SURVEY ON THE PHYTOPLANKTON OF THE PROTECTED AREA "PODA" (June – August 1995)

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PROJECT: "PROTECTION AND NATURE EDUCATION IN PODA PROTECTED AREA"

MANAGEMENT PLAN FOR PODA PROTECTED AREA NEAR BOURGAS

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BOURGAS, 1997

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GLOSSARY OF TERMS

Important Bird Area - territory important for the birds after implementation of new BirdLife criteria.
Investigated area - the territory of PODA protected area, Phoros bay, Uzungeren
PODA protected area (the site; the territory) - the area with borders described in 1.0.
Protected area (according to Bulgarian legislation) - piece of nature with typical landscape, valley, gorge, lake and other which may be used as territory for recreation and tourism.

SUMMARY OF THE MANAGEMENT PLAN

Object: PODA protected area; co-ordinates: 27°27'00"E; 42°27'30"N; UTM-grid: NH 30; NG 39;
area: 100.7 ha

Location: Immediate to the fence of the last building of the town of Bourgas - Shipyard "Ilia Boiadgiev".

Conservation status: Protected area since: April 20, 1989.
Important Bird Area since: 1989.

Management infrastructure: Owner of the site: the state.
Manager of the site: Bulgarian Society for the Protection of Birds (BSPB)

Description of the site: Historically connected with the Bourgas-Mandra firth. Afterwards the territory has established as the most eastern part of Mandra lake. The intensive human activities after sixties lead to considerable changes in its appearance. It is possible different types habitats to be clarified on its current, comparatively small area - fresh water, brackish, salt, hyperhaline water bodies, overflows, etc. PODA is typical representative of lagoon with secondly developed natural habitats.

Meaning: In PODA could be found the unique breeding spoonbill colony for the Black Sea coast. It is nesting together with heron species (grey heron, nigh heron, purple heron, little egret). Regularly in the area as breeding species occur glossy ibis. With special interest are included in Bulgarian Red Data Book species (5 plants and 6 animals), as well as new founded for the country species: plant (*Chenopodium botryoides*), spider (*Callilepis cretica*), beetles (*Pseudocypus cupreus* and *Ocypus simulator*). The territory of the protected area is a habitat also for other rare plant and animal species.

Management policy: To protect the site as a key point for the Black Sea coast and the country, which support great variety of plant and animal species. In near future PODA to became a territory where rare plant and animal species to breed and developed aiming their resettlement in the surrounding areas.

Main planing activities:

Defining the value and the status of the different sections and making control on the trespassers.
Supporting and creating new equipment for nesting birds (pile dwelling and heap islands; heron nests; boxes and platforms for ducks, etc.)
Creating and supporting Nature protection and information Centre as well as additional equipment for nature conservation education (ecological route; exhibition in the Centre; advertising materials and souvenirs, etc.).
Implementing monitoring programmes on:
- breeding, migratory and wintering birds;
- water balans and chemical composition of the waters;
- plant communities (status and developing);
- phyto-, zooplankton and zoobenthos (degree of the developing of the water bodies);
- fish populations (status; food spectrum and their presence in the bird's food);
- status of the vertebrate (excluding fishes and birds) and invertebrate fauna.

PART 0: PREAMBLE

0.1. POLICY

The Bulgarian Society for the Protection of Birds (BSPB) is a voluntary non-governmental organisation. It was established in 1988 with the purpose of conserving and protecting birds and their habitats. In the years of its existence BSPB has won recognition as an operative national organisation based on both a large-scale social support and scientifically-founded priorities and activities. The practical orientation, inner motivation and application of latest environmental methods allowed BSPB to achieve results unknown so far in biological diversity conservation in Bulgaria. The black vulture (*Aegypius monachus*) was restored to the country's fauna after decades of absence from it.

BSPB's high authority is the reason for the Society being involved in all important national environmental initiatives - for instance the National Strategy for biological diversity conservation, the National Programme for biological monitoring, etc. The fact that BSPB was appointed the Bulgarian representative in BirdLife International as well as that the Society was assigned to the task to implement two of the projects included in the Bulgarian-Swiss Programme for biological diversity conservation, points to a high international recognition.

One of the three major objectives of the Bulgarian Society for the Protection of Birds constituting its Strategy and National Programme, is to protect the locations which are important for birds, in terms of nest-building places, hunting territories, rest or feed areas during migratory and winter periods. The society has taken over Bulgaria's part of a colossal international project, conducted by BirdLife International, and particularly, Protection of Important Bird Areas (IBA) in Europe. BSPB has carefully considered its policy towards the protection of IBA with reference to Bulgaria's situation of today, and her development in the past few decades as well as with the country's possible future development. The Society aims at a good co-operation with the public organisations dealing with the protection of protected areas, establishing contacts with the purpose of influencing, for environment's sake, organisations either using natural resources in Important Bird Areas or affecting them in one way or another. BSPB's policy has always been aimed at involving local people in its initiatives.

The final aim is the actual conservation of as many important ornithological and natural locations as possible, through a practical implementation of the necessary measures and activities by the respective managing organisations.

As early as its incorporation the Bulgarian Society for the Protection of Birds has started practical environmental activities in several places, in themselves Important Bird Areas including protected natural areas. The activities themselves were managerial measures for the protection of certain important natural areas, e.g. the East Phodopes, the Atanassovsko Lake Natural reserve, the Srebarna Natural Reserve, etc.

The Society has carried out observations and investigations to identify important natural areas in the country and filed applications for the award of the Protected Natural Area status. The candidature of the PODA wetlands, to the south of Bourgas, was filed in 1988. As stipulated by Regulations No. 433/April 4, 1989, issued by the ex-Environmental Committee (Promulgated: SG 37/1989) (cf. App.I), the PODA wetlands by Bourgas was granted the status of Protected Natural Area under the management of the Bulgarian Society for the Protection of Birds. This has so far been the only protected natural area run by the Society. The land management plan submitted specifies the main objectives, tasks and strategies for its conservation and preservation of its natural importance.

0.2. NATIONAL OR OTHER SURVEYS

The Bulgarian Society for the Protection of Birds conducts several major national and international research studies which are significant for the protection of Important Bird Areas. First, this is the annual international midwinter poll of water fowls. It consists of a synchronised poll of birds inhabiting the major water basins, along the Danube and the Black Sea coast inclusive. In addition to the information on birds, data on the condition of locations, threatens, etc. have also been collected.

Similar data collection with regard to locations in the breeding season and during the migratory period has been annually taken up, although on a more-limited scale (focused mainly on several basic locations and regions in the country). Nevertheless, for a considerable number of locations a maximum complete information has been collected for the past ten years. During the past years the Bulgarian Society for the Protection of Birds has organised and carried out national poll of white stork (*Ciconia ciconia*) and corncrake (*Crex crex*), and valuable information on Important Bird Areas including protected natural areas was collected during the poll as well.

An essential element is to study the state of Important Bird Areas and to constantly monitor them; as well as the necessity for an urgent reaction in case of a threaten to their normal existence (including provoking international measures).

All data collected are stored in the National Bank for Ornithological Information within the Bulgarian Society for the Protection of Birds.

0.3. IDENTIFICATION OF SITES

Within the framework of the international project for Protection of Important Bird Areas in Europe, the Society completed the identification and inventory-making of Bulgarian Important Bird Areas. In 1989 twenty-two similar locations in Bulgaria were listed, the Mandra Lake inclusive, an inherent part of which is PODA protected area. In addition to the information regarding most of them, the Society has collected data on additional more than 65 Important Bird Areas while a system for a regular future IBA data collection has been established. In wintertime this is accomplished mainly through the participation of the Bulgarian Society for the Protection of Birds in the midwinter poll of birds in Europe, while in other seasons specially arranged Society initiatives contribute to this. Simultaneously, a network of co-ordinators has been built up whose responsibilities are to follow closely the location state, to alarm in case of danger, to promote activities related to the protection of priority sites. In 1994 and 1995 all the information was processed and prepared for publishing in a book entitled *Important Bird Areas in Bulgaria.* The book is to be published as a co-publication by the Bulgarian Society for the Protection of Birds and the Ministry of Environment.

0.4 SELECTION OF SITES

Despite a certain inequivalence of Important Bird Areas, the Bulgarian Society for the Protection of Birds considers all territories complying with the criteria of international importance to be of equal status from the point of view of their protection. As PODA protected area is the only protected natural area legally granted to BSPB to manage it, the protection of the area represents an exclusive priority for the Society, related to the priority development and implementation of a Management Plan as well as to creating all the preconditions for a long-term protection of the area. The PODA Wetlands will quite naturally be a location of paramount importance for the Bulgarian Society for the Protection of Birds as a model for a future protection of similar protected natural areas as well as a successive confirmation that the Society will approach the assigned tasks with a high level of seriousness.

PART 1: DESCRIPTION AND EVALUATION OF THE SITE

INTRODUCTION

Three large lakes are situated in the Bourgas area: the Atanassovsko, Bourgas (Vayakioysko or Vaya) and Mandra Lake (fig 1.). Each one has its specific features mostly determined by the various human activities carried out in the area. PODA protected area is the most eastern lagoon part of Mandra lake.

The Atanassovsko Lake is to be found to the Northern most. It is an oversaline lake of a firth nature (in its Northern part) and resembling a lagoon (in its Southern part), with a total area of 1,690 hectares. As reserve are declared about 1,050 hectares in the Northern part, and about 900 hectares were announced a buffer zone (including some adjacent areas). The main human activities in the lake are confined to salt-production. A considerable area is barred for the purpose of salt-production by board or embankment dikes - the overall industrial area is 1,600 hectares.

The higher plants are represented by the marsh samphire (*Salicornia europea*), sea wormwood (*Artemisia maritima*), etc.

The most typical inhabitant of the Atanassovsko Lake water among invertebrates is the brine shrimp (*Artemia salina*), an important nutritious resource for a number of birds.

The lake has a great importance as a nesting place for a number of plovers: the avoset (*Recurvirostra avosetta*), black-winged stilt (*Himantopus himantopus*), etc.; and gulls: Mediterranean gull (*Larus melanocephalus*), gull-billed tern (*Gelochelidon nilotica*), sandwich tern (*Sterna sandvicensis*), etc. The Atanassovsko Lake is one of the most important places where migratory birds can rest and wintering birds find a shelter; some of them are world-wide threatened species: the pygmy cormorant (*Phalacrocorax pygmeus*), Dalmatian pelican (*Pelecanus crispus*), marble duck (*Marmonetta angustirostris*), etc.

The Bourgas Lake is situated to the West of Bourgas. Its total area (water surface and several important adjacent areas) amounts to 3,500 hectares which makes it the largest lake along the Bulgarian Black Sea coast. The lake is grossly polluted by oil products, phenols and other chemical substances which suppress growth of life in it.

From a conservation point of view the Western part of the lake is the important area where a reed plantation with an area of 75 hectares was announced a protected natural area (cf. glossary of terms). To the North the protected natural area borders to a former breeding-pond which is no longer used. Its water pools are almost thickly grown with reed (*Phragmites australis*), cat's tall (great reedmace) (*Typha latifolia*), etc. The lake is an important nest-building place for the purple heron (*Ardea purpurea*), ferruginous duck (*Aythya nyroca*), and other birds. Of greatest importance among migratory and wintering birds are those being world-wide threatened species : the pygmy cormorant (*Phalacrocorax pygmeus*), Dalmatian pelican (*Pelecanus crispus*), white-headed duck (*Oxuyra leucocephala*), etc.

The Mandra Lake is situated to the Southern most part of the complex. Its total area (water surface and several important adjacent areas) amounts to 2,200 hectares. In 1963 a reservoir was built in the Eastern part of the lake contributing to significant changes in the lake and adjacent areas :

- its water surface increased. In addition considerable land area was flooded;
- rivers flowing into the lake changed their courses. Another reason for that were the dikes built along the rivers in advance;
- lake's salinity changed. Currently two parts have clearly been defined : Western (fresh water), the Mandra reservoir and Eastern (brackish to saline), Uzungeren and a narrow water canal in its Northern part.

A lot of rivers flow into the Mandra reservoir, three of which are of greater importance to the water balance : The Sredets (Groudovo) River, Fakiyska and Roussokastro Rivers. They have shaped on a large area (2,047.87 sq.km) representing the main part of the reservoir catchment basin.

The reservoir is subject to active fishing, both industrial and sports. Reservoir water is used for both irrigation and the needs of the oil-processing refinery NEFTOCHIM. Two areas were announced protected : protected natural area "Mouth of Izvorska River" (area of 151 hectares) and protected natural area PODA (area of 100.7 hectares).

PODA protected area is located in the most Eastern lagoon part of the Mandra Lake. To the East the area borders on the Black Sea. This vicinity ensures a large variety of habitats --- freshwater, brackish, saline, hyperhaline isolated water basins, frequently flooded areas, canals of inconstant level, embankment land areas (fig 2.). All these present various conditions for the development of multifarious sorts of plant communities and the related bird communities as well as other classes of vertebrates and invertebrates. Certain parts exhibit a very high level of water fluctuation (up to about 80 cm). This brings about to the concentration of various organisms used as nutritious basis (mainly by migratory birds).

The area vicinity to a thickly populated region (about 200,000, increasing up to 1 million in the summer tourist season) results in a considerable risk of uncontrollable intrusion into its frontiers (cf. 1.1.4.).

GENERAL INFORMATION

The investigated area for preparing of this management plan mostly refers to PODA protected area and adjacent areas: Uzungeren and the cannel, exceeding Northward to the Mandra reservoir; the Phoros bay (fig.3). Additional investigations were carried out in certain parts of the Mandra reservoir itself and the Bourgas lake.

1.0. LOCATION INCLUDING SITE BORDERS.

Country: Bulgaria.
District: Bourgas.
Settlement of immediate vicinity: City of Bourgas
Geographic co-ordinates: 27°27'00"E; 42°27'30"N
UTM - grid: NH 30; NG 39.
Borders of the site:
To the North: - the Bourgas Shipyards fence;
To the East: - the Black Sea shore (the border of the vegetation);
To the West: - the Bourgas-Sozopol highway;
To the South: - the Northern bank of the Mandra channel.
Area: 100.7 hectares.

1.1. LEGAL STATUS:

1.1.1. *Legal status of site:* According to documents dated November 22, 1995, the State was proclaimed proprietor of the lands enclosing protected natural area PODA.

1.1.2. *Designation of site:*
Protected area since: April 20, 1989.
Important Bird Area since: 1989.

1.1.3. *Past status and designations:* not differ significantly from this given in 1.1.1. and 1.1.2.

1.1.4. *Torts:*
- illegal access and inconvenience for birds;
- illegal cultivation of the area (vegetable borders);
- illegal commercial fishing;
- illegal hunting in a protected natural area, including rare and rare threatened bird species;
- illegal taking sand away of the area territory;
- illegal cattle grazing;
- litter and waste disposal;
- beach-visiting.

-collecting marsh worms.

1.1.5. *Reference to data bases:* the protected area is included in the European IBA List as part of Mandra lake (BG - 005).

1.2. MANAGEMENT INFRASTRUCTURE

1.2.1. *Organisational structure and administration:* the management of the site is given to the BSPB since the date of promulgation PODA a protected natural area (April 20, 1989). In the connection with its obligations BSPB developed a project "Protection and nature conservation in PODA protected area". It is implemented in the frame of the Bulgarian-Swiss Biodiversity Conservation Programme (BSBSP). One of the main objective of the project is developing and implementing of a site management plan. The control under applying of the legal norms is carrying out from the National Nature Protection Service (NNPS) by the Ministry of Environment (MoE).

1.2.2. *Staff involved and staff responsibilities:* in the team of the project "Protection and nature conservation in PODA protected area" are included four people: project leader, scientific co-ordinator, communication officer and ornithologist. In the implementation of the main conservation activities are taking part also voluntaries, members of the local BSPB branch, as well as members and sympathisers from the BSPB partner organisations from the country.

1.2.3. *Buildings:* a Nature protection and information Centre is building in the site. There will be established the office of the future management structure of the site.

PHYSICAL FEATURES

On the territory of PODA various investigations have been carried out to define more accurately different parameters (abiotic and biotic). The sampling points are universal for each type of study and are shown on fig 3. For further information - Appendix II.

1.3. CLIMATE.

1.3.1. *National climate*: The climate in Bulgaria is under influence of the atmospheric circulation of marine arctic, moderate marine, arctic continental, moderate continental and tropical continental air masses. Average annual air temperature is 10.5^{o}C, and average annual amplitude - 24-26^{o}C. In Bulgaria predominate N and NE winds. The most windy parts are: tops of the mountains, Dobrudga and Black Sea coast. Average rainfalls are 670-700 mm. The snow is keeping from 10-15 days (Petritch and Black Sea coast) till 200-250 days (in higher mountains). Annual rainfall sum is 74 mlrd. m^3

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1.3.2. *Regional climate*: PODA is situated in one of the three climatic regions of the Black Sea subprovince from the Continental-Mediterranean province. It is climatic region of the Bourgas lowland.

The Black Sea appears to be the major factor responsible for the climatic peculiarities of the region. This water basin immense in space and volume exerts influence most of all on temperature. Its warming effect can be felt since mid-October till the end of February. In summer and spring the effect has an adverse influence. All this presupposes the reduction of temperature amplitudes.

PODA lies in the borderline between the transitive-continental and subtropical types of rainfalls - in the direction determined by the village of Fakia and the Mandra Lake. The annual sum of the rainfalls for the coastal part of the region is fluctuating between 520 and 580 mm. The highest rainfalls are during June-November, and the smallest - during August-September.

The average annual air temperature is between 12 and 13^{o}C. This region is considered as one with the mildest winter regime. Only about 20 days during the winter have negative average temperature.

Considering the location of PODA, the zonal-western atmospheric transportation typical of moderate geographic latitudes, could be underlined as a regular dependence. On the background of this regularity, winds are said to be inconsistent and non-periodical determined by the nature of the circulation factor.

1.3.2. *Site climate*:

TEMPERATURE: The average monthly temperatures for the area are:

Month	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
Temperature	2.1	3.6	5.8	10.5	15.8	20.0	22.4	22.4	19.0	14.1	9.5	4.8

It should be noted that temperatures remain positive even in winter months. Bulgarian conditions are said to be characterised with the lack of actual vegetation at temperatures below 5 ^{o}C. With respect to this, it is important to be aware of the average statistic dates when temperatures definitely pass over and below 5 ^{o}C. With regard to the Bourgas region, these dates are March 5 and December 15. In comparison with the other parts of Bulgaria, the permanent crossing of that temperature-secured vegetation barrier occurs earlier. At the same time going below 5 ^{o}C occurs not earlier than mid-December. This is mainly due to the great heat absorption ability of the large quantity of water accumulated in the Black Sea. Although the average monthly temperatures in Bourgas are positive, negative temperatures in winter are common. Below are shown the absolute minimal temperatures reached so far for a 30-year period of observation. They are as follows:

Month	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
Temperature	-18.3	-18.1	-10.4	-1.3	-3.8	6.0	11.5	10.9	4.2	-0.6	-7.8	-10.3

The long-year observations on minimal temperatures point to a clearly expressed trend at increasing the December-January temperatures for the period 1951-1981 as compared to previous periods. Another trend is expressed as well pointing to decreasing the summer minimum; however, it is by far less strongly expressed.

RAINFALLS: The average annual quantity of rainfalls defined on the basis of 50-year observations, amounts to 546 mm which is lower than the average value for Bulgaria. Through the years this value varies a lot from year to year. The internal annual distribution of rainfalls is a very essential characteristics. During the April-September period which is the major vegetation period, rainfalls amount to 47 per cent, or 256 mm. During the October-March period rainfalls amount to 53 per cent, or 288 mm.

Rainfalls are generally balanced by periods, i.e., characteristic of the transitive-continental climatic zone.

ACTIVE PHOTOSYNTHETIC RADIATION (APR) : Essential to the biological production produced through the year, is the Active Photosynthetic Radiation (APR). The organic matter resulting from photosynthesis, with the APR direct participation, amounts to 90-95 per cent of the total dry mass. As Lingova (1981) has it, the annual distribution for the Bourgas region is as follows:

Month	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	Annual
APR	2.14	3.05	4.84	5.88	8.03	8.67	9.24	8.31	6.12	3.81	2.52	1.80	64.41

The above data are Kcal/sm^2 = 41.9 J/sm^2

The above data show that the Active Photosynthetic Radiation (APR) reaches its maximum values in July; in June its values are higher than in August, irrespective of the longer duration of the August sunshine. All this is essential for the newly-born bird breeding.

WINDS : As a basic climatic component, the wind influences the atmospheric circulation characteristics. However, essential for the territory concerned, is the breeze circulation.

The Bourgas region is characterised with the relatively small number of windless days. This in itself is a precondition for the greater natural possibility for cleaning the territory, characterised with large air-polluters, among which the Petrochemical Works is the greatest.

The average month wind velocity is relatively constant. It is highest in March - 44 m/sec., and lowest in December - 2.9 m/sec. During the other months it usually ranges within 3 to 2.5 m/sec. On the background of the maximums (February-April) and minimum (November-January) thus outlined, two secondary extremes are outlined as well - September: 3.2 m/sec and June: 3.1 m/sec. The secondary minimum (May-June) possibly affects the nest-building birds in the protected natural area, taking into consideration that at the time the newly born have not become strong yet.

Ornithofauna is possibly affected by the breeze circulation by way of:

-reducing the quantity of clouds and contributing to increasing the sunshine during the warm half-year;

-reducing the vertical temperature gradients and even causing dynamic temperature inversions preventing the formation of connective clouds (less rainfalls);

-ceasing the daily increase in temperatures and causing decrease in average maximum temperatures of 3 ^{o}C to 4 ^{o}C, as compared to the adjacent territories to the west;

-the transfer of colder and more humid air determines also higher air humidity, both absolute and relative. Here it is 15 to 20 per cent higher than in adjacent territories;

-creating favourable conditions for passive flying of soaring birds during the period of migration, facilitating them to use PODA as a place to rest and feed.

1.4. GEOLOGY AND GEOMORPHOLOGY.

1.4.1. *Solid geology:* lack of data.

1.4.2. *Drift geology:* lack of data.

1.4.3. *Hydrology:*

Both the historical development of the Bourgas-Mandra firth and various types of anthropogenic activities in the area provide a good illustration of the impact of nearby water quantities for shaping and maintaining the hydrological background of protected natural areas (cf. App. II).

Various amounts of water formed in a large area with a high variety of physico-geographical conditions flow into the sea. They constitute the catchment area of the Mandra reservoir (cf. part 1 INTRODUCTION).

Additional, not established for the moment, quantity of waters flows through the canal dug for outflowing of the Komlouk lowland. In the last are entered waste waters from the nearby complex "Meden rudnik" and waters from Bourgas lake.

WATER-SALINE REGIME : As the PODA area is an unseparable part of Uzungeren bay and is in direct contact to the Black Sea, the area water-saline restrictions are formed in compliance with the processes carried out in these two water reservoirs as well as the Mandra reservoir . Work conditions of the reservoir floodgates are in direct relationship to the changes in the saline composition of Uzungeren water during the year, protected natural area PODA respectively.

On the basis of the latest observations on basins general mineralization in the protected natural area, the following conclusions can be drawn:

- Certain water aquatories have a specific water-saline composition; their mineralization ranging in very large limits both in space and time (fig.2.);
- Five water types can be detected:

-Fresh: 0.367 - 0.760 mS

-Almost fresh: 1.42 - 2.72 mS (formed after a sudden flow-off of great water quantities out of the Mandra reservoir);

-Fairly saline (brackish): 4 - 8 mS;

-Considerably more saline: 10 - 19.6 - 26 mS;

-Oversaline (hyperhaline): 30 -32 mS and more.

FLUCTUATIONS OF WATER LEVELS: in the connection with the preparing of the current management plan 4 piezometers and 7 pylons for measuring respectively the underground and surface water level have been constructed. Data for the fluctuation of the water levels are given on the fig.4. There are collected from weekly measuring of the water level for about one year period.

The greatest fluctuations were detected in the pools "Ribarkata" - 83 cm, and "Basin 6" - 71 cm.

Owing to work conditions of the Mandra reservoir and sea level fluctuations, the greatest dynamics in water constructions was detected in the Uzungeren- Black Sea canal.

Fluctuations in the water levels of "Lopatarskata lokva" are significant - 61 cm. At the same time mineralization remains almost constant. This effect is due to the water-tight clay screen on the pool bottom placed there when NEFTOCHIM settlers were built ("Lopatarskata lokva" used to be the most Southern part of the fourth settler).

1.5. SOILS.

There are data collected during sondage by constructing of the piezometers (cf. App.II).

BIOLOGICAL FEATURES

1.6. COMMUNITIES, ECOSYSTEMS AND BIOTOPES

CORINE-biotopes (fig. 5.).

16 Coastal sand dunes and sand beaches - 20%.
22.4. Freshwater canal with a slow water flow - 0.5%.
23.1. Unvegetated brackish and salt waters - 7%.
23.2. Vegetated brackish and saline waters - 60%.
53.111. Flooded Phragmites beds - 3.5%.
53.112. Dry Phragmites beds - 10%.

1.7. VEGETATION STRUCTURE

Fig 6. shows the composition and distribution of basic plant communities.

The largest area is occupied by the *Phragmites australis* formation. The high, density, developing rate and structure of the reed formations are very important for forming the composition of the ornitofauna of the area (especially the nesting fauna). On fig.7-10 could be followed the developing process of the main reed beds in the area for about a 30-years period.

The area bordering to the Bourgas-Sozopol highway and the dike heaped over the water-main is covered by pure reed formations of up to 1,6 - 1,8 m high. To the East of the dike, in direction to the sea, reed is smaller in size and abundance. The West part of the protected natural area, to start from the Bourgas Shipyards fence to the back road, is occupied by *Phragmites australis (Cav.) Trin. ex Steud* plus *Artemisia santonicum L.* plus *Juncus maritimus Lam.*

The sand zone stretching to the sea is occupied by *Elymus sabulosus* plus *Plantago scabra* plus *Gypsophilla trichotoma* plus *Salsola rutenica* plus *Cakile maritima* plus *Eryngium maritimum* plus *Aster tripolium* plus *Lactuca tatarica.*

The shallow saline wetlands to the West part of the protected natural area are occupied by *Salicornia europea L.* formations. The central part is occupied by *Atropis convoluta Grsb.*

The south-eastern part of PODA is occupied by *Juncus maritimus Lam.*, *Bolboschonus maritimus (L.) Palla.*, *Ruppia maritima L.* formations.

1.8. FLORA.

1.8.1. *Lower plants*: With reference to the development of this Management Plan, 161 taxa were found. Thirty-three of them were detected in the additional points outside the borders of the protected natural area, Uzungeren and the Phoros bay. Tables 1. and 2. show a list of species and their distribution as well as phytoplankton structure in the area under study.

Phytoplankton is characteristic for its unstable nature - comprises various species and exhibits changing seasonal dynamics. It is mainly based on water level fluctuation and watercf.d transportation by birds.

According to its nutritional value and distribution in the area phytoplankton determines the various trophic characteristics of water basins in PODA during investigated period:

Point (cf.fig.3.)	**Nutritional Value**
A	Low - fewest edible species by zooplankton;
B	Very high. Edible species. The best nutritional base for zooplankton;
C	Low - low abundance of phytoplankton. More edible species in August. Eu - up to oligotrophic nature;
D	High. Phytoplankton of high nutritional value for zooplankton. Ey - up to hypereutrophic nature;
E	Low. Presence of edible species; but blooms of inedible species. Eu - up to hypereutrophic in July-September. Beta-mesosaprobic;
F	Middle - Not abundant phytoplankton, but qualitative nutrition basis for zooplankton. Oligo-beta-mesosaprobic.
G	Middle - low abundance of phytoplankton. A good nutrition basis.
H	Very high. Edible species of high nutritional value. Eutrophen; beta- to alpha-mesosaproben.

1.8.2. *Higher plants*: The investigations carried out so far with regard to the management plan development showed the availability of 231 species on the territory of the protected natural area. (Table 3.).

Table 4. shows the PODA composition by geoelements.

Among the newly-found species most interesting are *Chenopodium botryoides Sm in Sowerby* (new species for Bulgarian flora), Ranunculus sphaeorospermus Boiss. et Blanche in Boiss. (new species for Black Sea coast flora) as well as the five rare and protected species:

Species	**Distribution and Population Condition**
Gypsophilla trichotoma Wend.,	Mosaic, along the sand area in the NE part, and on some of the dirt roads in the Northern part;
Silene euxina Rupr.	Single individuals in the sand in the NE part;
Eryngium maritimum L.	Seven individuals in the sand in the NE part;
Lactuca tatarica (L.)	W part; within the formation of *Phragmites australis* and *Typha latifolia*; good condition;
Coryspermum nitidum Kit.	Single individuals in the sand in the NE part.

Not long ago there used to grow the rare halophyte *Blackstonia perfoliata L. Huds.* and the species *Orchis mascula L*. and *Fritilaria pontica Wahl.* (found in herbariums only).

1.9. FAUNA.

1.9.1. *Invertebrates*: Not well studied. A special attention was paid to zooplanktonic and zoobenthic organisms: species composition; distribution in the protected natural area basins; numbers and biomass (Tables 5. and 6.), as well as for the representatives from the order Dragonflies (Odonata).

With regard to seasons there is a spring maximum in the number and biomass of zooplankton, followed by a summer minimum and fair increasing in autumn. Possible explanation is decreasing of the water level in the pools which leads to loses of the overflows around pools and concetrating fish species inside the pools. This probably is connected with increasing predatory press from fishes. As a result a general decrease in the number and biomass of zoobenthic organisms is observed. It is probably due to this that zooplanktonic and organisms have no essential significance as nutritional resources for birds; they participate indirectly through as a fish food (Table 9.).

The information on the other groups of invertebrates are not complete. Information on monthly collection of entomological traps is available (fig 3.). Table 7. gives the initial data obtained after processing a quarter of the information collected.

More interesting invertebrates are representatives from: classes Arachnoidea - *Callilepis cretica* (new species for the country); class Insecta, order Dragonflies (Odonata) - *Lestes macrostigma* (rare species for the country) and order Coleoptera - *Pseudocipus cupreus* (new species for the country) and *Ocypus simulator* (new species for the country).

1.9.2. *Fish*:

Table 8. gives a list of the types of fish inhabiting the protected natural area and adjacent water basins. Table 9. gives the nutritious spectre of species inhabiting protected natural area PODA.

About 39 species are known to dwell in protected natural area PODA and adjacent water basins, six of them can be met in the area (cf. Table 8.). fig 11. shows their spatial distribution.

