

QUANTIFYING LIFE CYCLE OF CARBON BUDGET OF FOREST ROADS IN MANAGED CANADIAN FORESTS LANDSCAPES

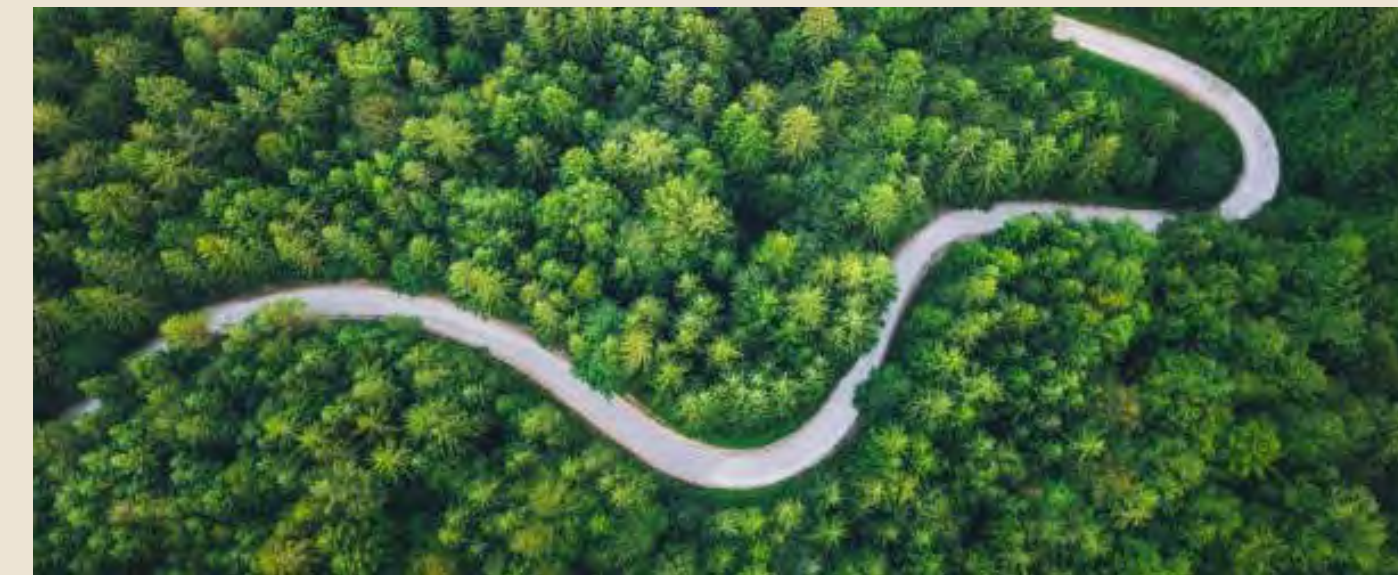
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CONTEXT

Construction of forest roads is the main forest management activity that decreases the productive area of the forest.

