Information Sheet on Ramsar Wetlands
(RIS)
Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/ updated:
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DD MM YY

2. Country: BULGARIA

Designation date Site Reference Number

3. Name of wetland: ATANASOVSKO LAKE

4. Geographical coordinates: 42⁰ 34' 00" N and 27⁰ 28' 00", E; UTM grid NH 30, 31.

5. Altitude: From 0 to minus 1,5 m.

6. Area: 1404,3 ha (of the reserve and the new proposed south part)

7. Overview:

Declared as a Ramsar site No 292 on 28.11.84; The site includes the northern part of a hypersaline lake, associated salt marsh and reed beds, a complex of saltpans and settling pools surrounded by a perimeter dike and canal with fresh water. The area is important for numerous species of breeding and migrating birds. Because of its high salinity, the lake rarely freezes and is thus an important area for wintering and staging Dalmatian pelicans, ducks, waders and other water birds. Human activities include salt producing.

***Legal Status*:** The north part of the lake has been declared as nature reserve (State gazette, № 70/1980). The whole area of the reserve is owned by the State. The land in NW, N, NE and E directions is a part of the buffer zone is owned by the Municipality Burgas; a piece of the buffer zone in north and western part is private.

In 1999 the northern part of the lake has been re-categorize as maintained reserve according to the new Protected Areas Act (State gazette, № 99/1999) with some activities permitted until approval of the Management plan. The south part of Atanasovsko Lake together with a belt of about 200 m around the northern part has been declared as a buffer zone of the reserve (State gazette, № 85/1981).

***Brief Physical Geographic Characteristics*:** hyperhaline lake near the coastline, divided in two parts by the road Bourgas - Varna. The northern part is similar to an estuary and has been declared as nature reserve since 1980. The southern part is a buffer zone of the reserve. A buffer zone is the area around the other parts of the reserve. The both parts of the lake are salt-pans since 1906. The lake level is with about 1 m lower than the sea level. According to the Corine Biotope Habitat Types the lake belongs to type 15: Coastal and Halophytic communities -salt marshes, salt steppes, salt scrubs, salt forests (12 % from the total area), type 23: Standing brackish and salt water (80 %) and type 53 Water fringe vegetation (8 %). Small freshwater marshes, as well as a system of canals overgrown with marsh vegetation, surround the lake. The fresh water from its catchment area is collected in a circular canal and flows into the sea. A part of this canal serves to feed the salt -works with sea water from the Burgas Bay.

South part of a hypersaline lake complex with salt and freshwater marshes, reed beds, saltpans and settling pools surrounded by a perimeter dike, canal with fresh water and sea coast. The site is important for numerous species of breeding, migrating and wintering birds. Important "Bottle neck" point on the big migration route "Via Pontica". Due to its high salinity, the this part of the lake rarely freezes and is thus an important area for wintering and staging Dalmatian pelicans, ducks, waders and other water birds. Human activities include salt producing and scientific work. The proposed area ecologically is very close connected with the existing Ramsar site.

8. Wetland Type (the applicable code are marked)

Wetland Type:

Marine-coastal:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Inland:	**L**	M	**N**	O	P	**Q**	**R**	**Sp**	**Ss**	**Tp**	**Ts**
	U	**Va**	**Vt**	**W**	Xf	**Xp**	**Y**	**Zg**	Zk		
Man-made:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	9		

Please now rank these wetland types by listing them from the most to the least dominant:

5, J, Tp, Ts, 9

9. Ramsar Criteria (Please circle the applicable Criteria; the *Criteria for Identifying Wetlands of International Importance* are reprinted beginning on page 11 of this document):

1 • **2** • 3 • **4** • **5** • **6** • 7 • 8

10. Map of the site included? Yes.

11. Name and address of the compiler of this form:

Tanyo Michev, project "Burgas Wetlands", Burgas 8000, Ferdinandova Str., 78, Swiss Biodiversity Conservation Programme, Sofia, Lavele Str. 8, E-mails: burgaswet@bsbg.net; tanyo@mbox.infotel.bg. Web site: www.pomonet.com

12. Justification of the criteria selected under point 9:

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
In the Black Sea biogeographical region there are only two Salinas (type 5 of Human-made wetlands in Ramsar classification) - Atanasovsko Lake and Pomorie Lake. They have representative, rare and unique characters and are good example of millennium long sustainable co-existence between man and nature and wise use of natural resources.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

In the reserve and the newly proposed part are recorded the following animals, included in the IUCN Red List:

- 2 species of Mammals*: Spermophilus citellus, Lutra lutra;*
- 15 species of Birds; among them more numerous*: Pelecanus crispus, Phalacrocorax pygmeus, Aythya nyroca, Crex crex;*
- 2 species of Reptiles: *Testudo graeca, Testudo hermanni;*
- *3 species* of Amphibians: *Hyla arborea. Bombina bombina, Triturus cristatus;*
- 1 species of Fishes: *Neogobius melanostomus.*

