

DESIGN OF DOUBLE COMPARTMENT DEVICE FOR MICRO AND MACRO PLASTIC ENTRAPMENT IN FLOWING WATER

The debris and plastic collection device consist of two chambers made of laminated aluminium. Each chamber is fitted with a movable flap of bakelite at the proximal end and a double layer collection pouch of nylon net at the distal end. The bakelite flap moved inward during the flow of water in the chamber however, a reverse movement is checked by fixing a stopper on the lower arm of the frame. This facilitated the opening of chamber during a unidirectional flow of water during high and low tide conditions. The collection pouch had chambers made of two layers of nylon mesh of 5mm and 0.5 mm, respectively. The inner chamber (5mm pore size) collected the debris and plastic of 5mm and above. However, the outer chamber collected the plastic and debris of 0.5mm or less. The collection pouches are attached to main frame of the chamber and can be removed after they are filled with the debris and plastics. The aluminium device has a mouth opening (260cm×65cm) fitted with two flaps of size (125 X60 cm) to prevent the escape of plastic debris during reverse flow of water. These flaps act like a door during water ingress into the unit. The thickness of bakelite flap is 3mm thickness for smooth movement during tides. The sides of the bakelite flaps are covered with aluminium layer. The main purpose of aluminium device is collection of marine debris and macroplastics (size more than 5 mm) from landward side during low tide and seaward side during high tide.

The installation, collection and quantification can be performed with least manpower as only two persons are required for entire operations. The nylon net pouches of 50.0mm and 5.0 mm are reusable after the collection as only washing under running water for half an hour is required for opening the clogged pores of the net. The catchment area of the device can be increased by attaching side arms of nylon nets. The lamination of the aluminium frame showed no leaching of the metal after coming in contact with water as confirmed by ICP-MS. Therefore, the contamination of water from aluminium is a ruled out possibility.



Microplastic, macro- and megaplastic collected in the lower compartment of the device during post-high tide duration. The upper compartment shows the plastic and floating debris collected during high tide