Smithsonian | SCIENCE *for Global Goals*

STARTING WITH SUSTAINABILITY

LESSON SET

ACTIVITIES + INVESTIGATIONS
COMMUNITY RESEARCH TOOLS
MULTIMEDIA EXTENSIONS
SCIENCE READINGS
FOR YOUTH AGES 11-18

ssec.si.edu/global-goals

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Welcome to this Starting with Sustainability Lesson Set. This lesson set includes educator and youth-facing lessons and supplemental materials that are inspired by the United Nations Sustainable Development Goals and draw on content from the Smithsonian Science for Global Goals guide series found at **https://ssec.si.edu/global-goals.**

Smithsonian Science for Global Goals uses a *Discover*, *Understand*, *Act* framework to guide youth from ideas about real-world problems to actions. The Discover section contextualizes global issues within local communities by encouraging young people to recognize their existing knowledge. In the Understand section, youth gather data on real-world problems through natural and social science research. Finally, youth apply their learning through self-determined actions to help solve problems for their local and global communities.

DISCOVER
How do environmental problems affect the health of my community?

UNDERSTAND
How can we find solutions for plastic waste?

ACT
How will we act to improve our environmental health?

Essential Understanding: The environment affects people's health. Each person can take action to improve the health of people and the environment.
Topics: environment, health, research, community, pollution, waste management, plastics
Target Population: youth, ages 11 to 18
Estimated Time: at least 90 minutes to complete the lesson set

Lesson Set Resource Page:
ssec.si.edu/sustainability-lesson-set-health-environment

- Full Lesson Slides
- Connections with Standards
- Activity + Investigations instructions
- Worksheets
- Printables

Discover: Educator Overview

Discover

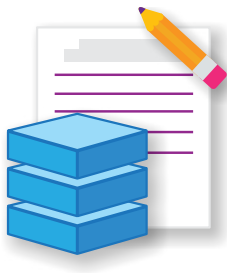
Learning Objective:

Students will be able to explain the relationship between the environment and human health, research community environmental problems, and reimagine a healthier community.

Activity Overview:

- **Discover Reading (optional):** A 1-page reading on the relationship between the environment and human health, and a community connection activity.
  Estimated Time: 15 minutes
- **Discover Investigation:** Students investigate community environmental problems and their impact on community health.
  Estimated Time: 15 minutes + optional investigation time
- **Discover Investigation Extension (optional):** Students can extend their Discover investigation by reimagining their community to remove environmental problems.
  Estimated Time: 15 minutes

Materials List



- Paper
- Pen or pencil
- Photo of local area (each student finds one after the Discover reading)
- Internet access (optional)
- Local maps, physical or online (optional)
- Recording device (optional)
- Art supplies (optional)

Discover Resources:

ssec.si.edu/sustainability-lesson-set-health-environment

1. Discovery Activity slides
2. Identify Environmental Problems Using Data slides
3. Community Interview Instruction Slides
4. Environmental Problems Worksheet

Discover Reading (optional):
Health and the Environment

The environment is the conditions and things that surround us. Living things, the weather, and nonliving things such as rocks are all a part of the natural environment. Many parts of the environment have been created by people. Roads, houses, and conditions created by people, like a feeling of love or social belonging, are all parts of the human-created environment.

Your environment affects your health. You get many important things from your environment, such as water, air, and food. Some things in your environment may help you to be healthy and happy and some things may not.

? Examine this picture. Can you find at least two things that would help people feel healthy or happy? Can you find two things that might make it more difficult to be healthy and happy? Discuss with a partner.

Your community has its own unique environment. The environment in your community includes the conditions and things very near to you, like the conditions found in your home, school, and neighborhood.

Community Connection

Find a picture of the area around you. You can take a picture or use a picture someone else has taken. What things in the photo might help or harm your health?

Discover Investigation:

How do environmental problems affect the health of my community?

1. Print a copy of the Environmental Problems Worksheet for your group or create a table like the one below.

   Resource: Environmental Problems Worksheet

Environmental Problems		
Problem	Research	Impact

2. Think about your community. A community can be the area right around you—your school, for example. Or it can be larger, like your neighborhood or your town. You can decide which area you want to investigate.
3. Are there any environmental problems you have noticed in your community? For example, does your community have problems related to litter or air pollution? With your group, list any problems you can think of under the *Problem* column.
4. If you have time, you can use existing data to help you identify problems.
   Resource: Identify Environmental Problems Using Data slides
5. For each environmental problem, write down your experience with that problem under *Research*. For example, if you listed a problem like littering, you could put some details about trash in your community, such where its often left.
6. If you have time, research more about the experiences of others with environmental problems through community interviews.
   Resource: Community Interview Instructions Slides
7. For each environmental problem, write what you know about its effects on human health in the *Impact* column. For example, one impact of air pollution is people developing asthma. If you do not know the impact, you can use Internet searches, books, or conversations with members of your community to better understand how environmental problems in your community affect people's health.

