

# TECH FOR GLOBAL CITIZENSHIP

Educator Guide



## Overview

In this digital lesson module, students in Grades 4–8 will design an app for global good. After learning about the United Nations Sustainable Development Goals and the difficulties the UN is experiencing as they measure the progress of these goals, students will consider the idea of creating a digital ecosystem for the environment and the role that citizen scientists could play in such an ecosystem. They will then be challenged to create an app concept that could help communities around the world work toward *Sustainable Development Goal 12: Responsible Consumption and Production* by focusing on water, food, waste, and energy use. After creating app designs that encourage and facilitate data collection and inspire environmentally-friendly action, student groups will help each other improve their designs as they consider how to optimize their apps for use by communities around the world.

The accompanying presentation was created with PowerPoint so that it can be used in a variety of classrooms. If you are using a laptop with a projector, simply progress through the PowerPoint by clicking to advance. All of the interactive aspects of the presentation are set to occur on click. This includes images, text boxes, and links which will appear in your web browser. If you are using an interactive whiteboard, tap on each slide with your finger or stylus to activate the interactive aspects of the presentation. There will be information on how to proceed in the notes section for each slide.

## Content Areas

Technology, Science, Engineering, English Language Arts

## Activity Duration

4 sessions (45-60 minutes each)

## Grade Level

Grades 4–8

## Essential Questions

- What are the United Nations Sustainable Development Goals?
- How can citizen scientists contribute to a digital ecosystem for the environment?
- Could an app facilitate global environmental action?

## Materials

All days:

- Device with the ability to project and display video, one for the teacher

## Day 1

- Handout 1: Environmental Data, enough for half the class
- Scrap paper, one per student

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- Video 1: DLB
- Handout 2: Sustainable Development, one per student
- [Video 2](#): What is Sustainable Development?
- [Video 3](#): 'We the People' for the Global Goals

## Day 2

- Devices with internet access, enough for half the class  
\*If possible, download the free Mosquito Alert App (available in the App Store and Google Play) on four of these devices before class begins. If this is not possible, Handout 3 includes instructions for how students can learn about this app from its website. If this website can't be accessed on your school network, the following webpages can instead be printed for one-third of the class:
- [mosquitoalert.com/en/project/what-is-mosquito-alert/](https://mosquitoalert.com/en/project/what-is-mosquito-alert/)
- [mosquitoalert.com/en/project/send-data/](https://mosquitoalert.com/en/project/send-data/)
  - Handout 3: App Exploration (3 pages), 5 copies
  - Handout 4: SDG 12, one per student

## Day 3

- Handout 5: Factsheet (2 pages), 4 copies cut out in advance
- Page 25 {"Responsible Consumption and Production"} of the [170 Daily Actions Packet](#), enough for half the class
- Handout 6: App Dev Packet (5 pages, stapled), enough for half the class
- Sticky notes, one pack

## Objectives

Students will:

- Explain the role data plays in solving problems.
- Consider how citizen scientists could contribute toward building a digital ecosystem for the environment.
- Create designs for key pages of an environmental app that inspires action and collects data related to a sustainable development focus area.
- Review and optimize their app design in order to facilitate global use.

## Teacher Prep

- Read through the lesson instructions and the corresponding slide presentation in advance.  
Make sure the materials are ready to go prior to each day's lesson.



## Background

In September 2015, representatives from 193 countries convened at the United Nations Summit in New York and agreed on 17 Sustainable Development Goals. Four months later, the goals kicked off on January 1, 2016, and countries around the world began concentrated efforts focused on the economic, social, and environmental dimensions of sustainable development in order to combat climate change, reduce injustice and inequalities, and end extreme poverty. An overview of each goal can be found [here](#).

The United Nations broke these 17 goals into 169 targets for the world to meet by 2030. A total of 232 [indicators](#) of progress were also established to measure if these targets—and the overall goals—have been achieved. However, while countries around the world have been working toward these goals over the past four years, the current level of available data to measure their progress is not sufficient. As of April 2019, there was not enough data to measure progress in sixty-eight percent of the environmental-related indicators, which demonstrates the difficulty of adequately measuring progress toward these global goals through traditional data collection. A primary reason for this is cost: Traditional data collection is expensive, and—as a result—is often performed inconsistently. In addition, the data collected at a national level is not universally consistent, which has prompted concerns about its accuracy and objectivity.

The United Nations is therefore making a [case](#) for the creation of a digital ecosystem for the environment, which would enable “governments, the private sector, academics, citizens and other stakeholders to work together to match policy needs, data streams, technological solutions and technical expertise.” Such a digital ecosystem would enable everyday citizens (i.e., citizen scientists) to collaborate with scientists and organizations around the world in collecting data and protecting the environment. Though apps and web-based environmental programs already exist, a digital ecosystem for the environment would be different in that it would need to be based on clear global standards, definitions, and data-collection policies. Once these are established, anyone could participate as a citizen scientist from anywhere in the world.

The goal of this guide is to give educators a collection of resources designed to teach students about the United Nations Sustainability Development Goals and prompt them to explore the role technology can play in changing our world for the better. The four days of lessons follow an inquiry-driven 5E instructional model: Engage, Explore, Explain, Elaborate, and Evaluate.

