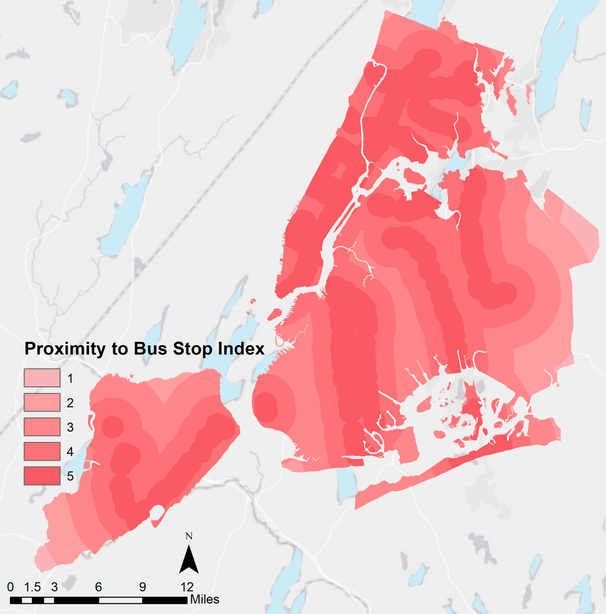
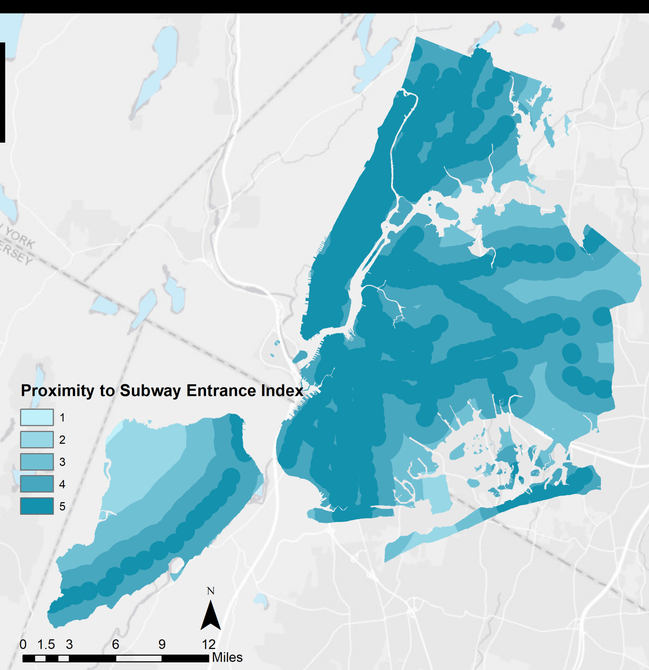
Money Walks: A Suitability Assessment for Kinetic Energy Tiles In NYC

