

Land use and land cover changes and its implications for local and regional climate change: perceptions and challenges for mitigation and adaptation actions

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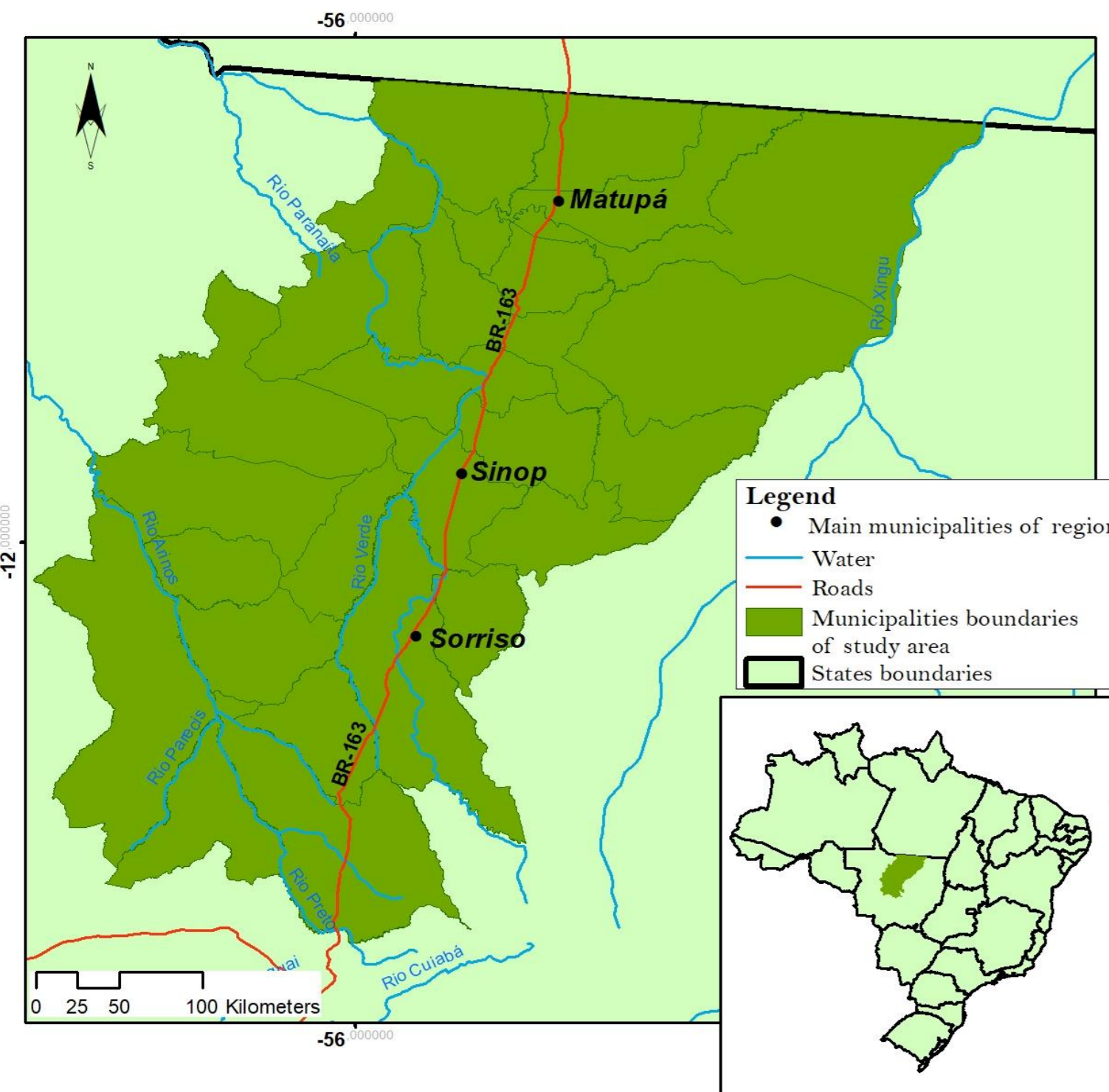
INTRODUCTION

This work aimed to identify possible changes in climatic variables in a region of agricultural frontier in the transition between the Savannah-Amazon biomes, where forests were replaced by extensive agricultural areas. Recent episodes of drought and extremes rains in this region have represented large economic losses for agricultural producers. Therefore, some questions arose, guiding this research:

- The recent climatic instability can be related to the intense in the land use and land cover changes through which the region experienced?
- Can older producers feel any change in the weather from earlier or more recent times?
- How do producers understand this instability in the climate?
- How do local institutions such as the Secretariats of Agriculture and Environment and producer associations address the issues about climate change?

