MASSACHUSETTS BAY TRANSIT AUTHORITY (MBTA) SERVICE AREA ANALYSIS

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12/12/2008

Introduction

The following is a service area analysis and comparison of both land use types and population density statistics around the MBTA transit nodes. A comparison is made between two primary study areas: 1) Buffers consisting of ½ mile radii around the MBTA transit nodes, and 2) Rings consisting of area outside 1/2 mile but within 1 ½ miles of the MBTA transit nodes. This unique analysis facilitates a greater understanding of differences between these distinct study areas - making the tailoring of transit operations, integration of ICT with existing land use, and connections with a greater number of transit riders possible.

Data Layers

Data Layer	Source	Minimum Acceptable Accuracy
1) Land use	Mass GIS \ Physical_ Resources \ Land _Poly	100 ft
2) Population density	Mass GIS\Census_2000\Census2000blockgroups_poly	500 ft

Methodology

Approach 1: Land use within 1/2 mile of the transit nodes

Approach 1 applies a map of the Boston Metro Region with MBTA transit nodes and land use from MassGIS (See Data Layers). Land use was clipped to ½ mile buffer zones created around the MBTA nodes and symbology was imported to these buffer zones (See Figure 1).

Approach 2: Land use outside 1/2 mile but within 1 1/2 miles of the transit nodes

For purposes of a comparison, Approach 2 applies 1 1/2 mile buffer zones, while removing the selected land use within the ½ mile buffer zones in the approach above (See Figure 2).

Approach 3: Population density within 1/2 mile of the transit nodes

Approach 3 applies a select by location query to find population density blockgroups with the MBTA transit nodes as a focal point (centroid). Exporting this data created a population density information layer within the ½ mile buffer zones (See Figure 3).

Approach 4: Population density outside 1/2 mile but within 1 1/2 miles of the transit nodes

Conversely, a population density information layer was created for 1 1/2 buffer zones and the population density within ½ mile of the transit nodes was removed (See Figure 4).

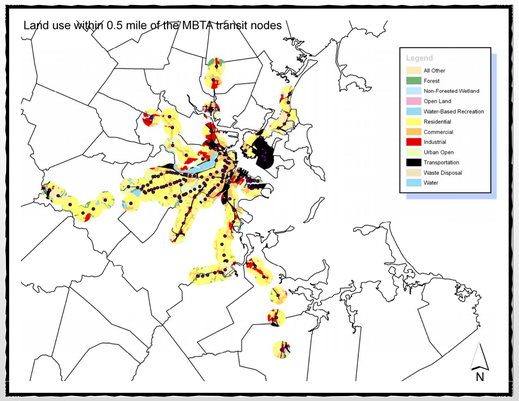


Figure 1.

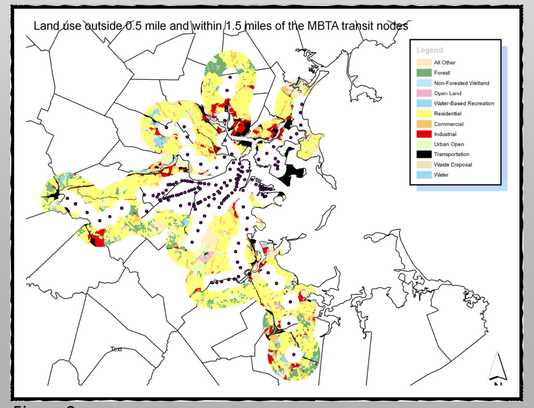


Figure 2.

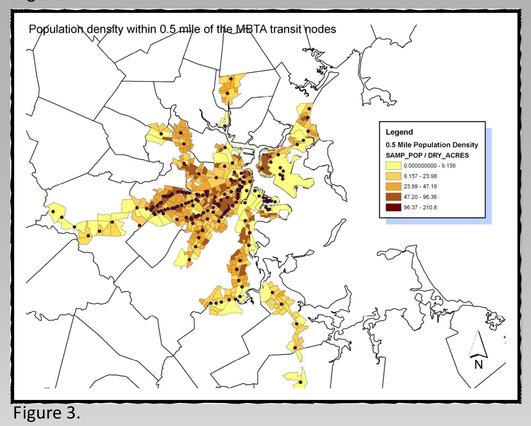


Figure 3.

