

NETLAKE Citizen Science 2017

Lake Sedimentation Rate Comparison – Making Sediment Trap and Deployment

Introduction

This protocol describes how to make and deploy a sediment trap to measure the sediment that falls to the lake bed.

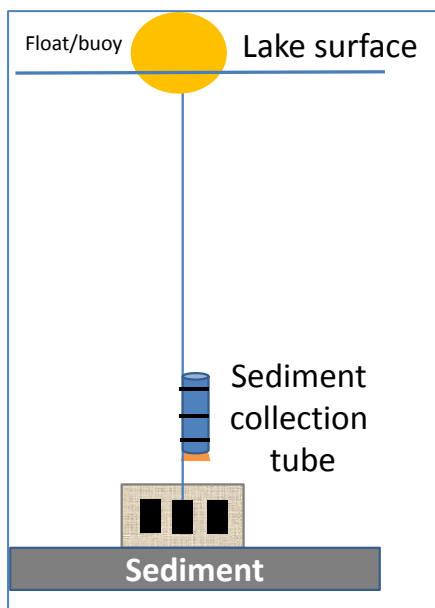
Please read the entire protocol before starting! Normal health and safety precautions should be taken at all times, for more information see website: www.nioo.knaw.nl/Netlake-Citizen-Science

Sediment trap design:

There are 3 alternative sediment trap designs. A sediment trap can be put in place off a pier, or deployed at the centre of the lake (close to where the deepest point is expected to be). Each design uses a Wavin type tube (the type used in plumbing/construction) or Perspex tube, which can be between 5 and 10 cm diameter. A key point for deployment is that the sediment trap is 1. well stoppered at the base and 2. stays in an upright position.

Design 1:

the tube is attached directly to a nylon rope which is attached to a buoy:



Design 1: simple collection tube attached to mooring rope for deeper water.

Materials:

Wavin or Perspex tubes of between 5 and 10 cm diameter, and 30 cm in length

Rubber or other stopper to fit tightly onto the base of this tube

Silicon glue

Braided nylon rope

Cable ties

Small plastic buoy (small marine buoy with eyelet is ideal. OR you can use a 3-4 litre bottle (for example a clean detergent bottle) with an eyelet hook glued into the lid, and then the lid siliconed onto the bottle)

Concrete breeze block/cinder block or other similar weight (anchor)

Mounting ties of a diameter that will fit around your collection tube: image of a mounting tie: www.directindustry.com/prod/ses-sterling/product-7845-1270861.html

Preparations:

You should have an estimate of this depth before you start to assemble your buoy.

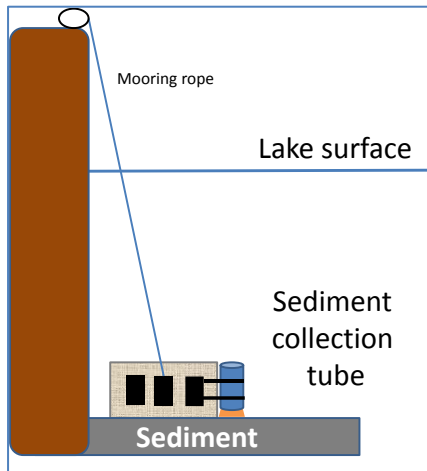
1. Estimate the site depth by using string (longer than your estimated depth!) with a small weight on the end (e.g. a plastic bottle filled with sand).
2. When you are over the deepest point in a boat, lower the weight into the lake and feed the string down slowly.
3. Mark the point on the string in your hand with some duct tape when you reach the lake sediment with the weight.
4. You will need this length of rope, plus c. 1 m extra to tie to the block anchor and float.

Construction:

1. First get the line and float ready: use braided nylon rope as the anchor rope. The rope length will depend on the depth of your site, plus c. 1 m extra to tie to the block anchor and float.
2. Tie one end of your rope to your anchor securely.
3. Tie a float to the other end.
4. Thread three mounting ties through the braided rope at 7 cm intervals with the base one at approximately 2 metre from the anchor. These will be used to connect the collection tube at the base, middle and top to the rope. Other methods of attaching the tube to the rope can be tried also once it is upright and secure.
5. Securely stopper the collection tube, using plenty of silicone glue to seal up the join between the tube and stopper.
6. Put three mounting ties around the collection tube at the top, middle and base at 7 cm intervals.
7. Connect the mounting ties on the tube, and mounting tie on the rope, using a regular 14 cm cable tie, ensuring that the tube is in an upright position.

Design 2

This design is based on one used in a student study in the Great Lakes (USA) (see: http://homepages.cae.wisc.edu/~chinwu/CEE618_Impacts_of_Changing_Climate/Adam/Construction.html). It is best used off a jetty or pier where the water is shallow. The sediment collection tube is assembled as above, attached to the **SIDE** of the cavity block. However, a shorter tube of 15 cm is used for better stability:



Design 2: simple collection tube attached to cavity block as anchor for shallow water.

