

CORMORANTS IN THE IJSSELMEER AREA: COMPETITOR OR INDICATOR?

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Introduction

Cormorants are highly dependent of the turbidity of their feeding grounds for fishing. They fish preferably in water with intermediate turbidity. In very turbid water the visibility is limiting prey detection and as a result the birds do not hunt optimally. In clear waters, fish can probably easier escape.

Keywords: overfishing, under water climate, water quality, indicator

Results

In the turbid water of the Markermeer system Cormorants feed mainly on Ruffe *Gymnocephalus cernuus*. The diet of Cormorants which feed on Markermeer is comparable with the diet of birds in the lake Veluwemeer, situated between the reclaimed area and the mainland in the end of the eighties/beginning nineties. In this period the turbidity on this lake was very much alike the situation on Markermeer in recent years. When lake Veluwemeer became clear as a result of a large scale water purification programme at the beginning of the nineties, the fish biomass decreased and the fish community became more diverse. Fish species which are more dependent on clear water systems like Rudd *Rutilus erythrophthalmus* and Tench *Tinca tinca* increased and Ruffe decreased. For Comorants the system became less attractive for fishing because of too clear water. The number of birds decreased as well. In the diet of the Cormorants the proportion of Ruffe decreased dramatically and the proportion of cyprinids, like Rudd, Tench, and Roach *Rutilus rutilus* increased and hence diet became more varied. The food consumption of Cormorants ran parallel to the gradients in turbidity and fish communities of the water system (Fig. 1).

Discussion

Competitor or indicator?

In the IJsselmeer area cormorants are only partly a competitor with the commercial fisheries because the birds only catch small prey, mainly perch *Perca fluviatilis*. For eel *Anguilla anguilla* and pikeperch *Stizostedion lucioperca* it is unlikely that cormorants are significant competitors because these species are at relatively low numbers consumed by the birds. The fact that the natural mortality of the fishes has never been measured means that the predation of cormorants can not be compared with the yield of fishermen in later years. Overfishing of commercial fisheries in the lakes IJsselmeer and Markermeer has lead to a large amount of small prey fish in the system because the larger predatory fish (Perch and Pikeperch) are caught intensively by commercial fisheries. The resulting large biomass of small fish causes a high pressure on zooplankton and in turn algae can increase.

The larger number of prey in combination with a better underwater climate for hunting fish is favourable for the cormorants. In this way human interference may have caused better circumstances for cormorants.

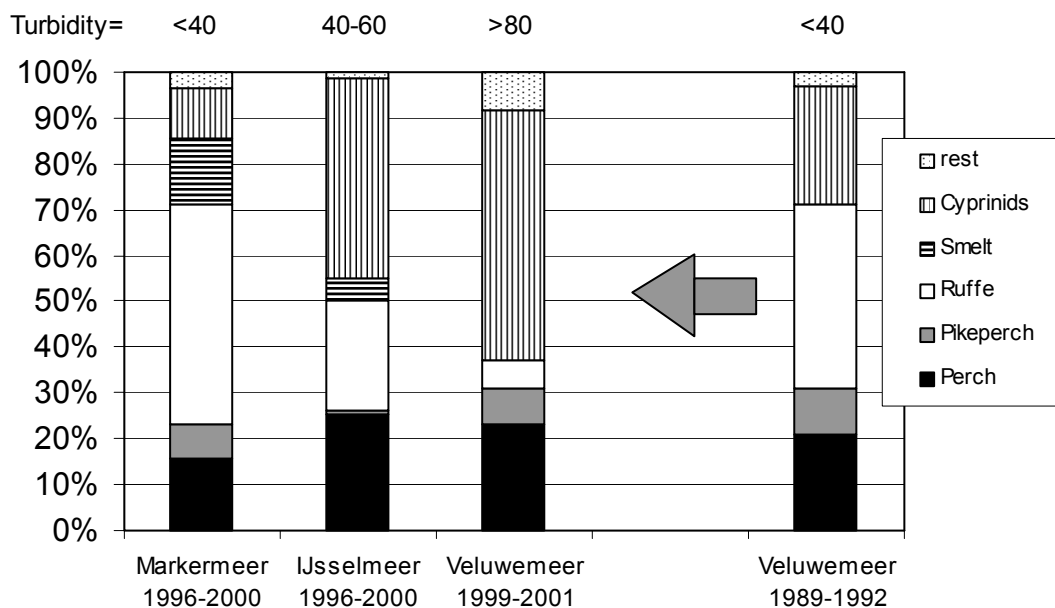


Figure 1. Diet of Cormorants in autumn and winter (by mass), roosting respectively at Lepelaarplassen (Markermeer, N = 1,809), Steile Bank (IJsselmeer, N = 3,530) and Veluwemeer (N = 4,932) for the period 1999-2001 and 1989-1992 (after a change in water quality). Turbidity = Secchi depth (cm).

In spite of an average clear water situation as a result of the smaller supply of nutrients, algal blooms can occur in spring and summer. Though high numbers of cormorants can be interpreted as a result of overfishing by human beings. The number of birds are in this way not competitive to the fisheries but more a signal that the commercial fisheries are far from sustained. Measurements of birth, mortality and food choice of cormorants gained good indications of changing water quality and the conditions of the water system. Less cormorants and a more diverse menu (less Ruffe) indicate a healthier and more clear water system. This gives the opportunity for managers to use the cormorant as an indicator for the state of water quality and to evaluate the level of exploitation of the fish community by commercial fisheries and fish eating birds.

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