Data 151 Project Part 1

Owen Galicia, Jack Colwell, Lilu Smith, and
Santiago Gutierrez Morales

Overview of Past Project

- This project will analyze data from the previous research projects: *Environmental Restoration Target Estimation Around Engquist Nature Preserve* and *Assessing Carbon Sequestration Potential of Cropland Conversion in Porter County, IN*
- These research projects were done at Shirley Heinze Land Trust (SHLT) by students of the Geography Department at Valparaiso University, including Jack Colwell (member of this group), Korbin Opfer (current student), Doc Janowiak (recent alumnus), and Justin Self (recent alumnus). This research is also supported by Dr. Jon-Paul McCool of the Geography Department.

Overview of Past Project Cont.

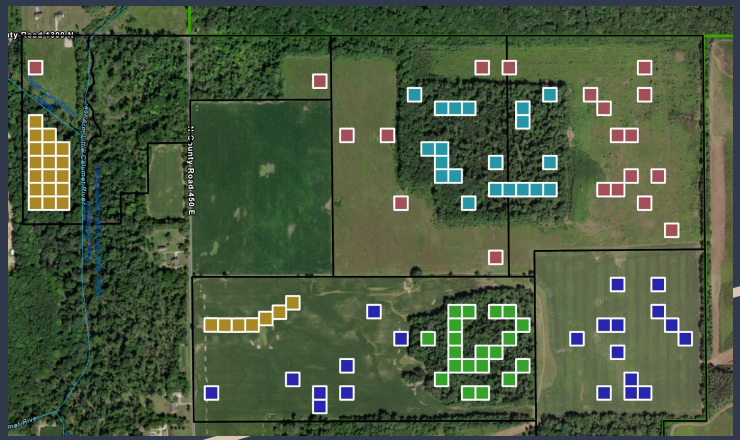


Figure #1: A map of sampling locations, colored by land type, with prairie in red, forested wetland in teal, forest in green, floodplain forested wetland in gold, and agricultural fields in blue

Past projects collected soil samples at SHLT and brought them back to the lab for analysis.

Environmental parameters analyzed:

- Bulk density
- Gravel mass
- Rock and soil volume
- Wet/ dry weight
- Mineral sample
- Organic matter, soil organic carbon, and calcium carbonate percent
- Estimated carbon in horizon per sq. m.
- Estimated carbon in 10 cm per sq m.

Overview of Current Project

Data Point ID	Sample_Type (A Horizon/Sub-Surface)	Crucible ID	Crucible Mass (g)	Crucible_Wet (g)	Crucible_105°C (g)	Crucible_550°C (g)	Crucible_1060°C (g)
AH-27	A Horizon	6E	16.87	27.798	27.424	24.455	24.3
AH-27	Sub-Surface	7X	18.86	29.685	29.572	29.158	29.0
AH-6	A Horizon	RX	16.531	27.162	27.055	25.772	25.6
AH-6	Sub-Surface	8R	18.743	30.508	30.452	30.255	30.1
AI-24	A Horizon	C3	16.056	27.22	26.731	22.467	22.3
AI-24	Sub-Surface	I	16.035	26.394	26.266	25.806	25.7
AI-25	A Horizon	66	18.793	29.891	29.558	27.534	27.4
AI-25	Sub-Surface	O2	17.378	27.378	27.279	27.08	27.0
AI-27	A Horizon	K9	18.126	29.412	29.117	26.476	26.3
AI-27	Sub-Surface	DD	19.909	30.405	30.272	29.801	29.7
AI-3	A Horizon	4A	15.776	27.258	27.164	26.504	26.4
AI-3	Sub-Surface	PO	17.528	29.653	29.549	29.347	29.2
AJ-10	A Horizon	KK	20.386	30.894	30.826	30.11	30.0
AJ-10	Sub Surface	FF	19.927	31.695	31.62	31.393	31
AJ-12	A Horizon	G	18.346	28.984	28.876	28.295	28.1
AJ-12	Sub Surface	D2	18.785	28.764	28.672	28.441	28.3
AJ-17	A Horizon	K9	18.132	28.725	28.635	27.851	27.
AJ-17	Sub Surface	8L	16.693	27.377	27.293	27.03	26.9
AJ-21	A Horizon	C3	16.078	26.8	26.649	25.121	25.0
AJ-21	Sub Surface	2D	15.888	26.152	26.039	25.778	25.6
AJ-24	A Horizon	LL	21.354	31.817	31.567	29.105	28.9
AJ-24	Sub Surface	100	18.274	28.787	28.7	28.377	28.2
AK-12	A Horizon	WW	20.038	30.618	30.341	28.03	27.9
AK-12	Sub Surface	AA	21.616	32.225	32.082	31.752	31.6
AK-21	A Horizon	UU	21.572	32.07	31.885	30.185	30.0
AK-21	Sub Surface	PO	17.598	28.008	27.871	27.561	27.
AK-23	A Horizon	Y	17.511	28.141	28.018	27.144	27.0