In protected natural area PODA Mosquito fish (*Gambusia affinis holbrooki*) can be found in greater quantities and is a potential nutritious resource for fish-eating birds. The analysis of 12 nest remnants belonging to the

heron colony showed the availability of two major species: carp (*Cyprinus carpio*) and goldfish (*Carassius auratus gibelio*). Traces of them were almost equal in the remnants, but goldfish prevailed quantitatively. This presupposes that birds have fed mostly in Uzungeren and Mandra.

Seven of the 39 species have been enlisted in the Red Book of Bulgaria . Two of these, Caucasian goby (*Knipowitschia caucasica*) and three-spined pike (*Gasterostelus aculeatus*) are met in protected natural area PODA. The other species are: common kilka (*Clupeonella delicatula*), Caspian shemaya (*Chalcalburnus chalcoides*), Aral stickleback (*Pungitius platygaster*), silverside (*Atherina mohon pontica*) and syrman goby (*Neogobius syrman*).

The populations of all of the above species, with the exception of common kilka (*Clupeonella delicatula*) and silverside (*Atherina mohon pontica*) are in good condition.

1.9.3. *Amphibians and reptiles*:

Fourteen amphibian and reptile species have been found in protected natural area PODA (Table 10.).

Most interesting among them are the species included in the Red Book of Bulgaria: Eastern spadefoot (*Pelobates syriacus balcanicus*), Balkan glass-snake (*Ophisarus apodus*), Western four-lined snake (*Elaphe quatorlineata sauromates*).

1.9.4. *Birds:*

The number of birds observed in PODA until January 15, 1997 is 238 (62 per cent of the ornithofauna, accepted for the country (Table 11.). This makes protected natural area PODA one of the places in Bulgaria most abundant in bird species. The first place has been attributed to Sofia area until now, with 243 bird species over an area of 182 sq.km (Yankov,1983); while in PODA almost the same number of species was detected over an area of 1 sq.km.

Their conservation status is shown in Table 12.

209 species are under the protection of the Environmental Law (SG 42/1986).

70 species are included in the Red Book of Bulgaria by category as follows:

- rare - 23 (3 nest-building species)
- threatened - 44 (12 nest-building species)
- extinct - 3

132 species have been approved to be of European environmental importance (Tucker, Heath, 1994):

SPEC1	Species of global conservation concern - 8
SPEC2	Concentrated in Europe and with unfavourable conservation status - 18
SPEC3	Not concentrated in Europe but with unfavourable conservation status - 65
SPEC4	Concentrated in Europe and with a favourable conservation status - 41

The degree of endangerment of species (Tucker, Heath, 1994) is:

endangered - 9	localised - 6	vulnerable - 36	secure - 143
rare - 11	declining - 30	( )status provinsional - 52	

Five species comply with the numerical criteria of the Convention on Wetlands of International Importance, particularly as fowl habitats (Ramsar).

- *Pelecanus crispus* - 26-203 ind. (Uzungeren: 1995-1997);
- *Platalea leucorodia* - 30-37 br.pairs (PODA: 1992-1996);
- *Egretta alba* - 22-131 ind. (Uzugeren:1995-1996);

Aythya fuligula - 12 800 ind. (Phoros bay, Uzungeren: 1993);
Oxyura leucocephala - 183 ind. (Phoros bay, Uzungeren: 1993).

228 species are included in the Convention for protection of the wild European flora and fauna and their habitats (Bern, SG, 13/1991): App. II - 158 species; App. III - 70 species.

145 species are included under the Convention for the Protection of Migratory Wild Animal Species (Bonn): App. I - 4 species; App. II - 141 species.

90 species come within the CORINE programme and define a place of European importance.

A.) Nest-building species
The international importance of PODA is determined by the mixed colony of :
Platalea leucordia, Ardea purpurea, *Egretta garzetta, Ardea cinerea* and *Plegadis falcinellus*. A periodically nesting species is *Phalacrocorax pygmeus*.

PODA appears to be the only nest-building location along the Black Sea coast and one of the largest in the country with regard to *Platalea leucordia* species. Owing to this, the species was determined as a priority in the research work for the preparation of this Management Plan (cf. App. II).

In 1996 eighteen species built nests in PODA.

Dynamics in the numbers of nest-building species included in the Red Book of Bulgaria in 1992-1996.

		1992	**1993**	**1994**	**1995**	**1996**
1.	*Phalacrocorax pygmeus*	20-30	-	-	-	-
2.	*Ardea purpurea*	-	-	-	16	18-20
3.	*Plegadis falcinellus*	25-30	26	25-30	-	-
4.	*Platalea leucorodia*	30-35	30-35	30-35	37	30-32
5.	*Tadorna tadorna*	-	-	-	1	1
6.	*Aythya ferina*	5	8	5	6	7-8
7.	*Aythya nyroca*	-	1	-	-	-
8.	*Cyrcus aeruginosus*	1	1	1	1	1
9.	*Haematopus ostralegus*	1	1	1	1	-
10.	*Himantopus himantopus*	16	14	12	12	25
11.	*Recurvirostra avosetta*	11	9	13	11	5
12.	*Charadrius alexandrinus*	2	1	1	1	2
13.	*Sterna albifrons*	14	11	8	6	-
14.	*Panurus biarmicus*	-	-	-	1	-

B.) Migratory species
Above PODA is one of the great migratory European routes "Via Pontica". A quantitative assessment of *Ciconiiformes, Pelecaniformes* and *Falconiformes* species would not be indicative due to the dispersion of bird flocks in the area. Additional research work is required.

C.) Wintering species
Protected natural area PODA, Phoros and Uzungeren bays (cf. fig 1.) form wintering places characteristic of abundant nutritious basis for species of international and European environmental importance, e.g., *Pelecanus crispus*, *Oxyura leucocephala* and *Phalacrocorax pygmeus*.

Average number of the wintering species included in the Red Book of Bulgaria in the complex PODA-Phoros bay-Uzungeren during 1992-1995 and 1997 (in ind.).

		1992	**1993**	**1994**	**1995**	**1997**
1	*Gavia arctica*	-	-	-	1	1
2	*Podiceps grisegena*	-	-	-	1	-

3.	*Podiceps nigricollis*	-	249	-	370	235
4.	*Phalacrocorax carbo*	-	118	-	46	350
5.	*Ph.pygmeus*	-	54	56	55	175
6.	*Pelecanus crispus*	-	1	-	26	203
7.	*Botaurus stellaris*	-	1	1	1	7
8.	*Egretta alba*	3-4	3-4	3-4	22	131
9.	*Cygnus olor*	-	14	-	9	62
10.	*Anser anser*	-	2	-	-	25
11.	*Tadorna tadorna*	40-50	40-50	40-50	65	5
12.	*Anas strepera*	3-4	3-4	3-4	6	25
13.	*Netta rufina*	-	5	-	3	8
14.	*Aythya ferina*	-	7600	-	-	4500
15.	*Aythya nyroca*	12	-	-	-	1
16.	*Somateria mollissima*	-	1	-	2	1
17.	*Oxyura leucocephala*	-	183	-	-	
18.	*Circus aeruginosus*	-	13	-	15	36
19.	*Circus cyaneus*	-	4	-	1	1
20.	*Accipiter nisus*	1-2	1	-	1	1
21.	*Haematopus ostralegus*	-	1	-	3	-
22.	*Gallinago gallinago*	-	1	-	10	2
23.	*Tringa totanus*	-	11	-	9	5
24.	*Larus minutus*	-	65	-	1	1
25.	*Larus ridibundus*	-	120	-	51	150
26.	*Larus genei*	-	3	-	1	-
27.	*Panurus biarmicus*	-	-	-	45	call

1.9.5. *Mammals:*

Fifteen mammal species have been known so far. Among them the particoloured bat (*Vespertilio murinus*) was found at a distance of about 14 km to the South of PODA. That is not a great distance and it is possible that the species be found in PODA as well.

It is only the European river otter (*Lutra lutra*) which is included in the Red Book of Bulgaria. Another interesting species is the Etruscan shrew (*Suncus etruscus*). PODA is the third location of the species for the country.

CULTURAL AND SOCIO-ECONOMIC FEATURES

1.10. CURRENT HUMAN USE: WITHIN THE SITE (fig.12).

1.10.1. *Agriculture*: the territory of PODA doesn't afford opportunities for the development of whatever rural branch. There are, however, individual illegally cultivated by private persons areas (negligible).

1.10.2. *Forestry:* There are no separate wood species as well as larger plantations of interest to the forestry.

1.10.3. *Recreation:* Owing to its vicinity to the city, the sand zone being a marker to the East of the protected natural area, is very often used as beach, promenade and birdwatching especially during the summer months.

1.10.4. *Hunting*: The important strategic position of PODA, on the great migratory route 'Via Pontica', is a precondition for occurring great concentrations of birds during the autumn-winter period. Despite hunting prohibition within the borders of the protected natural area, hunters do intensively shoot water fowls both in PODA itself and in the adjacent territories - the Phoros Bay, the part of the Mandra Lake known as Uzungeren, and the four-kilometres-away to the South "Tchengene skele" Inlet (fig 1.).

1.10.5. *Fishing:* That part of the Bourgas Bay, serving as the PODA Eastern border is used annually by local fishing brigades (16 in number), while the drainage canal and part of the Phoros Bay - by private persons. Each fishing brigade includes 10 to 15 people. All of them have a boat and drag-nets of up to 300-500 m long. They use for fishing the marine aquatory of the Phoros Bay as well as a sand shore zone of five to ten meters wide.

1.10.6. *Education*: The diversified flora and fauna of the area is used by the local branch of the Bulgarian Society for the Protection of Birds to improve environmental education focusing mainly on schoolchildren in the region. Area tours on environmental issues are organised with the purpose of observation and training in defining the bird species characteristic of the site.

With reference to the activities associated with the preparing of the Management Plan for the protected natural area PODA, public relations and environmental education are among the priority measures to implement. Therefore a specific action strategy is developed (cf. App. III.).

1.10.7. *Research*: The only investigations carried out on the territory of the protected area were carried out by Bondev and Simeonov (1979,1981) with regard to the effect of pollution on the higher marsh vegetation and its recovery following the disposal of biologically treated waste water by Neftochim AD. In the remaining scientific literature PODA is referred to as a location where certain representatives of the flora and fauna were detected in a number of regional studies of the Black Sea coast, South Bulgaria, etc. These publications are marked with (*) after the author's name in "References".

In developing the Management Plan systematic two-year studies have been carried out on abiotic and biotic factors of the area. Seasonal samples have been collected and processed to determine: water balance; water basin mineralization; qualitative and quantitative composition of phytoplankton, zooplankton and zoobenthos; the condition of higher flora and vegetation; species composition of invertebrate and vertebrate fauna (deeper study of birds).

1.10.8. *Residential*: the Northern part of the area has currently been used for bivouacking by the members of a local fishing brigade. Vans or self-made huts and tents are used for residence. These used to be found on the sand area to the East of PODA.

A Nature conservation and information centre is built at the moment. It will be the future base for the menagement structure to the area.

1.10.9. *Industrial*: (cf. fig.12).

-Two ex-oil pipelines and one water main pass through the territory of the protected natural area. The latter provides the city of Bourgas with drinking water and is covered by a soil embankment while the other are buried under the ground;

-In 1991 the construction of a drainage canal collecting the Komlouk Lowland waste water was accomplished. This canal leading waste water into the sea is situated in the Northern part of PODA;

-Immediately by the Western border of the protected area are located technical devices (various cables) belonging to postal and telephone services, electricity cervices, coastal guard troops, Navigation Maritime Bulgare. They are all buried underground past the highway. Some of the postal and telephone services devices pass through PODA as well;

-On the territory of the protected area is the old road joining Bourgas and Sozopol. Part of it lies in the Eastern part of PODA;

-Occasional steel poles can be seen in the area - remainders of the once passing through PODA power line. They are 9 in number with a height of about 35 m.

1.10.10. *Others* (cf. fig 12):

-taking sand away of the area territory: the PODA closeness to the highway ensures easy access to the beach zone at the shore as well as to particular spots in the area with sand disposals, remains from various construction activities by private persons and public enterprises (mostly at the time of the Bourgas Shipyards construction).

-domestic animals grazing: mainly the domestic animals bred by fisherman. After moving fishermen's huts to the North, the impact of this negative factor decreased significantly.

-grass mowing: some of the large numbers of pits resulting from various kinds of activities, are shallow and some parts of them dry up in summer. With water withdrawal characteristic type of vegetation grows up in these parts, which vegetation is preferred by private proprietors to feed their cattle. Some of them breed in the area;

-domestic animals: as a result of the intensive human presence in the site, various sinanthropic animal species (mainly stray dogs and cats) are inhabiting PODA.

-earthworms: fishermen regularly dig earth to extract earthworms used for bait;

-pollution: owing to the long-year regular exploitation of the area by man, it is considerably polluted by urban waste. Especially threatened is the sand area to the East, used as a fishermen's bivouac place until recently. The area is additionally polluted after great wave activity in the sea.

The immediate vicinity of PODA to the international highway, adds to urban waste pollution. Litter and waste are disposed on various places, both along the West border of PODA, in the immediate nearness to the highway and straight in the site.

-uncontrolled visits by fishermen, children, workers employed with the shipyards, beach-goers, ornithologists, etc. researchers.

1.11. CURRENT HUMAN USE: ADJACENT TO SITE (cf. fig 13.)

1.11.1. *Land-uses and forestry*: No land in the in adjacent territories is used for agriculture or forestry.

1.11.2. *Present human settlements*: PODA is situated in the immediate vicinity to a thickly-populated region - the city of Bourgas. Nearest to the area is the residential complex of Meden Roudnik which was built on a hill, right above the so-called Komlouk Lowland. The latter is situated immediately to the Bourgas - Sozopol highway and thus it borders PODA.

1.11.3. *Industrial*: The Bourgas Shipyards fence was defined as the Northern border of the protected area. It is the last enterprise included in the Southern industrial zone of Bourgas.

In compliance with the Bourgas siting and development plan under consideration, the current Southern industrial zone shall be moved along the Northern bank of the Bourgas Lake. The area used until now shall be kept as a reserve area for a possible future enlargement of the Bourgas port. The territory of protected natural area PODA including the Kafkata hill and the aquatory of Uzungeren are included in the future park zone.

1.11.4. *Others (cf. fig.13)*:

-In the 1970s the Komlouk Lowland was used as dungeon - occasional heaps of litter are still to be detected in some parts of it. It has become deeper now and the basins thus formed are filled with water. Now "Hydrotechnical and Drainage Activities OOD", a Varna company is taking away sand from the basin bottoms. The activities are to continue till 1998;

-The lakes thus formed were used by the "Leading" Company for fishing. These activities were done for two or three months in 1993, then were given up for reason of inefficiency.

-To the South the Komlouk Lowland borders to the ex-oxidizing (stabilizing at the moment) lakes managed by NEFTOCHIM. Nearest to PODA is the fourth lake which was once included in the area;

-The Bourgas Incinerator is situated on the Kafkata hill to the South of the site. The Incinerator waste water is disposed in the bay to the fore of the protected area. Waste water results from gas condensing following the animal corpses autoclaving.

-Once there was a prison on the said hill. The bottom of the gravel-pit formed as a result of the prisoners' activities, is now filled with water. In summer, when certain parts dry up in the sun, there are favourable conditions for cattle grazing.

-The ex-prison building was later used as a hive-store, while since 1995 it has been used as well as receiving place for stray dogs.

1.12. PAST HUMAN USE:

According to Shkorpil (1926) the sea coast to the South of the Balkans is divided into two parts. The Mandra Lake is included in the second, the Strandja part. This lake is directly connected to the sea through the Poros strait (currently Phoros), of a depth up to 1 to 1.5 m; navigable for ships. The banks are mostly marshy; along the Roussokastro river the marshes can be found as far as the Roussokastro village.

A number of Latin chroniclers, geographers and historians announce for a town founded there at the time of Emperor Basylian, Deltuum, on the bottom of the Akrian Lake (the present-day Mandra Lake) between the rivers Roussokastro and Karabounar (the present-day Sredets). This town was surrounded by marshes from three sides. Beside it was the ancient trench of Erkeliyata which used to be the borderline between Bulgaria and Bysantium for a long time.

To the South of the Mandra Lake there used to be a port-fortress called Skaffida. It is said, 'The mouth of the Fakiya river is at he village of Skeffa. The only dry place among coastal wetlands beside it is called Kolebouroun (Fortress bridge); on a hill above the lake are the ruins of an old road; the traces of a cobbled-stone road were lost, as they say, under the clear lake water.'

The ruins of the fortress called Skaffida and the nearby Perro have been mentioned in all Italian maps of the Black Sea as early as the time of Pietro Vesconte : 1318.

In an old French chronicle on the campaign of Count Amadea of Savoya in 1366, a mention is made about the little town of Skaffida as a good and safe port.

'The narrow mouth of the lagoon' is known by the Venetian geographer Negri living in the 15th century.

Nikita Akaminita says in a message that in 1203, during the Latin siege of Constantinople, king Alexis III escaped to Debelt by sea.

According to Irechek the Mandra Lake, which he calls a lagoon, together with the rivers flowing into it, forms a flow to the sea through the Poros (Phoros) strait. He also mentions a lot of springs, which he calls 'freshwater wells', along the sand areas separating the Vaya, Atanassovsko and Pomorie lakes from the sea.

1.13. LANDSCAPE (cf. fig 14.).

PODA protected area is situated on an even land turning to hilly to the South. In the past the PODA territory used to be marshy, almost the whole of it covered by water plantations (probably reed). Its present most

Northern part had left untouched by the Mandra Lake water run-offs. It was used for vineyard-growing. The Bourgas-Sozopol road was immediately to the sea shore (cf. fig 12).

The later intensive human activities within the area played a decisive role for shaping the present-day appearance of the site. A barrier fishing device (guard) was constructed in 1928-29. It used to be a steel grid system submerged in water, thus connecting the PODA territory with the Western part of the Phoros Cape. The grid allowed small-sized mullets to penetrate the guard-enclosed space of the Phoros Bay and feed there in summer. In September, when the fish was large enough to fail to pass through the grid openings, the grids were submerged. Along the guard were openings where fish crowded and was easily caught in fishing-nets. In the 50s and 60s quite a large fishing was done there. Two similar opinions regarding fish-draught were reported in 1956-57 : 40 to 50 tons of fish at the bridge of the canal connecting the Mandra Lake with the Black Sea; and in 1966-67 : 30 to 40 tons of fish at the same place. This was probably the same event while the latter statement seemed more reliable.

With the outset of the construction work on the oil processing refinery "NEFTOCHIM" in 1960, the Eastern part of the Mandra Lake was given up for the construction of a lake intended for oxidizing (later, stabilizing) lakes intended for the factory waste water.

In 1963 a barrage was built turning a great part of the semi-saline Mandra Lake into a freshwater reservoir , collecting water from the rivers Izvor, Fakiya, Sredets, (Groudovo) and Roussokastro. That part of the ex-lake remained to the East of the barrage retains its connection to the sea. It is now known as Uzungeren.

With the construction of the new Bourgas-Sozopol highway, in the early 70s, part of the fourth oxidizing lake was torn away. This alongside with the Bourgas Shipyards fence brings about the final shaping of the future protected area in its present borders.

To shape the area final appearance, the later intensive human activities contributed a lot. Owing to them, zones differing in shape, size and animal/plant composition were formed. Human activity was mainly expressed in passing two oil pipelines (the one is no longer used at present, and the other will soon be out of operation); water mains, power line; drainage canal collecting water from the Komlouk Lowland (cf. fig.12.). Immediately along the Western border of the protected area are placed technical devices (various types of cables). They are all buried underground past the highway. Some of the postal and telephone services devices pass through PODA as well (cf. fig.12.). Other human activities influencing the protected area outer appearance are as follows: taking sand away, cattle grazing, grass mowing.

The above mentioned great fish catches have attracted local fishermen's attention, and later they built housing buildings along the sea. They did not exert a great influence on forming the present appearance of the area. Despite the huts and vans to live in, they have cultivated small gardens. Domestic animals have also been bred, mainly goats and dogs. Much more serious is fishermen's influence on birds in the area, and it has been given its due mention in appropriate places of this Management Plan.

All these activities in the area and adjacent basins exert a direct influence on the formation of specific plant communities and related birds and other animals inhabiting the area. On discharging water from the reservoir (and particularly, on overflowing due to spring high water) to the Southern part of PODA a quantity of freshwater is let flow. It 'dissolves' saline sea water in the South-east part of the area. This is also favoured by the remnants of the ex-guard serving as breakwater against the strong wave activities in the bay. With water freshened and natural shallow places in this part of the area, this helps the rapid growing of specific plant communities far into the sea - mainly reed massifs, and -at places- *Bolboschonus maritimus*.

For convenience of study and site description, the territory of protected natural area PODA is conventionally divided into separate zones, as shown in fig 16.

1.14. ADDITIONAL DESCRIPTIVE MATERIAL

1.14. ADDITIONAL DESCRIPTIVE MATERIAL

1.14.1. *Bibliography:*

- * **- Specific data on PODA protected area are included.**
- **The author's name is a mark that the corresponding material is stored in the Management Plan's archive.**

Александрова, К., 1967. **Кефаловите риби в езерата по българското Черноморие. - Изв. на НИИРСО, Варна, т.VIII: 263-294.**

Бондев, Ив.; С.Симеонов *, 1979. **Влияние на замърсяването върху динамиката на висшата блатна растителност в местностт "Пода" край Бургас. - сп. "Екология", 5, БАН, 1979: 3-9.**

Бондев, Ив.; С.Симеонов *, 1981. **Възстановяване на растителната покривка в събирателните езера в местността "Пода" край Бургас след пускането на биологично пречистени отпадъчни води в тях. - сп. "Екология", 9, БАН, 1981: 28-35.**

Велчев,В., П.Василев. 1976 **Еколого-биологично и фитоценологично проучване на пясъчната лилия (Pancracium maritimum L.) в района на Созопол. - Фитология, 5: 3-20.**

Воденичаров, Д.; Ст.Драганов;
Д.Темнискова, 1971. **Флора на България. I Водорасли. - София.**

Вълканов, А., 1934. **Принос към хидрофауната на България. - София.**

Вълканов, А., 1936.**Бележки върху нашите бракични води. 2. Опит за тяхното хидрогеографско и биоложко проучване. - Год.Соф.Унив., т.3: 209-341.**

Вълканов, А., 1936. **Бургаските блата. - Рибарски преглед, N5: 69-71.**

Върбанов, В., 1934*. **Някои редки видове за нашата фауна и грижи за тяхната закрила - Ловец, N11: 5-6.**

Георгиев, Ж., 1967. **Видов състав на ихтиофауната на българските черноморски езера. - Изв. на НИИРСО, Варна, т. VIII, 221-228.**

Георгиев, Ж., 1976.* **Птиците на Черноморието между Бургас и Варна. - В: Сухоземна фауна на България. С., БАН: 261-286.**

Димов, И., 1967. **Сезонна и годишна динамика на биомасата на зоопланктона в някои езера по българското черноморско крайбрежие. - Изв. на НИИРСО, Варна, т.VIII: 157-176.**

Иванов, К.; А.Рождественски;
А.Сотиров; Д.Воденичаров, 1964. **Езерата в България. - Публ. Инст. по Хидрол. и Метереол., София, XVI, 242 с.**

Карапеткова, М.; М.Живков, 1995. **Рибите в България. - Изд. "Гея-Либрис": 247 с.**

Консулов, С., 1912. **Материали за изучаване фауната на България. Rotatoria. - Год.Соф.Унив., /1911-1912/.**

Константинов, Г., 1935. **Блатата Мандра и Вая. - Рибарски преглед, N9: 131-132.**

Кънева-Абаджиева, В.;
Т.Маринов, 1967. **Динамика на зообентоса в нашите крайморски езера за периода 1964 - 1966 г. - Изв. на НИИРСО, Варна, т. VIII: 177-196.**

Лимонов, П., 1938. **Рибното богатство на бургаските блата (сладководните риби в тях). - Рибарски преглед, N2: 22-23.**

Михайлова, М., 1961. **Хидробиологични изследвания върху Мандренското езеро във връзка с рибостопанското му използване. - Год.Соф.Унив., т.53, 1: 57-122.**

Найденов, В., 1967. **Хидробиологични изследвания върху водоемите в южното черноморие и Странджа в България. I. Cladocera, Calanoida, Cyclopoida. - Изв. на Зоол. Инст., XXIV: 57-95.**

Национален план **за приоритетни действия по опазване на най-значимите влажни зони на България. - МОС, 55 с.**

Национална стратегия **за опазване на биологичното разнообразие. Основни доклади.- том I, 1993: 663.**

Нечаев, А., 1938. **Особености на Мандренското блато в хидрологично и риболовно отношение. - Рибарски преглед, N5: 72-73.**

Петков, П., 1921*. **Принос към изучаване българските Odonata. - Год. на Соф. Унив., II, Физико-математически факултет., XV-XVI, 1918-1919 - 1919-1920: 1-39.**

Петрова, В., 1967. **Сезонна и годишна динамика на фитопланктона в българските крайморски езера с рибостопанско значение. - Изв. на НИИРСО, Варна, т.VIII: 131-156.**

Простов, А., 1964*. **Изучаване на орнитофауната в Бургаско. - Изв. на Зоол.и-т с музей, БАН, 15: 5-68.**

Простов, А.; Д.Смилова, 1983*. **Орнитологичната колекция на отдел "Природа" при Окръжна дирекция "Културно-историческо наследство"-Бургас. - Орн. инф.бюл., N13-14: 14-30.**

Рождественски, А., 1967. **Промени в хидрологичния и хидрохимичния режим на по-важните в риболовно отношение български езера край Черно море. - Изв. на НИИСО, Варна, т.VIII: 93-130.**

Симеонов, С.; Т.Мичев;
Д.Нанкинов. 1989. **Фауна на България. Т.20 Aves. Ч. I. С., БАН.**

Флора на България. - **том II:**

Цветков, Л., 1955.**Хирономидната фауна на българските черноморски езера. - Изв. на Зоол. Инст., IV: 214-249.**

Червена книга на НР България - **Изд. на БАН, София, т.1: 447 с.; т.2: 183 с.**

Янков, П., 1983.**Орнитофауна Софии, ее структура и формирование. - Канд. дис., АН БССР, Минск: 239 с.**

Aquaculture, **vol.1, Barnabe, G., 1989, Technique et Documentation-Lavoisier.**

A management plan **for a protected wetland of international importance: Palude Brabbia. - By; Fabio Casale, LIPU, Bruxelles, 5 October 1994.**

Cruz-Pizaro, L., 1993. **Function of zooplankton in lake ecosystems. - In: Salanki, J., P. Biro (eds.), Limnological bases of lake management, Proceed. ILEC/UNEP Int. Training Course, Tihany, Hungary, 11 - 23 Oktober, 1993: 41-59.**

De Bernardi, R., 1993. Biomanipulation in conservation and manegement of lakes. - In: Salanki, J., P. Biro (eds.), Limnological bases of lakes management, Proceed. ILEC/UNEP Int. Training Course, Tihany, Hungary, 11 - 23 October, 1993: 161-171.

Draganov, St., M.Stoyneva, J.Boyadjiev, 1994. Bulgarian Botanical Nomenclature and Terminology.- Ann. Univ.Sof.:

European guidelines for the preparation of Site management plans for protected and managed natural and semi-natural areas. - A format for a site management plan, Twinning Group of Eurosite, 1992.

Interim Management Plan for the Wicklow Mountains National Park. - By: P. Warner; Period of the plan: 30/04/91 to 31/12/93.

G. Toth, L., J. Padisak, 1982. Attempt at a multifactor estimation of the eutrophication of the Tihany area of Lake Balaton. I. Introductory, considerations, methods, algological indices. - Bot. Kozlem, 69 (1 - 2): 71-84.

Olrik, K., 1994. Phytoplankton. - Ecology. Ministry of the Environment, Danmark. Danish Environmental Protection Agency.

Petkoff, St., 1919. Materiaux pour la flore algologigue du littoral bulgare de la mer Noire. - Sp. BAN, XVIII, 8: 25-135.

Site management planning for conservation. - Proceedings of the Training Course, Gdansk, Poland, 09 - 15 April 1994.

Sladecek, V., 1973. Arch. hydrobiol, Ergebn. Limnol.

Tucker, G.; M. Heathh. 1994. Birds in Europe; their conservation status. - Cambridge.

1.14.2. *Maps (App.IV):*

Fig.1. Situation of PODA protected area compared to the wetland complex around Bourgas.
Fig.2. Change in the degree of total mineralisation of the pools in PODA protected area during the year.
Fig.3. Situation of the sample points.
Fig.4. Dinamics of the underground and surface water levels in PODA protected area.
Fig.5. Habitats in PODA protected area (according to CORINE).
Fig.6. Vegetation map of PODA protected area.
Fig.7. Developing of the reedbeds in the territory of PODA protected area (aerophoto-picture from 1965).
Fig.8. Developing of the reedbeds in the territory of PODA protected area (aerophoto-picture from 1978).
Fig.9. Developing of the reedbeds in the territory of PODA protected area (aerophoto-picture from 1986).
Fig.10. Developing of the reedbeds in the territory of PODA protected area (aerophoto-picture from 1995).
Fig.11. Distribution of the fish species in PODA protected area.
Fig.12. Past and current human landusage of the PODA protected territory.
Fig.13. Land usage in surrounding area to the PODA protected area.
Fig.14. Territory of PODA protected area in the past (a map from 1937).
Fig.15. Route of the ecological path.
Fig.16. Informal zones in PODA protected area.
Fig.17. BSPB' activities for investigation and protection of PODA protected area.

1.14.3. *Tables (App.V):*

Table 1. Check list of the algae species and their distribution in PODA protected area in the sample points (A - H).
Table 2. Structure of the phytoplancton in PODA protected area.
Table 3. Flora composition in PODA protected area.
Table 4. Geoelement composition of the PODA protected area's flora.
Table 5. Quantity (N) and biomass (B) of the zooplancton and zoobenthos in PODA protected area.
Table 6. Check list of the zooplancton and zoobenthos organisms and their distribution in PODA protected area.
Table 7. Check list of the invertebrate species occurring in PODA protected area.
Table 8. Check list of the fish species in PODA protected area and surrounding water bodies.
Table 9: Qualitative composition of the food of the fish species.
Table 10. Check list of the amphibian and reptile species occurring in the PODA protected area.
Table 11. Check list of the bird species established in PODA protected area till 15.01.1997.
Table 12. Nature conservation status of the bird species established in PODA protected area till 15.01.1997.
Table 13. Check list of the mammal species occurring in PODA protected area.

1.14.4. *Documents (App.I):*

(1.) Report issued by ATB Primorie/14.04.1995 (Regulations No. 901/20.07.1995).

(2.) Regulations No. 433/April 4, 1989, issued by the ex-Environmental Committee (Promulgated: SG 37/1989).