The guide provides slide-by-slide instructions for each day of lessons to ensure educators are prepared to explain, discuss, and facilitate the hands-on content in the presentation. While the presentation is designed to cover four class sessions, it can be flexible depending on the students’ needs and the time available.

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## ENGAGE | Slides 1–3

**Overview:** After brainstorming examples of data use in their own lives, students will consider why data is important. They will then watch a kick-off video that previews the Sustainability Development Goal Challenge that they are about to investigate further.

### DAY 1 | Slide 1

- Begin class with a brainstorming session. Define data as factual information (numbers or descriptions) that is collected to better understand something, and then challenge the class to brainstorm examples of data they use or see in their own lives.
- Click once to kick off the brainstorming with an example. When you reveal *steps taken in a day*, explain that smart phones and other step-tracking devices collect this data so users can better understand how active they are.
- Then start the countdown clock and encourage students to share their data ideas. As each student shares, take note of their ideas and challenge them to describe *what* people can better understand because of this data.
- Continue until the clock reaches zero!

### Day 1 | Slide 2

- Divide the class into pairs and distribute one copy of *Handout 1: Environmental Data* to each pair. Explain that this handout provides a few visual examples of real data.
- Read the handout's instructions and give students a few minutes to review the data and discuss the handout's questions.
- Then bring the class back together and summarize their discussion. Click once and ask: Based on your brainstorming and what you reviewed on Handout 1, why do you think data is important? How can it help us and others?
- Before moving on, ensure students understand that data is important because it helps people understand the past or current state of a situation and figure out the best way to move forward and/or solve a problem. For instance:
  - If weather data tells us New York is generally cold in the winter, we should probably pack a coat for a January trip!
  - If the Air Quality Index tells us our air quality is poor, it may not be the best day to exercise outside.
  - Or, if your family is considering moving to a new area, knowing where earthquakes hit may be useful as you decide where to live.

### Day 1 | Slide 3

- Explain that data is not only helpful when we're trying to make personal decisions, but it is also used by people in science, technology, math, and engineering fields as they measure, track, and try

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to solve environmental problems. One such problem is climate change, which is one of the largest environmental problems facing Earth today.

- Ask students to demonstrate, through a show of hands, if they are familiar with the term *climate change*.
- If needed, review/explain that climate change is caused by human development on Earth. Greenhouse gases are released as we burn wood and fossil fuels for energy and heat, use fossil fuels for transportation, and mass-produce food and other products. Just as a greenhouse is very warm, greenhouse gases trap Earth's heat and prevent it from escaping into space, which is causing global warming and other instances of climate change.
- Click the play button to show Video 1: DLB, and instruct students to use a piece of scrap paper to note key words that are mentioned during the video.
- When the video is complete, ask the class to share some of the words that they recorded. Tell students that they are about to investigate many of these words so they can fully understand what the video is challenging them to achieve!

## EXPLORE | Slides 4–8

**Overview:** Once students understand the meaning of sustainable development, they will learn about the United Nations Sustainable Development Goals and begin to consider the problems scientists are facing as they try to measure the progress of these goals. Students will also be introduced to the idea of creating a digital ecosystem for the environment.

### Day 1 | Slide 4

- Ask students to indicate through a finger scale (zero for disagree through ten for strongly agree) if they think humans have the power to make a difference and positively affect our environment.
- Once students have shared, confirm that people do still have the power to make a difference and affect climate change for the better. We can do this by trying to make the world a better place not only for the people, plants, and animals who live here now, but also for people, plants, and animals who will live here in the future. This is called sustainable development.
- Pass out *Handout 2: Sustainable Development* to each student, and review the handout's directions.
- Then click the play button to show [Video 2: What is Sustainable Development?](#) and encourage students to listen carefully and jot notes on the handout as they watch. Pause the viewing after each category is introduced (at 1:34, 2:36, and 3:08) and instruct students to share what they have written or sketched with a neighbor.
- When the video is complete, click once to reveal and review each of the sustainable development categories. Reiterate that sustainable development is how we meet the needs of the world today without impacting how people in the future will be able to meet their needs. This can be achieved when we think about all three of these sustainable development categories.

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## Day 1 | Slide 5

- Go on to explain that a global organization called the United Nations is trying to help the world achieve sustainable development.
- Tell the class that the United Nations is an association that has representatives from 193 countries. Its goal is to help countries promote peace, develop relationships, and solve world problems.
- Click twice, and continue to explain that in 2015 the United Nations worked together to develop 17 Sustainable Development Goals (SDGs) that cover the three sustainable development categories.
- Click once more and explain that these 17 goals aim to reduce extreme poverty, to reduce inequalities, and to combat the threat of climate change by 2030.

## Day 1 | Slide 6

- Click the play button to show [Video 3: 'We the People' for the Global Goals](#), and tell students that this video briefly outlines each of the 17 SDGs.
- Once the video is complete, click once and ask: What do you think the United Nations needs to collect in order to know if progress has been made toward solving these problems?
  - Answer: Data!

- Click once and read the “Match the Goal!” activity that appears on the screen. Then challenge student partners to discuss which SDG(s) they think the data could measure.

Note: Many of the data points can connect to more than one goal. As students share the connections they can make between the data points and one or more goals, encourage them to share the reasoning behind their answers.

