

ESSENTIAL

SCIENCE
FOR TEACHERS

LIFE SCIENCE

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Bottle Basics

TerrAqua

Field Population

Brassica &
Butterfly

EcoColumn

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BOTTLE
BIOLOGY.

TerrAqua Column

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Materials needed

For Building

- ▶ 3 2-liter plastic bottles (bottle 1 provides a deep base and top, bottle 2 provides an internal unit (optional), and bottle 3 provides a deep funnel.)
- ▶ 2 bottle caps (for top and deep funnel)
- ▶ 1 20-cm length of nylon craft cord (for wick)
- ▶ China or non-permanent marker (for making marks)
- ▶ Safety razor or utility knife (for starting bottle cuts)
- ▶ Scissors (for finishing bottle cuts)
- ▶ Soldering iron or drill (for making wick hole in bottle cap)
- ▶ Push pin (for making air holes)

For Stocking and Maintaining

It's very important that all materials introduced into the TerrAqua Column — living, dead, or nonliving — are clean and free of anything that might be toxic to living things (e.g., oil, pesticides, etc.). The organisms you introduce should be small and suited to the habitats you construct. The number of organisms you introduce will depend on what they are but it is generally best to err on the side of adding too few than too many, especially in the aquatic habitat. Bigger organisms should definitely be limited to one or two.

You can [download an inventory of aquatic and terrestrial plants and animals](#) (PDF) that Paul Williams has found make good choices. Many varieties can be collected from local environments and most can be purchased from Carolina Biological Supply Company (1- 800-334-5551) or www.carolinabiological.com.

The [Bottle Biology Web site](#) is also a resource for materials "custom

developed" for bottle systems like this.

Aquatic habitat

- Fine grained aquarium gravel (provides "bedrock")
- Sand or topsoil (provides bottom sediment)
- Untreated tap water or distilled water (provides aquatic habitat)
- "Boulders," "sunken logs," and other miniature objects typical of a pond bottom
- Aquatic plants and animals
- Fish food (if you include a fish)

Terrestrial habitat

- Fine grained aquarium gravel (provides "bedrock")
- Topsoil (provides soil substrate)
- Leaf litter (provides decaying material)
- Terrestrial plants and animals
- "Boulders," "dead trees," and other miniature objects typical of a forest habitat
- Food for animals as needed

Building Instructions:

1. Following the instructions for making cuts in Bottle Basics, make a deep base unit, deep funnel unit, and top unit. An internal unit for either the aquarium or terrarium is optional.
2. Melt or drill a hole in both bottle caps and screw onto the top and deep funnel units.
3. Insert the "wick" through the hole in the bottle cap of deep funnel with approximately 10 cm on either side.
4. Make air holes at the top of the aquarium and terrarium.
5. If you wish to string your system, refer to the instructions for stringing bottles in Bottle Basics.
6. The system is assembled by inverting the deep funnel over the deep base and adding the top.

Stocking Instructions

Aquatic habitat

1. Add a layer of sand or topsoil (2-3 cm) to the deep base.
2. Add a layer of gravel (1-2 cm) on top of the sand or topsoil.
3. Add water to a level about 1 cm below the cap of the inverted deep funnel.
4. Plant aquatic plants in the bottom sediment. A chopstick or skewer will help you push the stems or roots into the ground.
5. Arrange "boulders" and other objects on the bottom sediment.
6. Add floating aquatic plants.
7. Add aquatic animals.

Terrestrial habitat

1. Add a layer (1-2 cm) of gravel to the deep funnel.
2. Mix equal parts of leaf litter and topsoil together, moisten, and add a layer (6-8cm) over the gravel.
3. Add terrestrial animals that burrow to the soil (e.g., worms).
4. Plant terrestrial plants in the soil.
5. Arrange "dead trees" and other objects on the soil.
6. Add terrestrial animals.
7. Establish a "water connection" between the aquatic and terrestrial habitats by holding the terrarium over the aquarium at a slight angle and slowly pouring water down the side of the terrarium until it drips from the "wick" into the aquarium. This is essential to

ensure “wicking” action.

Maintenance Instructions

1. Provide a light source, preferably indirect window light. A small desk lamp or plant light will work, too. For artificial lights, provide 12 –14 hours of light daily.
2. Remove algae weekly. Gather filamentous algae by “spooling” with a toothbrush or tweezers. Remove algae along the sides of the bottle with a paper towel.
3. Change the water weekly. Use a turkey baster to remove and replace 25% of the water each week.
 - ▶ Regularly feed animals that require an external food source.

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