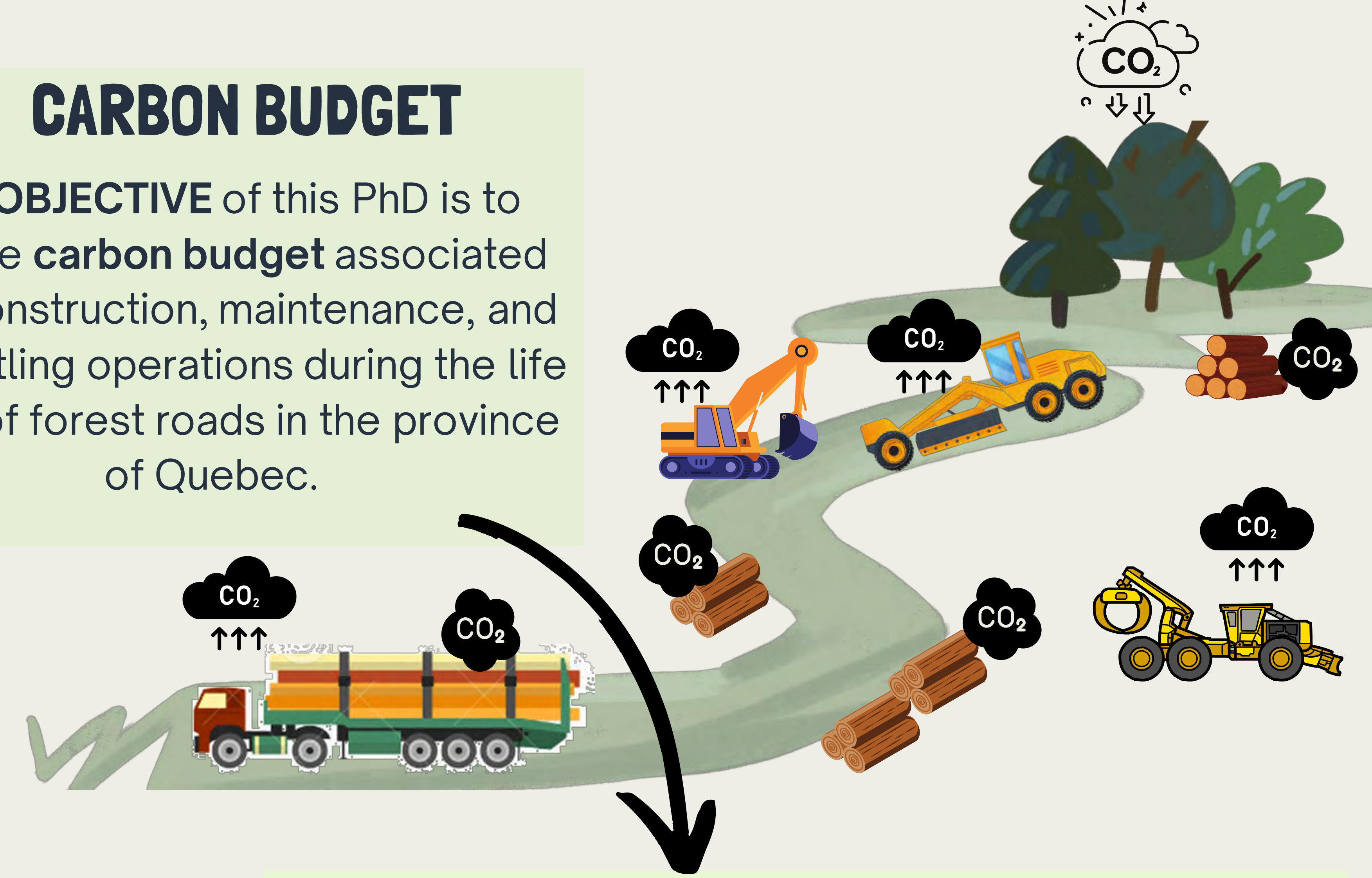


Effects

- | | |
|--|---|
| <ul style="list-style-type: none"> • Economy • Forestry management • Fire control • Recreational • Social | <ul style="list-style-type: none"> • Water sedimentation • Unwanted species • Loss of topsoil • Soil compaction |
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CARBON BUDGET

THE OBJECTIVE of this PhD is to analyze **carbon budget** associated with construction, maintenance, and dismantling operations during the life cycle of forest roads in the province of Quebec.



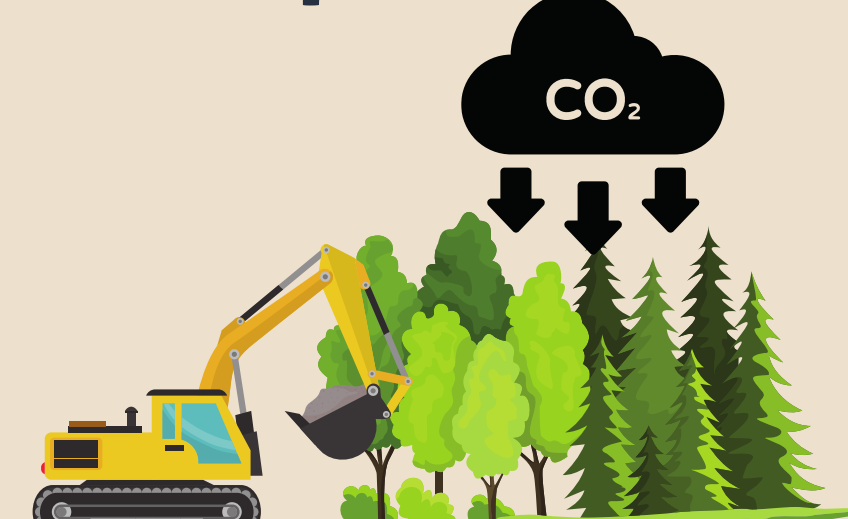
CHAPTER 2

Evaluate the timing of road dismantling strategies based on the carbon budget following a temporal and spatial gradient.

