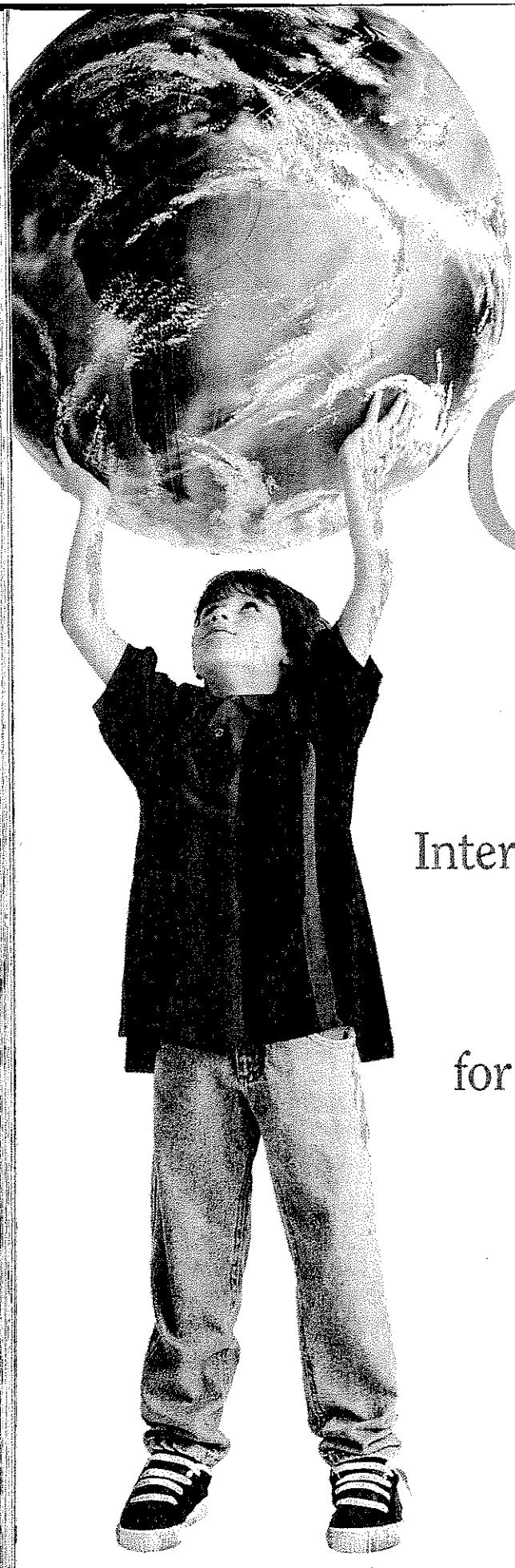

Our Growing Planet

Interdisciplinary population activities for elementary students

By Elizabeth Lener

PERHAPS THERE IS NO ONE issue that affects us all so directly as human population growth. No person in this country is immune to longer lines at the grocery store, to traffic jams, or to the heightened pressures on the natural environment that surrounds us. However, these impacts are trivial compared to those felt by people in other parts of our planet.

The United States in the year 2000 had a population of 270 million and is expected to grow to 335 million by the year 2025 (Population Reference Bureau). This is equivalent to adding a New York City to the world every month of every year! Although the U.S. growth rate of 0.9 percent is below the world's growth rate of 1.5 percent, it is higher than most industrialized nations.

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Resources usage is phenomenal in the United States. For example, Americans constitute less than five percent of the world's population, but they use nearly 25 percent of the world's resources. We are responsible for 23 percent of the world's carbon dioxide emissions, and we own 25 percent of the world's cars. The facts all seem to point to the same conclusion. To ensure a safe and happy future for ourselves and our neighbors around the world, we need to examine the choices we make and evaluate their impact on our natural environment and the people in it.

What better time to introduce these ideas than in elementary school? Children are naturally curious and passionate about taking care of the world around them. Our science department chose to use this topic as the focal point of our schoolwide theme entitled People and the Planet (Wasserman 1996). I put the unit together, and each teacher modified activities slightly for his or her own classroom. Approximately 360 first- through sixth-grade students participated in the unit. First- and second-grade students met twice a week for 40 minutes, and third- through sixth-grade students met four times a week for 40 minutes. Students conducted activities culled from various resources.

