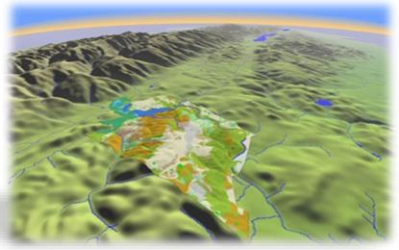
NICHOLAS SCHOOL OF THE ENVIRONMENT AND EARTH SCIENCES
DUKE UNIVERSITY



ENVIRON 761:
Course Wrap-up

Instructor: John Fay

TAs: Emily Tucker & Isabel Hillman

Agenda

- Final project details
- Course Overview/Feedback
- Course Evaluations

Final Project

This is your opportunity to demonstrate that you can conduct an analysis involving some aspect of conservation GIS and effectively communicate its results.

Grading “rubric”…

Name: _____

Topic: _____

Presentation	Introduction	Methods	Results	Discussion
/15	/15	/25	/20	/20

Comments:

Final Project: *Introduction*

- Define the "problem" (i.e. why do we care?)
- Explicitly state your hypothesis or objectives
- Cite other studies that you are using as a guide or that recommend methods that you are using *(this is one that students tend to overlook!)*

Final Project: *Materials & Methods*

- Describe your study area
- What data were used? What software?
- Assumptions for the analysis…
- Why are these methods appropriate to your project?
- What general GIS analysis procedures did you use?
  - Explain as logical flow rather than listing the ArcMap tools used…
- What analytical techniques did you use? (e.g. summary stats)

A flow chart may be helpful for multiple step projects

Final Project: *Results or observations*

Present results

(make sure they address your hypotheses and/or objectives)

- Summary statistics/table/graph
- Maps

  no need to overwhelm with many maps; choose the most important variables to display and also try to combine multiple variables in one map to make a 'concise map'- first priority of course is clarity and ease of interpretation

Final Project: *Discussion & conclusion*

- Interpret your findings
- Were there any surprises?
- Any recommendations based on your results?
- Limitations of your methods/results.
- How do your findings compare to those examples you found in the literature?
- Briefly restate you major findings and why they are important and what areas of further research are needed.

Final Project

Your findings may not be what you expected or desired...

That's ok, but explain why not:

- Faulty logic/analysis?
- Bad data?

And how you would succeed if given a second try:

- Different analysis?
- Different data?

Final Project

References

literature cited, both 'gray' and peer-reviewed

Acknowledgements

data, advice provided outside of this class

Appendices

e.g. for analysis portion of your project (not necessary for data maintenance steps such as importing or reprojecting) provide model snapshots

Citing software/data

Details are less important – consistency is…

ArcGIS:

> ESRI 2019. ArcGIS Pro: Release 2.3.0. Redlands, CA: Environmental Systems Research Institute.

For spatial data, see:

http://library.queensu.ca/webdoc/maps/citation.htm

Final project

*Disorganization makes the reader **cranky***

- About 10-15 pages*, double spaced;
  < 2000-2500 words
  *(*teams with more people = longer)*

- Manuscript style:

  Flow chart, maps/figures, etc. should be on page at the end of the manuscript (don't fit into the document itself)

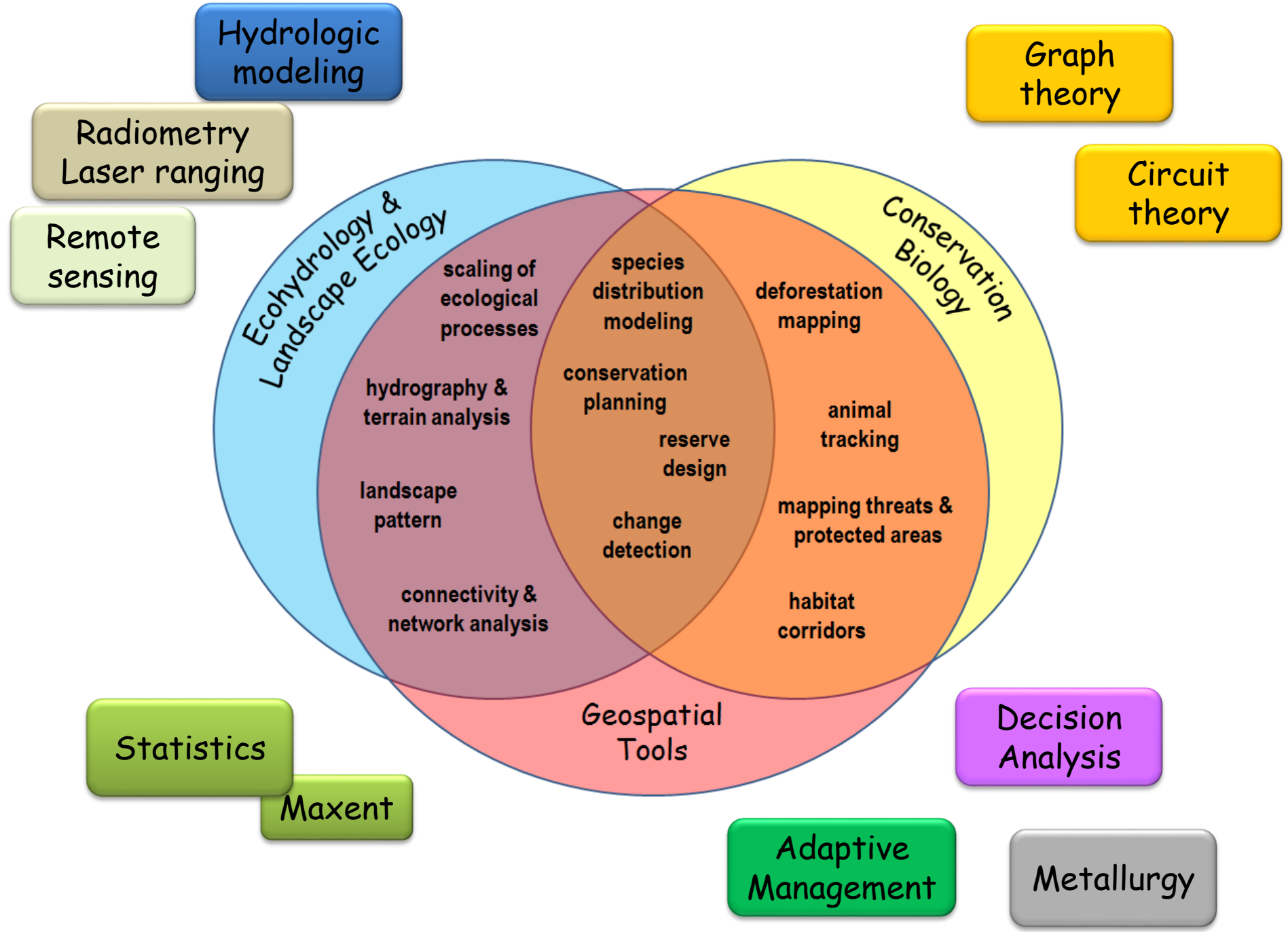
- Be **concise** and **professional** in word selection