- After the students’ ideas are discussed, click twice to replace the data with a new data point, and repeat the activity a total of three times.
  - Data: Number of people in the world who are undernourished.
  - Data: Number of people who have access to hand-washing areas with soap and water.
  - Data: How much of Earth is forested.

## Day 1 | Slide 7

- Reveal that the United Nations is currently having trouble collecting environmental data that measures if the SDGs are being achieved.
- Click twice and instruct students to turn and talk about: Why might it be difficult to collect this data from countries around the world?
- After a few students share their thoughts, click to reveal why data collection can be tricky:
  - It is expensive for countries to pay for scientists to collect this data.
  - Because it’s expensive, the data may not be collected regularly enough to assess if change is occurring.

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- Countries around the world may collect and report data in different ways. This can make the data hard to compare, and it can also be hard to know if the data is accurate.
- Then click twice and instruct students to think-pair-share\*: To solve a global problem, do you think it's important for countries to work together as they collect data? Why or why not?

\* In a think-pair-share, students think about the question independently, discuss their answers with a partner, and then share their thoughts with the larger class.

## Day 1 | Slide 8

- Reiterate that it is important for countries to coordinate their data collection. When countries around the world collect data the same way, all of the data can be used and compared, and the United Nations will be able to know if the SDGs are being met!
- Explain that, for this reason, the United Nations is encouraging the creation of a *digital ecosystem* for environmental data.
- Click once more to display the definition: A community of organisms that live and work together. Then ask students to remind you what an ecosystem is.
- Then click once again to alter this definition to *digital ecosystem*. Explain that a digital ecosystem is a global community that works together to collect and submit data using the internet. The UN is pushing for a digital ecosystem because it would mean that people around the world could use the internet to unite and collect data about the SDGs.
- Wrap up by asking students to demonstrate through a show of hands: Do you think you (as students) would be able to contribute toward the UN's Sustainability Development Goals if a digital ecosystem for the environment existed?

## EXPLAIN | Slides 9–13

Students will further explore the idea of a digital ecosystem for the environment as they investigate apps designed for citizen scientists. They will then be challenged to create their own app concept that strives to help communities around the world work toward Sustainable Development Goal 12: Responsible Consumption and Production. To prepare for this, student groups will explore a focus area within SDG 12.

## DAY 2 | Slide 9

- Begin class by reviewing the same question that concluded last session: Do you believe you could contribute toward the UN's Sustainability Development Goals if there was a digital ecosystem for environmental data?
- Go on to explain that opportunities already exist for students to help the environment as citizen scientists. Click and explain that a citizen scientist is a person like you or me who takes part in data collection or data analysis. Since most people have access to devices, apps are an easy way for citizen scientists to collect or analyze data. There are already many apps that encourage the work



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of citizen scientists!

- Divide the class into pairs. Then:
  - Distribute *Page 1 of Handout 3: App Exploration* to one-third of the partners, along with a mobile device with the Mosquito Alert app.
  - Distribute *Page 2 of Handout 3: App Exploration* to another one-third of the partners, along with a device with internet access.
  - Distribute *Page 3 of Handout 3: App Exploration* to the remaining one-third of the partners, along with a device with internet access.
- Explain that students should follow the directions on their handout to investigate their app.
- Once 10–15 minutes have passed, bring the class back together for a quick recap.
- Click twice to bring up the Mosquito Alert app, and then click through to the corresponding link provided on the slide. Invite those who researched this app to share their work with the class.
- Click again and repeat with the remaining two apps.
- Conclude by asking: Why is citizen science important?
- Be sure students understand that scientists rely on data. The more people who can record observations and share data, the better! When people around the world can use technology to document and share data, scientists are able to accomplish much more than they ever could themselves.
- Extension: Share with students that unfortunately, there can be pressures or motivating factors to falsify data. Sometimes it is a financial pressure or the pressure to publish. Poor observations or faulty measurement can also lead to inaccuracies. Other times it may be a user error in that data was inaccurately entered or maintained. Ask students to consider how bad or false data can impact the environment, institutions, and society.

## Day 2 | Slide 10

- Now that students have an understanding of the potential of citizen scientists, explain that students will apply what they have learned to help build a digital ecosystem for the environment.
- Divide students into groups of three, and click twice to reveal the challenge:
  - You and your peers are now app developers at a top app company, and you have an important new project: To design an app that will help citizen scientists around the world collaborate to achieve SDG 12: Responsible Consumption and Production.
- Explain that this SDG is especially important because out of all the Sustainable Development Goals, it currently has the least data available to track if it is being achieved.

## Day 2 | Slide 11

- Pass out *Handout 4: SDG 12* to each student and explain that before they can begin designing an

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app, they must first understand Goal 12: Responsible Consumption and Production.

- Ask: What exactly is consumption and production?
- Click once to review the definition of consumption, and explain that a consumer is someone who uses products, resources, or services.
- Ask: Who here is a consumer?
- Click and ensure students understand that *everyone* is a consumer. Then ask students to share examples of products or services that people may eat, use, or buy. Be sure students understand that consumption does *not* simply refer to food—it includes all products or services that they use (such as clothing, technology, transportation, etc.).
- Click again to review the definition of production, and explain that a producer is someone who makes products. Click once more and explain that most producers are companies, but we all *consume* what these companies produce.
- Ask students: What do people consume that has been *produced*?