EVALUATION OF THE SITE

1.15. ECOLOGICAL

1.15.1. *Fragility*: The area is subject to intensive human intervention because of its proximity to a thickly populated region, crowded international highway, sea shore, and the treatment installations of a large industrial enterprise. The territory is crossed by the late international road which is currently and regularly used by local fishermen, recreational visitors, and private cattle-breeders. Due to this the Eastern part of PODA was not used by birds to build nests, despite the favourable conditions offered by water basins in the area. Birds are constantly disturbed in the Northern part of the protected area as a result of various types of human activities, such as: taking sand away, grass mowing, cattle grazing, beach-visiting, promenade, fishing. These uncontrolled activities result in a continuous change of habitats which is a serious threat to rare bird and animal species found in the area. The area is highly sensitive owing to its comparatively small area, the peculiarities of its configuration, the availability of a strong anthropogenic impact from all sides.

1.15.2. *Rarity*: The territory is used as nesting, migratory and recreational place by seven world-wide threatened species : the Dalmatian pelican (*Pelecanus crispus*), red-breasted goose (*Branta ruficoliis*), ferruginous duck (*Aythya nyroca*), white-headed duck (*Oxyura leucocephala*), greater spotted eagle (*Aquila clanga*), imperial eagle (*Aquila heliaca*) and corncrake (*Crex-crex*). Within the protected area there is a mixed colony represented by the only nesting colony of spoonbill; grey heron, little egret, night heron and purple heron; Bittern. The glossy ibis appears regularly in the area as nesting species. Lots of black-necked stilt and other species of waders can be found in the area.

Of particular interest are also:

- the five plant species enlisted in the Red Book of Bulgaria : *Eryngium maritimum, Gypsophilla trichotoma, Corispermum nitidum, Lactuta tatarica* and *Silene euxina* as well as the recently discovered species of *Chenopodium botryoides*;
- the well-developed population of the rare for the country representative of Odonata - *Lestes macrostigma*;
- the newly discovered for the country species: *Callilepis cretica, Pseudocypus cupreus, Ocypus simulator*;

- the vertebrate species included in the Red Book of Bulgaria : *Gasterostelus aculeatus, Knipowitschia caucasia, Pelobates syriacus, Ophisaurus apodus, Elaphe quatorlineata sauromatus, Lutra lutra;*
- Suncus etruscus - third for the country location of the species;
- PODA is a representative of one of the rarest habitats in the country - a lagoon and a combination of saline and freshwater marshes.

1.15.3. *Naturalness*: Although intensive human activities have continuously changed the area appearance, the different water salinity (freshwater, brackish, saline, and hyperhaline) can be considered as natural in particular isolated water areas. Generally the PODA habitat can be defined as natural, although secondarily developed.

1.15.4. *Typicality*: The plant and animal life composition of PODA protected area is defined by the specific type of habitats formed. They in turn are subject to a strong double influence - the proximity of the sea and of the Mandra Lake. The highly variable water composition within various water basins presupposes the development of diversified and specific plant communities and the related bird communities. As a whole, PODA is a typical lagoon representative, while its individual parts - of other habitats: coastal beach zone, reed massifs in eutrophic water basins, etc. PODA is one of the few survived habitats of this type.

1.15.5. *Stability and Instability*: Owing to its specific nature and location (cf. 1.2.1.) the area is highly susceptible to changes as a result of various human activities (cf. 1.10. and 1.11.). Despite it, the strongly developed plant communities, mainly of reed (*Phragmites australis*) - homogeneous or mixed with other plant species: marine bolboschonus (*Bolboschonus maritimus*), *Juncus maritimus* etc. - provide a good opportunity for shelter of nesting species in PODA. Due to this, birds are allowed to produce offspring even in the immediate vicinity to the intensive highway. The different depth bottom of basins in the case of colonial nesting heron and spoonbill as well as the specific chemical composition of water in the area don't seem to allow vegetation to entirely occupy water surfaces. This adds to a certain resistance of nesting bird habitats. On the whole protected natural area PODA can be classified as a place of sufficiently high stability, despite its anthropogenic loads.

1.15. SOCIAL AND ECONOMIC ASPECTS.

The area doesn't afford opportunities for the development of rural and forestry economy. The abundance of birds, both qualitatively and qualitatively, the immediate vicinity to the sea and a thickly populated region is a precondition for its intensive use by fishermen, hunters and recreational visitors. The presence of people is in most cases illegal, especially in the cases when it is of more permanent nature. Therefore, on the basis of Report issued by ATB Primorie/14.04.1995 (Regulations No. 901/20.07.1995) (cf. App.i), the Mayor of Bourgas orders the removal of illegally placed huts etc. installations used mainly by the members of the fishing brigade. The Bulgarian Society for the Protection of Birds took the necessary measures to compensate fishermen's losses after complying with the Mayor's ordinance. The Society provided the funds required to move fishermen's property to a new place and supplied timber to satisfy some of their wants.

Within the borders of the protected natural area PODA, other economic activities are also carried out, such as: taking sand away, grass mowing, cattle grazing, sinanthropic animal breeding. As a result of the frequent human visits and due to the continuous disturbance, particular parts of the area are only potentially rather than actually important for birds. Moving fishermen's bivouac to the North of PODA contributed a lot to the decrease of the negative impact the said activities had on the area.

Potential Value:

-for wildlife - decreasing the importance of the disturbance factor, particularly in the Eastern part of the site, would increase the birds' chances to produce offspring undisturbed in this area; and would improve the nesting conditions for the species characteristic of PODA. In the future, PODA could serve as a "reservoir" for movement of populations of other bird species to other areas - the spoonbill, heron, ibis, etc. Ensuring an actual protection for the area will preserve its unique nature as one of the few similar areas along the Bulgarian Black Sea coast.

-environmental education - the rich flora and fauna of the protected area and its vicinity to Bourgas is a precondition for its target use for the purposes of environmental education.

-scientific research - the combination of various habitats on the small territory of the protected area resulting in a great species diversity, provides a rich basis for scientific research.

-demonstrations by other natural area managers - some of the successful practical initiatives arranged by the Bulgarian Society for the Protection of Birds so far aimed at improving and studying living conditions for organisms in the area were used for preparation of others site management plans for wetlands. In the future the current stated activities could be applied also after proved effect.

-attraction for visitors - An Nature protection and information Centre is building in the area. Its main purposes are the implementation of the Management Plan, involving local public and raising its environmental awareness. Auxiliary devices were built in the area which will serve visitors, such as: observation tower, information board, singe boards (marking movement on tour roads) as well as boards providing explanatory notes (within the observation points). With the purpose of saving trouble to the area inhabitants by visiting guests, the more sensitive areas along the route are made safe by means of hedgerows or walls of straw-mats (cf. fig.15.).

EVALUATION OF THE MORE IMPORTANT FEATURES OF THE SITE:

Object	Feature	MEANING		
		International	National	Regional and local
Plant communities	Hydro- and hygrophitic			high
Flora				
	Bassia hirsuta	moderate		
	Chenopodium botryoides		high	
	Gypsophyla trichotoma		high	
	Silene euxina		high	
	Ranunculus sphaerospermus			high
	Eryngium maritimum		high	
	Corispermum nitidum		high	
	Lactuca tatarica		high	
Fauna				
Invertabrates	*Callilepis cretica*		high	
	Lestes macrostigma		high	
	Lestes dryas	moderate		
	Sympecma fusca	moderate		
	Anax parthenope			moderate
	Anaciaeschna isosceles	moderate		
	Hemianax ephippiger		high	
	Libellula fulva			high
	Pseudocypus cupreus		high	
	Ocypus simulator		high	
Fishes	*Knipowitschia caucasica*		high	
	Gasterosteus aculeatus		high	
Amphibians	*Pelobates syriacus balcanicus*		high	
	Bufo viridis	moderate		
	Hyla arborea	moderate		
Reptiles	*Emys orbicularis*	moderate		
	Ophisaurus apodus		high	
	Natrix tessellata	moderate		
	Elaphe quatorlineata sauromates		high	
Birds	*Platalea leucorodia*	high		
	Plegadis falcinellus	high		
	Botaurus stellaris	high		
	Oxyura leucocephala	high		
	Pelecanus crispus	high		
	Phalacrocorax pygmeus	high		
	Aythya nyroca	high		
	Recurvirostra avosetta			moderate
	Himantopus himantopus			moderate
Mammals	*Lutra lutra*		high	
	Suncus etruscus		high	

PART 2: IDEAL OBJECTIVES

2.1. IDEAL OBJECTIVES FOR THE SITE.

2.1.1. *Preservation of protected natural area PODA and its conservation for future generations.*

2.1.2. *Ensuring the long-term availability of bird nesting species and communities characteristic of the area*.

2.1.3. *Increasing the number of bird nesting species characteristic of the area with the purpose of their natural return to appropriate adjacent wetlands.*

2.1.4. *Providing appropriate conditions for feeding migratory and wintering bird species.*

2.1.5. *Defining and improving the conditions for possible nesting locations for rare bird species in territories near PODA protected area.*

2.1.6. *Protection of the remaining environmentally important components of the PODA protected area ecosystem.*

2.1.7. *Implementing priority environmental activities in adjacent environmentally important natural areas: Uzungeren, Mandra reservoir, Tchengene skele, Vaya, etc.*

2.2. CONSTRAINS:

2.2.1. *The property problem - the Bulgarian Society for the Protection of Birds is a managing organisation, and not a proprietor of the site.*

2.2.2. *Environmental activities do not enjoy a complete and mass support on the part of population yet. A strong consumer attitude towards the area is observed.*

2.2.3. *There is no experience in dealing with such areas (reed mowing or burning, water level regulation, etc.).*

2.2.4. *Bulgarian researchers and experts are lacking experience in preparing management plans for protected natural areas.*

2.2.5.*The present social and economic situation in Bulgaria does not allow to carry out an activity, nor even to make elementary planning and prepare economical study divided by activities.*

2.2.6. *Natural threats within the area:*

-gaining new water territories by reed communities and reducing the available nesting area for birds;

-restricting the development of zooplanktonic and zoobenthic organisms both qualitatively and quantitatively;

-lack of direct land connection between the greater part of the area and the adjacent water basins - the Black Sea and Mandra Lake (Uzungeren) - thus reducing the new fish species penetration into the PODA territory.

2.2.7. Human threats within the area:

-disturbing birds through uncontrolled visits;
-destroying the signs;
-destroying or going round barriers aimed at restricting motor vehicle access;
-hunting and fishing;
-collecting earthworms;
-using the land area for grazing by domestic animals;
-taking sand away of the protected natural area;

-polluting with urban waste.

2.2.8. Human threats outside the area:

-the stabilizing lakes of NEFTOCHIM and the activities related to petrochemical industry;

-intensive road traffic along the entire Western border of the protected area;
-the availability of a large port in the Bourgas Bay;
-hunting and fishing in adjacent territories;
-setting up a receiving-house for stray dogs near the site.
-atmospheric air pollution by the oil refinery influencing the area at a particular direction of winds.

RESULTS ACHIEVED FROM BSPB IN MANAGING THE AREA SO FAR.

The Bulgarian Society for the Protection of Birds has undertaken a number of activities aimed at the area study and protection (fig 17.):

-marking the area borders immediately after the area announcing as protected area in 1989 as well as maintenance and replacement the marking in 1991, 1993, and 1994;
-monitoring of birds and state of the area since 1989 till the present day;
-individual and joint visits with the Bourgas Regional Environmental Inspectorate to eliminate infringements on status;
-area study with regard to making clear birds' requirements for environmental protection as well as other elements of biological diversity;
-guided tours on environmental issues;
-annual report on the status of ornithofauna in the area;
-midwinter poll of water-fowls in the area and adjacent water basins;
-development of environmental plans on world-wide threatened birds - Slender-billed curlew (Numenius tenuirostris); ferruginous duck (Aythya nyroca);
-investigations in the area with regard to its announcing an Important Bird Area as part of the Mandra Lake;

-increasing available birds' nest-building area through:
* building islands: pile dwellings (4 - 130 m^2 area) and heap (2 - 105 m^2 area);
* removing land vegetation;
* building nests for herons (30 in the reed massif to the SE part of the area) and placing models of herons and spoolbills;
* placing artificial nests (2) on electrical poles with the purpose of attracting the white stork as nest-building species;
* preparing and installing birdhouses for nesting of ducks;
* building platform for nesting or resting for ducks and cormorants;
* installing reed sheds for ducks;

-ensuring peace for nest-building species by growing shrubs along the more frequented paths in the area;
-ensuring sefely passing of otters through the canal for outflowing Komlouk lowland;
-destroying illegal vegetable areas;
-destroying hunters' hides;
-installing barrier equipment to reduce the access to the protected area;
-weekly measuring the level of underground and surface water;
-evaluating trophic quantities of basins;
-determining environmentally important plant and animal species and taking measures to protect them;
-regular cleaning the area from urban waste.

PART 3: OPERATIONAL OBJECTIVES AND MANAGEMENT PRESCRIPTIONS

3.1. DEFINING THE ENVIRONMENTAL IMPORTANCE OF PARTICULAR ZONES WITHIN THE PROTECTED NATURAL AREA AND MEASURES FOR THEIR CONSERVATION OR USE.

3.1.1. *Defining the environmental importance of particular zones of protected natural area.*

3.1.2. *Defining the status particular zones*

3.1.3. *Offering priority managerial measures connected with habitat management*:

- increasing the area of submerged reed massifs in the SE part of the protected natural area (related to 3.7.5.);
- producing clear water areas among reed massifs (related to 3.3.2.);
- increasing the area of plant-free land zones (related to 3.3.2.);
- producing additional artificial water basins (related to 3.6.3.);
- restricting marsh plantation covering in the zone of the mixed colony of herons and spoonbills (related to 3.6.2.);

3.2. ESTABLISHING CONTROL OVER INFRINGEMENT THE PROTECTED AREA STATUS, INCLUDING SETTING UP VOLUNTEER GROUPS.

3.2.1. *Setting up a base (Environmental and Educational Centre) and keeping a regular staff of guards in the area.*

3.2.2. *Organising actual protection for rare plant and animal representatives by means of a regular survey and control for infringements in the protected area.*

3.2.3. *Warning violators with the purpose of preventing new infringements.*

3.2.4. *Renewing old marking, signs and inscriptions and replacing it (if required).*

3.2.5. *Installing additional barriers (if required) on the roads in the area.*

3.3. PRESERVING AND IMPROVING NEST-BUILDING CONDITIONS FOR BIRDS IN THE AREA.

3.3.1. *Maintaining the nest-building devices built so far.*

3.3.2. *Increasing the available nest-building area by:*

- building additional artificial islands;
- grass-mowing in particular zones;
- building nests for herons in protected natural area PODA and adjacent water basins;
- producing and installing artificial nests for fowls;

3.3.3. *Limiting the access of stray dogs and cats to protected natural area and especially to nests and nesting*.

3.3.4. *Carrying out additional plant-growing initiatives.*

3.4. MONITORING THE NESTING, MIGRATORY AND WINTERING BIRD SPECIES POPULATIONS.

3.4.1. *Monitoring nesting populations of international importance: Platalea leucorodia, Plegadis falcinellus, Ardea purpurea, Aythya nyroca, national importance: Egretta garzetta, Nycticorax nycticorax, Ardea cinerea, Tadorna tadorna, , Aythya ferina, Circus aeruginosus, Haematopus ostralegus, Himantopus himantopus, Recurvirostra avosetta, Charadrius alexandrinus, Sterna albifrons, Sterna hirundo and Panurus biarmicus and regional importance: Tachybaptus ruficollis, Rallus aquaticus, Charadrius dubius, Remiz pendulinus and Acrocephalos spp.*

- Evaluating the territorial distribution of birds;
- Evaluating the size and density of populations;
- Dynamics of reproduction period;
- Basic locations (biotopes) for nest-building, rest and breeding.

3.4.2. Monitoring the migratory and wintering bird species populations of international importance: *Numenius tenuirostris, Phalacrocorax pygmeus, Pelecanus crispus, Oxyura leucocephala, Branta ruficollis, Aythya fuligula, Aythya ferina, Aquila clanga, Aquila heliaca;* national importance: *Tachybabtus ruficollis, Podiceps nigricollis, Botaurus stellaris, Egretta alba, Tadorna tadorna, Aythya nyroca*, *Anas strepera, Netta rufina*, *Somateria mollissima, Bucephala clangula, Mergus albellus, Calidris alpina, Larus minutus, Larus ridibundus, Larus genei, Panurus biarmicus* and regional importance: *Podiceps cristatus, Phalacrocorax carbo, Ardea cinerea,Cygnus olor, Cygnus cygnus, Anser anser, Anser albifrons, Anas penelope, Anas crecca, Anas*

platyrhynchos, Anas acuta, Anas clypeata, Mergus serrator, G.chloropus, Calidris minuta, Larus argentatus/cachinans, Alcedo atthis, Emberiza shoeniclus:

- Annual tracing the autumn migration of soaring birds in protected natural area PODA and adjacent territories;
- Tracing the number of wintering birds in protected natural area PODA and adjacent wet territories;
- Detecting the places of concentration for breeding and rest;
- Determining trophic requirements;
- Collecting dead/killed birds to study the food composition and dead birds to study the cause of death;
- Looking for mazut covered birds to eventually help them;
- Starting a monitoring programme in co-operation with appropriate partners in Turkey, Greece and Rumania.

3.5. INVOLVEMENT, ENVIRONMENTAL EDUCATION AND AWARENESS OF COMMON PUBLIC (LOCAL, NATIONAL, INTERNATIONAL) TO THE PROBLEMS OF PROTECTED NATURAL AREA.

3.5.1. *Running initiatives for raising environmental awareness of common public and fostering environmental skills and behaviour among children.*

3.5.2. *Joining the local municipal programme on environmental education.*

3.5.3. *Working out, approving and work on contracts for joint activities with related organisations.*

3.5.4. *Establishing environmental units in Bourgas schools.*

3.5.5. *Organising voluntary groups for practical work on protecting the natural area.*

3.5.6. *Carrying out initiatives related to guided tourism in the area.*

- Arranging and maintaining an exhibition area in the Environmental Centre;
- Marketing of the consumers interes related to: arranging of the exhibition, educational and advertising materials, etc.;
- Additional inside equipment of the Centre;
- Technical equipment for the Centre;
- Architechture design of the yard of the Centre;
- Forming routes for movement of visitors in the area (building appropriate devices for observation of characteristic representatives of the plant and animal world and ensuring people walks safe for birds).

3.5.7. *Massmedia Relations.*

- Press releases in local newspapers on major events and activities related to the project work;
- Radio and TV emissions on local massmedia.

3.5.8. *Preparing informational and educational matter : stickers, leaflets, photos, slides, albums, boards, posters.*

3.6. HYDROLOGICAL CONDITIONS.

3.6.1. *Monitoring water balance :*

- weekly measuring the level of underground and surface waters in the area and adjacent territories;
- defining the quantity of incoming water in the area from rainfalls and snowfalls as well as a result of oozing from adjacent territories;
- monitoring for eventual floods in the area in case of a rough sea in the bay.

3.6.2. *Control over water level in key places for nest-building species by means of building suitable devices, e.g. ground and underground canals, auxiliary dikes, etc.*

3.6.3. *Increasing the area of water basins and forming additional ones within the borders of the protected natural area and adjacent territories.*

3.6.4. *Monitoring the specific chemical composition of water in the protected area :*

- seasonal test sampling from underground and surface waters;
- checking sea and Uzungeren influence for changing the specific chemical composition of water;
- checking the change of depth and salinity in the Phoros Bay and Uzungeren water.

3.6.5. *Preparing a plan for use of Mandra reservoir water.*

3.6.6. *Defining the potential sources of pollution in areas outside protected natural area PODA.*

- defining the opportunities for polluting PODA water as a result of oozing from adjacent territories;
- defining the nature and degree of pollution from larger industrial enterprises;
- defining wind circulation and movement in the bay as a source of pollution.

3.7. DESCRIPTION AND TENDENCIES IN THE DEVELOPMENT OF PLANT COMMUNITIES.

3.7.1. *Defining the species composition, structure and distribution (mapping) of basic types of plant communities and their influence over nesting bird distribution.*

3.7.2. *Studying the condition and tendencies for the development of plant communities.*

3.7.3. *Completing the information on the floristic composition of the protected area - Valuation of the rare species enlisted in the national, European and world Red Books; locations and state of populations; density, numbers, availability of weed species. and other threatening factors.*

3.7.4. *Re-introducing rare plant species.*

3.7.5. *Studying the influence of the chemical composition of water in the protected area over the distribution of plant species and communities.*

3.7.6. *Increasing the area of submerged reedbed in the SE part of the area.*

3.7.7. *Valuation of plant communities in certain adjacent wet territories with regard to their possible likening the mixed colony of herons and spoonbills in PODA with the purpose of movement of species to adjoining territories.*

3.7.8. *Preparing promotional matter on the plant world in the area : herbarium specimens, photos, slides.*

3.7.9. *Arranging exhibitions of appropriate rare plant formations for the purpose of environmental education.*

3.8. WATER BASIN TROPHIC VALUE ASSESSMENT AND DEFINING THE TENDENCIES IN THEIR DEVELOPMENT.

3.8.1. *Studying the degree of eutrophicationof the pools - degree of trophity.*

3.8.2. *Defining potential places for bird breeding from the point of view of availability of phytoplanktonic organisms having nutritional value for zooplanktonic and zoobenthic organisms - degree of trophicity.*

3.8.3. *Studying the qualitative and quantitative composition of phytoplanktonic organisms - numbers and biomass and distribution.*

- seasonal water sampling;
- qualitative and quantitative characteristics.

3.8.4. *Defining the most problematic points (from the point of view of pollution) and taking certain urgent priority measures*.

3.8.5. *Preparing promotional matter on certain characteristic representatives in the area : herbarium specimens, photos, slides.*

3.9. ZOOPLANKTON AND ZOOBENTHOS ASSESSMENT: DISTRIBUTION, NUMBERS, AND BIOMASS IN CERTAIN WATER BASINS OF THE AREA.

3.9.1. *Seasonal dynamics of numbers and biomass.*

- seasonal water sampling;
- qualitative and quantitative characteristics.

3.9.2. *Mapping the distribution of zooplanktonic and zoobenthic organisms within the protected area.*

3.9.3. *Defining the possible locations for bird breeding within the protected area with regard to the zooplanktonic and zoobenthic organisms numbers and biomass.*

3.9.4. *Collecting more information on nutritional spectrum of birds directly consuming representatives of these biological groups.*

3.9.5. *Preparing promotional matter out of some more characteristic representatives in the area : preparations, photos, slides.*

3.10. CONDITION OF FISH POPULATIONS STATE WITHIN THE PROTECTED AREA, IN THE FRONT BAY AND ADJACENT WATER BASINS.

3.10.1. *Monitoring the numbers, qualitative composition and age structure of ichthyofauna in PODA and adjacent water basins:*

- seasonal study the dynamics of fish populations and factors influencing the dynamics of populations;
- collecting more detailed information on the availability and condition of rare fish species enlisted in the Red Book of Bulgaria .

3.10.2. *Mapping the distribution of mass fish species in PODA and adjacent water basins.*

3.10.3. *Valuation the food of mass fish species.*

3.10.4. *Valuation the significance of particular fish species for birds* :

- defining the size of mass fish species and their valuation as a possible nutritional resource for birds;
- collecting additional literary information on nutritional spectrum of birds.

3.10.5. *Defining the possible locations for bird nutrition with regard to the ichthyofauna composition in the sites.*

3.10.6. *Developing a concept on fish presentation and utilization in the process of environmental education within the Plan.*

3.10.7. *Preparing promotional matter from various fish species : durative wet preparations, photos, slides.*

3.11. VALUATION OF VERTEBRATE AND INVERTEBRATE FAUNA CONDITION (FISH AND BIRDS EXCLUDING).

3.11.1. *Defining species composition of vertebrate flora in the area:*

- regular monitoring of the area waters;
- collecting additional information on availability of various species - caught in entomological traps, animals killed by passing motor vehicles;
- preparing a complex bibliographic reference.

3.11.2. *Evaluating the area as habitat of rare and protected vertebrate species.*

3.11.3. *Making direct access between protected natural area and adjacent water basins safe, particularly from the side nearer to the highway (Western border of PODA) :*

- building an underground tunnel allowing animals and reptiles to pass;
- ensuring otters safe passing along the canal draining the Komlouk Lowland.

3.11.4. *Preparing promotional matter - photos and slides.*

3.12. EVALUATING THE CONDITION OF INVERTEBRATE FAUNA.

3.12.1. Defining the species composition of invertebrate fauna in the area:

- installing entomological traps and monthly sampling during April-November;
- collecting more detailed information on flying insects, mainly representatives of the orders dragonflies (*Ordonata*) and butterflies (*Lepidoptera*) being attractive objects which could be used in the process of environmental education;
- water sampling.

3.12.2. *Evaluating the distribution and numbers of some invertebrate species used as food for birds :*

- defining insects detected in pellets of birds in the nest-building colony;
- collecting additional information on nutritional spectrum of birds.

3.12.3. E*valuating the area as habitat of rare invertebrate species.*

3.12.4. *Preparing promotional matter - preparations, photos, slides.*

DEFINING PRIORITIES

Conservation priorities:

Conservation rare colonial nesting birds typical of the protected area (related to 3.1, 3.2.).

Conservation the conditions favouring the normal co-existence of bird communities (related to 3.3.).

Conservation the other environmentally important plant and animal species (related to 3.2., 3.3.4., 3.11.3.).

Environmental education (related to 3.5.).

Priorities of investigations:

Ornithological state (related to 3.4.).

Hydrological state (water chemical composition including) (related to 3.6.).

The condition of higher flora and vegetation (related to 3.7.).

Valuation of water basins by degree of trophicity and saprobity. (related to 3.8.).

Zooplanktonic and zoobenthic characteristics. (related to 3.9.).

The condition of fish populations (related to 3.10.).

The condition of vertebrate fauna (fishes and birds exclusive). (related to 3.11.).

The condition of invertebrate fauna (related to 3.12.).

3.5. FIVE-YEAR WORKPLAN.

Number	Description of the activity	Expected effects	Year				
			1998	1999	2000	2001	2002
3.1.1.	Defining the meaning of the different sections	Improved of the measures applied so far	+	+	+	+	+
3.1.2.	Defining the statute of the different sections	Planing future activities	+	+	+	+	+
3.2.	Control over trespassers	Preventing activities leaded to change of the appearance of the area	+	+	+	+	+
3.3.1.	Support of the built nesting equipment	Ensuring nesting of the terns	+	+	+	+	+
3.3.2.	* build additional islands	Ensuring nesting of the terns and waders	10 ì^2	5 ì^2	5 ì^2	-	-
	* removing grass vegetation	Ensuring nesting of the terns and waders	200 ì^2	200 ì^2	150 ì^2	100 ì^2	50 ì^2
	* building nests for heron species	Ensuring nesting of the heron species	20	20	after proved effect		
	* preparing and placing nestboxes for waterfowls	Ensuring nesting of the waterfowls	-	3	2	after proved effect	
3.4.1.	Monitoring of the nesting population birds	Ensuring of the long-term existing of the nesting species	+	+	+	+	+
3.4.2.	Monitoring of the wintering and migratory population of birds	Creating appropriate living conditions for wintering and migratory species	+	+	+	+	+
3.5.1.-3.5.8. (3.5.6. excluding)	Involvement community to the problems of the area	Creating motivation to the community for participation in conservation activities	+	+	+	+	+
3.5.6.	* making and supporting of a exhibition area	Increasing awareness of the population for the area	+	+	+	+	+
	* design the yard of the Centre		-	+	support		
	* design routs in the area	Managing and control the movement in the area	+	support and correction (if necessary)			
	* building of hides		-	2 (after purchased)			
	* building observation tower		+	support			
	* safety the rout by:						
	-straw-mat		220 ì	510 ì (after purchased)			
	-bushes		400 ì	additional plantation (after proved effect)			
3.6.1. 3.6.4.	Water balance and chemical composition of the waters						
	* weekly measuring of the underground and surface water level	Defining measures for control of the water levels in the area	+	+	+	+	+
	* seasonal sampling from the underground and surface waters in PODA and surrounding wetlands	Defining the influence of the surrounding water bodies for making water composition in the area	+	+	+	+	+

3.6.2.	Regulation of the water level in the pools	Support and manage of the typical plant formations	-	studying	building appropriate equipment (after proved effect and purchased)		
3.6.3.	Creating additional pools in the area and surrounding wetlands	Ensuring additional places for developing of the typical for the area plant and animal species and ensuring birds with additional feeding places	-	studying	building appropriate equipment (after proved effect and purchased)		
3.7.1. 3.7.2.	Characterisation of the plant communities	Description of the nesting places for the birds and creating of the additional nesting area	+	+	+	+	+
3.7.3.	Collecting more detailed data for florist composition of the area	Protection of the rare species included in Bulgarian Red Data Book	+	+	+	+	+
3.7.4.	Re-introducing rare plant species		+	+	+	+	+
3.7.5.	Studying the influence of the chemical composition of water in the area over the distribution of plant species	Effective manage of the present plant communities and creating new ones for attracting certain bird species	+	+	+	-	-
3.7.6.	Increasing the area of submerged reedbeds	Ensuring additional nesting area for heron species	-	-	-	creating conditions for developing of reedbeds	
3.8. 3.9.	Seasonal collecting of water samples from phyto-, zooplankton and zoobenthos	Following the process of developing of pools and defining their meaning as food base for birds	+	+	+	+	+
3.10.1. 3.10.2.	Number, compositions, structure and mapping of the mass fish species	Evaluation of their statute aiming their protection	-	+	+	+	+
3.10.3. 3.10.4. 3.10.5.	Studying fish food spectrum and their significance as food base for birds	Defining, aimed protection, feeding places for birds	+	+	+	+	+
3.11. 3.12.	Evaluation of the condition of vertebrate (fish and birds excluding) and invertebrate fauna	Defining, aimed protection, distribution places for the species included in Bulgarian Red Data Book and other conservation lists	+	+	+	+	+

FINANCIAL ESTIMATION OF THE MAIN EXPENSES

Number	Describtion of the activity	1998	1999	2000	2001	2002
	Running the Nature protection Centre	10000	10000	10000	10000	10000
3.3.	Keeping and improving the conditions for nesting birds	410	440	400	400	400
3.4.	Monitoring of the breeding, migratory and wintering populations	350	350	350	350	350
3.5.	Communities outreach	36690	5890	5890	5890	5890
3.6.	Water balance	1600	500	6000	2350	400
3.7.	Plant communities	200	950	700	20000	200
3.8. and 3.9.	Condition of the pools	400	400	400	400	400
3.10.	Investigation on the fish populations	4400	250	350	350	350
3.11. and 3.12.	Condition of the vertebrate (fish and birds excluding) and invertebrate fauna	200	200	200	500	200
Total		***54250***	***18980***	***24290***	***40240***	***18190***
Total for the whole five-year period				**155 950**		

BULGARIAN-SWISS CONSERVATION PROGRAMME
(SCIENTIFIC REPORTS)

PHYSICAL FEATURES OF THE PODA PROECTED AREA

by Konstantin Spassov

CLIMATIC CHARACTERISTICS

The Black Sea appears to be the major factor responsible for the climatic peculiarities of the region. This water basin immense in space and volume exerts influence most of all on temperature.

