Water plants

THEIR

function

AND

management

ENVIRONMENT AGENCY

Water plants – their function and management

Water plants are found in almost all aquatic habitats in Britain and are an essential part of river and lake life. This booklet describes their role in the aquatic environment, when they should be controlled, and how. Green plants require sunlight and their growth is very sensitive to the clarity of the water.

FUNCTIONS

The role of plants in a fishery is shown in Figure 1.

These can be listed as follows:-

Aeration of the water

In the process of photosynthesis, which takes place only in daylight, oxygen is given off as a by-product. So when submerged plants are growing they may increase the dissolved oxygen content of the water. This excess oxygen is generally removed at night as a result of respiration by the plants. Dense weed-beds may then remove oxygen to levels that are critical for fish life.

Shelter for animals

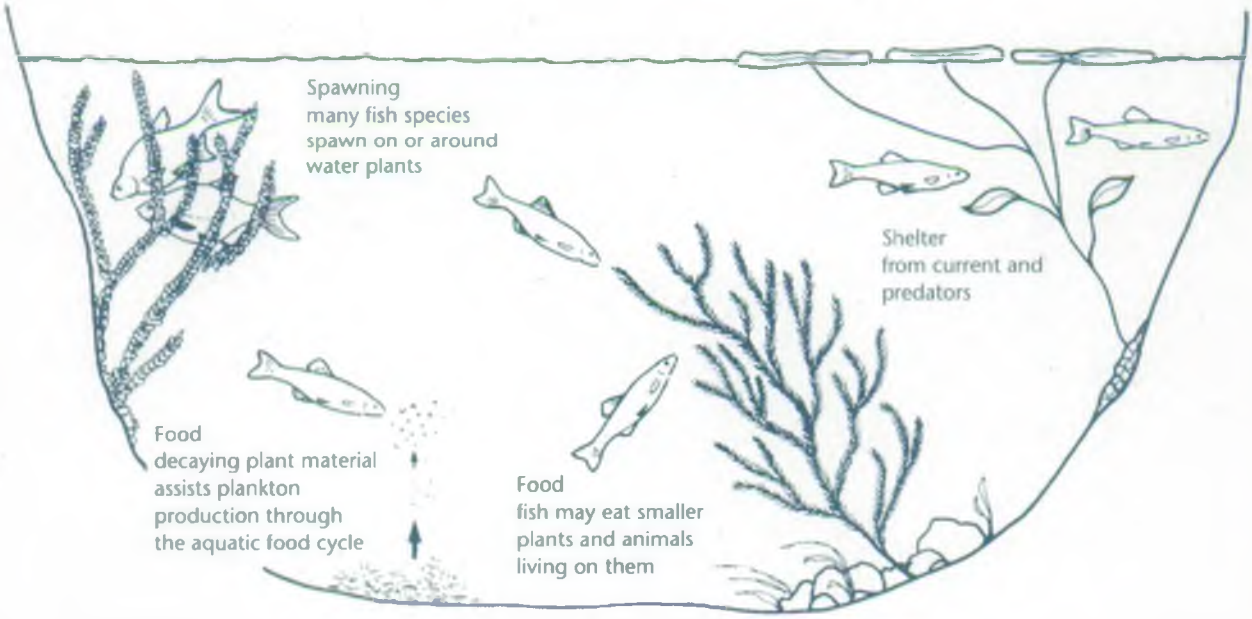
The larger plants provide a refuge for animals and protect them against the current as well as from predators. The eggs of some species of fish and invertebrates are deposited on plants. Because they provide this shelter they increase the productivity of the water. A pool with many plants generally contains more food for fish than one without plants, but too much vegetation can lead to water quality problems, as well as being a nuisance to the angler.

Provision of food for other organisms

Plants, whether they are living or dying, form a food source for many animals. Plant detritus, for example, is a major food source for many invertebrates and some fish species.

The Role of Water Plants in a Fishery

Fig. 1



Consolidation of the bed and banks of the stream

The roots of plants help to bind the soil, preventing the banks from slipping, and protecting them against erosion; rooted plants anchor gravel and stones, making the bed more habitable for invertebrates.