Materials:

Wavin or Perspex tubes of between 5 and 10 cm diameter, 15 cm in length

Stopper or bung to fit this tube

Duct tape

Two lengths of multiply nylon rope that reach from the lake bed to the top of the pier

Cable ties

Concrete breeze block/cinder block (anchor)

Mounting ties of a diameter that will fit around your collection tube: image of a mounting tie:

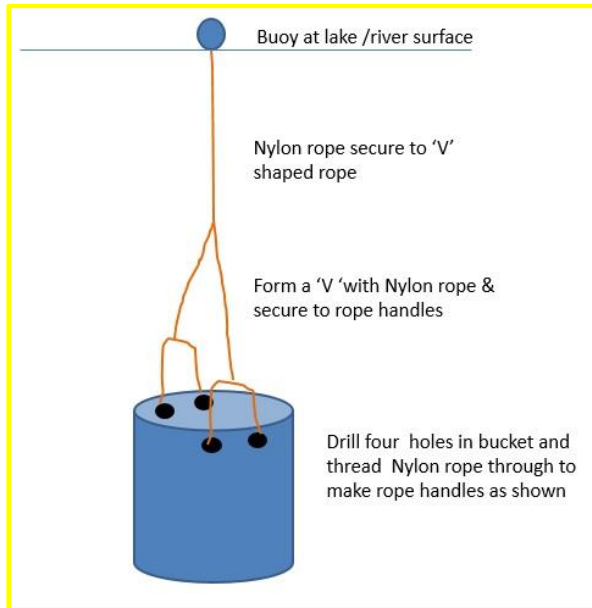
www.directindustry.com/prod/ses-sterling/product-7845-1270861.html

Construction:

1. Thread two mounting ties through the cavities of the anchor. These will be used to connect the collection tube at the base and top to the block.
2. Securely stopper the collection tube, using plenty of duct tape to tape up the join between the tube and stopper.
3. Put two mounting ties around the collection tube at the top, middle and base.
4. Connect the mounting ties on the tube, and mounting tie on the rope, using a regular 14 cm cable tie, ensuring that the tube is in an upright position.
5. Tie one end of a rope to the block securely. Tie the other end to a mooring on the pier. This rope is to aid in retrieval of the sediment collection tube. **You may use two ropes if this will make retrieval easier at your location (use two people - one to carefully pull each rope up while keeping the tube stable). You should take care to carefully lift the trap off the sediment surface to disturb the sediment bed as little as possible.**

Design 3

This design uses concrete to secure a Wavin tube in a plastic bucket. It can be used in a shallow or deep location. Ensure that the deployed trap is on a level part of the lake bed, and is upright:



Design 3: the sediment collection tube is placed in a bucket weighted down with concrete.

Materials:

Plastic bucket approx. 25cm high x 25cm diameter
 Concrete mix (sand cement & stones) approx. 17-18 cm high
 Tube 1: Wavin or Perspex tube 5-10cm diameter 30cm in length
 Tube 2: Wavin or Perspex tube 3-5cm diameter 30cm in length (**BUT** narrower than Tube 1)
 Stopper to cap end of Tube 2
 Plastic funnel 25cm diameter 25cm in length
 Cable ties
 Screws
 Water proof sealant or Silicone
 Nylon Rope

Construction:

1. Place the plastic bucket on a level surface.
2. Place Tube 1 (the larger tube) in centre of bucket and infill in the gap between the tube and the bucket with concrete. Finish approx. 7-8cm from top of the bucket.
3. Put the stopper into Wavin tube 2 (this tube will be the sediment collection tube). Then use plenty of silicone glue to seal up the join between the tube and stopper.
4. Place the plastic funnel on top of Tube 2. Secure the plastic funnel and Tube 2 with three screws or cable ties as required.
5. Place the plastic funnel on top of Tube 2. Using a hand power drill and screws, secure the plastic funnel and Tube 2 together with three screws or cable ties as required
6. Next, drill four holes (equal distance apart) around the top edge of the plastic bucket large enough for your rope to fit through

7. Thread a single nylon rope (c. 60-80 cm) continuously through hole 1, then through hole 2 & tie the ends, knotting securely to form a loop of rope handle (see figure below). Do the same with a second piece of rope and holes 3 and 4. be sure to knot very securely – test that the handles will be able to stay knotted when the bucket is suspended!
8. Using more nylon rope of a similar length, form a V shape and secure to rope handles. Finally, rope can then be extended and connected to a buoy at the lake surface as shown below.

