Impact of Trees in Urban Areas of Springfield, MA

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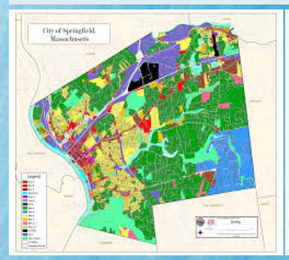
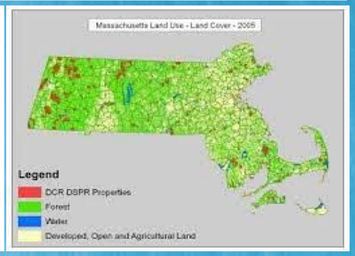
Introduction

Forest loss leads to a drastic decrease in the water supply on a local and national scale. It also breaks the climate balance at the regional and even planetary level, exacerbating the threat posed by global climate change. The main cause of deforestation is the change in land use to convert forests into pastures for livestock or cultivated fields and to build large buildings. This practice has been promoted by all levels of governments, which have only seen forests as idle land, without being able to understand their multiple benefits or their vital character. A series of perverse incentives provided by them has led people to cut down their forests in exchange for economic resources





Objectives and Hypotheses

General: To quantify the impact of urban forest in the City of Springfield.

1. To study urban forest cover in different neighborhoods of Springfield
2. To evaluate ecosystem services of urban trees
3. To develop strategies to increase urban forest cover in the city

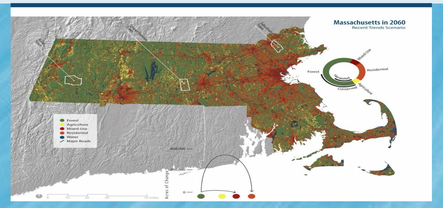
Hypothesis 1: Forest cover varies by neighborhood in the city

Hypothesis 2: Benefits of urban forests are significant to city environment and quality of life

Hypothesis 3: Education and forest conservation can increase urban forest cover

Background

Forest loss leads to a drastic decrease in the water supply on a local and national scale. It also breaks the climate balance at the regional and even planetary level, exacerbating the threat posed by global climate change. The main cause of deforestation is the change in land use to convert forests into pastures for livestock or cultivated fields and to build large buildings. This practice has been promoted by all levels of governments, which have only seen forests as idle land, without being able to appreciate their multiple benefits or their vital character. A series of perverse incentives provided by them has led people to replace forests in exchange for economic resources.

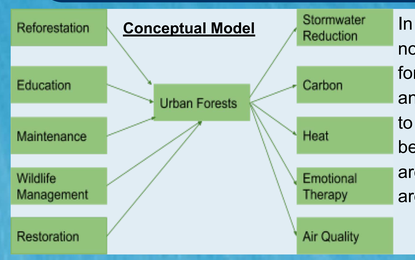


Study area

There is a 7.5% vacant land in Springfield. Areas of eastern Springfield are low density residential since it is the last area to be developed in Springfield history. On the other hand, the area of the floodplain of the Connecticut Rivera with the highest density residential and business district area.

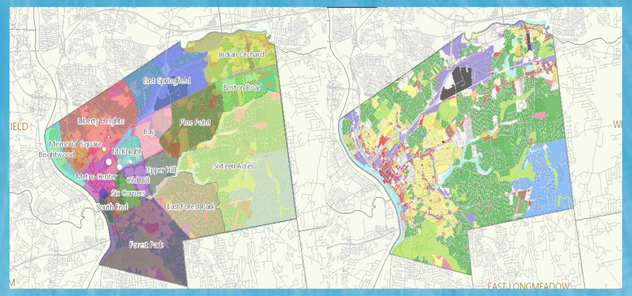
By the year of 2014 the Forest Park canopy cover area covered approximately 41.3% of the entire neighborhood. Boston Road canopy cover area was 44 % and Liberty Heights neighborhood had a canopy cover area of 28% of the neighborhood. By 2010, the entire population summed approximately 153,060 (Census 2010) and it is estimated that by 2020 this number would increase by 2,246.00.

Methods



In this diagram we can note that actions such as forest land maintenance and reforestation can lead to increased environmental benefits in the Springfield area as well as in adjacent areas..

Results and Discussion



Neighborhood	Canopy cover (%) Data (2017)
Forest Park	41.3%
Boston Road	44%
Liberty Heights	28%
Metro Center	6.7%

i-Tree

Tools for Assessing and Managing **Forests & Community Trees**

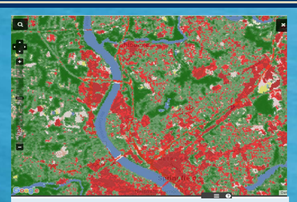


Figure A
Liberty Heights Neighborhood

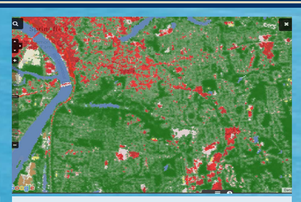


Figure B
Forest Park Neighborhood

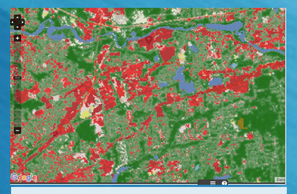


Figure C
Boston Road Neighborhood

Figure D
Metro Center Neighborhood

Figure E
Boston Road Canopy Cover.