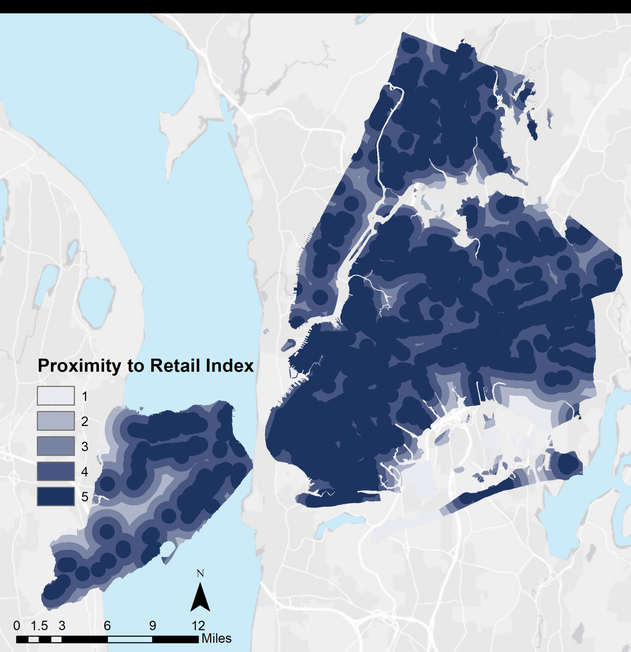
Key Factors



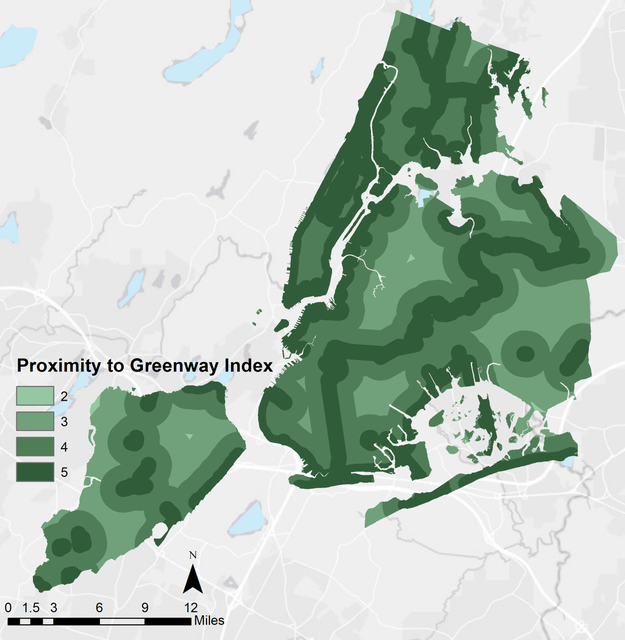
PROXIMITY TO BUS STOP: New York Public transportation system is utilized by millions of people every day. Distance to the nearest bus stop was considered through the expectation that a high volume of foot traffic would occur near these points.



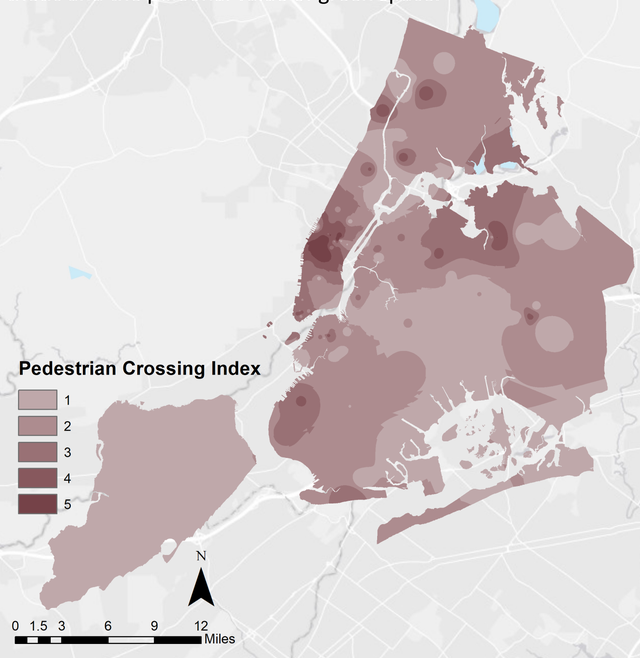
PROXIMITY TO SUBWAY ENTRANCE: Similarly, heavy foot traffic is expected closer to subway entrances since countless subway riders will pass through each day. The areas surrounding these entrances will then also experience a high level of walkers.



PROXIMITY TO RETAIL LOCATIONS: Retail in this case indicates buildings that provide shopping and dining services like stores, malls, bars and cafés. Whether you live, work or visit New York City you are likely to visit at least one of these points.



PROXIMITY TO GREENWAYS: Greenways in New York are existing walking paths that allow pedestrians to experience nature in the highly urbanized city. These paths already experience high foot traffic due to their aesthetic and the personal value of green space.



PEDESTRIAN CROSSING COUNTS: Interpolation was run on the 144 street crosswalks across the five boroughs in which crossings were recorded from 12-2PM on 9/23/2017 to estimate the volume of pedestrian crossings for the entire city from 12-2PM on any given day. The rate is relative to New York City.