Interception of silt and plant debris

Plants reduce the cross-section of the channel and raise water levels when they grow in running water. Where they hold back the flow upstream of weed banks, silt is likely to be deposited. In lakes there can be a build-up of decomposing plant material over the years, which increases the productivity of the pool as well as the density of plants and raises the bed, thus promoting the development of marshes and dry land, although this can take hundreds of years. Excessive build-up of decomposing plant remains can lead to deoxygenation of the water, particularly if disturbed in warm conditions.

Types of plants

Plants can be considered in four groups:

(a) *Emergent plants*

These have erect aerial leaves arising from open water or mud. They grow where the water level ranges from just below ground level to about half the maximum height of the plant.

Long, narrow-leaved plants like grasses are called reeds; examples are common reed *(Phragmites australis)* bur-reed *(Sparganium erectum)*, reedmaces *(Typha latifolia* and *Typha angustifolia)*, reed-grass *(Glyceria maxima)* and bulrush *(Scirpus lacustris)*. Broad-leaved plants include water plantain *(Alisma plantago-aquatica)*, arrowhead *(Sagittaria sagittifolia)* and great water dock *(Rumex hydrolapathum)*.

(b) *Floating-leaved plants*

This group includes water lilies *(Nymphaea alba* and *Nuphar lutea)*. Most of the plants are rooted in the bed and have long pliable stems, but a few, such as duckweed *(Lemna minor)* and frog-bit *(Hydrocharis morsus-ranae)*, are not and drift about the water surface.

Members of this group are found intermingled with emergent and submerged plants in water just over one metre deep, or deeper in the case of free-floating species.

(c) *Submerged plants*

These are commonly rooted in the mud, as in the case of Canadian pondweed *(Elodea canadensis)* and water milfoil *(Myriophyllum spp)*. A few, however, are free-floating below the water surface, such as ivy leaved duckweed *(Lemna trisulca)* and hornwort *(Ceratophyllum)*.

When flowering, most extend their flowering shoots above the water. Water milfoil *(Myriophyllum spp)* and mare's tail *(Hippuris vulgaris)* are good examples of this.

(d) *Algae*

Algae are primitive plants, classified botanically according to the colour of pigment they contain. Filamentous green algae are common examples, often growing in entangled mats and known as 'blanket weeds' or 'cott'. The group also includes many microscopic forms that float about in the water and give rise to 'blooms' when conditions are suitable for their rapid growth and multiplication. A succession of blooms can occur, which various species dominate. Under certain circumstances, especially in nutrient-rich waters in high summer, blue/green algal blooms may produce toxins which can be dangerous to humans and animals.

ESTABLISHMENT AND GROWTH

Most aquatic plants are perennials. They die back in the winter and reproduce themselves each year vegetatively from stems or rhizomes (underground runners). Some produce turions – compact winter buds that drop to the bottom in the autumn and regrow in the spring, rather like seeds, (for example, *Potamogeton* and *Myriophyllum*). Algae reproduce vegetatively from their own strands or filaments. These grow long chains of cells, which break off to form new strands. Microscopic forms split in half, each half developing into a new adult.

Many of the perennial water plants re-grow very rapidly once growth has started in the spring. Water crowfoot *(Ranunculus aquatilis)*, for example, begins growth in April or May and reaches lengths of six metres by the end of June. Re-growth after cutting in the summer, but before the plants flower, is equally rapid. Regrowth is slower if the plant is cut after flowering.

OBJECTIVES OF MANAGEMENT

Aquatic plants have an important role in the environment, but in some circumstances they need to be managed. The objective of management should be to get the right balance between the benefits plants can provide and the problems they can cause (such as interfering with angling or influencing water quality).Completely removing aquatic plants would damage a fishery because fish would have less food and shelter and fewer places to spawn.

Methods of management

CUTTING

Before any weed cutting is carried out (especially in rivers), contact the local Environment Agency Fisheries Office to check that the proposed work is appropriate.

Cutting is one of the more common methods of management that usually starts in spring. In rivers shallow enough to wade in, plants can be trimmed using hand scythes or where the water is too deep, chain scythes may be used. Two operators are necessary, one on each bank, and the scythe should be see-sawed back and forth while moving upstream in a river. The same method can be used on lakes. When cutting is carried out on a river, a stop net must be used to prevent plants floating downstream and causing a nuisance to other water users. Cut plants must be removed from the river.

