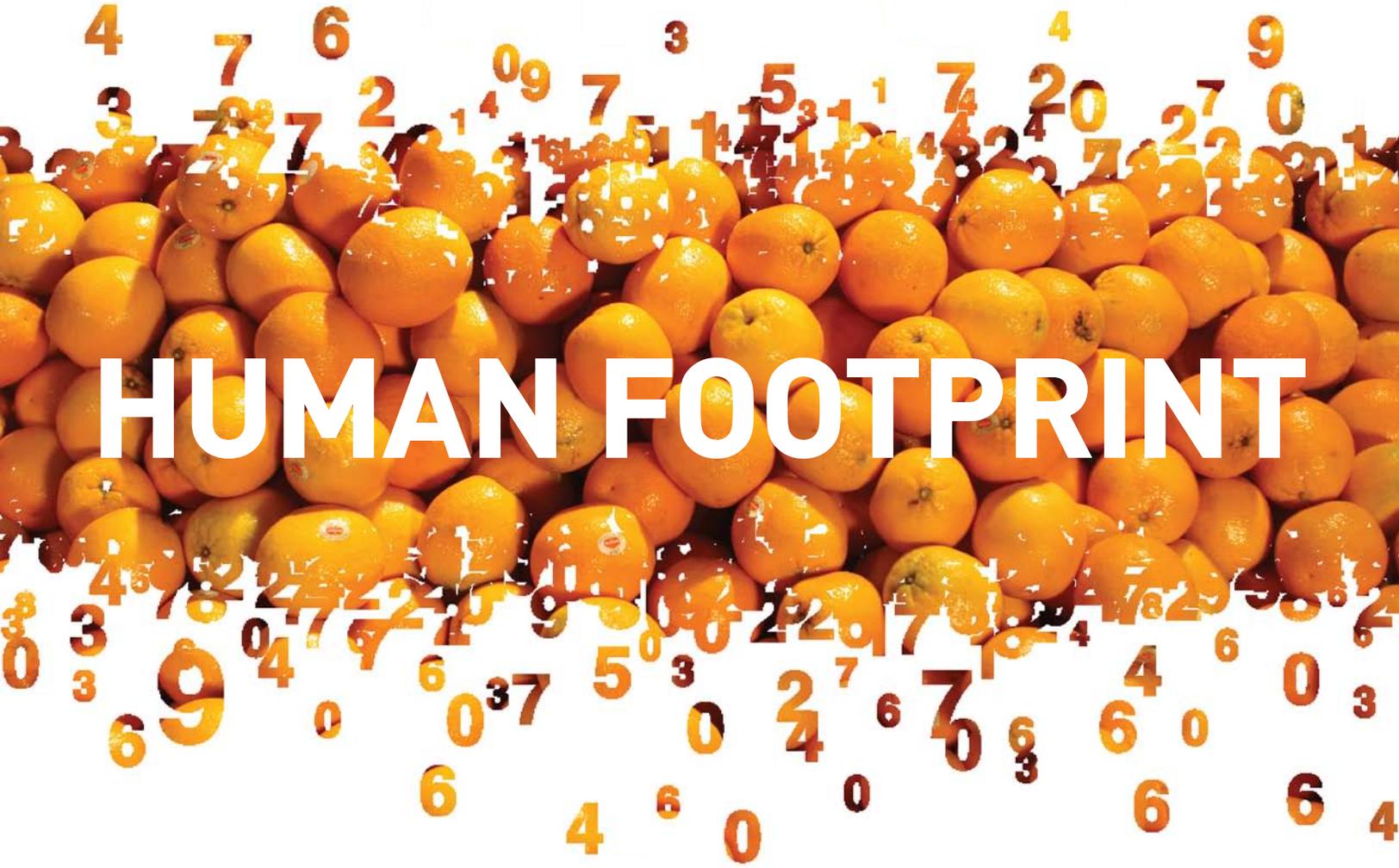


EDUCATIONAL RESOURCE

Over your lifetime, 12,000 oranges will travel 23 million miles to reach you.
It's all part of your...