In the reserve and the newly proposed part are recorded the following plant and animal species, included in the Bulgarian Red Data Book:

- 27 species of Higher plants (one of them – *Corispermum nitidum* - is included in the European Red Data Book);
- 95 species of Vertebrates.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

As the lake is situated in the most western part of Black Sea coast, it is a place with great concentrations of wildfowl, raptors, passerines and representatives of other bird groups. The peak numbers of autumn migration over Atanasovsko lake for the period 1978-2001 are up to 60,000 raptors and up to 240,000 storks, pelicans and cranes. Thus Atanasovsko lake takes well deserved place among the famous bottle neck sites in Europe.The site with highest migration numbers in Europe of: *Pelecanus onocrotalus, Pelecanus crispus, Circus aeruginosus, Falco vespertinus.*

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.
In the last several years during winter time (from November to February) the lakes supports over 20,000 waterbirds. The maximal numbers are: December 1998 – 25,358 ind.; December 1999 – 30,619 ind. (unpubl. data); January 2000 – 40,204 ind. (Kostadinova, Dereliev, 2002).

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

Atanasovsko Lake regularly supports 1% of the individuals in a population of one species or subspecies of waterbirds:

Species	1% Level		Average Numbers in Atanasovsko Lake		% of the Biogeographic Population
	Breeding (pairs)	Migrating / Wintering (ind.)	Breeding (pairs)	Migrating / Wintering (ind.)	Migrating / Wintering (ind.)
Pelecanus crispus	All	25		381 W	15.20%
P. onocrotalus	-	700		30,000 M	42.86%
Ciconia nigra	-	350		3000 M	8.57
C. ciconia	-	4000		136,000 M	34.00%
Pl. falcinellus	35	100		230 M	2.39%
Pl. leucorodia	20	60		130 M	2.16%
Cygnus olor	-	450		500 W	1.10%
Tadorna tadorna	-	750		2,000 W	2.66%
R. avosetta	620		540		0.87%
H. himantopus	450		150		0.33%
Ch. alexandrinus	620		250		0.40%
G. nilotica	200		100		0.50%

13. General location:

In the Eastern part of Bulgaria, on the Western coast of Black Sea. The lake is located near the town of Bourgas, in direct proximity to the Constantza-Istanbul international E-87 motorway. Town of Bourgas (220,000 inhabitants) is a District Center.

14. Physical features:

14.1. Solid Geology

The region of Atanasovsko Lake belongs to Burgas synclinorium from the Eastern Srednogorie tectonic region. This is a big and complex structure, which arises from the Nova Zagora and Jambol in western direction and gradually enlarges in eastern direction. The main axis is with east-west direction. This synclinorium gradually sinks and is lowering near Burgas and in Burgas bay. The geophysical data show that the synclinorium continues in the shelf region. A part of this synclinorium appeared at the land surface between Burgas, Achtopol and Rezovo.

The Burgas synclinorium is fulfilled by various, thick up to 2,000 – 3,000 m uppercretaceous (coenomanic, turonic and senonic) sediments and volcanogenous rocks. This uppercretaceous sediment - volcanic complex is strongly folded. Thus there many anticlinal and synclinal folds exist. The main axis of these folds is again with east-west direction (S t r a s h i m i r o v, Z a f i r o v, 1981).

14.2. Origin

The Atanasovsko Lake has a natural origin. Since the beginning of 20 century it has been changed into Salinas.

14.3. Hydrology

The reserve lake's volume is 3.2 mln. m^3 with average depth 0.30 m and water surface of 10.9 km^2. Integral index of changes in the lake volume is fluctuation of water level in different basins. The changes in water level are result of impact of several factors. The most important are morphometric characteristics of the lake, inflow, internal dynamics of water masses. Because monitoring of water level is "rich in information" and at the same time is simple to implement, it is accepted as almost obligatory measurement, which should be done regularly. The dynamics of water flow is determined in every cellar. Water quantities move from a cellar to cellar in a way to have enough time to increase its salinity. This is provided by a system of dykes, embankments and wood locks. The depth in Tolbukhin cellar is between 50 - 70 cm, in embankment zones the depth changes between 30 and 56 cm, in "main lake" between 10 and 35 cm, in internal retensor (from 20 to 50 cm. In drainage canal at the water-lock the depth is between 100 and 200 cm. The direction and flows are shown at the enclosed scheme of the reserve. Relatively small depth in the pre-cellars is a cause of sharp change of salinity after rainfalls, flowing of fresh or salt water from drainage or sea canals. Also coastal winds have a strong impact on water dynamics because of the small depth. Processes of water interchange have a significant influence on water ecosystem.

The biggest drainage canal goes round the lake and we call it ring canal or encircling drainage canal. There is sea canal also. Simply they differentiate in their purpose. The ring canal is draining fresh water south and the sea one is providing sea water to the inlet of distribution system of evaporation cellars. Periodical input of seawater has a significant impact on the hydrological processes and dynamics of water masses in separate basins. Drainage canal collects fresh water from all catchment area of the lake and drains them into the sea, especially during the winter time. In this way fresh water

does not mouth into cellars and does not diluting salinity concentration. Several embankments and dykes, situated outside the reserve, assist this function of the ring canal.