In response to these questions, we hope that this work will contribute to the discussion about the necessity to bring relevant scientific information to society in a more accessible way, contributing to improve the level of awareness about climate change by actors directly linked to agriculture, aiming that perceive themselves inside in this system as the agent causative and agent impacted by the changes in the local climate.

METHODS

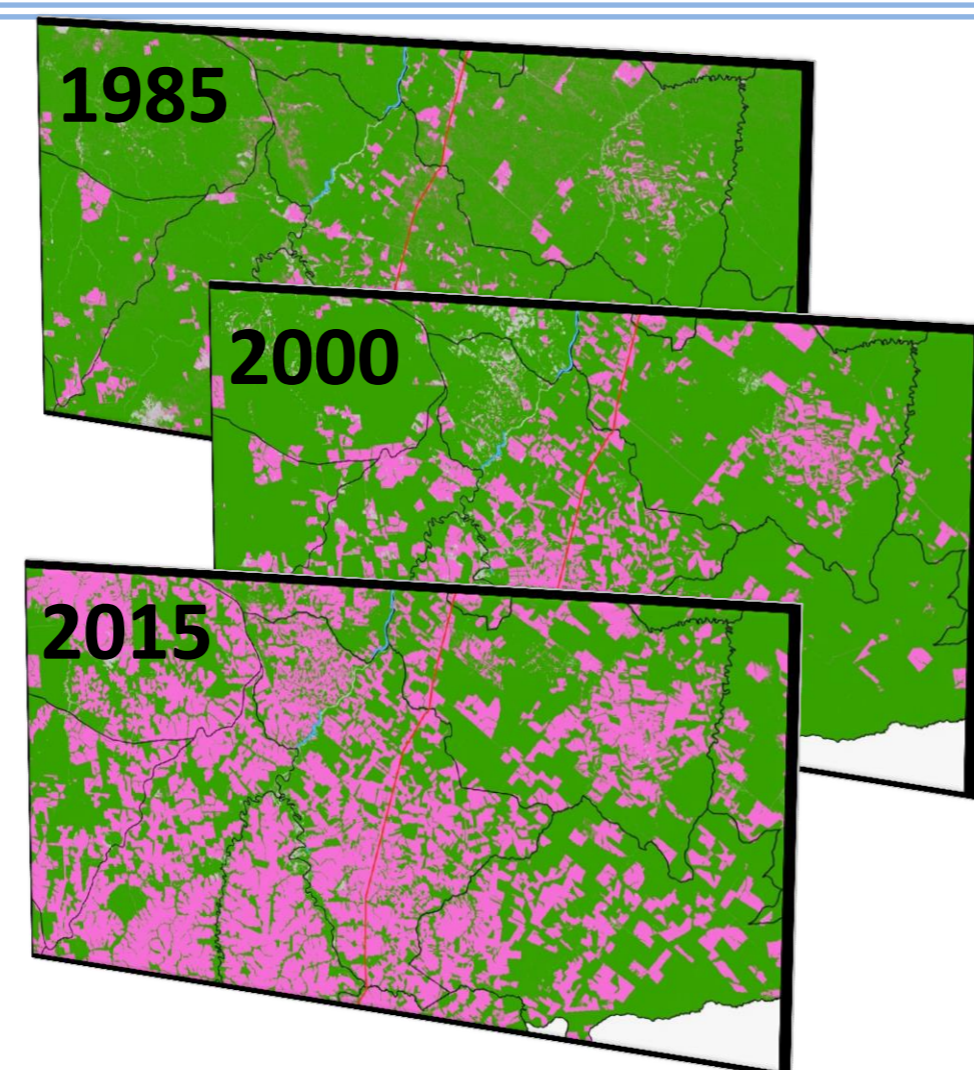


STUDY AREA

- 27 municipalities in the state of Mato Grosso.
- Municipalities with economy based on agriculture (IBGE, 2016).
- The study area corresponds to one-fifth of the area of Mato Grosso State and represents 35% of the planted area in the state.
- Municipalities that have experienced intense changes in land use and land cover.

LAND USE/COVER CHANGE ANALYSIS

- Landsat TM Images Mosaics for the years 1985, 2000 and 2015, obtained in U.S. Geologic Survey.
- Segmentation and classification by Software Spring 5.5.0 (INPE).
- Three classes were created: Forest (natural forest); non-forest (natural field and rocky outcrops) and use (pastures, agriculture, and urban area).
- Quantifications and mapping in ArcGis 10.