## Day 2 | Slide 12

- Explain: One reason why SDG 12: Responsible Consumption and Production is a goal is because our world's material footprint is growing.
- Ask: What do you think the term *material footprint* may mean? Once several students have answered, explain that our material footprint is filled with everything that people around the world consume.
- Click twice, and ask students to brainstorm: What have you consumed (used, eaten, or bought) this week? Give students a couple minutes to brainstorm with their groups and sketch small pictures to illustrate this consumption in the Material Footprint on Handout 4.
- Then ask students to consider: Was it easy or hard to fill up this footprint with everything you consumed this week?
- Wrap up the discussion by returning to Goal 12: Responsible Consumption and Production.
  - Explain: Our world must learn how to produce and consume responsibly and sustainably because our material footprint is growing more quickly than our world can handle. We are consuming food, water, and energy faster than they can be produced or replenished, *and* the way that these resources are produced can often create pollution or have negative effects on animals and plants.
  - Click twice and continue to explain: If the number of people on Earth continues to grow, *and* the world doesn't change how it produces and consumes, we will need three planets to provide all of our resources by 2050!
- Conclude class by challenging student groups to complete Part 1 of Handout 4 and summarize what they have just learned. This handout should then be saved in a safe place until the following session.

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## DAY 3 | Slide 13

- Instruct students to take out *Handout 4: SDG 12* and quickly review their work from the previous session.
- Then tell students that they are about to kick off their app brainstorming!
- Click once and explain that each app group will focus on one of the following areas of responsible consumption and production:
  - Water
  - Energy
  - Food
  - Waste

Note: There will be some overlap between these categories!
- Assign one focus area to each app group and try to ensure that at least two groups are focusing on each area. Then distribute copies of the following to each group:
  - *Handout 5: Factsheet* (corresponding section, cut out in advance)
  - *170 Daily Actions Sheet*
- Click once and explain that groups will use this new information to complete Parts 2 and 3 of *Handout 4: SDG 12* with their group over the next 15 minutes. As they do, they will be answering:
  - What **actions** could help your focus area?
  - What **data** could help measure progress in your focus area?

## ELABORATE | Slide 14

**Overview:** Students will use their research and brainstorming to begin “developing” an app that facilitates global data collection and inspires environmentally-friendly action related to their SDG 12 focus area.

### Day 3 | Slide 14

- Tell students that it’s now time to narrow down their brainstorming and design their app!
  - Pass out one *Handout 6: App Dev Packet* to each small group, review the directions together, and answer questions as needed.
  - Tell students that they will have the time remaining\* in class to complete pages one through four in this packet, and then encourage students to begin.
- Note:** If more time is needed by the end of class, allow groups additional time to complete pages 1–4 before continuing to Day 4.

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## EVALUATE | Slides 15–18

**Overview:** After presenting their app ideas, student groups will collaborate to optimize their apps for use by communities around the world.

### DAY 4 | Slide 15

- As class begins, explain that each group will be responsible for briefly sharing phase one of their app designs with the class. The presentations should be quick (no more than two minutes each) and should cover the questions asked on page 5 of their App Dev Packet.
- To prepare, encourage student groups to immediately begin working on the last page of their *Handout 6: App Dev Packet*. Allow about 10 minutes for this presentation preparation.

### Day 4 | Slide 16

- Call the class back together and welcome them to the General Assembly (or meeting) of the United Nations.
- Explain that each group will present their app to the class, including the app's focus area, the environmental action it encourages and why, the data it collects and why, and a brief description of how the app will work.
- Click once and invite groups who focused on water to share first. Then click twice and continue with groups who focused on energy, food, and then waste.
- As groups present, encourage students to listen for ideas that they may be able to use to improve their own app. Remind the class that everyone is working toward the same SDG, so sharing ideas will benefit everyone! At the end of each presentation, encourage students to share ideas they heard that they may be able to incorporate into their own apps.

### Day 4 | Slide 17

- Once everyone has presented, introduce the idea of optimization and explain that it is always important to consider how a design can be improved or *optimized* in order to achieve the desired results.
- Remind students that the goal of their app to help people around the world work toward and measure SDG 12. In order to accomplish this, all app users must understand exactly what data they need to collect and what actions they should take.
- Challenge students to consider how they can optimize their app to ensure it is understood and implemented effectively by all users:
  - Click once and explain that if their app will be used by people of all different ages and backgrounds, it must be as user-friendly as possible. What could be simplified or added to ensure everyone understands the goal of the app and the app's instructions?
  - Click again and encourage students to also consider *how* people around the world are different, and how this may affect their experience with the app. For example:

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- Language: What could students add or include in their app to help people who speak different languages?
  - Phone Access: Explain that not everyone lives in a community where every person owns a smart phone—or even if they have a phone, they may not have internet access or data to use. In communities where people have these limitations on their phones, could the app stay the same or should changes be made?
  - Imagery: How could imagery be changed or added to make it welcoming to all users? For instance, an app that focuses on donating clothes could illustrate many kinds of clothing—and not just outfits typically found in the United States.
- Before students begin their optimization, distribute a few sticky notes to each group and then pair groups together. If possible, pair groups who have worked on the same focus area.
  - Instruct groups to share their apps with each other in more detail, and then help each other evaluate and optimize their apps based on the criteria provided on the slide. Groups may make changes directly to their app designs or describe the change on a sticky note and attach it to a relevant section of their app.

