For towns needing improvement in their science education, the outdoors can be an important teaching tool. The Massachusetts State Educational frameworks require lessons for elementary students that benefit from outdoor activities and natural classroom. These frameworks suggest particular lessons that could be enhanced by an outdoor setting and offer a chance to enrich students' learning by relating science to the world around them (DOE, 2006).

This project identifies environmentally immersive settings for learning opportunities by assessing school's accessibility to open space sites in their towns. Through an analysis of proximity, land use type, ownership and road access, cities in four Essex County, MA cities have been identified and ranked according to their quality.

The fifth-grade education frameworks offer learning opportunities for the natural environment and are based on observational skills. Because of the simplicity of these lessons, they can be applied to many natural settings and offer a good relation to identifying open space in communities. Therefore, the schools chosen for the accessibility assessment were those containing public fifth-grade classrooms.

The cities of Danvers, Lawrence, Lynn, and Methuen were selected as areas for GIS influences because of the need for improvement in fifth-grade science testing scores. From the 2009 report of Essex County MCAS Science scores (MCAS, 2009), the percentage of students needing improvement was compared across all towns. A spreadsheet of 'Needs Improvement' was joined to a map of elementary school districts by their district name to produce a map showing classes of achievement (Figure 1). The four towns in this project were identified by the map having the highest 'Needs Improvement' rate in the county at between 46% and 51%.

A detailed analysis was performed on these cities to produce a map showing the location of accessible public space. The quality of these spaces were ranked in classes as a function of proximity to schools, land use type, ownership and road access. These mapping results can be viewed at the bottom of this poster (Figures 8-9), and their accessibility ratings can be compared.

**OVERVIEW**

**Identifying Accessible Sites for Outdoor Science Education**

**METHODS**

To analyze the data, the following methodology was employed:

1. **Road Buffer Selection**: A road buffer was created for each school. All roads within a one-quarter mile of a school were included in this buffer. The buffer selection process is shown on a map in Figure 2.

2. **Quality Classification**: Areas of the city with a school were divided into three class levels based on the quality of accessibility. These classes were Class 1, Class 2, and Class 3. Class 1 represents areas that are easily accessible and offer a high quality of accessibility, while Class 3 represents areas that are difficult to access and offer a low quality of accessibility. The criteria for classifying the accessibility were based on the proximity to roads, the presence of natural features, and the overall condition of the area.

3. **Legend**: The legend shows the different classes of accessibility. Class 1 is represented by green, Class 2 by yellow, and Class 3 by red. The legend also includes a map feature layer that shows the location of schools.

**FINAL RESULTS**

**Methuen**

- **Legend**: Accessibility Class
  - Class 1
  - Class 2
  - Class 3
- **Map Features**: Road, Water, School

**Lynn**

- **Legend**: Accessibility Class
  - Class 1
  - Class 2
  - Class 3
- **Map Features**: Road, Water, School

**Danvers**

- **Legend**: Accessibility Class
  - Class 1
  - Class 2
  - Class 3
- **Map Features**: Road, Water, School

**Lawrence**

- **Legend**: Accessibility Class
  - Class 1
  - Class 2
  - Class 3
- **Map Features**: Road, Water, School

**Sources**


**Accessibity Class**

1. **1st Place**: Methuen. The city has the highest accessibility per school, 15.8 Acres per School.
2. **2nd Place**: Lynn. Lynn has the second-highest accessibility per school, offering very little Class 1 area but having a high percentage of accessible space.
3. **3rd Place**: Danvers. Danvers has the least number of acres total, but 5% of its area is Class 1 accessible space. Their area is limited, but it’s a higher quality of other室外.
4. **4th Place**: Lawrence. Lawrence has the lowest acres per school, but its percentage of Class 1 area is higher than that of Methuen and Lynn.

**INTRO TO GIS**

This project was part of a larger GIS project that focused on assessing the accessibility of outdoor learning environments for students in Essex County, MA. The city of Methuen was chosen as the focus of this project because of its high percentage of students needing improvement in fifth-grade science testing scores. The analysis was conducted using ArcGIS software, and the results were visualized using a series of maps and graphs. The project's findings suggest that Methuen has a high potential for outdoor science education, with many accessible sites near the schools. The project's conclusions may help in guiding future planning and resource allocation for outdoor learning opportunities in Methuen.