Option 1



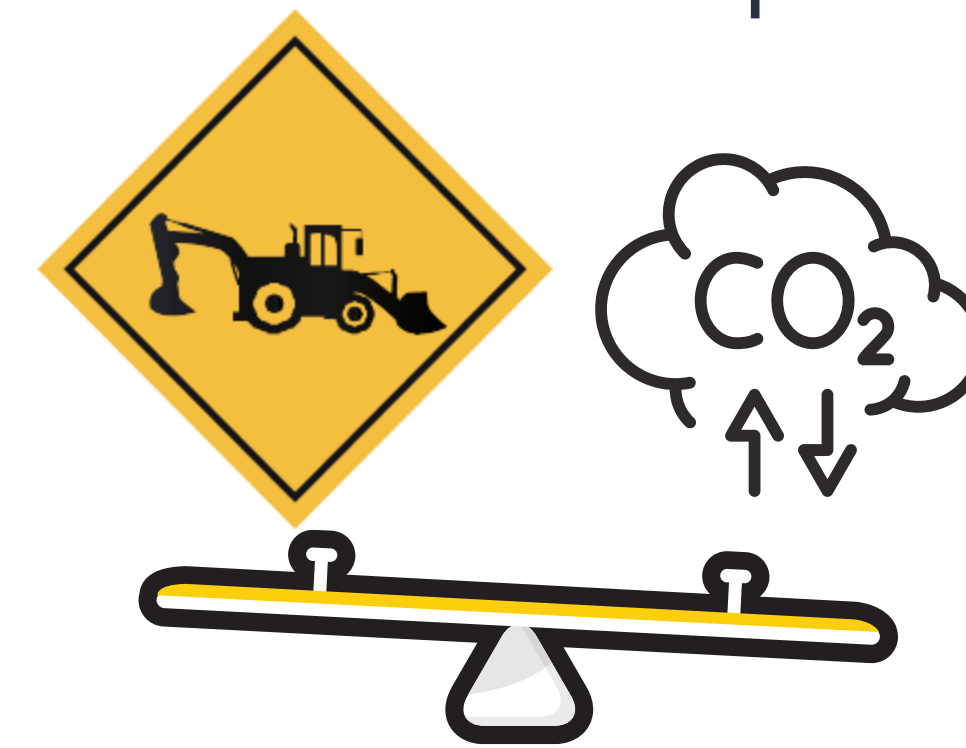
Option 2



Hypothesis: Effect on the carbon budget is explained by the **deterministic variables**: forest type conditions, soil type, latitude, etc. and by the **disturbance variables** "time since construction" and "time of deactivation".

CHAPTER 1

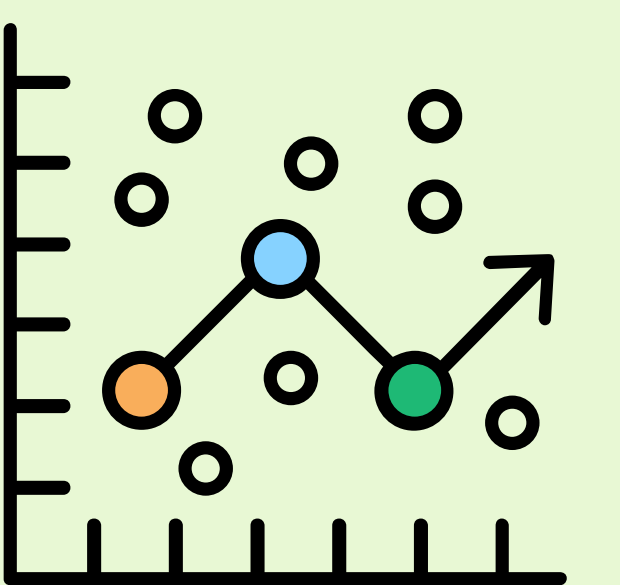
Quantifying the carbon emissions of forest roads during construction, maintenance, and wood flow use in a temporal and spatial gradient at landscape level.



Hypothesis: The higher the rate of reuse and maintenance of forest roads to connect new harvesting areas, the better the carbon budget.

METHODOLOGY

- For the analysis, in the 3 chapters we will use machine learning models and advanced analytics.
- We will work with available data and models that best represents the operation and dynamics of the forests.
- Our study area will be managed forest landscapes located in the Province of Quebec.



CHAPTER 3

Proposing feasible strategies to better integrate carbon budget of forest roads at a regional scale.



Hypothesis: The strategies are explained by forest type conditions, age, characteristics of transformation centers that use wood and its processes.

CONTRIBUTION

- Evaluating the dynamics of roads and their impact on the carbon balance of the forest, in order to provide a methodology for analysis for future interventions.