HUMAN FOOTPRINT

INTRODUCTION

Think about what you use, consume, and discard in an average lifetime. Calculate this for every American and then for every person on Earth. Humans have left their mark on 83 percent of Earth's surface. What can we do to reduce our environmental impact?

“Human influence on Earth can be positive or negative, benign or catastrophic. Recognizing this responsibility is the first step each of us can take to transform the human footprint and save the last of the wild.”

– Dr. Eric W. Sanderson

Director, Human Footprint Project
Wildlife Conservation Society/Columbia University

WHAT'S INSIDE:

This companion to National Geographic Channel's *Human Footprint* includes background information, a lesson plan, and three activities:

- *Mapping Our Human Footprint*
- *Perils of Plastic*
- *Protecting Earth's Wildlife*

Over an average lifetime, each American will...

Note: Calculations based on an average lifetime of 77.75 years or 28,379 days. The United States population is rounded to 301,000,000.

Burn **31,350** gallons
of gasoline

Read **5,054** newspapers
= 43 trees

Discard **64** tons
of garbage

Use **1.8** million
gallons of water



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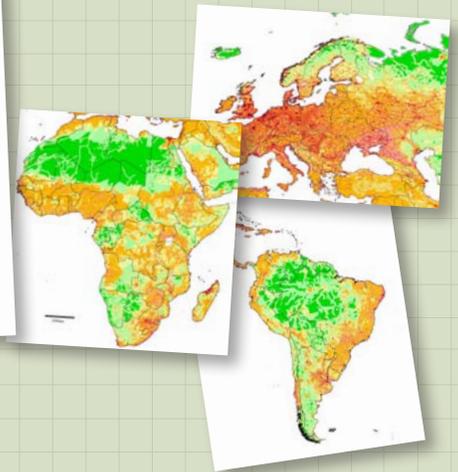
Humans have influenced 83% of Earth's surface.

This finding from the Human Footprint Project, a major initiative of the Bronx Zoo-based Wildlife Conservation Society, is based on analysis of four factors that have the most impact on wildlife and wild lands: population, travel routes, land use, and lights.



Human Footprint Atlas: North America

Human Footprint Atlas: World



Go to wcs.org/humanfootprintatlas to download maps.

Our footprint varies around the world.

Americans make up five percent of the world's population, own 30 percent of the world's cars, and consume 25 percent of the world's energy. By their first birthday, the average American will be responsible for more carbon dioxide emissions than a person in Tanzania generates in a lifetime.

Discuss: Why do different cultures use and consume things at different rates? What do these numbers indicate about contemporary American culture?

Possible answers: *Answers will vary, but encourage students to make a connection to variables such as average lifespan; income; access to goods; diet; culture; climate.*

Global population trends impact our footprint.

Today's global population (estimated at 6.6 billion) is expected to rise to nine billion by 2050 and to over 36 billion by 2300.



➤ **Discuss:** In some areas of the globe, people are already in conflict over a limited amount of natural resources. How will a growing population affect people's access to food, potable water, and fuel? What affect might the population increase have on pollution and encroachment on wildlife habitats?

Possible answers: *A rise in population will increase demands on food, water and fuel; pollution and habitat loss will also likely increase unless steps are taken to offset the rise in global population.*



NATIONAL GEOGRAPHIC

Credits

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ONLINE RESOURCES

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Preserve Our Planet

preserveourplanet.com

WILDLIFE CONSERVATION SOCIETY

Human Footprint Project

wcs.org/humanfootprint

Human Footprint Atlas

wcs.org/humanfootprintatlas

U.S. CENSUS BUREAU

U.S. and World Population Clocks
census.gov/main/www/popclock.html

Damascus, Syria by James L. Stanfield/National Graphic Society; Illustration by C. Trieste Lockwood; Population data: *World Population Prospects: 2000 Revision*, United Nations Population Division, Department of Economic and Social Affairs

ACTIVITY 1: Mapping Our Human Footprint

Students learn about the *Human Footprint Atlas*, analyze a map showing where and to what extent humans have influenced Earth, and participate in a class discussion. They make connections between patterns of human influence and geographic factors.