Discover Extension (optional):

Apply Your Learning to Your Community!

1. Examine the photo you took or used of your community for the Community Connection activity. What would need to change about the photo for your community to have a happier and healthier environment?
2. Create a way to record and share these changes. For example, you could:
   - Mark directly on the photo to show how it would need to change.
   - Make a drawing to show a happier or healthier version of your community.
   - Use many pictures to create a collage showing things that would make your community better.
   - Use another art form, such as song, poetry, drama, or dance, to show how you imagine a better community.
3. Share your ideas about a happier and healthier community with someone else in your community.
4. Examine the mood board below.
   - When you think about how things are now in your community, which of the mood board symbols best shows how you feel?
   - When you think about how you would like things to be in your community, which of the mood board symbols best shows how you feel?

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MOODBOARD

Understand: Educator Overview

Learning Objective:

Students will be able to analyze the scope of the plastic waste problem and identify actionable solutions for their own community through research and engineering activities.

Activity Overview:

- **Understand Reading (optional):** A 1-page reading on the increase in plastic production, and a community connection activity.
  Estimated Time: 10 minutes
- **Understand Investigation:** Investigate three strategies for plastic waste management: reducing, upcycling, and creating alternatives such as bioplastic.
  Estimated Time: 25 minutes
- **Understand Research Extension (optional):** Students can extend their learning by researching health statistics for their local area and creatively communicating those statistics to their community.
  Estimated Time: 15 minutes + art creation time

Materials List

- Paper
- Pen or pencil
- Makerspace activity: Plastic item that can be repurposed and items to help with repurposing
- Bioplastic Engineering Activity (see slides for details)

Understand Resources:

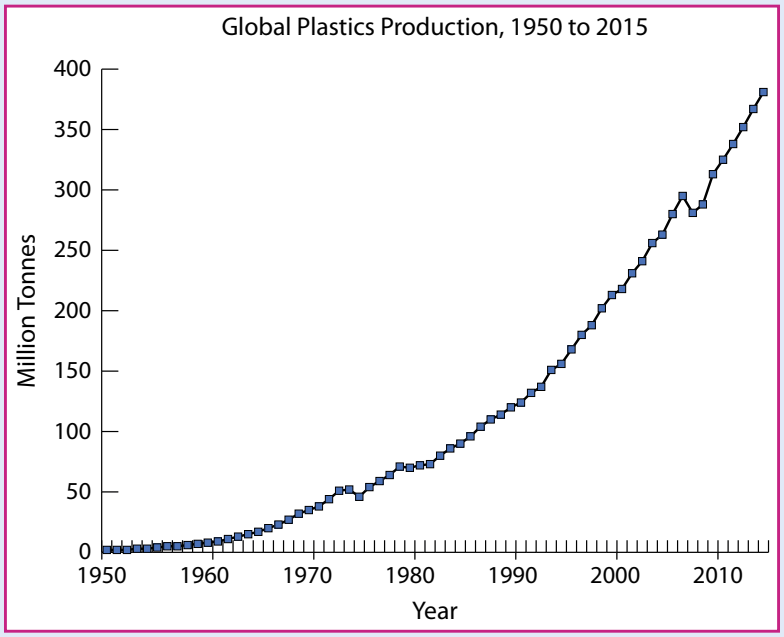
ssec.si.edu/sustainability-lesson-set-health-environment

1. Understand Activity slides
2. Plastic Waste Investigation Worksheet
3. Plastic Waste Makerspace Activity slides
4. Bioplastic Engineering Activity slides

Understand Reading (optional):
The Plastic Waste We Create

One problem you may have noticed in your community is litter or pollution. People can help the health of the environment by thinking about how we manage the waste we create. Waste is materials that we throw away or get rid of. One waste problem that has changed a lot over the last few decades is plastic.

? Examine the graph on how plastic production has changed over time and answer the questions.



Notice: How would you describe the change in plastic production since 1950?

Think: What problems do you think this increased use of plastic creates?

Wonder: Are there things you think you could do to decrease plastic waste?