## Day 4 | Slide 18

- Bring the class back together to conclude the session, and encourage groups to share one change that they made to their app to improve its ability to collect data in communities around the world.
- Explain that while their apps may not actually be developed right now, this exploration should serve as an important reminder of how technology can be used to benefit the world.
- Remind students that apps and websites like SciStarter already exist, which students can use to find and participate in a citizen science project that will benefit the environment.
- Challenge students to continue using technology to help the greater good and to continue doing their part to make small impactful changes that help the world work toward the Sustainable Development Goals.

## 4–8 National Standards:

### Next Generation Science Standards

#### Earth and Human Activity

- 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
- MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

#### Engineering Design

- 3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

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- MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

## Standards for Technological Literacy (ITEEA) Standards

Standard 1: Students will develop an understanding of the characteristics and scope of technology. In order to comprehend the scope of technology, students should learn that:

- E. Creative thinking and economic and cultural influences shape technological development.
- F. New products and systems can be developed to solve problems or to help do things that could not be done without the help of technology.

Standard 5: Students will develop an understanding of the effects of technology on the environment. In order to discern the effects of technology on the environment, students should learn that:

- B. Waste must be appropriately recycled or disposed of to prevent unnecessary harm to the environment.
- C. The use of technology affects the environment in good and bad ways.
- F. Decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.

Standard 8: Students will develop an understanding of the attributes of design. In order to comprehend the attributes of design, students should learn that:

- C. The design process is a purposeful method of planning practical solutions to problems
- E. Design is a creative planning process that leads to useful products and systems.

## Common Core English Language Arts Standards

### Reading

- CCSS.ELA-LITERACY.CCRA.R.7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

### Writing

- CCSS.ELA-LITERACY.CCRA.W.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

### Speaking and Listening

- CCSS.ELA-LITERACY.CCRA.SL.1: Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
- CCSS.ELA-LITERACY.CCRA.SL.2: Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.



## Sources

Citizen science and the United Nations Sustainable Development Goals: [researchgate.net/profile/Dilek\\_Fraisl/publication/336375789\\_Citizen\\_science\\_and\\_the\\_United\\_Nations\\_Sustainable\\_Development\\_Goals/links/5da4967445851553ff91ed7b/Citizen-science-and-the-United-Nations-Sustainable-Development-Goals.pdf?origin=publication\\_list](https://researchgate.net/profile/Dilek_Fraisl/publication/336375789_Citizen_science_and_the_United_Nations_Sustainable_Development_Goals/links/5da4967445851553ff91ed7b/Citizen-science-and-the-United-Nations-Sustainable-Development-Goals.pdf?origin=publication_list)

Ensure Sustainable Production and Consumption Patterns: [un.org/sustainabledevelopment/wp-content/uploads/2019/07/E\\_Infographic\\_12.pdf](https://un.org/sustainabledevelopment/wp-content/uploads/2019/07/E_Infographic_12.pdf)

Final list of proposed Sustainable Development Goal indicators: [sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf](https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf)

Goal 12: Responsible Consumption, Production: [sdgfund.org/goal-12-responsible-consumption-production](https://sdgfund.org/goal-12-responsible-consumption-production)

Goal 12: Responsible Consumption and Production: [undp.org/content/undp/en/home/sustainable-development-goals/goal-12-responsible-consumption-and-production.html](https://undp.org/content/undp/en/home/sustainable-development-goals/goal-12-responsible-consumption-and-production.html)

Global Waste to Grow by 70 Percent by 2050 Unless Urgent Action is Taken: World Bank Report: [worldbank.org/en/news/press-release/2018/09/20/global-waste-to-grow-by-70-percent-by-2050-unless-urgent-action-is-taken-world-bank-report](https://worldbank.org/en/news/press-release/2018/09/20/global-waste-to-grow-by-70-percent-by-2050-unless-urgent-action-is-taken-world-bank-report)

Responsible Consumption and Production: Why It Matters: [un.org/sustainabledevelopment/wp-content/uploads/2016/08/12.pdf](https://un.org/sustainabledevelopment/wp-content/uploads/2016/08/12.pdf)

Solid Waste Management: [unenvironment.org/explore-topics/resource-efficiency/what-we-do/cities/solid-waste-management](https://unenvironment.org/explore-topics/resource-efficiency/what-we-do/cities/solid-waste-management)

Sustainable Development Goals Overview: Ensure Sustainable Production and Consumption Patterns: [unstats.un.org/sdgs/report/2019/goal-12/](https://unstats.un.org/sdgs/report/2019/goal-12/)

The Case for a Digital Ecosystem for the Environment: [un-spbf.org/wp-content/uploads/2019/03/Digital-Ecosystem-final.pdf](https://un-spbf.org/wp-content/uploads/2019/03/Digital-Ecosystem-final.pdf)

UNEP Report Finds “Good Progress” on 23% of Environment-related SDG Indicators: [sdg.iisd.org/news/unep-report-finds-good-progress-on-23-of-environment-related-sdg-indicators/](https://sdg.iisd.org/news/unep-report-finds-good-progress-on-23-of-environment-related-sdg-indicators/)

