Climate Change Modeling and the Weather-Related Road Accidents

Introduction

Climate change has been a major concern in recent decades, with implications for various sectors, including transportation. This study focuses on the impact of climate change on weather-related road accidents, using the New Brunswick province of Canada as a case study for the 21st century (2011-2040).

Methodology

1. **Data Collection**
   - Road accidents data, traffic flow, environmental conditions, and road geometry were collected for the road network of New Brunswick province.
   - Accident data, both single and multiple accidents, were based on police accident reports for the period of 1997-2007.

2. **Regression Analysis**
   - A multiple linear regression analysis was conducted to examine the factors that contribute to weather-related road accidents.

3. **Step 1: Accident Severity Index (ASI)**
   - The Accident Severity Index (ASI) was calculated using the following formula:
     \[ ASI = PDO + S + 1.5F \]
   - Where:
     - PDO: property damage only
     - S: injuries
     - F: fatalities

4. **Step 2: Exposure to Weather-Accident Severity (EWAS) Index**
   - The EWAS index is defined as ASI adjusted for meteorological variables.

5. **Step 3: Weather-related accident variables**
   - The effect of meteorological variables on road accidents was assessed using regression analysis.

Results

- **Summary of NBR and PR models for the New Brunswick province**
  - Table showing the coefficients of explanatory variables.

Discussion

- Combined effects of hazardous weather conditions and factors of road accidents are significant.
- Climate change-related increase in the ratio of hazardous weather days will be increased in most of the climate zones of New Brunswick during 21st century.
- More hazardous weather will result in increased accident severity.
- Road Safety Strategy 2015 of Transport Canada should adopt the holistic approaches containing hazardous weather conditions along with other factors of road accidents.

Conclusion

- The results suggest that the climate change models should be integrated with traffic safety models to improve the understanding of the impacts of climate change on road safety.

References