Environmental Education Research
2011, 1–30, iFirst Article

Conceptualizing climate change in the context of a climate system: implications for climate and environmental education

Daniel P. Shepardson[a]*, Dev Niyogi[b], Anita Roychoudhury[c] and Andrew Hirsch[d]

[a]*Departments of Curriculum and Instruction and Earth and Atmospheric Sciences, Purdue University, West Lafayette, USA;* [b]*Departments of Agronomy and Earth and Atmospheric Sciences, Purdue University, West Lafayette, USA;* [c]*Department of Curriculum and Instruction, Purdue University, West Lafayette, USA;* [d]*Department of Physics, Purdue University, West Lafayette, USA*

(*Received 7 March 2011; final version received 1 September 2011*)

Today there is much interest in teaching secondary students about climate change. Much of this effort has focused directly on students' understanding of climate change. We hypothesize, however, that in order for students to understand climate change they must first understand climate as a system and how changes to this system due to both natural and human influences result in climatic and environmental changes and feedbacks. The purpose of this article is to articulate a climate system framework for teaching about climate change and to stimulate discussion about what secondary students should know and understand about a climate system. We first provide an overview of the research on secondary students' conceptions of climate and climate change. We then present a climate system framework for teaching about climate and climate change that builds on students' conceptions and scientific perspectives. We conclude by articulating a draft conceptual progression based on students' conceptions and our climate system framework as a means to inform curriculum development, instructional design, and future research in climate and environmental education.

Keywords: climate change; conceptions; understanding; curriculum

The Intergovernmental Panel on Climate Change (IPCC) has concluded that global warming is inevitable and that human activity is likely to be the main cause (IPCC 2007a). According to the IPCC, human activities continue to modify landscapes and alter atmospheric composition of greenhouse gases – carbon dioxide, methane, and nitrous oxides – to the Earth's atmosphere, and global temperatures are expected to rise, causing the Earth's climates to change. These changes may affect precipitation patterns, severe and extreme weather events, and over time environmental systems. Furthermore, human health and agricultural productivity may be sensitive to climate change. Additionally, the effects are expected to exacerbate over the next decades and are expected to drive policies and regional and global economies (IPCC 2007a). Thus, it is vital that students learn about climate change. Climate change is by far the most important environmental issue facing society and as such is an important environmental education topic (Jickling 2001). We

*Corresponding author. Email: dshep@purdue.edu

ISSN 1350-4622 print/ISSN 1469-5871 online

http://dx.doi.org/10.1080/13504622.2011.622839
http://www.tandfonline.com