

Did you know?

Aquatic plants play an important role in lake ecology by providing food and a habitat for many smaller plants, animals and birds. They also:

- provide shelter for young fish,
- help to improve the clarity of the water,
- help stabilise lake shore banks, and
- reduce the amount of sediment being suspended in the water.

Aquatic plants growing in lakes are known as 'macrophytes'. They include all plants big enough to be seen with the naked eye.

Aquatic plants are categorised depending on where they grow:

- emergent - the plant grows in water but part of it grows above water,
- floating - the plant floats on the surface of the water, and
- submerged - the plant grows under water.

These plants are sensitive to the geology (rocks and layers of soil) of the lake catchment, the area that drains into the lake. The plant communities found in soft-water lakes are naturally very different to those in hard-water lakes. The softness and hardness of water refers to the quantity of dissolved minerals present. Soft water contains small amounts of dissolved minerals, whereas hard water contains larger amounts of dissolved minerals.

Aquatic plants are good at showing if the quality of the water is good or bad. The plant community in a lake will respond over time to a deterioration in water quality, or to significant changes in water levels.

The Environmental Protection Agency (EPA) monitors these aquatic plants at more than 10,000 sites in over 200 lakes once every three years. This is done to assess the ecological health of these lakes, so we can understand and manage our freshwaters and respond to any changes in them. This work is done under the European Union's Water Framework Directive.

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What do these freshwater aquatic plants look like?

Pictured below are a few examples of some common macrophytes found in Irish lakes. They include floating, emergent and submerged species.



Hornwort (*Ceratophyllum demersum*) a submerged macrophyte



Bladderworts (*Utricularia* sp.) a submerged carnivorous macrophyte that feeds on zooplankton (tiny animals)



Pondweed (*Potamogeton perfoliatus*) a submerged macrophyte



Pipewort (*Eriocaulon aquaticum*) a submerged macrophyte with flowers above the water surface

What do these freshwater aquatic plants look like? (continued)

From left to right: Stonewort (Charophytes) a type of submerged freshwater green algae, water lilies and rushes (Nuphar lutea and Phragmites australis), the whorled water-milfoil (Myriophyllum verticillatum) a submerged macrophyte.



How do we monitor aquatic plants in lakes?

The distribution of macrophytes within a lake is largely dependent on depth and light penetration.

In deep lakes, plants will typically be concentrated around the shore where there is enough light to allow for growth. However, some species can be found at depths of more than 10 metres.

In shallow lakes, often the entire bed of the lake will be covered by plants. This only happens if there is enough light and enough shelter from wind and wave action. Wind and waves can prevent plant growth in exposed areas of the lake.

The macrophyte community in each lake is sampled using the same method. Several 'transects' (a straight line), each 100 m in length, are selected at right angles to the lake shore. Along each transect, stops are made at set distances and the depth and plant species at each location are recorded.

A double-headed rake and bathyscope (a tube used to see under water) are used at each location. The sampling is carried out from a boat during the summer. This is when the macrophyte communities are present in the greatest quantities.



How are the results used to assess lake quality?

A biological index has been developed for Irish lakes. It gives a measure of the ecological health of each lake based on the macrophyte communities it contains. This index is simply a number that indicates the biological status of each lake. The index has six different scores that capture important aspects of the plant community. These scores are combined to give an overall result for each lake. The six aspects of the plant community which are assessed are the:

- maximum depth of colonisation (the deepest place the plant grows);
- average depth of colonisation;
- abundance of charophytes (a type of freshwater green algae);
- relative abundance of elodeids (submerged plants, or plants with only their flowers above the waterline);
- relative abundance of tolerant (of high nutrient levels) species; and
- average trophic plant score (a measure of how sensitive or tolerant macrophyte species are to nutrient levels).

The overall index is adjusted to take different lake types into account. For example, the depth metrics do not apply in shallow lakes. The index is used to categorise lakes into one of five quality (status) classes:

1. High

2. Good

3. Moderate

4. Poor

5. Bad

'High' is when the water is not polluted at all, and 'bad' is when the water is most polluted.