Final project

- Submit by 11:59pm, May 1st to receive full credit
  - Email me if you will miss that deadline

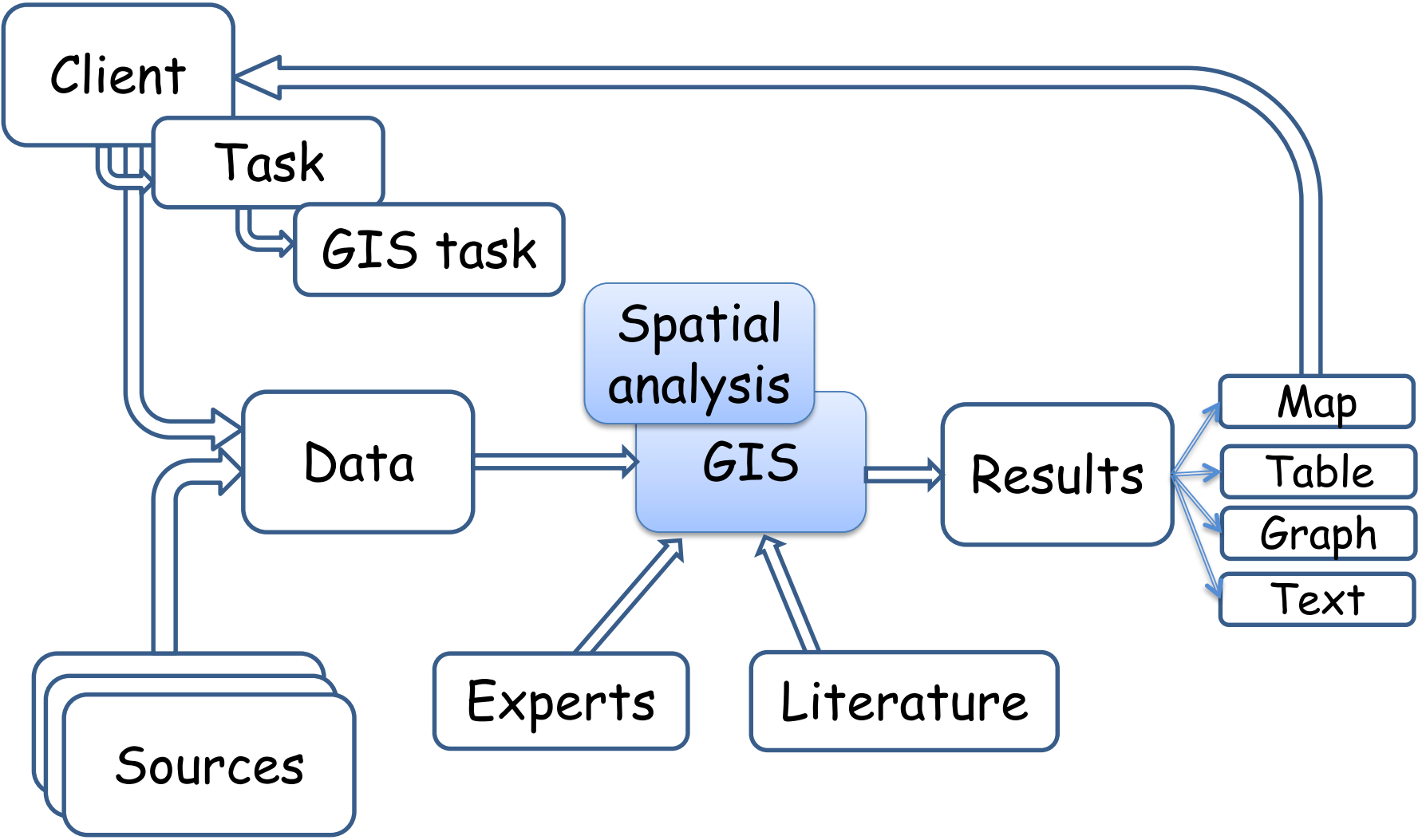
- Submit as a Word document or PDF
- Upload to Sakai (Assignments section)
  (One submission per team)

