



# Keeping our Brownsville community alive: The carbon footprints of cars and trees

Jamie Bernard, Chantinièce Britton, Patrice Brown, Tahiem Hilliard, Tessa Kingston, Jivaro Mordaunt, Malik Orr, and the students of Ms. Parker's Sophomore & Junior GK-12 science research classes, Teachers Preparatory School, Brooklyn NY 11212



## Abstract

The GK-12 science research class of Teachers Preparatory School in Brownsville focused on research related to global warming. It is important for the community to know if there are enough trees in the neighborhood to compensate for CO<sub>2</sub> emissions by cars and people. To test this hypothesis, the carbon footprints of cars and the sequestration of trees in the neighborhood were calculated and compared. An approximate four-block radius around Teachers Preparatory School was chosen as the study area with about 200 trees measured. The total CO<sub>2</sub> sequestration of the trees was combined with population density and car counting data. The cars in the study area emit different levels of CO<sub>2</sub> each day into the air. By using clickers, a variety of vehicles were counted at specific locations and times within the 4-block radius. The carbon footprint was then calculated for each car type and combined for a total carbon footprint value. The carbon footprint of population density was determined from a 2010 census. Overall, we have found that the number of trees in our neighborhood do not compensate for the carbon footprint resulting from people and cars. To lower the carbon footprint people should walk, carpool, bike, and take the bus when possible.



Fig. 1: (a) Students labeling tree locations. (b) Students measuring tree using tape measures and worksheets.

## Introduction

Students in the GK-12 science research class of Teachers Preparatory School in Brownsville decided to do research on global warming. They measured an area of 242,182.15m<sup>2</sup> and within that area measured 200 trees in total. They measured the height and circumference of the trees along the sidewalks, and from these measurements calculated their carbon footprint. They measured the amount of traffic traveling through their study area. The cars around this area emit different levels of CO<sub>2</sub> each day into the air. Generally, the trend is that the bigger the car, the more CO<sub>2</sub> it produces. This study is important to the community because people would like to know if there are enough trees to absorb the amount of CO<sub>2</sub> being put out by cars and people. This study proves that cars and people are negatively affecting the neighborhood, and new ways are needed to either prevent or reduce CO<sub>2</sub> levels. Information that the students already knew from the beginning of the year is that cars, people, and other factors contribute towards global warming.



Fig. 2: (left) Students preparing materials and breaking up into teams to measure trees in surrounding area. (right) Student team measuring tree using tape measure.

## Tree Measurement and Car Counting Locations near Teachers Preparatory School

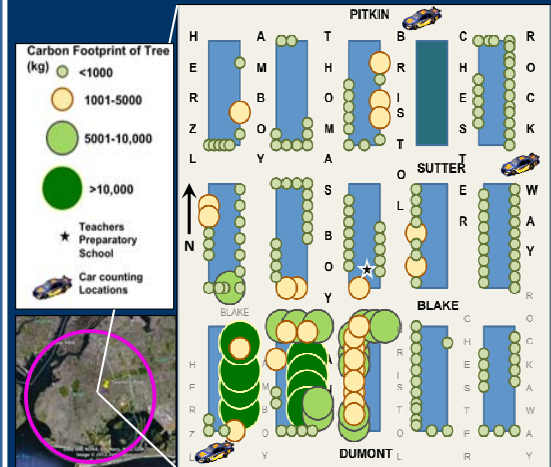


Fig. 3: Map showing street names and locations of tree measurements and car counting intersections. Tree represented by calculated carbon footprint values (kg). (bottom left) inset map showing Brooklyn borough and location of Teachers Preparatory School.

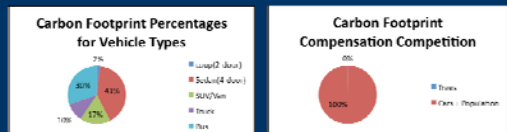


Fig. 4: (a) Pie Chart showing carbon footprint percentages for each vehicle type. (b) Pie chart showing the carbon dioxide compensation of trees for car and population density. Population density data taken from 2010 census.

## Methodology

**Trees:** Students measured the circumference and the height of trees using tape measures, clipboards, and data tables. We measured approximately 200 trees to get the most data. After collecting the data, they converted all measurements into meters in order to get the carbon footprint for the trees. They added up all the carbon footprints of all the trees to determine the total carbon footprint.

**Cars:** Students also counted the different types of vehicles that drove through the study area. They counted coups, Sedans, SUVs, trucks, and buses. They used clickers to keep track of how many cars passed. Students then calculated the carbon footprint for each type of car as well as the total carbon footprint for all the cars.

**Population Density:** Students used the 2010 census to determine the population density's carbon footprint.

## Conclusions

Overall, the students found that the number of trees in their neighborhood do not compensate for the carbon footprint resulting from people and cars in the neighborhood. Planting more trees will aid in this imbalance. To lower the carbon footprint people can walk, carpool, and take the bus. Future investigations include the carbon footprint resulting from use of electricity.

## Acknowledgements

Special thanks to Carmen Simon, principal of Teachers Preparatory School, Marji Parker, and the fellows of the GK-12 program Jennifer Drieves and Andrea Huska. Also, Micha Tomkiewicz, Louise Hainline, and Michelle O'Dea. Supported by GK-12 "City as Lab" NSF-DGE 0638718