Figure F
Forest Park Canopy Cover.

Tree Benefit Estimates: Air Pollution (English units)

Description	Amount (lb)	±SE	Value (USD)	±SE
Carbon Monoxide removed annually	292.05	±0.00	$195	±0
Nitrogen Dioxide removed annually	6,177.10	±0.00	$1,307	±0
Ozone removed annually	38,095.37	±0.00	$30,060	±0
Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	7,221.94	±0.00	$22,635	±0
Particulate Matter less than 2.5 microns removed annually	2,051.62	±0.00	$142,946	±0
Sulfur Dioxide removed annually	2,003.32	±0.00	$135	±0
	55,841.40	±0.00	$225,277	±0

A2-.Boston Road

Tree Benefit Estimates: Air Pollution (English units)

Description	Amount (lb)	±SE	Value (USD)	±SE
Carbon Monoxide removed annually	835.79	±0.00	$557	±0
Nitrogen Dioxide removed annually	17,677.76	±0.00	$3,741	±0
Ozone removed annually	109,022.13	±0.00	$166,157	±0
Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	20,667.89	±0.00	$64,778	±0
Particulate Matter less than 2.5 microns removed annually	5,871.36	±0.00	$409,085	±0
Sulfur Dioxide removed annually	5,733.15	±0.00	$386	±0
	159,808.08	±0.00	$644,704	±0

A3-Forest Park.

Tree Benefit Estimates: Air Pollution (English units)

Description	Amount (lb)	±SE	Value (USD)	±SE
Carbon Monoxide removed annually	567.36	±0.00	$378	±0
Nitrogen Dioxide removed annually	12,000.14	±0.00	$2,539	±0
Ozone removed annually	74,007.14	±0.00	$112,792	±0
Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	14,029.92	±0.00	$43,973	±0
Particulate Matter less than 2.5 microns removed annually	3,985.63	±0.00	$277,688	±0
Sulfur Dioxide removed annually	3,891.82	±0.00	$262	±0
	108,482.00	±0.00	$437,642	±0

A4-Liberty Heights

Tree Benefit Estimates: Air Pollution (English units)

Description	Amount (lb)	±SE	Value (USD)	±SE
Carbon Monoxide removed annually	398.85	±0.00	$266	±0
Nitrogen Dioxide removed annually	8,435.92	±0.00	$1,785	±0
Ozone removed annually	52,025.91	±0.00	$79,291	±0
Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	9,862.82	±0.00	$30,912	±0
Particulate Matter less than 2.5 microns removed annually	2,801.84	±0.00	$195,217	±0
Sulfur Dioxide removed annually	2,735.89	±0.00	$184	±0
	76,261.23	±0.00	$307,656	±0

A5 Metro Center.

Figures A to D show in red the built area and the green area represents the forest cover in each neighborhood assessed.

Figures E to H shows current forest cover for each neighborhood assessed.

Figures A2 to A5 show the estimate, in pounds, of air pollution removal by trees. (yearly)

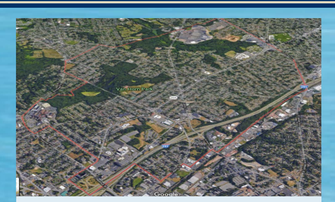


Figure G
Liberty Heights Canopy Cover

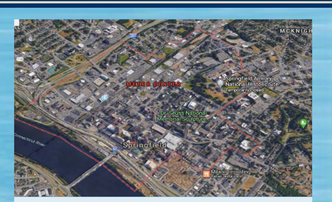


Figure H
Metro Center Canopy Cover

Table: Benefits and Strategies

Restoration	Instead of building new infrastructure such as company buildings and housing buildings, we must restore or renovate existing buildings that are not in use. The buildings that must be demolished for safety, should be replaced with a renovated natural floor.
Reduction in Greenhouse Effect	The government should focus on industries that have an influence on greenhouse effects.
Stormwater	Trees help the hydrological cycle by transpiration. That is, absorbing rainwater from the soil. Promoting programs such as ReGreen in all urban communities.
Farming	The government could offer a subsidy to farmers so that they can treat the soil after harvest in order to conserve animal species. Also, farmers could evaluate the possibility of accepting an alternative that allows them to decrease the use of insecticides.
Replanting Trees	More emphasis in promoting the efforts of Community programs. ReGreen's mission is to restore the forest in urban areas by providing a free tree to households. Citizens can join the effort by volunteering to plant a tree.
Energy Saving	A tree in the yard serves as shade and as a heat blocker. Refreshing the home and avoiding the use of air conditioning. This is how you can save money on your electricity bill.

Conclusions

Research has shown that removing trees to construct structural buildings and cultivate has created great damage to the atmosphere and the lifespan of all living things. Researchers have recognized that replanting of trees and treatment of damaged soils. Programs in Springfield like Regreen and Greening the Gateway Cities Program, aim to promote planting and maintenance of urban trees planting trees in urban areas of Springfield. It creates and provides alternatives to landowners in order to keep soil and watershed in private land. The population size, farming and built infrastructure in urban areas have an impact in forestland cover.

Acknowledgements

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