



Use of the Seasons and Biomes Project in Climate Change Education

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The Seasons and Biomes Project is an inquiry- and project- based initiative that monitors seasons, specifically their interannual variability, with the goal of increasing primary and secondary students' understanding of the earth system, and engaging them in research as a way of learning science, understanding climate change, contributing to climate change studies and participating in the fourth International Polar Year. International professional development workshops have been conducted in the United States, S. Africa, Germany and most recently in Thailand. Primary and secondary teachers and teacher trainers as well as scientists from Argentina, Bahrain, Cameroon, Canada, Czech Republic, Estonia, Germany, Greenland, India, Peru, Paraguay, Mongolia, Norway, Saudi Arabia, South Africa, Switzerland, Thailand and the United States have participated in the training workshops and are working with students. Available to the Seasons and Biomes participants are the rich array of scientific protocols for investigations on atmosphere/weather, hydrology, soils, land cover biology, and phenology as well as learning activities which have been developed by the Global Learning and Observations to Benefit the Environment program (GLOBE) program (www.globe.gov). GLOBE is an international (109 countries involved) earth/environmental science and education program that brings together scientists, teachers, students and parents in inquiry-based studies and in monitoring the Earth, increasing awareness of and care of the environment, and increasing student achievement across the curriculum. Students conduct their studies at or close to their schools and submit the data they have collected to the Data Archive on the GLOBE website. Seasons and Biomes has developed additional learning activities and measurement protocols such as freshwater ice phenology protocols (freeze-up and break-up) and a frost tube (depth of freezing in soils) protocol that are being used in schools. A mosquito protocol developed by Thai scientists as part of the program to determine abundance and types of mosquitoes that are vectors of malaria and dengue fever, has been successfully tested in two schools and will now be used by students in at least 15 other schools in Thailand. African schools are also interested in using the mosquito protocol. A mosquito protocol to determine start of season in northern latitudes will be tested in Alaskan schools. There is a lot of interest in the effect of climate change on environmental parameters, populations of disease vectors and relationship to disease incidence. Changes in plant and ice phenology can be both indicators and impacts of climate change. Seasons and Biomes has also conducted Pole to Pole climate change videoconferences for Alaskan and Argentinean students, and arctic and antarctic scientists. These gave the students the opportunity to share their observations, ask each other questions, ask the scientists their questions on climate change and discuss topics for research investigations. The videoconferences were followed by web chats and web forums to allow more students from other countries to participate. Students are encouraged to present their studies at science fairs and symposiums and during GLOBE conferences. Indeed some students including Alaskan Native students, have done so.