**Directions:** Review the data below with a partner. For each example, discuss:

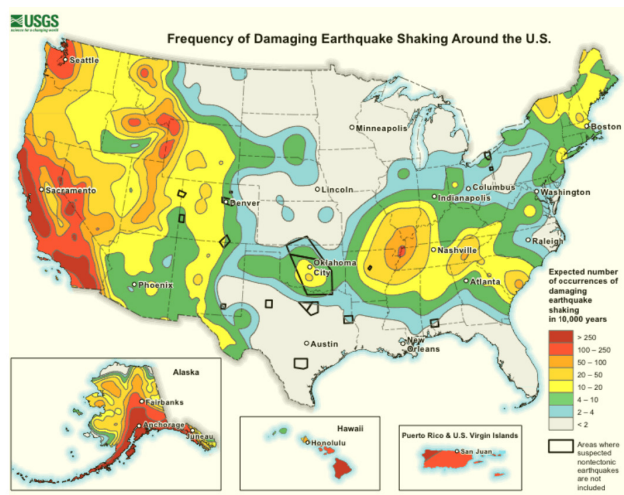
1. What does this data help us understand?
2. What problems (big or small) could this data help us solve?

## New York, NY, USA

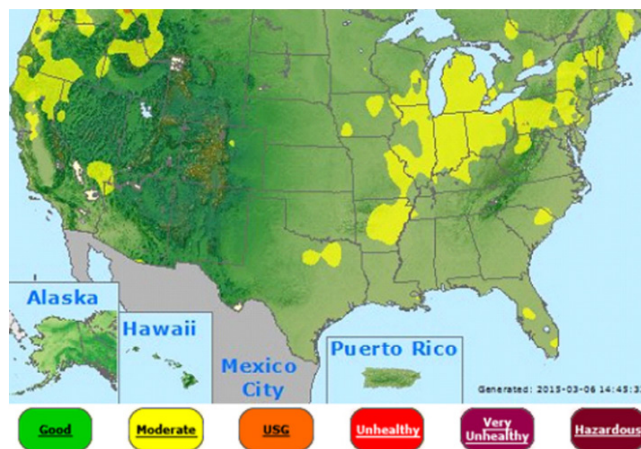
Weather averages

[Overview](#) [Graphs](#)

Month	High / Low (°F)
September	76° / 61°
October	64° / 50°
November	55° / 42°
December	44° / 31°