ATMOSPHERIC AIR TEMPERATURE

The Black Sea can be seen as a temperature reservoir. Its warming effect can be felt since mid-October till the end of February. In summer and spring the effect has an adverse influence. All this presupposes the reduction of temperature amplitudes.

I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
2.1	3.6	5.8	10.5	15.8	20.0	22.4	22.4	19.0	14.1	9.5	4.8

It should be noted that temperatures remain positive even in winter months. Although all positive temperature can provide conditions for active vegetation, Bulgarian conditions are said to be characterized with the lack of actual vegetation at temperatures below 5 ^{O}C. With respect to this, it is important to be aware of the average statistic dates when temperatures definitely pass over and below 5 ^{O}C. With regard to the Bourgas region, these dates are March 5 and December 15. In comparison with the other regions of Bulgaria, the permanent crossing of that temperature-secured vegetation barrier occurs earlier. At the same time going below 5 ^{O}C occurs not earlier than mid-December. This is mainly due to the great heat absorption ability of the large quantity of water accumulated in the Black Sea. Although the average monthly temperatures in Bourgas are positive, negative temperatures in winter are commonly observed. Below are shown the absolute minimal temperatures reached so far for a 30-year period of observation. They are as follows:

I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
-18.3	-18.1	-10.4	-1.3	-3.8	6.0	11.5	10.9	4.2	-0.6	-7.8	-10.3

The long-year observations on minimal temperatures point to a clearly expressed trend at increasing the December-January temperatures for the period 1951-1981 as compared to previous periods. Another trend is expressed as well pointing to decreasing the summer minimums; however, it is by far less strongly expressed.

RAINFALLS

Rainfalls are undoubtedly one of the most important climatic elements which are formative with regard to conditions in a wet zone. To a great extent they form water resources, ensure water-saline regime and the development of natural vegetation, whose species variety in turn helps maintaining optimal conditions for the remaining parts of the eco-chain.

The extremely great changeability of rainfalls in space and time presents particular difficulties in characterizing rainfalls as a basic climatic component. At first sight spatial changeability plays second role, considering the small territory and its plain nature. It should not be forgotten, however, that a number of water streams, formed on a wide area with various physico-geographical conditions, flow into the sea through wetlands Poda. Considering that rainfalls are a basic contributing element in water balance, a study of rainfalls over the whole

catchment area should not be neglected. Unfortunately this cannot be done at the time (preparing the wetland Management Plan).

The average annual quantity of rainfalls defined on the basis of 50-year observations, amounts to 546 mm which is lower than the average value for Bulgaria. Through the years this value varies a lot from year to year. The internal annual distribution of rainfalls is a very essential characteristics. During the April-September period which is the major vegetation period, rainfalls amount to 47 per cent, or 256 mm. During the October-March period rainfalls amount to 53 per cent, or 288 mm.

It is an interesting fact that Poda lies in the borderline between the transitive-continental and subtropical types of rainfalls. This relative border can be drawn in the line village of Fakiya - the Mandra Lake. To the North and north-west of it the amount of rainfalls in the cold half-year ranges within 48-50 per cent while to the south it amounts to 55 per cent (360 mm). Further south, for the catchment area of the Veleka river, winter rainfalls amount 60-65 per cent of the total amount; and to the south of the Veleka they are already twice as much as during the period April-September. Rainfalls are generally balanced by seasons, i.e., characteristic of the transitive-continental climatic zone.

Winter	:	143 mm	26 %
Spring	:	128 mm	24 %
Summer	:	125 mm	23 %
Autumn	:	148 mm	27 %

ACTIVE PHOTOSYNTHETIC RADIATION (APR)

Essential to the biological production produced during the year, is the Active Photosynthetic Radiation (APR). The organic matter resulting from photosynthesis, with the APR direct participation, amounts to 90-95 per cent of the total dry mass. As Lingova (1981) has it, the annual distribution for the Bourgas region is as follows:

I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	Год.
2.14	3.05	4.84	5.88	8.03	8.67	9.24	8.31	6.12	3.81	2.52	1.80	64.41

The above data are Kcal/sm^2 = 41.9 MJ/sm^2

The above data show that the Active Photosynthetic Radiation (APR) reaches its maximum values in July; in June its values are higher than in August, irrespective of the longer duration of the August sunshine. All this is essential for the newly-born bird breeding. The future management of the wetlands will be more efficient if the above relationship be clarified in future research work.

WINDS

As a basic climatic component, winds influence atmospheric circulation characteristics. Considering the location of Poda, the zonal east-west atmospheric transfer, typical for moderate latitudes, can be stressed as a general relationship. Under this relationship, and considering the circulation factor, winds can be determined as unstable and aperiodic. However, essential for the territory concerned, is the breeze circulation. As a common rule, local winds are not given their due while characterizing the overall atmospheric circulation.

East winds are most frequent in Bourgas lowlands (25-30%).

The Bourgas region is characterized with the relatively small number of windless days. This in itself is a precondition for the greater natural possibility for cleaning the territory, characterized with large air-polluters, among which Neftochim EAD is the largest.

The average month wind velocity is relatively constant. It is highest in March - 44 m/sec., and lowest in December - 2.9 m/sec. During the other months it usually ranges within 3 to 2.5 m/sec. On the background of the maximums (February-April) and minimums (November-January) thus outlined, two secondary extremes are outlined as well - September: 3.2 m/sec and June: 3.1 m/sec. The secondary minimum in May-June (3.3-3.1. m/s) possibly affects nest-building birds in the protected natural area, taking into consideration that at that

time the newly born, although already left their nests, have not become strong enough yet. Here a mention must be made of the high percent of wind frequency in gradation 0-1m/s for May and June, 44.2% and 44% respectively. At the same time, however, May, June and July are characterized by a minimal number of extremely strong windy days (above 14 m/s). For May these figures are 1.5 m/s; June : 1.4 m/s; July : 1.1 m/s. The average monthly number of days where wind velocity is above 14 m/s is 2.4, and the greatest values refer to January : 3.3 m/s; February : 3.7 m/s; March : 3.3 m/s; and November : 3.3 m/s;

Ornithofauna is possibly affected by breeze circulation by means of:

- reducing the quantity of clouds and contributing to increasing the sunshine during the warm half-year;
- reducing the vertical temperature gradients and even causing dynamic temperature inversions preventing the formation of convective clouds (less rainfalls);
- ceasing the daily increase in temperatures and causing decrease in average maximum temperatures of 3 ^{O}C to 4 ^{O}C, as compared to the adjacent areas to the west;
- the transfer of colder and more humid air determines also higher air humidity, both absolute and relative. Here it is 15 to 20 per cent higher than in adjacent areas;
- creating favourable conditions for passive flying of soaring birds during the period of migration, facilitating them to use Poda as a place to rest and feed.

The breeze blowing from sea reaches to a height of 570 to 700 m while vice versa this height is 200 to 300 m.

The future study of the basic climatic elements regime is a necessary precondition for revealing relationships related to forming the biological diversity and more efficient management of the wetlands.

WATER-SALINE REGIME OF WETLANDS PODA AND ADJACENT AREAS IN BOTH NATURAL AND ANTHROPOLOGICALLY-INFLUENCED CONDITIONS

Protected natural area Poda is a marshy area situated in the south-east part of the Bourgas bay. Its origin and development are in close connection to the Mandra Lake, one of the eighteen large lakes located along the Bulgarian Black Sea coast with a length of about 380 km. From a hydrological and hydrogeological point of view Poda is its inseparable part. Anthropological activities in the last thirty to forty years have strongly influenced the current state and evolution of the area under consideration. It should be considered, however, that not so long ago it used to be system of settling basins and purification devices belonging to Neftochim EAD. For a certain period of time it was used as uncontrolled dunghill where domestic and construction waste was deposited. The Poda area has been used as an inert material (sand) mine for long.

The Bourgas-Mandra firth is the largest along the Bulgarian Black Sea coast. It comprises an area of 108.6 sq.km and has a length of 19 km and a maximum width of 6.3 km (Popov, Mishev, 1974). It was shaped over the mouth area of old drowned river valleys in the Holocene. The bigger river valleys are linked to the rivers Aytoska, Chakurliyska, Roussokastrenska, Sredetska, Fakiyska and Izvorska.

The present stage of the Bourgas-Mandra firth development has been reduced to the Mandra Lake and adjacent Ouzoungueren bay. The other parts: the Bourgas lake (Vaya) and Atanassovsko lake have turned into lagoons separated from the sea by sand-beach areas. The Mandra Lake having turned into a dam lake, only the Ouzoungueren bay and spills resulting from the canal behind the dam exhaust devices.

At present access of sea water behind the dam wall is made impossible. Thus water in the dam lake remains fresh, while it used to be brackish when sea water could enter it.

The Mandra Lake and Ouzoungueren bay are in direct contact to the Black Sea by means of a canal mouthed into the sea and thus shaping the Souther part of protected natural area Poda. Its bed has been repeatedly corrected, the last correction being made in connection to the construction of a settling system for Neftochim EAD. The construction of the Bourgas-Ahtopol highway and the bridge-laying brought to certain changes in the canal depth. The said canal drains water from the large area of the above-mentioned rivers: Roussokastrenska, Sredetska and Fakiyska, covering 2047.87 sq.km. The other rivers, spring-flooded gullies, canals, etc., taking part in maintaining the lake water balance, comprise an area not greater than 150 sq.km.

The most essential anthropological changes, however, are due to the construction of a dam in the Tulip Hill area in 1962, when the natural sea-lake link was totally cut. The Mandra Lake was then turned into a dam lake and only the spill-firth of Ouzoungueren remained outside it. Until 1962 the area of Mandra was about 10 sq. km and its volume - 11 cu.m, with a maximum depth of 2 m, the mouthing area (of a depth reaching to 5 m) excluding (Rojdestvenski, 1967). Following building up water behind the dam, hydrological regime considerably changed, the lake surface reaching up to 30 sq.km in maximum water storage. Serious changes occurred in the internal annual distribution of rivers draining into the sea. In summer and autumn water flows to the sea are minimal, while in minimum-rainfall-years no actual water drain to the sea is observed. Then, only the water having passed through the Neftochim water-treatment installations, are mouthed into the sea at the bridge in the Southern end of Poda. In winter and spring, however, considerable quantities of water are released to the sea owing to the great surface inflow to the dam lake and the relatively smaller water consumption. In the years of maximum dry up (1949-50), surface flow has actually been missing and the level of the Mandra Lake has fallen below the sea level. No water balance assessment of the current totally changed state has been done, but after literary information (Rojdestvensky, 1962), the following data concerning inflow and outflow elements can be used: river inflow - 328 mln cu.m; rainfalls over the lake area - 5 mln cu.m; sea water inflowing during high water storage (tides) - 45 mln cu.m. The expenses are respectively: evaporations - 9 mln cu.m; and drain to the sea - 368 mln cu.m. Thus annual course amounted to 34 volumes. At present sea water is only allowed to the Ouzoungueren firth. The basic drain from the lake to the sea is mainly contributed now to the water already passed through the Neftochim water-treatment installations. Our own research showed that this inflow is comparatively regularly distributed through the year. Data collected in 1993 witnessed that the overall drain resulting from the Southern end of Poda is 30 mln.cu.m; the maximum inflow occurring in May - 2,779,000 cu.m; and the minimum inflow occurring in August - 2,217,000 cu.m. In July, August, September and October this appears to be the total quantity of water draining to the sea. In 1966, owing to the full dam lake in July and August, there was a direct flow from the lake.

FLUCTUATIONS OF WATER STORAGE

In 1996 the water level of seven points were monthly monitored. On the basis of observations in the period April 9 - August 13, 1996 the following conclusions can be drawn:

1. The greatest fluctuations in water storage were detected in the pool 'Ribarkata' - 76 cm, and 'Basin 6' - 71 cm. The fluctuations in "Sea Pool" and 'Guard' were of the same order; however, owing to incomplete information (up to August 2, 1996), no complete information on water storage can be provided. The minimums for the pools of 'Ribarkata' and 'Basin 6' were recorded on August 13, 1996.

Water storage in the sea along the line Mandra-Canal and Old Bourgas bridge-Sozopol ranged within 21 cm. Here the greatest dynamics was detected, easily explained with the water quantities released from the Mandra dam lake.

Fluctuations in minimal and maximal water storage of 'Lopatarskata lokva' amount to 54 cm. These are significant fluctuations not corresponding directly to the above water-saline regime which remains relatively constant. This surprising effect is due to the weak link between surface and underground water owing to a clay (water-tight) screen below 'Lopatarskata lokva'. This screen was artificially placed during the construction of Neftochim EAD settling basins. 'Lopatarskata lokva' used to be a part of the fourth settling basin.

WATER-SALINE REGIME

On the basis of observations made in 1996 (March and August) within the Management Plan concerning wetlands Poda, the following conclusions can be drawn:

1. Separate water aquatories have a specific water-saline composition, their mineralization ranging in very large limits both in space and time.

2. In March the values of electrical conductivity measured ranged within 0.367-19.6 mS which is characteristic for water in various pools, defining it from fresh to saline.

3. Four water types were detected:
- Fresh: this is water in the canal flowing out of the Mandra Lake - 0.367 mS and water in the canal draining the Komlouk Lowland (the Northern border of protected natural area Poda) - 0.720 mS;
- Fairly saline (brackish): water in most pools where conductivity ranged within 4 - 7 mS;
- Considerably more saline (10 - 19.6 mS): this water could be found in the central part. At that time, however, water everywhere was characterized by smaller degree of mineralization than the water in the Bourgas bay (16.6 mS). The only exception was 'Morskata lokva' (19.6 mS).
- Oversaline (hyperhaline): 30 -32 mS and more.
- The fourth water type , almost fresh), were localized in the Southern part of Poda and were within 1.4 - 2.72 mS. They had formed as a result of sudden release of large quantities of water owing to an incident in the Rakov Dol dam lake. In the beginning of 1996 as a result of a microdam damage, a large, unknown quantity of water flew from the Mandra dam lake to the Black Sea, considerably changing water-saline regime of protected area Poda.

In summer and autumn the hydro-chemical regime was totally different:
- Water of the Komlouk Lowland draining canal was fresh again - 0.680 - 0.760 mS;
- Water of the Mandra-Black Sea canal altered in wide ranges from 0.8 to 24.5 mS depending on the operation mode of exhaust installations and sea level fluctuations;
- Water quantities released from the dam lake hardly affected water mineralization at the reed massif in the Southern part of Poda;
- Water of 'Lopatarskata lokva' increased its mineralization a little and reached 8 mS;
- Water of 'Ribarkata' pool had experienced considerable changes - turning from brackish to hyperhaline, with mineralization exceeding two to three times that of the Bourgas bay water. Mineralization exceeding the sea one was also detected in the basins to the South of 'Ribarkata' ('Lopatarskata lokva' and 'Kokilarskata step') but it didn't exceed 30-32 mS;
- Water of 'Guard' and 'Basin 6' pools came close to the mineralization of sea water (25 26 mS). At that time of the year, in these particular areas it is quite possible for mineralization to fall below 20 mS, but it didn't take place during investigations.

Different water mineralizations during the period are probably due to the complex and specific link between sea water, rainfalls and underground waters; the basic process motor here being sea level fluctuations and the complex synoptic conditions at the time.

The specific water-saline regime of particular water basins is in a direct, unknown yet, link to the seasonal dynamics of the organisms forming the nutritious basis of birds as well as maintaining a high biological diversity factor. The following preliminary conclusions and reccommendations concerning water and water-saline regime management of Poda can be made at this stage, in connection with environmental balance and biological diversity improvement:
1. The places of greatest changes in water-saline regime - the 'Ribarkata' pool - are probably the places of highest biological productivity - a boom development of plankton and oversaturation with dissolved oxygen - up to 200 and more per cent.
2. An opportunity is provided to bring water to 'Lopatarskata lokva' or some of the other basins belonging to the canal in the Southern end of Poda. Owing to the fact that the chemical composition of canal water changes in a very wide range - from fresh to sea - it is possible to feed water of different composition. Such water feed can be accomplished only afer additional research work.

BULGARIAN-SWISS CONSERVATION PROGRAMME
(SCIENTIFIC REPORTS)

REPORT CONCERNED IMPLEMENTATION OF CONTRACT OBLIGATIONS
(*selected part*)

by Vladimir Kemilev

2. The established geologo-lithological structure with regard to piezometers on drilling is as follows:

Piezometer No.1.

0.0-1.4 m	Embankment : Brown clay with certain ribbed gravel stones of size up to 15 mm;
1.4-1.8 m	Greyish-black clay with decayed organic remainders, soft and plastic;
1.8-2.4 m	Grey sand clay, with mussel shells, soft and plastic;
2.4-4.5 m	Gray, small-sized sand, with mussel shells, muddy;

Piezometer No.2.

0.0-0.2 m	Greyish-black clay with roots, soft and plastic;
0.2-0.4 m	Yellow-brown sand, middle-sized, with a lot of broken mussel shells;
0.4-0.6 m	Grey sand, middle-sized, with a lot of broken mussel shells;
0.6-3.9 m	Grey sand, small-sized, with occasional broken mussel shells;

Piezometer No.3.

0.0-0.4 m	Yellow-grey sand, small-sized, with some broken mussel shells;
0.4-0.9 m	Grey-black-grey mud, with small-sized sand grains, soft and plastic;
0.9-1.2 m	Grey sand, middle-sized, with some broken mussel shells;
1.2-2.0 m	Grey sand, small-sized, with mussel shells;
2.0-2.5 m	Grey and black mud, soft and plastic, with occasional mussel shells;

Piezometer No.4.

0.0-0.5 m	Embankment : quartz gravel stones, rounded, sized up to 7 cm, yellowish, sandy-clay filler;
0.5-1.0 m	Embankment : Grey clay with rounded quartz gravel stones, sized up to 4 cm;
1.0-1.5 m	Embankment : Greyish-black sand clay, oozed with oil products;
1.5-1.7 m	Embankment : Grey sand clay, with an odour of oil products;
1.7-2.6 m	Black mud, soft and plastic, with reed stalks, oozed with oil products;
2.6-3.0 m	Grey mud, liquid plastic, wit sand grains, with mussel shells and decayed plant remainders;
3.0-3.4 m	Grey sand, small-sized, muddy with decayed organic substances, coloured in brown;
3.4-4.7 m	Grey sand, small-sized, clayish.

BULGARIAN-SWISS CONSERVATION PROGRAMME
(SCIENTIFIC REPORTS)

GROUND LAYER ANALYSES FOR MOLLUSKA

by proff. Angel Angelov

RE: Analyses of 22 drill samples provided by four stations in protected natural area Poda, Bourgas. The samples were washed using a sieve with 'eye' openings of 1 mm. On the basis of either complete shells or shell fragments 24 mollusca were detected, among which 11 species of *Bivalvia* and 13 species of *Gastropoda* (among which one species failed to be detected). All mollusca (their shells) are characterized by a subfossil nature.

Sample N1, piezometer N1, depth 0.1 m.
Sterile from the side of organisms only pieces of rock.

Sample N2, piezometer N1, depth 1.5 m.
Cerastoderms glaucum - fragments.

Sample N3, piezometer N1, depth 2.0 m.
Bithium reticulatum - in large number.
Rissoa splendida - 15.
Hydrobia ventrosa - 15-20.
Teredo sp. (maxillae) - single.
Ostrea lamellosa - fragments.
Cerastoderma glaucum - fragments.

Sample N4, piezometer N1, depth 2.50 m.
Bithium reticulatum - 5 (many juv.).
Rissoa splendida - about 50.
Theodoxus (*fluviatilis*?) - 1.
Tritia reticulata - fragment.
Hydrobia ventrosa - many.
Parthenina terebellum - 1.
Valvata piscinalis - 1.
Cerastoderma sp. - fragment.
Syndesmia ovata - 3.

Sample N5, piezometer N1, depth 3.0 m.
Bithium reticulatum - 11 (many juv.)
Hydrobia ventrosa - many
Rissoa splendida - 5-6.
Parthenina terebellum - fragments.
Syndesmia ovata - fragments.

Sample N6, piezometer N2, depth 0.1 - 0.2 m.
Bithium reticulatum - single.
Rissoa splendida - 15-20.
Cerastoderma glaucum - fragments.
Ostrea lamellosa - fragments.

Sample N 7, piezometer N2, depth 0.3 - 0.4 m.
Rissoa splendida - in large number.
Bithium reticulatum - in large number.
Parthenina terebellum - single.
Tritia reticulata - single.
Trophonopsis breviatus - single.

Theodoxus sp. - single.
Nana sp. - single.
Bela nebula - single (juv.).
Pholas sp. - fragments.
Mythilaster lineatus - single.
Cerastoderma glaucum - 2-3.
Donacilla cornea - 6.

Sample N8, piezometer N2, depth 0.7 - 0.8 m.
Rissoa splendida - in large number.
Bithium reticulatum - in large number.
Hydrobia ventrosa - single.
Trophonopsis breviatus - fragment.
Parthenina terebellum - fragment.

Sample N9, piezometer N2, depth 1.6 - 1.8 m.
Bithium reticulatum - about 30.
Rissoa splendida - many.
Hydrobia ventrosa - many.
Tritia reticulata - single.
Mythilaster lineata - fragment.

Sample N10, piezometer N3, depth 0.2 - 0.3 m.
Rissoa splendida - in large number.
Bithium reticulatum - in large number.
Parthenina terebellum - 1 + fragment.
Spirula triangulata - 1.
Chamelia gallina - 3.
Donacila cornea - 8.
Ostrea lamelosa - 1 + fragment.
Cerastoderma glauca - fragment.

Sample N11, piezometer N3, depth 0.6 - 0.7 m.
Bithium reticulatum - 15.
Rissoa splendida - 4.
Cerastoderma glauca - 2.

Sample N12, piezometer N3 , depth 1.0 - 1.1 m.
Bithium reticulatum - in large number.
Rissoa splendida - in large number.
Hydrobia ventrosa - offten.
Cerastoderma glauca - 2 + fragment.
Ostrea lamelosa - 1.
Chamelia gallina - 1.
Donacila cornea - 6.

Sample N13, piezometer N3, depth 1.2 - 1.4 m.
Bithium reticulatum - single.
Rissoa splendida - single.
Cylichina strigella - 1.

Sample N14, piezometer N3, depth 2.3 - 2.4 m.
Bithium reticulatum - 15-20.
Rissoa splendida - 12.
Cylichina strigella - 2.
Hydrobia sp. - often.
Cylichina variabilis - 1.
Ostrea lamelosa - fragment.
Cerastoderma glaucum - juv. + fragment.

Sample N15, piezometer N4, depth 0.3 - 0.4 m.
Sterile from shells.

Sample N16, piezometer N4, depth 1.0 - 1.1 m.
Bithium reticulatum - singles.
Ticola pula - 1.
Cerastoderma glaucum - fragments.
Syndesmia ovata - fragment.

Sample N17, piezometer N4, depth 1.3 - 1.4 m.
Bithium reticulatum - singles.
Cerastoderma glaucum - fragment.

Sample N18, piezometer N4, depth 1.5 - 1.6 m.
Bithium reticulatum - singles.

Sample N19, piezometer N4, depth 1.7 - 1.9 m.
Pholas sp. - fragment.
Cerastoderma glaucum - fragment.
Hypanis caspia - fragment.

Sample N20, piezometer N4, depth 2.6 - 2.8 m.
Bithium reticulatum - about 60
Hydrobia ventrosa - about 15
Rissoa splendida - often.
Cerastoderma glaucum - single.
Solen vagina - fragments.

Sample N21, piezometer N4, depth 3.0 - 3.2 m.
Bithium reticulatum - often.
Rissoa splendida - often.
Hydrobia ventrosa - single.
Syndemia ovata - single.

Sample N22, piezometer N4, depth 3.4 - 3.6 m.
Bithium reticulatum - singles.
Rissoa splendida - singles.
Hydrobia ventrosa - 7-8.
Cerastoderma glaucum - fragment.

Gastropoda
Marine
Bithium reticulatum
Rissoa splendida
Tricola pula
Cylichina strigella
Cylichnina variabilis
Trophonopsis breviatus
Parthenina terebellum
Bela nebula
Tritia reticulata

Freshwater
Theodoxus (fluviatilis?)
Valvata piscinalis

Brakish
Hydrobia ventrosa

Bivalvia
Marine
Cerastoderma glaucum
Pholas sp.
Ostrea lamelosa
Solen vagina
Chamelea gallina
Donacilla cornea
Parthenina terebelum
Mythilus lineata
Spisula triangulata

Brakish
Syndesmia ovata
Hypanis caspia

As a result of the analysis of the mollusca (*Bivalvia* and *Gastropoda*) populating the area of Poda, Bourgas, for a long period of time, it can be inferred, with a great degree of probability, that, for a considerable period of time, water at the time was characterized by its sea nature, but with a changeable salinity, often exceeding sea salinity. The greater part (78 per cent) of the mollusca detected are evrihaline, but more resistant to greater saltening than to freshening (they are greater in number in most samples, irrespective of depth). Only three species or 12 per cent of the total mass are of expressed brackish nature. They are less in number, and can endure greater freshening of firth water better.

Fresh species were detected in two samples only, moreover these were single individuals. Their availability in the firth is casual and as a result of accidental fresh water waves entered the firth from water masses outside it.

BULGARIAN - SWISS BIODIVERSITY CONSERVATION PROGRAMME

PROJECT "PODA"

SURVEY ON THE PHYTOPLANKTON OF THE PROTECTED AREA "PODA" (June - August 1995)

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I. INTRODUCTION. MAIN PURPOSES AND TASKS OF THE SURVEY

The importance of the phytoplankton in the management of wetlands of different types is worldwide known and widely accepted. As a first step of the food chain and main trophic basis, the phytoplankton (its structure and changes) provides possibilities: **i)** to detect the eventual ecosystem changes at their very early stages; **ii)** to predict the development of the system; **iii)** to propose management measures and to control the ecosystem.

The main **purposes** of the present survey are:

- to characterize the phytoplankton of the wetland;
- to evaluate the pollution or eutrophication of the system and to stress the most problematic sites;
- to evaluate the trophic status of the investigated basins and nutritional value of the phytoplankton;
- to propose some management measures;
- to propose the main tasks of future investigations and monitoring of the protected area.

The main **tasks** of the present survey are:

- qualitative characteristic of the phytoplankton:
  - -- species composition;
  - -- number of species at sites;
  - -- representation of different ecological groups in the phytoplankton;
  - -- size spectra;
  - -- changes of the characteristics mentioned above during the different periods of the investigation (late spring and summer);
- quantitative characteristic of the phytoplankton:
  - -- cell numbers/l at different sampling sites;
  - -- proportions of the different algal groups;
  - -- changes of the characteristics mentioned above during the different periods of the investigation (late spring and summer);
  - -- dominant species;
- comparison of all mentioned parameters and their changes for the evaluation of the ecological situation of the protected area (trophic status, eutrophication/pollution problems).

II. REVIEW

The algal flora of the wetland Poda had been poorly investigated. Only 4 species by Mihajlova-Nejkova (1961) were reported for the period when Poda was a part of big Mandra Lake.

In the compendious work on Bulgarian lakes (Ivanov et al., 1964) only Mandra lake was meentioned with total of 38 algal species without delimitation between the freshwater and the brackish and salt part of the lake. In the Bulgarian algal flora.I. (Vodenicharov et al., 1971) 88 species are mentioned as typical of the wetlands (freshawter and brackish ones) along the Black Sea coast, without exact pointing of their localities and 3 species are pointed out especially for the Bourgas region.

The phytoplankton as a community of the wetland "Poda" had never been studied.

III. SAMPLING SITES

The sampling sites are showwn on Fig. 1. Among them **site E** is **freshwater** one and **sites A, B, C, D and F** are with **brakish water**. Sites A and B are the most influenced by Black Sea waters sites.

IV. MATERIALS AND METHODS

The **phytoplankton** samples had been collected during two different seasons: late **spring** (24.06.1995) and **summer** (21.08.1995). The samples had been collected in glass bottles (250 ml) by **sedimentation method** and fixation by **2-4% formaline**. This type of collectiong is standard and widely used, but prevents from exact determination of species in some algal groups (mainly flagellates).

The determination of the **species composition** (except diatoms for which special processing of samples is necessary) was done according to standard quides, mannuals and floras used in such types of investigations, as well as according to some newly published taxonomical papers. (Some diatom genera are mentioned in the survey as far as it was possible to distinquish them by shape of the cells and of the structure of dead frustules).

The **quantitative** elaboration was done according to our own estimation of algal dimensions for biomass/l and counts were done on blood-counting camera of Thoma. The main counting unit is the algal cell. The different types of **strategists** were evaluated according to data on their dimensions (Olrik, 1994).

Dominant species were determined according to their presententation in algal quantity (cell numbers/l).

The **trophic conditions** of the investigated basins are evaluated on the basis of phytoplankton quantities (G. Toth, Padisak, 1982). The trophic value of the phytoplankton as the basis of the **food chain** is evaluated according to the data on the qualitative structure of the phytoplankton and worldwide accepted and undoubtful data and opinions on the edible potential of different algal groups for zooplankton and fish (*e.g.* Cruz-Pissarro, 1993, De Bernardi, 1993).

Saprobic conditions are estimated only for the freshwater part of the wetland according to the saprobic system and Sladecek's list of **indicator** species (Sladecek, 1973).

V. RESULTS AND DISCUSSION

V. 1. Qualitative structure of the phytoplankton

V.1a. Species composition

In the phytoplankton samples a total of **30 taxa** was foud. They belong to 26 genera, 14 orders, 10 classes, 2 subdivisions and 5 divisions. Most of the determined species belong to the divisions **Cyanophyta and Chorophyta** (subdivision **Euchlorophytina**).

More detailed data on the distribution of species at different sites for both sampling periods are shown on Table 1. These data clearly show the different species composition and different conditions in each of the investigated sites. No one species could be point as common for all sites.

V.1b. Number of species at sites

Number of species at the investigated sites is small and varied from **1** to **11** (in June - from 1 to 7 and in August - from 4 to 11) - Fig. 2.

