

Rising Sea Level, Rising Danger for Logan Airport

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Background Information

Global warming could cause sea level to rise 0.5 to 2 meters by 2100. Such a rise would inundate wetlands and lowlands, erode beaches, exacerbate coastal flooding.

1-meter rise could drown approximately 25 to 80% of the U.S. coastal wetlands.

1-meter rise could inundate 5,000 to 10,000 square miles of dry land if shores were not protected and 4,000 to 9,000 square miles of dry land if only developed areas were protected.

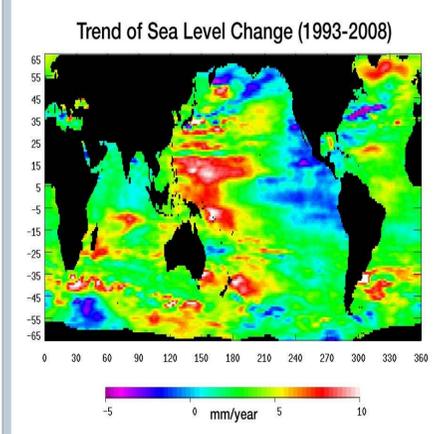
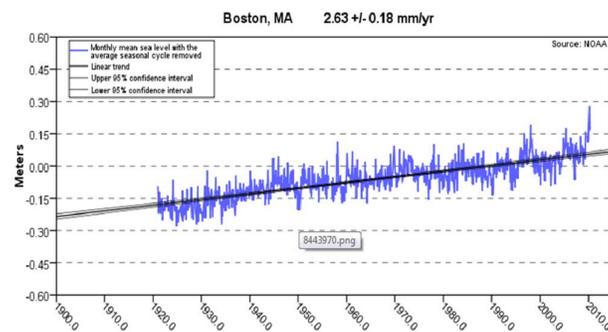


Figure 1: Light blue indicates areas in which sea level has remained relatively constant since 1993. White, red, and yellow are regions where sea levels have risen the most rapidly up to 10 millimeters per year and which contain the most heat. Green areas have also risen, but more moderately. Purple and dark blue show where sea levels have dropped, due to cooler water.
Data Source: NASA Jet Propulsion Laboratory

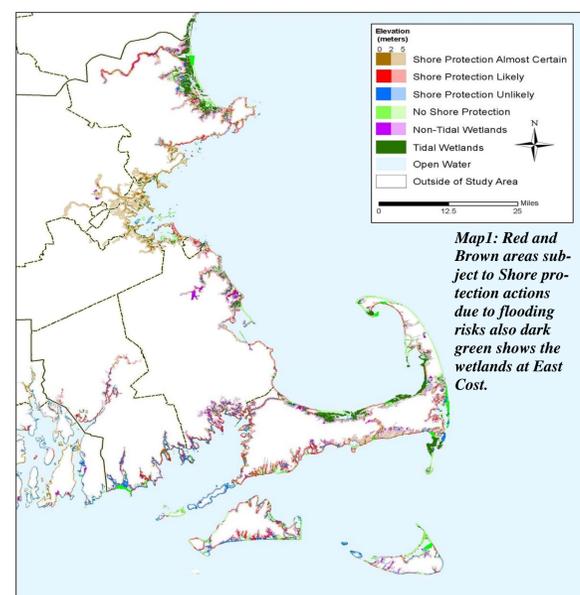
Introduction

East Boston is hosting New England's largest airport. Logan Airport is located at East Boston and occupying 1,413 acres of filled land along the flats of the east Boston and the area serves a useful area for understanding effects of coastal flooding.

