

# Build a Mosquito Trap

## Activity Guide



**Build a simple trap to capture mosquito eggs and larvae using recycled and inexpensive materials.**

### Introduction

This simple DIY trap will allow you to set up sites for ongoing monitoring of mosquito breeding that can be reported using the GLOBE Observer Mosquito Habitat Mapper tool. When you monitor potential mosquito breeding habitats using the GLOBE Observer mobile app, you are also helping scientists identify the conditions in which mosquitoes thrive so that they can help forecast disease outbreaks.

### Time

- To create the trap, 15 minutes – 30 minutes, depending on whether this activity is done as a demonstration or hands-on activity, or part of an ongoing program.
- 1-2 weeks for the trap to collect eggs and develop into larvae.
- 20-30 minutes to review trap contents and report the data using GLOBE Observer.

### Materials

- Empty 2 Liter plastic bottle (1 per trap)
- Netting or Mesh (e.g., nylon netting from a fabric store or laundry bag) with very small openings – just large enough for mosquito eggs to fall through (note: the eggs are barely visible, nearly microscopic- (you will need netting with openings larger than pantyhose).
- Scissors or an X-Acto or utility knife (see safety warning)
- Rubber band (1 per trap)
- Packing or duct tape
- Black paper or tape
- Sandpaper
- Water Bait: rice water (the milky liquid left after washing rice), pond water, water with a couple of pinches of fish food added.
- GLOBE Observer app, downloaded to smart phone or tablet. Note: you will need to create a login and register – see instructions under “Program.”

### Safety

- Use extreme caution cutting the plastic bottle. This step can be done in advance when working with a group, or use a utility knife to create a starter cut for participants, which can then be more easily cut with rounded scissors.

- Traps are used to lure mosquitoes. Select quiet locations to place the traps, away from visitor seating areas.
- When checking the trap for eggs and larvae, if there are any adult mosquitoes in the reservoir gently swirl to drown so they can't bite.

Before going outside, warn participants of potential hazards

- Adult Mosquitoes: Visitors should wear insect repellent and long sleeves, if possible.
- Contaminated Water: Visitors should not touch water with their bare hands.
- Site-Specific Hazards: Warn visitors of hazards specific to your location, such as traffic and uneven terrain.

## Preparation

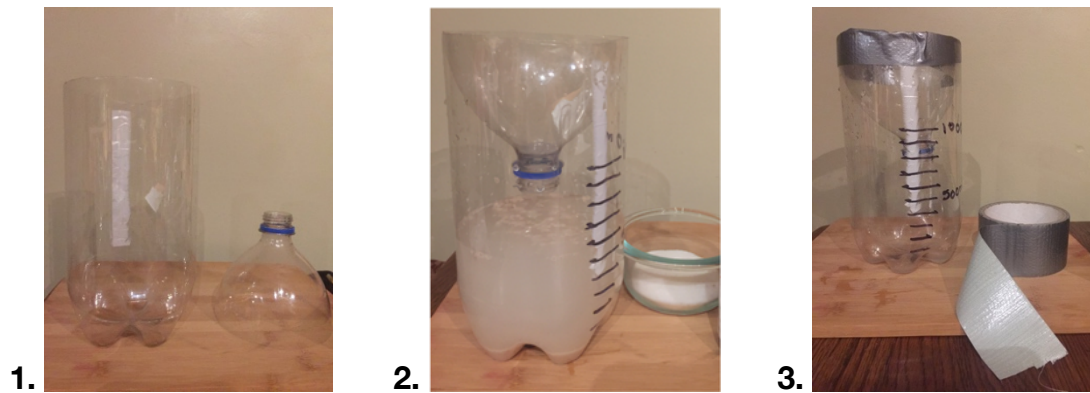
- In the event announcement, include a request to participants to bring in a clean, empty 2 liter plastic bottles. These will be used to build traps. Participants will be able to take their completed trap home at the end of the event.
- Setup a recycling center where visitors can donate recycled bottles in preparation for the event.

### 2-3 days prior to your event

- Determine how many traps you plan to create in your program, and whether as a hands-on activity, make-and-take activity, a demonstration, or display.
- If you are going to set up traps around your site (library museum, science center, schoolyard), scout out potential locations in advance. It is possible to include both indoor and outdoor locations.
- Prepare the water bait in advance of your program – this could be done up to the day before your program.
- Invite attendees to return and check their water and bait in traps every two weeks. Have available replacement bait as needed.

