

# ED21D-3473 Student Contributions to Citizen Science Programs As a Foundation for Independent and Classroom-Based Undergraduate Research in the Earth Sciences

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Environmental monitoring projects on the grounds of a campus can serve as data collection sites for undergraduate research. Penn State Brandywine has utilized students in independent study projects to establish two citizen science programs and to begin collecting data, with the data sets serving as a foundation for authentic inquiry-based exercises in introductory-level Earth science courses. The first citizen science program is The Smithsonian Institution's Global Tree Banding Project, which contributes to research about tree biomass by tracking how trees respond to climate. We are going beyond the requirements of the Smithsonian project. Instead of only taking two measurements each in the spring and fall, undergraduate researchers are taking measurements every two weeks throughout the year. We started taking measurements of ten trees on campus in 2012 will continue until each tree outgrows its tree band. The data is available for download in Google Spreadsheets for students to examine changes in tree diameter within one or between growing seasons, supplemented with temperature and precipitation data (see <http://sites.psu.edu/treebanding/>). A second citizen science program we have begun on campus is the NASA-funded Digital Earth Watch (DEW) Picture Post Project, allowing students to monitor the environment and share observations through digital photography. We established four Picture Post sites on campus, with students taking weekly photos to establish an environmental baseline of the campus landscape and to document future environmental changes pre- and post-construction. We started taking digital photos on campus in 2014 will continue well past the completion of construction to continue to look for changes. The image database is less than a year old, but the images provide enough information for some early analyses, such as the variations in "greenness" over the seasons. We have created a website that shares the purpose of our participation in the Picture Post Project and links to our images (see <http://sites.psu.edu/picturepost/>). Having these citizen science programs on campus provides students a greater connection to their local environment, the opportunity to work with data collected by and for students, and the ability to contribute the data to a global database and research program.

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