Part 5 | DIY Circulating Kits

We created DIY circulating kits in order to make participation in Neighborhood Science projects available to community members who can't attend our programs, or who want to learn about and contribute to the projects at their own pace. These DIY kits can significantly lower the barriers to entry due to lack of resources (e.g., equipment, tools, and easy-to-follow instructions, etc.) and motivate patrons of all ages to contribute to real-world scientific research.

DIY circulating kits need to be:

- Simple enough for people to understand how to do the projects without assistance
- Small enough to be carried and stored easily
- Inexpensive enough to create multiple kits, with additional funds available to purchase replacements if any elements become lost or damaged
- Interesting enough to appeal to all ages
- Flexible enough that community members without access to mobile technology can still participate in gathering and sharing data

Each DIY circulating kit contains:

- Instruction packet and laminated, erasable data collection sheets
- User feedback form
- Collection & observation tools
- Observation journal or notebook

To better sustain a high level of engagement, consider surveying your patrons, frontline librarians, and staff to identify interests and community concerns. While they can be fun STEAM activities, these Neighborhood Science kits will be even more meaningful to your patrons when they are tied to a research project that addresses topics relevant to their neighborhood, such as loss of biodiversity, pollution, or health issues.

Globe at Night (Light Pollution Monitoring) Kit

Why Do Scientists Study Light Pollution?

Scientists study light pollution in order to better understand how it impacts the climate and the ecosystem in urban areas. The thousands of lights that illuminate the cities of today have been shown to increase the average air temperature which contributes to the harmful effects of climate change.

What's in the Kit?

- 1 Sky Quality Meter (SQM)
- 1 Red LED Light Flashlight
- 1 Planisphere (Stargazing Chart)
- 1 Mini GPS Location Finder
- 1 USB Charging Cable
- 1 Spare 9V Battery
- 1 spare AA Battery
- 1 Sharpie
- 1 Eraser
- 1 Observation Journal
- Safety Rules

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How to Help Scientists Collect Data?

Go to *SciStarter* and view the instructions on how to conduct a night sky observation. You will first need to create a free account.

Step 1

If you have a smart device, turn on the GPS feature. You can also use Google Maps or download a free GPS-Map app for your iOS/Apple or Android device.

If you don't have a smart device, use the Mini GPS tracker included in the kit for location coordinates and elevation information. Press and hold the middle button to turn on the GPS and give it 8-15 minutes to connect to a satellite. When connected, the screen will display a signal icon with bars and a blinking black bullet. Press the top button three times to see coordinates and two more times to see the elevation information measured in meters. Press and hold the middle button to turn the GPS off.

Step 2

On a night when the moon is not high, at least an hour after sunset, go outside to a clear spot with your Sky Quality Meter (SQM), your planisphere/constellation guide, and your red LED flashlight to protect your night vision. Make sure to write down the serial number of your SQM for when you are submitting your data.

Step 3

With the sensor/faceplate pointing towards the sky, push the red button on your SQM once and wait as it takes its reading. Once it's finished be sure to take note of the measurement or record the measurement on the data card.

Step 4

Next, using your planisphere and the Observe tab on the Globe at Night website, see which constellations you can find on your own.

Step 5

Go to the Globe at Night website to enter the data you collected from your observation. Allow the webapp to use your current location.

Step 6

Complete our survey and return the kit to the library so someone else can contribute.

Monitoring Water Quality Kit

Why Do Scientists Study Water Quality?

Rising sea levels and increasing average global temperatures due to climate change are threatening the quality of water that is essential to ecosystems across the globe. Scientists study data such as pH, electrical conductivity (EC), and temperature from samples of different water sources to better understand the effects that climate change may have on the quality of water.

What's in the Kit?

- 1 Distilled Water Wash Bottle
- 1 Empty Water Bottle with Cap
- 1 Pack of pH Paper
- 2-3 Glass Vials with Cap
- 1 HANNA DiST TDS Meter
- 1 Mini GPS Location Finder
- 1 USB Charging Cable
- 1 Instructions Packet
- 1 Sharpie
- 1 Eraser
- 1 Observation Journal
- 1 Pair of Gloves
- Safety Rules

How to Help Scientists Collect Data?

