

Digital Preservation of Cultural and Natural Resources

NATURE Sunday Academy 2018-2019

Project Description:

Students will use a variety of technologies to learn how to digitally preserve cultural resources.

Project Objectives:

- Students will develop an appreciation for their own culture and recognize how culture varies through time and space
- Students will examine and interpret aerial photographs
- Students will design and implement a campaign to digitally preserve resources they value.
- Students will have hands on experiences with a variety of novel 3D modeling technologies.

Session Organization:

11:00-11:30 Cultural connection/brief introduction

11:30-12:00 Activity I: Aerial Photographs

12:00-12:45 Lunch

1:00-1:45 Activity II: Cultural Resource Discussion

1:45-2:30 Activity III: Digital Preservation

2:30-3:00 Wrap up

ND State Science Standards:

List the North Dakota State Science Standards addressed by this lesson plan/activity.

Materials and Equipment:

Index cards

Activity I: Aerial Photographs

Introduction to aerial photographs will focus on how to download photographs, and how to examine them in ArcGIS.

Students will download aerial photographs for their community from different times and examine them either in ArcGIS or simply as photographs on their computer. Students will have time to examine the photographs on their own and will be encouraged to look for what has changed through time, what is new, what is missing, etc.

Activity II: Cultural Resource Discussion

Students will be given a stack of note cards and encouraged to think about what they value most in their community, and what makes their community special. Students will be encouraged to think of specific places or items that they value. To initiate their thinking on this we will remind them to think

about what places they looked for in the aerial photographs, we are likely to look at those places we value most first. Students will be given ~2 minutes to complete this task.

Students will then organize their cards by the places they mentioned. This will ensure that a place isn't mis-counted simply because it is not described with the same language. Students will be given ~2 minutes for this activity. After this somebody assisting that day could be enter all the places into a word cloud creator to generate a word cloud showing the places and things that are valued. Those mentioned many times will be shown as larger. Because a word cloud generator works by mentions of a given word each place will need to be entered into the text as many times as it is mentioned in the card, this can be done simply with copy and paste. As these data are being entered, we will discuss community vs personal values and how culture varies in time and space. Students will be encouraged to reflect on what places or things were mentioned most and why some places were only important to one or very few people while others are widely viewed as a valuable community resource. Students will then be asked to consider what resources their parents or grandparents might value most or consider community resources. We will discuss how these are similar or different from their own values. We will emphasize that personal values and culture do not always align, yet both are important and both should be considered worth protecting. After this discussion students should be able to examine the word cloud generated, and after the first group they will have the opportunity to compare with other groups across the state to see how things vary.

After this discussion students will receive a brief presentation about the loss of cultural resources in ND, North America, and around the world due to natural and anthropogenic effects.

Activity III: Digital Preservation

This section will begin with a brief presentation on how we can preserve cultural resources and will highlight groups and places that are doing this. This will also remind students of the vast online resources that allow them to explore areas that may be difficult to reach. We will discuss traditional methods including all forms of art that capture elements of culture, and photographs that can help preserve a place at a specific moment in time. We will then highlight some of the modern methods including Structure from Motion (SfM) and Terrestrial Laser Scanning (TLS). We will highlight how both methods work, as well as the benefits and limitations of each method.

After the presentation students will have the opportunity to create a SfM and a TLS model. Students will work on groups of 2-4 depending on the class size. Each group will select something to build an SfM model of. These will ideally be supplied by the college and will be culturally relevant items, alternatively I can bring items or we can work on something as simple a chair or backpack. The basic technique of taking photographs from a variety of angles will be explained so students can begin working on this process. Students will learn how shadows impact their model, and the need to reference points in each photograph. As the groups begin working on an SfM model of their object, one group at a time will use the TLS scanner to take one scan of the classroom. This will give each student an opportunity to use the scanner. The TLS group will then take the data they collected and upload it to a central computer and will have the opportunity to explore the point cloud they helped make. They will be able to see where shadows exist and can help to suggest the next scan location.

After students collect sufficient data from their SfM models they will begin to build their models using Agisoft Photoscan. Students will be encouraged to make a model with a medium to low resolution to ensure that they can complete the process.

After TLS data have been collected by each group the final model will be built using all the data. This will be done as a group to save time. The process of building the model will be quickly demonstrated as students take a break from the model they are working on. As the computer is doing what it does students can keep working on their own models. Once the process is complete each group will have an opportunity to manipulate the TLS model.

Wrap-Up & Discussion:

The wrap-up will be focused on a discussion of what technique would be best for preserving the site identified as the most valued community resource in Activity II. We will discuss what should be considered for the site, what obstacles might exist, what other technologies might be helpful. Finally, we will create a plan for a digital perseveration campaign. Students will also be encouraged to add their photographs to a facebook or Instagram account that will be created for this project.