The length of the canal, respectively of lake's side, is about 12 km. Depth in the canal deviates significantly in different stretches. It depends on the surface run-off as well. At the water-lock between sea canal and drainage one (point 3') the depth is between 1.20 m and 2.20 m depending on the run-off. Width is also different in different stretches. Most of the canals are 2.50 - 3.0 m wide. At the above-mentioned water-lock the width is 10 m. The average depth is 1.5 m and together with average width 3 m the total volume of water in the drainage canal is 54 000 m^3, which is several times less than the volume of the lake. Catchment area of the reserve is 109 km^2. In the case if run-off coefficient of the catchment is the same as the coefficients of rivers which discharge into sea north and south of Atanasovsko Lake, we estimate as an annual run-off into drainage canal W = 6,870,000 m^3. About 10% of this run-off is flowing to the lake. Other quantity is flowing into clay pit lake (point 3) and the rest remained in the canal.

The lake itself has a very unique and complicated hydraulic scheme. It is determined by mixture of salty and fresh waters and by morphometric features of different cellars.

14.4. Soil types and soil characteristics

Soil survey. Atanasovsko Lake is surrounded by alluvial and alluvial-meadow soils**,** which are organic soils with slight profile, where the humic-torpkaceous horizon is restricted by underground waters to deepness of 40 - 50 cm. The humic content in the surface layer is 4,5 - 5,5 % and decreases by depth. The values of pH range between 8.2 and 8.9 and show its slightly alkoaline to alkaline character. At eastern and western direction the soils are of smolnic black earth type. They have black accumulative humic horizont, which is 50 - 60 cm wide and gradually turns into browny-dark transitional horizon "B" which is 25 - 35 cm wide. The carbonate horizon of these soils is located at depth of 80 - 90 cm. It is browny - yellow colored and is full with soft white carbonate concretes. The active reaction is slightly acid to alkaline (pH values between 6.8 - 7.2). Small areas with canella-forest soils are situated in northern direction.

The bottom of Atanasovsko Lake is covered by curative mud, which is nature resource with particular value. This value is determinate by its high medical quality, restricted deposits (only in Pomorie lake and Atanasovsko Lake) and very long process of creating (1 cm layer for about 100 years). Medical institutions in Bourgas and Pomorie are supplying with curative mud from Atanasovsko Lake.

14.5. Hydrochemistry and Water Quality.

The hydrochemistry of Atanasovsko Lake has been investigated by B o t e v (1997). In August and September 1995 samples have been collected and analyzed for salinity.

The fluctuations of the salinity, calculated by the Knudsen formula (S t r i c k l a n d, P a r s o n s, 1965), for the brackish water stations in the different months of sampling, are rather high. As a result of decrease of rainfalls and permanent evaporation of water in the separate crystallization ponds of the salt works, there is almost double increase of salinity from the spring months to the months of July and September. Similar changes are confirmed from the data reported by I v a n o v e t a l (1964). Exceptionally high value for salinity of the order of 169%**o** was found at Station 12a, where enormous number of species of the brine shrimp *Artemia salina* were found. The big increase of salinity in the artificially dug out ring-canal for supplying crystallization ponds of the salt works with sea water from the Black Sea between the month of May and the months of July and September is due to the fact that there was inflow of such water in the last two months. This is confirmed by the salinity values at these stations in this time - between 16.03%**o** and 18.30%**o** - the values identical with the fluctuations in sea water at the Bay of Burgas (R o z h d e s t v e n s k I y, 1980).

14.6. Depth.

The depth of Atanasovsko Lake is very small. The average depth is 0.30 m and the n\maximal – about 2 m. The depth in Tolbuhin cellar (point 8) is between 0.50 – 0.70 m, in embankment zones depth changes between 0.30 and 0.56 m, in "main lake" between 0.10 and 0.35 m, in internal retensor from 0.20 to 0.50 m. In drainage canal at the water-lock the depth is between 1 and 2 m. Relatively small depth in the pre-cellars is a cause of sharp change of salinity after rain falls.

14.7. Climate:

Regional Climate. The average precipitation value is between 520 and 580 mm. The highest values are reached in June and November, and the lowest - in August and September. The annual average air temperature is 12 - 13 °C, and the average annual amplitude is 20.5 - 21.5 °C. This region is among the regions with the most soft winter regimes. The average temperature in January varies between 1.5 and 2.5 °C. Only 20 days during the total winter period have negative values of the temperature. Only during drastic spells of cold weather the absolute temperature minimum reaches - 21- 22 °C (I v a n o v e t a l., 1964).

