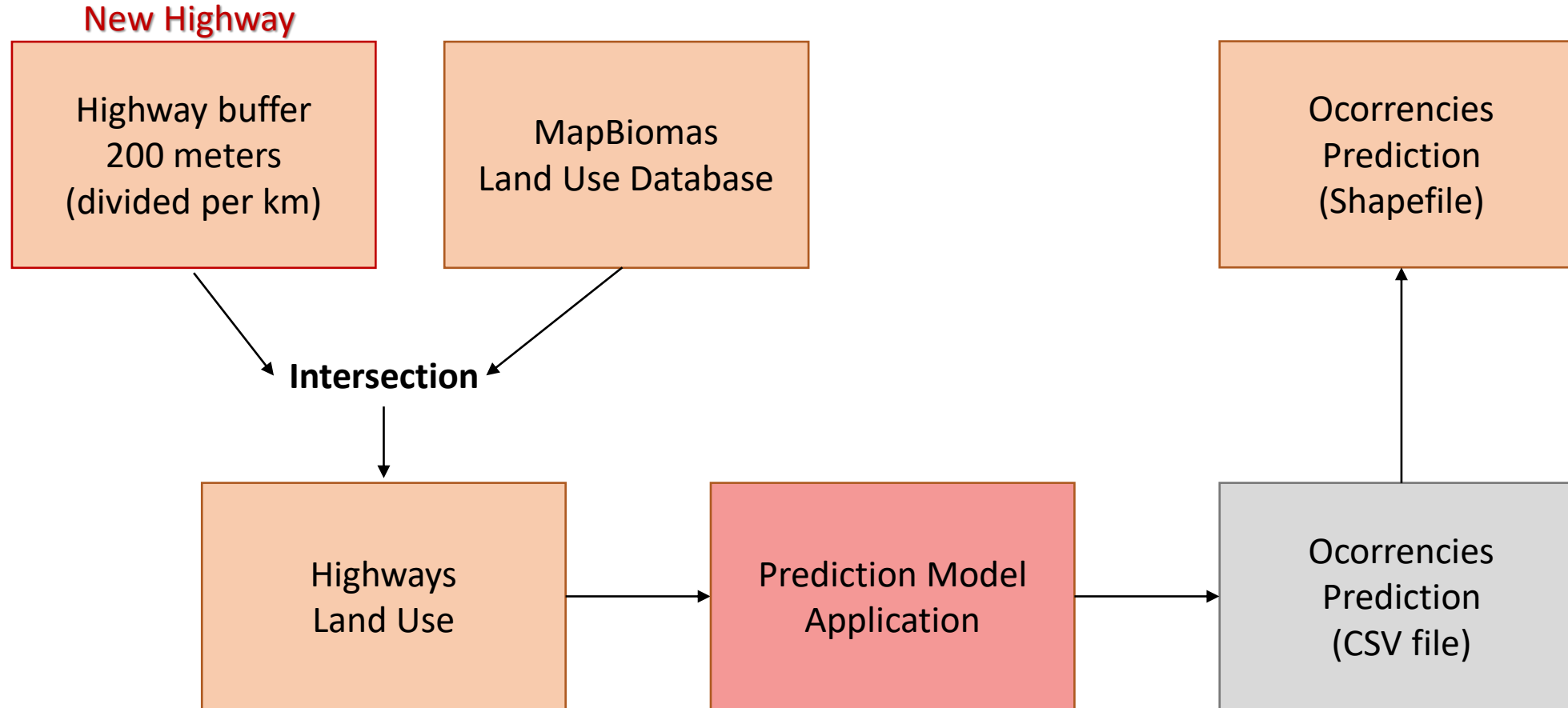


Prediction Model

- Poisson regression model
- Analysis by Km

Variables and Measurement Scale of the Prediction Model			
Variable	Type	Description	Scale
Number of Animals	Dependent	Total number of individuals involved in wildlife roadkill incidents. Data sourced from the "Highways Wildlife Roadkill Occurrences" database.	Ratio
Vegetation	Preditor	Land use class that includes all areas with vegetation formations present in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio
Non-vegetated areas	Preditor	Land use class that includes all areas not occupied by vegetation formations and water present in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio
Agriculture	Preditor	Land use class that includes all cultivated areas present in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio
Water	Preditor	Land use class that includes all areas occupied by watercourses and bodies of water in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio

Prediction Model Application

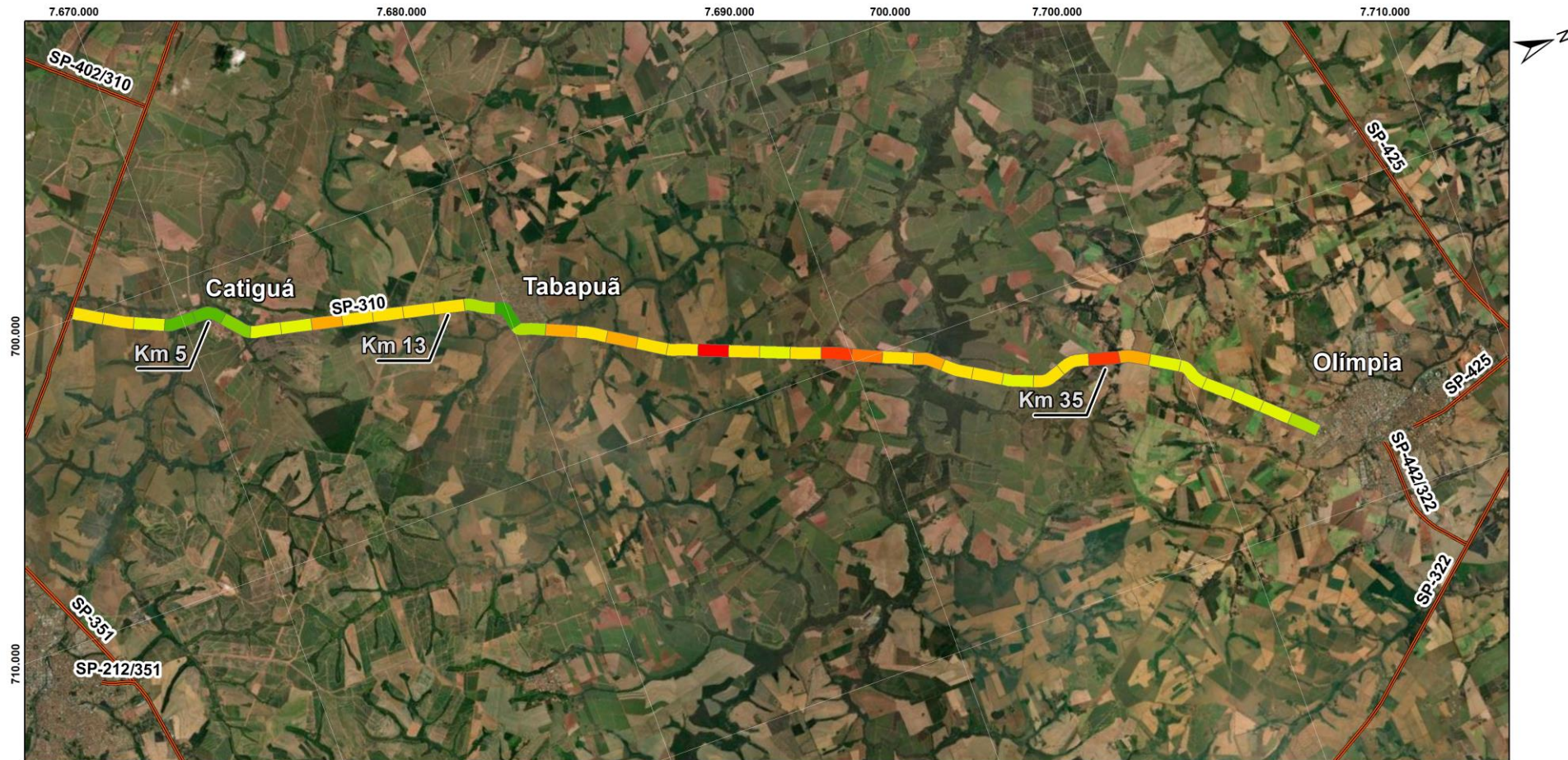


Simulation of Model Application

- We simulated an improvement plan for the 42-kilometer road connecting the SP-310 highway to the city of Olímpia, transforming it into a modern, four-lane highway with parameters similar to those used in the model training.



