Transportation-Related Air Pollution: Implementing Electric Bikes in Paraná

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Introduction

PARANÁ

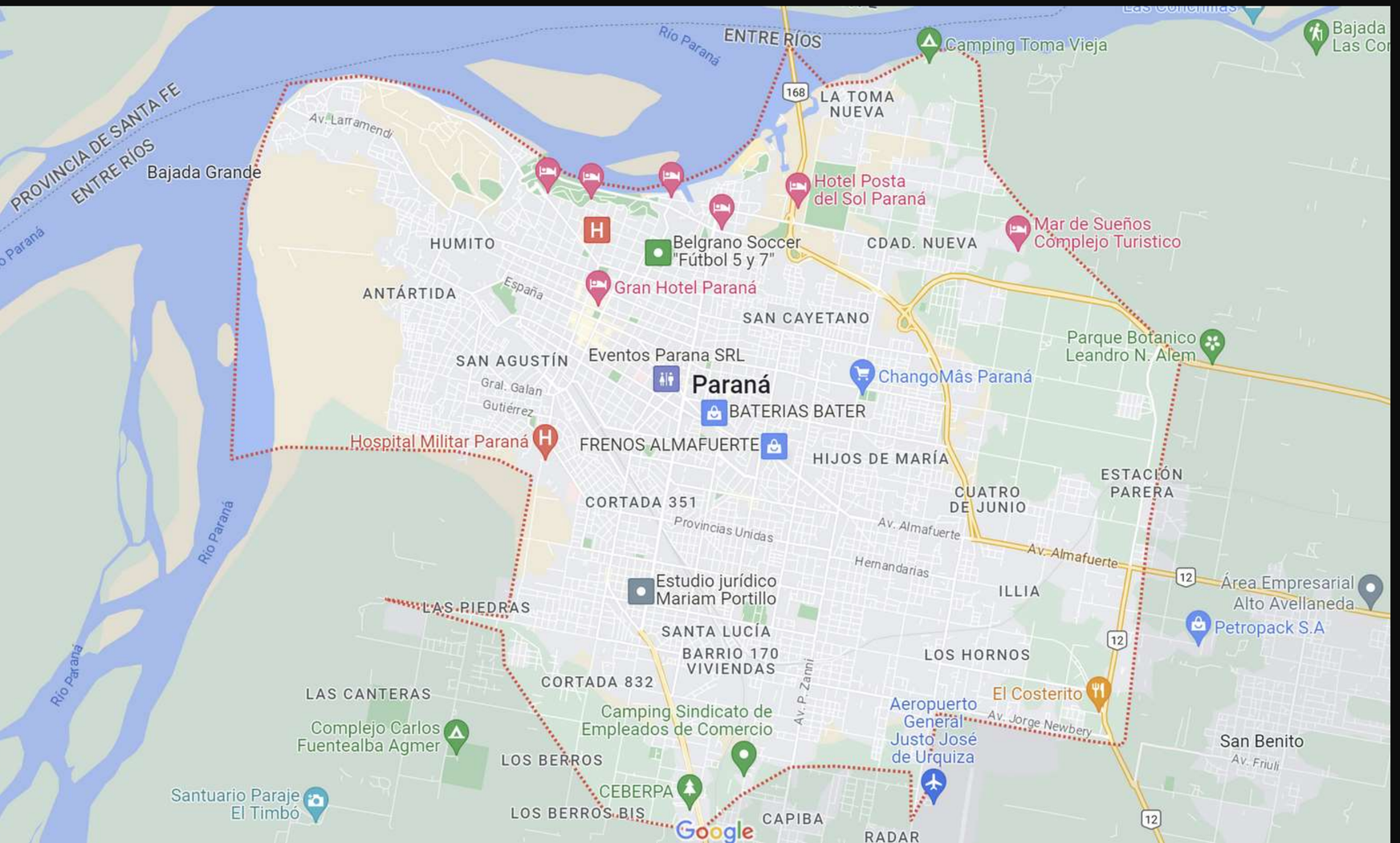
- **Foundation Date: June 25, 1813**
- **Inhabitants: 380,000 approximately**
- **Neighborhoods: 270**
- **137 square kilometers**
- **Cars: 136,775 (May, 2021)**

Presentation Purpose and Solution

The purpose of the presentation is to address the problem of air pollution caused by transport in Paraná, Entre Ríos, Argentina. This will be achieved by describing the implementation of electric bikes as a solution.