Site Climate. Very detailed information is available from the Meteorological station at Burgas Airport, which is situated very close to the reserve (at a distance less than 1 km). Only some data are included in the ***Table 2, App. 1.***

15. Hydrological values:

A description of the principal hydrological values of the wetland, e.g., its role in the recharge and discharge of groundwater, flood control, sediment trapping, prevention of coastal erosion, and maintenance of water quality.There are only two over salty lakes in Bulgaria (the other one is Pomorie Lake). That's why the hydrological value is very high.

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16. Ecological features:

16.1. Main habitats and vegetation types.

Herb or field layer. Both mezophite and hygrophyte microtherme vegetation are presented by: torphaceous and marshy vegetation with predomination of reed (*Phragmiteta australis),* rush (Typhaeta latifoliae*,* Typhaeta angustifoliae), cene (Schoenoplecteta lacustris) and others.

The type of vegetation is distributed nearby the canal, surrounding the reserve, its banks, parts of the bounding pools and lower sections of the area from the outside. Coenoses of *Phragmites australis* are mostly monodominate and in some parts they overgrow the wall dikes. In the process of formation takes a partial assist *Typha latifolia* and in less percentage on drier places - *Typha angustifolia. Salix alba* and *Salix eleagnus* singly or in small groups among the reed could be found. Halophyte grass coenoses like Limonieta gmelinii*,* Salsoleta sodae or with predomination of *Salicornia europea*, *Sueda maritima, etc.* appeared also. Coenoses made by those species in the reserve are located on the mostly salted soils - during seasonal incidentally, or in cases of aquatories with increased concentration of salts in the water in the foothill of the dikes of lower relief. *Salicornia europaea* takes the main part in the coenoses. In some parts it forms pure stands and especially at the recently created dikes it is a pioneer species. Other halophites mixed with grass species could be found on the dikes, such as - *Sueda maritima*, *Salsola kali*, *Limonium gmelinii*, *Parapholis incurva*, *Aueluropus litoralis* and others

Mezoxerotermal grass coenoses with predomination of Agropyreta intermedie, Festuceta pseudovinae, Poaeta bubosae, Lolieta perennae with participation of *Cynodon dactylon*, in some places with *Dichantium ischaemum* and *Chrysopogon grillus.* Although relatively rarely, representatives of the typical psamophite vegetation could be found in the coenoses of Leymeta racemosi, Amophylleta arenariae, Centaureeta arenariae and others.

The vegetation on the reserve is represented by hydrophyte, hygrophyte mezophite, and mezoxerophyte associations, some of them secondary in origin on places of previously existed mixed broadleaf forests and shrubs, mixed with halophyllic, xeromesphyte grass coenoses. Changes in the originally existed coenoses are reported due to the considerable antropogenic impact during the last 50 - 60 years. Salt manifacturing also lead to ecological changes. For example, the changes of the vegetation cover are closely connected with: changes of the hydrological and salt-balancing regimes, appearance of ruderal species, dike-construction works, agricultural activities that take place in the buffer-zone of the reserve, and with the background pollution from the industrial areas of Burgas and the international airport, as well.. The halophyte coenoses, like this of *Salicornia europaea* and *Sueda maritima* could be recognized also as pioneer ones. These species are the first established in the foot of the dykes ***(App. 2, Fig. 1.*** The reserve vegetation does not tolerate changes of degradation with no respect of their incidental or periodical character that is reflected by construction and reconstruction activities of the dykes. Incomplete data from the research show the existence of the relatively small number of rare or endangered species (Acc. to the Low for the Protection of Nature).

Understorey and shrub layer. The shrub vegetation in the reserve and its buffer zone is scarcely distributed. The wild autochtonos species (*Amygdalus nana, Astragalus cicer, Genista tinctoria, Ononis arvensis, Ononis spinosa,* etc.) are singly represented in the traditional herbaceous coenoses. Some slightly specialized species (*Clematis vitalba, Prunus spinosa, Rosa cannina, Rosa pontica, Rubus sanguineus, Tamarix tetrandra,* etc.) penetrated and developed at the ruderalized terrains. *Syringa vulgaris, Tamarix tetrandra* and *Hedera helix* are represented in small groups on the lime substrata in the north-eastern part of the lake, at close vicinity to the sea coast and in the south-eastern part of the buffer zone. Species like *Ficus carica, Prunus sativa, Hedera helix* could be found somewhere in the reserve territory and in the previous friut-orchards situated in the recent buffer zone.

Layer of trees. There is no autochtonous tree vegetation in the reserve and its buffer zone. Single specimen of *Salix alba*, *Salix eleagnus, Salix fragilis* and partially of *Populus tremula* could be rarely found in the reedbed and along the shore of the freshwater body..

16.2. Limnological characteristics.

The main limnological features of the Atanasovsko Lake are presented on ***Table 3***, ***App. 1.***

16.2.1. Phytoplankton

In the phytoplankton samples a total of 120 taxa was found. They belong to 102 genera of 7 phyla. Most of the determined species belong to the phyla Chorophyta (mainly Euchlorophytina), Chrysophyta (mainly Bacillariophytina) and Cyanophyta - 47, 41 and 36 taxa, respectively. Only in the freshwater part of the wetland 41 species of 34 genera were found. The remained 74 species were presented both in salt- and in fresh waters.