Plastic litter can create a lot of problems for people. Plastics can clog waterways, creating problems for humans and other living things. Plastic litter can allow standing water, which can be linked to a number of mosquito-borne diseases, such as malaria. Plastics can break down into very small pieces called microplastics, which are found in the ocean, in soil, and even in human bodies! Some scientists think the chemicals in plastics can hurt people as well.

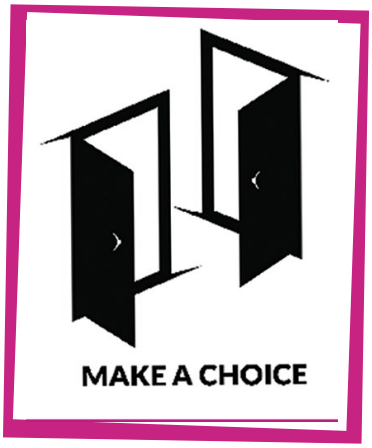
Community Connection

Move around the room you are in and search for as many items as you can find that contain plastic. Be sure to notice plastics used for different purposes. We use plastic for many things other than containers. How many can you find?

Understand Investigation:

How can we find solutions for plastic waste?

1. Discuss with your group: Are there any environmental or health problems related to the plastics you use? Can you think of any strategies to try to solve those problems?
2. You will now investigate three strategies to reduce plastic waste. You can divide your group into three smaller teams and each team can investigate one, or create stations and rotate, or just choose one strategy to investigate.
   - Use less plastic strategy: Identify situations where you could use less plastic.
     Resource: Plastic Waste Investigation Worksheet
   - Throw away less plastic strategy: Repurpose previously used plastic.
     Resource: Plastic Waste Makerspace Activity slides
   - Make plastic less harmful to the environment strategy: Create a new type of biodegradable plastic.
     Resource: Bioplastic Engineering Activity slides



3. Come back together and discuss with a partner: What do you think are the advantages or disadvantages of each strategy?
4. With your partner, pick one piece of plastic waste you have noticed in the past. Choose the strategy you think might work best to reduce this plastic waste.
5. Discuss as a group:
   - Which strategies for creating less plastic waste would be best to use in your community?
   - How could you share these strategies with your community?
   - Is there one strategy that you could start using on your own right now?

Understand Research Extension (optional):
Research More!

1. Examine the results of your plastic waste investigation on your Plastic Waste Investigation Worksheet. If you did not complete the investigation, do so now.
2. Calculate how much plastic you waste over time and record your answer.
   a. Count the number of pieces of plastic waste you threw away (this was recorded in the *Amount of Plastic* column on the worksheet).
   b. Depending on how long you collected plastic, multiply that number to figure out how much plastic you use in a year and record your answer.

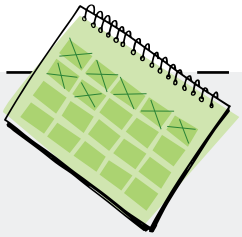
   For example, if you collected plastic for:
   - One day, multiply the amount of plastic you use in a day by 365 days in a year
   - One week, multiply the amount of plastic you used in a week by 52 weeks in a year

3. Take your answer and imagine yourself at age 70. How much plastic waste will you have made by then, if you continue making the same amount? To find out, figure out how many years between your current age and age 70. Then multiply this number by the number of pieces of plastic you use a year.
4. Discuss, write, draw or act out your answers to the following questions. Share your reflection with your group.
   a. Do you think people in your community understand how much plastic many people are using?
   b. How do you think you could share what you have learned?
5. Discuss as a group:
   a. What steps can you take to educate your community about the plastic waste they create?
   b. How can you gather community support for implementing a strategy to reduce plastic waste?

Act: Educator Overview

Learning Objective:

Students will apply what they have learned by choosing and implementing actions to solve a problem related to the health of people and the environment.



Activity Overview:

- **Act Reading (optional):** A 1-page reading from Smithsonian expert Steve Nelson on actions individuals can take to help reduce waste, and a reflection on how to apply these concepts within the community.
  Estimated Time: 10 minutes
- **Act Investigation:** Students build consensus around a group action and complete a detailed action plan.
  Estimated Time: 20 minutes
- **Act Investigation Extension (optional):** Students implement their action plan and evaluate which Smithsonian Science for Global Goals community research guide might best support their additional areas of interest.
  Estimated Time: 10 minutes + action implementation time

Materials List

- Paper
- Pen or Pencil

Act Resources:

ssec.si.edu/sustainability-lesson-set-health-environment

1. Act Activity slides
2. Action Planner Worksheet
3. *Environmental Justice!* guide
4. *Biotechnology!* guide
5. *Sustainable Communities!* guide

