

# How to Build a Recirculating Stream Table

(Adapted from MRHOLLISTER.COM, 10/9/2017)

A stream table can be used to demonstrate many water-related concepts and principles, including flow rate, velocity, channel slope, erosion, and deposition. This demonstration can also illustrate stream bank meandering, flood plains, and stream bank stabilization. Because it is easy to transport, setup, and operate, the stream table can be used for a wide range of venues where time and space is limited. This design requires a 110/120 Volt power source and 3-4 gallons of water.

## Tool List

- Phillips head screwdriver
- Knife or box cutter
- Lighter
- Hot glue gun
- Hot glue
- Scissors



## Parts List – (Estimated cost \$50-\$60)

- (10 ft) 1/2" OD X 3/8" ID vinyl tubing
- (1) 1.5" zinc-plated lamp nipple
- (2) brass knurled locknuts
- (1) Sterilite 60 to 74 QT, clear underbed storage box
- (2) 3/8" Hole x 7/8" OD rubber washers
- (1) 3/8" barbed tubing - tubing nylon elbow
- (1) 1/2" x 1/2" barbed ball valve
- (1) piece felt or piece of outdoor carpet for bottom of storage box
- (2) small zip-ties
- ((1) 80-120 GPH Submersible pump
- (1) 5 GAL plastic bucket for storing sand
- (2) 2-Inch spring clamps
- (1) small piece nylon window screen or pantyhose to act as screen over outlet
- (1) 50 LB bag play sand
- (1) 2-4 GAL container (or equivalent) for pump sump
- (1) 12" ruler or straight edge to level sand
- (1) plastic spray bottle



## Optional Items

- Small animal, building, trees, etc. figurines to accentuate
- Food coloring
- Scoop for adding/removing sand
- Extra 5 GAL bucket to store/transport water
- Boards or plywood to support/carry stream table w/sand

## ASSEMBLY

Step 1: Mark a small dot on a flat surface near a corner of the storage container. Be careful not to get too close to a corner. The mark should be about  $\frac{3}{8}$ " –  $\frac{1}{2}$ " from the bottom of the container.



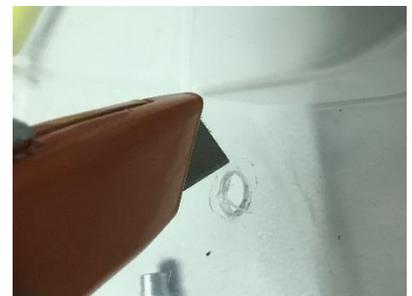
Step 2: Use a standard Phillips head screwdriver to melt a small hole through the container at the mark. Use a lighter to heat the tip of the screwdriver so that it will melt the plastic.



Step 3: Use a pre-heated glue gun to melt and widen the hole so that it is just large enough to push through the threaded lamp nipple. This should be a tight fit.



Step 4: Use a sharp knife or box cutter to carefully scrape away any melted plastic to create a smooth, flat surface on both sides of the hole. It is important that the rubber washer fit snug to the plastic to prevent leaks.



Step 5: Insert the threaded lamp nipple into the hole. Leave approximately 2/3 of the nipple protruding to the outside of the container.



Step 6: Add rubber washer to the inside and outside part of the threaded lamp nipple and make sure it fits firmly against the container.



Step 7: Screw on the brass lock nuts and hand-tighten as much as is possible. Over-tightening the lock nut by using pliers can damage the container.



Step 8: Using scissors, cut off a 4-5 foot piece of clear vinyl tubing.



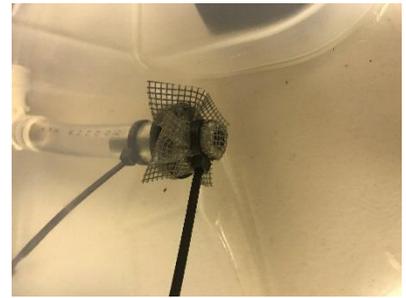
Step 9: From the 5-foot section of clear vinyl tubing, cut off a 3-inch piece of tubing, and connect the elbow attaching both pieces as shown.



