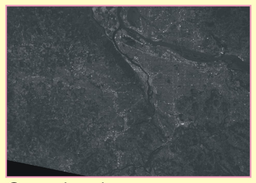
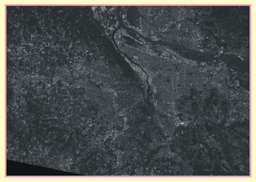
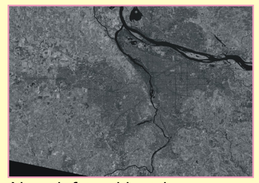
# Urban Forest Canopy Cover, Portland, Oregon, 1991 - 2002

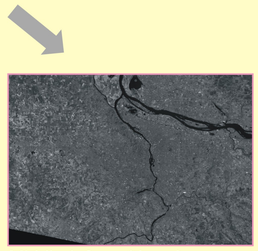
*Mike Lackner, PSU Geography*

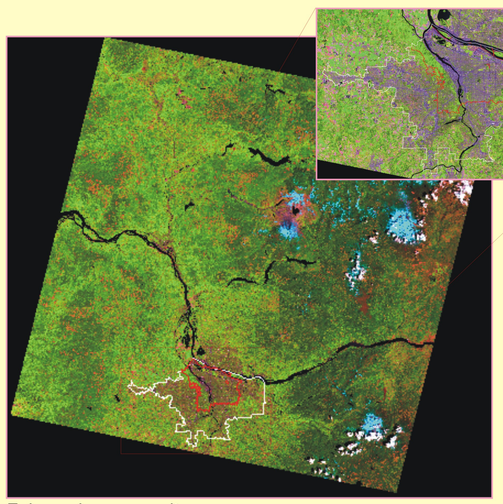
## Data


Green band


Red band


Near-infrared band

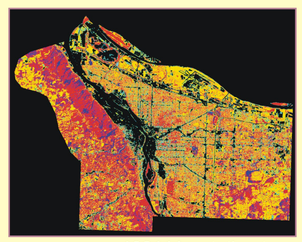

Middle-infrared band

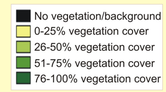

False-color composite

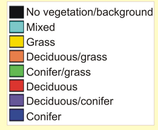
30-meter TM Landsat Data


1-meter digital aerial photography

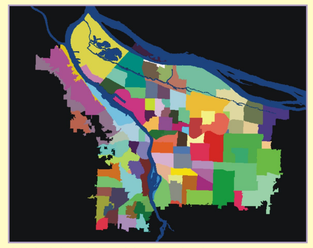

1991 Vegetation amount


1991 Vegetation type




1991 Vegetation Data
*(Newman 1997)*


Neighborhood boundaries

Ancillary Data

## Methodology

### *1) Unsupervised Classification*

- Input images: band 2 (green), band 4 (near-infrared), band 5 (middle-infrared), ratio of bands 3 (red) and 4.
- 10 classes identified after first classification.
- Subdivided classes further to get a total of 100 classes.

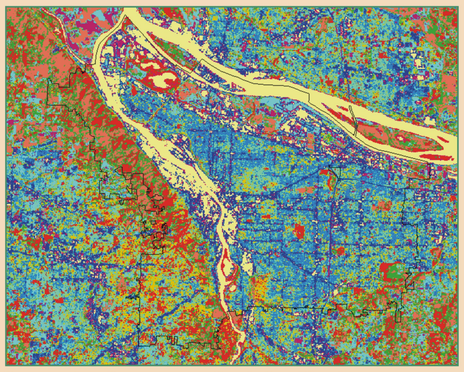
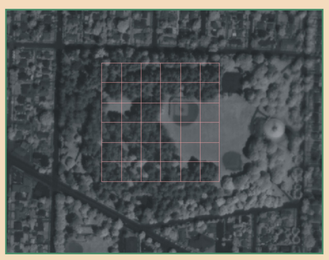


Image after first unsupervised classification

### *2) Assigning Vegetation Type and Amount Categories to Classes*

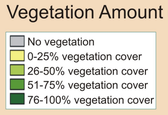

1-meter resolution natural-color image (sample area)

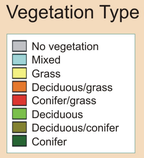

1-meter resolution near-infrared image (sample area)

- Put 25-meter grid onto 1-meter images.
- Determined vegetation amount with natural color image.
- Determined vegetation type with near-infrared image.