Act Reading (optional):
Community Choices and Environmental Health

Meet Steve Nelson, the zone manager for the Smithsonian's National Zoo and Conservation Biology Institute. Steve (pronounced *Steev*) is in charge of the buildings and outdoor spaces. He also leads the Recycling Task Force for the Smithsonian. He wanted to share what he has learned with you:

"Your first goal on anything is waste reduction. If you don't buy something, then you don't have to worry about recycling or anything else. It is a huge deal if you don't buy it in the first place. For example, with packaging, you can choose between a brand that uses very minimal packaging or one that's got fancy stuff to make it marketable.

"Consider everything that's being wasted now with an open mind. At the Smithsonian we've got these huge display banners in the museums. They are up for a while and then the exhibit changes. They take the banners down and put up new ones. In the past those banners went to the landfill. Now we turn them into tote bags! By doing that, we've just removed all the banner waste from the landfill.

"We need to start thinking beyond what we are doing right now. We need to consider what is possible. I think the biggest message is that one person can make a difference. One person cannot change everything, but one person can change what they do. If that one person becomes a million people, they are going to make a big change. Collectively, you have power."

Community Connection

What are some opportunities in your community to use your power to create less plastic waste or help solve other environmental problems?

Act Investigation:
How will we act to improve our environmental health?

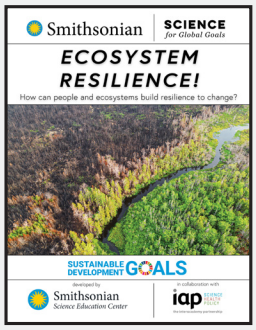
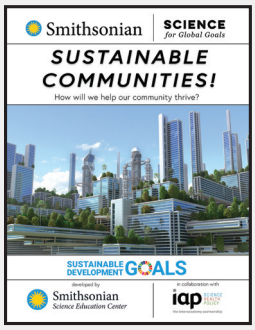
Now you will get ready to act. The first step toward action is deciding what problem you want to solve and the action you want to take to solve it. Then you can plan when and how you will act.

1. With your group, decide on the problem you want to help solve. This might be a problem such as too much plastic waste or a lack of knowledge about alternatives. Or it could be another problem you noticed. Write down the problem either on the Action Planner Worksheet or on a separate piece of paper.
   Resource: Action Planner Worksheet
2. Using the worksheet or paper, list any actions you can think of that might help solve the problem. For example, maybe you want to communicate information to children in your community. Maybe you want to help people switch to alternatives to plastic to reduce their waste. List any actions that will help to solve your problem.
3. Write down the strengths your group has and how they could be used to improve the health of your community. For example:
   a. Are members of your group part of any groups that you could communicate with?
   b. Do members of your group have any special talents, such as art or music, that might be useful to capture people's attention?
   c. Are members of your group interested in science and engineering or other ways to try to find innovative solutions?
   d. Do group members have good planning or organization skills?
4. Pick an action based on the strengths of your group.
5. Write down your ideas to plan for your action. Be sure to think about:
   a. What will you need to do?
   b. How can you make sure everyone in your group is included?
   c. Are there other people you need to help you or give you permission?
   d. Where will your action take place?
   e. What materials will you need?
   f. What challenges should you be prepared for?
6. List each step you need to do to complete this action.
7. Assign one or more steps to each person in your group.
8. Congratulations, you have planned your action!

Act Research Extension (optional):
Choose Your Path!

The time has come to act! You can use everything you have learned to take the first step toward making your community more environmentally healthy.

1. With your teammates, implement your action plan. This may take some time. When you are finished, come back and complete this activity.
2. Think quietly about the action you took.
   - What went well?
   - What do you think could have gone better?
   - How would you change your action if you had to do it again?
3. Decide on how you want to learn more! The community research guides listed here can help you explore different topics. Which topics interest you most?

		
Ecosystem Resilience! Explore ways to change the relationship between people and nature for the benefit of both.	*Biotechnology!* Explore ways biotechnology can be used to improve the environment.	*Sustainable Communities!* Explore how communities can work together to improve their environment.

4. As a group, pick a guide that you would like to use and start to explore together.

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MOODBOARD

How do you feel about your ability to help create a better future?