Fig #2: A snippet of the data that was collected and analyzed from the aforementioned research projects

- The healthy soil metric baselines are currently being researched by our Data-151 Team to test our collected data against

- The results of the current project can **help farmers identify prime real estate for new agriculture development**

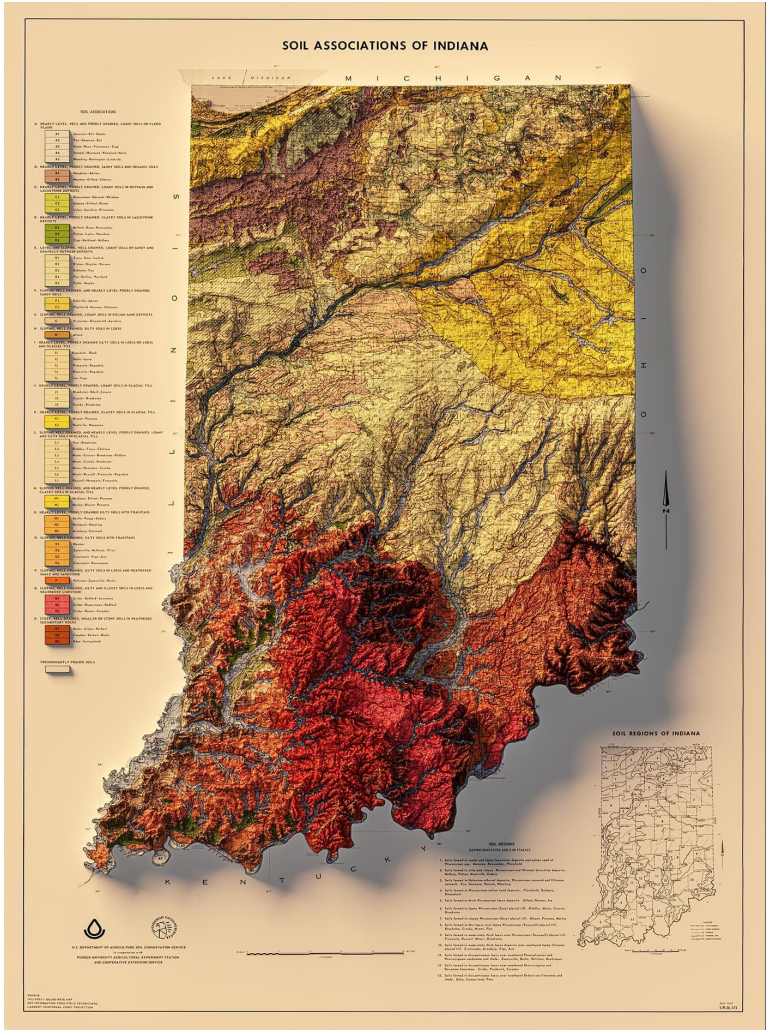
Assessment

Research question:

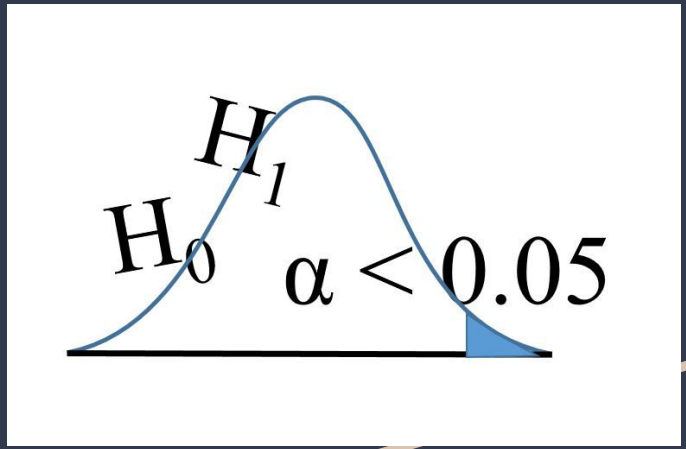
- What land cover type is best for agriculture based of certain environmental parameters?

Planned Methods:

- Correlation matrix of the different parameters created
  - Reason for use: it will us soil parameter can accurately predict another, or at least the magnitude and direction of another parameter
- Analysis of Variance (ANOVA)



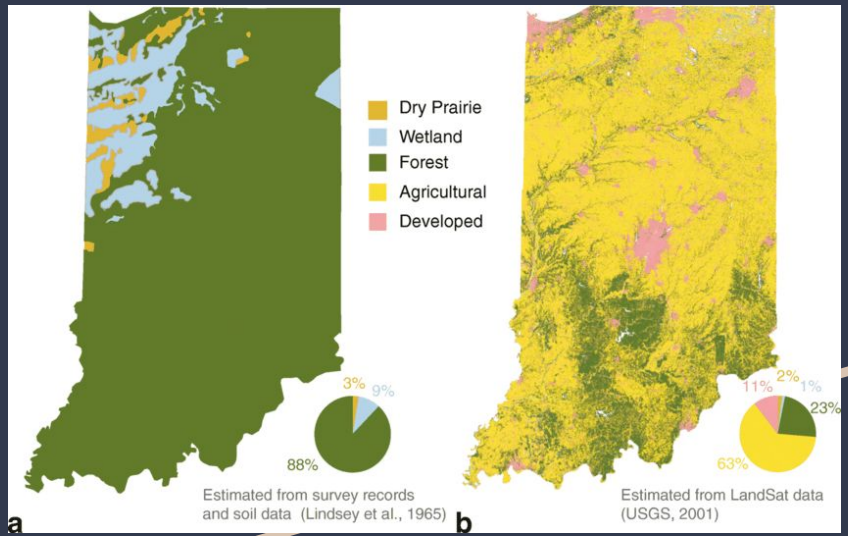
Assessment Cont.



Hypothesis and importance:

- H0 (null): There is no difference between what land cover type is the best for agriculture
- Ha: (alternative): At least one of the land cover types is significantly better or worse for agriculture than the other land cover types
- Allows the researchers (us) to statistically analyze our data and draw accurate conclusions about whether our results are likely due to chance or an actual phenomenon

Assessment Cont.



How to measure the success of our research question and hypothesis:

- By researching what numbers are adequate values for agriculture, and seeing how many land types are able achieve those numbers

- We will be able to tell if our hypothesis is correct if our results are statistically significant. If they are, then our hypothesis (alternative) is correct.

Schedule

9/23 - 10/18:

- Get rid of outliers in our data, conduct an exploratory and deep analysis of our data
- Figure out what type of modeling is best for our project, and document anything that was more difficult than expected
- Document what we have learned, and what revisions were made

10/18-11/13:

- Make a draft of our model, and start typing up the research paper
- Work on the final draft of our report and demonstrate our modeling skills and efforts

11/13-12/10:

- Continue to work on research paper and final presentation slides.
- Complete them and make them look presentable and clean up the whole project.

Any Questions?