The **extremely small number of species in all sites** could be explained by **... different reasons** and their coincidence in some of the sites:

a) the negative influence of the polluted and eutrophicated water from the Black Sea (site **A** - there only one species *Synechocystis sp.* was found in small numbers/l);

b) the presence of strong pollution (at least organic one) and eutrophication in the freshwater canal **E** lead to blue-green algal blooms (*Microcystis viridis)* which might be toxic;

c) the competition of bacteria (site **B**) decreased the development of algae;

d) the small dimensions of the water basins with small depth of the water column favoured the monodominant phytoplankton communities (dinophyte bloom in site **F** in June).

V.1c. Representation of different ecological groups

All the species found at **site E** are typical **freshwater** and **planktonic** species.

Most of the species found in the brakish and saltwater part of the protected area (**sites A - D, F**) are typical of **brackish and saline** waters. In the conditions of small water depth the observed mixture of typical planktonic species with **benthic** representatives is well explainable. In all the sites **planktonic** species dominate in these mixtures.

V.1d. Size spectra

According to their dimensions most of the found green algae and diatoms could be classified as **colonists** (C-strategists), whereas most of the found cryptophytes and dinophytes are with slight specialization and are so-called **tranzitional species** (between ruderals and colonists) and most of the blue-green algae belong to the group of **stress-tolerant** strategists (S-species).

The changes in the development of different strategists in each site and their seasonal shifts are partly discussed below.

These different types of life-strategy are mentioned here especially because the representatives of first two strategic types are mentioned in the literature as available food for zooplannkton, while the stress-tolerant species are unedible for animals.

V. 1e. Species alteration

The number of algal taxa found at the reserve is more or less the same for all taxonomical levels during the three periods (Table 1). The changes observed in the species composition and in the proportions of the different algal groups are presented here with the work term "species alteration".

The most pronounced changes observed at **site 1** are the decrease of the blue-green algal species from spring to late summer up to their full absence in the autumn and the development of diatoms (mainly pennate) and some euglenoid and yellow-green algae in summer.

The changes in the species composition at **site 2** clearly show that at the background of more or less stable diatom complex (mainly pennate diatoms) the species alteration is from blue-green algae (mainly benthic filamentous ones) in spring to green flagellates in summer and flagellate cryptophytes in autumn.

The changes of species composition at **site 3** are well pronounced: from coccal blue-green which cause water-bloom in spring to diatom-chlorococcal complex in summer and to complex of different flagellates (euglenoids, pyrrhophytes, cryptophytes and chlamydomonads) in autumn.

Species alteration in **site 4** is clear: development of green algae and euglenoids in June, of blue-green and diatom algae in August and of diatoms and green algae in September.

The changes in the species composition in the salt part of the reserve (except site 5 and 6 which were unacceptable after drainage) could be present in the following way:

- **site 7** - raphidophytes and dinophytes in June, mixture of species from all groups in August and blue-green, raphidophyte and cryptophyte algae in September;
- **site 8** - mixture of diatoms in June, blue-green and green algae in August and again diatoms (only pennate) in September;
- **site 9** - only blue-green algae in June, mixture of flagellates from all groups in August and appearance of diatoms in September with decrease of flagellate presentation;
- **site 10** - blue-green algae and appearance of dinophytes in June, blue-greens with different flagellates and diatoms in August and diatoms and flagellates in September;
- **site 11** - blue-green algae in June and August and development of diatom complex in September.

The **different pattern of species alteration** in the investigated sites clearly show the existence of different conditions there. The salinity (for the salt water part) and different degree of pollution and eutrophication (for the freshwater part) could be pointed out as more important parameters (at the background of the same water temperature and more or less the same depth of the water column).

V. 2. Quantitative structure of the phytoplankton

V. 2a. Phytoplankton cell numbers/l at different sites

Data on the phytoplankton cell numbers/l at different sites on different dates are presented in Table 2. The biggest phytoplankton quantity was found at site D in August - **1 929.0x10^6** cells/l and the lowest one - at site A in June - **15.6x10^6 cells/l.**

V. 2b. Quantitative representation of different algal groups

There is not an algal group which representatives group were presented in significant quantities in all investigated sites during the all sampling periods.

The quantities of the blue-green algae (division **Cyanophyta**) are the biggest established ones. Representatives of this group caused the so-called algal blooms in the freshwater part of the protected area (site E) and dominate over the other groups in late spring and summer (sites B and C).

Green algae (subdivision **Euchlorophytina**) and especially various flagellates play an important role in the phytoplankton communities in different basins. At site D in August they caused water-bloom and contributed significantly to the total phytoplankton quantity.

Representatives of the other groups (**Euglenophyta, Dinophyta, Bacillariophytina, Raphidophyta, Cryptophyta)** have much smaller role in the phytoplankton quantites.

V. 2c. Changes in the phytoplankton quantity during the investigated period

Changes in the total phytoplankton quantity during the both different seasons of investigation **increased significantly** (Fig. 3).

The changes in the quantitative presentation of different algal groups at each site are well pronounced and clearly show the existing of different situations (Table 2). Partly these changes are discussed together with the species alteration, with the dominant species and with the discussion of trophic state.

V. 2d. Dominant species

According to their quantitative presentation in phytoplankton assemblages several species could be pointed out as dominants in the investigated sites during different periods (see below). This analysis is done mainly with regards to the trophic importance of phytoplankton in the different sites.

Dominant species and their alteration were different in each of the investigated sites. They could be presented in the following way:

- **site A** - *Synechocystis sp.* (June);
- **site B** - *Synechocystis sp.* (June); *Plectonema sp.* + *Rhodomonas sp.* + unidentified green flagellates (August);
- **site C** - Unidentified coccal green alga (June); *Oscillatoria sp.* (August);
- **site D** - *Chattonella sp.* + *Chaetoceros sp.* (June); *Pyramimonas minima* (August);
- **site E** - *Microcystis* cf. *viridis* (June and August);
- **site F** - *Peridinium sp.* (June); *Rhodomonas* sp. div. (August).

3. Trophic and saprobic conditions of the investigated sites. Phytoplankton as the basis of the food chain.

The total species composition, the estimation of species domination and phytoplankton quantity provide possibilities to evaluate the trophic situation and saprobic conditions of the investigated freshwater **site E - eutrophic** and **a-b - mesosaprobic**; abundant phytoplankton presented mainly by **unedible** and most probably **toxic** species for zooplankton and fish.

The saprobic conditions in the **salt and brakish water** part are not evaluated. The trophic system could not be used in its original form in the hyperhaline conditions of the salt basins.

- site A - the **poorest** site in terms of phytoplankton quantity and quality with species **edible** for zooplankton;

- **site B - abundant** (cells/l) phytoplankton in August; 60% of the species are **edible** and with **high nutritional quality** for zooplankton;

- site C - phytoplankton is **less abundant** than in site C and was presented mainly of **unedible** species;

- **site D -** the basin with the **most abundant** phytoplankton in August, when development of **edible** species with **high nutritional quality** for zooplankton was detected;

- site F - the basin with **abundant** phytoplankton with the **richest** presentation of **theoretically edible** species of **high nutritional quality during all the periods** of investigation. We had especially to point out that some of the dinophytes (tha monodominants in the phytoplankton of this site) could be **toxic** and therefore some tests are recommended for future investigations.

4. Main problems of the water basins according to the phytoplankton data

According to the investigations ofn the phytoplankton quality and quantity of the six sites located at the territory of the protected area it could be stated that **pollution and eutrophication** problems exist both in the **freshwater and in the brakishwater part** of the protected area. The negative influence of the Black Sea waters and of the canals from "Neftochim" is obvious. Changes in the phytoplankton assemblages in the salt and brakish water part most probably are connected also with the saline regime of the basins. In these basins with changing hydrochemical conditions phytoplankton is of different nutritional value during different periods and is most important as the basis of the food chain in summer. The phytoplankton species from the frehwater canal are absolutely unedible and most probably caused negative effect on the following trophic levels.

The eutrophication could cause **toxic** water blooms with extremely negative effect on the biota.

CONCLUSIONS AND RECOMMENDATIONS

- The **qualitative** composition of the phytoplankton could be pointed out as interesting one, presented by different algal groups and different strategists. Most of the species (especially the flagellates) need more exact determination in living conditions. Only after such exact determination it will be possible to give more precize information on the trophic value of the phytoplankton and its role in the **food chain** and to propose more measures for biomanipulation and management of the wetland.

- The changes of the **phytoplankton quantities** in each site could be classified as significant and pronounced. But they could not be explained only according to the data from 2 samplings and need to be more detailed on the basis of more frequent sampling.

- Data on the species alteration and different quantitative presentation of algal groups show the existence of **different conditions** at each site of investigation. As most important parameters the saline regime and the pollution and eutrophication of the sites could be pointed out.

- The data on the trophic situation in the different sites clearly show that the **trophic conditions** change. The freshwater canal is of extremely poor nutritional quality and the production could not move through the food chains.

- It is necessary to take measures to stop the eutrophication from the "Neftochim" canal to obtain more rich in species phytoplankton without **algal blooms** in site E.

- It is necessary to obtain more information on the toxicity of dinoflagellate algae of the wetland, as well as on the toxicity of *Microcystis* - blooms which could cause severe problems to the food chains and to monitor them.

REFFERENCES

--Cruz-Pizaro, L., 1993. - Function of zooplankton in lake ecosystems. - In: Salanki, J., P. Biro 9eds.), Limnological bases of lake management, Proceed. ILEC/UNEP Int. Training Course, Tihany, Hungary, 11 - 23 October, 1993, 41 - 59.

--De Bernardi, R., 1993. - Biomanipulation in conservation and management of lakes. - In: Salanki, J., P. Biro 9eds.), Limnological bases of lake management, Proceed. ILEC/UNEP Int. Training Course, Tihany, Hungary, 11 - 23 October, 1993, 161 - 171.

-G. Toth, L., J. Padisak, 1982. - Attempt at a multifactor estimation of the eutrophication of the Tihany area of Lake Balaton. I. Introductory, considerations, methods, algological indices. - Bot. Kozlem, 69 (1 - 2): 71 -84.

--Ivanov, K., A. Sotirov, A. Rojdestvenski, D. Vodenicharov, 1964. Lakes in Bulgaria. Publ. Inst. Hidrol. Metereol. (Sofia), XVI, 242 (in Bulgarian).

--Olrik, K., 1994. Phytoplankton - Ecology. Ministry of the Environment, Denmark. Danish Environmental Protection Agency.

--Sladecek, V., 1973. Arch. hydrobiol, Ergebn. Limnol.

--Vodenicharov, D., St. Draganov, D. Temniskova, 1971. Flora of Bulgaria. I. Algae. Sofia.

BULGARIAN-SWISS CONSERVATION PROGRAMME
(SCIENTIFIC REPORTS)

ZOOPLANKTON AND ZOOBENTHOS

by Stanoy Kovachev
Final Report (1995-1996)

Purpose

The protected area "Poda" includes several basins as habitats for birds, and the environmental conditions of their existence there are undoubtedly connected with the biological regime of these localities. The state of the zooplankton and the zoobenthos is to give useful information about the trophic state of the various basins as a basis for the future activities on the management of the protected area. Species composition of both communities, its distribution among the various basins and the qualitative data are the reason to estimate the role of both communities under question in the biological regime in the basins that are subject of observation.

References review

The data available about the hydrofauna in the area are not very reach. Konsulov (1912) reported two rotifers, mentioned also by Valkanov (1934) who aided some crustaceans. The latter author (Valkanov, 1936) listed very many species, both planktonic and benthic for the Mandra Lake and it is very difficult to know which of them are from the locality Poda itself. This difficulty exists in several later publications. Cvetkov (1955) pointed out five species of chironomids for the Mandra Lake, and Mikhailova (1961) also published a rich list of species from the fauna in the same area, but practically difficult to understand which of them are from the area Poda. Especially from this place, are five species Cladocera and four Copepoda, published by Naidenov (1967).

Sampling sites

Several sites were observed during two-year period as determined together with Mr M. Marinov, with a variety of environmental conditions. They are:
A - eastern part of the area; a pool among reedbed in 1995, and the Phoros bay during 1996. The two points practically do not differ as they reflect the situation at the open sea, in spite of the decreased salinity.
B - the "tern pool", in the northern part of the area, where a colony of this bird settles.
C - the "spoonbill pool", located in the western part of the area.
D - the "avocet pool", located between sites A and C, at the middle of the area.
E - puddles on the place of old sand pits in the northern part.
F - a canal with very slow velocity, entering the sea at the very northern part of the locality.
G - a point outside of the protected area, at Uzungeren bay in the Mandra Reservoir, known as visited by glossy ibis in the past.

Materials and methods

The protected area "Poda" was visited five times, in June and August 1995. and May, July and September 1996. Site G was visited once in May 1996. Zooplankton was collected by filtration of 20 l though conic plankton net, and the benthic samples were taken out by bottom sampler with surface 0.9 m^2. All of the samples were kept in 4 per cent formaline

and later processed in the laboratory. The biomass of the bottom animals was measured directly by an electronic balance, and of the zooplankton by usage of individual standard weight for each of the species. All of the quantitative data obtained were recalculated and presented per m^2 for the benthos , and m^3 for the plankton.

Species composition

Zooplankton

The qualitative composition of the zooplankton is shown on Table 1 (table 6 in the management plan). Due to the greater number of samples during various seasons, species composition was enlarged up to 30 species: 13 Rotatoria, 9 Cladocera and 8 Copepoda. The increased number of species came mainly from the spring season: and especially in the locality Uzungeren bay, which is typically freshwater waterbody. The lowest number of species (5) was found in the sea water point A. Twice more species were found in the brackish basins; the increased species (18) in site C could be connected to not so strong salinity, rather as a tendency to freshwater. The greatest number (24) was found in Uzungeren, site G, although the single sampling there. From this point of view, the typically freshwater canal, site F, is not so rich of species (10), which seems explainable as some slow velocity is visible and the water body is not strongly stagnant. However, some loading of the water from the waste basins westwards the road should be supposed.

Zoobenthos

Table 2 (table 6 in the management plan) shows the species composition of the zoobenthic communities. The typically sea site A is impressively poor of species (4). There is no very well connection in the distribution of the species among the other pools; yet more species were found in sites C (14) and F (19). Especially at the latter one the aquatic insect larvae are that give the great richness of species. What concerns the site G (Uzungeren bay) the comparatively low number of species is explainable firstly by the single sample, and also by the limitation of the considerable organic loading there, permitting only several very specialised species to exist in large amounts (see below).

Dynamics of the quantitative parameters

Both zooplankton and zoobenthos communities are characterised quantitatively by their number of individuals, or quantity N, and the biomass B. All of the samples were united seasonally as: spring-June 1995 and May 1996, summer - August of both years, autumn - October 1995 and September 1996.

Zooplankton

The data on Table 3 (table 5 in the management plan) show that the zooplankton is relatively poor in its quantity, and the lowest abundance and biomass were established at site A (under strong marine influence). The plankton in the other of the basins is several times higher. In spite of this fact their plankton is not very abundant. An exception is the enormous quantity at site G; however, it is formed there by rotifers and crustacean larval stages (nauplii and copepodites) which have very small individual weights. An outbreak of the biomass could be expected during the several next weeks, corresponding to their quantity. Generally, in a seasonal aspect there exists a spring maximum of the zooplankton, decreasing during the summer, and again slightly increasing during the autumn. Sudden decreasing of the quantity and the biomass in some of the sites (especially B, D, E) is probably due to various reasons: predatory fish press, loss of water level during the hot months; some of the basins (e.g. E) have relatively constant biomass during the worm months in spite of the rapid decreasing of the number of the individuals, as the heavier copepods prevail.

Zoobenthos

The parameters of the benthic community at site A are some greater in biomass - Table 4 (table 5 in the management plan) - because of the heavy mollusc shells; thus, they do not have considerable trophic value. In the other sites the quantity and the biomass are surprisingly low and probably have not very important role as trophic source. An exception is the zoobenthos in site G, where tubificid worms and chironomid larvae form the great biomass, while the enormous quantity is due to the naidid worms.

Conclusion and recommendations

With an exception - site A, which is a typical marine habitat - the various basins of the protected area "Poda" are strongly eutrophicated, and with predominantly brackish characteristic, according to their species composition, especially of the plankton. The canal (site F) in the northern part of the area is an exclusion with its clearly fresh waters. The planktonic community has poor presentation, both qualitatively and quantitatively, but it is under the predatory press of fish, which, in its turn is a good trophic supply for the fisheating birds. The zooplankton, however, is doubtly able to control the primary trophic level according to the waterblooms often observed. The benthic community is not rich enough to ensure trophically the higher level and the direct consumers as some birds are, have to get their food elsewhere.

A permanent monitoring of the nutrients could help to regulate the relationships between the primary and next trophic level. Especially a system for transferring of water to the basins that have shortage of it seems needed. Probable change of the salinity should not be regarded as dangerous for the development of the invertebrate communities. A potential source as a decision of the problem is the canal at the northern side of the area, but in this case a special attention should be paid to the water quality to avoid of additional loading of the pools by probable pollutants.

*Remark: The Appendixes to the report (tables and references) are included as Appendixes to the management plan.

BULGARIAN-SWISS CONSERVATION PROGRAMME
(SCIENTIFIC REPORTS)

ICHTHYOFAUNA OF WETLAND PODA AND ADJACENT WATER BASINS

by Lachezar Pehlivanov

ICHTHYOFAUNA OF WETLAND PODA AND ADJACENT WATER BASINS
(results from the investigations carried out in 1995)

Wetland Poda is situated to the south of Bourgas, in the Eastern part of the Mandra Lake. The area used to serve as a settling basin for polluted water coming from Neftochim EAD. Since 1989 the part of the wetland located between the Bourgas-Sozopol highway and the sea have been granted the status of 'protected natural area' with the purpose of protecting rare fowls populating the area.

No information on wetland Poda hydrological, hydrochemical or hydrobiological characteristics has been published. Specialized publications can only give relatively old related information on areas adjacent o the Mandra Lake (Alexandrova, 1967; Gueorguiev,1967; Dimov, 1967; Kuneva-Abadjieva, 1967; Marinov, 1967; Petrova, 1967; Rojdestvenski, 1967). The lake area is about 100 sq.m divided to several water zones differing in size among which reef massifs and dikes are located. As a whole, water salinity is close to that of sea water, with the exception of the canal bordering the wetland to the north. In Ouzoungueren, the adjacent eastern part of the Mandra Lake, water salinity changes, depending on water regime and prevailing wind direction. Most of the year its salinity is close to that of sea water, but in winter and spring, when great quantities of water from the Mandra dam lake are overflowing, water salinity of Uzungeren birth, and particularly in its west part, decreases considerably. Wetland bottom is covered by a more or less thick layer of mud having a distinctive odour of hydrogen sulfide.

Information on ichthyofauna of the site under consideration are obtained by carrying out field research and analysis of literary data. Classical ichthyological methods were used in field research. The materials were collected during two visits in the summer of 1995 using netlike devices : spoon-nets, drag-nets, etc.; then it was fixed in a 4-per cent solution of formaldehyde and treated in laboratory conditions. Additional information on frequent fish species in Uzungerenand the sea bay in front of protected natural area Poda were collected from local fishermen.

Ichthyofauna of Wetland Poda
No information on Uzungeren fish populations can be found in literature. Field research showed that, on the whole, ichthyofauna in Poda was poor both qualitatively and quantitatively. Obviously, this is related to the unfavourable abiotic conditions, and particularly - the hydrogen sulfide released from bottom sediments from one side; and the lack of direct land link of the greater part of the wetland to the sea and Uzungeren, from the other.

Six fish species belonging to six families were detected during the investigations:
- Poeciliidae, Gambusia affinis holbrooki (mosquito fish)
- Muglilidae, Liza (Mugil) ramada (thin-lipped mullet)
  Liza (Mugil) sp. - larvae
- Gobidae, Knipowitschia caucasica (Caucasian goby)
- Gasterosteidae, Gasterosteus aculeatus (three-spined stickleback)
- Percidae, Perca fluviatilis (perch)
- Cyprinidae, Rutilus rutilus (common roach).

Two of the above fish species: the Caucasian goby and three-spined stickleback are recorded in the Red Book of Bulgaria under the title 'threatened by extinction'. The Caucasian goby is a Caspian relict met in the Black, Azov, Aegian and Caspian Sea and the Sea of Marmora. This is an evrihaline species which can be found in the sea coastal zone, river mouths and coastal lakes. It sticks to areas with sand, muddy bottom. It reaches a length of up to 50 mm. It was included in the Red Book of Bulgaria because of its strongly decrease in number and disappearing from many previous habitats

(Karapetkova, Pomakov, 1985; Karapetkova, Zhivkov, 1995). The three-spined stickleback is a boreal-Atlantic relict. It is distributed in the north part of the Pacific and Atlantic Oceans, the Black and Azov Sea including. This fish species, too, is too tolerant towards the changes in water salinity. It can be found in sea coastal zones, coastal lakes and marshes, river mouths as well as fresh water basins (it was detected in marshes along the Maritsa and the Danube), sticking to places abundant in water plantation. Its size is up to 50-73 mm. The three-spined stickleback is a mass fish species in certain parts of its areal but in Bulgaria, although it used to be in high numbers, it has now disappeared from a lot of previous habitats (Karapetkova, Pomakov, 1985; Karapetkova, Zhivkov, 1995).

The most abundant fish species in wetland Poda if the Mosquito fish which can be met everywhere and in great numbers. Comparatively great in numbers are also the mullet larvae, but they can be found in limited wetland areas only - cf. sketch (fig.11 in the management plan). The numbers of other species is considerably lower.

Ichthyofauna does not populate the wetland area regularly - cf. sketch (fig.11 in the management plan). For instance, no fish species were detected in drying basins. The Caucasian goby and three-spined stickleback can be found in shallower saline water basins only, with comparatively thin layer of mud on the bottom. As expected, mullets could be met in the zones directly linked to the sea. The canal bordering the wetland to the north is the only place where fresh water species like the perch and common roach can be found. This can be explained by the fact that this canal is directly linked to the Mandra dam lake and is essentially an oligohaline water basin. Spatial distribution of fish species inside basins shows a clearly defined species specificity. Thus, while gobies and three-spined sticklebacks live a bottom life, the mosquito fish swims actively in the surface layer but is concentrated in coastal areas or in the vicinity (and, even, among) macrophyte plantations.

As seen from the information shown in Table 1 (table 9 in the management plan), concerning the nutritional spectrum of the fish under study, the trophic chains in the eco-system of wetland Poda are based upon the detritus. Most fish species appear to be the third step in nutrition chain, consuming zoobenthos and the so-called 'pseudoplankton' (harpacoides). Only the mullet exceeding 50 mm in size feeds directly on detritus, while zooplankton representatives (the rotatory *Brachionus ureolaris*) were detected only in the food of the mosquito fish smaller than 23 mm in size. Seaweed (*Campylodiscus clypeus* and *Nitzschia sygmoidea*) serve rather as a start food for the mullet and mosquito fish larvae and young individuals. It should be noted that a lot of sand crystals were detected in some of the mosquito fish digestive tracts belonging to the smaller size.

If a conclusion should be drawn out of the degree of filling the digestive tracts studied, in summer the trophic conditions with regard to the fish populating the wetland, are good and are not a limiting factor for the development of ichthyofauna.

Ichthyofauna of Adjacent Water Basins

The most complete information on fish species in Uzungeren bay was provided by Gueorguiev (1967). He established 26 fish species, where 11 of them populate Uzungeren permanently, and the rest enter it either periodically or casually. During the period of his research the permanent ichthyofauna of Uzungeren is completed mainly by brackish and sea species, where the most numerous (six species) is the faunal complex of primary sea autochthonous forms; second, with four species, comes the group of Mediterranean and boreal-Atlantic migrants; and with one species only, is the complex of primary fresh water fish. According to Gueorguiev (1967), the most abundant species among sea species temporarily populating Uzungerena re mullet species (*Mugilidae*); while the most abundant fresh water species are the carp, goldfish and rudd.

According to the Environmental Ministry (National Plan) the following fish species threatened by extinction, and included in the Red Book of Bulgaria, were detected in Uzungeren: the Caucasian goby and Caspian shemaya (*Chalcalburnus chalcoides*) as well as the rare fish species (*Stizostedion marinus*) and syrman goby (*Neogobius syrman*).

Our information does not allow us to make a full revision of ichthyofauna in Uzungeren. As for the wild carp found here earlier (threatened by extinction species), it could have hardly survived after stocking the Mandra dam lake with cultivated carp races for a number of time. Simultaneously, there is a good reason to suppose that mullets have been ones of the most abundant summer inhabitants here so far. Two species, new for Uzungeren, and recorded during the research work conducted, must be noted : the mosquito fish, obviously, a permanent inhabitant; and anchovy (*Engraulis encrasicholus ponticus*, belonging to the *Engraulidae* family), a temporary one. Local fishermen say that, in cases of

greater outflow from the Mandra dam lake at the time of spring high water, the grass (Chinese) carp and silver carp can be found in Uzungeren.

According to information from the same source, more abundant permanent inhabitants of the bay in front of protected natural area Poda are various types of gobies (the round goby - *Neogobius melanostomus*, toad goby- *Mesogobius batrachocephalus*, etc.), while migrant fish shoals also pass periodically : mullets (*Mugilidae*) - during almost the whole year; Mediterranean scad (*Trachurus mediterraneus ponticus*) - end of spring and autumn; European sprat (*Sprattus sprattus sulinus*) - second half of March and autumn; the shad (*Alosa pontica pontica*) appears at the same time; silverside (*Atherina mochon pontica*) - in April; bluefish (*Pomatomus saltatrix*) and anchovy (*Engraulis encrasicholus ponticus*) in summer; bonito (*Sarda sarda*) - in autumn.

The Fish as Nutritious Resource for Birds, Inhabited Protected Area Poda

For reasons beyond our control the actual composition of food scraps with birds building nests in wetland Poda was not investigated. Owing to this, inferences for the role of various fish species inhabiting wetland Poda and adjacent areas as food for populating birds, can be of a presumable nature only.

In wetland Poda itself, the potential nutritious resource for fish-eating birds is represented mainly by the mosquito fish, as it is the most numerous and widely distributed species while its small size (l_{max} = 39 mm) as well as the abovementioned peculiarities of its spatial distribution make it an easily accessible prey. An indirect proof of this supposition is the observed defensive behaviour of this fish species, aiming at avoiding bird attacks. Young carps, perches and mullets inhabiting the canal to the north of wetland Poda, too, can serve as a potential nutritious resource for birds. In Uzungeren and the sea bay fish-eating birds could probably use as food not only the mosquito fish, but young (one-summer and one-year) fish of almost all permanent or temporary fish species inhabiting the area. What makes us conclude so is their size, their presumable large quantities and the fact that they are usually concentrated in the surface water layer, and often - in the coastal zone where they are accessible for many bird species.

Basic Trends for Ichthyofauna Management

The basic trends for ichthyofauna management in wetland Poda and adjacent areas must comprise two aspects:

1. Conservation of species threatened by extinction registered in the Red Book of Bulgaria.

As mentioned above, the Caucasian goby and three-spined stickleback were recorded as 'threatened by extinction species' owing to their strongly reduced numbers. The basic reasons for that are pollution and drying up a number of habitats (marshes and river spills); as for three-spined stickleback - rapacious fishing in the past as well.

The results obtained provide an opportunity to suppose that a limiting factor to the numbers of these species in wetland Poda are rather abiotic conditions (water chemical composition, water regime) than biotic (trophic base, water chemical composition, water regime). To support their populations respectively, it is abiotic factors that should be controlled (as far as possible) - to prevent water basins pollution with waste, to monitor water quality in adjacent areas; if required, to take measures to prevent water basins populated by Caucasian goby and three-spined stickleback from drying up.

2. Maintaining the trophic base of fish-eating birds.

The trophic base of fish-eating birds populating wetland Poda depends on the fish stock state both in the wetland itself and adjacent water basins. It should not be forgotten, however, that a lot of the factors defining fish population numbers in Uzungerenand the sea bay in front of the wetland are not subject to monitoring, at the present stage of science and practical experience. Thus for instance, sea fish migrations could hardly be monitored while controlled - even less; and, respectively, fish shoals occurring in Uzungeren and the bay. On the other side, it is possible and necessary:

- to monitor water chemical composition in wetland Poda and adjacent areas with the purpose of promptly diagnosing the eventual worsening of water qualities as fish environment (due to pollution or other reasons) and to take measures to restore them;
- to control keeping the established fishing regulations stating allowed fishing devices, fishing terms, minimal size and maximal quantities of the fish caught in Uzungeren and the sea bay;
- to monitor the fish population state by means of control fishing and inquiries, simultaneously observing the peculiarities in feeding and nutritious behaviour of birds; moreover, in case of trophic condition worsening in wetland Poda and adjacent areas - to take the required organizing and biotechnical measures to restore the fish stock.

To allow successful monitoring and management of ichthyofauna in wetland Poda and adjacent areas a cooperation between the Regional Fishing Inspectorate, Regional Environmental Inspectorate, local authorities, organizations and people doing industrial fishing in the area as well as local population should be established.

It should be recommended to prepare a programme, within the information centre planned, for monitoring water fauna, ichthyofauna included, of wetland Poda and adjacent areas, considering two major tasks:
- to monitor long-term changes of biological diversity in these water eco-systems;
- to link the trends of their development to the dynamics of bird populations inhabiting protected natural area Poda.

Such a monitoring could be carried out simultaneously with the measures to control and manage ichthyofauna or irrespective of their realization.

Recommendations for Fish Presentation and use in the Process of Environmental education within the Project
Owing to the specific conditions, the fish populating wetland Poda can hardly be observed in field conditions. A suitable form for its presentation are aquariums which can be located in the future Information centre. The small number of species and the vicinity of water source will not present great technical and economical difficulties in solving this task. Creating suitable conditions in aquariums which is not very difficult, will provide an opportunity to demonstrate various elements of fish behaviour. For instance, the interesting matrimonial and parental behaviour of gobies and particularly, the three-spined stickleback, could be observed. Moreover, these observations could have both educational and scientific value. Further, the exposition could be gradually expanded to cover as fully as possible fresh-water, brackish and sea fish species found in the south Black Sea coast. Such a collection would be unique for Bulgaria.

Some of the fish populating the wetland and adjacent areas are quite attractive and could be used as photos or pictures on posters, leaflets, calendars, etc. promotional printed matter.

Then relationships between different water inhabitants, fish included, of wetland Poda and adjacent areas could be used as illustration of various peculiarities of nutritional spectrum in water eco-systems in environmental education.

ICHTHYOFAUNA OF UZUNGEREN AND PHOROS BAY
(results from the investigations carried out in 1996)

On implementing this plan our attention was directed towards the study of ichthyofauna in Uzungeren- the part of the Mandra Lake adjacent to wetland Poda. This is in itself the only part of the Mandra Lake which has preserved a direct link to the sea after the construction of the dam wall.