Starting with Sustainability Lesson Set
Good Health and the Environment
Community Research Guide

Smithsonian Science for Global Goals Development Team

Lesson Set Developers/Writers
Heidi Gibson, Andre Radloff, and Khadijah Thibodeaux

Douglas M. Lapp and Anne B. Keiser Director
Dr. Carol O'Donnell

Division Director
Dr. Brian Mandell

Global Goals Series Developers
Heidi Gibson
Andre Radloff
Logan Schmidt
Khadijah Thibodeaux

Project Manager
Hannah Osborn

Marketing & Communications Team
Carolina Gonzalez

Digital Media Team
Sofia Elian
Joao Victor Lucena

Publishing Assistant
Raymond Williams, III

Smithsonian Science Education Center Staff

Executive Office
Kate Echevarria
Johnny McInerney

Advancement & Partnerships
Holly Glover, Division Director
Denise Anderson
Inola Walston

Finance & Administration
Lisa Rogers, Division Director
Allison Gamble
Jasmine Rogers

Professional Services
Dr. Amy D'Amico, Division Director
Addy Allred
Alexia Antunez-Hernandez
Katherine Blanchard
Katherine Fancher
Katie Gainsback
Jacqueline Kolb
Dr. Hyunju Lee
Shellie Pick
Layla Sastry
Elle Satterthwaite
Sherrell Williams

Smithsonian Science for the Classroom Developers
Dr. Sarah J. Glassman
Dr. Emily J. Harrison
Melissa J. B. Rogers
Dr. Mary E. Short

Contributing interns
Hailey Bowers
Aanila Kishwar Tarannum

Research Mentor

Steven Nelson

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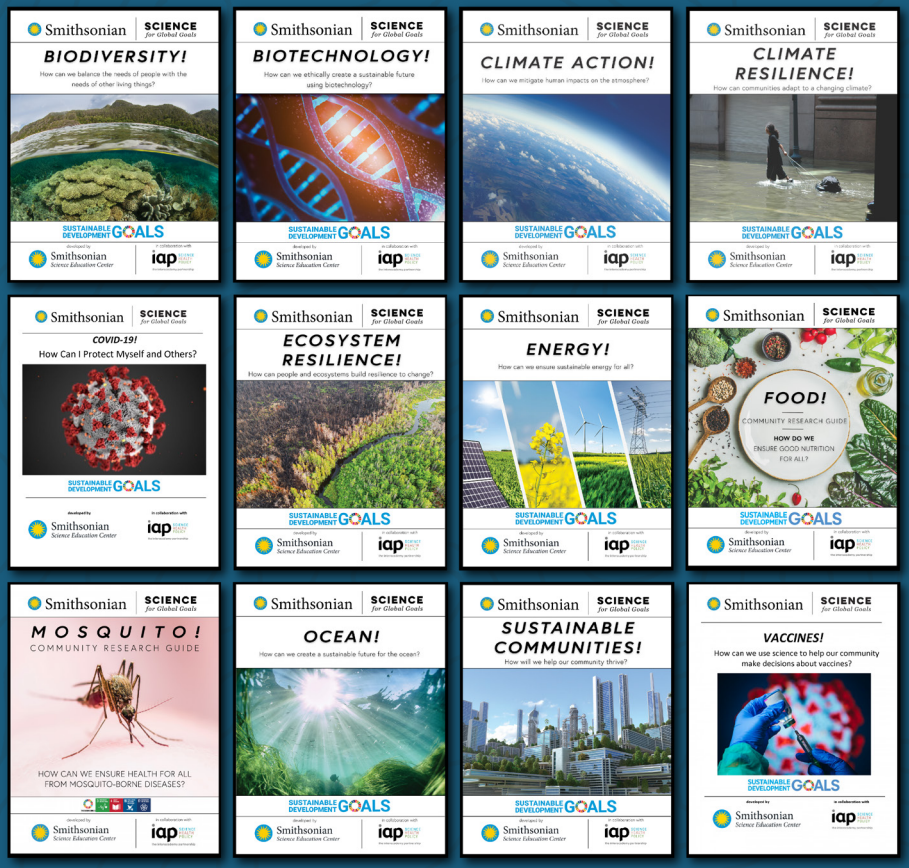
Global Plastics Production graph[1] – Hannah Osborn, SSEC
Research mentor – Steven Nelson
Bag image – Steven Nelson

References:
1 – Geyer, R., J.R. Jambeck, and K.L. Law. 2017. "Our World in Data: Global plastics production 1950 to 2015." https://ourworldindata.org/plastic-pollution

MAKE A CHOICE FOR THE FUTURE

Ready to learn more? Access the Smithsonian Science for Global Goals guides to discover, understand, and take action on sustainability issues in your community.



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