The biggest phytoplankton quantity was $1424x10^6$ cells/l. The lowest quantity was $1x10^6$ cells/l. The highest estimated biomass value was 59.02 mg/l. In the freshwater part the biomass was highest at sites 3 and 4 (up to 38.11 mg/l). The lowest value was 0.001 mg/l. The phytoplankton quantity varied significantly at each site. Generally, for the salt part of the reserve it was higher during summer periods of 1995 (August) and of 1996 (July). Representatives of the division Cyanophyta, of the subdivisions Bacillariophytina and Euchlorophytina were presented in significant quantities in all investigated sites, but during different sampling periods. Representatives of Pyrrhophyta and Raphidophyta occasionally caused algal blooms in some saltwater basins or there mass development was found in some parts of the salt basins. The other groups (Euglenophyta, Cryptophyta, Chrysophytina and Xanthophytina) had much smaller role. Representatives of the subdivision Zygnemaphytina did not participate significantly in the quantitative structure of the phytoplankton.

According to the investigations of the phytoplankton quality and quantity of the eleven sites located at the reserve territory it could be stated that pollution and eutrophication problems are most important in the freshwater part of the reserve. Changes in the phytoplankton assemblages in the salt-water part most probably are connected with the saline regime of the salt production basins. The eutrophication of Black sea waters, which entered the system through the surrounding canal, has to be taken into account, but it seems that its effect is diminished because of the specific character of water movement through the Salinas.

16.2.2. Zooplankton and Zoobenthos.

Totally 34 constant components have been found: 20 Rotatoria, 6 Cladocera and 8 Copepoda in the reserve during the two years of observations. About a half of them occurred in the buffer zone basins during the second year. Several factors: seasonal events, changing salinity and exchange of water masses between the lake end the sea create variety of environmental conditions which give the possibility for many species to occur. The number of species under these specific conditions should be estimated as high, compared to the most similar Pomorie Lake, from where some 15 species are known.

The zooplankton community seems to be poor, but the quantities found during the study are actually residual after a great part of it is eaten by the predator's fish and so on). Having this in view, the actual production of the system should be estimated as high. The sudden exchange of the environment by entering marine water is a stress for the aquatic invertebrates (also for the fish, by the way), and is followed by rapid decreasing of the quantitative values.

The zoobenthic species found in the reserve and buffer zone are presented by 7 worms, 8 mollusks, 7 crustacean and 13 insects, totally 35 species. They are also separated into two complexes. The first of them includes freshwater inhabitants at sites 1 - 3 and the eastern canal (sites 4, 17 and 18) during the spring, as well as the western canal (site 13). The second one consists of halophilic species with constant character of the bottom fauna. Among them typical for the specific conditions are some crustaceans (*Corrophium, Gammarus, Sphaeroma*), mollusks *(Hydrobia, Cardium, Syndesmia*), and the brine fly *Ephydra* and *Chironomus salinarius*. As halophilic, but occasional participants in July 1996 the marine shrimps *Crangon crangon* and *Leander* sp were noted; they are not permanent of the lake invertebrate fauna. In some of the basins along the road in the buffer zone a borrowing actinia species was also found, but not identificated.

The following species were established also: *Gammarus aequicanda*, *Gammarus subtypicus* and *Corophium volutator* from order Amphipoda, *Idothea baltica basteri* and *Sphaeroma serratum* from order *Isopoda* as well as two shrimp species - *Palaemon serratus* and *P. elegans* from order *Decapoda.*

The species from order *Amphipoda* vary in their representation during the particular periods of the year and in specific lake's ponds. The species *Gammarus subtypicus* is predominant in ponds with a relatively low salinity and was found with *Artemia salina.*

17. Noteworthy flora:

17.1. Algae.

Totally 30 species were reported (P e t k o f f, 1919) and 14 of them were used in the description given by I v a n o v e t a l. (1964), without delimitation between the freshwater and the brackish and salt part of the reserve. In the compendous list of species found at the wetlands along the Bulgarian Black Sea Coast and in the Black Sea by P e t k o f f (1932) 180 taxa were included without pointing their exact localities. In the Bulgarian algal flora. I. (V o d e n I c h a r o v e t a l., 1971) 88 species are mentioned as typical of the wetlands (fresh water and brackish ones) along the Black Sea coast, without exact pointing of their localities and 6 species are pointed especially for the salt basins and canals of Burgas Salinas. There the species *Oscillatoria bulgarica* described by K o m a r e k (1969) from canals of the Burgas Salinas is also included.

17.2. Vascular plants.

The vascular plants of Atanasovsko Lake have been investigated by V e l e v (1997). According to him 233 species of higher plants are registered in Atanasovsko Lake**.** Nine of them are protected by the Law for Nature protection, twenty species are included in Bulgarian Red Data Book (1 vanished, 3 threatened and 16 rare species). One species - *Corispermum nitidum* is included in the List of Rare, Threatened and Endemic Plants of Europe and two - *Nonea atra* and *Silene thymifolia* are Balkan endemic species.