A small U-shaped mechanical cutter is available for attachment to a punt for use on larger waters. It has been introduced to Britain from the USA and cuts a swathe of about one metre wide to a depth of about one metre. The cutting blade is operated by a small engine mounted on top of the knife frame. A rake attachment, which enables the boat to collect the cut weed in standing water, is sold as an extra. Larger purpose-built weed-cutting boats are also available. Other methods include excavator-mounted weed-cutting buckets for use on small watercourses.

RAKING OR 'COTTING'

Rakes are used to remove 'cott' from the water surface, and floating rope booms may be used to draw floating plants such as duckweed to the sides of a water where it can be removed. Rakes can also remove submerged aquatic plants such as Canadian pondweed.

Biological methods

DUCKS

Domestic ducks and other waterfowl that feed on aquatic plants can keep down plant growth in ponds, but too many of them will contaminate the water with their droppings. Initial trials have shown that on small pools of up to one acre, a pair of pinioned red crested pochards *(Neta rafina)* will control soft-tissued macrophytes.

FISH

Chinese Grass Carp *(Ctenopharyngodon idella)* will consume large quantities of aquatic plants in the right conditions. Their rate of feeding increases with rising temperature. Below 16°C their activities have very little effect, rising to a peak level at 25°C (at this temperature they can consume their own weight in weed every day).

Grass carp are selective feeders, preferring the soft plants such as Canadian pondweed to the more fibrous ones such as water lilies and emergent water plants. The value of this fish for weed control in the UK has yet to be proved in practical applications. It is unwise to stock grass carp less than 18-20cm (about 100g) because smaller fish are less effective at eating plants. At this size, weed control in a pond would be achieved over a two-year period with a stocking rate of 200 kg/ha – assuming summer water temperatures exceed 16°C for prolonged periods.

(There are legal restrictions on the use of grass carp: introductions require approval from the Ministry of Agriculture, Fisheries and Food, as their release without consent is prohibited under the Wildlife & Countryside Act 1981. In addition, the prior written consent of the Environment Agency is necessary.)

CARP

Common carp, if introduced into a pond in the correct density, will uproot the softer stemmed plants while feeding in the pond mud. Increased turbidity may then restrict or control plant growth by cutting down light penetration. Quite high densities of carp are required to achieve control. Recommended stocking levels are in the region of 400lbs/acre. Introductions of carp also require consent from the Environment Agency; application forms and advice may be obtained from the local Fisheries office.

FERTILISATION

This method must not be used if the pool has an overflow to a stream. The development of planktonic algal blooms, which reduce light to a level preventing the growth of rooted water plants, has been used with success in America and in this country. The pool is fertilised with soluble phosphate (100 kg Triple Super Phosphate per ha) in the early summer as the rooted vegetation begins to develop. Sometimes, until the correct balance is achieved, unwanted filamentous algae can develop. Because of complications in achieving the correct nutrient balance, this method can lead to excessive and potentially toxic blue/green alga blooms with disastrous consequences. Great care must be taken and you should always take advice from the local Environment Agency Fisheries Office.

TREES

Trees overhanging a water can cut down light and reduce aquatic plant growth. But they need to cast dense shade to produce any real effect.

POLYTHENE SHEETING

It is possible to create "swims" in ponds with heavy plant growth by sinking suitably weighted black polythene sheeting. It is necessary to puncture or slash the sheeting to prevent the collection of gases beneath it.

BARLEY STRAW

Barley straw bales can reduce algae growth in ponds and lakes. Some success has been gained by placing bales in the inflow (preferably loosely bagged in netting to increase available surface area). The recommended dosage rate is around 1-1.5kg/m^2 in early spring.

HERBICIDES

There are several different types of herbicide available for use in water, and they have different actions. Herbicides that kill the parts of the plant with which they come into contact are called *contact herbicides*. Others that do not kill the plant rapidly in this way, but enter the plant itself are known as *translocated herbicides*. As a general rule, only this latter group are any use in controlling re-growth of perennial water plants. They can be divided further into *non-selective*, which will kill all plants, and *selective*, which kill only certain species. Localised treatment using either contact or specified translocated herbicides is possible under certain conditions.

