Map of the day

LUST

[Map of the United States showing different regions with color coding for LUST GIZScore. The map includes a legend with color intervals and a scale for miles.]
Announcements

• We will start putting together poster layouts at the beginning of lab this week

• During lab, I will hand back your methods outlines with comments – come prepared to work on your projects
Extra help hours Next Week

Extra hours in the LEARNING COMMONS

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Extra help hours for Week After

Extra hours in the LEARNING COMMONS

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10 - 12p
POSTER CONERENCE - 202-203 Holdsworth
Poster printing logistics

• Sign up for a poster printing slot online on the Google doc by Tuesday 4/21 (next week).

• **Do NOT miss your appointment.** If there’s an emergency, call the learning commons at 577-1272

• Poster printing is downstairs in DuBois library. You’ll need $17.28 on a UCard to print (for a 24” x 36” size poster).
Final Poster Conference

• Will be on Thursday, 4/30 from 10 am – 12 pm in Holdsworth 202/203

• Arrive by 9:45 to set up your posters

• We’ll talk more about specifics next week
Tip of the day: Use ArcMap documents to your advantage

• Once you have created a figure for your poster (study area map, input data layers, results figure), save it as its own ArcMap document

• This is the purpose of an ArcMap document – if you need to adjust anything about your figure later, you don’t need to recreate the whole thing
Tip of the day: Use ArcMap documents to your advantage

If you want to use similar data in a new figure, use ‘save as’ to create a new .mxd
Case Study #1:
Landscape Ecology of Invasive Plants

Objective:

• Understand how geographic features relate to the distribution of invasive plants in MA

Vieira et al., 2014, Landscape Ecology
Collect distribution data

Study area map
Table of predictor variables

Table 2: Description of all spatial layers used. Length and distance measurements were calculated within FSPs or within IPANE grid cells.

<table>
<thead>
<tr>
<th>CODE</th>
<th>Description</th>
<th>Units</th>
<th>Source</th>
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<tbody>
<tr>
<td>DFR</td>
<td>Average distance to forest and residential roads</td>
<td>30m (grid resolution)</td>
<td>MassDOT 1:5000 Roads layer reclassified based on CAPS (2013)</td>
</tr>
<tr>
<td>DOR</td>
<td>Average distance to all other roads</td>
<td>30m (grid resolution)</td>
<td>MassDOT 1:5000 Roads layer reclassified based on CAPS (2013)</td>
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<tr>
<td>FRL</td>
<td>Total forest/residential road length</td>
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<td>MassDOT 1:5000 Roads layer reclassified based on CAPS (2013)</td>
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<tr>
<td>ORL</td>
<td>Total other road length</td>
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<td>MassDOT 1:5000 Roads layer reclassified based on CAPS (2013)</td>
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<tr>
<td>DS</td>
<td>Average distance to any stream</td>
<td>30m (grid resolution)</td>
<td>Post-census 2000 TIGER/line files (MassGIS)</td>
</tr>
<tr>
<td>SL</td>
<td>Total stream length</td>
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<td>Post-census 2000 TIGER/line files (MassGIS)</td>
</tr>
<tr>
<td>DRES71</td>
<td>Average distance to residential areas in 1971</td>
<td>30m (grid resolution)</td>
<td>1:25,000 aerial color infrared photography, interpreted by UMASS Department of Forestry Resource Mapping Project (1999) (MassGIS)</td>
</tr>
<tr>
<td>DRES99</td>
<td>Average distance to residential areas in 1999</td>
<td>30m (grid resolution)</td>
<td>1:25,000 aerial color infrared photography, interpreted by UMASS Department of Forestry Resource Mapping Project (1999) (MassGIS)</td>
</tr>
<tr>
<td>IS</td>
<td>Percent impervious surface</td>
<td>1m (grid resolution)</td>
<td>Combination of Sanborn data and data from the EOT road centerline(2006) (MassGIS)</td>
</tr>
<tr>
<td>LUF71</td>
<td>Percent forest in 1971</td>
<td>30m (grid resolution)</td>
<td>1:25,000 aerial color infrared photography, interpreted by UMASS Department of Forestry Resource Mapping Project (1999) (MassGIS)</td>
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<tr>
<td>LUO71</td>
<td>Percent open in 1971</td>
<td>30m (grid resolution)</td>
<td>1:25,000 aerial color infrared photography, interpreted by UMASS Department of Forestry Resource Mapping Project (1999) (MassGIS)</td>
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<tr>
<td>LUF99</td>
<td>Percent forest in 1999</td>
<td>30m (grid resolution)</td>
<td>1:25,000 aerial color infrared photography, interpreted by UMASS Department of Forestry Resource Mapping Project (1999) (MassGIS)</td>
</tr>
</tbody>
</table>
Methods

