

**Project Title: Air quality in Berks County, Pennsylvania: an evaluation and comparison of model based estimations and observed data**

**A. Name:** Gregory P. Setliff **Department:** Biology

**B. Course for which content related to children’s environmental health will be developed:**

BIO130 Environmental Issues: Global Perspectives

**C. Projected calendar of activities:**

Course content will be developed during August 2009, implemented over the course of 1–2 weeks in November 2009 (during the 11th or 12th week of class), and evaluated by the second week of January 2010.

**D. Description of Project**

1. Children’s environmental health is relevant to nearly every topic in this non-major’s environmental issues course. Students learn about the impacts of various environmental issues on children in our class. Pollution, food security, human population issues, sustainable resource use, waste, and poverty are just a few of the topics covered in the course that are highly relevant to children’s health and the environment.

2. New course content based on PICEH’s air quality data for Kutztown will provide locally relevant environmental data that will allow students to explore a variety of air quality issues that may directly impact the students and their children. The new content will also give students the opportunity to critically examine the benefits and limitations of environmental air quality estimates generated from models by comparing these data to actual data from PICEH’s air monitoring studies.

Last year, USA today issued a special report entitled “The Smokestack Effect” (<http://content.usatoday.com/news/nation/environment/smokestack/index>), which ranked

Kutztown area schools among those with the worst air quality in the United States. These popular reports are typically the only avenue that most of my students use to learn of an environmental issue. Too often, students summarily accept the conclusions stated in these reports and little or no thought is given to the underlying assumptions or type of data that were used to generate the study's conclusions. Last semester, I asked students in my BIO130 class to study the methodology of the USA today report and provide feedback on how the conclusions were generated. To my surprise, few students discovered that the report was based on an EPA model (Risk-Screening Environmental Indicators model) despite the fact that the model is explicitly cited and described in a methodology page on the USA today website. Even fewer students were able to describe any of the basic underlying assumptions of the EPA model. This brief in-class assignment exposed a serious deficiency in student's scientific literacy skills, leading to their inability to critically evaluate the results of the studies.

The results of an ongoing study of Berks County air quality by PICEH ([www.piceh.org/library\\_docs/BerksInhalationRA%20Report-Final.pdf](http://www.piceh.org/library_docs/BerksInhalationRA%20Report-Final.pdf)) recently reported very different conclusions from the previously mentioned model based estimators. Differing conclusions from various scientific studies can be confusing to many students. The proposed project will enable students to examine the reasons for these discrepancies and will help address student's deficiencies in scientific literacy.

3. For the proposed project I will develop the in-class exercise described above into a one to two week project. Students will compare model based estimators of air quality in Berks County (*viz.* EPA National Air Toxic Assessment and/or Risk-Screening Environmental Indicators models) with the direct observations of air quality reported in the Inhalation Human Health Risk Assessment available from PICEH website. Students will be asked to identify implicit and explicit assumptions in both studies, evaluate if the conclusions are justified based on the results, and discuss why discrepancies sometimes occur between the results and conclusions of the two types of studies.

4. Lecture topics during the week of the project will cover topics such as the role of models in environmental science and types of assumptions and will introduce the students to the model and actual data related to Berks County air quality. Students will work in pairs to write

a one page report comparing the two types of studies, identifying the purpose and assumptions, and evaluating conclusions. Finally, there will be an in-class roundtable discussion for the students to discuss their findings.

5. The one page report will be taken up at the beginning of the second class (before the roundtable discussion) and graded. Questions based on the roundtable discussions will also appear on the final exam.

6. The expected outcomes of the proposed project are: one new lecture on environmental models and their assumptions, one new lecture on air quality estimations for Berks County, a one page group report, and an in-class discussion session.

This project will help students to become better informed and more critical consumers of scientific information. They will gain an appreciation for the value of both modeled data and observed data when used in the proper context.

**E. Projected date for submission of a final report:**

January 11, 2010