



## Official BioPenPals Lesson Plan

### What is the BioPenPals project?

BioPenPals is similar to any pen pal experience teachers may have had in the past. The main difference is that BioPenPals is aligned with Next Generation Science and Common Core Standards (USA). Students make nature observations, record their findings, and compare them to observations from other countries. The project focuses on biodiversity, habitat, and adaptations as a way to teach students the importance of scientific observation and citizen science. In addition, it teaches students about other landscapes, cultures, languages, and the positive power of social networking.

### What materials will I need to participate?

Participation is easy! There is no need to spend money on BioPenPals.

- Tablets or smartphones (Please borrow or use your own! Any “smart” device will do!)
  - You will need one device for every 3-5 students.
- WIFI internet connection inside your school or classroom
- iNaturalist app (free to download at the [Google Store](#) or [Apple App Store](#))
- The official BioPenPals data sheet: [Click here for a free download!](#)
- At least three class periods

### What activities do the students complete?

1. Classes connect with each other from schools in different countries. [Click here to connect!](#)
2. Students record species observations outdoors at their school or park using the iNaturalist app.
3. Students analyze observation data using the BioPenPals data sheet.
4. Students post their results as journal entries on iNaturalist.org.
5. Students prepare and share a Nature and Culture Report with details about themselves and their environment.
6. Optional: Classes connect through Skype or mail to compare language, culture, schools, etc.!

## Objectives

Upon completion of BioPenPals, students will be able to...

- Observe and record biodiversity
- Compare species' habitats and adaptations through research and analysis
- Write journal entries to share their academic findings
- Interact with peers from across the globe

## Prepare to Make Connections

- [Register here](#) to connect with a sister class. The National Park Service will hand-select sister classes based on grade level. Once connected, we will connect you and your sister teacher through email.
- Make a plan to borrow tablets or smartphones if the students cannot provide their own.
- Review the [iNaturalist Teacher's Guide](#).
- Create one [iNaturalist account](#) for your class.
- Download the [BioPenPals Data Sheet](#) to print or use electronically with your students.
- If possible, collect field guides and/or partner with local experts who can confirm (identify) iNaturalist observations.
- Select the site that will be used by students to make iNaturalist observations (school, park, etc.).
- Set up smart devices:
  - Download iNaturalist app (free to download at the [Google Store](#) or [Apple App Store](#)) onto each device.
  - Log into your classroom account on each device. If students are under the age of 13, it is especially important that they use a classroom account to protect their privacy.
  - To use the iNaturalist app, you must give your devices permission for the app to access the camera and location information.

## The Activities

- **Getting to Know iNaturalist**
  - Create teams of 2-5 students. Each team selects a name.
  - Introduce the ideas of pen pals and observing biodiversity. Explain that these concepts combine to make BioPenPals.
  - Present an age-appropriate version of [iNaturalist community guidelines](#). Students should have a clear understanding of appropriate behavior and the need for privacy.
  - Demonstrate how to use the iNaturalist app and allow students to explore the app by

exploring previously recorded observations from around the world.

- Try going outside your classroom and letting the students make some practice observations of species that are easy to find.

- **Go Outside!**

Outdoor observations

1. Coordinate via email with your sister teacher to find out when and where their class will be going outside to record observations. You do not need to do the activities on the same day, but students will be curious.
2. You'll be using the tablets or smartphones, but you won't need a WIFI or data connection during the outdoor activities,
3. Each team gets at least one smart device to record species observations on the iNaturalist app.
4. Students try to record as many observations as they can! The app asks students to take photos of organisms and attempt to identify them in the field. Any help of field guides or local experts is especially useful here for student learning.
5. Make sure each observation is saved in the app. No WIFI or data connection is needed during the outdoor activities.

- **Back in the Classroom**

Data upload

- Using a WIFI connection, teams work with the teacher to make sure all observations are posted to the BioPenPals project in iNaturalist.

Data analysis

- Each team completes one BioPenPals data sheet.

Journal posts

1. Each team of students will post to your class's journal summarizing their team's experience as they recorded observations and compared them to those of their sister class. The post will be public, but it should be directed to your sister class.
  - i. Encourage creativity.
  - ii. Use only first names for privacy.
  - iii. You can instruct students to save their drafts instead of posting them, so you can review them before they become public. Or, students can post them directly, and they can be edited if necessary.
2. As a class, review and discuss the sister class's journal posts.

## Nature and Culture Report

- a. Teams work together to compile a Nature and Culture report including
  - i. A class photo with students labeled by first names.
  - ii. A list of the class's Top 10: foods, music, and hobbies.
  - iii. Photos and/or artwork of using the outdoors space for species observations.
  - iv. A paragraph or poem about what their outdoor space means to them; why is the place special or important?
  - v. A fiction or non-fiction story about one of the organisms they or their sister team observed.
  - vi. Questions or reflections about their sister team's journal entry.
- b. Send the Nature and Culture Report via email to your sister teacher. Or, package carefully in an international flat rate box and send from the post office.

### • Conclusion

1. You'll receive a Nature and Culture Report from your sister teacher.
  - a. Designate enough time for students to open, read, and share their sister team's report with each other.
  - b. Hold an open discussion
    - i) Ask students to describe the main similarities and differences between the species they observed and their sister team's results.
    - ii) Ask students why they think those similarities and differences exist.
    - iii) Discuss how using iNaturalist observations and identical data sheets helped them communicate with their sister teams.
    - iv) Ask students to use information from their sister team's iNaturalist journal entry and letter to describe their sister team's experience and how it compares to their own.
    - v) Students share challenges and favorite things about the project.

### Extensions

- Sister teams can continue exchanging letters.
- Lesson can be repeated a second time during the school year to observe seasonal variations.
- Add a language component where students ask a question or write a description in the sister team's language.

- Set up a Skype call between the two classes. For this, ask the students to write questions for their sister class beforehand.

### **Sample Discussion Questions**

1a. How many types of (taxonomic class) did our class find, and how many did our sister class find?

1b. How could the environment affect this number? Explain your answer.

2a. How many different types of habitats did we search? How many did our sister class search?

2b. How many different organisms did we find? How many did our sister class find?

2c. Do you think the number of habitats and number of different organisms are related? How do you think they are related, and what evidence do you see to support your idea?

3. Describe what would happen to the organisms and the environment if one of the parts of the food web disappeared. Use evidence to support your answer.

4a. Did you or your sister team record a visible human influence? What was it, and how do you think that influence might impact the organisms or the environment?

4b. What do you think would change if the human influence was removed? Explain your reasoning.

### **Next Generation Science Standards:**

#### **3-LS3-2**

Use evidence to support the explanation that traits can be influenced by the environment.

#### **3-LS4-3**

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

#### **MS-LS2-1**

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

**MS-LS2-2**

Construct and explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**MS-LS2-4**

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**Common Core Standards:**

**CCSS.ELA-LITERACY.W.3.2.A**

Introduce a topic and group related information together; include illustrations when useful to aiding comprehension.

**CCSS.ELA-LITERACY.W.3.2.B**

Develop the topic with facts, definitions, and details

**CCSS.ELA-LITERACY.W.3.3**

Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.