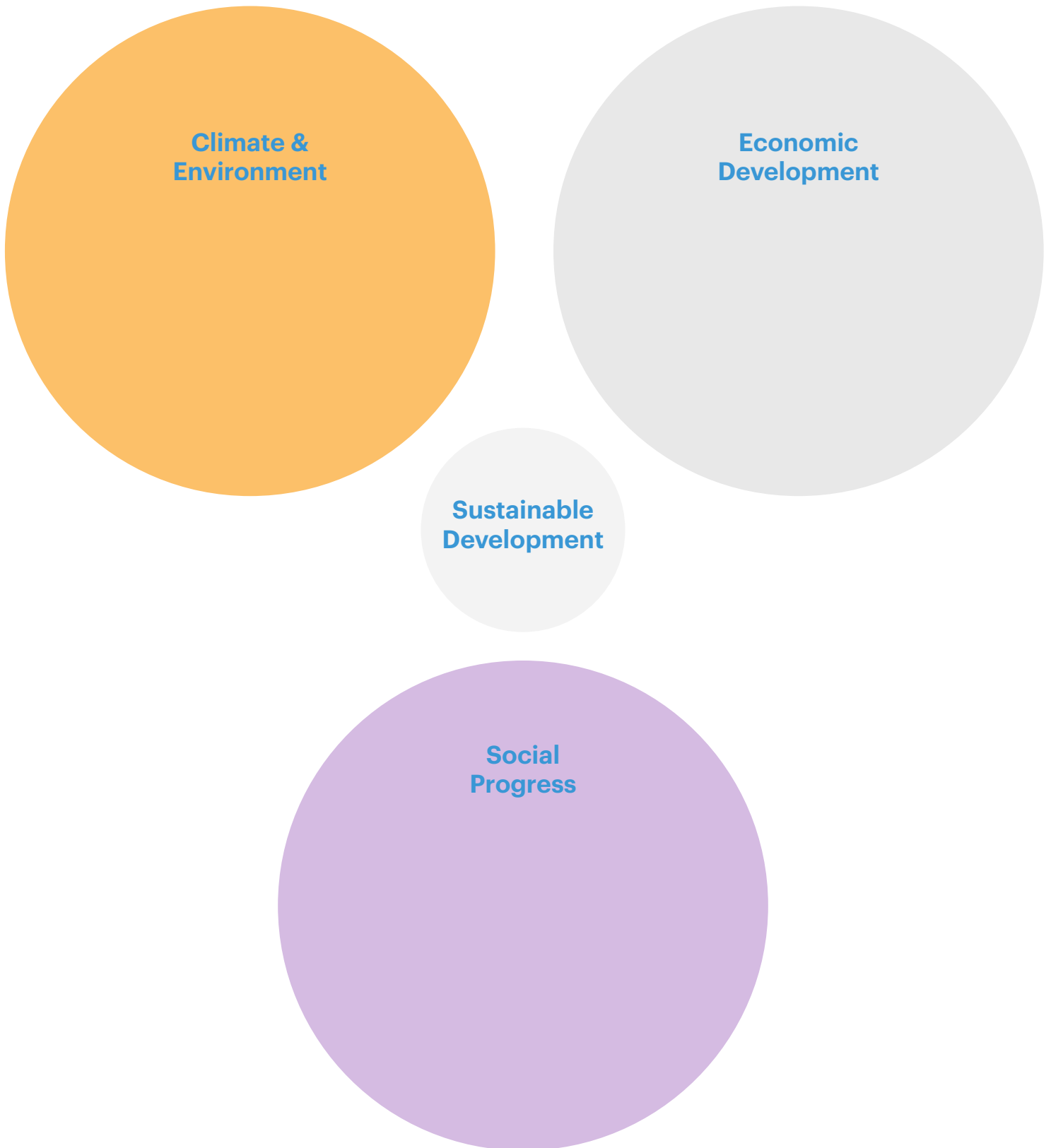


Air Quality Index: How polluted is the air?





**Directions:** The idea of sustainable development can be broken down into three categories. As you watch the video, jot words or sketch pictures to help you understand each one.



### Mosquito Alert App

*If your device has the Mosquito Alert App:*

1. Open the yellow and white Mosquito Alert app.
2. Tap the three lines in the top right corner.
3. Tap “App Tutorial.”
4. Tap “See Guide.”
5. Read each page of the guide, and then click the right arrow to go to the next page.
6. Click through the app to view some of the other pages.
7. Answer the questions below.

*If your device does not have the Mosquito Alert App:*

1. Open your web browser and type: [mosquitoalert.com/en/project/what-is-mosquito-alert/](https://mosquitoalert.com/en/project/what-is-mosquito-alert/)
2. Read the information on the webpage.
3. Next, go to [mosquitoalert.com/en/project/send-data/](https://mosquitoalert.com/en/project/send-data/) and review what the app looks like.
4. Answer the questions below.

Who do you think this app is designed for? Could anyone around the world use the app? Why or why not?

How does an app user submit data on this app? Why is this data important?

### Sunlight Tracker

Did you know that SciStarter.com has more than 1,500 citizen scientist projects?

1. Let's explore one! Open a web browser and type: [scistarter.org/sunlight-tracker](http://scistarter.org/sunlight-tracker)
2. Read the information on the project page.
3. Click on the "Sunlight Tracker" website.
4. Read the information on the home page to learn more about the project.
5. Answer the questions below!

Who do you think this app is designed for? Could anyone around the world use the app? Why or why not?

How does an app user submit data on this app? Why is this data important?

### Ant Forest

1. Open a web browser and type: [tinyurl.com/vzk8u65](https://tinyurl.com/vzk8u65)
2. Watch the video and learn more about the Ant Forest App.
3. Answer the questions below.

Who do you think this app is designed for? Could anyone around the world use the app? Why or why not?

What environmental data does this app collect? Why is it important?

How does this app help the environment?



### Part 1: Overview

In your own words, what is SDG 12?

Why is this goal important to our world?

### Part 2: Focus (circle one)

Water

Food

Energy

Waste

**Learn more:** Read the Factsheet and highlight any details that you think a citizen scientist may be able to help improve! Then read the Daily Action handout and highlight any actions that would help your focus area.

### Part 3: Connect

Water

Food

Energy

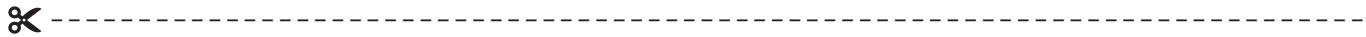
Waste

Fill out at least two rows in the chart below.

What action could people around the world take that would help your focus area?	What data could citizen scientists collect that would help scientists understand if this focus area is improving?
For example (if you were working on SDG 3: Good Health and Wellbeing): People can remind others to wash their hands after using a public restroom.	Every day, we can keep track of how many times we see people wash and not wash their hands after using a public restroom.

**Water Facts:**

- Only 3 percent of the world's water is drinkable, and humans are using it and polluting it faster than it can recover.
- Around the world, 1 in 3 people do not have access to safe drinking water.
- Excessive (too much) use of water makes water stress worse around the world. Water stress is when there is not enough water to meet everyone's needs.
- In addition to how we use water in our homes, our fashion decisions affect water stress. 2,700 liters of water are used to make a cotton shirt and 9,982 liters of water are used to make a pair of jeans.
- It is important for people who have access to fresh water to think about how much water they use and try to consume it responsibly.

**Energy Facts:**

- There are two types of energy: renewable energy and non-renewable energy.
  - Renewable energy comes from sources that don't run out, like sunlight, wind, and rain. When this type of energy is used, there is less air pollution.
  - Non-renewable energy comes from sources that can run out, like oil, natural gas, and coal. These are all fossil fuels. When fossil fuels are used as an energy source, it increases air pollution.
- The world's energy use is growing.
  - Transportation is the area where energy use is growing most quickly.
    - The number of people who own cars, as well as the total miles people drive and fly in a year, is continuing to increase.
  - Energy used in homes and businesses is growing the second fastest.
- The fashion industry is responsible for about 10% of the world's greenhouse gas emissions. To make new clothes, the fashion/clothing industry uses more energy than airplane flights and shipping industries combined.
- In 2015, a little under 1/5 of all of the world's energy use was from renewable energy sources.
- It is important to conserve how much energy we use and to consume energy responsibly!

