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1. **Project Title:** *Collaborating with New England Science Centers to Promote Place-based Climate Education*
2. **Project Description**

I am leading the development of a proposal to be submitted to the National Science Foundation's Informal Science Education program. This project - *Collaborating with New England Science Centers to Promote Place-based Climate Education*, will provide a local, personal context for the complex global issue of climate change, and in doing so, will serve as a template for cooperation between research universities, science centers, NGO's, and citizenry. It is our intention to capitalize on and integrate the expertise and established practices of our collaborators in order to create a unique educational experience.

While this project is still in the development stage, our current plans are to work with science centers in New England to develop place based climate education programs. That is, we will help the centers identify location-specific climate indicators that they either already monitor, or that can be observed easily by those visiting the center. We will develop protocols and training sessions for these measurements through collaboration with university researchers. Upon initial discussion with science center representatives, we have determined that there are three areas within which there is interest and a need : phenology of local plant species, species distribution (birds and plants) and extreme events.

This project is in support of the Engagement and Outreach component of UNH's Academic Strategic Plan. Specifically, it represents development of linkages between scientific experts from UNH and NGO's, science centers and our citizenry in the New England region.

3. **Background**

Although the last several years have seen the specter of climate change become increasingly present in public perception, it still remains intangible to most. Reports of global change are commonplace, and anomalous weather events often spawn discussions of global warming, but few recognize that changes have already taken place in our local environments, and will continue to do so. As such, there is a need to educate the public regarding climate science. A variety of sources show strong basic awareness of, and general concern about, climate change, however this does not usually correlate to any sort of detailed awareness of its effects, particularly as it relates to one's own life and environment. In addressing this point, we are focused on promoting an understanding of how climate drives change in participants' local environment. NSF surveys have shown high interest in science topics, but much lower actual understanding of the processes used and the evidence that is generated by scientific study. We hope to overcome this disparity by focusing on increasing participants' understanding about the process of attaining data. Also, although climate change is global in its effects, it is important for our target audience to relate to it on a personal level, necessitating the need for local and regional climate impacts as the target

for investigation. We will utilize the established practice of citizen scientist data collection, to teach, both the process of science, and the confidence in research that this can create (*knowledge of science*). We will also be partnering with the Nature Conservancy, to further provide a local context for a global issue—a practice that has been shown to create more meaningful and durable science education.

4. Project Details

a. Goals

- We will promote a synergistic partnership between researchers and science centers. Partners in the New England Science Center Collaborative (NESCC) have expressed a need for support in adding advanced research elements to their programming. This partnership will utilize the expertise of the research community to develop valid protocols for collecting and analyzing climate indicator data with respect to phenology, species distribution and extreme events. The NESCC will provide expertise in the creation of displays and training activities, as well as providing researchers with a means for communicating leading-edge research in these three foci.
- We will use *place-based learning* to provide a meaningful context for climate education. By using locally specific climate indicators, we will engage participants through research of that which is familiar to them.
- We will create a series of *citizen science* protocols. These protocols will be introduced through science center activities, and will become the foundation for continued participant investigation. Clean Air-Cool Planet has been instrumental in establishing protocols based on the *Northeast Regional Climate Indicator Report*, and will continue to provide the organizational structure for this aspect of the project.
- We will use the proven, inquiry-based practices that we have successfully implemented in formal educational settings. Through *citizen science*, we will create a series of investigations that participants can use in their community. Inquiry will progress on a continuum from highly guided investigations in the science center setting, to more autonomous, learner-driven explorations once the participants get home. The UNH team has used the theoretical framework of inquiry-based learning in K-12, undergraduate, graduate, and teacher education.

b. Target Population/Audience

Our project is targeting traditional science center visitors—individuals, families, and community groups, but will also be available for visiting schools to supplement their curricula. We aim to extend the reach of our science center programming by engaging the participants at home and in the community, following their initial visit.

c. Evidence of External Collaboration and Partnership

Internally, this project will involve faculty and staff from the Climate Change Research Center. I will serve as the Principal Investigator and will be responsible fro

the overall organization and implementation of the project including identifying key research partners for development of protocols. Cameron Wake (Co-PI) will provide the project with his expertise in climate science and climate indicators as well as his extensive experience in outreach. Erik Froburg, the Education Coordinator for CCRC, has had experience implementing climate science in formal and informal science educational settings. He will be primarily responsible for organizing meetings, training sessions and communications between partners. This project will benefit our group, as it is a natural extension of the outreach we have begun working on within our group. We will also ask for salary funds from NSF within the grant.

We are partnering externally with **Clean Air Cool Planet** (CACP), the **New England Science Center Collaborative** (NESCC), and the **Nature Conservancy**. Our main partnership currently is with Richard Polonsky, director of NESCC. We have met several times and have drafted a two page white paper that Richard is taking to his constituency to determine interest. We are then planning a half-day meeting in June with the key partners to discuss their needs of science centers and what this project could provide for them. We will submit a preproposal to NSF on September 13th.

This project will directly benefit the NESCC by providing their centers with a site-specific product tailored for their audience. It will be a truly collaborative effort and will benefit all partners philosophically and financially.

d. Expected Impact

We hope to establish an archetype for science center-university-community collaboration. Although we are utilizing the established practice of collecting citizen scientist data collection, we are less focused on the research value of this data, than we are on teaching the process of science, and the confidence in research that this can create (*knowledge of science*). One of the challenges for "big picture" science questions is how to make them tangible for untrained participants. By partnering with the Nature Conservancy, we have provided a local context for a global issue—a practice that has been shown to create more meaningful and durable science education.

e. Scholarship

We have developed a model of participant inquiry that integrates several approaches to teaching environmental science. This integration has been applied in order to engage the learner for a greater period of time, and on a more personal level. Though none of these individual components are particularly novel when taken alone, the integration of all parts will create a unique opportunity for participants to experience the role that scientific study plays in informing our understanding of climate change. Evaluation of this approach will provide us with an opportunity to determine the effectiveness of this methodology and therefore prepare a publication for the peer reviewed literature. This approach to ISE is unique and if successful would likely serve as a model for other content areas at science centers across the country. We plan to explore adding an additional partner with expertise in this type of publication as it is not directly in my field of research.

5. Evaluation Plan

The evaluation of the project including the effectiveness of the collaboration and the impact of the place-based inquiry approach to ISE will be completed by an outside evaluator. Goodman Research currently has a working relationship with CACP and NESCC in evaluating their ISE projects.