PROBLEMS WITH THE USE OF HERBICIDES

It is necessary to identify the species of plants that you wish to treat so that the appropriate herbicide can be used. Some species are resistant while other herbicides, although effective, may be inappropriate because of the range of plant species present. Water hardness may also affect the way in which a herbicide works. *It is essential that the manufacturer's instructions are followed exactly.* Generally, when using a herbicide, accurate calculations must be made of the volume of water to be treated and, for this, accurate depths and areas must be known. Great care must be exercised in a fishery so that not all weed is destroyed. Often, when total eradication of plants takes place, the first plants to recolonise are the most undesirable in a fishery, such as 'cott' and duckweed. Depending on the type of plant, only small areas of pond should be treated at one time to reduce the risk of deoxygenation arising from the decaying weed. Ideally treatment should take place in the late spring as water temperatures are rising. On no account should a "heavily weeded" pond be overtreated in mid-summer "just to make sure" – this is one of the best ways of killing all the fish present.

REGULATIONS

Aquatic herbicide is a powerful pollutant, so consent for its use must be obtained from the Pollution Control Department of the Environment Agency before it can be used. Herbicides are capable of killing plants, and they can be extremely toxic to humans, cattle and other animals.

The Control of Pesticides Regulations 1986 provides for much tighter restrictions on the labelling, use and application of herbicides. All users of pesticides (including herbicides) have general obligations. They must take all reasonable precautions to protect the health of human beings, creatures and plants, to safeguard the environment, and in particular to avoid pollution of water. These obligations cover actions before, during and after the application of herbicides.

Anyone who is paid to apply the herbicide ought to have a Certificate of Competence issued by the National Proficiency Tests Council. The requirement for a Certificate depends on the person's age, where they work or who they work for, and in each case the product being used and its mode of application.

Further enquiries should be addressed to your local MAFF office.

Further reading

Aquatic Plants – a guide to recognition by David Spencer-Jones and Max Wade. Published by ICI Professional Products.
Tel: 01252 724525.
ISBN: 0 90 1747 033

Aquatic Weed Control by Chris Seagrove. Published by Fishing New Books Ltd £13.00
Tel: 01865 240201.
ISBN: 0 85 2381 522 News Books Ltd.

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS32 4UD
Tel: 01454 624 400 Fax: 01454 624 409

ENVIRONMENT AGENCY REGIONAL OFFICES

ANGLIAN
Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 5ZR
Tel: 01733 371 811
Fax: 01733 231 840

MIDLANDS
Sapphire East
550 Streetsbrook Road
Solihull B91 1QT
Tel: 0121 711 2324
Fax: 0121 711 5824

NORTH EAST
Rivers House
21 Park Square South
Leeds LS1 2QG
Tel: 0113 244 0191
Fax: 0113 246 1889

NORTH WEST
Richard Fairclough House
Knutsford Road
Warrington WA4 1HG
Tel: 01925 653 999
Fax: 01925 415 961

SOUTHERN
Guildbourne House
Chatsworth Road
Worthing
West Sussex BN11 1LD
Tel: 01903 832 000
Fax: 01903 821 832

SOUTH WEST
Manley House
Kestrel Way
Exeter EX2 7LQ
Tel: 01392 444 000
Fax: 01392 444 238

THAMES
Kings Meadow House
Kings Meadow Road
Reading RG1 8DQ
Tel: 0118 953 5000
Fax: 0118 950 0388

WELSH
Rivers House/Plas-yr-Afon
St Mellons Business Park
St Mellons
Cardiff CF3 0LT
Tel: 01222 770 088
Fax: 01222 798 555

For general enquiries please call your local Environment Agency office. If you are unsure who to contact, or which is your local office, please call our general enquiry line.

ENVIRONMENT AGENCY GENERAL ENQUIRY LINE

0645 333 111

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

ENVIRONMENT AGENCY EMERGENCY HOTLINE

0800 80 70 60

ENVIRONMENT AGENCY

HO 1 98 10K C-BAR Printed on Cyclus Print, a 100% recycled totally chlorine free paper