

Background to aquatic macrophytes, collecting data along a belt transect

1 Purpose and scope

This document provides background information on aquatic macrophytes and collecting data along a belt transect.

2 Associated documents

Biological assessment: Aquatic macrophytes, collecting data along a belt transect

3 Introduction

Aquatic plants (also known as macrophytes) are defined as plants ‘that grow in water or need a waterlogged environment to carry out their life cycle’¹. An aquatic macrophyte can be an emergent as well as being submerged or floating (Figure 1 and 2).

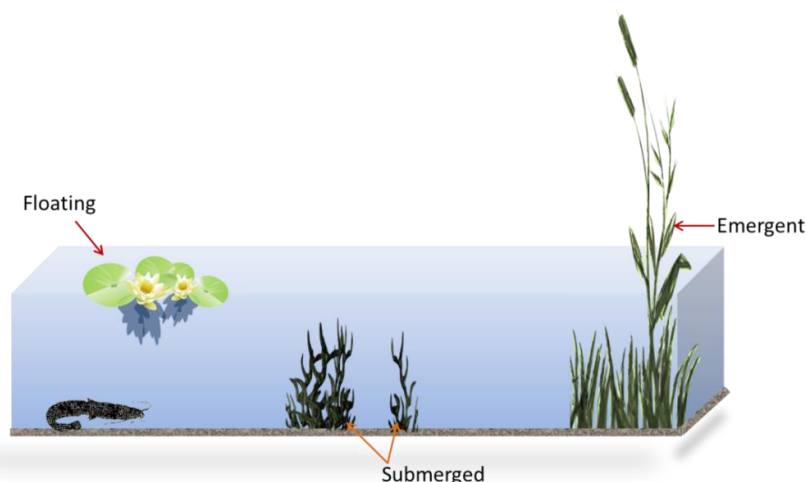
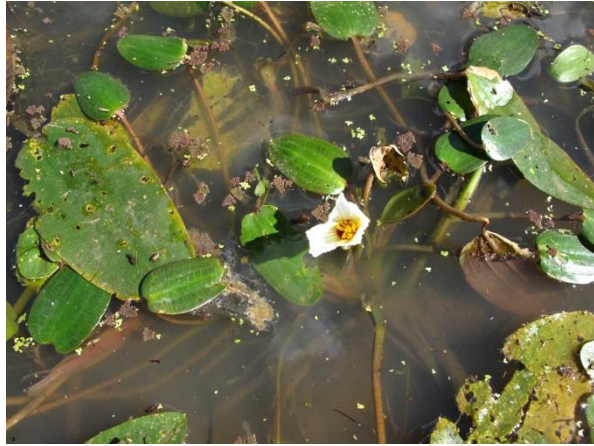


Figure 1: Schematic showing submerged, floating and emergent vegetation

Because they are supported by the water, aquatic macrophytes need little of the supporting or structural tissues that are found in land plants. Instead, there are numerous air spaces inside the stems, leaves and roots that aid gas exchange between the shoot and the root and also aid buoyancy. Submerged parts generally have no, or alternatively, only a thin waxy cuticle enabling the plants to absorb minerals and gases directly from the water.

Aquatic macrophyte habitats can occur in slow to fast flowing water. In lakes (Figure 3a) and rivers these plants are important because they provide cover for fish, water birds and a solid substrate for aquatic invertebrates. They also produce oxygen, which aerates the water, and are an important food source for some fish, birds and other wildlife.

¹ <http://wetlandinfo.des.qld.gov.au/wetlands/ecology/components/flora/>



(a)



(b)



(c)



(d)

Figure 2: Native aquatic macrophytes (a) floating (*Ottelia* sp.), (b) emergent (*Cyperus* sp.), (c) submerged/free floating (*Ceratophyllum* sp. (d) emergent (*Eleocharis* sp.)

4 Macrophytes as environmental indicators

Aquatic plant species assemblages are often determined by environmental variables at the local and landscape level. Macrophyte composition, abundance and growth are useful environmental indicators because they can be affected by a number of physical and chemical factors within stream habitats, including turbidity, nutrient concentrations and flow disturbance regimes. Macrophytes are not only affected by environmental conditions, but they themselves facilitate changes in water chemistry and physical habitats and can have a major role in aquatic ecosystem functioning, including:

- provision of habitat for aquatic organisms such as macroinvertebrates and fish
- reduction of erosion on stream banks
- effects on the nutrient cycle
- vertical mixing of water
- increase in dissolved oxygen levels
- reduction in water velocities, increase in water depth and channel width
- increase in sedimentation

- act as a food source.

A decline in a macrophyte community recorded over time may indicate water quality problems and changes in the ecological status of the water body. Land use practices can cause numerous impacts on water quality which can in turn impact on macrophyte communities via excessive turbidity and sedimentation, (deposition of mineral or organic matter by a fluid flow) as well as increases in nutrient concentration and herbicides.