- COURSE OVERVIEW -

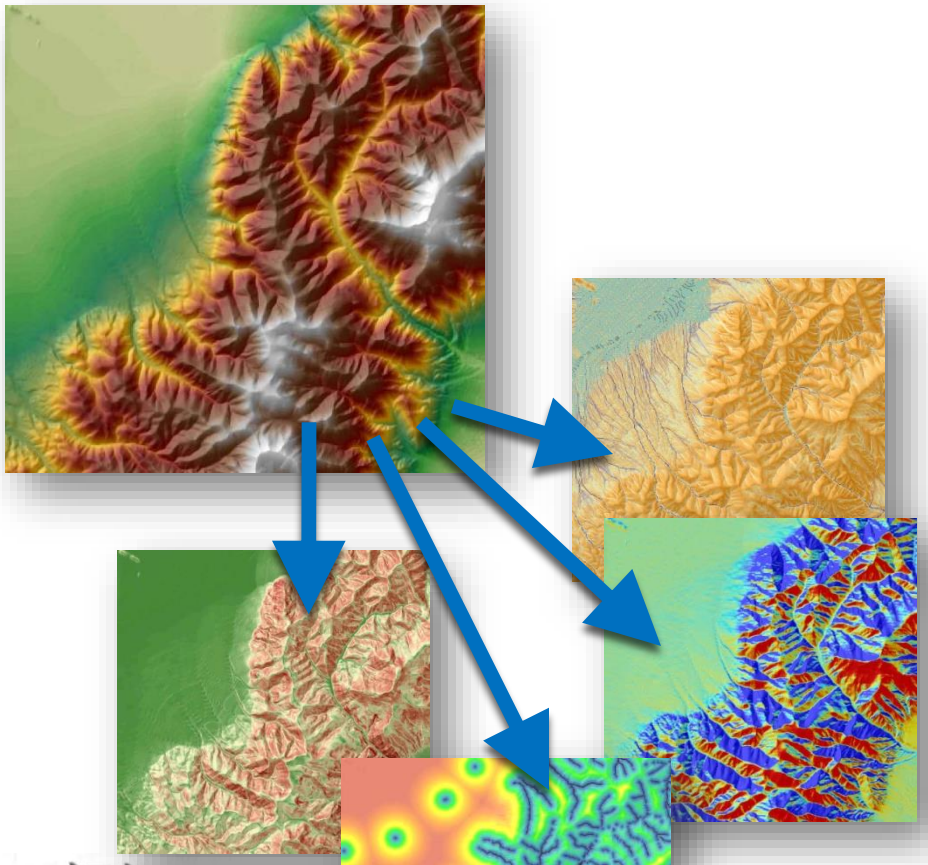

Hydrologic modeling
Radiometry
Laser ranging
Remote sensing
Graph theory
Circuit theory
Ecohydrology & Landscape Ecology
Conservation Biology
Geospatial Tools
scaling of ecological processes
hydrography & terrain analysis
landscape pattern
connectivity & network analysis
species distribution modeling
conservation planning
reserve design
change detection
deforestation mapping
animal tracking
mapping threats & protected areas
habitat corridors
Statistics
Maxent
Decision Analysis
Adaptive Management
Metallurgy

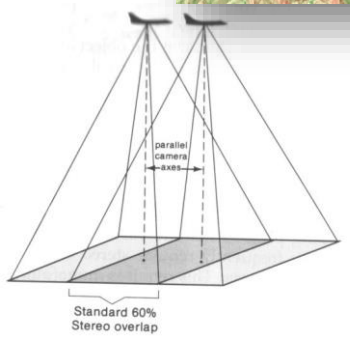
Date	Topic	Lecture	Lab Topic
9-Jan	**Course Introduction**	Course Introduction	Lab introduction/Best practices
14-Jan	**Project Based GIS**	Intro/Geospatial Data I	SL 1: Using ArcGIS Online
		Geospatial Data II	P1: Pipeline Assessment
21-Jan		*MLK Day*	*no class*
		Guest: Liz Kailes	
28-Jan		Communicating results	
	Ecohydrology/Terrain Analysis	Ecohydrology	P2: Sierra Costera Site Assessment
4-Feb		Terrain analysis	
		Riparian analysis	
11-Feb		NC Hog Farms (Vujic)	
	Habitat Modeling	Habitat modeling approaches	P3: Salamander habitat model
18-Feb		GeoWET habitat tool	
		GJAM (A. Schwantes)	
25-Feb		Model evaluation	
		Machine learning (K. Bradbury)	
4-Mar	**Landscape analysis**	Habitat patches & patch geometry	SL: Patch geometry (March 19)
		Wildife Road Xings (R. Sutherland)	
11-Mar		*Spring break*	*no class*
		Spring break	*no class*
18-Mar		Patch corridors & connectivity	SL: Patch connectivity(March 25)
		Course project discussion	
25-Mar		Patch sensitivities/stresses	SL: Patch threats (April 1)
		Fuzzy Analysis	*Project Check-ins*
1-Apr	**Conservation planning**	Computing biodiversity	SL: Biodiversity (April 8)
		Prioritization & MARXAN	
8-Apr		Prioritization & Portfolio (Dean U.)	SL: Prioritization(April 15)
		Monitoring & Change detection	
15-Apr	**Misc Topics**	Course Recap	Projects

Project-based GIS

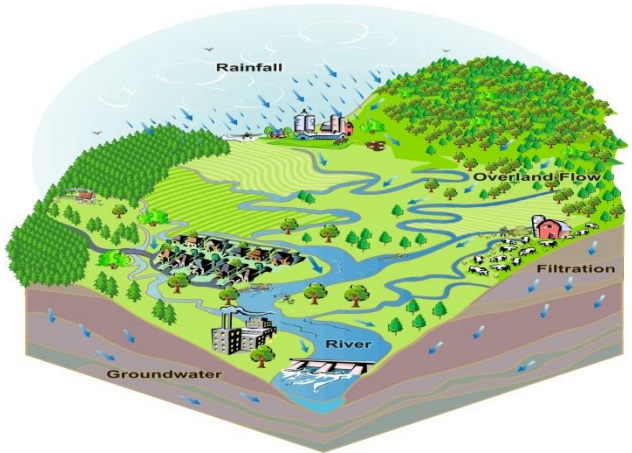


Ecohydrology/DEM based analysis





- Terrain based analysis
  - Exposure
  - Moisture
  - Insolation
- Hydrologic analysis
  - Streams & runoff
  - Watersheds