• Zonal statistics to summarize distance to road, impervious surface, land cover etc. within each fishnet

• Use data extracted from GIS to create regression models that predict invasive species presence.
Modeled relationships

- Probability of invasive species presence
- Open land cover
- Distance to residential areas
Modeled relationships

Model for Forest Stewardship Plan data

| Binomial model                              | Estimate | Std. Error | z value | Pr(>|z|) |
|---------------------------------------------|----------|------------|---------|----------|
| (Intercept)                                 | 2.50     | 1.43       | 1.744   | 0.08     |
| Distance to residential areas 1971 (LOG)    | -1.33    | 0.56       | -2.38   | 0.01 *   |
| Stream length (LOG)                         | 0.25     | 0.10       | 2.41    | 0.01 *   |
| Land-use open in 1999 (ARC)                 | 3.83     | 0.82       | 4.66    | .00000031 *** |
| Land-use change, forest to open (ARC)       | -6.58    | 2.26       | -2.90   | 0.003 ** |

Model for Invasive Plant Atlas data

| Binomial model                              | Estimate | Std. Error | z value | Pr(>|z|) |
|---------------------------------------------|----------|------------|---------|----------|
| (Intercept)                                 | 6.62     | 1.23       | 5.37    | .0000000779 *** |
| Distance to other roads (LOG)               | -1.04    | 0.35       | -2.90   | 0.00364 ** |
| Distance to streams (LOG)                   | -1.78    | 0.28       | -6.24   | .00000000043 *** |
| Other road length (LOG)                     | 0.22     | 0.10       | 2.10    | 0.03561 * |
| Land-use change (ARC)                       | -1.66    | 0.56       | -2.92   | 0.00344 ** |
| Land-use change, forest to open (ARC)       | 2.91     | 1.09       | 2.66    | 0.00773 ** |

Predictor variables are almost completely different. Data collection has a huge effect on model results.
Predicting landscape invasion
Case Study #2: Human Footprint

Objective:

• Define and evaluate the extent of the human footprint in western ecosystems

Leu, Hanser & Knick, 2008, Ecological Applications
Variety of Human Footprints
Spatial Extent of Anthropogenic Features
Agriculture
Railroads
Urbanization
Power lines
The Human Footprint: Physical Effect Area

13% of western United States are covered by anthropogenic features.
The Human Footprint

Human Footprint Class

Human Footprint Intensity

Low

High
Case Study #3: Renewable Energy in CO
Using prior knowledge to categorize suitability

NREL Wind Potential at 50 m
Euclidian distance tool

Distance to Transmission Lines
Reclassified land cover into degrees of suitability

Ideal Land Cover
Reclassified census data into degrees of suitability

Population Density
Suitability Analysis

<table>
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<th>GIS Model Score</th>
<th>Mean NREL Wind Potential</th>
<th>Area (km²)</th>
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<td>80–89%</td>
<td>64%</td>
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<td>70–79%</td>
<td>39%</td>
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<tr>
<td>60–69%</td>
<td>21%</td>
<td>11 574 225</td>
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<td>50–59%</td>
<td>16%</td>
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Final Poster Content

Scientific papers/reports/presentations have a very specific organization

**Introduction**  Tells us why the topic is interesting

**Methods**  Tell us what you did

**Results**  Tell us what you found

**Discussion**  Tells us why what you found is interesting

Your final poster should follow this organization
Final Poster Content

Introduction

*Information to include:*
- Why is the topic important?
- Brief background info that others might not know
- Your motivating question

*Figures to include:*
- Your study area map
- A picture (if applicable)
Final Poster Content

Methods

Information to include:
- General steps in your methodology
- Important decisions you made in your analysis
- Use bullets

Figures to include:
- Any methods steps you want to highlight
- Table of data layers
Figures to include:
- Any methods steps you want to highlight
- Table of data layers
- Keep them small, your results should be the real focus

Janke, 2010
# Final Poster Content

## Results

*Information to include:*
- Description of any final maps or analytical results (this section should have more figures than text)

*Figures to include:*
- Final results map(s)
- Other results figures (e.g., histograms or scatter plots)
Final Poster Content

Discussion

Information to include:

- Summarize any important take home points from your analysis
- Discuss any future steps you could take
Ivory Billed Woodpecker Conservation

Your Name Here
Department of Environmental Conservation

Introduction:
Text about why bird conservation is important and some history on the ivory billed woodpecker (Figure 1). Define your question here.

