Tourist Citizen Science Heather A. Fischer

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1. What is Citizen Science?

...a bidirectional flow of knowledge between the public and scientists, where the public participates in the scientific process through data collection, analysis, etc¹.



- Most citizen science programs are geared toward volunteers who have time for training and longterm participation in the citizen science program (i.e. residents of the study area).
- Tourists are often overlooked as potential volunteers, with the correct program and tools tourists may be good citizen scientists.

3. Map of Life – Denali

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Figure 1. How the program works

Download the Map of Life App from the App Store. Sign in then download the Denali offline area

Use the app in the park either riding the park busses, hiking,

biking, or camping. The Denali

offline area will work without cell

2. Tourists as Citizen Scientists?

In order to assess the potential for tourists as citizen science volunteers the Map of Life- Denali citizen science program was developed in 2016.

• Map of Life- Denali

- Where: Denali Park and Preserve Alaska (Figure 1)
- What: Volunteers use the Map of Life Mobile App to record wildlife observations in the park.
- Who: Anyone with a smartphone, the project is designed to be tourist and resident friendly.
- When: Began in the Summer of 2016 and is ongoing.

This poster examines the potential of tourists as citizen science volunteers by comparing tourist and resident volunteers and their impact on the educational and scientific outcomes of the Map of Life- Denali program.







Figure 1- Denali National Park and Preserve, Alaska. Denali is a 6 million acre park which focuses on conservation of the subarctic ecosystem. It is also home to the tallest

5. Methods: Surveys

In order to asses the educational outcomes of the program a previsit survey was administered when the visitors arrived in the park and a post-visit survey administered after their visit.

- **Pre Use Survey** Questions included demographic information: age, state/country of residence etc., wildlife quiz questions, and place attachment questions.
- **Post Use Survey** Questioned included a repeat of the quiz questions from the first survey, followed by similar place attachment questions, and lastly, any feedback about the application.

The quiz questions in the surveys tested the knowledge of the volunteers, these questions covered basic wildlife facts, wildlife safety, and conservation issues.

The place attachment question included a multiple word choice style questions which asked volunteers to choose multiple words to describe their place attachment to the park and experience².

In total 140 volunteers completed out both of the surveys and used the app. 119 Tourists and 21 Residents.

e of acts, found click on the record button, the location and time of the

service.

the location and time of the observation is automatically recorded by the phone's GPS

Educational Outcomes-The survey results were used to

While in the app go to the Denali

knowledge of the park and asks

questions about perceptions of

Info page fill out the Pre-Visit

survey. This survey tests

the park

To record a observation open the app and search the species list. Photos and description in the species info page can help with identification.

After the trip into the park fill out the Post-Visit survey. Answers will be compared to the Pre-Visit survey.

> Species observation data made through the Map of Life app was used to analyze the scientific outcomes of the project and examine if the the type of volunteers (resident or tourists) affects these outcomes

mountain in North America, Denali.

4. Map of Life Mobile App.

Map of Life is an existing naturalist mobile phone-based application developed at Yale University. The App allows volunteers to record the precise location of their wildlife observations while touring the park. The participants downloaded the application while at the park entrance, then use it offline, relying on their phone's internal GPS to capture spatial data.

The mobile application collected the volunteered geographic information (VGI) used in this research. The VGI consists of geo-tagged wildlife observations made by volunteers using the application during the summer of 2016. The data collected was used to examine the scientific outcomes of the project and is used to compare the data collected by the tourists and resident volunteers.





Figure 3– Difference in Pre and Post Quiz Scores. Tourists had a greater increase in their quiz scores. Which indicates positive educational outcomes for the program. assess the educational and experience outcomes of the citizen science program and examine if the the type of volunteers (resident or tourists) affects these outcomes.

6. Results: Educational Outcomes

In order assess the potential for tourists to be citizen science volunteers the results from the surveys were analyzed. This analysis was done to reveal any differences in educational and experience outcomes between the tourists and resident volunteers.

Analysis of the quizzes (Figure 3) shows the tourists had a greater increase in knowledge (i.e. their "quiz grades" showed a greater different between the pre and post surveys. Residents had higher quiz grades in the pre-visit survey and post-visit survey, but the tourists showed a medium of a 17% increase in their quiz score. This indicates positive educational outcomes for the program.

Responses to the multiple word choice question were used to assess the volunteers' place attachment to the park. The question included tangible words (i.e wilderness, wildlife, nature, and mountains) and intangible words (connected, happiness, and part of nature). These intangible words align with the idea of place attachment². Figure 4 shows the percentage of volunteers who chose specific words in the surveys. The tourists selected less intangible words in the pre-visit survey but the amount of intangible words chosen increased in the post-visit survey. Figure 5 shows the difference in the amount of tangible and intangible words chosen in each survey by each group of volunteers. The increase in the selection of intangible words indicates the possibility of an increased feeling in place attachment to the park after visiting the park.

Connected
Conservation
Happiness
Mountains
Nature
Part of Nature
Widlife
Wilderness

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7. Results: Scientific Outcomes

The scientific outcomes of the program were examined by comparing the spatial data collected in the app by the local residents, to the spatial data collected by the tourists. Overlay analysis was performed with species occurrence points. This analysis indicates that the data from the two samples are spatially similar. The species occurrence point data was converted to raster; this means each cell in the raster layer will be given a numerical value based on the number of points that are contained within the cell. The values of each cell in the two raster layers was mathematical merged to create a new raster layer.

Figures 6 and 7 show examples of the VGI collected during the first month of the citizen science project. Each map shows data for a different species. The entire dataset is currently being cleaned and was not ready for analysis.

This preliminary analysis shows some areas of overlay between the tourist and resident data, since this is only a portion of the data the observations are sparse. Ripley's K function (Figure 8) shows that there is statistically significant clustering between the tourists and resident observation points.



Figure 8– Results of Ripley K Function. The data is clustered at closer and farther distances. Which means there are spatial similarities in the tourist and resident

species observation data.



intangible words in the first survey, however the amount of

intangible words increased in the post visit survey.



This research aimed to assess the potential for tourists to become citizen science volunteers through analyzing the educational, experience, and scientific outcomes of the Map of Life- Denali citizen science program. Although tourists did not initially exhibit the same amount of knowledge and attachment to the park as resident, the tourists did increase their knowledge and attachment during their participation in the program. The tourists also produced a significant amount of species observation data and though preliminary analysis using raster overlay and Ripley's K function this data shows some similarities to the residents' data. The Map of Life- Denali citizen science program shows that there is potential to have successful tourist volunteers, if the program is designed with tourists in mind.



Figure 7– Bear observations along the Denali park road. This preliminary data is sparse but shows some correlation between the tourist and resident observation data.

References- 1. Bonney, R., C. B. Cooper, J. Dickinson, S. Kelling, T. Phillips, K. V. Rosenberg, and J. Shirk. 2009. Citizen Science: A Developing Tool for Expanding Science Knowledge and Scientific Literacy. *BioScience* 59 (11):977–984. Brown, G., M. Kelly, and D. Whitall. 2014. Which "public"? Sampling effects in public participation GIS (PPGIS) and volunteered geographic information (VGI) systems for public lands management. *Journal of Environmental Planning and Management* 57 (2):190–214. 2. Toomey, A. H., and M. C. Domroese. 2013. Can citizen science lead to positive conservation attitudes and behaviors? *Human Ecology Review* 20 (1):50–62. Ramkissoon, H., L. D. G. Smith, and B. Weiler. 2012. Relationships between place attachment, place satisfaction and pro-environmental behaviour in an Australian national park. *Journal of Sustainable Tourism* (February 2015):1–24.