Problem Definition and Analysis: Description of the Context

Paraná and its key places



We are going on a tour around three different areas:

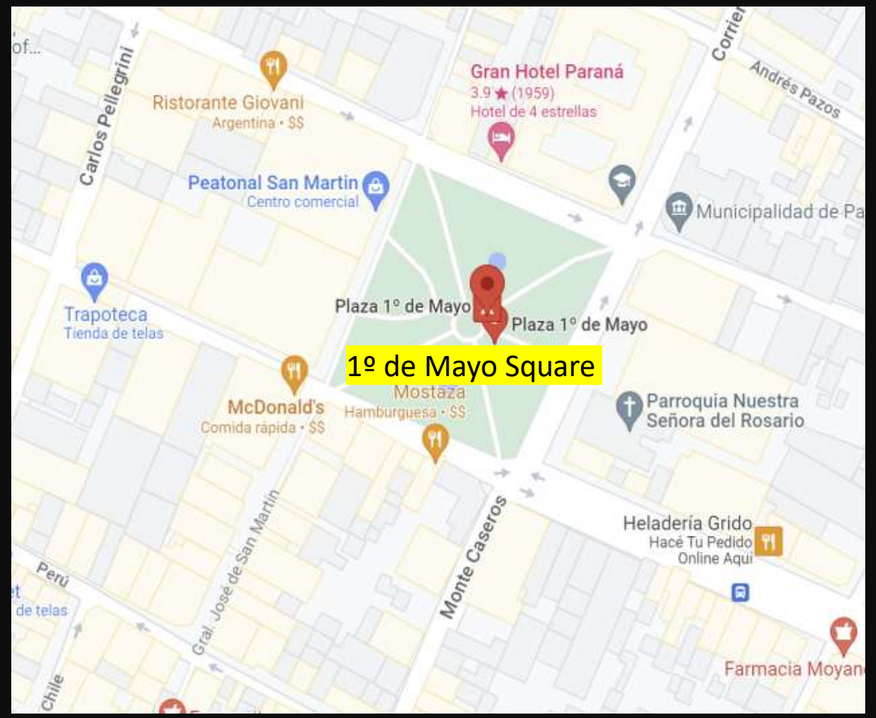
- Cultural Area
- Historic Area
- Touristic Area