The unique blending of experiences was one of the reasons for the unit's success. The unit had three main parts: human population growth over time; the impact of population growth on Earth and its people; and projects aimed at making positive changes within the local community.

Human Population Growth

We began the unit by figuring the population growth over the last 500 years. Fourth- through sixth-grade students did an AIMS activity called Global Gains (Weibe 1996). The activity dealt with the concept of doubling time. Students used actual population data from the year 1500 through 2000 to make projections regarding when they thought the population might double again. As they graphed the population growth, they were able to see the pattern of exponential growth for themselves, as well as make predictions for the doubling time of our population.

Third-grade students created a wall-sized population graph. They put a timeline on the wall outside of the science classroom. They were shocked to see that the world population grew from 500 million people (five squares) in 1500 to 6 billion people (60 squares) by the year 2000.

Seeing a Million Stars (Wasserman 1996)

First- through third-grade students

- Draw 10 stars on a piece of paper and make 100 copies.
- Have students tape these sheets all around the room to see what 1,000 stars look like.
- Discuss how many rooms would be needed for a 1,000,000 and 1,000,000,000 stars.

Many students had difficulty understanding the size of numbers like millions and billions, so we had students participate in activities to help them grasp the magnitude of these numbers. Measuring a Million (Wasserman 1996) taught fourth- through sixth-grade students how to use their measuring skills to solve the problem of how tall a stack of 1,000,000 and 1,000,000,000 sheets of paper would be. Students were amazed to learn that a billion sheets of paper would stand 130 km high!

First- through third-grade students did an activity that allowed children to visualize big numbers like millions and billions (see box, center). These activities provided a way for students to imagine how much space 1,000,000 people need.

What a Crowd!

Learning about how the population has grown would be meaningless unless we also talked about how those growing numbers affected everyday activities.

The population unit also included several activities dealing with crowding. In the Population Circle (Wasserman and Scullard 1994), students explored how crowded the world is becoming. After marking a circle on the classroom floor with masking tape, two students-each representing 250,000,000 people-stand in the circle. Each second that the game is played represents one year. The data for this population numbers are found in "Population Circle," Counting on People. The activity continues until 24 very crowded people are standing in the circle.

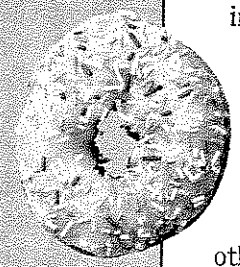
The Crowding Can Be Seedy (Wasserman and Scullard 1994) activity allowed students to conduct experiments with radish seeds. The class divided into three groups. Group one planted five radish seeds in a dirt-filled cup; group two planted 25 seeds in their cup; and group three planted 50 seeds in their cup. After observing their growth over several weeks, the effects of overcrowding were quite evident. Students observed that the cups with the most seeds did not support healthy plants.

Food Facts

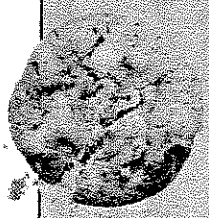
Populations cannot grow indefinitely without consequences; however, the topic of carrying capacity proved to be a sobering one for our students. Project Wild, an interdisciplinary, supplementary environment and

Hunger Banquet (Wasserman and Scullard 1994)

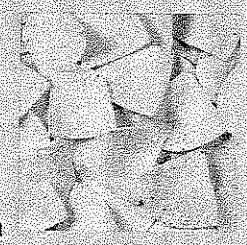
Fourth- through sixth-grade students



- Buy a myriad of tasty foods that students will enjoy—anything from donuts to chips.
- Set the food on the counter in front of the room.
- Put a menu on the board listing food prices.
- Set up two large tables in the room: on one table represent a first-world country by placing a tablecloth and vase of flowers; leave the other table plain to represent a second-world country.
- Hand students envelopes with fake money and an identity card as they come into class.
- Inform students that they each represent one of three places: a first-, second-, or third-world country.
- Instruct third-world country students (the majority of students) to sit on the floor in the back of the room,while allowing their first- and second-world neighbors to sit at the two tables.
- Give first-world country students $40 to spend on food.
- Give second-world country students $8 to spend.
- Give third-world students $3 to spend on food.
- Make false visas to sell at the food market as well.
- Charge second-world students $1 per visa, and charge third-world students $7 per visa to the second world and $9 per visa to the first world.



