Research Article

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General assessment of the biodiversity of the Bulgarian Black Sea coastal wetland Atanasovsko Ezero

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Abstract: The paper presents data on the total biodiversity, the newly described and threatened, rare and invasive species of the complex wetland Atanasovsko ezero, which is situated in the vicinity of the town Burgas on the southern Black Sea coast of Bulgaria. Different parts of Atanasovsko Ezero were declared as Managed Reserve, Ramsar Site, Protected Zone of the network Natura 2000 and Important Bird Area. The structure of the paper is in accordance with the taxonomic part of the Updated Management Plan of the area, which is in a process of approvement. Based on the critical review of the literature, supplemented by recent field studies and survey data, it could be stated that at least 1173 species, varieties and forms have been found on the territory of the complex wetland. More than 35% of them have different threatened status according to international and national legislative and non-legislative documents. By contrast, only four of the recorded species (i.e. 0.3%) have been declared as invasive. This combination of rich biodiversity with the presence of globally and regionally threatened species proves the outlining of the area amongst the most important sites of Bulgarian biodiversity and nature conservation.

Key words: invasive species, protected area, rare species, reserve, salines, threatened species

Introduction

Atanasovsko Ezero (abbreviated hereafter as AE), situated near the town of Burgas on the Bulgarian Black Sea coast (ca. 1,5 m lower than the sea level), is a polystructural wetland complex composed by permanent and temporal water bodies with various origin and changing halinity, supplied by rain and sea waters, with a surrounding canal connected with the Black Sea (Stoyneva & Michev 2007). During the first half of the year, the canal collects the freshwaters and flows into the Black Sea, whereas during the second half it serves to provide the waters from the Burgas Bay. Therefore, most of the water bodies of AE are used as salines since 1906 and it is well-known that one of the most peculiar features of the wetland is the inability for self-regulation, with an existence and status totally dependent on the human activities. In the same time, the complexity of the wetland and its regulated hydrological regime with significant variations of the halinity are the basis for the exclusive biodiversity of AE and its outstanding conservation significance. Therefore different parts of AE were declared as Managed Reserve, Ramsar Site, Protected Zone of the network Natura 2000, Protected Site and Important Bird Area (Stoyneva & Michev 2007, Vassilev et al. 2013). The scientific background of the ecological monitoring of the whole area and its use in the future wetland management were discussed

by Stoyneva & Michev (1996). The first Management Plan (abbreviated hererafter as MP) of the reserve was prepared in 1997 and approved in 2003 (Michev 2003). More recently the project for Updated Management Plan of AE (Michev 2015, abbreviated herafter as UMP) was prepared and presented for approvement by the Bulgarian Ministry of Environment and Waters (MoEW**).**

The aim of the present paper is to summarize data on the biodiversity (Algae, Bryophytes, Vascular plants, Fungi, Lichens, Invertebrates, Fishes, Amphibians, Reptiles, Birds, Mammals) of AE according to the information of relevant experts, included in the general author list of the article in alphabetical order of the family names. Special attention is paid to the newly described species and to the species which are threatened, rare or invasive.

Material and Methods

The complex wetland AE is a well-known site situated at the southern Bulgarian Black Sea coast. Its detailed description is provided under inventory number IBW1900 in the first database of Bulgarian wetlands and their biodiversity (Stoyneva & Michev 2007). Study area covers the whole territory of AE (incl. the water bodies and the land parts located between them). The information on the organismic groups is organized in accordance with the UMP, which followed the reguirements for Management Plan structure provided by MoEW. Due to the limited volume of this paper, the methods specific for each taxonomic group, the analyses of earlier references, as well as complete checklists of organisms and of species of conservation importance with relevant habitats (which are available in the MP and UMP), were not described in detail. The texts on separate groups were prepared by the following experts: Cryptogams and Fungi - M. Stoyneva-Gärtner, Vascular plants – D. Dimitrov, Invertebrates - Z. Hubenov, L. Kenderov and I. Pandourski, Fishes – S. Mihov, Amphibians and Reptiles – B. Naumov, Birds - L. Profirov, T. Michev, K. Bedev, I. Dimchev and B. Michev, Bats – I. Pandourski and other Mammals – V. Popov.