Species Distribution Modeling

NatureServe
A Network Connecting Science With Conservation

Observation points

Habitat Modeling software

Habitat Suitability Map

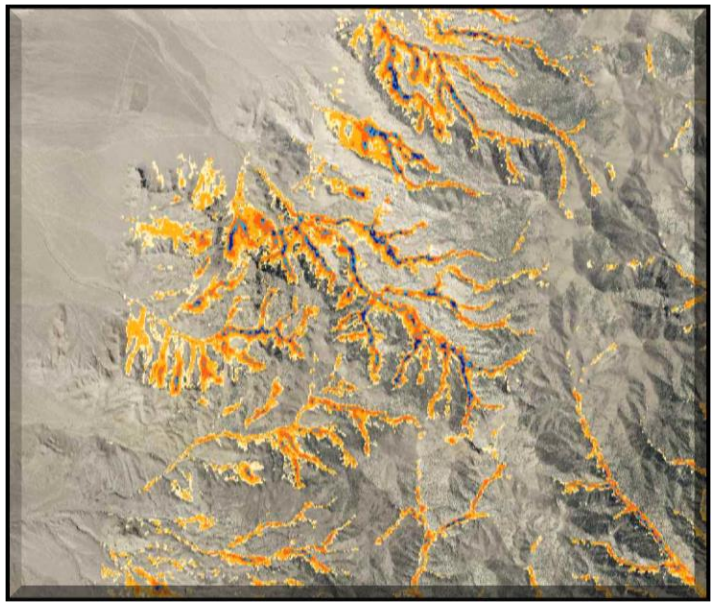
✓ ArcGIS
✓ MaxEnt

Spatial Data Layers

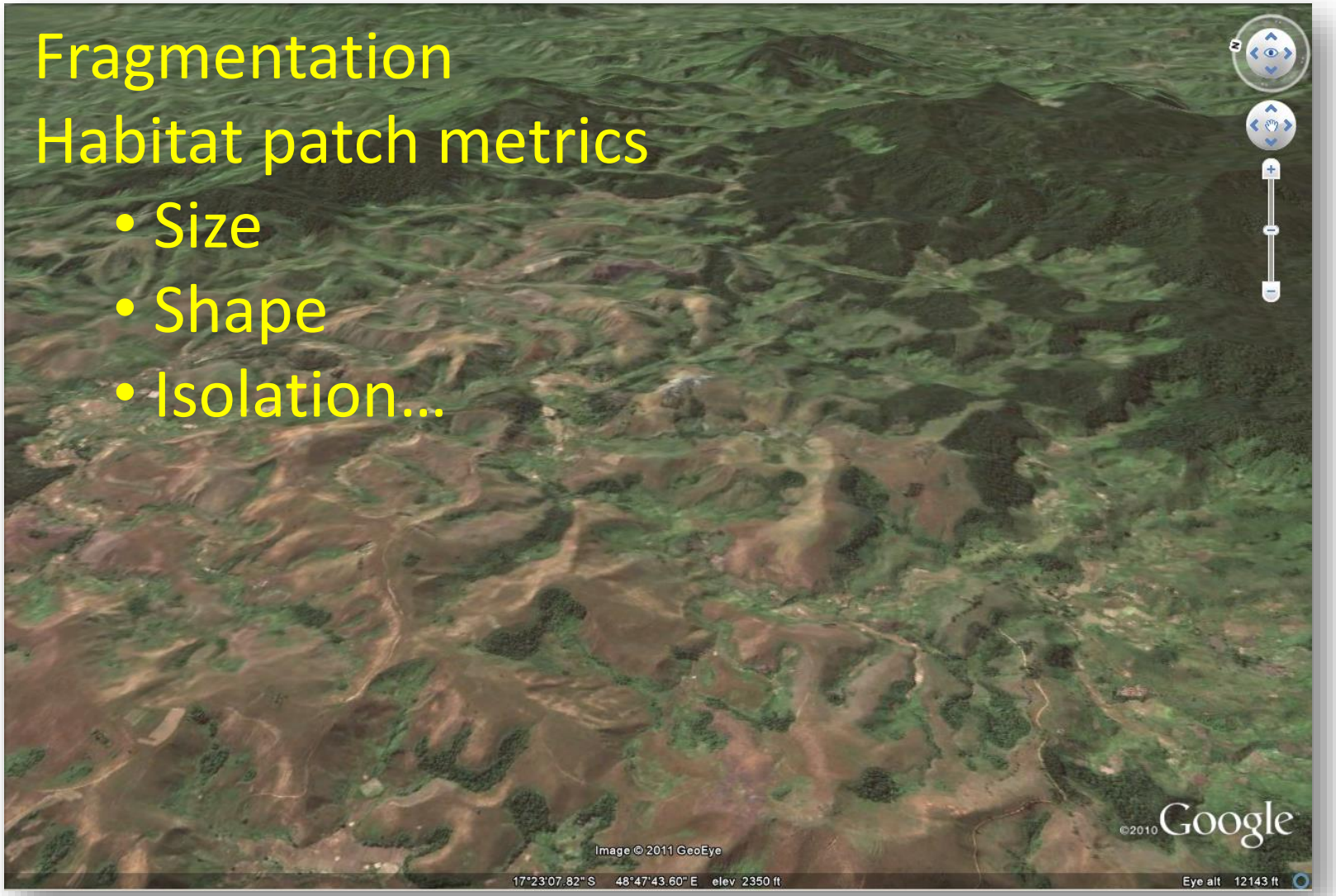
- *Elevation*
- *Slope*
- *Insolation*
- *Distance to water*
- *…*

Habitat probability (relative suitability)

