

CHAPTER 1

INTRODUCTION

1.1 SCOPE OF THE BOOK

The lake shore is as important for the lake as the membrane is for the cell. The shore is a filter for undesired releases into the lake and a buffer zone, which levels out the impacts on the lake coming from its surroundings. The shore may be considered the lake's protection zone.

Conservation of the natural conditions of the shore must therefore play an important role in lake management.

The shore is an ecotone (i.e. a transition area between two ecosystems - in this case a lake and a terrestrial ecosystem surrounding the lake). One can, for example, stand with one foot in water and the other on the bank - one foot in the hydrosphere and the other one in the lithosphere. These are radically different ecosystems containing very different environmental conditions and communities. Species may be expected to replace one another relatively abruptly due to this gradient in environmental factors.

Nature has developed transition zones or ecotones between ecosystems to make a relatively gentle transition. Ecotones may be considered buffering zones between two ecosystems. Lakes with an overexploited shore and with a reduced transition or buffering zone on the other hand become more vulnerable particularly to alteration in the lake environment.

Humans must use ecotone concepts when they design interfaces between human settlement and nature. Unfortunately, it is common practice to construct houses, hotels and so on close to a lake shore line. Under such circumstances, emissions coming from these settlements are transferred directly to the ecosystem. If a buffering zone was maintained, the emissions would be at least partly absorbed.

The scope of this book is to demonstrate the importance of the lake shore in a holistic lake management framework and discuss how the ecotone between lake and land can be maintained as an effective protection zone for the lake, and how the shore management can become an integrated part of the lake management.

1.2. ZONES

Lakes and ponds may be zoned on the basis of depth and type of vegetation that will appear over the course of time in freshwater areas. (Sêe Figure 1.1.)

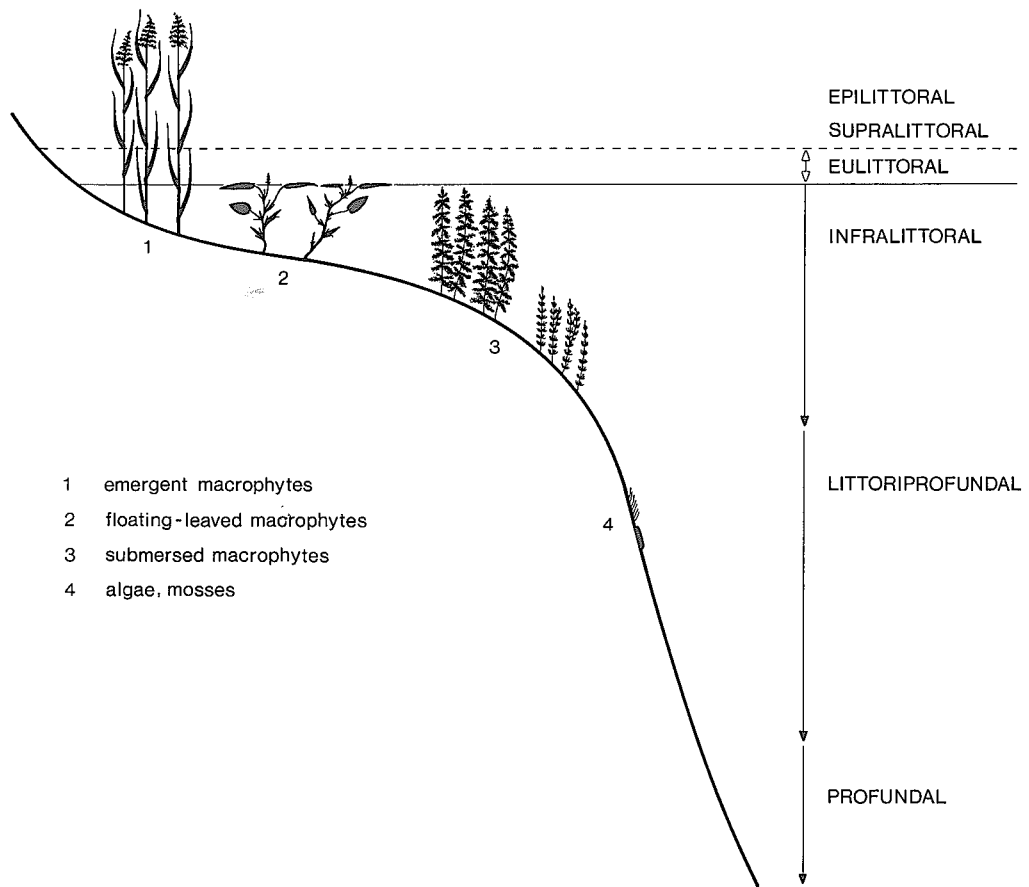


Fig. 1.1. Zonation of a lake.

The zone just above the edge of standing water is described as **the supralittoral zone**. This zone, although not submersed, is exposed to wave action along the margins of lakes during windy periods. Astatic lakes, lakes used as drinking water source or man-made reservoirs will, in addition to wave action, be exposed to variations in water depth comprising the eulittoral, which will imply that the supralittoral zone is variable over time.

The result of wave action and the subsequent abrasive effect of sand and pebbled shorelines means that life may be sparse in this zone. Certain emergent macrophytes and algae and animals will tolerate such conditions.

However, ecotones generally have a high diversity due to the so-called "edge effect". The main reason for this is simple. Where a terrestrial ecosystem, for instance a forest, grades into a lake some species characteristic of both systems are found side by side.

From the water's edge to a depth of a few meters is **the (infra-)littoral zone**. It is dominated by emergent or submersed macrophytes. Shallow lakes may be monozonal (i.e. they contain only one zone: the littoral zone). The life in this zone is highly dependent on the vegetation present. It is often the most productive zone in the lake and is therefore rich in plankton. It often demonstrates a typical example of "edge effect" with a high diversity of life forms - higher than the supralittoral zone or the open water (the pelagial zone). The vegetation is very beneficial to the fauna that thrive in this area. It serves as an anchorage for many of the aquatic organisms as well as breeding sites for snails, insects, etc., and birds. Even sparsely populated vegetative areas will reduce wave action in the area, which in turn will minimize turbidity (see also Chapter 3). Another important feature is the production of oxygen by photosynthetic activity of the submersed hydrophytes. Below the (infra-)littoral is a transitional zone, the littoriprofundal with algae and sometimes mosses. It finally is followed by the profundal which is lacking any photosynthetic organisms.

The ecotone between water and land - the shore - consists of these four zones: the supralittoral, the eulittoral, the (infra-)littoral and the littoriprofundal zones. Sometimes a distinct wet zone above the supralittoral may be characteristic in rocky shore sections. This conveniently is called epilittoral. The question that this book seeks to answer is: how can we manage this transition area to the benefit of the entire lake.