CLIMATE DATAS ANALYSIS

Data:

- Weather Stations: Gleba Celeste Station. Period : 1986 – 2016. Information: Precipitation, Number of rainy days, Maximum and Minimum Temperatures
- European Centre for Medium-Range Weather Forecasts – ECMWF. Period: 1990 – 2010. Information: Precipitation and Temperatures

RESEARCH WITH PRODUCERS AND INSTITUTIONS

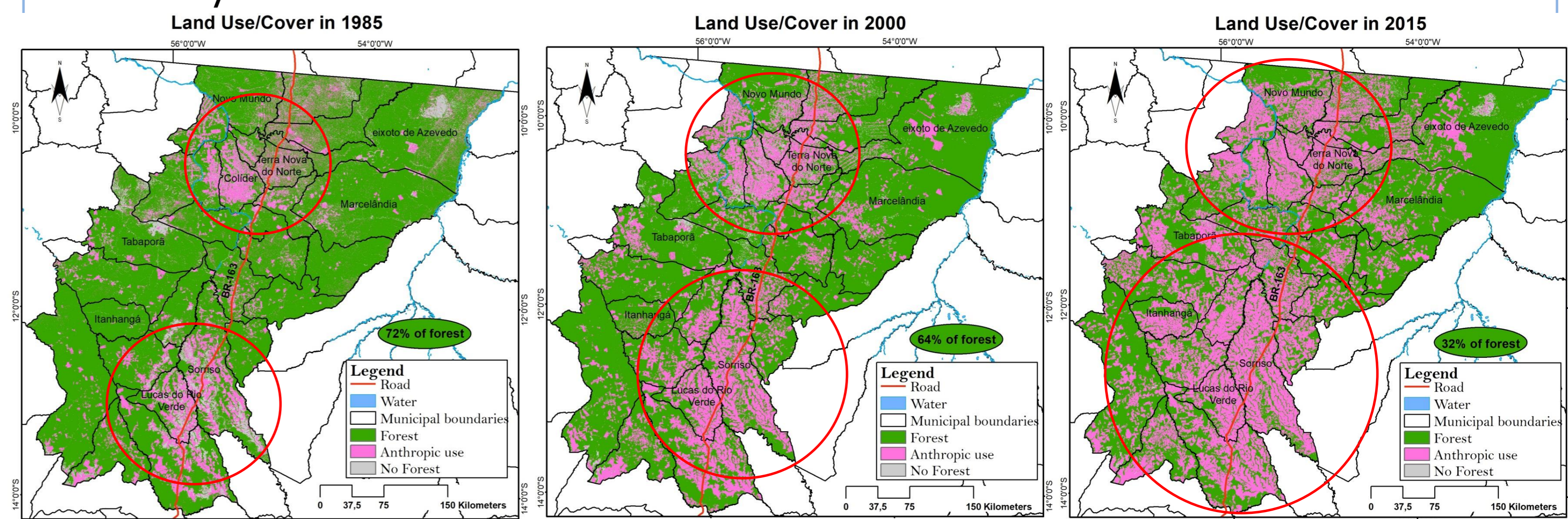
This step was carried out in three phases:

1. Obtaining information about local policies or actions developed by the municipal government, producer associations or research institutions.
2. Interviews were carried out with the Secretary of the Environment and Agriculture of each municipality, as well as associations and unions of producers. Due to the extension of the area analyzed, part of the interviews was carried out by telephone and skype.
3. The fieldwork had as main focus interviews the producers. For each producer, a series of questions were asked about their history, production system, climate and their explanations for observed climate changes.