Literary Reference

Industrial fishing has been done for long in the Mandra Lake (wetland) and the sea bay in front of it. Owing to this, the area has been paid attention to by a number of Bulgarian scientists and environmentalists interested in the field of ichthyology, hydrobiology, hydrology and fishing. The earliest information on fish populations in the lake and adjacent sea bay can be found in a publication by Konstantinos (1935) where it is mentioned that among permanent inhabitants of the Mandra Lake most interesting for fishing are the carp and pike-perch. Gobies and mullets are traditional fishing objects as well; they, however, are temporary inhabitants - come from the sea in the warm months to feed and leave the lake on reducing water temperatures. More detailed information on ichthyofauna of Bourgas lakes, the Mandra included, is provided by Vulkanov (1936) who identified seven fish species in fishermen's draughts (the carp, pike-perch, mullet, little mullet, Caspian shemaya, rudd and bluefish), and the others he joined into two groups - gobies and miscellaneous. In 1931-1935 draughts the greatest part is contributed to the carp, gobies, pike-perch and mullet. The article points out that fresh-water fish species prevailed in the Mandra Lake while in Vaya most fish species were primarily marine ones. Moreover, the author stressed that during spring high-water fresh-water fish species travelled towards the sea, while in summer they receded towards the upper part of the water basin as well as in tributaries.

In other work published two years later (Limonov, 1938) the author underlined that the inflow of fresh-water to the Mandra Lake has considerably decreased for a period of forty-fifty years. Towards 1938 this has led to a great qualitative and quantitative impoverishment of fresh-water ichthyofauna and limiting of its distribution to the upper part of the water basin as well as in tributaries. The observations of Nechaev (1938) supported the information on ichthyofauna composition in the Mandra Lake and spatial distribution between fresh-water and sea fish species in a west to east direction. Alongside he mentioned that a large quantity of carp was also detected in the east part of the basin at a salinity of 13.03 per milles. The same author showed that the numbers of peaceful fish species in the water basin were too high, leading to a very slow growth, according to him; however, to compensate, there were favourable conditions for the availability of ichthyophagous fish species. We could suppose that this meant good trophic conditions for fish-eating birds as well.

The situation changed sharply after 1962. The dam built divided the lake into two parts where totally different conditions of life for fish were created. The Mandra dam lake is a typical fresh-water basin with a water level above the sea level. Its fauna is diminished with most of the temporary inhabitants entering the Mandra Lake from the sea. Evrihaline mullets are an exception for they can enter from Uzungeren with sluices open (Gueorguiev, 1967). As in this case the flow is too strong, only adult fish can enter the dam lake (Alexandrova, 1967). The sea influence is preserved in the east part of the Mandra Lake - Uzungeren. This site is referred to mesohaline basins with changeable salinity. In the summer-autumn period it is close to sea salinity, and in the spring-winter period, due to the larger flow of fresh water salinity, particularly in its west part, drops considerably (Rojdestvenski, 1967). The most complete information on fish fauna in Uzungeren is provided by (Gueorguiev, 1967). He reports eleven permanently living species, among which are brackish and marine. The most numerous appears to be the faunistic complex of primarily-marine autochtonous forms, presented by three families : herrings-*Clupeidae* (1 species), sticklebacks - *Gasterosteidae* (1 species) and gobies - *Gobiidae* (4 species). Second, with four species, is the group of Mediterranean and boreal-Atlantic immigrants. The poorest presentation belongs to the complex of primarily fresh water fish which includes one species only - the pike-perch (*Stizostedion lucioperca*) belonging to the perch family - *Percidae*. The author also notes 15 temporarily inhabiting species in Uzungeren (cf. the table enclosed). The primarily fresh water fish species (four species of the carp family - *Cyprinidae* are found to be here at the time of spring high water through the Mandra dam lake equipments. In the spring-summer period a lot of sea fish species enter Uzungeren, among which the most numerous are he representatives of the *Mugilidae* family - mullets (predominantly mullet - *Mugil cephalus*, and golden grey mullet - *M. auratus*), and the *Atherinidae* family - silverside (*Atherina-Atherina mochon pontica*). From the rest temporary inhabitants usually only certain individuals appear in Uzungeren (Gueorguiev, 1967). Later to the list of species filed by Gueorguiev (1967) a new species was added - *Neogobius syrman* (syrman) belonging to the *Gobiidae* family (Karapetkova, Zhivkov, Alexandrova-

Kolemanova, 1993). According to some information provided by the Environmental Ministry (National Plan ...) in Uzungeren the marine pike-perch (*Stizostedion marinus* - the *Percidae* family) has been found, but its availability was not confirmed (Karapetkova, Zhivkov, Alexandrova-Kolemanova, 1993). However, in the period 1967-1995 there has hardly been some information in scientific literature on Uzungeren fauna. *Clupeonella delicatula* can only indirectly be supposed to no longer inhabit Uzungeren(Karapetkova, Zhivkov, 1995).

Among the species mentioned in literature as Uzungeren inhabitants, seven have been recorded in the Red Book of Bulgaria (Karapetkova, Pomakov, 1985; Karapetkova, Zhivkov, 1995): *Clupeonella delicatula*, Caspian shemaya (*Chalcalburnus chalcoides*), nine-spined stickleback (*Pungitius platygaster*), three-spined stickleback (*Gasterosteus aculeatus*), silverside (*Atherina mochon pontica*) and the Caucasian goby (*Knipowitschia caucasica*) - as 'threatened by extinction species', and the syrman (*Neogobius syrman*) - as 'rare'.

Results from Investigations Carried out in accordance with the programme agreed, in 1996, in Uzungeren and Phoros bay, research started as early as 1995, has been continued. Ichthyological material was collected in net-like devices and treated in laboratory conditions. Visual observations have also been carried out in the process of operation. To establish ichthyofauna composition in the bay, apart from own information, information from fishermen working there has also been used. With the purpose of determining the trophic base of some fish-eating species, bone material detected in scraps, and collected by assistants to the wetland Poda project have been analyzed.

Ichthyofauna composition.

The two-year research information allows to infer that ichthyofauna composition in Uzungeren does not differ considerably from the one collected before (Gueorguiev, 1967). Results proved that *Clupeonella delicatula* did no longer belong to permanent inhabitants (Karapetkova, Zhivkov, 1995). A new species belonging to that group, the mosquito fish, has also been detected. Simultaneously, considerable changes in qualitative representation of various species have been observed. Most obvious are the changes in the relative share of carps. Although, according to Gueorguiev (1967), only single individuals can be found in draughts, during our investigations the goldfish, rudd and Caspian shemaya appeared to be comparatively abundant species. Moreover, they can be supposed to be actual permanent inhabitants of Uzungeren. Both one-year and two/three-year old individuals have been caught in fishing nets. Probably, their tolerance to water salting allows them to stay in the basin for a longer time, although they would hardly breed here. The same, however, applies to the pike-perch which is reported in literature as a permanently inhabiting species. We found comparatively great numbers of one-year pike-perch, and none of nought-year individuals. The relative share of older age groups belonging to this species in the fish population list is a small one, but this is not unusual, considering the peculiarities of its biology as well as the active fishing load to which it is subject. The relative low numbers of adult sexually mature carps are probably due to the same reason (both breeding fish artificially in the dam lake and intensive industrial fishing are a fact). The new Uzungeren inhabitant, the mosquito fish, is characterized by its great numbers; it, as is well-known, is a live-born fish with a high degree of adaptability.

Fish populations of the other species reported as permanent inhabitants of Uzungeren, protected species included, are comparatively steady and do not show essential changes as compared to older data. It should not be forgotten, however, that - according to literary information - they had never reached very great numbers.

The observations made showed that among temporary inhabitants mullets (the *Mugillidae* family) preserve their leading role in a quantitative sense during the spring-summer period on entering Uzungeren. They remain the basic object for industrial fishing (if any). However, during investigations no goldfish (*Atherina mochon pontica*) was caught, although it had been reported by Gueorguiev (1967) to reach, alongside with mullets, great numbers. A new fish species, the anchovy, was added to the list of temporary inhabitants. The number of temporary inhabitants, as related to sea species, can be altered considerably in principle, depending on lots of factors influencing both their quantity and migratory behaviour. Moreover, the effect of those factors can be too distant both in space and time. Probably, the low number (or lack) of silverside in Uzungeren is based on the decrease of its quantity in the Bourgas bay, related most of all to pollution. Owing to nothing else but increasing pollution, the numbers of the once abundant fish species have strongly declined in Bulgarian water as a whole, and it has been recorded in the Red Book of Bulgaria as 'threatened by extinction species' (Karapetkova, Zhivkov, 1995).

According to the information collected, fish species, permanent inhabitants of the Phoros bay, are comparatively small in number. A reason for that can be sought above all in water pollution in the Bourgas bay as well as in storing considerable quantities on mud in the area in front of wetland Poda; and partly, in continuous fishing by drag-nets. Relatively

abundant permanent inhabitants here are mainly various species of gobies (the round goby- *Neogobius melanostomus*, toad goby- *Mesogobius batrachocephalus*, etc.). Migrant fish shoals pass periodically : mullets (*Mugilidae*) - during almost the whole year; Mediterranean scad (*Trachurus mediterraneus ponticus*) - at the end of spring and in autumn; European sprat (*Sprattus sprattus sulinus*) and the shad (*Alosa pontica pontica*) - the second half of March and in autumn; silverside (*Atherina mochon pontica*) - in April; small-size bluefish (*Pomatomus saltatrix*) and anchovy (*Engraulis encrasicholus ponticus*) in summer; bonito (*Sarda sarda*) - in autumn, etc.

The number of passing fish changes a lot within years. Two clearer trends can be outlined at the background of these changes:
a) preserving the relatively high share of mullets, which are the basic goal of industrial fishing;
b) great lowering in number and relative share of silverside.

Spatial Distribution of Fish.
The results of investigations carried out showed that most sea fish species, temporary inhabitants of Uzungeren, stick to the wide area facing the sea. Mullets are an exception, entering in great numbers the branch coming from the Mandra dam lake. Their movement there is limited due to the newly-built dike, which -to a large extent- isolates the 'tail' part of Uzungeren from its main aquatory. On entering a great quantity of water from the dam lake, it is possible that mullets are able to reach the dam. A high concentration of fresh-water fish species is observed in the area above the dike, in summer : the Caspian shemaya, one-year old pike-perch, etc. Generally, during dry seasons the primarily fresh-water fish species are concentrated mainly in the branch which links the Mandra dam lake to the large part of the basin. Possibly, at the time of high water, when larger quantity of fresh water comes in from the dam lake, their distribution increases temporarily in the direction to the sea. Among this group the mosquito fish only is distributed in all parts of Uzungeren. The permanent inhabitants of marine origin, too, are distributed comparatively regularly along the basin aquatory, as they are species too tolerant to water salinity.

Most of the species, permanent inhabitants of Uzungeren (the carp, stickleback, goby, pipefish, mosquito fish) as well as young mullets were established to be concentrated in the coastal zone, near macrophyte plantations or, even, among them. Mainly adult fish from the Mugillidae family and the pike-perch stick to the basin open areas.

The fish distribution in the Phoros bay has not been studied for technical reasons. It is well-known from literary sources that the distribution of gobies depends most of all on the ground nature and bottom lay. As for fish species, temporarily penetrating the bay, they are active swimmers and their spatial distribution is obviously very dynamic.

Food Assessment with Abundant Fish Species. The results showed that food composition with abundant fish species inhabiting Uzungeren, does not differ significantly from literary information on their nutritional spectrum. The considerable share of planktonic crab-like species (mainly cyclopoids *Megacyclops gigas*) in the food of fish species which, in other water basins are known to be zoobenthos consumers (mosquito fish, sticklebacks, young carps), impresses a lot. This, however, is not a sign of worse trophic conditions, for the species under consideration have a large nutritional spectrum and size whose energy demand can be satisfied by zooplankton as well. It can be supposed that the zooplanktonophagy observed is a certificate of zooplankton large numbers.

The carp belonging to older age groups (one to two y.o.), being respectively of larger size, feed mainly on bottom invertebrates, insect larvae predominantly (Diptera), etc. The zooplanktonic share remains comparatively great in the Caspian shemaya food only, while plant components (phytoplankton, macrophytes) play an essential role in the rudd diet. The goby also feeds on bottom invertebrates. The pike-perch at an age of one year and more, is an ichthyofagous species. The nutritional spectrum of fish studied included only the carp family - Caspian shemaya, goldfish and rudd (up to one y.o.). With the exception of larvae, mullets are detritophagous species.

The results obtained from the observations carried out allow to infer that trophic resources satisfy the demand of abundant fish species inhabiting wetland Poda.

Nutritional Spectrum of Certain Fish-Eating Species.
Bird scraps collected from twelve nests in 1995 and 1996 have been studied. Fish bones and scales were found in eleven scraps. The analysis proved that everywhere the bone material came from carps (a detailed list is enclosed). In ten scraps the material was identified by types. It turned out that the bones belonged to carp and goldfish only. Both species were equally found in scraps, but the goldfish prevailed in number. The victims were one- and two-year old fish species. The

length of one-year old fish species was 10 to 12 cm, while the length of two-year old fish species was 15 to 20 cm. An almost complete black-striped pipefish (*Syngnathus nigrolineatus*) with a length of about 5 cm was found in one of the scraps. Apart from fish remains, insect fragments (water beetles, grasshoppers) and higher crab-like species were also found in scraps.

The results obtained allow the assumption that birds had fed in Uzungerenand the Mandra dam lake. Areas can be defined in more details by means of observations on bird behaviour and other methods.

Recommendations on Uzungeren Management.
Detailed guidelines on Uzungeren management from an ichthyological point of view are presented in 1995 report. Yet another guideline can be added: to find an excuse to protect the branch connecting the basin larger part to the Mandra dam lake, as a lot of fish-eating species probably feed there and, at the same time, the area is frequented by poachers, various economical activities take place there, etc. In addition, I do reckon it advisable, to restore the guard in front of protected natural area Poda in the years to come, for it would contribute to increasing the Uzungeren aquatory.

A Concept on Fish Presentation and use in Environmental education within the Plan has also been presented in 1995 Report.

*Remark: The Appendixes to the report (figure, table and references) are included as Appendixes to the management plan.

BULGARIAN-SWISS CONSERVATION PROGRAMME
(SCIENTIFIC REPORTS)

STRATEGIC PLAN FOR SETTING UP OF PUBLIC RELATIONS WITHIN THE BSPB PROJECT "PROTECTION AND CONSERVATION EDUCATION IN THE PODA PROTECTED AREA

by Svetla Marinova

Ideal aims:
1. To form in the locals consern in the protection of the natural gifts of the Protected territory;
2. To increase the conservation culture of the local and national community;
3. To form conservation knowledge, skills and consience in the young people;
4. Join the local peole to the neccessity of the creation of information center - place for ecological and conservationn education;
5. Prove the usefulness of the Protected area for the local economy and tourism;
6. To learn from the locals how to menage the protected territory;
7. To reach unanimity with all governmental and non-governmental conservation organisations;
8. The formation of ecological and conservation behaviour to become base for the creation of conservation conscience within the future generations;

Tasks/Mission:
1. Identifying of the target groups for influencing during the setting up of the public relations with the locals;
2. Education of students from the local teahcer traininng college in order to join them in the ecological programme of the Municipality;
3. Creation of conservation awareness in the schools of Burgas;
4. Organising of expeditions, practical observations and laboratory processing of the materials collected with the Scaut club-Burgas;
5. Promoting projects for onitological and enthomological monitoring of the area involving in this pupils from the eco-club in the Nature and mathematics school and the German language school;
6. Organised study of the basic plant and animal communities within the protected territory and arround;
7. Organising groups of voluntaries for practical work in the protection of the area;
8. Study the traditional livinghood of the locals , which has something to do with the protected araea;
9. Provide regular scientific information aiming to convince the locals in the neccessity of creation of information center;
10. Join in the programme of the Municipality for conservation education of pre- and school age;
11. Active participation in organised mass events by common NGOs and especially by the BSPB Bulgas branch;
12. Support of the conservation initiatives of the governnnmental institutions;

Strategies:
Target groups for influencing at the setting up of the public relations
1. Teacher-students (teacher training college)
2. Pupils from the Burgas schools ("Eco-menager" club at the Nature and mathematics school, German languge school, Middle school "Sts Kiril & Metodii" - classes for art and geography , primary schools etc.)
3. Children from preschool age;

4. Common NGOs and GOs:
4.1. LSPB-Burgas branch;
4.2. Division "Ecology" in the municipality;
4.3. Local branch of Hunters and anglers union;
4.4. Bulgarian movement Blue flag;
4.5. Bulgarian tourist union Stranga;
4.6. "Eco-menager" foundation;
4.7. Scout club;
4.8. Municipal division for culture and education;
4.9. Green Balcans -Burgas;
4.10. Center for technical and science creativity;
4.11. Regional inspectorate of the MoE;
4.12. Natural history museum;
4.13. Regional inspectorate of the Forestry committee;
5. Masmedia;
6. Tourist agencies;
7. Banks;
8. Bisnessmen;

Raising the conservation awareness of the people and forming conservation knowledge, skills and conscience in the young people.

1. Joining in the programme for conservation education of the Municipality
1.1. through circles of lectures, talks and practical activities on the field to attract teacher-students for participation in the work with the preschool age children;
1.2. support teachers included in thwe municipal programme for conservation education;
2. Forming of conservation ggroups in the Burgas schools
2.1. elaboration of common programme with the team of scientists responsible for the preparation of the menagement plan of Poda;
2.2. one year project for studying of the ornithological and entomological fauna of Poda;
2.3. regular meeting with students - lectures, talks, slide and videofilm shows on conservation subjects, roler games;
2.4. meetings with the children of the people working in the Neftochim oil processing plaant - with the same activities as above;
2.5. participation in subject practical lessons from the art classes (open-air lessons in Poda) and attracting them for the adverticement activities of the project;
2.6. founding of expeditions in Poda lagoon and the near by protected territories;
2.7. founding of group of voluntaries for participation in the conservation working holidays (summer and autumn) on the territory of the protected area;
2.7.1. building up artificial isles, dikes and other facilities for nesting of terns and waders;
2.7.2. regular organised cleaning from urban garbage of the Poda lagoon;
2.7.3. renewing of the marking of the protected territory;
2.7.4. survey on the Spoonbill and Glossy Ibices colonies;
2.7.5. bilding up of artificial nest in the Poda protected area;
2.8. Participation in the autumn migration counts and the mid-winter counts;

3. Media relations
3.1. Starting permanent column " The Nature - our second face" in the "Black sea lighthouse" newspaper;
3.2. Publishing materials on conservation problems in the "Neftochim" newspaper;
3.3.Broadcasts on radio "Glarus"(herring gull);
3.4. public awareness inquiriess concerning the conservation activities carried out in the Poda, through local newspapers;

Relations with common NGOs

1. Participation in organised conservation activities
1.1. tourist excursions;
1.2. local protest meetings;
1.3. exhibitions;
1.4. Cellebration of national and international events;

2. Relations with tourist qgencies;
2.1. Htels;
2.2. Study the interest in eco tourism;
2.3. Leaflets, posters etc.;
2.4. Offering guides for tourist groups to the near by protected territories;

Activities connected with the sponsoring and selfsustaining

1. Putting money-boxes on proper public sites (airports, hotels, tourist complexes, exhibitions, business clubs etc.);
2. Request to the the "Neftochim" oil processing plant to support financially the summer conservation holiady;

Table 1. Check list of the algae species and their distribution in PODA protected area in the sample points (A - H).

**For additional information see fig.3.*

N	Point / Taxon	A	B	C	D	E	F	G	H
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*
	C Y A N O P H Y T A								
1.	*Anabaena sp. st.*		+	+			+	+	
2.	*Anabaenopsis arnoldii*		+			+			
3.	*Anabaenopsis elenkinii*		+		+				
4.	*Aphanocapsa delicatissima*			+					
5.	*Aphanocapsa sp.*		+		+		+	+	
6.	*Chroococcus aphanocapsoides*								+
7.	*Chroococcus turgidus*						+		
8.	*Chroococcus sp.*							+	
9.	*Clathrochloris hypolimnica*					+		+	
10.	*cf. Cyanarcus sp.*						+		
11.	*Cylindrospermum sp. juv.*		+				+		
12.	*Lyngbya circumcreta*								+
13.	*cf. L.limnetica*				+	+			+
14.	*Lyngbya sp.*					+			
15.	*Merismopedia glauca*				+				
16.	*Merismopedia tenuissima*							+	+
17.	*Microcystis aeruginosa*					+			
18.	*Microcystis.incerta*					+		+	
19.	*Microcystis.viridis.*					+			
20.	*Microcystis wesenbergii*					+			
21.	*Microcystis sp. juv.*			+					
22.	*cf. Microcrocis sp.*					+			
23.	*Oscillatoria acutissima*			+					
24.	*Oscillatoria amphibia*					+			
25.	*Oscillatoria chlorina*			+					
26.	*Oscillatoria laetevirens*			+					
27.	*Oscillatoria planctonica*			+					
28.	*Oscillatoria sp. (fragments)*		+	+			+	+	+
29.	*Phormidium ambiquum*						+		
30.	*Phormidium fragile*								+
31.	*Phormidium sp.*			+					+
32.	*Planktolyngbya sp.*								+
33.	*Planktothrix mougeotii*					+	+	+	
34.	*cf. Plectonema sp*		+	+		+			
35.	*Plectonema sp*					+	+	+	
36.	*Pelonema subtilissimum*		+						+
37.	*Romeria gracilis*								+
38.	*Romeria leopoliensis*						+		+
39.	*Snowella sp.*			+					
40.	*Spirulina abbreviata*								+
41.	*Spirulina corakiana*		+		+				
42.	*Spirulina major*							+	
43.	*Synechocystis sp*	+	+	+		+			
44.	*Tychonema granulatum*			+					
45.	*Woronichinia fusca*		+				+		

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
EUGLENOPHYTA									
46.	*Euglena sp. div.*		+		+	+	+		+
47.	*Eutreptia sp.*				+			+	
48.	*Phacus pyrum*								+
DINOPHYTA									
49.	*Gymnodinium uberrimum*				+				
50.	*Gymnodinium sp.*		+		+		+		+
51.	*Ellobiopsis chattonii*				+				
52.	*Peridinium cf. umbonatum*				+				
53.	*Peridinium sp. div.*		+	+	+	+	+	+	
CHRYSOPHYTA									
	Chrysophytina								
54.	*Dinobryon petiolatum*						+		
55.	*Ochromonas sp.*					+			
	Xanthophytina								
56.	*Tetraplektron tribulus*					+			
57.	*Tribonema sp. (fragments)*					+		+	
	Bacillariophytina								
58.	*Achnanthes cf. lanceolata*								+
59.	*Amphora ovalis*				+	+	+		
60.	*Amphora sp.*			+					
61.	*Aulacoseira sp. div.*		+	+		+	+	+	+
62.	*Chaetoceros sp.*			+	+			+	
63.	*Cocconeis sp*				+	+		+	
64.	*Cyclotella sp.*					+		+	
65.	*Cymbella cf. tumidula*					+			
66.	*Cymbella sp. div.*		+	+	+			+	
67.	*Eunotia sp.*			+					
68.	*Fragillaria sp.*			+			+		
69.	*Gomphonema cf. parvulum*					+			
70.	*Gomphonema sp.div.*					+	+	+	+
71.	*Navicula cf.accomoda*		+						
72.	*Navicula tuscula*								+
73.	*Navicula sp. div.*		+	+	+	+	+	+	+
74.	*Nitzschia acicularis*		+	+	+		+	+	
75.	*Nitzschia apiculata*								+
76.	*Nitzschia cf. commutata*							+	
77.	*Nitzschia sp. div.*			+		+	+		
78.	*Opephora cf. mantii*							+	
79.	*Pinnularia sp. div.*			+		+	+	+	+
80.	*Pleurosigna sp.*						+		
81.	*Rhoicosphenia curvata*			+	+	+			
82.	*Stephanodiscus sp.*					+			
83.	*Surrirella ovata*								+
84.	*Surrirella cf. splendida*								+
85.	*Surrirella sp.*				+	+		+	
86.	*Synedra sp. div.*			+	+	+	+	+	+
87.	*cf. Thalassiosira sp.*			+					
88.	Pennatae sp. div.			+			+		
CRYPTOPHYTA									
89.	*Cryptomonas obovata*			+		+	+	+	+
90.	*Cryptomonas ovata*								+

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
91.	*Cryptomonas phaseolus*					+			
92.	*Cryptomonas cf. phaseolus*				+				
93.	*Cryptomonas rostratiformis*								+
94.	*Cryptomonas sp. div.*		+		+			+	+
95.	*Rhodomonas minima*				+				
96.	*Rhodomonas minutus*			+			+		
97.	*Rhodomonas minutus var. planctonica*			+					
98.	*Rhodomonas sp. div.*			+	+		+	+	+
99.	Unidentified cryptophytae alga		+						
RHAPHIDOPHYTA									
100.	*Chattonella sp.*				+	+			
101.	*Gonyostomum latum*							+	
CHLOROPHYTA									
	Euchlorophytina								
102.	*Ankistrodesmus falcatus*						+	+	+
103.	*Botryococcus braunii*								+
104.	*Carteria sp.*		+			+			
105.	*Chlamydomonas sp div.*		+	+		+	+	+	+
106.	*Chlorella neustonica*						+	+	
107.	*Chlorella sp.*			+			+		
108.	*cf.Chlorella sp.*			+					
109.	*Chlorogonium minimum*					+			
110.	*Chlorogonium sp.*					+			
111.	*Closteriopsis acicularis*							+	
112.	*Crucigenia qudrata*		+						
113.	*Dictyosphaerium pulchellum*					+		+	
114.	*Dunaliella sp.*		+						
115.	*Elakatothrix sp.*					+			
116.	*Golenkinia radiata*					+		+	
117.	*Hyaloraphidium contortum*								+
118.	*Keratococcus suecicus*					+			
119.	*Kirchneriella intermedia*		+	+					
120.	*Kirchneriella lunaris*						+	+	
121.	*Kirchneriella majori*								+
122.	*Kirchneriella obesa*			+					
123.	*Micractinium pusillum*					+			
124.	*Monoraphidium arcuatum*			+					+
125.	*Monoraphidium contortum*			+		+	+	+	+
126.	*Monoraphidium flexuosum*						+		
127.	*Monoraphidium griffithii*						+		+
128.	*Monoraphidium irregulare*			+		+			+
129.	*Monoraphidium komarkovae*			+					
130.	*Monoraphidium pseudobraunii*							+	+
131.	*Nephrochlamys rotunda*								+
132.	*Oocystella borgei*							+	
133.	*Oocystella solitaria*			+		+			
134.	*Pandorina morum*					+			
135.	*Pediastrum duplex*					+			
136.	*Pediastrum tetras*							+	
137.	*Pseudokirchneriella danubiana*			+		+	+		+

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
138.	*Pseudokirchneriella rotundra*								+
139.	*Pseudokirchneriella subcapitata*			+					
140.	*cf. Pyramimonas micron*				+				
141.	*Pyramimonas sp.*		+	+	+	+			
142.	*Raciborskiella salina*				+				
143.	*Scenedesmus acuminatus*							+	
144.	*Scenedesmus armatus*					+			
145.	*Scenedesmus communis*					+		+	
146.	*Scenedesmus intermedius*								+
147.	*Scenedesmus maximus*					+			
148.	*Scenedesmus naegeli*					+			
149.	*Scenedesmus opoliensis var. mononensis*					+			
150.	*Scenedesmus pleiomorphus*				+	+	+		
151.	*Scenedesmus spinosus*					+			
152.	*Schroederia setigera*							+	
153.	*Schroederia spiralis*			+		+			
154.	*Tetraedron minimum*					+			
155.	*Tetraselmis cordiformis*		+						
156.	*Tetrastrum glabrum*								+
157.	*Thorackomonas korschikofii*						+		
158.	Prasinophyceae sp. div.				+			+	+
159.	Tetrasporales sp. div.					+			
160.	Unidentified 2-flagellate alga		+	+					
161.	Unidentified 4-flagellate alga		+				+		

Table 2. Structure of the phytoplancton in PODA protected area *(Cya - Cyanophyta, Eugl - Euglenophyta, Pyr - Pyrrhophyta; Rap - Raphidophyta, Bac - Bacillariophytina, Cry - Cryptophyta, Euchl - Euchlorophytina; Chry - Chrysophytina; T-taxons; S-species; N-number; B-biomass).*

		STRUCTURE																				Dominant species	Trophic and saprobic conditions
		QUALITATIVE										QUANTITATIVE											
Point	Date	Total number		Maximum number species								Total		Dominated by:									
														N	B	N	B	N	B	N	B	N	B	N	B	N	B		
		T	S	Cya	Eugl	Rap	Pyr	Bac	Cry	Euchl	Chry	N	B	Cya	Eugl	Pyr	Rap	Bac	Cry	Euchl	Chry		
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*	*13.*	*14.*	*15.*	*16.*	*17.*	*18.*	*19.*	*20.*	*21.*	*22.*	*23.*	*24.*
A	24.06. 1995	1	1	1									0.004									*Synechocistis sp.*	Less edible species for the zooplancton
B	24.06. 1995	29	5	3								$1x10^7$	4.47	+					+			*Synechocistis sp.-by* N *Cryptomonas sp.*-by B	Edible species Most important trophic base for the zooplancton
	21.08. 1995		10							3		$7.34x10^8$	36.08	+		+						*Plectonema sp.*- by N *Peridinium sp.*- *by* B	
	04.05. 1996		9					5				$1.5x10^7$	0.31	+				+				*Aphanocapsa sp.*-by N *Navicula sp.*-by B	
	06.07. 1996		14	8								$2.51x10^9$	61.03	+		+				+		*Plectonema sp.*- by N *Peridinium sp*-by B	
	10.09. 1996		13							8		$3.6x10^7$	1.75	+						+		*Plectonema sp.*- by N *Navicula sp.*-by B	
C	24.06. 1995	47	2									$5x10^6$	0.38							+ +		*Chlorella sp.*-by N и B	Low phytoplancton abundance More edible species in august Eu- to oligotrophic character
	21.08. 1995		7	3								$4õ10^7$	3.66	+ +								*Oscilatoria sp.*- *by* N и B	
	04.05. 1996		17							9		$1x10^7$	35.58	+		+						*Peridinium sp*-by N и B	
	06.07. 1996		24					11				$4.7x10^7$	5.54					+		+		*Chlorella sp.*-by N *Rhoicosphenia sp.*- by B	
	10.09. 1996		13	5								$4.6x10^7$	0.16	+				+				*Woronichinia sp.*- by N *Nitzschia sp.*- by B	

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
D	24.06. 1995	31	7				2					$2x10^7$	154.79				+ +					*Chattonella sp.*- by N и B	Phytoplancton with high nutritional quality
	21.08. 1995		4				2					$6.84x10^8$	84.43							+ +		*Pyramimonas micron*-by N и B	
	04.05. 1996		7					+				$1.77x\ 10^8$	151.91			+ +						*Aphanocapsa sp.*- by N *Peridinium sp.*- by B	
	06.07. 1996		9					+				$1.68x\ 10^8$	370.48			+				+		*Pyramimonas micron* - by N *Peridinium sp.*- by B	Eu- to hypereutro-phic character
	10.09. 1996		20	4			4	4				$1.89x10^9$	21.14	+ +								*Chattonella sp.*- by N и B	
E	24.06. 1995	62	3	+								$1.8x10^7$	63.4									*Microcystis cf. viridis* - by N и B	Edible species; bloom of inedible.
	21.08. 1995		7					+				$2.6x\ 10^8$	104.0									*Microcystis cf. viridis* - by N и B	
	04.05. 1996		10					8				$2x10^5$	0.43								+ +	*Ochromonas sp.* и *Navicula sp.* - by N *Ochromonas sp.* - by B	Eu- to hypereutro-phic in July-September.
	06.07. 1996		24					11				$6.9x10^7$	79.49							+		*Aulacoseira sp.* - by N и B	Beta-mesosaprobic.
	10.09. 1996		45							22		$9.81x10^8$	24.35	+ +						+		*Microcystis aeruginosa* - by N и B	Possible organic pollution.
F	24.06. 1995	42	1				1						17.6									*Peridinium sp* - by N и B	Low phytoplancton abundance.
	21.08. 1995		4				2						79.3									*Rhodomonas sp.*- by N и B	
	04.05. 1996		1	1				1				$6x10^7$	0.04	+ +								*Aphanocapsa sp.*- by N и B	Good trophic base for the zooplancton.
	06.07. 1996		33	10				11		9		$1.2x10^7$	2.26	+ +				+				*Chroococcus turgidus* - by N *Navicula sp.* - by B	
	10.09. 1996		6	1				1				$5x10^6$	2.67					+		+ +		*Thoracomonas korschikoffii*- by N и B	Oligo-beta-nesosaprobic.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
G	04.05. 1996	45	26					11				$3x10^6$	0.59	+ +				+ +				*Navicula sp.* - by N *Ankistrodesmus falcatus* - by B	Low phytoplancton abundance.
	06.07. 1996		19					7				$27x 10^6$	4.1					+ +				*Nitzschia sp.* - by N и B	Good trophic base.
	10.09. 1996		16	5								$33x10^6$	0.4	+ +				+ +				*Aphanocapsa sp.*- by N *Nitzschia sp.* - by B	Strong organic pollution.
H	04.05. 1996	51	51							16		$1.75x 10^8$	11.65	+	+							*Aphanocapsa sp.*- by N *Euglena sp.* - by B	Edible species with high nutritional value. Eutrophic; beta- to alfa-mesosaprobic.

