

BUILD A SUP-TRAWL

Science Unites People

July 2022



INTRODUCTION

The SUP-Trawl is an adapted model based on the LADI, developed by the Civic Laboratory for Environmental Action Research. This is an instrument to sample microplastics from surface water by pulling it behind a small, floating device that is propelled by muscle power. For instance a stand-up paddle board, canoe or kayak. It's a cheap, low-tech and easy to build trawl. This makes it ideal for citizen science projects.

Pay attention: make sure you produce as little plastic waste as possible while building the trawl, by collecting (micro)plastics and correctly disposing of all the waste that is created during the project.



WHAT DO YOU NEED?

FRAME

- Hardwood board (1.8x14.5x180cm)
- Stain to waterproof the wood
- 12x Hardwood stainless steel screws 5x40 PK TX
- 3x Eyebolt black HCP 4.40x40x16
- Luggage binder 25mm-7m
- PVC pipe - Sewage pipe 75mmx2m
- 2x PVC end piece/cap
- 2x PVC connector piece with rifling
- PVC glue
- Sealing kit

ROPE

- Polypropylene rope, braided 4mmx10 m

NET (ZIE SECTION 2. FOR DETAILS)

- Micromesh net, mesh size of 335 um (2m in length)
- Zip fastener
- Connecting ring
- Cod-end (end of the net)
- 8x hexagon bolts and nuts RVS M08 (ST50)
- 8x metal sheet ring M8 RVS
- 8x grommets M8 and a puncher to make holes

EQUIPMENT

- Drill
- Saw
- Spanband/lashing strap with clasper ('ratel')
- 2x Wrench for bolt M08 (or an adjustable one)
- Scissors
- Lighter (to stop the rope from fraying)
- Puncher
- Hammer
- Small scissor

HOW DO YOU MAKE THE TRAWL?

STEP 1: FRAME (ATTENTION: 24 HOUR WAITING TIME)

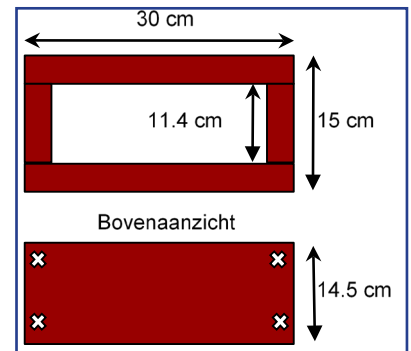
The frame consists of a wooden cube (30x15 cm) that is open in the front and back. On both the shorter sides, a PVC pipe is connected to make it float. The size of the cube is equal to the opening of the net.

Wooden frame

- Saw the boards to the right size
 - Width 2x 30cm
 - Height 2x 11,4 cm
- Drill the holes for the screws (slightly smaller diameter than the screws)
- Stain the boards (including the holes) to make them watertight.

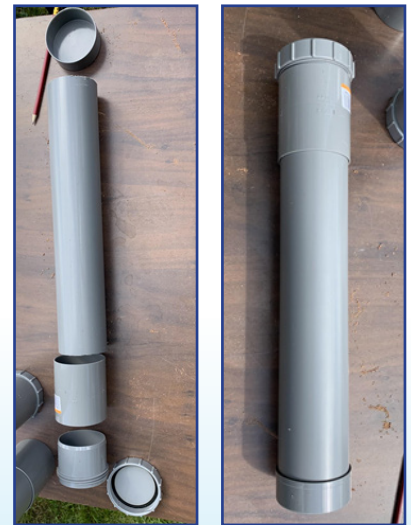
- Wait 24 hours until the stain is dry -

- Attach the upper and lower board to the sideboards with two screws each (in the pre-drilled holes). See the image on the right for an example.



Floating arms

- Saw or cut two pieces of PVC pipe to a length of 45 cm (collect all the chips in a tray or vacuum cleaner). You can make them shorter, but it depends on the weight of the wood (the lighter it is, the less buoyancy you need). (1)
- Use PVC glue to glue one end piece to one end and the connecting piece with rifling on the other side. (2)
- Repeat this for the other PVC pipe
- Drill a hole in the middle of both connecting pieces that is big enough for an M8 bolt.
- Drill a hole in the side of the cube for an M8 bolt. Do this to the top and front of the frame, so that the floating arms are placed high enough and there is enough space at the back to attach the net. (3)
- Attach the PVC connecting pieces that you just drilled a hole in to the side of the cube with the bolt (rifling outwards) and bolt (M8), with a sheet ring in between. (3)
- Close the bolt-side with the sealing kit. Make sure that no water can run into the PVC pipes (because that will sink your trawl).



1

2



3

STEP 2: NET

We bought the net and flow meter (to measure distance) at Hydrobios GmbH, Germany. Below you can find the description of the products and a price indication for 2021, taxes and shipping costs excluded. In the picture on the left you see a double amount of material.

You can sow your own net. This can be cheaper, but takes a lot more time. For a manual to do this, we refer to the protocol that was developed for LADI by the Civic Laboratory for Environmental Action Research (CLEAR).