Methods:
Criteria used to define woodpecker habitat. How you did what you did (Figures 2-4).

Fig. 1: Woodpecker

Fig. 2: Buffer
Fig. 3: Aspect
Fig. 4: Land Cover

Results & Discussion:
Woodpecker habitat. Final map or maps, final analysis (Figures 5-6). Discuss why these results are interesting.

Fig. 5: Map result
Fig. 6: Graph result
Ivory Billed Woodpecker Conservation

Your Name Here
Department of Environmental Conservation

Introduction:
Text about why bird conservation is important and some history on the ivory billed woodpecker (Figure 1). Define your question here.

Methods:
How you did what you did (Figures 2-4)

Fig. 2: Buffer
Fig. 3: Aspect
Fig. 4: Land Cover

Results & Discussion:
Final map or maps, final analysis (Figures 5-6). Discuss why these results are interesting

Fig. 5: Map result
Fig. 6: Graph result
Ivory Billed Woodpecker Conservation

Your Name Here
Department of Environmental Conservation

Introduction
Why your topic is important (Figure 1). Define your question

Fig. 1: Woodpecker

Methods
How you did what you did (Figure 2)

Fig. 2: Aspect & Land cover

Results & Discussion:
Final map or maps, final analysis (Figure 5). Discuss why these results are interesting

Fig. 3: Final awesome map
Lion Habitat Suitability Analysis based on Vegetation Type and Proximity to Water

Anna Garvin
Global Classroom – Big Cat Research Project

Introduction
Lions are a threatened species; habitat loss and conflict with humans has led to a population decline over the last several decades. In 1992, we estimated 440,000 lions in the wild. By 2003, the number had fallen to somewhere between 16,800 and 19,700 lions. Something must be done about the conservation of these animals in order to prevent them from suffering extreme endangerment and possible extinction.

Kruger National Park (Fig. 1) is one of the largest game reserves in Africa. Located in South Africa, it is home to around 3000 lions. It is therefore ideal place to study these big cats and determine how best to move forward with the conservation effort.

Figure 1: Study Area

Methods
Over the course of three summers my team collected observation data on the big cats of Kruger National Park. The bulk of our data focused on the Transvaal Lion – Panthera leo krugeri (Fig. 2). We collected presence data, but not absence data. Additionally, data collection did not occur uniformly throughout the park; we spent more time in some areas than others. Because of the nature of our data it was a challenge to analyze subjectively.

- Attained spatial vegetation data.
- Performed a count of lion, leopard, and cheetah numbers in each of the five vegetation types.
- Created a bar graph of raw numbers of cats in each vegetation type (Fig. 3).
- Created a pie chart for each vegetation type illustrating the ratio of lions to leopards and cheetahs (Fig. 6).
- Calculated means of data to assess and evaluate differences.
- Created a buffer around rivers and waterbodies in areas of appropriate vegetation using the mean distance of data from bodies of water plus one standard deviation assuming a log-normal distribution.

Results and Discussion

An overview of the counts of lions, leopards, and cheetahs in each of the five vegetation types of our study area. I found that the ratio of lions to other cats was highest in Mixed Loewold Bushwill and Mixed Loewold Bushwill with areas, 87% lions and 13% leopards, respectively. This would mean that lions and cheetahs have a better chance of surviving in these vegetation types, but more likely, lions have a preference for those vegetation types. Therefore these areas would be most suitable for lions when considering expansion of conserved land (Fig. 7).

Upon calculating proximity of cats to bodies of water, I found that cats were sighted an average of 0.27 km away from water. This is a surprise, lions naturally would be found near water to be near a source of hydration and to be near their prey. Also worth mentioning is the fact that our study was conducted during the dry season, when most bodies of water were dried up. This would make it even more likely that lions would spend most of their time in areas where water was readily available.

Most cats were found within 5.07 km of water (Specifically, 3.87 km) is the mean distance to water plus one standard deviation. By making a 3.07 km buffer around rivers and bodies of water, and restricting the areas to vegetation types: Mixed Loewold Bushwill and Mixed Loewold Bushwill (Fig. 8), you can see what areas around Kruger Park would be good candidates for conservation expansion, as lions have demonstrated a preference for land close to water in Mixed Loewold Bushwill or Mixed Loewold Bushwill areas.