- 30 - 50%
- 50 - 75%
- 75 - 90%
- 90 - 95%
- 95 - 100%

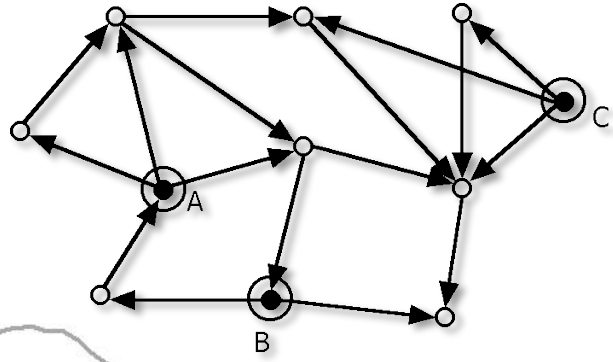


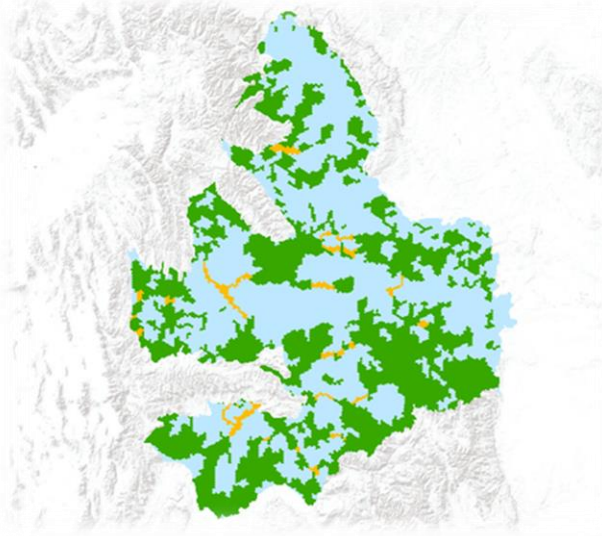
Landscape Pattern Analysis

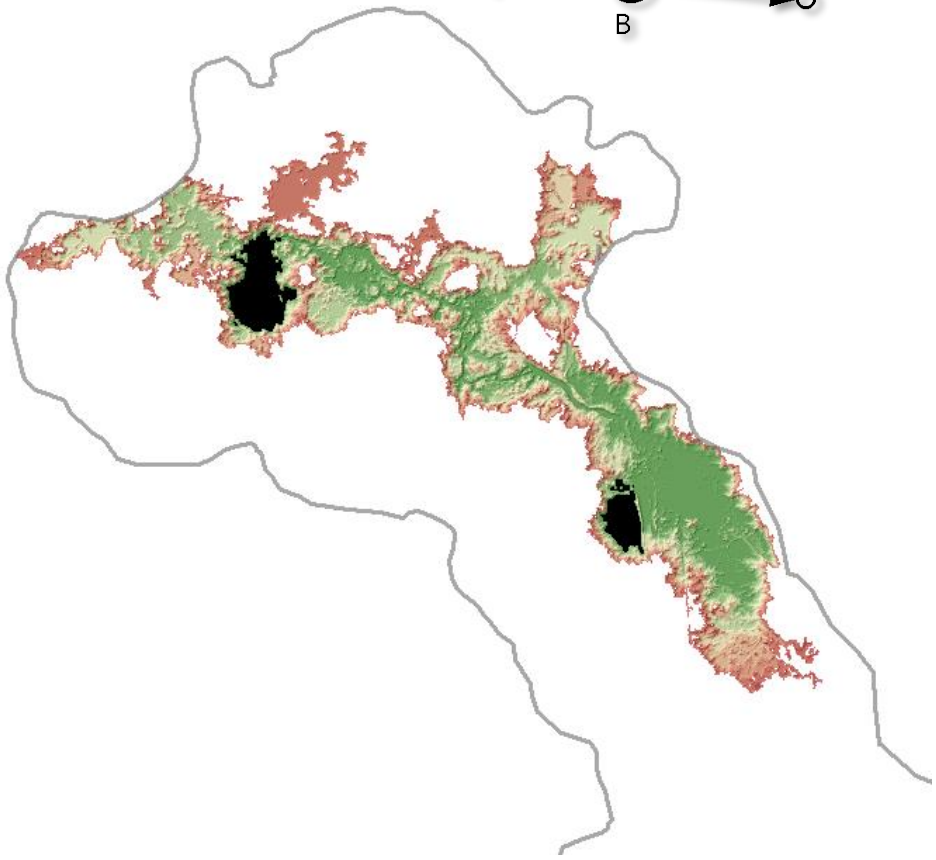


Ambotitafanana, Madagascar

Corridors & connectivity