Step 10: Attach the short end of the tubing to the threaded lamp nipple as shown and secure with a zip tie. Make sure to slide the tubing all the way up the threads. **HINT: Slightly heating the tubing with a hot hair drier or other means can help it to expand, making this task a little easier.**



Step 11: Cut a small square piece of nylon window screen. Fold the piece over the inside part of the threaded lamp nipple and secure with a zip tie to prevent large particles from getting through and clogging the pump.



Step 12: Cut a piece of felt or other fabric to fit the dimensions of the bottom, inside of the storage container. Attach to the bottom of the container with hot glue. This will create more friction at the bottom of the container and limit sliding of wet sand along the bottom.



Step 13: Place and secure the pump to the bottom of the small Tupperware or water storage container.



Step 14: Connect a piece (cut to fit) of vinyl tubing to extend from the discharge side of the pump to the top of the storage container. Make sure that the discharge outlet of the pump is fit for 1/2" OD tubing.



Step 15: Attach the ball valve to the other end of the vinyl tubing to regulate flow from the pump.



Step 16: Attach the vinyl tubing to the upstream end of the container (opposite end of the threaded lamp nipple outlet) using a spring clamp.



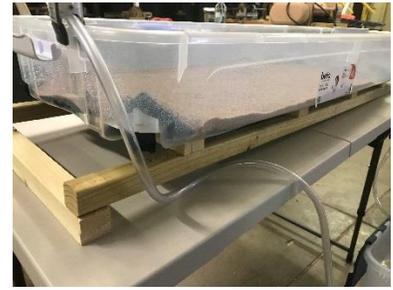
Step 17: Place the vinyl tubing extending from the discharge end of the container (elbow) into the small Tupperware or water storage container and secure it with a spring clamp.



Step 18: Pour approximately 1" of sand into the storage container. Using a spray bottle, wet the sand thoroughly to help it settle. Repeat this process until the sand covers about ¼ to 1/3 the depth of the container.



**Step 19:** Tilt the container on one end to create a slight slope. If the container begins to buckle in the middle or is too flimsy to move safely, place the container on a piece of plywood or boards that can be tilted with ease.



**Step 20:** Fill the small Tupperware or storage container with water and turn on the pump. You may need to siphon the hose or elevate the water-filled container to get water flowing. Once the water is flowing, you may need to add water to the storage container as the larger storage container fills and begins to drain.



***Congratulations! You just created your own stream table.***

## OPERATION

- To start, use a ruler or straight edge to smooth out the sand in the container. Create a slight slope from the inlet end to the outlet end of the container. Be careful not to bury the drain outlet. Using your finger or ruler edge, cut about a 3/4" to 1" channel straight from the inlet to the outlet. Turn on the pump and (if possible) adjust it to low flow to allow water to fill the channel slowly. Increase the flow and observe how the velocity of water begins to erode away at the channel banks causing the stream to meander.



- Monitor the system to ensure water is recirculating and that the outlet drain does not become plugged. You may need to add water to the pump sump (small water container) to keep the pump submerged.
- Accentuate the stream table with figurines such as small model buildings, fences, trees, bridges, cars, animals, and people.
- Add a few drops of food coloring to the upper end of the channel. Observe where the water velocity is fastest and slowest.

## DISCUSSION QUESTIONS

1. To begin, ask ... "Have you ever flown in an airplane? How did the rivers and streams look from above? Why aren't rivers and streams straight?"
2. Would you expect the shape of rivers to stay the same or change over time? Why or why not?
3. Is the depth of a river the same all the way across? Where would you expect to find deeper water?
4. Does the water level in a river fluctuate? How can you tell just by looking?
5. What is a sand bar? Does the water along a sandbar move faster or slower than water along a steep bank?  
*Suggestion: Add a couple small drops of food coloring to the stream inlet to observe the speed of water and where it move fastest.*
6. How is a sand bar formed?
7. What is erosion?
8. What happens to soil and rock that is eroded in a river?
9. What happens when a large boulder or other object falls into a river? *Suggestion: Place a rock in the middle of a major channel and observe.*
10. How can we prevent property loss caused by river flooding, erosion, and river meandering? *Suggestion: Support the sides of a major stream with pieces of felt, rock or other items to observe if erosion is reduced.*