Lesson Title: "Your town, how will it grow?"

Teacher: Melanie McCracken/Groton-Dunstable HS

Level: High School

Date: March 2018

Prerequisite Skills:

Basic computer skills: cut and paste, powerpoint design

Basic skills for using google earth pro and geo maps online

Knowledge of ecological succession and disturbance to forest landscapes

Length of time:

4-5, 84 minute class periods

Audience level:

Grade 9-12

Materials list:

Access to computers and online information

Google earth pro (this is a free app that can downloaded)

Hard copies of maps (optional as they are online, but easier to use as a hard copy)

Dioramas powerpoint:

https://docs.google.com/presentation/d/1VgDhfN2YdCAeaMyUHiJxD-U0kWOtMu1WaRHHEkVihRA/edit?usp=sharing

Web sites:

https://smartgrowthamerica.org/our-vision/what-is-smart-growth/

http://harvardforest.fas.harvard.edu/SYLandUseChangeMaps

https://grotonma.mapgeo.io/properties/217-54?latlng=42.611963%2C-71.601074&panel=search&zoom=15

https://www.census.gov/quickfacts/fact/table/actontownmiddlesexcountymassachusetts,MA,grotontownmiddlesexcountymassachusetts/PST045217

Objective:

Students will use the map sets of their town and google earth pro and geo maps to determine newly developed sites.
Students will relate smart growth concepts and sprawl to development in their town
Students will produce a powerpoint presentation and present to the class

Background:

This lesson can be accomplished as a stand-alone or can be embedded in a land use unit. Below is one way to embed it in a land use unit.
Students are introduced to their forest plot and measure trees to instill a sense of what an untouched forest parcel may look like and how much carbon biomass is stored in a typical forest plot in their town.
They are introduced to invasive species and succession to show how plant species may change permanently as humans disturb sites. They are introduced to the history of land use in New England (Diorama powerpoint) to help understand how the landscape has changed historically and where it is at present.
Students are introduced to land use concepts and vocabulary either online or from class textbook.
Students learn that citizens have a voice and can determine the direction of development that a community may take. That direction can influence human health directly and indirectly through ecosystem health.

Lesson: (This lesson can be accomplished without days #1-3.)

Day #1
HW assigned: complete guided reading section 5.4 succession and invasive species from textbook (Pearson Environmental science: Your Turn Your World)

Invasive species- outside to see American chestnut sprouts and hemlock woolly adelgid damage.

Day #2 and #3
Students are introduced to forest measurement techniques using DBH. Students go out to measure the diameter of trees in the 1/10th hectare plot. Students convert diameter measurements to carbon storage in the plot.

Day #4
Students introduced to dioramas and succession using a powerpoint which includes a quick movie and a graph on forest cover over time. Take away- deforestation through 18th into early 19th century and reforestation through mid to late 19th century.
Maps- students look at maps (online or hard copies, all maps or just the 4 local maps) , student groups list 10 things they notice and report out to class. Class discussion.
HW assigned from textbook: complete guided reading 10.2 and 10.3 on sprawl and sustainable communities

Day #5

Students work in groups of two. Groups study maps and choose newly developed area on map to research. Students use geo maps of Groton and Dunstable (website) to find address of developed site. They use the map site to download pictures of their site and find out year of development, acreage, price etc.

Day #6
Teacher introduces quick facts on the census site. Students calculate growth rate of the town and density and compare it to surrounding towns. Teacher reminds students of the 2 contributors to sprawl (per capita land use and growth rate).

Day #7 and #8
Students use google earth pro and toggle between dates for pictures of their site through time. Students download pictures to a powerpoint. Use website that explains the ten principles of smart growth to determine if smart growth concepts are being used in their community or if sprawl is occurring (or a combination of both). Students present to class.

Grading

0-10 pts Both students present equally. Students present in a loud voice to be heard at back of class. Students are serious and presentation makes sense. Students use notes and have good eye contact.

0-5 pts. powerpoint includes ortho map of Groton showing location of property.

0-5 pts. Students have several pictures of their developed site including current picture of site with house fully constructed.

0-5 pts. Pictures show several aerial views of property as it was developed and fully developed from 1995-present. Pictures show surrounding neighborhood.

0-10 pts. powerpoint includes notes referring to the 10 principles of smart growth and whether the site has been developed using the principles.

0-10 pts. Students also describe community including per capita land use and growth rate and relate it to the concept of sprawl.

NGSS Standards

NGSS:

HS-ESS3-1 Earth and Human Activity

https://www.nextgenscience.org/pe/hs-ess3-1-earth-and-human-activity

HS-ESS3-3 Earth and Human Activity

https://www.nextgenscience.org/pe/hs-ess3-3-earth-and-human-activity

HS-ESS3-4 Earth and Human Activity

https://www.nextgenscience.org/pe/hs-ess3-4-earth-and-human-activity

HS-LS2-2 Ecosystems: Interactions, Energy, and Dynamics

https://www.nextgenscience.org/pe/hs-ls2-2-ecosystems-interactions-energy-and-dynamics

HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics

https://www.nextgenscience.org/pe/hs-ls2-6-ecosystems-interactions-energy-and-dynamics

HS-LS2-7 Ecosystems: Interactions, Energy, and Dynamics https://www.nextgenscience.org/pe/hs-ls2-7-ecosystems-interactions-energy-and-dynamics

Sample student work Grade 11-12 CP1

powerpoint:

https://docs.google.com/presentation/d/1y5B8arEWl0vGfIhj2VfSVL8Tkr6ThHvVplEgXpR5I1A/edit?usp=sharing

Essay:

What is smart growth?

Wintergreen Lane is not a good example of smart growth. It is a big neighborhood filled in with single family homes. To make the neighborhood they had to cut down hundreds of trees and destroy a big forest. It is not mixed land uses because they had carved this neighborhood into a thriving forest. When making the neighborhood they didn't try and put it into land that's already been developed on. The neighborhood is all big expensive houses with big yards that are made for families looking to live their best lives. They did make the neighborhood a good place for walking and for kids riding bikes and playing with each other. Wintergreen Lane isn't a good place to live if you want to be able to walk to stores and the center of town. The walk is not that far but its right on the edge of having to drive. This neighborhood is secluded and is a good, safe place for a family to live. There was no open land here before in wintergreen lane. The only way of transportation from wintergreen lane is either by foot, or by car. In groton there is no public transportation so anywhere you live you need to rely on yourself for transportation.