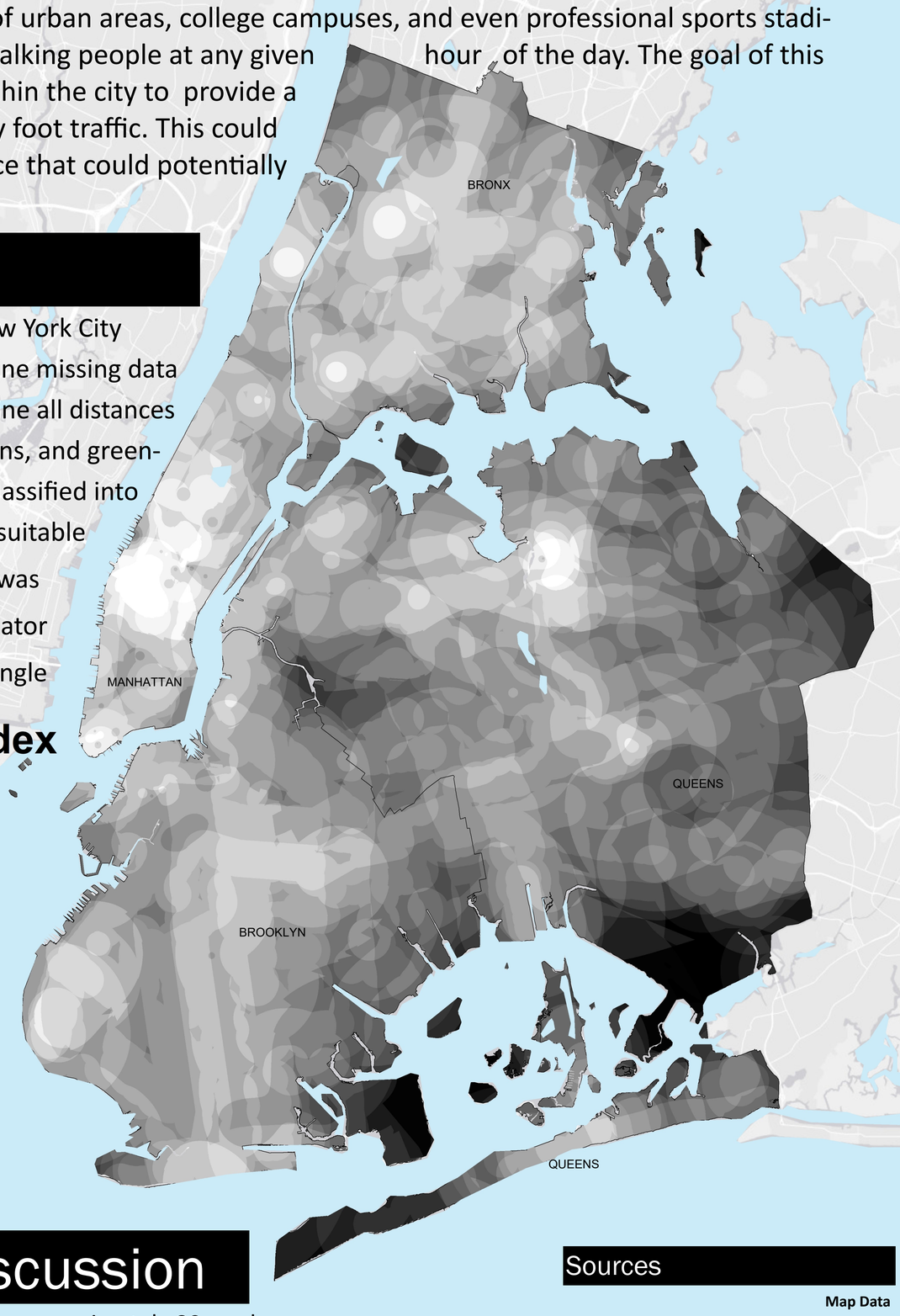
Index Factor	Weight	5	4	3	2	1
Proximity to Bus Stop (ft)	20%	< 3070 ft Most Suitable	3070 < 8040 ft	8040 < 15050 ft	15050 < 24280 ft	24280 <= 90000 ft Least Suitable
Proximity to Subway Entrance (ft)	20%	< 2390 ft	2390 < 6830 ft	6830 < 14010 ft	14010 < 30070 ft	30070 ft <= 90000 ft
Proximity to Retail (ft)	15%	< 2000 ft	2000 < 4000 ft	4000 < 6000 ft	6000 < 8000 ft	8000 <= 90000 ft
Proximity to Green way (ft)	20%	0 < 2050 ft	2050 < 6140 ft	6140 < 12630 ft	12630 < 22630 ft	22630 <= 90000 ft
Pedestrian Crossing (#of crossings)	25%	0 < 2116	2116 < 3352	3352 < 5237	5237 < 8163	8163 <= 17261

Introduction

With a global dependency on fossil fuels there is an ever growing need for renewable energy. Kinetic energy harvesting is one kind of renewable energy resource with great potential. Kinetic energy is the energy of motion and can be found in any object that moves. Take footsteps for example! When kinetic energy tiles are displaced by pressure the vertical movement causes a rotary motion within the tile which generates electricity. This technology has already been implemented in a number of urban areas, college campuses, and even professional sports stadiums. New York City is filled with millions of walking people at any given hour of the day. The goal of this project is to locate the most suitable sites within the city to provide a significant amount of kinetic energy via heavy foot traffic. This could provide NYC with a renewable energy resource that could potentially cut electricity costs of municipal buildings.

Methods

A suitability assessment was executed on all New York City Streets. Euclidean distance was used to determine missing data for pedestrian crossing counts, as well as to define all distances from bus stops, subway entrances, retail locations, and greenways. The data for each key factor was then reclassified into one of five categories rank of 5 indicating most suitable for kinetic energy tiles and 1 as least. After this was done to each feature in the map a raster calculator was used to classify the several indexes into a single index displaying areas in NYC with the most foot traffic, or potential kinetic energy, as the most suitable for kinetic energy tiles.



Discussion

There are approximately 80 road crossings in the region of high suitability in downtown Manhattan. If one kinetic energy tile was placed at each foot traffic would create upwards of 459,00 0 kwh in a year saving the city hundreds of thousands of dollars.

0 3.25 6.5 13 19.5 26 Miles

N

Sources

Map Data

NYC Open Data

UCLA Geoportal

ESRI

Cartography by Kayla Williams

Intro to GIS GIS-0101-01 Professor Cris Perez

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Projection: NAD 1983 State Plane New York Long Island FIPS 3104 Feet

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