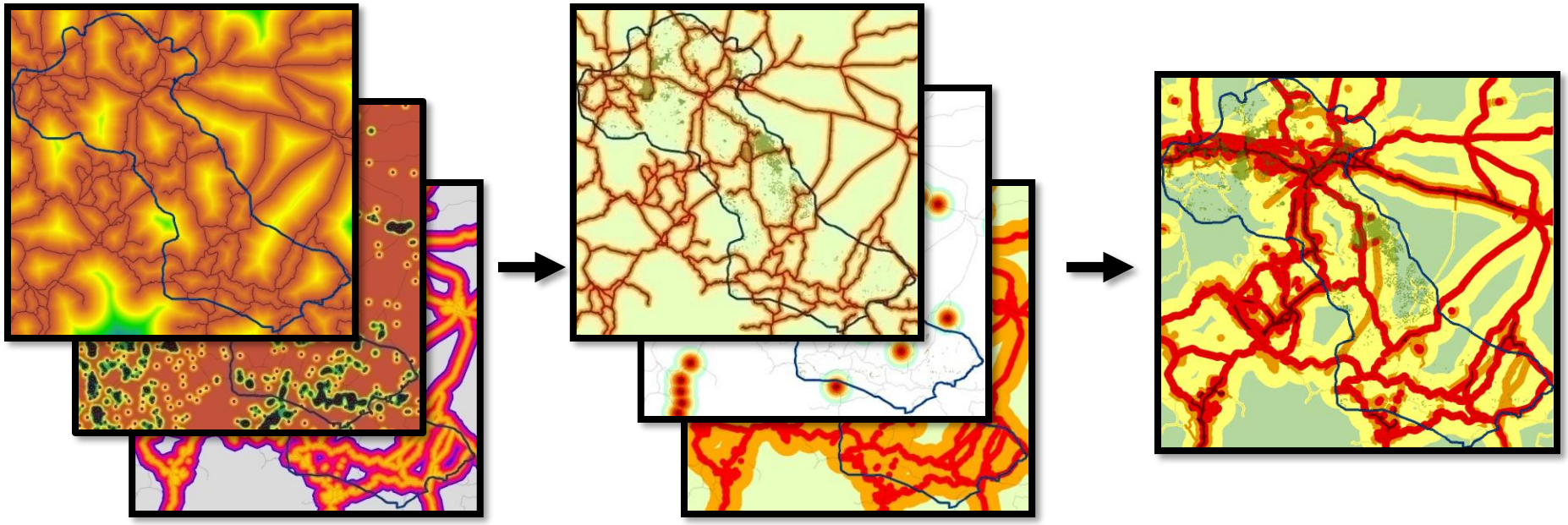


Threat mapping

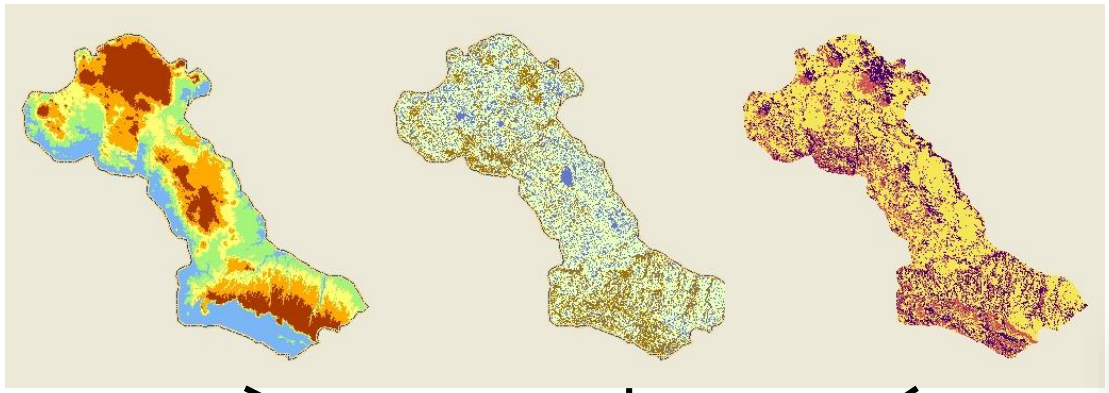
Continuous single threat maps

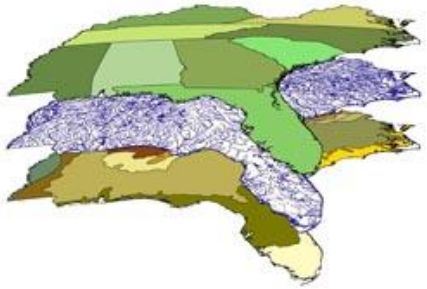
Categorical single threat maps

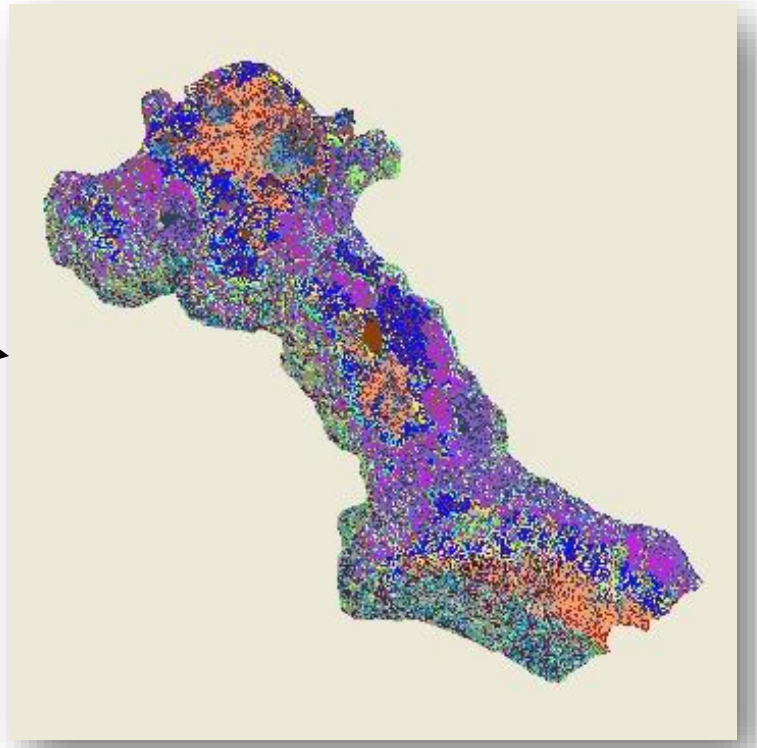