Recently in the vicinity of the reserve the orchid *Orchis elegans* has been found in a great quantity. There is a proposal for declaring of the place as protected site.

18. Noteworthy Fauna

18.1. Invertebrates.

This large group of animals has been investigated partially. More attention has been paid to some species as the Brine Shrimp, which serves as a food for many bird species in the reserve. The group of the dragonflies has also great conservational value.

Brine Shrimp (*Artemia salina*). The population of this species has been investigated by A n d r e e v (1997). The Brine Shrimp, *Artemia salina,* is one of the most often represented inhabitants of the lake. The specific character of the hyperhaline lake is offering good conditions for the species' development. This and the remaining species with a relatively poor qualitative content are providing a reliable feeding source for other inhabitants. Conditions for keeping a feeding chain for the fish population and the birds inhabiting the lake are established.

The favorable conditions of growth of *Artemia salina* is the northern zone of Atanasovsko Lake, where from particular areas a tenfold of tones biomass could be collected.

Dragonflies (Odonata). The following species of Dragonflies (Odonata) have been established:

1. *Chalcolestes viridis*
2. *Lestes barbarus*
3. *Lestes virens*
4. *Coenagrion pulchellum*
5. *Enallagma cyathigerum*
6. *Ischnura pumilio*
7. *Ischnura elegans*
8. *Aeschna mixta*
9. *Anaciaschna isoscelens*
10. *Anax imperator*
11. *Anax parthenope*
12. *Hemianax ephippiger*
13. *Libellula fulva*
14. *Orthetrum cansellatum*
15. *Orthetrum albistylum*
16. *Crocothemus erythraea*
17. *Sympetrum striolatum*
18. *Sympetrum meridionale*
19. *Sympetrum fonscolomb*

Among the established species the following ones are of particular interest: *Chalcolestes viridis* - rare for Bulgaria; known mainly from Southern Bulgaria; *Anax parthenope* - relatively rare, distributed mainly along the Black Sea Coast; *Hemianax ephippiger* - extremely rare species, found mainly along the Black Sea Coast; *Libellula fulva* - extremely rare species, known mainly from Southern Bulgaria.

18.3. Fishes (Pisces).

Being separated into large number of evaporating and crystallizing basins with various salinity (from $0.12^0/_{00}$ to $168^0/_{00}$) the water surface together with the canals is a complex system of water bodies which makes impossible the formation of a stable faunistic ichthyologic complex. The great difference in the environmental conditions, and first of all the salinity, act during the different seasons and is an additional obstacle against the formation of rich of species fish fauna. Quantitatively, however, the eurybiont species like the caucasian gobby *Knipowitschia caucasica,* the speaclebacks *Gasterosteus aculeatus* and *Pungitius platigaster* develop in mass. Abundant development is observed also of the mosquito fish *Gambusia affinis holbrooki*, introduced in this country in 1924. This species is freshwater, but tolerate salinity up to 7 - $8\ ^0/_{00}$, and is found in the northern canal along the brine basins. At the northeastern part of the reserve there is a late quarry full with freshwater where the golden fish *Carassius auratus gibelio* is abundant, and the carp *Cyprinus carpio* develops also in much smaller quantity. All of the species mentioned are able to reproduce in the reserve. In the large evaporating basins with salinity between 5 to $60^0/_{00}$ the caucasian gobby and both species of speacklebeck are permanent inhabitants; besides them mugilid species enter during the summer by the marine water and remain there because the available food. This was the practice in the past, when fishermen trapped young fish along the coast and replaced them in the brine basins for fattening. Some 40 t of fish annually were produced in this way in the Pomorie Lake. In the eastern part of the canal that connects the brine basins with the sea, some marine species occur; they are not so important in the faunistic complex of the reserve. The qualitative and the relative quantitative characteristics of the ichtyofauna is shown on ***Table 4, App. 1.***

18.3. Amphibians and Reptiles

The information on these groups is relatively scarce and should be gathered additionally in the future. There are not special investigations on amphibians and reptiles in the reserve. According to M i c h e v (1995) the following amphibians and

reptiles occur there ***(App. 1, Table 5).*** Two of these species, namely *Ophisaurus apodus* and *Elaphe longissima* are included in Bulgarian Red Data Book as threatened species.

18.4. Birds.

This group is the richest and the best investigated one. According to P r o f i r o v, D i m i t r o v , N y a g o l o v (1997) in the reserve, buffer zone and at the coast in front of the lake 294 bird species (or 75 % of all bird species in Bulgaria) are recorded and 62 species of them are breeding. Thus Atanasovsko Lake occupies the first place in Bulgaria according to the richness of bird species.. Recently M i c h e v e t a l., (1999) have reported 306 species ***(App. 4).***

The birds of Atanasovsko Lake have following conservation features:

255 species from all 306 for Atanasovsko Lake are declared as protected according the Nature Conservation Law.

