

## MINI GRANT PROJECT SUMMARY

Please complete the project summary and return the completed form to Alyssa Johnson, Administrative Assistant at the Institute on the Environment, at [joh10074@umn.edu](mailto:joh10074@umn.edu). Paper copies will not be accepted. Please also attach any photos, publications, brochures, event agendas or other materials that were a result of the mini grant summary.

<b>Date of Report Submission:</b>	April 8, 2016
<b>Project PI &amp; Dept/School</b>	Elizabeth Borer Department of Ecology, Evolution, and Behavior -- University of Minnesota, Twin Cities
<b>Project Title:</b>	Tools for Addressing Environmental Challenges: A Training Program on Bayesian Hierarchical Modeling
<b>Grant Amount \$:</b>	\$3,000

### Project Context & Purpose

*Please include the original project purpose statement and revise for any changes that occurred in the project after the start date with a short explanation of the changes.*

**Project Context and Purpose:** Confronting environmental challenges requires integrating complex environmental data that spans disciplines as well as spatial and temporal scales. Developing predictive models that realistically reflect this complexity is a key goal of environmental research. Bayesian hierarchical modeling is a statistical tool for developing predictions from complex and heterogeneous data. Unfortunately, despite growing interest in this modeling framework among researchers at the University of Minnesota, there are no formal opportunities for training in this area in the environmental sciences. We addressed this gap by implementing a workshop on Bayesian hierarchical modeling for interdisciplinary environmental research teams at the University of Minnesota and international collaborators. *The implemented project did not deviate from the original proposal.*

## Work Completed

*Please provide a summary of the work that was completed for the mini grant project.*

**Project Description:** The workshop was held on Sunday August 2, 2015 and attended by 12 University of Minnesota collaborators (six graduate students, five post-doctoral researchers, and one faculty member), as well as eight external scientific collaborators from the Nutrient Networks (two domestic researchers and six international researchers). Dr. Kiona Ogle (Northern Arizona University) – an expert in Bayesian hierarchical modeling for the environmental sciences – attended as workshop instructor. During the workshop, Dr. Ogle provided lecture, hands-on exercises, and led group discussions about the design, implementation, and interpretation of Bayesian hierarchical models.

### **Work Completed for the Mini Grant Project:**

1. We solicited, evaluated, and selected participant applications.
2. We provided background material, including a pre-workshop meeting, for all participants.
3. We collaborated with the workshop instructor (Dr. Ogle) on workshop design and content.
4. We coordinated workshop logistics (e.g., IonE meeting space reservation, travel arrangements for Dr. Ogle, and food for workshop participants).
5. We conducted an evaluation of the workshop by soliciting written feedback from all participants.

## Partnerships & Collaborations

*Please provide a summary of the project personnel, partnerships and collaborations that worked directly on the project or were started as a direct result of the mini grant project.*

### **Project Personnel:**

Charlotte Riggs, Eric Lind, and Elizabeth Borer (Mini Grant co-PIs; University of Minnesota) supervised, implemented, and evaluated the project.

### **Partnerships and Collaborations:**

The **Nutrient Network** was a project partner. The workshop took place immediately prior to the 2015 Nutrient Network Annual Meeting. This allowed for international collaborators from the Nutrient Network to participate in both the workshop and the Annual Meeting. In addition, **Dr. Ogle** – our workshop leader and external collaborator – also attended a portion of the Annual Meeting. The exchange between the Nutrient Network, Dr. Ogle, and University of Minnesota resulted in the formation of new collaborative research relationships.

## Project Outcomes & Impacts

*Please provide a summary of the outcomes and /or impacts of the mini grant project including future plans for the project.*

### **Summary of outcomes and impacts of the Mini Grant Project:**

- 1. This project supported the training of interdisciplinary teams of researchers** at the UMN in the implementation of Bayesian hierarchical modeling. We solicited and received applications from environmental researchers across the University; applications from graduate student participants and established interdisciplinary teams were encouraged. We selected applications for which this modeling tool would benefit their ongoing research and participation in interdisciplinary teams.
- 2. We encouraged international collaboration** with the Nutrient Network. Eight participants were external scientific collaborators affiliated with the Nutrient Network; six of these participants were international researchers representing two countries.
- 3. We provided a novel training opportunity for advancing environmental science.** There are not existing opportunities to receive training in Bayesian hierarchical modeling for environmental science through traditional departments or existing research programs.
- 4. Workshop participants increased their understanding of and ability to apply and evaluate Bayesian hierarchical models.** Based on the post-workshop evaluations, participants reported that their knowledge of Bayesian models increased, regardless of the level of understanding they began with. The model implementation exercises were the most useful parts of the workshop; participants commented that if the workshop were repeated, a longer time (e.g., two days) would allow for more of these effective hands-on activities.
- 5. The future:** This project facilitated an intellectual exchange among Nutrient Network researchers, University of Minnesota researchers, and Dr. Ogle. These collaborative research relationships are now ongoing.