Weighted overlay threat maps



Biodiversity and Gap analysis



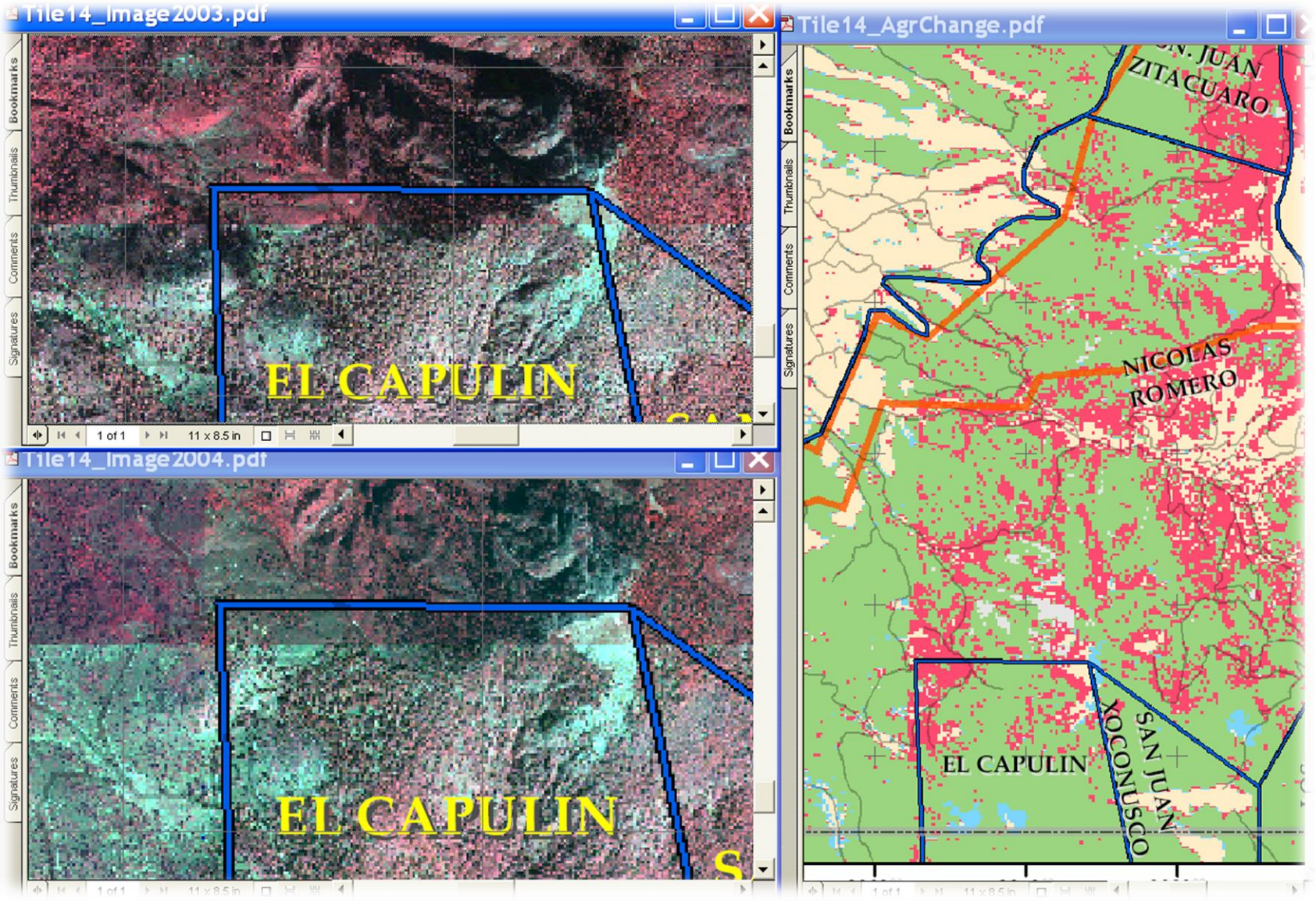




p	ln(p)	p * ln(p)	-Σ(p * ln(p))
43.5%	-0.832	-0.36210	
32.6%	-1.121	-0.36540	
8.7%	-2.442	-0.21244	1.213
4.4%	-3.135	-0.13637	
4.4%	-3.135	-0.13637	