Simulation of Model Application



Legend

Paved State and Federal Highways



Prediction of Wildlife Roadkill



Expected number of animals roadkilled (3-year period)

UNIVERSAL TRANSVERSE MERCATOR PROJECTION (UTM)
ZONE 22
SIRGAS 2000 DATUM

Simulation of Model Application



Km 5

Surroundings: Urban Area
Classification: Lower Risk

Surroundings: Forest Fragment
Classification: High Risk

Km 35

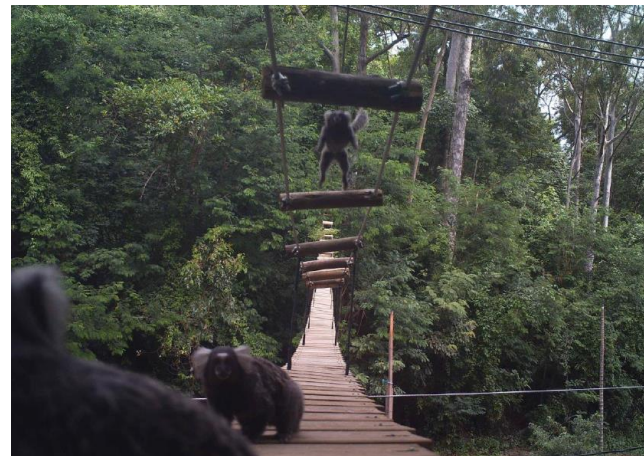


Km13

Surroundings: Agriculture
Classification: Intermediate Risk

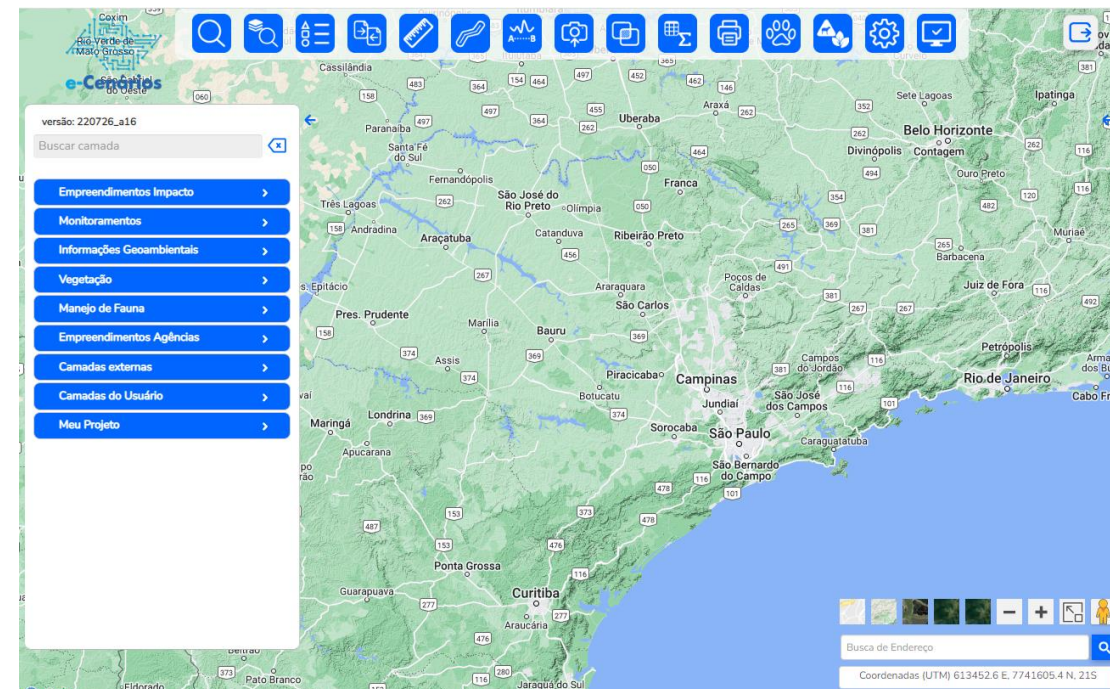
Simulation of Model Application

- Use while designing the layout and developing the executive project
- Identify areas with high potential for roadkill
- Planning of mitigating measures (exemple: determining where wildlife crossing devices should be placed)
- Landscape connetion
- Route alternatives analysis



Next Steps

- Expand the model to cover the entire State of São Paulo
- Increase the dataset size
- Add more predictor and environmental variables
- Make data collection app available to the Highway Operators
- Make the model available to the Highway Operators via Geoportal e-Scenários
- Use in decision-making processes





THANK YOU

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