INDIRECT EFFECT OF EXTREME FLOODING: DISAPPEARANCE OF WADING BIRDS ROOST CAUSED BY VEGETATION TURN

JOSEF RAJCHARD[1], ZUZANA BALOUNOVÁ[1], RADEK NOVÁK[3], PAVEL KINDLMANN[2]

[1] University of South Bohemia in České Budějovice, Faculty of Agriculture, Department of Biological Disciplines, Studentská 13, 370 05 České Budějovice, Czech Republic; e-mail: rajchard@zf.jcu.cz, baloun@zf.jcu.cz
[2] University of South Bohemia in České Budějovice, Faculty of Biological Sciences, Department of Mathematics, Physics and Chemistry, Branišovská 31, 370 05 České Budějovice, Czech Republic; e-mail: pavel.kindlmann@centrum.cz
[3] RUMPOLD 01- Vodňany s.r.o., Stožická 1241/3, 389 01 Vodňany, Czech Republic; e-mail: novak@rumpold.cz

Abstract

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The Zlivsky pond (vicinity of České Budějovice, South Bohemia, Czech Republic) belonged to the most important breeding places for three species of wading birds: of up to 100 pairs of the night heron (*Nycticorax nycticorax*), which is one third of the South Bohemian population of this species, of 3 pairs of spoonbill (*Platalea leucorodia*), also one third of the Czech spoonbill population, and of 1–4 pairs of little egret (*Egretta garzetta*), which occurred here since 1997 as in the first and only site in Bohemia. All three species are included among the NATURA 2000 selected target species. The water level in the pond markedly increased during the flood in August 2002 and the islands were flooded for about 3 weeks. In 2003, the year following the flood, only two unsuccessful breeding pairs of the spoonbill were recorded, while the other two species were absent, although no direct deaths of birds due to floods were observed. Here we analyse the mechanism that led to disappearance of these rare bird populations. We found that the most likely cause for that was disappearance of almost all the small (less than 4 m in height) black elder (*Sambucus nigra*) shrubs suitable for breeding of these species. These findings may aid future efforts to save these rare bird species.

Key words: extreme flooding, night heron, spoonbill, little egret, shrubs

Introduction

There has been increasing recognition that catastrophes are an important factor in the dynamics of threatened species (Wilcox, Elderd, 2003), because even large populations

may be destroyed by one isolated extraordinary perturbation (Pimm et al., 1988). While the relationship between long-term environmental variability and persistence time has been thorougly studied (e.g., Foley, 1994; Johst, Wissel, 1997; Halley, Iwasa, 1998; Halley, Kunin, 1999; Inchausti, Halley, 2003), and theoretical models predict that increasing environmental variation increases the probability of extinction (Drake, Lodge, 2004), the mechanisms of population extinctions due to environmental catastrophes are still poorly understood, especially when extinction is not a direct result of the catastrophe. In the case study presented here we analyse mechanism that led to extinction of several bird populations due to the 2002 floods in the Czech Republic.

Several artificial islands in the Zlivsky pond (vicinity of České Budějovice, South Bohemia, Czech Republic) belonged to the most important breeding places for three species of wading birds: of up to 100 pairs of the night heron (*Nycticorax nycticorax*), which is one third of the South Bohemian population of this species, of 3 pairs of spoonbill (*Platalea leucorodia*), also one third of the Czech spoonbill population, and of 1–4 pairs of little egret (*Egretta garzetta*), which occurred here since 1997 as in the first and only site in Bohemia. The water level in the pond markedly increased during the extremely high flood in August 2002 and the islands were flooded for about 3 weeks. In 2003, the year following the flood, only two unsuccessful breeding pairs of the spoonbill were recorded, while the other two species were absent.

