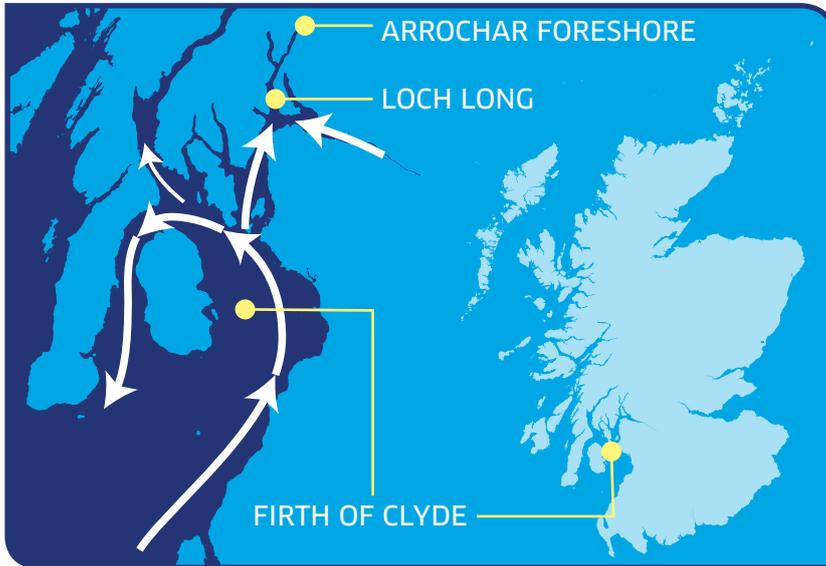


THE ARROCHAR ‘LITTER SINK’



The problem

The foreshore at Arrochar lies at the head of Loch Long, a sea loch off from the Firth of Clyde.

During the winter months especially, large volumes of dead seaweed (sometimes called “wrack” or “ware”) accumulate on the foreshore. In the past this was viewed as a bonus for the area as the seaweed was removed and used on fields and gardens as fertiliser. This was a wide spread practice in Scotland, and some coastal villages have a “Ware Road” to this day¹.

However since the 1950s, plastic has started to become used daily around the globe and it is estimated that we make over 400 million tonnes each year. Of this, about 2 to 5% enters the sea, through bad management of our waste².

The presence of this plastic waste in our seas means that the “ware” on Arrochar foreshore is

¹See, for example, <https://tangandware.com/> for more information
² 2017

now completely mixed with pieces of plastic, from large items like buckets and shoes to almost invisibly small pieces, broken down from larger items such as plastic bags and bottles. This mix is now a problem to the local community, not a resource because it cannot be used as fertiliser any longer, and to date there is no known way of separating out the seaweed from the litter.

Where does the litter come from?

This is of course a very important question and if we can identify the source, perhaps we can stop it.

There are four important factors here: the shape of the Firth of Clyde, the prevailing winds, the spin of the earth and the River Clyde.

The Shape of the Clyde: We can see from the map that the Firth of Clyde has an opening to the west connected to the northern edge of the Irish Sea. From that westerly entrance to the Clyde,

there is an almost continuous, unbroken south-north running coast line from Loch Ryan, past Girvan, Ayr, Troon, Ardrossan, Largs, and ending up at Greenock, where the coastline makes a sharp turn eastwards. The opposite side of the Firth of Clyde is very different, with channels and side lochs branching off, like Holy Loch, Loch Striven, Kyles of Bute, Loch Riddorn, Loch Fyne and Loch Goil. This shape is the result of how the glaciers which cut the Firth of Clyde interacted with the local geology.

The Prevailing Winds: Winds over the west coast of Scotland come mainly from the south, through to the west. Measurements at Prestwick show that the average annual wind blows from the SE/SW sector more than 40% of the year, at an average speed of 12 knots. We estimate that these prevailing winds drive the equivalent of about 3,700 cubic metres of seawater each second, or 49 cubic kilometres in a year into the Firth of Clyde (at the surface).

The Spin of the Earth: You might wonder why this is relevant but owing to the shape of the Clyde, winds can blow the water at the surface from the Irish Sea into the Clyde. Water moving on the face of the earth always tries to turn right - in the northern hemisphere - so the wind-blown water entering the Clyde hugs the right hand coast, and will flow past Loch Ryan, past Girvan, Ayr, Troon, Ardrossan, Largs, ending up in the basin outside Loch Long. This is where it meets the outflow from the River Clyde.

The River Clyde: At the point where the Firth of Clyde turns eastwards, outside Loch Long, freshwater from the Clyde River, plus other rivers flowing through the Glasgow and surrounding region's urban and industrial areas (such as the Leven, White, and Black Cart Waters

and Kelvin) will drive a net flow outwards towards the sea. It is estimated that this flow is about 300 cubic metres of water per second, or 9.5 cubic kilometres a year.

Arrochar foreshore litter

This means there are now two confluent flows of water reaching the basin outside Loch Long - one originating from the Irish Sea outflow and one from the River Clyde catchment area and it is assumed that both of these flows have about 20 litter items for each square kilometre of water (1m deep) within them.

Using the estimated flows of water, coupled with the probability litter will enter Loch Long and arrive on the foreshore, we estimate that:

- The litter on Arrochar foreshore comes about equally from the Irish Sea and the Clyde River
- Both of these deliver about 62,000 items of litter onto the foreshore, mixed with seaweed, each year
- Arrochar foreshore receives about 11% of all the marine litter entering the Clyde, whether from the Irish Sea or the river
- About 1.2 tonnes of marine litter ends up on Arrochar foreshore from the Irish Sea and Clyde catchment combined (guessing that each piece of litter, on average, weighs 10 grams).

What can I do?

Marine litter is everybody's problem and we can all do our bit to help tackle it, and the first steps are to reduce the amount of waste we produce by remembering to reduce, reuse and recycle, and to always dispose of any waste responsibly.

Many thanks to the Arrochar, Tarbet & Ardlui Community Council for identifying this issue, and for their advice and local knowledge.