Materials:



- World map from the *Human Footprint Atlas: World* (wcs.org/humanfootprintatlas)



- Additional country or regional map(s) from the *Human Footprint Atlas* (optional)



- Overhead or computer projector to display map(s)



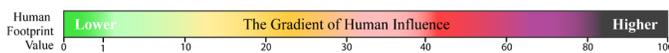
- 20-30 minutes for class discussion

DIRECTIONS

1. Introduce. Scientists with the Wildlife Conservation Society/Columbia University's Human Footprint Project mapped degrees of human influence over every square kilometer of Earth's surface (1 square kilometer = .39 square mile).

- Four factors were evaluated—population, travel routes, land use, and lights. While humans affect Earth in many ways, these four have the most immediate impact on wildlife and wild lands.

2. Display *Human Footprint Atlas: World map*. Review the legend, explain that green signifies areas of *lesser* human influence; red signifies areas of *greater* human influence:



Discussion prompts:

- Find your hometown. What color is it on the map? How great is the human influence? *Answers will vary.*
- What areas are *less* influenced by humans (shaded green)? *Possible answers: the Amazon Rainforest, the Sahara Desert, Northern Canada, Northern Russia, and central Australia.*
- What connections can students make between areas of *less* influence (shaded green) and geographic factors (e.g., climate, physical landscape). Encourage students to notice that these areas tend to have a harsh climate and are remote and/or inaccessible due to physical features (e.g. Arctic Circle, Sahara Desert, the Himalayas, the Amazon rainforest).
- Will areas with *lower* degrees of human influence remain this way (remind students that this map reflects four factors: population, travel routes, land

use, and lights)? Which factors are likely to change over time? Each factor could increase, decrease, or remain unchanged over time. The *Human Footprint Atlas* will need to be constantly updated to reflect these changes.

- In which areas is the degree of human influence *greater* (shaded red)? *Possible answers: Europe, India, Southeast Asia, and the eastern coast of South America.*
- What connections can students make between areas of *greater* influence (shaded red) and geographic factors (e.g., climate, physical landscape). Encourage students to notice that these areas tend to have a moderate climate, arable land, and proximity to oceans. They are also close to sources of fresh water and are easily accessible.

For Further Discussion

- This map does not show population, but areas that have been affected by human populations. Have students compare this map to a world population map. What differences do they see?
- Have students compare two continents and hypothesize reasons for different levels of human influence.
- Have students compare one or more regional or country maps from the *Human Footprint Atlas*.
- Ask students to visualize (or draw) a map of human influence of their hometown. What gradient or color is their school neighborhood? The nearest park? The nearest shopping area?

ACTIVITY 2: Perils of Plastic

Students learn about the world's largest "landfill", a collection of trash covering an estimated five million square miles of the Pacific Ocean. To connect this crisis to their own world students collect their recyclable trash for one week and weigh it. They extrapolate this number to make additional calculations.

Materials:



- *Perils of Plastic* (PDF)
- Paper bags, garbage cans or cardboard boxes to collect trash, bathroom scale, labels
- 20-30 minutes to read and discuss handout, and introduce activity; One week for students to collect recyclable trash; 30-45 minutes to complete activity

DIRECTIONS

- 1. Introduce.** Over a lifetime, each American throws away nearly 15 tons of packaging. Much of this ends up in the oceans, and much of it is plastic. As plastic ages it breaks into pieces (called "nurdles" or "mermaid tears"). These pieces make their way into the food chain and can sicken or kill wildlife.
- 2. Distribute *Perils of Plastic* student handout.**
- 3. Read and discuss.** What is the so-called "Great Pacific Garbage Patch"? (The world's largest trash "landfill", located in the Pacific Ocean.) What factors combine to form this massive collection of garbage? (The garbage collects in the ocean due to a combination of human and environmental factors. A system of ocean currents called the *North Pacific Subtropical Gyre* collects and traps trash, mostly from the shores of America and Asia.) What is so daring about David de Rothschild's voyage? (He plans to sail 8,000 miles across the Pacific Ocean in a lightweight raft made from plastic bottles.)
- 4. Start activity.** Tell students that they are going to collect their recyclable trash for a week.
 - Students should bring in "clean" trash only. Bottles and cans should be rinsed and dried. All paper, plastic, and metals should be clean.
 - Option: students can collect all of their recyclable trash or trash from lunch only, from school only, from home only, etc.
- 5. Weigh and Calculate.** After one week, have students measure and weigh the accumulated trash. Then ask students to calculate:
 - If this is the amount of trash from one week, what would it equal at the end of one year? After ten years?
 - Factors such as collecting recyclable trash from lunch only should be taken into account when making subsequent calculations.
- 6. Share and Reflect.** Ask students to share what they learned from the reading and activity.
 - Why is plastic harmful to the environment?
 - Why could people do to produce less trash?