86 species from all 100 birds included in Bulgarian Red Data Book are registered in Atanasovsko Lake: 29 of them are rare, 52 are threatened and 5 - extinct as breeding. 7 rare and 11 threatened species are breeding.

17 species cover Ramsar numerical criteria for wetlands with international importance - 3 as breeding (*Recurvirostra avosetta, Sterna sandvicensis and Gelochelidon nilotica)* and 14 as migrating or wintering.

102 species registered in Atanasovsko Lake are included in Corine biotopes project (16 of them as breeding).

170 species are included in 4 BirdLife Spec. categories:

Species of global conservation Concern (Spec. 1) - 13 species;

Concentrated in Europe with unfavorable conservation status (Spec. 2) - 20 species;

Not Concentrated in Europe but with unfavorable conservation status (Spec. 3) - 78 species;

Concentrated in Europe and with favorable conservation status (Spec. 4) - 59 species.

283 species are with European threat status according to BirdLife:

183 migrating species are included in Bon Convention: 4 - in Appendix I and 179 in Appendix II.

All these data clearly show the great regional and international conservation importance of Atanasovsko Lake.

The bird migration over Atanasovsko Lake is very well studied in two ways:

Ringing of mainly waders and passerines since 1977;

- Observations of visible autumn migration of soaring birds (10 August - 30 October) from 1978 till 1993.

The results show that Atanasovsko Lake ranks first in Europe in the migration of *Pelecanus crispus, Pelecanus onocrotalus, Circus aeruginosus* and *Falco vespertinus.* It occupies second place according to the migration of *Aquila pomarina.* The peak numbers of autumn migration over Atanasovsko Lake for the period 1978 - 1994 are up to 60 000 raptors and up to 240 000 pelicans, storks and cranes. They origin from the eastern half of Europe.

Atanasovsko Lake is of big importance as wintering place for ducks, waders and pelicans. Since 1977 regular midwinter counts have been made. Its importance among all wetlands along Black Sea coast is shown on ***Fig. 4, App. 2.*** Significant increase of the midwinter numbers is observed at Dalmatian Pelican and Common Snipe

As one may see from above given data Atanasovsko Lake is

The site with highest species diversity of birds in Bulgaria

The place with highest number of birds species from Bulgarian Red Data Book

The site with highest breeding numbers in Bulgaria of: *Recurvirostra avosetta, Himantopus himantopus*, *Sterna albifrons*, *Sterna hirundo.*

Unique breeding place in Bulgaria of: *Larus melanocephala*, *Larus genei, Gelochelidon nilotica*, *Sterna sandvicensis*

The site with highest migration numbers in Europe of :*Pelecanus onocrotalus, Pelecanus crispus*,*Circus aeruginosus*, *Falco vespertinus.*

The site with the biggest midwinter numbers in Bulgaria of: *Tadorna tadorna*

18.5. Mammals

S t e f a n o v (1997) has investigated the mammalian species composition (except bats) and has established their status in the reserve and its buffer zone. According to him the primary list of mammalian species is as follows ***(App. 1, Table 10):***

Five species of small mammals on the trap lines were captured: East European vole (*Microtus rossiaemeridionalis),* domestic mouse (*Mus sp.*), wood mouse (*Apodemus sylvaticus*), bi-coloured white-tooted shrew (*Crocidura leucodon)* and Lesser white-tooted shrew (*Crocidura suaveolens*).

Generally, the established species of macromammalia are popular of the country and are interesting mainly as a part of the ecosystem of the reserve and/or as a food base for predators. The following three species are of particular interest from the point of view of protection of species diversity:

Pygmy white-toothed shrew (*Suncus etruscus).* In the course of our investigations we were not able to registrate this species, which may be dependent on the ineffectively of the traps used. In literature up to now there is an announcement about two sites of this species in Bulgaria. One of them is in "Atanasovsko Lake".

Gunther's vole (*Microtus guentheri*). The species was not established neither with capture with traps, neither by following the traces of the living activity (colonies). Its existence had been established only by studying pellets of the Barn owl.

European souslik (*Spermophilus citellus*). It is widely spread in Bulgaria and is not considered to be endangered. In the last two decades this species reduced in abundance. It is accompanied with a reduction in number of its habitat.. The species is included in the Bern convention ratified by Bulgaria (State gazette, No 23, 1995).

Data received during the investigation allow us to consider that only three species of big mammals permanently occur in the reserve and the adjacent areas: fox, weasel and wild boar.

Fox (*Vulpes vulpes*). Based on inquiry data and personal investigation it had been established 3 inhabits of fox burrows during 1995. In two of them there were litters. One of these inhabits was in the territory of the reserve.

Weasel *(Mustela nivalis*). It had been observed permanently by workers in the Salinas. The traces had been registered on the dikes in and also out of the lake. Based on the frequency of the registrated traces it can be supposed that weasel permanently persists in the reserve and in the adjacent areas in small numbers

Wild boar *(Sus scrofa).* Generally, the inquiry data show the persistence of relatively large number of wild boar. They inhabite the west parts of the reserve, covered with reed.