## Food Facts

- Every year about 1/3 of all food produced is wasted—mostly due to rotting while in stores or homes or spoiling as it is transported from place to place.
- Almost 2 billion people go hungry or are undernourished every year.
- 2 billion people around the world are overweight or obese.
- While it's the production of food that hurts the environment, consumers affect the production! The choices that consumers make impact what producers produce.  
To have a sustainable diet, we can...
  - Reduce the amount of meat we eat: Land is being overused as food production and a demand for animal-based products increases this pressure. When land is overused, entire ecosystems can be lost. Eating a diet with more plant products can help, because plants need less land to grow.
  - Eat local, seasonal food: This kind of food requires less energy to make its way from farms to our plates, and there is less of a chance of food loss to spoilage (and therefore waste) as it travels.
  - Buy (or catch) fish from sustainable stocks: When a fish is from a sustainable stock, it means that there are enough fish in the ocean for this fish breed to continue indefinitely. When one kind of fish is overfished, the entire food web can be affected.

## Waste Facts

- Every year about 1/3 of all food produced is wasted—mostly due to rotting while in stores or homes or spoiling as it is transported from place to place.
- 11.2 billion tons of solid waste is collected worldwide. More than 1/10 of this waste is plastic!
- Every second, the equivalent of one garbage truck of fabric (mostly from clothing) is either brought to landfills or burned.
- Waste contributes to air and water pollution, and contaminates soil. This impacts the water we drink and the food we grow. It also damages ecosystems and can cause disease.
- People around the world should try to produce as little waste as possible. We should also try to recycle and/or reuse our resources whenever we can. When consumers decide to reuse and recycle, it reduces what needs to be produced. When less is produced, fewer greenhouse gases are released.

## Fact Sources

- [un.org/sustainabledevelopment/sustainable-consumption-production](https://un.org/sustainabledevelopment/sustainable-consumption-production)
- [un.org/sustainabledevelopment/blog/2019/08/actnow-for-zero-waste-fashion/](https://un.org/sustainabledevelopment/blog/2019/08/actnow-for-zero-waste-fashion/)
- [who.int/news-room/detail/18-06-2019-1-in-3-people-globally-do-not-have-access-to-safe-drinking-water-unicef-who](https://who.int/news-room/detail/18-06-2019-1-in-3-people-globally-do-not-have-access-to-safe-drinking-water-unicef-who)
- [fao.org/nutrition/education/food-dietary-guidelines/background/sustainable-dietary-guidelines/en/](https://fao.org/nutrition/education/food-dietary-guidelines/background/sustainable-dietary-guidelines/en/)

**Directions:** It's time to create your app design! This packet will guide your group as you:

1. Narrow down your app ideas.
2. Design the three main pages of your app.
3. Prepare to share your ideas.

### Step 1: Narrow down your app ideas from Handout 4.

**What one easy action could people around the world take to help your focus area?** Be clear and specific.  
*Example for SDG 3: Health & Wellbeing: People could remind others to wash their hands after using public restrooms.*

**What data or information could be collected around the world to help scientists understand if progress is being made in your focus area?** The simpler, the better!

*Example for SDG 3: Health & Wellbeing: People could count the number of people they see who wash their hands after using a public restroom as well as the number of people they see who don't wash their hands after using a public restroom.*

**How could an app collect this data or information?** The easier, the better!

*Example for SDG 3: Health & Wellbeing: People could click a button on the app every time they are in a public restroom and see someone wash their hands, and another button each time they see someone who doesn't wash their hands. The app will keep track of these totals every day.*



**Step 2: App Development—Homepage**

Below, design your app’s homepage. It must include:

- A name for your app.
- Words, a picture, or a symbol that explains the app’s overall purpose.
- Pictures or words that link to the Action Page and Data Page.
- Pictures or words that educate users about the importance of the app and encourage people to use it.

As you design, think carefully about how people will use this app page. Draw an arrow from anything that the user will click on (buttons, links, pop-ups, etc.) and explain in the margin how it will work!



**Step 2: App Development— Action Page**

Below, design your app’s Action Page. It must include:

- A short description of the action you want people to take.
- A short description of why this action is important.
- Pictures or words that encourage people to take this action.
- A way for people to document the action they took. In other words, how will they show or prove that they took this action?

As you design, think carefully about how people will use this app page. Draw an arrow from anything that the user will click on (buttons, links, pop-ups, etc.) explain in the margin how it will work!



**Step 2: App Development—Data Page**

Below, design your app’s Data Page. It must include:

- A short description of the data people will collect. Remember: Everyone must collect their data the same way!
- A short description of why this data is important.
- A simple way for people to submit the data they collect. In other words: *How* will they use the app to share their data?
- Pictures or words that encourage people to collect this data.

As you design, think carefully about how people will use this app page. Draw an arrow from anything that the user will click on (buttons, links, pop-ups, etc.) and explain in the margin how it will work!



### Step 3: App Presentation Prep

Your group will be responsible for sharing your app with the class. Be ready to present the ideas below!

1. **Overview:** What is your focus area? How will your app inspire people to take an action *and* what data will it collect?
  
2. **Closer Look:** Be ready to use your app designs and demonstrate how your app will work.

Record the most important points that you should share about each app page below. Clearly explain *how* each page of your app will help your focus area!

**Home Page:**

**Action Page:**

**Data Page:**