Assessment

Rate students on a scale of one to five based on the following components:

- Read and understood the information in *Perils of Plastic*.
- Participated in a classroom discussion about plastic trash and the *Plastiki* voyage.
- Contributed clean, recyclable trash to the class collection.
- Participated in the "weigh-in" of collected trash.
- Extrapolated one week's worth of recyclable trash to a year and ten years.
- Made a connection about personal consumption and how the waste each of us generates can have a negative impact on the environment.

ACTIVITY 3: Protecting Earth's Wildlife

Students learn how a growing demand for natural resources such as wood and coltan threatens habitats and wildlife. They select one issue and develop a list of actions people could take to reduce or reverse the problem. They complete a project (e.g., poster, skit, graphic novel) communicating the issue and their action steps.



Materials:

- *Protecting Earth's Wildlife* student handout (PDF)



- One-two class periods to complete activity, additional time to share and review

DIRECTIONS

1. Introduce. Explain that around Earth, wild habitats and the wildlife they support are threatened because of human activity. Only 17 percent of Earth's surface remains untouched by human influence.

2. Divide the class into small groups. Distribute *Protecting Earth's Wildlife* to each group.

3. Explain. Tell students they have been given a fact sheet about two animals whose habitats and futures are under threat. Ask students to:

Step 1: Read. Review the handout and select one animal to focus on.

Step 2: Summarize. Use a separate piece of paper to note key issues.

Step 3: Brainstorm. Create an action list of steps people could take to reduce or reverse the problem.

Step 4: Create. Share the issue and suggest action steps. Create a poster, storyboard, PSA, graphic novel, skit—or another idea they propose—that communicates the key issues and suggested action steps.

4. Share and review. Encourage students to present their completed activities to the rest of the class. You may want to have a Human Footprint day when students come together to share their findings. You can also create a Human Footprint area in your classroom and display the students' final projects.

Assessment

Rate students on a scale of one to five based on the following components:

- Read and understood the information in the student handout about the growing demand for natural resources and the impact this demand has on habitats and wildlife.
- Worked in a group to select one animal and habitat on which to focus.
- Summarized key issues that the animal and its habitat face.
- Brainstormed with the group to create a list of actions people could take to reduce or reverse the problem.
- Developed and completed a presentation such as a skit, poster, or pamphlet, that communicated key issues and suggested actions people could take to reduce or reverse the problem.

PERILS OF PLASTIC

Name: _____

The world's largest trash "landfill" isn't on land—it's in the Pacific Ocean.

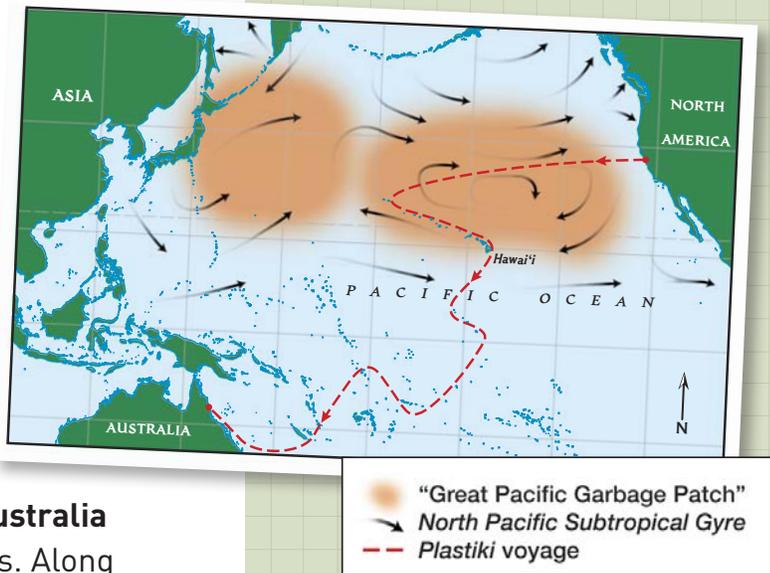
The so-called "**Great Pacific Garbage Patch**" covers an estimated five million square miles of ocean waters. That's the size of the United States, Mexico, and Central America combined!