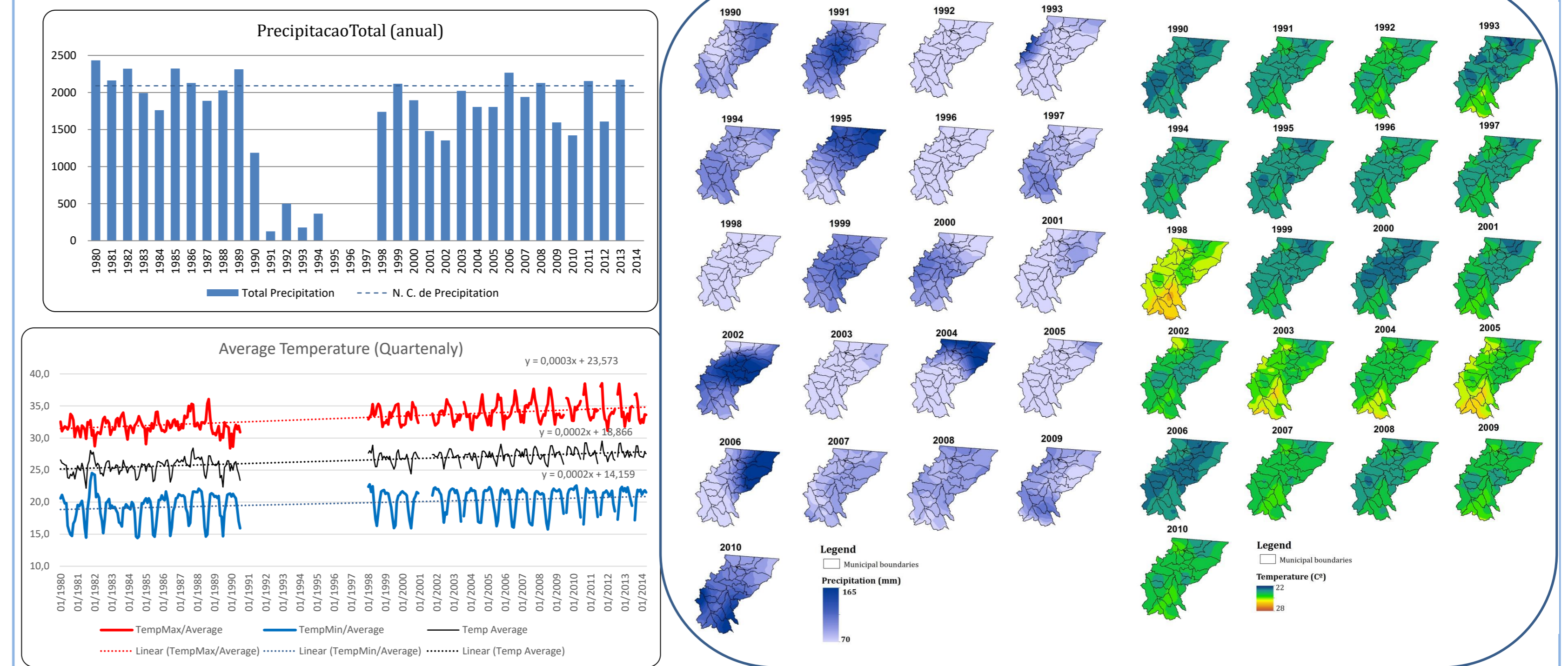


RESULTS

LAND USE/COVER CHANGE ANALYSIS



CLIMATE DATA ANALYSIS



- Large data gap
- Temperature increase
- No change in precipitation

- Insufficient data to analyze the precipitation pattern

RESEARCH WITH PRODUCERS AND INSTITUTIONS

Municipal Government	Producer's Associations and Unions	Producers (Large and Small)	Research Institutions
Have consolidated environmental policies, but without specific actions for climate change.	Smallholder associations do not discuss climate change. They cite the absence of awareness-raising actions on the distribution of environmental mitigation technology.	Perceived increase in temperature, making it impossible to work at certain times of the day. Changes in the rainfall regime, which causes uncertainties in planting and harvesting time, and in productivity.	Technical assistance institutions are focused on improving the productivity of producers. Concerns about environmental impacts are related only to the loss of soil productivity and water availability.
Among the actions that are closer to the climate change problem, are those designed to combat fires. But its consequences do not deal with changes in the local climate, but only the effect of smoke on the health of the population.	Large-producer associations, principally soybean producers, address their discourse on sustainability and cite methods such as "no-tillage" and "biological fixation" as climate change mitigation measures.	Most of the producers believe that the climate change is a natural process independent of human action.	Large institutions such as Embrapa develop technologies based on sustainable agricultural production, but most of their experiences do not extend to the small producer.

CONCLUSIONS

An increase in temperature was identified in municipalities with high rates of land use change and land cover; this increase was perceived by the producers, having directly influenced the agricultural production, but there is a difficulty of the producers in associating their way of producing with the changes caused by the local climate. This fact increases the challenge of research institutions and public policies in creating mitigation and adaptation programs that actually influence the productive sector.

REFERENCES

SIDRA, IBGE. (2016). Sistema IBGE de recuperação automática. USGS - United States Geological Service (Serviço Geológico dos Estados Unidos). Earth Explorer - Collection- Landsat Archive. Disponível em <http://earthexplorer.usgs.gov/>. Accessed may 2017.