Results

Cryptogams (Algae, Bryophyta) and Fungi (incl. Lichens)

In total, ca. 210 algal taxa were documented in 23 scientific studies (for details see MP and Dimitrova et al*.,* 2018) and six of them were included in the Red Lists of Bulgarian algae (Temniskova et al. 2008, Stoyneva-Gärtner et al. 2016). Three new species were described from AE (Komárek 1956, Valkanov 1970, Stoyneva 2008): *Phormidium bulgaricum* (Kom.) Anagn. et Kom. (Syn. *Oscillatoria bulgarica* Kom.), *Nephrochloris nudum* Valk. and *Lobocystis michevii* Stoyneva. The only data on the species composition of bryophytes (1 sp.), fungi (2 sp.) and lichens (1 sp.) of AE are available in the UMP. Among them is *Clathrus ruber* P. Michelli ex Pers. - the basidiomycetous fungus with a debatable threatened status in Bulgaria (Uzunov et al. 2016). All taxa found in AE represent <1% of the cryptogamic and mycotic diversity of the country.

Vascular flora

Data about the vascular flora of AE are available in 11 publications summarized in the UMP, and recently the ecological state of AE based on macrophytes was published by Stoyneva et al. (2015). Totally 397 (9.95%) vascular plant species from 255 (28.97%) genera and 75 (51.02%) families were reported (UMP). The percentage values in the parentheses above show the representation of the number of species, genera and families in the AE flora in the overall flora of Bulgaria. The species found are predominantly meso/xerophytes (205), followed by mesophytes (56), hygrophytes (27), etc. Twenty-three species were included in the Red List of Bulgarian vascular plants (Petrova & Vladimirov 2009), fourteen species were included in the Red Data Book of the Republic of Bulgaria (Peev 2015), fifteen species are protected under the Biodiversity Act of the Republic of Bulgaria, one is included in the CITES Convention and one - in the Bern Convention.

Invertebrates

Totally 6 types, 10 classes, 35 orders, 82 families and 157 species are known from AE and the surrounding basins (Hubenov et al. 2015, UMP). This represents 0.52% of the Bulgarian invertebrate fauna (9.8% of the marine fauna and 5.2% of the freshwater fauna) and includes 56 marine and marine-brackish species (35.7%) and 101 species (64.3%), which are brackish-freshwater, freshwater and terrestrial forms connected with water. The types Rotifera, Annelida and Arthropoda, and the classes Eurotatoria, Crustacea and Insecta comprise the main part of the known taxa. Three of the invertebrates found in AE are included in the Black Sea Red Data Book (Dumont et al. 1999) and eight species belong to the European and IUCN Red Data Lists. Eight rare species and one Black Sea endemic – *Chironomus valkanovii* (Michailova, 1974) - were also recorded. Amongst the species found were the invasive *Rapana venosa* (Valenciennes, 1846), *Anadara kagoshimensis* (Tokunaga, 1906) and *Mya arenaria* (Linnaeus, 1758). *Jaera sarsi* (Valkanov,

1936) was described as a new species from the territory of AE (Valkanov 1936).

Fishes

Totally 22 species were recorded in the AE (UMP), but amongst them the only proved resident and the most typical species is the Caucasian Goby *Knipowitschia caucasica* (L. C. Berg, 1916). Moreover, its population in AE is the densest and biggest in area in Bulgaria. Regarding the European and national legislative documents and Red Lists, the ichtyofauna of AE is characterized by low conservational status. Only three of the species are included in Annex 3 of the Bern Convention and seven species are enlisted in the IUCN Red List in Least Concern category.