Vegetation Amount (whole study area)


Vegetation Type (whole study area)




### *3) Calculating Canopy Cover Percent*

- Assigned weights to vegetation images to calculate canopy cover percentages.

| Vegetation Type | Canopy Weight |
|---|---|
| No vegetation | 0 |
| Grass | 0 |
| Mixed | 10 |
| Deciduous/grass | 50 |
| Conifer/grass | 50 |
| Deciduous | 100 |
| Conifer | 100 |
| Deciduous/conifer | 100 |

| Vegetation Amount | Canopy Weight |
|---|---|
| 0-25% | 20 |
| 26-50% | 45 |
| 51-75% | 70 |
| 76-100% | 100 |

## Purpose and Goals

This project intends to explore characteristics of tree canopy in the city of Portland, Oregon. Canopy cover extent of 2002 was measured through GIS analysis and was then compared to images from 1991 that resulted from a similar study done in 1997.

## Further Study

- Accuracy assessment through field checking.
- Comparison to data from 1972 and 1982.
- Relating canopy cover extent to land use.
- Relating canopy cover to neighborhood characteristics.

**Contact Information**

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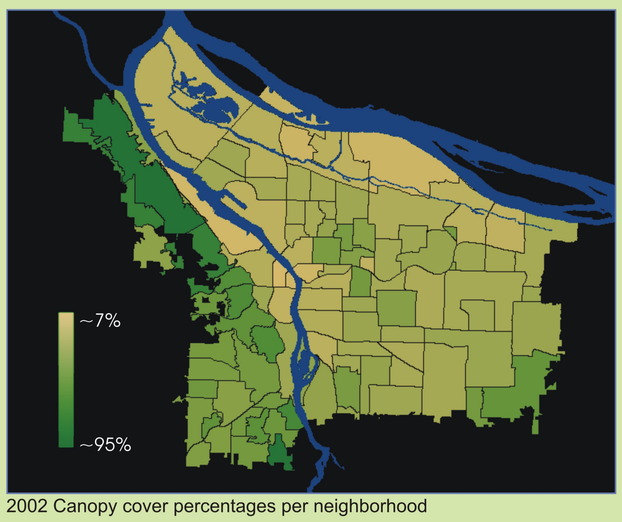
**Funding**

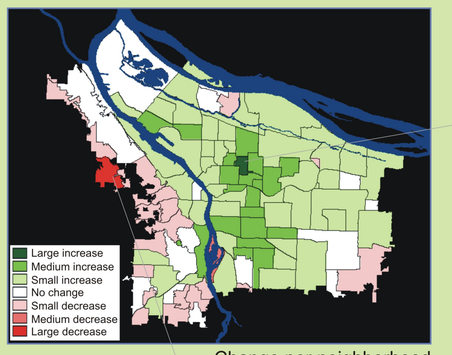
- Portland General Electric.
- Portland State University Undergraduate Research Activity Award.

## Results



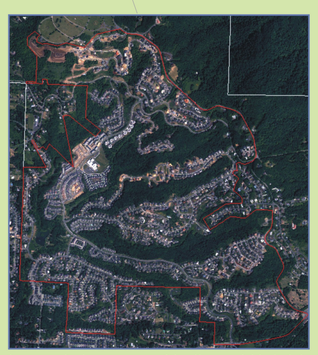
2002 Canopy cover percentages per neighborhood

- Slight increase in canopy cover from 1991 to 2002.
- Changes not evenly distributed throughout city.
- Largest increase in Alameda.
- Largest decrease in Northwest Heights.
- Results still need to be verified through accuracy assessment.



Change per neighborhood


Largest increase: Alameda


Largest decrease: Northwest Heights

**Mean Canopy 1991**
25.5% (including Forest Park)
22.8% (excluding Forest Park)

**Mean Canopy 2002**
26.3% (including Forest Park)
23.6% (excluding Forest Park)

**Percentage Change 1991-2002**
+0.8%