Table 3. Flora composition in PODA protected area.

N	Family	Species	Biological type	Geoelement
1.	*2.*	*3.*	*4.*	*5.*
1.	*Pinaceae*	Pinus nigra Arn.	♄	SMed
2.	*Salicaceae*	Salix alba L.	♄	EAs
3.		Salix babylonica L.	♄	As
4.		Populus simonii Car.	♄	As
5.	*Betulaceae*	Betula alba L.	♄	EAs
6.	*Moraceae*	Morus alba L.	♄	As
7.	*Polygonaceae*	Polygonum aviculare L.	⊙	Kos
8.		Polygonum mesembricum Chrtek	⊙–⚇	Pont E
9.		Rumex crispus L.	♃	Bor
10.		Rumex palustris Sm.	⊙–⚇	EAs
11.	*Portulacaceae*	Portulaca oleraceae L.	⊙	As
12.	*Chenopodiaceae*	Bassia hirsuta (L.) Aschers.**	⊙	EAs
13.		Salicornia europaea L.	⊙	Kos
14.		Salsola ruthenica Iljin	⊙	EAs
15.		Chenopodium glaucum L.	⊙	EAs
16.		Chenopodium botryoides Sm in Sowerby ***	⊙	EAs
17.		Atriplex hastata L.	⊙	Bor
18.		Atriplex oblongifolia Waldst. et Kit.	⊙	EAs
19.		Atriplex nitens Schkuhr.	⚇	EAs
20.		Suaeda maritima (L.) Dum.	⊙	Kos
21.		Corispermum nitidum Kit.*	⊙	Eur
22.	*Amaranthaceae*	Amaranthus albus L.	⊙	Am
23.	*Caryophyllaceae*	Gypsophyla trichotoma Wend.*	♃	AsMed
24.		Petrorhagia prolifera (L.) Ball et Heywood	⊙	EMed
25.		Silene conica L.	⊙	EAs
26.		Silene noctiflora L.	⊙–♃	ESib
27.		Silene otites (L.) Wib.	♃	EMed
28.		Silene euxina Rupr.*	⊙–⚇(♃)	Pont
29.		Diantus armeria L.	⊙–⚇	Eur
30.		Moenchia mantica (L.) Bartl.	⊙	EMed
31.		Cerastium semidecandrum L. var. semidecandrum	⊙	EMed
32.	*Ranunculaceae*	Clematis vitalba L.	♄	EMed
33.		Delphinium consolida L.	⊙	EMed
34.		Myosurus minimus L.	⊙	Bor

1.	2.	3.	4.	5.
35.		Anemone pavonia Lam.	♃	Med
36.		Ranunculus sphaerospermus Boiss. et Blanche in Boiss.****	♃	AsMed
37.		Ranunculus sardous Crantz.f.parviflorus (L.) Willk. et Lange	☉–☉	EMed
38.	*Hypericaceae*	Hypericum perforatum L.	♃	Kos
39.	*Papaveraceae*	Papaver dubium L.	☉	EMed
40.		Fumaria rostellata Knaf.	☉	EMed
41.	*Brassicaceae*	Cakile maritima Scop.	☉	EMed
42.		Cardaria draba (L.) Desv.	♃	EMed
43.		Berteroa incana (L.) DC.	☉–♃	ESib
44.		Lepidium latifolium L.	♃	EAs
45.		Lepidium ruderale L.	☉	Bor
46.		Barbarea vulgaris R.Br.in Ait.	☉–♃	EAs
47.		Sinapis arvensis L.	☉	EAs
48.		Descurainia sophia (L.) Webb ex Prantl. in Engl. et Prantl.	☉–☉	Bor
49.		Sisymbrium orientale L.	☉–☉	AsMed
50.		Calepina irregularis (Asso) Thell. in Schinz. et Kell.	☉–☉	Med
51.		Tlaspi perfoliatum L.	☉	EMed
52.	*Platanaceae*	Platanus orientalis L.	♄	Med
53.	*Rosaceae*	Agrimonia eupatoria L.	♃	EMed
54.		Crataegus monogyna Jacq.	♄–♄	EAs
55.		Rubus sanguineus Friv.	♄	Med
56.		Prunus spinosa L.	♄	EMed
57.		Prunus divaricata Led.	♄	EAs
58.		Malus domestica Bornh.	♄	EAs
59.		Mespilus germanica L.	♄–♄	AsMed
60.		Prunus armeniaca L.	♄	As
61.		Potentilla reptans L.	♃	Kos
62.	*Fabaceae*	Glycyrrhiza echinata L.	♃	EAs
63.		Ononis arvensis L.	♃	EAs
64.		Galega officinalis L.	♃	EMed
65.		Trifolium echinatum M.B.	☉	Med
66		Trifolium diffusum Ehrh.	☉–☉	EMed
67.		Trifolium fragiferum L.	♃	Eur
68.		Trifolium arvense L.	☉	EAs
69.		Trifolium angustifolium L.	☉	Med
70.		Trifolium resupinatum L.	☉	Med
71.		Trigonella coerulea (L.) Ser.	☉	EMed
72.		Trigonella monspeliaca L.	☉	EMed
73.		Melilotus albus Medic.	☉	EAs

1.	2.	3.	4.	5.
74.		Melilotus officinalis Medic.	☉	EAs
75.		Lotus corniculatus L.	♃	EAs
76.		Medicago lupulina L.	☉–☉	EAs
77.		Medicago minima (L.) Bartl.	☉	EAs
78.		Medicago disciformis DC.	☉	Med
79.		Medicago.sativa L.	♃	As
80.		Medicago marina L.	♃	PoMed
81.		Robinia pseudoacacia L.	♄	Adv
82.		Spartium junceum L.	♄	Med
83.		Lathyrus tuberosus L.	♃	EAs
84.		Vicia villosa Roth.	☉	EAs
85.		Vicia grandiflora Scop.	☉–☉	EMed
86.	*Geraniaceae*	Geranium dissectum L.	☉	EAs
87.		Geranium molle L.	☉–☉	EAs
88.		Geranium tuberosum L.	♃	Med
89.		Erodium cicutarium (L.) L.Herit	☉	EAs
90.		Erodium ciconium (L.) L.Herit in Ait.	☉–☉	Med
91.	*Malvaceae*	Althaea cannabina L.	♃	EAs
92.		Althaea officinalis L.	♃	EAs
93.		Malva sylvestris L.	☉	Kos
94.	*Moraceae*	Morus alba L.	♄	As
95.	*Lythraceae*	Lythrum salicaria L.	♃	Kos
96.	*Eleagnaceae*	Eleagnus angustifolia L.	♄	EAs
97.	*Tamaricaceae*	Tamarix tetrandra Pall.ex Bieb.	♄-♄	PoMed
98.	*Simarubiaceae*	Ailanthus glandulosa Desf.	♄	As
99.	*Onagraceae*	Oenothera biennis L.	☉	Adv
100.	*Apiaceae*	Torilis arvensis (Huds.) Link.	☉	EAs
101.		Tordylium maximum L.	☉–☉	EMed
102.		Foeniculum vulgare Mill.	♃ – ☉	Med
103.		Daucus carota L.	☉	Eur
104.		Eryngium campestre L.	♃	Eur
105.		Eryngium maritimumL.*	♃	Eur
106.		Conium maculatum L.	☉–☉	EAs
107.		Apium graveolens L.	☉–☉	EAs
108.	*Zygophyllaceae*	Tribulus terrestris L.	☉	EAs
109.	*Linaceae*	Radiola linoides Roth.	☉	EAsMed
110.	*Euphorbiaceae*	Euphorbia helioscopia L.	☉	EAs
111.		Euphorbia peplis L.	☉	PoMed
112.	*Plumbaginaceae*	Limonium gmelinii (Willd.) O.Kuntze	♃	EAs
113.	*Oleaceae*	Fraxinus excelsior L.	♄	Eur

1.	2.	3.	4.	5.
114.		Ligustrum vulgare L.	♄	EMed
115.	*Convolvulaceae*	Calystegia sepium (L.) R.Br.	♃	Kos
116.		Convolvulus arvensis L.	♃	Kos
117.	*Cuscutaceae*	Cuscuta campestris Yunck.	☉	Adv
118.	*Asclepiadaceae*	Cynanchum acutum L.	♃	EAs
119.	*Gentianaceae*	Centaurium spicatum (L.) Fritsch.	☉	Med
120.		Blackstonia perfoliata (L.) Huds.	☉	EMed
121.	*Boraginaceae*	Anchusa velenovskyi (Gusul.) Stoj.	♃	Pont
122.		Anchusa officinalis L.	♃ – ☉	EMed
123.		Echium italicum L.	☉	EMed
124.		Myosotis ramosissima Rochel in Schultes	☉	EAsAfr
125.	*Verbenaceae*	Verbena officinalis L.	♃	Kos
126.	*Lamiaceae*	Salvia virgata Jacq.	♃	EAs
127.		Balota nigra L.	♃	Eur
128.		Lycopus europaeus L.	♃	EAs
129.		Marrubium peregrinum L.	♃	EMed
130.		Mentha spicata L.	♃	EAs
131.		Lamium purpureum L.	☉	EMed
132.	*Solanaceae*	Lycium barbatum L.	♄	Bor
133.		Solanum nigrum L.	☉	Bor
134.		Datura stramonium L.	☉	Bor
135.	*Scrophulariaceae*	Verbascum blattaria L.	☉ – ☉	Bor
136.		Linaria euxina Vel.	☉	Pont
137.		Parentucelia latifolia (L.) Caruel in Parl.	☉	Med
138.		Antirrhinum majus L.	♃	Med
139.		Veronica polita Fries	☉	EAsAfr
140.	*Orobanchaceae*	Orobanche amethystea Thuill.	♃	EAs
141.	*Plantaginaceae*	Plantago altissima L.	♃	As
142.		Plantago media L.	♃	EAs
143.		Plantago coronopus L.	☉	EMed
144.		Plantago scabra Moench.	☉	EAs
145.	*Rubiaceae*	Galium aparine L.	☉	EAs
146.		Galium verum L.	♃	EAs
147.	*Caprifoliaceae*	Sambucus ebulus L.	♃	EMed
148.	*Dipsacaceae*	Cephalaria transsylvanica (L.) Roem.et Schult.	☉	Eur
149.	*Cucurbitaceae*	Cucurbita pepo L.	☉	Adv
150.		Ecbalium elaterium (L.) A.Rich.	☉	Med
151.	*Asteraceae*	Carduus acanthoides L.	☉	Eur
152.		Carduus nutans L.	☉	EMed
153.		Carthamus lanatus L.	☉	EMed
154		Aster tripolium L.	☉	ESib

1.	2.	3.	4.	5.
155.		Pulicaria prostrata (Gilib.) Aschers.	2ф	EAs
156.		Erigeron canadensis L.	☉–☉	EAm
157.		Artemisia absinthium L.	2ф	Bor
158.		Artemisia santonicum L.ssp.patens(Neilr.)K.Pers.	2ф	Pont
159.		Artemisia vulgaris L.	2ф	Bor
160.		Artemisia annua L.	☉	EAs
161.		Artemisia campestris L.	2ф	EAm
162.		Artemisia scoparia W.et K.	☉	Eur
163.		Lactuca tatarica (L.) C.A.Mey*	2ф	EAs
164.		Centaurea diffusa Lam.	☉	EMed
165.		Centaurea euxina Vel.	☉	Pont
166.		Centaurea solstitialis L.	☉	EMed
167.		Cichorium intybus L.	2ф	EAs
168.		Picris echioides L.	☉	EMed
169.		Chondrilla juncea L.	☉	EAs
170.		Matricaria inodora L.	☉	EMed
171.		Matricaria chamomilla L.	☉	EAs
172.		Silybum marianum (L.) Gдrtn.	☉	Med
173.		Arctium lappa L.	☉	EAs
174.		Sonchus asper (L.) Hill.	☉	Eur
175.		Achillea millefolium L.	2ф	EAs
176.		Cirsium arvense (L.) Scop.	2ф	EAs
177.		Helianthus annuus L.	☉	Adv
178.		Crepis sancta (L.) Babck.	☉	PoSMed
179.		Senecio vernalis W.K.	☉	SMed
180.		Tragopogon dubius Scop.	☉	Bor
181.		Onopordon acanthium L.	☉	EAs
182.		Xeranthemum cylindraceum S.S.	☉	Med
183.		Xanthium strumarium L.	☉	Eur
184.	*Potamogetonaceae*	Ruppia maritima L. ssp. spiralis (Dumort.) Aschers.	2ф	Kos
185.	*Lemnaceae*	Lemna gibba L.	2ф	Kos
186.	*Typhaceae*	Typha latifolia L.	2ф	Bor
187.		Typha domingensis (Pers.) Steud.	2ф	Bor
188.	*Poaceae*	Agropyrum junceum (L.) P.B.	2ф	EMed
189.		Agropyrum litorale (Host.) Dum	2ф	Med
190.		Alopecurus myosuroides Huds.	☉	Bor
191.		Milium vernale M.B.	☉	AsMed
192.		Elythrigia elongata (Host.) Nevsky	2ф	EAs
193.		Parapholis incurva (L.) Hubb.	☉	EAs
194.		Sorghum halepense (L.) Pers.	2ф	EAs

1.	2.	3.	4.	5.
195.		Polypogon monspeliensis Desf.	⊙	EAs
196.		Hordeum marinum Huds.	⊙	EAs
197.		Hordeum murinum L.	⊙	Bor
198.		Vulpia myurus (L.) Gm.	⊙	Bor
199.		Cynodon dactylon Pers.	2ϟ	Kos
200.		Atropis distans (L.) Grsb.	2ϟ	Bor
201.		Atropis convoluta Grsb.	2ϟ	MedSib
202.		Dasypirum villosum (L.) Caud.	⊙	Med
203.		Bromus arvensis L.	⊙	ESib
204.		Bromus tectorum L.	⊙	Eur
205.		Bromus mollis L.var.contractus Lange	⊙	Bor
206.		Bromus ramosus Huds.	2ϟ	EAs
207.		Phleum tenue Schrad.	⊙	Med
208.		Leymus racemosus (Lam.) Tzvel. ssp.sabulosus (Bieb.) Tzvel.	2ϟ	Pont
209.		Calamagrostris epigeios (L.) Roth.	2ϟ	EAs
210.		Phragmites australis (Cav.) Trin.ex Steud.	2ϟ	Kos
211.		Poa palustris L.	2ϟ	Bor
212.		Poa annua L.	⊙	Kos
213.		Poa bulbosa L.	2ϟ	EAsAfr
214.		Poa pratensis L.	2ϟ	Bor
215.		Poa compressa L. f; arenaria	2ϟ	EMed
216.		Scleropoa dura P.B.	⊙	EAs
217.		Avena barbata Pott.	⊙	MedAm
218.		Hordeum bulbosum L.	2ϟ	AsMed
219.		Eragrotis minor Host.	⊙	Bor
220.		Tragus racemosus (L.) All.	⊙–⊙	EAs
221.		Echinochloa crus-galli (L.) Beaur.	⊙	Kos
222.	*Cyperaceae*	Bolboschoenus (Scirpus) maritimus (L.) Palla	2ϟ	Kos
223.		Dichostylis hamulosa (Bieb.) Nees.	⊙	AsMed
224.		Holoschoenus vulgaris Link	2ϟ	EAs
225.		Carex extensa Good.	2ϟ	Eur
226.		Carex cuprina (Sand.) Nendtv.	2ϟ	Bor
227.	*Juncaceae*	Juncus bufonius L.	⊙	Eur
228.		Juncus maritimus Lam.	2ϟ	EAs
229.	*Liliaceae*	Fritillaria pontica Wahl.	2ϟ	PoMed
230.		Asphodeline lutea (L.) Rchb.	2ϟ	PoMed
231.	*Orchidaceae*	Orchis mascula L.	2ϟ	EMed

* Species included in Bulgarian Red Data Book
** Species included in Corine list of threatened species
*** New species for Bulgarian flora
**** New species for the Bulgarian Black Sea coast

Table 4. Geoelement composition of the PODA protected area's flora.

Geoelement type	Shortening	Species number	%
Euroasiatic	EAs	68	29.44
Euromeditherian	EMed	37	16.02
Borealis	Bor	23	9.96
Meditherian	Med	21	9.09
Cosmopolite	Kos	17	7.36
European	Eur	16	6.93
Asiatic	As	9	3.90
Asiatic-meditherian	AsMed	7	3.03
Pontic	Pont	6	2.60
Adventic	Adv	5	2.16
Pontic-meditherian	PoMed	5	2.16
Eurosiberian	ESib	4	1.73
Euro-asiatic-africanic	EAsAfr	3	1.30
Euro-americanic	EAm	2	0.87
Submeditheranian	SMed	2	0.87
Pontic-submeditheranian	PoSMed	1	0.43
Euro-asiatic-meditheranian	EAsMed	1	0.43
Meditheranian-siberian	MedSib	1	0.43
Pontic-european	PontE	1	0.43
Meditheranian-americanican	MedAm	1	0.43
Americanican	Am	1	0.43
Total		***231***	***100***

Table 5. Quantity (N) and biomass (B) of the zooplancton and zoobenthos in PODA protected area*.*

N	Season / Point	SPRING N	SPRING B	SUMMER N	SUMMER B	AUTUMN N	AUTUMN B
	ZOOPLANKTON						
1.	**A**	36 000	593	-	-	-	-
2.	**B**	63 000	1 438	12 000	840	18 000	970
3.	**C**	58 000	1 630	51 000	1 083	43 000	1 219
4.	**D**	69 000	2 081	18 000	4 118	17 000	5 217
5.	**E**	38 000	12 040	42 000	11 040	35 000	7 110
6.	**F**	118 000	19 512	49 000	14 012	56 000	12 100
7.	**G**	42 000	718	32 000	430	36 000	502
8.	**H**	398 000	8 120	-	-	-	-
	ZOOBENTHOS						
1.	**A**	1 650	12.8	-	-	-	-
2.	**B**	3 940	8.04	812	1.9	410	2.1
3.	**C**	1 900	5.8	1 300	3.1	1 720	3.3
4.	**D**	1 300	1.3	800	1.0	630	0.4
5.	**E**	830	3.4	140	1.1	270	2.0
6.	**F**	2 100	4.3	630	2.3	680	3.3
7.	**G**	1 840	13.0	1 140	12.8	1 312	17.3
8.	**H**	118 000	89.7	-	-	-	-

***** For the zooplancton: N (ind/m^3); B (mg/m^3);
For the zoobenthos: N (ind/m^2); B (g/m^2).

Table 6. Check list of the zooplancton and zoobenthos organisms and their distribution in PODA protected area.

N	Point / Species	A	B	C	D	E	F	G	H
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*
	Z O O P L A N K T O N								
	Rotatoria								
1.	*Synchaeta pectinata*		+		+			+	+
2.	*Synchaeta vorax*	+	+	+					
3.	*Asplanchna sp*		+	+	+	+	+		+
4.	*Brachionus calyciflorus*		+	+	+	+	+		+
5.	*Brachionus urceolaris*		+	+	+		+		+
6.	*Brachionus angularis*		+	+	+		+		+
7.	*Hexarthra mira*			+					+
8.	*Polyarthra vulgaris*			+		+			+
9.	*Polyarthra remata*								+
10.	*Filinia longiseta*								+
11.	*Keratella valga*			+		+			+
12.	*Keratella quadrata*					+			+
13.	*Keratella cochlearia*			+					+
	Cladocera								
14.	*Daphnia pulex*				+		+		+
15.	*Daphnia magna*				+	+	+		+
16.	*Daphnia cuculata*			+					+
17.	*Symocephalus vetulus*					+	+		+
18.	*Scapholeberis mucronata*			+	+		+		
19.	*Chidorus sphaericus*				+		+		+
20.	*Diaphanosoma brachiurum*			+					+
21.	*Ceriodaphnia affinis*								+
22.	*Bosmina longirostris*			+					+
	Copepoda								
23.	*Acartia clausi*	+	+	+					
24.	*Eurytemora velox*	+	+	+					
25.	*E.affinis*	+	+	+					
26.	*Calanipeda aqaedulcis*		+	+					
27.	*Eucyclops serrulatus*					+	+		+
28.	*Acanthocyclops robustus*					+	+		+
29.	*Mesocyclops crassus*			+		+			+
30.	*Cyclops strenulus*								+
31.	copepodites	+	+	+	+	+	+	+	+
32.	nauplii	+	+	+	+	+	+	+	+

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Z O O B E N T H O S								
	Oligochaeta								
1.	*Tubifex tubifex*					+	+		+
2.	*Limnodrilus udekemianus*								+
3.	*Limnodrilus claparedeanus*								+
4.	*Nais sp.*								+
	Mollusca								
5.	*Cardium sp*	+							
6.	*Acroloxus lacustris*					+	+		+
7.	*Radix ovata*			+		+	+		
8.	*Galba sp.*					+	+		
9.	*Hydrobia sp.*	+	+	+	+				
	Crustacea								
10.	*Asellus aquaticus*					+			+
11.	*Gammarus aquaeductus*		+	+	+		+		
12.	*G.subtypicus*		+		+				
	Ephemeroptera								
13.	*Syphlonurus lacustris*			+		+			
14.	*Cloeon dipterum*					+			
15.	*Caenis horaria*			+		+			
16.	*C.luctuosa*			+		+	+		
	Heteroptera								
17.	*Corixa*		+	+	+				
18.	*Notonecta*		+	+	+	+	+		
19.	*Naucoris*				+	+	+		
20.	*Sigara*					+			
	Odonata								
21.	g.sp.1				+	+			
22.	g.sp.2					+			
23.	g.sp.3			+		+			
	Coleoptera								
24.	*Lacophilus*					+			
	Diptera								
25.	*Chironomus riparius*		+	+	+	+			+
26.	*C.salinarius*	+	+				+		
27.	*C.halophilus*	+	+	+	+				
28.	*Ablabesmia sp*		+	+	+				+
29.	*Gliptotendipes gripekoveni*			+		+			+
30.	*Cricotopus silvestris*			+		+	+		

Table 7. Check list of the invertebrate species occurring in PODA protected area.

*Comments: 1. Species from classes *Diplopoda*; *Chilopoda* and *Insecta* (orders: *Orthoptera*; *Mantodea*; *Dermaptera*; *Heteroptera*; *Thysanoptera* and *Neuroptera*) are identified by the author - not specialist in the certain groups and because of this are needed of additional approve.
2. For additional information see. fig.3 и 10.

N	TAXON	SPECIES	CAUGHT IN TRAP										COMMENTS
			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*	*13.*	*14.*
I.	**Mollusca**												
1.		Helicella candicans	+	+				+	+	+			Xerophylic. Distributed in the whole country.
2.		Helicella spiruloides								+			Terrestrial. Distributed along the whole Bulgarian Black Sea coast.
3.		Monachoides incarnata	+										Terrestrial. Distributed along the whole Bulgarian Black Sea coast.
4.		Cerastoderma glaucum											Found in the earth layers during sounding for making piezometers.
5.		Pholas sp.											Found in the earth layers during sounding for making piezometers.
6.		Ostrea lamelosa											Found in the earth layers during sounding for making piezometers.
7.		Solen vagina											Found in the earth layers during sounding for making piezometers.
8.		Chamelea gallina											Found in the earth layers during sounding for making piezometers.
9.		Donacilla cornea											Found in the earth layers during sounding for making piezometers.
10.		Parthenina terebelum											Found in the earth layers during sounding for making piezometers.
11.		Mythilus lineata											Found in the earth layers during sounding for making piezometers.
12.		Spisula triangulata											Found in the earth layers during sounding for making piezometers.
13.		Syndesmia ovata											Found in the earth layers during sounding for making piezometers.
14.		Hypanis caspia											Found in the earth layers during sounding for making piezometers.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
15.		Tricola pula											Found in the earth layers during sounding for making piezometers.
16.		Trophonopsis breviatus											Found in the earth layers during sounding for making piezometers.
17.		Tritia reticulata											Found in the earth layers during sounding for making piezometers.
18.		Valvata piscinalis											Found in the earth layers during sounding for making piezometers.
19.		Theodoxus (fluviatilis?)											Found in the earth layers during sounding for making piezometers.
20.		Bela nebula											Found in the earth layers during sounding for making piezometers.
21.		Pseudotrichia rubiginosa	+	+					+				Terrestrial. Distributed in the whole country.
22.		Bittim reticulatum	+				+		+	+			Subfosilic. Marine species. Found in the earth layers during sounding for making piezometers.
23.		Rissoa splendida	+			+			+	+			Subfosilic. Marine species. Found in the earth layers during sounding for making piezometers.
24.		Cylichina strigella											Found in the earth layers during sounding for making piezometers.
25.		Cylichnium variabilis	+										Subfosilic. Marine species. Found in the earth layers during sounding for making piezometers.
26.		Hydrobia ventrosa	+										Eurihaline species. Living in brackish waters. Found in the earth layers during sounding for making piezometers.
II.	**Arthropoda**												
	Crustacea												
	Isopoda												
1.		Armadilidium vulgare	+	+	+		+	+	+		+	2P 3P	
2.		Trachelipus rathkei							+			2P	
3.		Pentheus officinalis	+				+	+				2P 3P	
4.		Methoponortus pruinosus									+	2P	
5.		Chaetophiloscia hastata			+	+	+	+	+	+	+	1P 2P	

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
	Amphipoda												
6.		Orchestia mediterranea	+		+	+	+	+	+	+	+	1P	
	Arachnoidea												
	Araneae												
1.		Dysdera crocota	+										New for the region.
2.		Zodarion thoni		+	+			+		+	+		
3.		Zodarion morosum	+		+	+							New for the region.
4.		Larinioides folium											New for the region.
5.		Diplostyla concolor							+		+		New for the region.
6.		Acartauchenius scurillis											New for the region.
7.		Lepthyphantes istrianus					+						New for the region.
8.		Alopecosa cuneta	+										New for the region.
9.		Arctosa leopardus									+		
10.		Aulonia albimana		+					+				New for the region.
11.		Pardosa hortensis	+								+		
12.		Pirata latitans					+						
13.		Trochosa ruricola					+				+		New for the region.
14.		Callilepis cretica			+								New for Bulgaria.
15.		Drassodes lapidosus									+		New for the region.
16.		Echemus babuni			+								New for the region.
17.		Zelotes hermani								+			New for the region.
18.		Zelotes prope exiguus											New for the region.
19.		Zelotes praeficus		+									New for the region.
20.		Steatoda phalerata											New for the region.
21.		Phrurolitus pullatus					+						New for the region.
22.		Titanoeca albomaculata	+						+		+		New for the region.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
23.		Ozyptila sanctuaria			+						+		New for the region.
24.		Thanatus vulgaris	+										New for the region.
25.		Evarcha arcuata				+							New for the region.
26.		Heliophanus auratus											New for the region.
27.		Phlegra fasciata											
	Diplopoda												
1.	*Julidae*		+	+								2P	
	Chilopoda												
1.		Lithobius sp.								+	+	2P	
2.		Scolopendra singulata											
3.		Scutigera coleoptrata										1P	
	Insecta												
	Odonata												
1.		Lestes macrostigma											Well developed population around the pool "Kontcheto".
2.		Lestes barbarus											Numerical individuals mainly along the S bank of the Komlouk channel and temporary pools in the section "Gastalaka".
3.		Lestes dryas											Single individuals around the pool "Kontcheto"; CORINE species.
4.		Sympecma fusca											Single individuals around the pool "Kontcheto"; CORINE species.
5.		Erythromma viridulum											Around the "Komlouk channel".
6.		Enallagma cyathigerum											Male and female individuals found in the N bank of the pool "Ribarkata" and in SW part of PODA.
7.		Ischnura pumilio											Single individuals around the banks of the pools.
8		Ischnura elegans											Well developed population in the whole protected territory.
9		Aeshna mixta											Numerical individuals among reedbeds in the pool "Lopatarskata lokva".
10		Aeshna affinis											One male ind. in the pool "Lopatarskata lokva".

