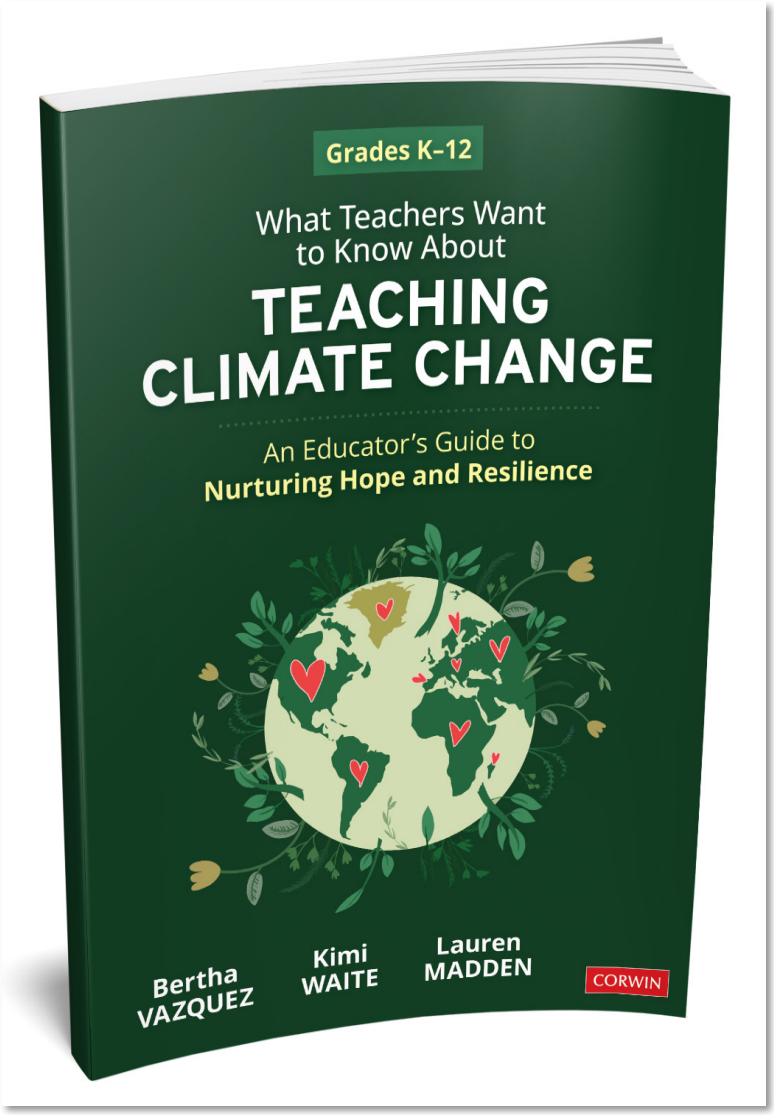

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CLIMATE CHANGE AND THE NGSS

Among the other innovations offered by the NGSS, for the first time in national standards, Global Climate Change appeared as a disciplinary core idea. This disciplinary core idea is introduced in middle school and continues into high school. This content addition ensures that climate change must be taught to middle and high school students across the country, in those states that have adopted the standards. However, the inclusion of climate change in the NGSS did not happen without conflict. The Heartland Institute, a prominent climate change denial organization, sent 300,000+ copies of its publication *Why Scientists Disagree About Global Warming* to U.S. teachers in 2017. This effort was part of a broader campaign to promote skepticism about climate science in educational settings (Hirji, 2019). Regardless of pushback, middle and high school classrooms across the country have been including climate change in their lessons since 2014.

Yet, this addition at the middle and high school level begs the question: What can teachers who work with children *before* middle and high school do to ensure their students are prepared to learn about climate change?

Q&A

Q: We all know climate change is real, but are there still some districts in the United States not validating the science and therefore not teaching it?

Wendy L. Welshans, Director of Forman Rainforest Project, Litchfield, CT

A: In states that have adopted the NGSS, teachers are required to teach about climate change in middle and high school science classes. Other states have different requirements, and there are some schools that do not teach climate change at all.

Interestingly, when we search for performance expectations related to Global Climate Change, we can see that there are no explicit and direct connections to standards at earlier grade levels. However, there are fundamental performance expectations contained in other disciplinary core ideas that lay the foundation for addressing climate change at a number of grade levels.

The most obvious of these are Human Impacts on Earth's Systems and Weather and Climate, but teachers should not feel limited to addressing climate change, or the prerequisite ideas for understanding climate change, in just these science topics.

Although teaching young children the difference between weather and climate is age appropriate and comprehensible, it is not always as simple as it seems. In many languages, such as Spanish, the words for weather and climate are the same. This means that supporting our English Language Learners in this context requires more than simply translating; we must provide the appropriate context to differentiate between the two ideas.

The Human Impacts on Earth's Systems disciplinary core idea is included in performance expectations as early as kindergarten. One example can be found below.

> *Students who demonstrate understanding can:*
>
> *K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.*

The idea that students can communicate ideas related to reducing human impacts is hopeful, solutions-oriented, and absolutely appropriate for kindergarteners. Five- and 6-year-olds may not be able to comprehend chemical reactions associated with burning fossil fuels, but they can clearly see smoke emissions from cars' exhaust and compare them to the lack of emissions generated by walking or riding a bike. Creating a "bike to school" campaign can be a fun way to invite children to think about reducing human impacts that lays the foundation for further investigations down the road.

Young children can also consider ways in which ecosystems change over time, how heat can change the speed at which air particles move, and what the differences are between weather and climate. As a result, with some simple changes in how teachers present science, NGSS-aligned K–5 lessons can clearly provide introductory climate change instruction.