Amphibians and Reptiles

The herpetofauna of the AE has not been sufficiently studied and only a list of 17 species is available (UMP). The seven amphibians found in AE represent ca. 29% of the amphibian fauna of Bulgaria (24 species according to Tzankov & Popgeorgiev 2014, Dufresnes et al. 2015). The ten reptiles also represent ca. 29% of the contemporary reptile fauna of Bulgaria (34 species according to Stojanov et al. 2011). Most of the recorded species are of high conservation status: fifteen are enlisted in the Annex 3 of the Biological Diversity Act of Bulgaria and 4 of them – in Annex 2; fourteen species are strictly protected in the European Union countries and four of them are among the target species for conservation in the Natura 2000 network (respectively Annex 4 and Annex 2 of the Habitats Directive); two species are included in the Red Data Book of Bulgaria (Golemansky 2015).

Birds

The List of Atanasovsko Ezero bird fauna till the year 2014 contains 333 species (Michev et al. 2004, 2011, 2012, Dimitrov et al. 2005, UMP) and represents 79.3% of the Bulgarian bird fauna (420 species according to Ivanov et al. 2014). All recorded species were classified as: 86 breeding (48 residents and 38 migratory breeding species), 33 summer visitors, 196 passing species, 89 wintering species and 58 vagrants (the sum of the birds in all categories exceeds the total number of the species found in AE because in some cases one and the same species belongs to more than one category). Most of the species found are of high concervation importance: nine are in the IUCN Red List; 307 are in the Bern Convention, 61 are in CITES, 185 have European Conservation Status, 117 are in the Bird Directive, 126 are in Bulgarian Red Data Book (Golemansky 2015) and 270 species are in the Biological Diversity Act of Bulgaria.

Mammals

Based on the critical review of the literature, supplemented by field studies and survey data, it could be stated that at least 33 mammalian species (incl. Bats) occur on the territory of AE (Peshev et al. 2004, Popov 2007, Popov et al. 2007, UMP), which represents 45,8% of the terrestrial mammals in Bulgaria (Peshev et al. 2004). Species with a high conservation status are the European souslik *Spermophilus citellus* (Linnaeus, 1766) and the otter *Lutra lutra* (Linnaeus, 1758). The souslik occurs outside the reserve in the buffer zone, while the otter is widespread and with a growing population in the area of the reserve. Three species which are rare in Bulgaria or in this part of the country occur in the reserve: pygmy white-toothed shrew *Suncus etruscus* (Savi, 1822), common dormouse *Muscardinus avellanarius* (Linnaeus, 1758) and common pine vole *Microtus subterraneus* (de Selys-Longchamps, 1836).

Regarding the Bats, ten species of Chiroptera belonging to the family of Vespertilionids have been registered in AE (Pandourski 2004, UMP). This comprises 27% of the Bulgarian bat fauna with total of 33 known species (Peshev et al. 2004). All bat species in the area of AE are protected by the Agreement on the Conservation of Populations of European Bats (EUROBATS), Bulgarian Biodiversity Act (App. 3 and App. 2), Bonn and Bern Conventions (App. II and III) and Directive 92/43 EEC (App. IV and II). In Bulgarian Red Data Book (Golemansky 2015) two bats are considered vulnerable (VU), while in IUCN Red list of threatened species 2016-3 all bat species registered in the Reserve have the status of least concern (LC).

Discussion

The analysis of data on different taxonomic groups spread in AE revealed the differences in the knowledge and need of more intensive studies on most of them in the area (in both temporal and spatial aspect). Nevertheless, the total registered biodiversity of AE consisted of 1173 species, varieties and forms (with birds as the richest group - 333 species), four of which (three algae and one invertebrate) were newly described. More than 35% of all taxa have different threatened status according to international and national legislative and non-legislative documents. By contrast, only four of the recorded species (i.e. 0.3%) have been declared as invasive. The combination of the rich biodiversity with the presence of globally and regionally threatened species proves the outlining of the area of AE among the most important sites of Bulgarian biodiversity and nature conservation.

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