Mean Sea Level Trend Boston



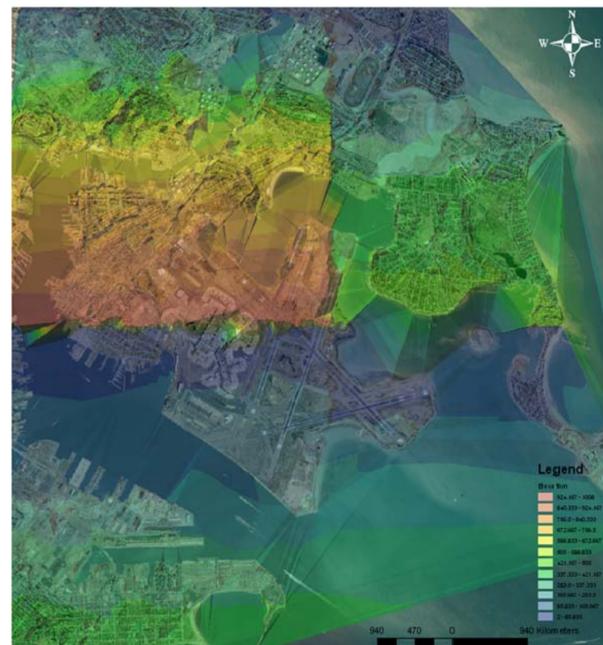
The mean sea level trend is 2.63 millimeters/year with a 95% confidence interval of +/- 0.18 mm/yr based on monthly mean sea level data from 1921 to 2006 which is equivalent to a change of 0.86 feet in 100 years.
Source: National Oceanic Atmospheric Administration "noaa.gov" 07/27/2010



Map 1: Red and Brown areas subject to Shore protection actions due to flooding risks also dark green shows the wetlands at East Coast.

Purpose

Logan Airport is almost entirely surrounded by water and it is constructed for the most part either on reclaimed, or very low-lying, land, with runways at around 20ft above sea level. Since Logan is surrounded on three sides by the sea, SLR is a big danger for its future.



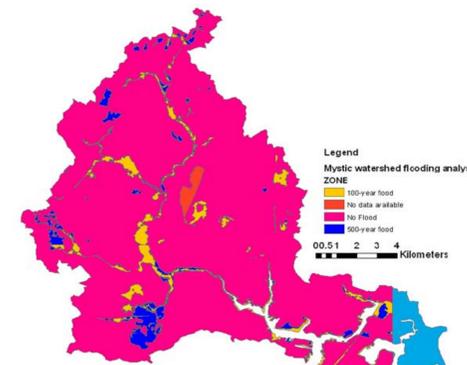
Methods

For better estimation of flood impacts on East Boston, smaller scale area "Mystic watershed" took into consideration. To perform this analysis, images from MASS GIS were downloaded for Mystic watershed and Logan Airport. In order to generate tables indicating the amount of watershed area occupied by each land use and flood zone type; several basic data analysis tools including merging, dissolving, clipping and querying used.

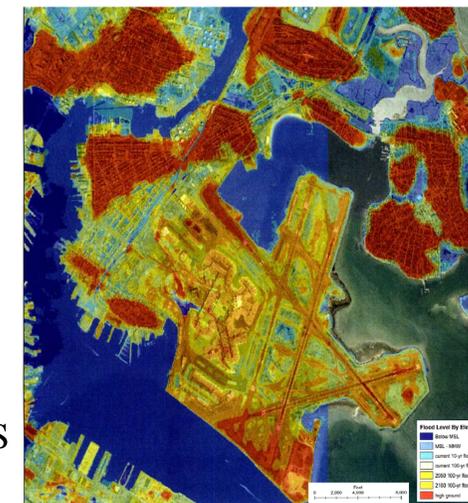
Results

In this conclusion, there are two important implications that needs to be highlighted:

Mystic Watershed



Flood Data	Square Kilometers
No Flood	173.063
500-year flood	6.081
No Data Available	1.315
100-year Flood	7.208
Total	~176



When same experiment implied to Logan Airport, the airport will lose 1,29 square kilometers of its land during 500-year storm and Logan Airport will lose 0.56 square kilometer land during 100-year storm.

Future Work

The effects particularly pronounced when combined with sea level rise and my experiments show that the increasing risk for Logan Airport, Boston. Coastal Zone Management can implement to the area.

Hard Engineered Barriers can develop to keep ocean water out of the area even during storm conditions.

Landscape flood mitigation defenses such as wetland retention and beaches tend to accommodate the environment and natural processes better than hard barriers.

Flood resident design This can involve raising building and pilings. But unfortunately this cannot implement Logan Airport due to its use.

References

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Titus J.G., and J. Wang. 2008. Maps of Lands Close to Sea Level along the Middle Atlantic Coast of the United States: An Elevation Data Set to Use While Waiting for LIDAR. Section 1.1 in: Background Documents Supporting Climate Change Science Program Synthesis and Assessment Product 4.1, J.G. Titus and E.M. Strange (eds.), EPA 430R07004, U.S. EPA, Washington, DC.