- Download the *mWater Surveyor* app for Android or iOS/Apple. Open the app and follow the instructions to create an account using your email address.
- Turn on the GPS feature on your smart device for accurate location coordinates and elevation. You can also use Google Maps or download a free GPS-Map app for your iOS/Apple or Android device.
- Access the complete mWater Surveyor app tutorial and reference guide.

Collecting and Surveying Water Samples

Step 1

Fill the clear 250 mL bottle in the kit with water from the source you want to sample (e.g. faucet, hose). To test water from additional sources, fill the glass vials in the kit for sample collection.

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Step 2

Immerse 1 pH testing strip into the water sample for up to 2 seconds and then remove. Shake off excess liquid. Wait 10 seconds and then compare the colors produced on the indicator pads with those on the color chart before the indicator pads dry. Record the pH value that contains colors that best reflect the colors that are on the strip. *Keep all unused pH testing strips in the original packaging.*

Step 3

Record the pH value on the data card using the Sharpie included the kit (marking is erasable using the included eraser).

Step 4

Turn on the TDS meter in the kit and dip the meter probe into the filled bottle (included) or a paper cup (not included) that contains the water sample. You will use TDS meters to test Total Dissolved Solids (TDS) in parts per million (PPM), and Electrical Conductivity (EC). Conductivity of water is important because it reveals water's salinity and the concentration of other minerals and contaminants. Record the values that appear on the display on the data card.

Only use the TDS meter for fresh water testing. Do NOT use it to test ocean/salt water.

Step 5

Return to the *mWater* app or website and input and submit the data you collected.

Step 6 - Cleaning

Drain the water sample in the collecting bottle or vials. Use the included distilled water to rinse the bottle and vials. Leave the cap off of the vials and bottle to dry. Place the caps back on the dried bottles and vials and put them back into the kit bag along with other equipment and materials that need to be returned.

Rinse the probe of the TDS meter in *tap water only* to neutralize the acidic fluid that was tested. *Do not* rinse it with distilled water.

Step 7

Complete our survey and return the kit to the library so someone else can contribute.

Don't have a smartphone or tablet? Follow these steps to participate in this project.

Clouds with NASA GLOBE Observer Kit

Why Do Scientists Study Clouds?

Clouds affect the overall temperature of the Earth and play a large role in controlling the planet's long-term climate. Scientists need accurate data on clouds to understand their impact over time. Satellites only see the top of the clouds while we see the bottom—together we get a much more complete picture of clouds and their effects in the atmosphere.

What's in the Kit?

- 1 Book: *What is Happening to Our Climate?*
- 1 GLOBE Cloud Identification Chart
- 1 Mini GPS Location Finder
- 1 USB Charging Cable
- 1 Sharpie
- 1 Eraser
- 1 Observation Journal
- Safety Rules

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How to Help Scientists Collect Data?

Step 1

Go to ***SciStarter.*** Create an account to access instructions on how to conduct, record, and share your cloud observations. You will also be directed to download the *GLOBE Observer* app.

Step 2

Open the *GLOBE Observer* app and follow the instructions to create an account.

Step 3

Turn on the GPS feature on your phone for the *GLOBE Observer* app to capture accurate location coordinates. You can also use Google Maps or download a free GPS-Map app for your iOS/Apple or Android device.

Step 4 (Optional)

Still not sure about your observations? Check out the *GLOBE Observer* tutorials page.

Step 5

Complete our survey and return the kit to the library so someone else can contribute.

Don't have a smartphone or tablet? Follow these steps to participate in this project.

Exploring Biodiversity with iNaturalist Kit

Why Do Scientists Study Biodiversity?

Biodiversity—the variety of life in a habitat or ecosystem—is a good indicator of how healthy an ecosystem is, which is why it is important for scientists to know about the different types of species living in a particular area. Studying biodiversity gives scientists and researchers a better understanding of the impacts of human activity and climate change on the ecosystem.

What's in the Kit?

- 1 Clip-On Lens Kit for Mobile Device
- 1 Plastic Tweezer
- 1 Mini GPS Location Finder
- 1 USB Charging Cable
- 1 Instructions Packet
- 1 Sharpie
- 1 Eraser
- Safety Rules

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How to Help Scientists Collect Data?