## Instructions

1. Cut the top off an empty 2 L bottle (just below the neck of the bottle where it begins to flare). This step could be done in advance as a safety consideration or to save time.
2. Add water bait to your trap. (You can experiment, this can also be made in advance). Make sure the water in the trap will be just below the net when you put the top on. Put a piece of netting over the mouth of the bottle and secure with a rubber band or tape. This is important: eggs can pass thru the net to the reservoir below, but adults will not that might develop from larvae will not be able to escape.
3. Tape the top of the bottle so that it is sturdy. Cover the outside of the trap with dark paper plastic, or an old dark color sock.
4. Use sandpaper to lightly scuff the sloping inside of the bottle top.
5. Place the traps outside and remind attendees to return and check on their trap every few days. Encourage attendees to use a small notebook to record data such as date, time, location, etc.
6. Report whether mosquito eggs or larvae are found in the trap using the GLOBE Observer app. See notes under Program section.



Above: Steps 1-3 for building the mosquito trap.

## Making the Bait

Let participants select which ‘food’ they would like to use. Configure several traps: with different color containers (black, transparent, etc.), different types of water. What else can you change in the trap design? You can compare the number of larvae you get with different traps.

The traps are designed to lure the female mosquito into laying her eggs. Select the kind(s) of bait to use in your trap(s).

- Rice water: milky liquid remaining after washing rice
- Pond water
- Water with 2 pinches of fish food
- Sugar/yeast water
  - Make sugar water by dissolving sugar in boiling water ( $\frac{1}{2}$  cup sugar to 1 cup of boiling water). Allow to cool to warm and comfortable to touch – 120-130 F – before gently mixing in yeast. The water needs to be warm enough to activate the yeast (carbon dioxide attracts mosquitoes), but not too warm to kill the yeast.

## How it all works together

The bait draws in the female mosquito to lay her eggs. When it rains, the eggs then fall through the mesh, but will not be able to escape if/when they reach the adult stage.

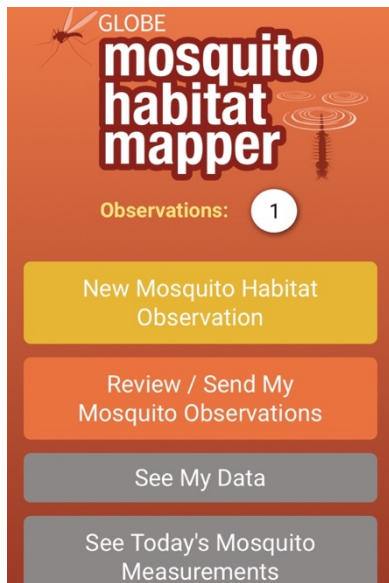
These traps work with different kinds of bait:

- The nutrients in rice water or pond water indicate to the female mosquito that this is a good place to lay her eggs.
- The carbon dioxide trail from sugar/yeast water can also lure in mosquitoes (similarly to being attracted to the carbon dioxide that people exhale).

It is best if you cover the trap with black paper, black tape, or an old black sock. If the trap is dark, it will seem like a safe place for the female to lay her eggs.

## Program Considerations

- When your visitors arrive, remind them of safety considerations. Adult mosquitoes bite, and could transmit dangerous diseases. When outdoors take safety precautions (use mosquito repellants, wear long sleeves/pants).
- Lead a discussion of the advantages of this DIY trap when monitoring mosquito breeding season (e.g., Easy-to-setup multiple locations to monitor over time; safety – mosquitoes will not develop into adults, bait is organic and safe around children and pets).
- Discuss considerations for where to place the traps (e.g., accessible, but not near places people will be sitting, quiet places, shady but not too cool.)
- Explain that they can do this same activity at home, work, or school, and they should report their results using GLOBE Observer Mosquito Habitat Mapper.
- After building their trap, set it aside and walk through steps of entering observations using the Mosquito Habitat Mapper tool. If there is technology available to display your smart device on a large screen, use it and demonstrate the steps.
- It is important that observations contributed by your attendees are uploaded to GLOBE Observer using the app.



Above: Mosquito Habitat Mapper home screen. From this screen, you can start a new observation or review and send prior observations. You will be prompted at the end of entering observations to submit observations. If you do not have access to wifi, you can save your observation and come back to the home screen to submit these observations later.

### Using the app

1. **Download the app:** <https://observer.globe.gov/about/get-the-app>.

2. **Create a login and register:**

When you first open the app, you will need to create a login by entering an email address.

***An email is sent immediately with a password.*** Login with the password, open the Mosquito Habitat Mapper tool in the GLOBE Observer app, and you're ready to start observing.

3. Observations can be entered into the app when offline and submitted when wifi is available. Don't forget to submit observations taken with the app. To see if you have any observations that have not been submitted, from the Mosquito Habitat Mapper tool home screen, select "Review/Send My Mosquito Observations." See screen shot below.