First- through third-grade students



- Have each student choose a colored piece of paper as they come into class.
- Inform students that each color represents a different type of country.
- Separate students based on the colors of the papers they are holding.
- Give first-world students an opportunity to eat a tremendous variety of foods.
- Offer second-world students the same foods, but allow them only a certain amount.
- Provide third-world students saltine crackers only.

conservation education program for K–12 educators, has an activity that deals with this topic in an active way. In How Many Bears (Project Wild 1992) students compete for an important limited resource—food. The goal of the game is survival—"bears" should try to collect as much "food" (construction paper squares) as they can in each round. As students conduct the activity, they soon realize that the amount of food cannot support all of the bears. Some bears do not make it past the first round. After each round, we discussed what happened and how it is similar to what happens naturally to animal populations.

Without a doubt, the most fascinating part of our unit was a Hunger Banquet (Wasserman and Scullard 1994) that focused on the unequal distribution of wealth and resources in the world today (see box, left). There was much uproar as fourth- through sixth-grade students realized how the activity would work. Some of our classes figured out ways to send people to the first world to get food and others did not. Some of the third-world groups pooled their money to buy a visa for one student. The student with the visa would travel to the first world and ask for money and food. That student would then bring back the money and food to share. All of our classes had heartfelt discussions about the importance of sharing with others and responsibly using resources. These discussions continued at home, in carpools, and in classrooms during the days that followed.

We modified the Hunger Banquet for third- and fourth-grade students. The third-world students were given saltines only, while the first-world students received a variety of foods (see box, left). Second-world students received smaller amounts, but they still had more than enough. This is an extremely emotional activity for students especially when they realize that they are not going to get food at the end of the class. The learning that comes from the activity, however, is immeasurable. This activity generated a great deal of frustration and sometimes jealousy. Many students felt that the activity was not fair. We used these feelings as a springboard for discussion on the distribution of wealth and goods and how this distribution is not fair.

If we were not born in the United States, how would our lives be different? The students who were in the first world did not feel the same suffering as their classmates, but they were often uncomfortable with their status. They often tried to help their classmates in need. When we

discussed everyone's feelings, it helped everyone to see different viewpoints.

Our Natural Resources

We then focused on how the increased population has an impact on the natural environment. By studying endangered species in our state, we learned that habitat destruction is one of the leading causes of this problem. Students played a game called Timber (Wasserman 1996) in which they acted as loggers and forest managers and discovered what happened to a forest over time as human population grew (see Timber, p. 30). At the end they realized that the forest cannot support the demand and watched as the trees disappeared.

For homework students also tabulated their daily water usage and were amazed to learn the quantity of water they consumed, both directly and indirectly. We gave students handouts from the Water, Water Everywhere activity (Wasserman 1996). It listed the amount of water used for many household functions and goods. For example, brushing teeth used on average 19 liters of water per day. Students used a tally sheet to list their water usage for a day. We evaluated students based on their level of detail and the accuracy of their mathematical calculations.

Working Toward Positive Change

After studying this topic for several weeks, students were ready to do something that would work toward positive change. Although children can't make choices that affect population numbers, they can do a great deal to lessen the environmental impact. As teachers, we worked hard to find activities that would allow students to be active and feel empowered. We also wanted to concentrate on local issues that affected our children. For example, we focused on cutting down the amount of garbage we produced at lunch. We called it Pollution Prevention Lunch. Our first- through fourth-grade students brought lunches to school. Together, we looked at ways to bring lunches to school that would produce the least amount of waste possible. Students were encouraged to bring in reusable food and beverage containers and silverware. To cut down on the use of nonreusable items such as paper napkins, we recycled some fabric scraps and turned them into cloth napkins by cutting them into squares with pinking shears. Students used fabric crayons to design environmental pictures on their napkins, which they brought in with their lunches each day. Students took home their cloth napkins each day and laundered them. Making the cloth napkin encouraged them to bring other cloth napkins from home as well. All of the science teachers went to each class and tallied the total number of positive items each class brought in for their Pollution Prevention Lunch. Two of our teachers made trophies out of old Tupperware containers. The trophies were then presented to the winning class.