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19. Social and cultural values:

There are no agriculture and forestry activities within the site. The lake itself is visited by bird watchers, bird photographers, scientists, ringers and nature lovers.

Hunting is strongly prohibited in the reserve and its buffer zone. Nevertheless, during the hunting season there is some hunting pressure, especially in the northern parts of the reserve. There are not exact estimates of the negative influence upon the bird populations.

Nowadays there are not fishing activities in Atanasovsko Lake. According to some data it had been used for fishing purposes till the Second World War. After 1995 a sport fishing began in the freshwater pond in NE part of the buffer zone, where some fish species have appeared due to the removal of the pollution. Unknown quantity of brine shrimp's eggs is taken out by poachers each year.

The site has not a religious or archaeological importance.

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20. Land tenure/ownership:

The reserve is an exclusive state property and is managed by the Ministry of Environment and Waters (MoEW). It is surrounded by land plots, which are eider private or Bourgas Municipality's property.

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21. Current land use:

(a) Site. The site is used for salt producing. In fact the reserve territory is the place for water transpiration and there are not human activities at all;

(b) Surrounding area. The surrounding area is used as arable land and industrial zone, incl. the Airport of Bourgas, the mine "Cherno more" and other.

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22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

(a) At the site: repairing of the old dykes and building of new ones and water pollution of the surrounding canal;

(b) Around the site: air pollution.

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23. Conservation measures taken:

- In 1976 a small territory (about 80 ha) has been declared as "Protected Site";
- In 1980 the north part of the lake with area of 1074.5 ha has been declared as nature reserve (State gazette, number 70/1980);
- In 1981 the south part of Atanasovsko Lake together with a belt of about 200 m around the northern part has been declared as a buffer zone with area of about 900 ha (State gazette, number 85/1981);
- In 1984 the reserve without the buffer zone is declared as a Ramsar site;
- In 1989 the reserve has been declared as Important Bird Area and as a Global Important Area since 1997;
- In 1999 the reserve has been re categorized from the category "strong reserve" to the category "maintained reserve" with area of 1074.5 ha;

- The reserve has been declared as Corine Site under No 77;
- Atanasovsko Lake has been designated by the Ministry of the Health as a place with significant stores of curative mud and it has been included in the so called " Zone A" with very strong regime.

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24. Conservation measures proposed but not yet implemented:

A Management Plan is in a procedure of official approval by MoEW. Some urgent measures, included in the plan, are already implemented by the project "Bourgas Wetlands".

There is a proposal for enlargement of the Ramsar site "Atanasovsko Lake" with the aquatory of the south half of the lake. This part is proposed also for declaring as a maintained reserve.

There is an other proposal for declaring as "Protected Site" according to the Protected Areas Act the wet meadows north to the reserve.

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25. Current scientific research and facilities:

25.1. Current scientific research:

- Monitoring of breeding, migrating and wintering birds by the team of the project "Bourgas Wetlands".
- Following of the autumn migration of soaring birds since 1978.
- Catching and ringing Passerines.

25.2. Current projects:

- Project "Bourgas Wetlands" at Bulgarian-Swiss Biodiversity Conservation Programme

25.3. Field Stations:

- Ecological Station at Central Laboratory for General Ecology - Sofia 1113, Gagarin Str. 2.
- Ringing Station of Institute of Zoology, Sofia 1000, Tzar Osvoboditel 1.

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26. **Current conservation education**:

- A summer seminar is organized each year for following of the autumn migration of soaring birds and for management activities in the reserve;
- A hide for birdwatcher is built;
- An Information (Visitors) Centre is foreseen to be built according to the Management plan of the reserve.

27. Current recreation and tourism:

Almost all foreign birdwatching groups, as well as singles birdwatchers are visiting Atanasovsko Lake in the spring, summer and autumn to observe the exclusive biodiversity of the lake and the impressive migration of soaring birds. Unfortunately there are not any facilities for the tourists. Atanasovsko Lake is used for national and international student voluntary summer brigades (prologned about 15-20 days) organized by "Bourgas Wetlands Project". 30-60 volunteers participate in average.

28. Jurisdiction:

a) Territorially: as Salinas the lake is under the jurisdiction of the "Chernomorski Solnitsi" EOOD, as well as under the obligations of the Municipality of Burgas, for the surrounding areas.

b) Functionally: as a reserve and Ramsar site the lake is under jurisdiction of the Ministry of Environment and Waters – Sofia, represented with the Regional Inspectorate for Environmental Protection and Waters (RIOSW) – Bourgas; 8000 Bourgas, 67 "Perushtitza" Str., Bulgaria.

29. Management authority:

The Regional Inspectorate for Environmental Protection and Waters (RIOSW) – Bourgas; Address: 8000 Bourgas, 67 "Perushtitza" Str., Bulgaria.

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