High turbidity can result in a low abundance and low species diversity of submerged aquatic plants. However, in Australia, shallow lakes and reservoirs may have high natural turbidity because wind results in the resuspension of sediments, and can represent a healthy natural habitat. Also, lakes and reservoirs in catchments with highly dispersible soils will have naturally high turbidity (ANZECC and ARMCANZ, 2000).

Increased nutrient concentrations, can lead to an over-abundance of floating macrophytes (Figure 3b). These include native species such as *Azolla* spp. (Figure 3c) and in the number of invasive weeds such as *Salvinia molesta* (Figure 3d). *Salvinia molesta* is a particularly harmful weed in waterways around Australia because excessive growth of this plant can choke streams and rivers causing serious environmental damage, including the loss of native species.

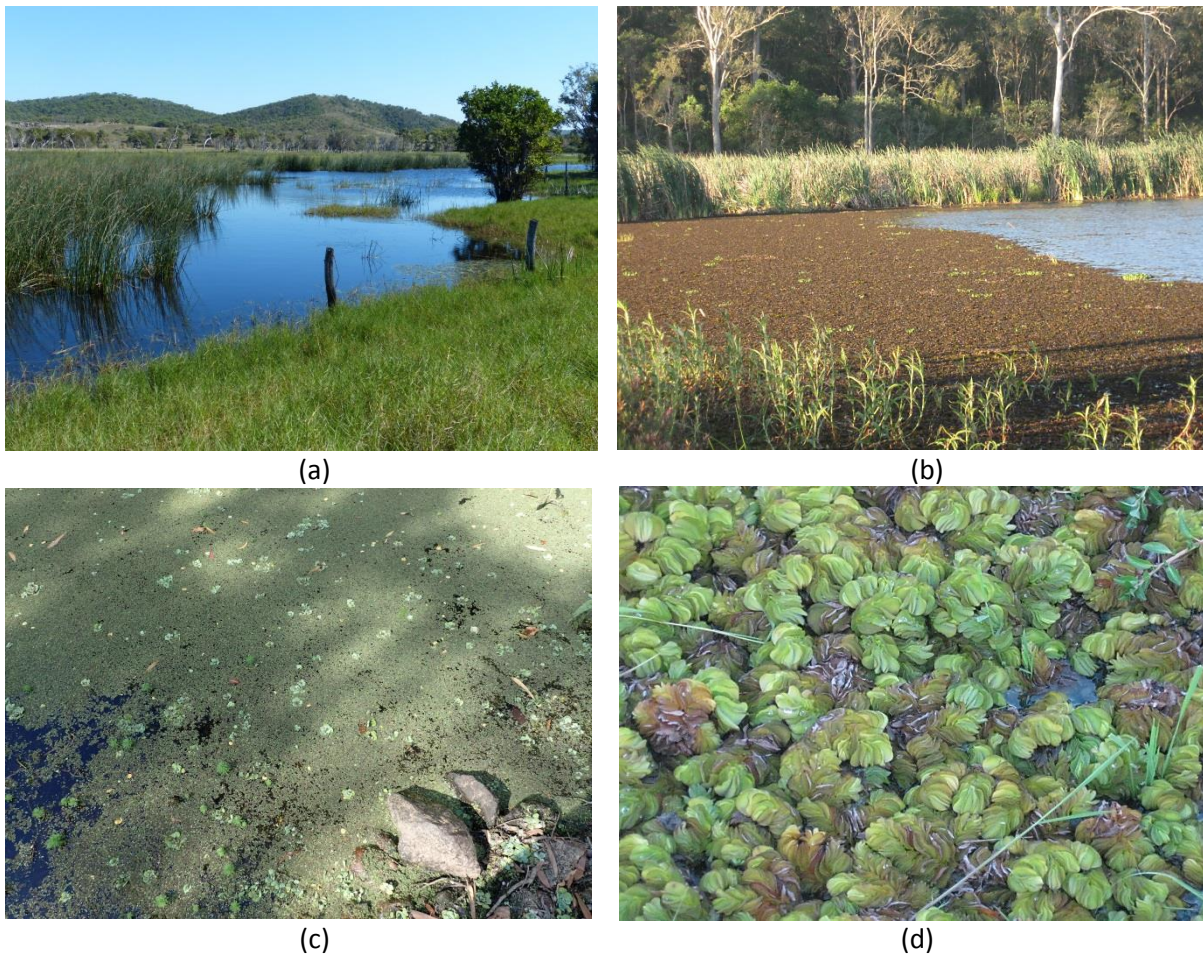


Figure 3: (a) Healthy aquatic macrophyte lake habitat (b) impacted lake habitat with abundant growth of invasive floating aquatic weed and native emergent species (c) native aquatic fern, *Azolla* sp. and (d) introduced weed, *Salvinia molesta*

Aquatic macrophytes can be monitored by collecting data along a belt transect as described in *Aquatic macrophytes, collecting data along a belt transect* document.

5 References and additional reading

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