

ity on plant and animal wastes near the soil's surface. This results in an increased amount of nitrous oxide near the soil's surface, which is then released into the atmosphere.



Reflection Section

- What are two things happening in tropical pastures that might be increasing the amount of nitrous oxide being released into the atmosphere?
- The scientists measured the amount of nitrous oxide 2 centimeters below the surface of the soil. Do you think that same amount of nitrous oxide is being released into the atmosphere? Why or why not?

Discussion

The scientists discovered that nitrous oxide is being released into the atmosphere as a part of the nitrogen cycle. They do not know, however, what causes bacteria to turn some ammonium ions into nitrous oxide and others into nitrogen. Nitrogen is a necessary gas in the atmosphere, but nitrous oxide is a greenhouse gas that could cause harm in great amounts. There is still a lot to learn about tropical soils and greenhouse gases. This research shows that humans impact the Earth

in ways that we may not be able to see. By making decisions to manage land in different ways, we affect what happens now and what will happen in the future.



Reflection Section

- What other things do you know about the effect of greenhouse gases?
- Do you think that no matter where they are on the planet, pastures cause more nitrous oxide to be released than would happen if the land were a forest? Why or why not?



Discovery FACTivity

In this FACTivity, you will answer the question: What are the similarities between a glass jar with soil and the Earth's atmosphere? The method you will use to answer this question is this: Get two thermometers, a large clear glass jar with a lid (be careful!), and 1 cup of dark soil. Put the soil into the glass jar to a depth of about 4 centimeters (or about 2 inches). Put a thermometer upside down in the jar, and close the lid. Turn the glass jar over, so that the soil is at the lid and the thermometer is right side up. Place the jar in

the sunlight or under a high-intensity bulb for 1 hour. Place the second thermometer near the jar.

At the end of the hour, record the temperature outside of the jar using the second thermometer. Record the temperature of the air inside of the glass jar. Compare the two temperatures. Then consider the following questions:

- What part of Earth does the air inside of the jar represent?
- What part of the Earth does the glass represent?
- What part of the Earth does the black dirt represent?

You will see that the soil is heated by the light, which then radiates the heat back into the air where it is trapped by the glass. You have created a greenhouse effect! Now see if you can answer the question posed at the beginning of this FACTivity.

This FACTivity was adapted from Rodriguez, N., Kampen, A., and Dufresne, M. (2000). It's your planet: A study of global warming. An interdisciplinary curriculum designed for middle school students and their exploration of global warming. Visit this Web site for more information and activities: <http://www.classtech2000.com/archno2/SessionB/Jesuit/gwarming.htm>

From Keller, M. & Reiners, W. A. (1994). Soil-atmosphere exchange of nitrous oxide, nitric oxide, and methane under secondary succession of pasture to forest in the Atlantic lowlands of Costa Rica. *Global biogeochemical cycles*, 8(4): 399-409.