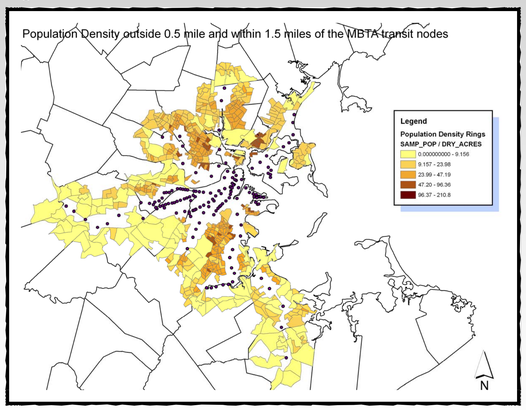


Figure 4.

Results 1: Land use within 1/2 mile of the transit nodes

The summary table below shows total acreage recalculated by land use types within the ½ mile buffer zones. Particularly of interest, forest land use comprises a total of 609 acres, while residential - 12,262 acres and commercial - 4,043 acres.

Results 1: Summary of Land Use Acreage By Type Within 1/2 Mile of the Transit Nodes

Land Use Reference	Land Use Type	Count	Land Use Totals (Acreage)
3	Forest	91	609.9940
4	Wetland	23	148.0362
6	Open Land	68	229.3484
9	Water-Based Recreation	18	70.6692
10, 11, 12, 13	Residential	238	12262.2373
15	Commercial	199	4043.4163
16	Industrial	118	1700.6704
17	Urban Open	426	2705.9129
18	Transportation	100	3251.8871
19	Waste Disposal	1	6.3050
20	Water	50	723.8128

Results 1: Summary of Land Use Acreage By Type Outside 1/2 Mile and Within 1 1/2 Miles of the Transit Nodes

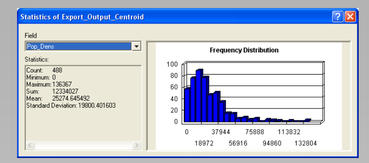
Land Use Reference	Land Use Type	Count	Sum of Land Use Acreage
3	Forest	362	4448.3462
4	Wetland	49	266.8851
6	Open Land	129	747.7521
9	Water-Based Recreation	37	171.3211
10, 11, 12, 13	Residential	549	24633.6184
15	Commercial	327	3134.6980
16	Industrial	201	2526.7920
17	Urban Open	560	3704.5607
18	Transportation	99	2790.7694
19	Waste Disposal	22	133.7760
20	Water	95	989.6316

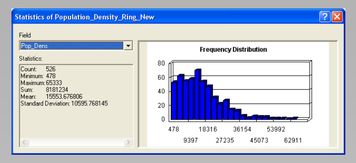
Results 2: Land use outside 1/2 mile but within 1 1/2 miles of the transit nodes

The summary table above and to the right shows total acreage recalculated by land use types outside 1/2 mile but within 1 1/2 miles of the transit nodes. Among the significant differences in land use are in forested land, comprising of 4,448 acres and residential of 24,633 acres. Additionally, commercial land use is actually less than in the 1/2 mile buffer zones, comprising of only 3,134 acres.

Results 3 and 4: Population Density Comparison

Creating a new field of sample population per square mile, below are population density statistics for the two study areas, results for 3 and 4 respectively..





A minimum of 136,367 persons per square mile for the 1/2 mile buffers is a significant difference from the maximum of 65,333 for the 1 1/2 mile rings in approach 4. However, one can visually see in Figure 4 that there are still distinct pockets of high population density within these outer rings.

Conclusions

The analysis above shows that there are in fact significant differences between land use in the two study areas. Not much farther than 1/2 mile from the transit stations, the landscape changes from that of commercial land to that of residential and forested land use. Network connectivity through the integration of ICT at transit stations would be all the more important in reaching out and connecting families of transit riders in more residential and forested areas.

Equally important to note are the limitations of data sources in this study, the most recent of which is MassGIS based on the 2000 Census. Utilizing a centroid method, furthermore, prevents the double counting of blockgroups, however, since the data layers are accurate only between 100 and 500 ft, this leaves a small margin of possible error. Finally, the choice was made to apply the dissolve option in this analysis—treating the buffers as a single feature resulting in total land use and population density, rather than acreage and statistics for each individual transit station.