Step 1
Download the *iNaturalist* app for Android or iOS/Apple. Open the app and follow the instructions to create an account.

Step 2
Go to *SciStarter*. Create an account to view the *Exploring Biodiversity* page and instructions.

Step 3
Turn on the GPS feature on your smart device for accurate location coordinates and elevation. You can also use Google Maps or download a free GPS-Map app for your iOS/Apple or Android device.

Step 4
Connect your *iNaturalist* account to your *SciStarter* account through the Account Settings on your *SciStarter* Dashboard.

Step 5
To take pictures of small things like insects or flowers, use the clip-on macro lens in the kit from about an inch away. To take pictures of things far away, clip the zoom or telephoto lens onto your smart device.

Step 6
Open the *iNaturalist* app and click on the camera icon to take pictures of and submit your observations.

Step 7
Complete our survey and return the kit to the library so someone else can contribute.

Don't have a smartphone or tablet? Follow these steps to participate in this project.

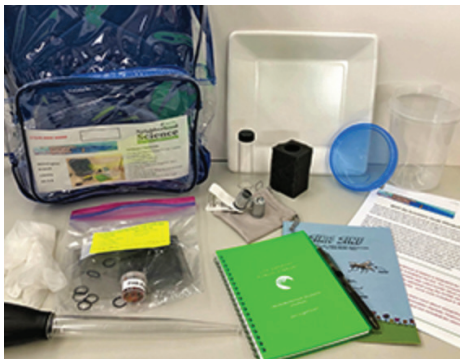
Mosquito Habitat Mapping with NASA GLOBE Observer Kit

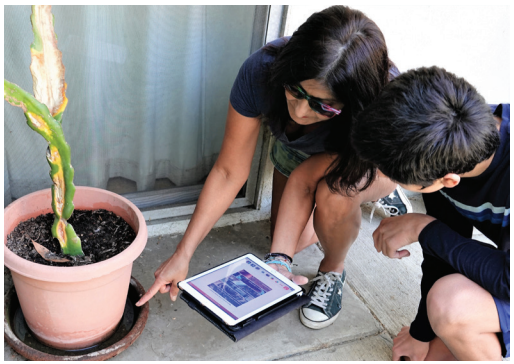
Why Do Scientists Study Mosquito Habitats?

Invasive mosquito species are spreading rapidly across Southern California with the potential to transmit viruses that cause serious diseases such as West Nile virus, dengue, and Zika. Surveillance and breeding site mitigation are key to preventing mosquito-borne disease outbreaks.

What's in the Kit:

- Trap Supplies
- 1 Turkey Baster
- 1 Plastic Container with Lid
- 2 White Paper Plates
- 1 Clip-on Cellphone Magnifier
- 1 Plastic Tweezer
- 1 Glass Vial of Rubbing Alcohol
- 1 Pair of Gloves
- 1 Sharpie
- 1 Eraser
- 1 Observation Journal
- 1 Book: *Zika Zine*
- 1 Instructions Packet
- Safety Rules





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How to Help Scientists Collect Data?

Step 1
Download the *GLOBE Observer* mobile app to your smartphone or tablet.

Step 2
Open the app and follow the instructions to create an account. You must have a valid email address.

Step 3
Turn on the GPS feature on your phone for the *GLOBE Observer* app to capture accurate location coordinates. You can also use Google Maps or download a free GPS-Map app for your iOS/Apple or Android device.

Step 4
Go to *SciStarter* and view the instructions on how to conduct, record, and share your mosquito observations digitally from a natural container. You will first need to create a free account.

Step 5
To conduct observations using your own mosquito trap, use the supplies in the kit and follow the instructions to build and set up a mosquito trap. To record your observations, select *New Mosquito Habitat Observation* in the app, and select *Container: Artificial.* Next, select Other, and then select *Adult Mosquito Trap.* Now make your observations of any larvae or any eggs in your trap. Make sure to submit your observations once a week.

Step 6
Read the Mosquito Habitat Mapper Tutorial, for detailed, step-by-step instructions on how to collect specimens and observations with the *GLOBE Observer* Mosquito Habitat Mapper.

Step 7
Complete our survey and return the kit to the library so someone else can contribute.

Don't have a smartphone or tablet? Follow these steps to participate in this project