Cultural Area

3 de Febrero Theater

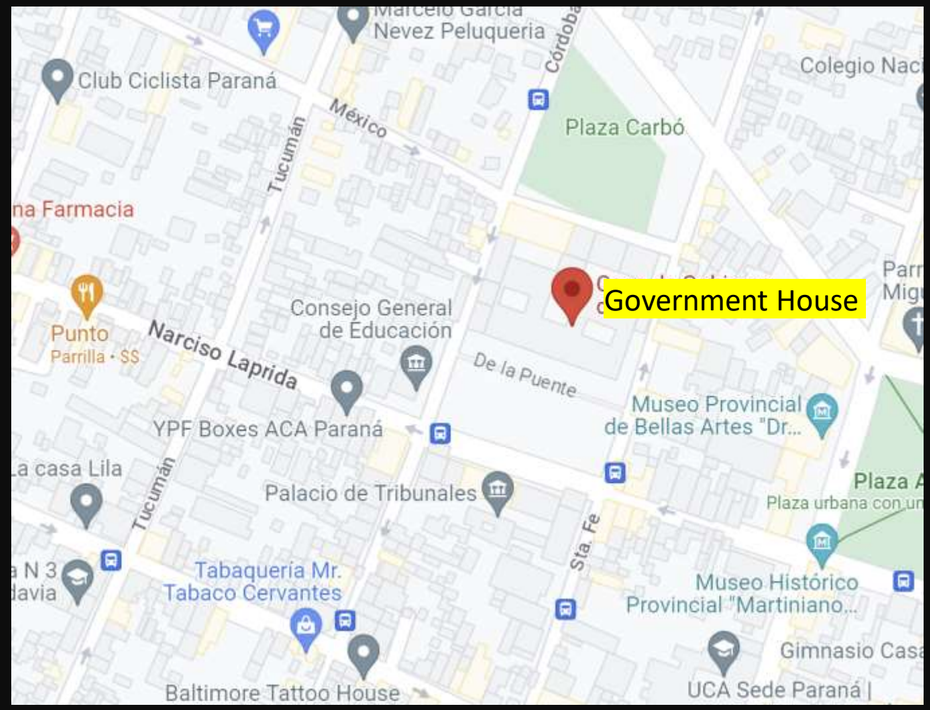
Historic Area

1º de Mayo Square



Historic Area

Government House



Historic Area

Raúl Uranga-Carlos Sylvestre Begnis Subfluvial Tunnel

Tourist Area

Urquiza Park

Problem Definition and Analysis: Problem Statement

Transportation-Related Air pollution

1. A growing urban center and number of inhabitants

2. A high dependence on vehicles

3. An increased traffic flow

4. An insufficient gas emission control

Problem Definition and Analysis: Description of Scenes that Help Picture the Problematic Situation

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Pre-toll route leading to subfluvial tunnel entry point

The city's central five-way intersection

Almafuerte Avenue

Problem Definition and Analysis: Identification and Analysis of Causes or Factors that Give Rise to the Problem

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Causes

- Inadequate environmental regulations

- Lack of safe cycling infrastructure

- Limited availability of sustainable transportation alternatives

- Lack of a well-developed public transport system

- Fossil fuel-powered vehicles

Consequences

- Poor air quality

- Negative impact on the health of city residents

- Shortage of sustainable transportation alternatives

- Insufficiency of environmental regulations

- Damage to infrastructure and buildings

The Way Forward: Problem Approach

Problem Approach

- Integration of advanced lithium-ion batteries
- Reduced charging time with fast-charging systems
- Energy recovery through regenerative braking

Problem Approach

- Incorporation of advanced materials (graphene and silicon)
- Use of low rolling resistance tires (preferably 26") for future spare part availability
- Implementation of an intelligent system called Pedal Assist System (PAS)

Problem Approach

- Introduction of electric bicycles in key areas
- Inclusion of electric bicycles at public transport stations
- Implementation in tourist interest areas
- Promotion of sustainable tourism and unique experiences for tourists

The Way Forward: Strengths and Weaknesses of the Proposal

Advantages of this Project

- Electric bikes do not emit greenhouse gases.
- They allow cyclists to cover longer distances with less physical effort.
- They are more cost-effective than motorized vehicles, both in terms of initial cost and maintenance.

Disadvantages of this project:

Disadvantages of this Project

- The initial cost of an electric bicycle is high.
- They are heavier than conventional bicycles.
- The battery life of electric bicycles is limited.

Conclusion

The project seeks to discourage vehicle usage among the people of Paraná because this has led to a marked deterioration in air quality, which has direct implications for the health of residents. Therefore, we must be aware of this problem.

References

- C. de, “capital de la provincia de Entre Ríos,” Wikipedia.org, Jul. 13, 2004. https://es.wikipedia.org/wiki/Paran%C3%A1_(Argentina) (accessed Aug. 09, 2023).

- “¿Qué Tipos De Baterías Llevan Las Bicicletas Eléctricas?» 2023.” https://bikepa.es/bateria-para-bicicleta-electrica/ (accessed Oct. 09, 2023).

- “¿Qué es la asistencia de pedal de bicicleta eléctrica y cómo funciona?,” Buybestgear EU, Mar. 14, 2022. https://www.buybestgear.com/es/blogs/guides/what-is-e-bike-pedal-assist-and-how-does-it-work (accessed Oct. 09, 2023).

Thank you for your attention!

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