When more time and resources allowed, I would expand my study area northeast, to include the entirety of Kruger National Park. Our study is partially limited, and lion conservation efforts would benefit from a larger study area. I would also collaborate with others rather than rely on sightings for data collection. This would eliminate the problem caused by the lack of absence data, and allow us to conduct a study that truly only involved lions, rather than having to compare their locations to those of leopards and cheetahs. Additionally, I would begin to look at the land usage for my proposed areas of conservation, to see if any of it is eligible for conversion to conserved land for lions.

Figure 2: Transvaal Lion – Panthera leo krugeri

Figure 3: Count of cats in study area

Figure 4: Histogram – distance of cats to water

Figure 5: Cat sightings and vegetation types in Kruger National Park

Figure 6: Proportion of cats by vegetation type

Figure 7: Print in preferred vegetation type

Figure 8: Priority Conservation Areas
Coastal Erosion on Crane Beach, Ipswich MA
Stephanie Berkman
Department of Environmental Conservation

Introduction
Crane Beach is a popular recreation and conservation site in Ipswich Massachusetts. Crane Beach includes over 4 miles of shoreline, 5 miles of trails through the dunes and the North Shore’s largest pitch pine forest.

This area has been recognized for its successful shorebird protection program and is a very important nesting site for piping plovers, a threatened bird species. In order to continue protecting the bird species and cater towards the recreational needs of the beach, the size and stability of the shoreline needs to be maintained. This leads me to ask the question: Is the Crane Beach coastline eroding?

Methods
To conduct my research I acquired all of the orthophotos of the Crane Beach area for the years: 1990, 1994, 2001, 2005 and 2008 as well as a historic coastal topographic map image from 1890 from MassGIS. To answer my research question I followed these steps:
- Created a new line shape file for each year and traced the coastline of that year (taking into consideration differences in tides).
- Compared the coastline of each year with that of 1990 by creating new polygon shape files for areas where coastline increased and decreased since 1990.
- Found the area of the polygons for each year.

Results & Discussion
In doing my research I found that the coastline of Crane Beach is eroding. When comparing the coastline of each year to that of 1990, there is a visible decrease in coast starting in 2001 (figure 5). 1994 was the only year that showed an increase in coastline and 2008 showed the most coastline loss. When comparing coastline in 1990 and 1990, a decreased is seen overall as well (figure 6). This large decrease in coastline from 1990 may be of concern to conservationists of Crane beach.

The species that inhabit the beach like the piping plovers need nesting habitat and space for their population to grow.

The increase in tourism to the beach is also putting more pressure on the recreational availability of the site. This yearly decrease in coastline should be taken into consideration while managing the site for recreation as well as conservation, ensuring that the needs of both be met. To track this coastal erosion, yearly coastline measures should be taken to assess if this is a random occurrence due to weather variance through the years, or if the coast is decreasing at a steady rate which would require additional management.
**Introduction**

In January of 2012 several acquaintances and I took a trip to Detroit, Michigan. Our goal was to experience firsthand the decay and fall from grace that Detroit has become so well known for. What we saw was worse then we could have even expected, entire blocks of burned out and abandoned houses, auto factories six blocks long abandoned and gutted, twenty story hotels from the golden age now standing as skeletons, schools, universities, hospitals, zoos, parks, mills, factories and more, all left to wither. Detroit in the past hundred years has experienced more growth and decline than any other US city, from a population in 1910 of 285,000 to a high in 1950 of 1.8 million, to an unmatched decline of over 500,000 to 71,300 in 2010. This project aims to analyze the relationships between demographic factors and infrastructure factors to look for relationships and discrepancies that may be detrimental to the social justice and equity of the city.

**Results & Discussion**

The outputs that were obtained from the raster calculations showed the hotspots around the city that had varying levels of risk. These various hotspots are areas that the resulting demographic factors such as low levels of high school graduation, and poverty levels may be a result of the infrastructure composition of the area. In order to gain a more accurate understanding of the social equity related to the infrastructure of Detroit, more extensive research should be conducted on the spatial influence of positive and negative factors of a city, crime rates, police station locale effectiveness, public school and higher education proximity influence, and other pressures.

**Methods**

Data was obtained from the City of Detroit Information Technology Services Department, the data primarily contained shapefiles that consisted of police stations, colleges, parks and recreational sites, condemned buildings, and census data for education and income per census block. A literature review was conducted on the social-urban equity landscape; to calculate the best methods for classification of spatial vulnerability, relative to distances from the particular variables and data collected. This research permitted the data to be classified into quantifiable values, which then allowed for raster calculation to be employed to search for connections among the particular infrastructure, demographic, and economic data.
Poster examples

• What are the strengths and weaknesses of the poster? What works well, and what could be improved?