Material and methods

Species

Night herons form relatively small colonies, especially in fishpond islands. They depend on the state of the vegetation, primarily on the height and structure of the shrubs, which these birds prefer. Little egrets are very rare in Central Europe. Their nests were found in 1864 near Ostrava (Schwab, 1869 in Hudec (ed.) 1994). Hlásek (1974, in Hudec (ed.) 1994) reported one isolated migration near Třeboň in 1971. In 1983 and 1988 this species was observed in South Moravia (Boucný, 1985 in Hudec (ed.) 1994).; Martiško, Rejmanová, 1990 in Martiško, 1994). No other observations of this species in the territory of the Czech Republic have been described. The night heron and the little egret are classified as severely endangered species, the spoonbill as a critically endangered species. All three species are included among the NATURA 2000 selected target species.

Site

The pond Zlivský (52.5 ha of water area, 383 m a. s. l.) is located in the České Budějovice basin, 12 km NW of České Budějovice. Part of this pond (20 ha) is a nature reserve. The pond is intensively exploited for fish production, mainly common carp, and therefore it is highly eutrophic. Five islands in the pond are approximately 100x7 m in size. Four of them were formed by stockpiles of mud during mud clearance of the fishpond 30 years ago.

During natural succession, three of the islands were overgrown mainly by black elder (*Sambucus nigra*) and to a smaller extent by some willow species (*Salix* sp.). Trees occurred only sporadically: birch (*Betula verrucosa*), wild cherry (*Prunus avium*) and higher willows. Shrubs were very dense, small areas were covered by low, mainly herbaceous nitrophilous plants, such as raspberry (*Rubus idaeus*), nettle (*Urtica dioica*) and lambs quarter (*Chenopodium album*). Herbaceous plants were almost absent under unbroken shrubs, firstly because of insufficient light and secondly because of the direct influence of water birds, primarily feeding of grey geese (*Anser anser*).

Results and discussion

State before the flood

The Zlivský pond has been an important breeding place of the night heron since the beginning of the 1990s. Its numbers have fluctuated between 80–100 pairs. The breeding night herons migrated from the parts of islands where shrubs had became too high to other places, where the shrubs were reaching 4 m at maximum. The most abundant shrub, black elder, was clearly the preferred plant for the night heron and the birds used its small fragrant branches for building their nests. Only few nests of the night heron were found on birches and willows nests. In 2002 the number of breeding pairs decreased to 50 pairs, because the amount of suitable (less than 4 m in height) shrubs declined and the area covered by shrubs was reduced by water erosion of the islands.

The Zlivský fishpond, which is at the northwestern border of the geographical distribution of the spoonbill, also hosted 1–3 pairs of this species and 1–4 pairs of little egret (Rajchard, Novák, 1998). According to Rajchard (1997), other interesting species found here included black-headed gull (*Larus ridibundus*) and grey goose (*Anser anser*).

State after the flood

The water level markedly increased in the fishpond during the extremely high flood in August 2002 and the islands were flooded for about 3 weeks. As a result, most shrubs and trees (especially black elder, birch, wild cherry and raspberry) died, only willow shrubs, forming a small part of the shrub layer, survived. In spring 2003, the foliage fully developed on the willows, but only on three elder shrubs located on the highest place of one of the islands. Approximately 95% of all shrubs remained leafless and died. The area under the shrubs was promptly colonized by a small number of ruderal plant species, the occurrence of which had been very limited in the preceding year.

The flood did not cause any direct deaths of individuals of either of the bird species. However, almost all the small (less than 4 m in height) black elder shrubs suitable for breeding of these species disappeared, which caused disappearance of almost whole population of the night heron and complete disappearance of the other two species. Thus flooding, which is sometimes used as a management practice to benefit waterbirds (Elphick, 2004) caused disappearance of rare wading bird species in this case.

Proposal for management

The measures that can potentially lead to restoration of the breeding colonies of the three wading bird species include reconstruction of the islands damaged by water erosion, which should be done during the autumn, in order not to interfere with breeding of other bird species (geese, ducks), and removal of the dead shrubs and trees. The vegetation should be then allowed to follow its natural succession, which tends to the formation of the shrub

layer of proper height. Advisable is total enlargement of the nature reserve to include the whole fishpond in order to prevent disturbance by visitors.

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