The trash is carried—and trapped—by a system of surface currents called the **North Pacific Subtropical Gyre**. A whopping 80 percent of the trash is plastic, carried from the shores of Asia and the Americas.

Preserving the planet is important. That's why David de Rothschild, a National Geographic Visiting Fellow, is leading a dangerous voyage through this very spot.

His goal is to sail from the United States to Australia on the *Plastiki*, a raft made from plastic bottles. Along the way, he'll report on eco-issues. "Saving the planet," says David, "is going to be one of this century's greatest adventures."

Attempting to sail 8,000 miles on a plastic raft will be next to impossible. For David, that's the point. He pushes his limits in order to inspire people to challenge and rethink their own.



WORLD'S LARGEST TRASH "LANDFILL"

Did You Know?

- Americans throw out 694 plastic bottles per second. That's 60 million a day!
- Over time, plastic becomes brittle and breaks apart into tiny pellets called "nurdles" or "mermaid tears." Wildlife that eat the pellets can sicken or die.
- Some parts of the Pacific Ocean contain six parts of plastic to one part of plankton!



Map © National Geographic Society Maps; ©iStockphoto.com/Dóri O'Connell

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PROTECTING EARTH'S WILDLIFE

Name: _____

DIRECTIONS

Step 1: Read. Learn about threats to Western lowland gorillas and Okapi, and select one animal to focus on.

Step 2: Summarize. Use a separate piece of paper to note key issues.

Step 3: Brainstorm. What actions could people take to reduce or reverse the problem?

Step 4: Create. Produce a poster, storyboard, PSA, graphic novel, skit—or another idea you come up with—to communicate the issue and your list of actions.



Forests in the Republic of Congo are mined for lumber. The Western lowland gorilla depends on a forest habitat for survival.

UNDER THREAT: Western Lowland Gorillas

The Ndoki-Likouala Landscape, in the Republic of Congo, supports many species including the Western lowland gorilla. This area's rich biodiversity is under threat because the trees are being cut down—often illegally—to provide wood used to build houses in the United States.

Two million homes are built in the United States each year and an average house uses wood from 64 trees. American houses are doubling and tripling in size, so more lumber is needed. Some of this lumber is coming from places like the Ndoki-Likouala Landscape.



Efforts are underway to protect this region's wildlife and habitat. For example, companies that follow strict environmental and social standards can use a Forest Stewardship Council (FSC) logo on wood they sell.

What could people do to reduce the demand for wood products?



Rare and shy, okapi are known to live in just one place on Earth, the Democratic Republic of the Congo. Demand for coltan, a valuable mineral, is changing their habitat.

UNDER THREAT: Okapi

The Ituri Forest in the Democratic Republic of the Congo is home to the okapi (pronounced oh-'KAH-pē), a rare mammal that is related to the giraffe. The Congo also contains 80 percent of the world's known reserves of coltan. This black, tar-like mineral is mined and processed into a heat-resistant powder that is in global demand. Why? It's used in things like laptop computers, digital cameras, game consoles, cell phones—and many other products.

As the popularity of portable electronic devices increases, so too, does the demand for coltan. One study estimates that cell phone sales will reach one billion a year by 2009. That's a lot of cell phones—and a lot of coltan. One way to off-set the demand for coltan is to buy fewer cell phones—and recycle the ones you have. Places like the Bronx Zoo, in New York, have drop-off stations where people can recycle old cell phones. A portion of the money raised goes to conservation efforts in the Congo.

What could people do to reduce the demand for coltan?