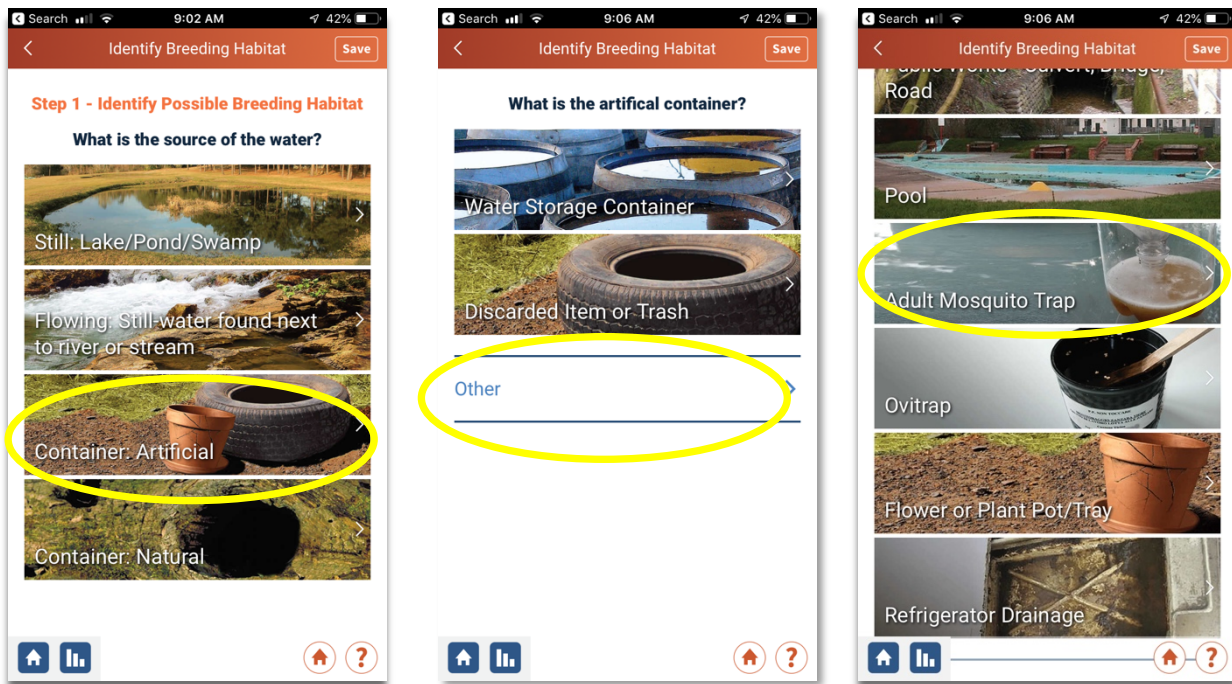
### Reporting mosquito trap data:

Each site should have one or more traps set up and report observations at least weekly on the contents. You could identify one day of the week to check (e.g., "Mosquito Mondays").

Notes: When reporting these observations, you will not dump out water and eliminate the habitat (one of the steps in the Mosquito Habitat Mapper), because you

want to compare its contents each week during the campaign. However, if you do have larvae in the trap, you can identify they are present, sample and count, then dump the water and start again.

4. Select “Adult Mosquito Trap” as the breeding habitat (see screenshots). You then indicate whether or not you found larvae in your trap, and if so were pupa or adult mosquitoes present. Use the comments to record things like how long the trap has been in operation.



Above: Screenshots from GLOBE Observer Mosquito Habitat Mapper showing **steps for identifying Mosquito Trap habitats**. 1. Select “Container: Artificial” 2. Select “Other” 3. Select “Adult Mosquito Trap.”

For ongoing programs or science clubs: use the traps to obtain a measure of the amount of mosquito larvae at their site (e.g., schoolyard, museum or library grounds, backyard) and how this number changes over time.

Check your trap at least once/week to see if there are larvae. When it rains, the eggs on the net fall into the water and then the eggs develop into larvae. (If the larvae become adults, it is ok because they can't escape through the netting.)

Following are ideas for simple experiments/investigations that can be done with these traps:

- When did the mosquito larvae first appear in the trap?
- When during the year do you find the most larvae?
- How does the number of larvae change over the year, from month to month?
- Is there a difference in the number of larvae observed suggesting that the Mosquito Habitat Mapper work might be effective in eliminating local breeding sites?
- What kind of trap works best for your mosquitoes? Citizen scientists can experiment: Besides the net, try adding a piece of dark cardboard and taping to the top of the container. You can also try using a piece of wood, like an ice cream stick. Make sure the cardboard or stick is above but near the water.