Ecoregional planning/site prioritization

Change detection & monitoring

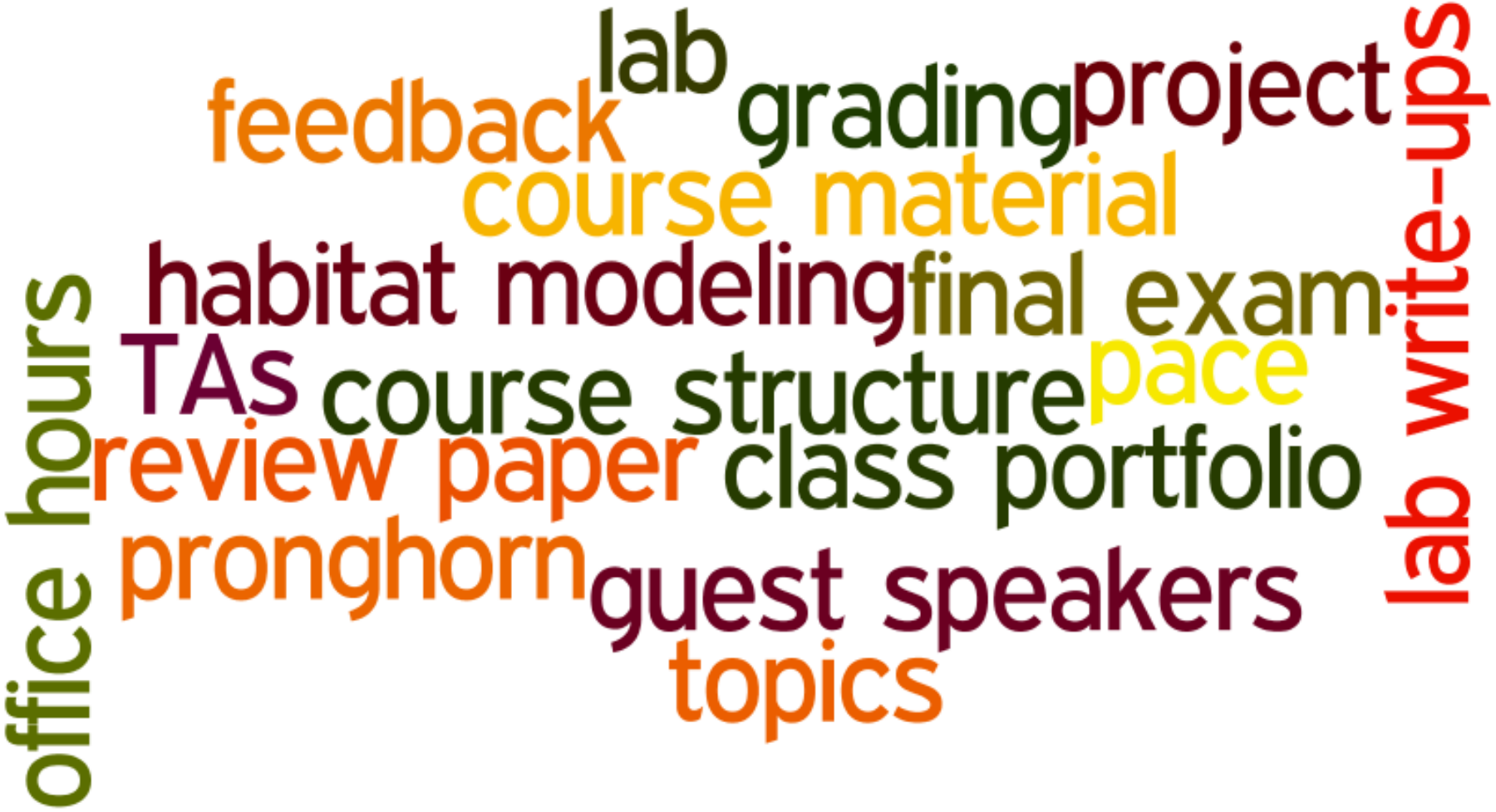


Guest Speakers

• **Liz Kalies**	*GIS Research at TNC, solar farms*
• **Tanja Vujic**	*Hog farms, biogas, and GIS*
• **Amanda Schwantes**	*GJAM – linking NEON species data with satellite data*
• **Kyle Bradbury**	*Machine learning and GIS*
• **Ron Sutherland**	*Connectivity in the South Atlantic LCC*

WWF

Feedback


lab
feedback
grading
project
course material
habitat modeling
final exam
office hours
TAs
course structure
pace
review paper
class portfolio
lab write-ups
pronghorn
guest speakers
topics

Course Structure: Labs?

1. Project based GIS
2. DEM-based analyses

   Riparian buffer analysis
3. Species distribution modeling
4. Landscape geometry
5. Connectivity
6. Threat mapping
7. Biodiversity/Gap Analysis
8. Prioritization: Marxan
9. Change detection & monitoring

- *Other topics not addressed?*

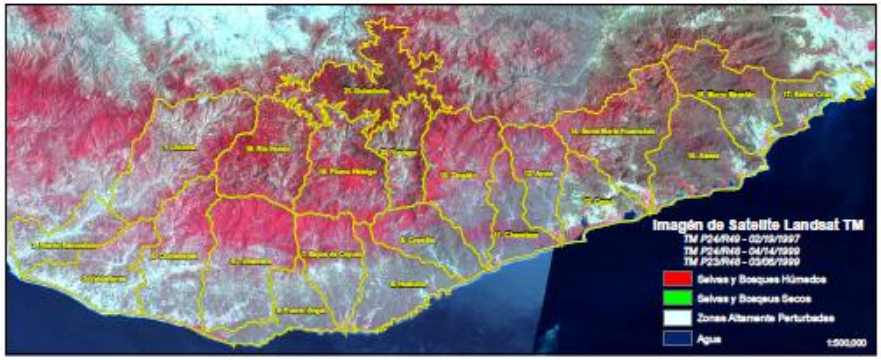
Course Structure

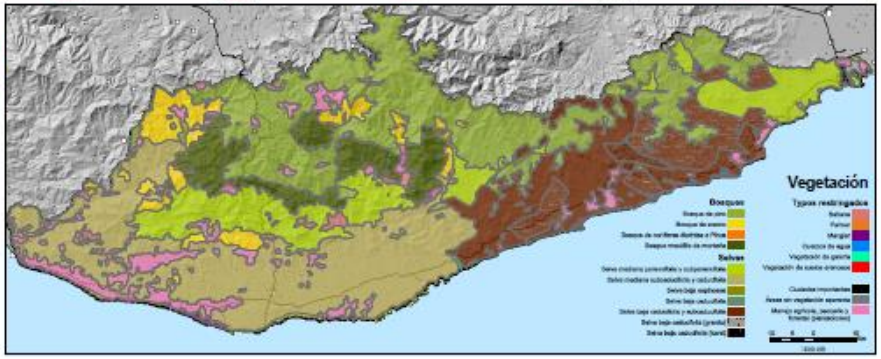
What would you like more of?

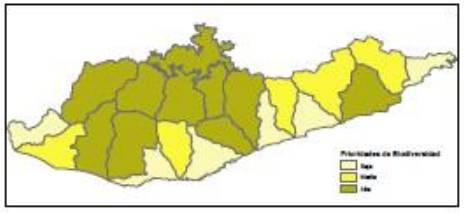
What would you like less of?

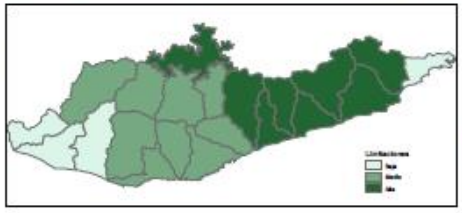
- What should we do differently?
  - Topics
  - Lecture format
  - Lab format (pronghorn?)
  - Research paper?
  - Course project? vs final lab?

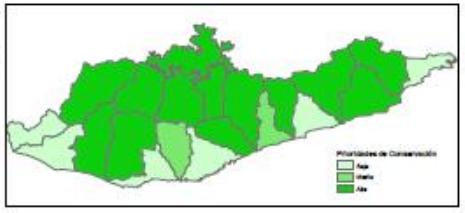
Prioridades de Conservación de la Sierra Costera de Oaxaca

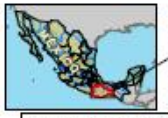












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