Part	Description	Article number	Price
1. Net Part for Neuston Net, mesh size 335 microns 30 x 15 x 200 cm	Net with a length of 2m and a mesh size of 335 um (micro-meter).	Hydro-Bios No. 438 212	€465,00
2. Nylon webbing with zip fastener for Neuston Net acc. to David/ Hempel 30 x 15 cm opening	Band with a zipper to attach to the frame and to easily zip the net on and off.	Hydro-Bios No. 438 210-001	€73,00
3. Fixing Ring for Soft Net Bucket 11 cm diam.	Fixing ring to attach the end (4.) to the net (1.).	Hydro-Bios No. 438 935	€92,00
4. Soft Net Bucket with Boltrope; diameter= 11cm, length= 25cm, mesh size 335µm	The end of the net, also called the cod-end, where the sample collects.	Hydro-Bios No. 438 930	€153,00
5. Mechanical Flow Meter	To measure distance by the movement of water.	Hydro-Bios No. 438 110	€393,00



Double amount of material



Flow meter

STWP 3: ATTACHING THE FRAME AND NET

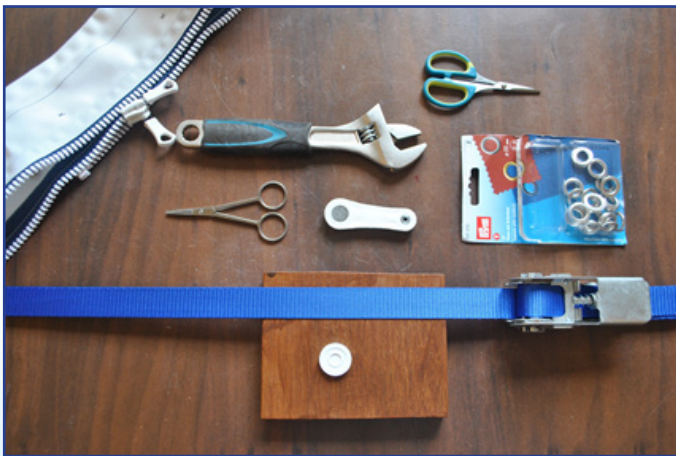
To attach the net firmly to the frame, we use a lashing strap and eyebolts.

Grommets

- We attach 6 grommets into the strap, two on top, two on the downside and one on each side. Follow the instructions for the punching machines to make holes for the grommets. Make sure the grommets have a bigger diameter than the M8 bolts. Make sure there is still room for the strap. See images below.
- First attach the grommets into the holes in the strap. When that is finished, you can drill holes for the M8 bolts into the frame (on the right distance for the grommets). Use the sheet rings for the bolts and nuts.

Lashing strap

- First pull the strap tight around the frame, before you clamp it.
- De clammer ('ratel' in Dutch) (metal) should be in the middle on the downside of the frame after clamping the strap. This causes a low centre of gravity on the downside of the frame in the water and during sampling.
- You can cut off the remainder of the strap and burn the end of the strap so it doesn't fray.



STEP 4: FINISHING

The final step is attaching the eyebolts to the frame and the rope to the eyes. To firmly attach the eyebolts in the frame, we pre-drill three holes.

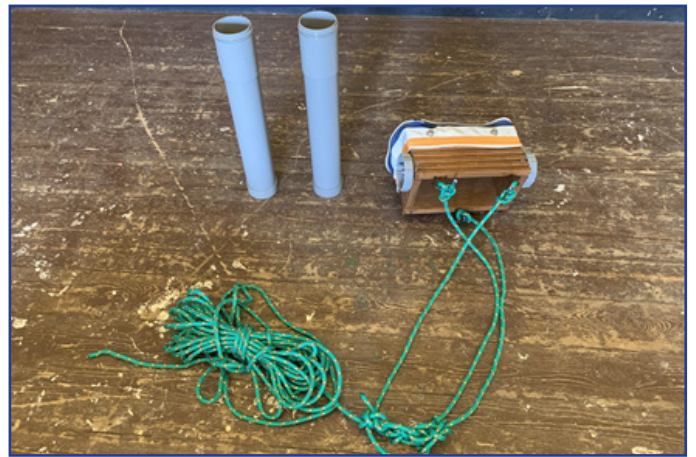
- Drill 2 holes in the upper board and 1 in the board on the downside.. Make sure the diameter of the drill is smaller than that of the eyebolts.
- Screw an eyebolt in each hole.
- Cut 3 pieces of rope of about 1,5 meter and burn/melt the ends against fraying.
- Tie the end of each rope to one of the 3 eyebolts.
- Make a bowline knot at the other end of each rope. Make sure the distance to the frame is equal for each knot/rope.
- Use the remaining rope to tie the bowline knots together with another bowline knot. You use this rope to attach the trawl to the supboard or kayak.

Tip:

- If it is too heavy to screw the eyebolts manually into the pre-drilled holes, you can try using a wrench.



Attaching the eyebolts.



Ropes are attached and the floating arms are not screwed to the frame (net is not included in the picture). Detached like this, it is easy to transport the trawl.