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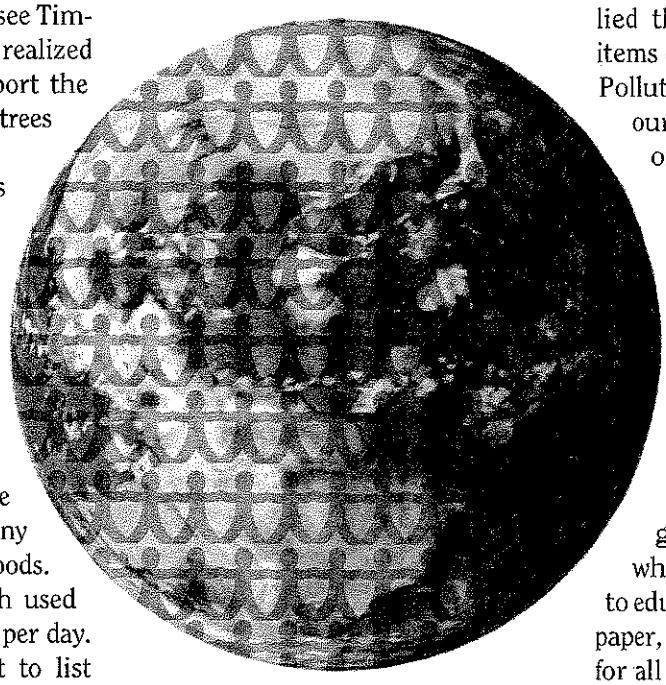

Students conducted other conservation efforts as well. Third- and fourth-grade students made cards to remind people to turn off all of the light switches and faucets in the building. As a class, fifth- and sixth-grade students chose issues on which to focus. One class wanted to educate everyone about using less paper, so they wrote reminder cards for all of the paper towel dispensers in the bathrooms. They also wrote an article about saving and recycling paper that went home to each family.

Several students even wrote a short play to perform for the lower school. The play dramatized a situation in which two students were washing their hands in the bathroom and used many extra paper towels. Another student came in and announced that she was the "paper towel patrol" and that people should only use one towel. The students then related facts about the amount of paper Americans use and the impacts that using less and recycling can have on the environment.

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Timber (Wasserman 1996)

- Divide students into groups of four.
- Give each group 120 wooden craft sticks in a coffee can to represent trees.
- Assign students to be: the forest manager, the logger, the forest, and the timer.
- Give the forest manager 32 wooden craft sticks and give the forest the coffee can of 120 sticks.
- Tell the timer to begin. Every 15 seconds, have the forest manager give the forest a tree.
- Have the loggers take away trees at the end of each minute, according to the population size. For example, at the end of the first minute, the logger takes one tree; at the end of the second minute, the logger takes two trees; at the end of the third minute, the logger takes four trees. After eight minutes, there will not be enough trees to keep up with the population's demand.
- Provide students with new exponentially growing population numbers throughout the activity.
- Discuss how many trees are needed and how they need to be planted exponentially to keep up with the population growth.
- Discuss the different use of trees.
- Brainstorm ways to cut down on the number of trees needed.

Another class created an informative webpage for our school website instructing the school community about saving fuel by properly inflating automobile tires. Another class started a "stop junk mail" campaign. The junk mail provided the address for stopping junk mail on our website as well as facts about paper use in the United States and recycling. Students also made "stop junk mail" posters for our school.

Assessment and Beyond

Students were evaluated throughout the unit based on their participation in the activities and their level of input in class discussions that followed. Fourth- through sixth-grade students were given several quizzes on the concepts that we covered throughout the unit including exponential growth, carrying capacity, and the impacts of population growth. Fifth- and sixth-grade students received a grade based on the level of detail and accuracy of mathematical calculations on their water-usage homework assignment. The posters and signs for light switches were not formally graded for younger students, but they were graded based on their level of quality and detail for fifth- and sixth-grade students.

We knew the project had greatly affected students when several weeks after we finished the theme and returned to the regular curriculum, students began participating in a new project. A Brownie Girl Scout troop began collecting coats for people who did not have enough clothes to stay warm during the winter. All of the science teachers were heartened when the students said that the idea had come from what they had learned during our population study. Even one person can make the difference in our ever-growing world. In addition to the learning that took place, this unit helped students become more conscious of their decisions and to feel that they could be active participants in determining the future of their planet.

Resources

Print

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Internet

Population Reference Bureau
prb.org/

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ase.org/

The address to write for information regarding stopping junk mail is: DMA Mail Preference Service, P.O. Box 9008, Farmingdale, NY 11735-9008.

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