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
11.		Anaciaeschna isosceles											Numerical individuals mainly along the dyke over the drinking water pipe; CORINE species.
12.		Anax imperator											One male individual by the embankment close to pool "Belene".
13.		Anax parthenope											Numerical individuals in the whole protected territory.
14.		Hemianax ephippiger											Single individuals by the old bridge over the channel Mandra-Black Sea as well as on the dyke over the drinking water pipe.
15.		Libellula fulva											Single individuals along the S bank of the "Komlouk channel".
16.		Orthetrum cancellatum											Numerical individuals in the whole protected territory.
17.		Orthetrum albistylum											Numerical individuals mainly around the temporary pools in the section "Gastalaka".
18.		Crocothemis erythraea											Numerical individuals around the pool "Kontcheto".
19.		Sympetrum striolatum											According to Petkov (1921); now along the S bank of the Komlouk cannel" as well as around the banks of the pools.
20.		Sympetrum vulgatum											According to Petkov (1921).
21.		Sympetrum meridionale											Single individuals around the banks of the pools.
22.		Sympetrum fonscolombei											Single individuals around the banks of the pools.
	Orthoptera												
1.		Decticus verucivorus											
2.		Pezotettix giornai										1P 2P	
3.		Locusta migratoria											
4.		Chrysochraon dispar										3P	
5.		Grilotalpa grilotalpa					+			+	+	3P	
6.		Grilus campestris	+						+		+		

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
	Mantodea												
1.		Ameles sp.										3P	
2.		Mantis religiosa											
3.		Empusa fasciata											
	Dermaptera												
1.		Labidura riparia										2P	
2.		Anechura euxina								+			
	Heteroptera												
1.		Sigara sp.											"Komlouk channel".
2.		Micronecta sp.											"Komlouk channel".
3.		Hebrus pusillus											"Komlouk channel".
4.		Iliocoris cimicoides											"Komlouk channel".
5.		Plea minutisima											"Komlouk channel".
6.		Prostema sanguineum					+						
7.		Atomophora sp.											Along the E bank of the pool "Morskata lokva".
8.		Metapterus linearis						+					
9.		Coranus sp.											Embanked dyke over the drinking water pipe.
10.		Dimorphopterus blissoides											Embanked dyke over the drinking water pipe.
11.		Heterogaster sp.						+					
12.		Podops incerta							+				
13.		Aelia virgata							+				
14.		Euridema ventralis											Along the E bank of the pool "Morskata lokva".
	Thysanoptera			+	+								
	Coleoptera												
	Carabidae												
1.		Cicindela littoralis nemoralis										1P 2P	Common in the protected territory.
2.		Carabus coriaceus kindermanni							+	+	+		Common in the protected territory.
3.		Scarites terricola											Common in the protected territory.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
4.		Broscus cephalotes semistriatus				+					+		Rare for the country; distributed along the Black Sea coast; Common in the protected territory.
5.		Dyschirius sp.									+		
6.		Trechus sp.		+			+						
7.		Cardioderus chloroticus											Rare for the country; distributed along the Black Sea coast.
8.		Pogonus luridipennis											Common in the protected territory.
9.		Pogonistes rufoaeneus											Rare for the country; distributed along the Black Sea coast.
10.		Calathus melanocephalus		+	+	+							Common in the protected territory.
11.		Calathus ambiguus											Common in the protected territory.
12.		Curtonotus cf. propinquus								+			Rare for the country; distributed along the Black Sea coast.
13.		Zabrus tenebrioides						+				2P	Common in the protected territory.
14.		Pseudophonus rufipes				+							Common in the protected territory.
15.		Ophonus sabulicola ponticus										3P	Common in the protected territory.
16.		Harpalus rubripes								+			Common in the protected territory.
17.		Harpalus serripes											Common in the protected territory.
18.		Acinopus picipes						+					Rare in the protected territory.
19.		Chlaenius vestitus									+		Common in the protected territory.
20.		Brachynus brevicollis											Common in the protected territory.
21.		Brachynus explodens										2P	Common in the protected territory.
	Staphylinidae												
1.		Pseudocipus mus			+								Widely distributed in Bulgaria.
2.		Xanthilinus sp.	+										
3.		Quedius meridio-carpathicus									+	+	Often found in the country.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
4.		Astrapaeus ulmi						+					Common for the country.
5.		Astilbus canalliculatus				+	+				+	+	Common for the country.
6.		Paederus litoralis									+		Common for the country.
7.		Pseudocipus cupreus									+		Caught in Bulgaria but not published till the moment.
8.		Rabigus pullus								+	+		Rare for the country.
9.		Oxypoda sp.									+		
10.		Heterothops dissimilis								+			Common for the country.
11.		Tachiporus sp.		+									
12.		Falagria sp.									+		
13.		Oligota sp.									+		
14.		Ocypus simulator										+	New for Bulgaria.
15.		Stenus sp.										+	
	Pselaphidae								+		+		
	Ptilidae										+		
	Embioptera		+	+		+	+		+			2P	
	Neuroptera												
1.	*Mirmelionidae*												Small pits made by larvae in the sand along the S bank of the "Komlouk cannel".
2.		Palpares libelluloides											One dead individual found on the road Burgas-Sosopol (W border of the protected area).
3.	*Ascalaphidae*												Imagines around the section "Gastalaka".
	Lepidoptera												
1.		Euchloe ausonia graeca											E part of the protected area.
2.		Pieris rapae											In the whole protected territory.
3.		Colias crocea											In the section "Gastalaka".
4.		Polyommatus icarus											On the embanked dyke over the drinking water pipe.
5.		Aricia agestis											On the embanked dyke over the drinking water pipe.
6.		Maniola jurtina											Along the N bank of the pool "Morskata lokva".
7.		Coenonympha pampilus											On the embanked dyke over the drinking water pipe.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
8.		Petrophora chlorosata											SE part of PODA.
9.		Aspitates ochrearia											W bank of the pool "Garda".
10.		Lythria purpuraria											SE part of PODA.
11.		Penthophera morio											Along the old road Burgas-Sozopol and among bushes by pool "Belene".
12.		Arctia vilica											Among the bushes by pool "Belene".
13.		Spiri striata											On the embanked dyke over the drinking water pipe.
14.		Protoschinia scutosa											On the embanked dyke over the drinking water pipe.
15.		Macdunnoughia confusa											On the embanked dyke over the drinking water pipe.
16.		Autographa gamma											On the embanked dyke over the drinking water pipe.
17.		Acontia lucida											On the embanked dyke over the drinking water pipe.

Table 8. Check list of the fish species in PODA protected area and surrounding water bodies.

* *RDB* - species included in Bulgarian Red Data Book
* *CORINE* - species included in Corine list of threatened species

N	FAMILY	SPECIES	STATUS	COMMENTS
1.	*2.*	*3.*	*4.*	*5.*
PODA protected area[1]				
	Poeciliidae			
1.		Gambusia affinis holbrooki		Distributed in the whole protected area. Potential nutrient resources for the fish-eating birds
	Mugilidae			
2.		Liza (Mugil) ramada		In places directly contacted with the sea
	Gobiidae			
3.		Knipowitschia caucasica	*RDB*	In the shallow salty water basins
	Gasterosteidae			
4.		Gasterosteus aculeatus	*RDB*	In the shallow salty water basins
	Percidae			
5.		Perca fluviatilis		In the channel for draining of the Komlouk lowland
	Cyprinidae			
6.		Rutilus rutilus		In the channel for draining of the Komlouk lowland
Foros bay[2]				
	Clupeidae			
1.		Sprattus sprattus sulinus		Second half of March and during the autumn
2.		Alosa pontica pontica		Second half of March and during the autumn
	Engraulidae			
3.		Engraulis encrasicholus ponticus		During the summer
4.	***Mugilidae***			Whole year
	Atherinidae			
5.		Atherina mochon pontica	*RDB*	April
	Pomatomidae			
6.		Pomatomus saltatrix		Small individuals during the summer
	Carangidae			
7.		Trachurus mediterraneus ponticus		End of spring and autumn
	Scombridae			
8.		Sarda sarda		Autumn
	Gobiidae			
9.		Neogobius melanostomus		Permanently
10.		Mesogobius batrachocephalus		Permanently
Узунгерен[3]				
	Clupeidae			
1.		Clupeonella delicatula delicatula	*RDB*	Permanent in the past. Now it is considered as disappeared

1.	2.	3.	4.	5.
	Engraulidae			
2.		Engraulis engrasicholus ponticus[4]		Temporary. New species for Uzungeren.
	Cyprinidae			
3.		Scardinius erythrophtalmus		Temporary
4.		Chalcalburnus chalcoides mandrensis	*RDB CORINE*	Temporary
5.		Carasius auratus gibelio		Temporary
6.		Cyprinus carpio		Temporary
	Gasterosteidae			
7.		Pungitius platygaster	*RDB*	Permanently
8.		Gasterosteus aculeatus	*RDB*	Permanently
	Syngnathidae			
9.		Syngnatus typhle argentatus		Permanently
10.		Syngnatus nigrolineatus		Permanently
	Poeciliidae			
11.		Gambusia affinis holbrooki[4]		Permanently. New species for Uzungeren
	Mugilidae			
12.		Mugil cephalus		Temporary
13.		Mugil auratus		Temporary
14.		Mugil saliens		
	Atherinidae			
15.		Atherina mochon pontica	*RDB*	Temporary. Now it is considered as disappeared
	Percidae			
16.		Stizostedion lucioperca		Permanently
17.		Stizostedion marinus[5]	*RDB*	Single note not approved till the moment
	Labridae			
18.		Crenilabrus ocellatus		Temporary
19.		Crenilabrus griseus		Temporary
	Blenniidae			
20.		Blenius sanguinolentus		Temporary
21.		Blenius tentacularis		Temporary
	Gobiidae			
22.		Pomatoschictus minutus elongatus		Temporary
23.		Knipowitschia caucasica	*RDB*	Permanently
24.		Gobius ophiocephalus		Permanently
25.		Gobius niger		Temporary
26.		Neogobius melanostomus		Permanently
27.		Neogobius cephalarges		Permanently
28.		Neogobius syrman[6]	*RDB*	Permanently
29.		Proterorhinus marmoratus		Permanently
	Pleuronectidae			
30.		Platichthys flesus luscus		Temporary

[1] The data are collected during investigations for preparing the management plan.
[2] According to the local fish brigade.
[3] According to Georgiev (1967) - excluding mentioned down species.
[4] The data are collected during investigations for preparing the management plan.
[5] According to MoE "National plan for priority activities for conservation of the more important Bulgarian wetlands".
[6] According to Karapetkova, Givkov, Aleksandrova-Kolemanova (1993).

Table 9: Qualitative composition of the food of the fish species.

Species *Nutrient composition*	G.aculea-tus	K.cauca-sica	R.rutilus	P.fluvia-tilis	G.affinis l > 30 mm	G.affinis l < 23 mm	L.rama-da (larv.)	L.rama-da l > 50 mm
Diptera - l. *	+	+	+	+	+	+	+	-
Diptera - s *	+	-	+	+	-	-	-	-
Coleoptera - l. *	-	-	-	-	+	-	-	-
Insecta **	-	+	-	-	-	-	-	-
Charpaticoida	-	+	-	-	-	+	-	-
Rotatoria	-	-	-	-	-	+	-	-
Oligochaeta	-	-	-	-	-	+	-	-
Acari	-	+	-	-	-	-	-	-
Algae	-	-	-	-	-	+	+	-
Detrit	-	-	-	-	-	-	-	+

* l. = larvae; s. = subimagines
** fam.Micronectidae (Heteroptera)

Table 10. Check list of the amphibian and reptile species occurring in the PODA protected area.

RDB - species included in the Bulgarian Red Data Book
CORINE - species included in Corine list of threatened species

N	CLASS/ORDER	SPECIES	STATUS	COMMENTS
	Amphibia			
1.	***Anura***	Bombina sp.		In the N part of the protected area by calls.
2.		Pelobates syriacus balcanicus	*RDB CORINE*	In the whole territory.
3.		Bufo viridis	*CORINE*	In the N part of the protected area by calls.
4.		Bufo bufo		One dead individual on the road.
5.		Hyla arborea	*CORINE*	In the N part of the protected area.
6.		Rana ridibunda		In the N part of the protected area.
	Reptilia			
7.	***Chelonia***	Emys orbicularis	*CORINE*	In the whole territory.
8.	***Squamata***	Lacerta viridis	*CORINE*	One individual by pool "Garda".
9.		Podarcis sp.		Numerous individuals on the sands around pool "Ribarkata".
10.		Ophisaurus apodus	*RDB*	In the S part of the protected area.
11.		Natrix natrix		Single individuals in the protected area.
12.		Natrix tessellata	*CORINE*	Widely distributed in the protected area.
13.		Elaphe quatorlineata sauromates	*RDB CORINE*	Two individuals in the N and S part of PODA and one close to the territory.
14.		Coluber jugularis		Single individuals observed at different places around the territory.

Table 11. Check list of the bird species established in PODA protected area till 15.01.1997.

coefficient	*number*	*status*
1	1- 9	SV - summer visitor but not nesting
2	10 - 99	R - resident
3	100 - 999	SM - spring migrant (01.03.-15.05.)
4	1000 - 9999	B - breeding (*)
5	10000 - 99999	AM - autumn migrant (01.08.-30.11.)
6	over 100000	W - wintering (01.12.-28.02.)

N	SPECIES	SV	R	SM	B	AM	W	OBSERVATION - max. number
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*
1.	Gavia stellata					1		09.11.95-1 ind.
2.	Gavia arctica						1	winter/1910-2 ind.(Varbanov,1934)
3.	Tachybaptus ruficollis*			2	1	2	2	26.03.95-77 ind.;1996-(3-4)br.pairs;10.10.95-30 ind.;02.10.93-31 ind.
4.	Podiceps cristatus					2	2	15.09.95-80 ind.;15.01.97-215 ind.
5.	Podiceps grisegena	1			?		1	05.07.66-1 pair(Georgiev,1976)
6.	Podiceps nigricollis			3		2	3	26.03.95-562 ind.;26.10.95-50 ind.;12.02.95-370 ind.
7.	Phalacrocorax carbo			2.		3	3	16.04.96-38 ind.;01.10.96-350 ind.;01.12.96-350 ind.
8. .	Phalacrocorax pygmeus*			2	2	2	3	19.03.95-41 ind.;1992-(20-30)br.pairs;02.10.95-32 ind.;31.12.96-175 ind.
9.	Pelecanus onocrotalus	2		3		4		28.05.96-76 ind.;09.04.1996-600 ind.;29.09.96-2000 ind.
10.	Pelecanus crispus	1		2		2	3	08.06.95-1 ind.;19.03.96-31 ind.;29.11.95-88 ind.;12.01.97-203 ind.
11.	Botaurus stellaris	1		1			1	08.06.95-1 ind.;02.04.96-2 ind.;13.02.96-7 ind.
12.	Ixobrychus minutus	1		1		1		21.06.92-3 ind.;02.05.87-3 ind.;24.09.96-1 ind.
13.	Nycticorax nycticorax*			2	2	2		23.04.96-36 ind.;1996-(28-30)br.pairs;18.09.95-60 ind.
14.	Ardeola ralloides	1		2		2		02.07.96-2 ind.;02.05.87-15 ind.;18.09.95-18 ind.
15.	Egretta garzetta*			2	2	3	1	02.05.87-30 ind.;1996-(65-70)br.pairs;29.09.96-106 ind.;07.12.95-1 ind.
16.	Egretta alba	1		1		2	3	28.05.95-1 ind.;25.03.96-3 ind.;21.10.96-24 ind.;15.01.97-131 ind.
17.	Ardea cinerea*			2	2	3	2	26.03.95-52 ind.;1996-(55-60)br.pairs;18.09.95-190 ind.;15.01.97-52 ind.
18.	Ardea purpurea*			2	2	2		20.04.95-13 ind.;1996-(18-20)br.pairs;18.09.95-46 ind.
19.	Ciconia ciconia	1		4		5		05.07.95-2 ind.;19.03.95-4600 ind.;27.08.96-20000 ind.
20.	Ciconia nigra			1		2		15.05.96-4 ind.;26.09.96-14 ind.
21.	Plegadis falcinellus*			2	2	2		07.05.92-46 ind.;1994-(25-30)br.pairs;03.08.88-43 ind.(Д Робъртс)
22.	Platalea leucorodia*			2	2	2		03.05.95-42 ind.;1996-(30-32)br.pairs;29.09.96-65 ind.

1.	2.	3.	4.	5.	6.	7.	8.	9.
23.	Cygnus olor	2		2		1	2	30.05.96-16 ind.;05.03.96-12 ind.;29.11.95-5 ind.;29.12.96-62 (Georgieva,Milchev)
24.	Cygnus cygnus						2	17.01.93-46 ind.
25.	Cygnus columbianus						2	28.02.89-10 ind.
26.	Anser albifrons						4	31.12.96-1810 ind.
27.	Anser anser*				1		2	17.06.52-1 pair with chicks(Prostov,1964);31.12.96-25 ind.
28.	Branta ruficollis						2	31.12.96-15 ind.
29.	Tadorna ferruginea	1						10.07.95-3 ind.
30.	Tadorna tadorna*			2	1	2	2	19.03.95-37 ind.;1996-1 br.pair;10.11.96-11 ind.;07.12.95-65 ind.
31.	Anas penelope			1			2	12.03.95-4 ind.;19.02.95-28 ind.
32.	Anas strepera			3		1	2	15.03.93-180 ind.;28.11.95-5 ind.;27.02.96-25 ind.
33.	Anas crecca			2		2	3	12.03.95-33 ind.;06.11.96-75 ind.;15.01.97-414 ind.
34.	Anas platyrhynchos*			3	1	3	3	15.03.93-160 ind.;1996-4 br.pairs;15.09.95-500 ind.;31.12.96-950 ind.
35.	Anas acuta						2	02.01.93-43 ind.
36.	Anas querquedula			2		3		26.03.95-91 ind.;18.09.95-150 ind.
37.	Anas clypeata	1		2		1	3	15.06.95-6 ind.;26.03.95-56 ind.;15.09.95-4 ind.;24.12.96-350 ind.
38.	Netta rufina						1	31.01.96-8 ind.
39.	Aythya fuligula	1		4		3	5	13.07.95-4 ind.;15.03.93-1400 ind.;14.11.96-600 ind.;17.01.93-12800 ind.
40.	Aythya ferina*			4	1	3	4	15.03.93-1800 ind.;1996-(7-8)br.pairs;26.10.95-400 ind.;17.01.93-7600 ind.
41.	Aythya nyroca*			1	1	1	2	09.05.96-3 ind.;1993-1 br.pair;01.10.96-7 ind.;06.12.92-12 ind.
42.	Aythya marila						1	10.01.93-5 ind.
43.	Somateria mollissima			1		1	1	19.03.95-3 ind.;18.08.95-3 ind.;19.02.95-2 ind.
44.	Clangula hyemalis						2	12.02.89-58 ind.
45.	Melanitta fusca						2	12.02.89-46 ind.
46.	Bucephala clangula						2	17.01.93-68 ind..
47.	Mergus merganser						2	29.12.96-13 ind.(Georgieva,Milchev)
48.	Mergus serrator			2		1	2	14.03.96-32 ind.;17.11.96-3 ind.;15.01.97-18 ind.
49.	Mergus albellus						3	31.12.96-200 ind.
50.	Oxyura leucocephala						3	10.01.93-183 ind.
51.	Pernis apivorus			2		2		09.05.96-55 ind.;26.08.96-56 ind.
52.	Milvus migrans			1		1		13.05.96-1 ind.;22.08.95-3 ind.
53.	Milvus milvus			1				12.03.59-1 ind.(Prostov,1964)
54.	Haliaeetus albicilla	1		1				30.05.96-1 ind.;07.03.96-1 ind.

1.	2.	3.	4.	5.	6.	7.	8.	9.
55.	Neophron percnopterus					1		05.09.91-1 ind.
56.	Gyps fulvus					1		29.09.96-1 ind.
57.	Circaetus gallicus			1		1		10.05.95-1 ind.;25.09.95-2 ind.
58.	Circus aeruginosus*		1	1	1	1	2	16.04.96-8 ind.;1996-1 br.pair;05.11.96-5 ind.;15.01.97-36 ind.
59.	Circus cyaneus						1	02.01.93-4 ind.
60.	Accipiter gentilis			1		1		25.02.95-1 ind.;10.95-1 ind.
61.	Accipiter nisus					1	1	14.09.96-8 ind.;15.01.97-1 ind.
62.	Buteo buteo			2		3		09.04.96-13 ind.;25.09.95-250 ind.
63.	Aquila pomarina			3		4		22.04.95-138 ind.;29.09.96-3000 ind.
64.	Aquila clanga			1				02.05.87-1 ind.
65.	Aquila heliaca			1				19.03.59-1 ind.(Prostov,1964)
66.	Aquila chrysaetus			1				05.89-1 ind.(Scott)
67.	Hieraaetus pennatus			1		1		02.05.95-1 ind.;22.09.95-2 ind.
68.	Pandion haliaetus			1		1		16.04.96-2 ind.;28.09.96-2 ind.
69.	Falco tinnunculus*			1	1	2	1	09.05.95-2 ind.;1996-1 br.pair;13.09.95-14 ind.;13.02.96-1 ind.
70.	Falco vespertinus			1		1		30.04.96-6 ind.;26.09.95-5 ind.
71.	Falco columbarius						1	02.01.93-1 ind.
72.	Falco subbuteo			1		1		23.04.96-2 ind;29.09.93-3 ind.
73.	Falco eleonorae	1						28.05.93 (Iankov)
74.	Falco peregrinus	1		1		1	1	28.04.96-1 ind.;04.05.95-1 ind.;14.08.95-1 ind.;23.01.96-1 ind.
75.	Perdix perdix*		1		1			24.04.96-2 ind.;1995-1 br.pair;22.09.95-8 ind.
76.	Coturnix coturnix					1		01.11.95-1 ind.
77.	Rallus aquaticus*		1		1			20.03.95-1 ind.;1995-(1-2)br.pairs;15.01.97-4 ind.
78.	Crex crex					1		24.09.96-1 ind.
79.	Gallinula chloropus*		1		1			31.01.96-3 ind.;1994-(3-5)br.pairs;15.01.90-130 ind.
80.	Fulica atra*		3		1			15.03.93-440 ind.;1996-3 br.pairs;31.12.96-2500 ind.
81.	Grus grus			2				14.03.96-14 ind.
82.	Haematopus ostralegus*				1	2	1	25.03.96-4 ind.;1995- 1br.pair;21.08.96-41 ind.;19.02.95-3 ind.
83.	Himantopus himantopus*			2	2	2		03.05.95-14 ind.;1996-25br.pairs;18.08.96-37 ind.
84.	Recurvirostra avosetta*			2	1	1	1	09.04.96-19 ind.;1996-5br.pairs;29.08.85-3 ind.;20.12.95-1 ind.
85.	Glareola pratincola	2				2		07.07.93-47 ind.;16.08.85-36 ind.
86.	Charadrius dubius*			1	1	2		07.05.96-4 ind.;1996-6br.pairs;13.10.96-21 ind.

1.	2.	3.	4.	5.	6.	7.	8.	9.
87.	Charadrius hiaticula					1		13.05.96-2 ind.;14.10.96-9 ind.
88.	Charadrius alexandrinus*			1	1	1		22.04.95-4 ind.;1996-2br.pairs;26.08.96-3 ind.
89.	Charadrius morinellus					1		21.10.58-6 ind.(Prostov,1964)
90.	Pluvialis squatarola			1		1	1	19.03.95-2 ind.;26.08.96-2 ind.;31.12.96-7 ind.
91.	Hoplopterus spinosus			1				07.05.60-3 ind.(Hanzak)
92.	Vanellus vanellus	1		2		1		25.06.96-3 ind.;25.03.96-27 ind.;05.08.96-4 ind.
93.	Calidris alba					2	1	10.10.96-11 ind.;07.01.97-7 ind.
94.	Calidris minuta	2		2		2	1	16.05.96-10 ind.;13.05.96-48 ind.;07.09.95-40 ind.;15.12.95-5 ind.
95.	Calidris temminckii					1		08.09.96-2 ind.
96.	Calidris ferruginea	1		2		2		29.07.96-6 ind.;07.05.96-41 ind.;07.09.95-12 ind.
97.	Calidris alpina			2		2	2	15.03.93-70 ind.;25.09.95-26 ind.;28.02.93-90 ind.
98.	Limicola falcinellus					1		18.08.96-2 ind.
99.	Philomachus pugnax			2		1	1	07.05.96-39 ind.;11.09.96-9 ind.;28.02.93-4 ind.
100.	Gallinago gallinago			1		1	2	19.03.96-5 ind.;18.09.95-4 ind.;28.12.95-10 ind.
101.	Gallinago media							1912 (Varbanov,1934)
102.	Scolopax rusticola					1		26.10.1995-1 ind.
103.	Limosa limosa			2		1	1	18.04.96-46 ind.;26.03.95-7 ind.;28.02.93-6 ind.
104.	Limosa lapponica			1		1		21.03.40-1 ind.(Prostov,1964);29.09.93-4 ind.
105.	Numenius phaeopus	1				1		15.08.96-4 ind.;13.08.95-8 ind.
106.	Numenius tenuirostris	1						22.03.51-1 ind.(Prostov,Smilova,1983)
107.	Numenius arquata	2		1		2	2	10.07.95-52 ind.;15.03.93-3 ind.;05.08.96-21 ind.;10.12.96-11 ind.
108.	Tringa erythropus	1		2		1		16.05.96-5 ind.;30.04.66-10 pairs(Georgiev,1976);18.08.96-5 ind.
109.	Tringa totanus	2		2		3	1	12.07.95-30 ind.;26.03.95-51 ind.;18.09.95-250 ind.;31.12.96-5 ind.
110.	Tringa stagnatilis	1		1		2		17.06.96-5 ind.;16.04.96-5 ind.;24.09.96-2 ind.
111.	Tringa nebularia	1		2		1		15.07.97-3 ind.;02.05.87-15 ind.;19.08.96-5 ind.
112.	Tringa ochropus	1		1		1		08.07.96-6 ind.;26.03.95-1 ind.;18.08.96-5 ind.
113.	Tringa glareola	2		1		2		15.07.96-42 ind.;04.05.95-7 ind.;19.09.95-57 ind.
114.	Xenus cinereus			1				13.05.96-1 ind.
115.	Actitis hypoleucos	2		1		1		13.07.96-16(Elliott) ;27.04.95-3 ind.;10.09.96-8 ind.
116.	Arenaria interpres			2		1	1	31.07.95-2 ind.;16.05.96-11 ind.;08.10.96-2 ind.;07.12.95-2 ind.
117.	Phalaropus lobatus					1		24.10.96-6 ind.
118.	Stercorarius pomarinus					1		21.10.94-1(Dändliker,Iankov)

1.	2.	3.	4.	5.	6.	7.	8.	9.
119.	Stercorarius parasiticus					2		18.05.40-1 ind.(Prostov,1964);21.10.94-14 ind.(Дндliker,Iankov)'
120.	Larus melanocephalus	2		2		3	4	24.07.95-15 ind.;25.04.96-14 ind.;14.11.96-180 ind.;02.12.96-1500 ind.
121.	Larus minutus	1		1		3	1	19.07.95-5 ind.;02.05.87-2 ind.;31.08.95-200 ind.;28.12.95-1 ind.
122.	Larus ridibundus	3		2		3	3	20.07.95-400 ind.;03.05.95-43 ind.;28.08.95-400 ind.;15.01.97-150 ind.
123.	Larus genei	1		1		2	1	20.07.95-4 ind.;09.04.96-2 ind.;18.09.95-38 ind.;09.01.93-3 ind.
124.	Larus canus						3	16.01.93-800 ind.(Iankov)
125.	Larus fuscus					1		01.10.96-1 ind.
126.	Larus cachinnans		4					31.12.96-1650 ind.
127.	Gelochelidon nilotica	1				1		25.07.95-2 ind.;03.08.95-1 ind.
128.	Sterna caspia					2		18.09.95-23 ind.
129.	Sterna sandvicensis	3		2		3		20.07.95-120 ind.;28.05.96-15 ind.;26.08.96-200 ind.
130.	Sterna hirundo*	3		2	2	3		20.07.95-120 ind.23.04.96-11 ind.;1996-51 br.pairs;28.08.95-150 ind.
131.	Sterna albifrons*	2		1	1	2		23.06.92-53 ind.;02.05.87-5 ind.;1995-6 br.pairs;18.08.96-79 ind.
132.	Chlidonias hybridus	2		2		1		30.05.95-11 ind.;02.05.87-30 ind.;18.02.96-2 ind.
133.	Chlidonias niger	3		2		3		12.07.95-400 ind.;02.05.87-20 ind.;15.08.95-400 ind.
134.	Chlidonias leucopterus	1		2				05.07.95-3 ind.;02.05.87-60 ind.
135.	Columba livia domestica*				1			1995-1 br.pair;15.07.96-6 ind.
136.	Columba oenas					1	1	02.10.95-1 ind.;13.02.96-2 ind.
137.	Columba palumbus	1		2			2	01.07.92-1 ind.;25.03;.96-45 ind.;10.01.96-65 ind.
138.	Streptopelia decaocto		1		1			1995-1 br.pair
139.	Streptopelia turtur	2		1		2		15.07.96-11 ind.;25.04.96-8 ind.;19.08.96-14 ind.
140.	Cuculus canorus	1		1				28.06.96-2 ind.;02.05.87-1 ind.
141.	Tyto alba						1	04.01.96-1 ind.
142.	Otus scops			1				09.05.95-1 ind.
143.	Asio flammeus					1	1	18.09.95-1 ind.l;01.02.96-1 ind.
144.	Caprimulgus europaeus					1		01.10.96-1 ind.
145.	Apus apus	1		2		1		18.06.96-8 ind.;30.04.96-17 ind.;21.08.94-58 ind.
146.	Alcedo atthis		1					09.04.96-2 ind.;08.09.96-2 ind.;15.01.97-5 ind.
147.	Merops apiaster*			2	2	2		13.05.96-38 ind.;01.07.92-6 nests;01.09.96-32 ind.
148.	Coracias garrulus			2		1		03.05.95-15 ind.;07.09.95-1 ind.
149.	Upupa epops			1		1		02.05.87-2 ind.;31.08.95-1 ind.
150.	Jynx torquilla			1				15.05.93-1 ind.

1.	2.	3.	4.	5.	6.	7.	8.	9.
151.	Picus viridis			1			1	23.04.96-1 ind.;31.12.96-1 ind.
152.	Dendrocopus mayor			1				19.03.96-1 ind.
153.	Dendrocopus syriacus			1		1	1	23.04.96-1 ind.;28.10.96-1 ind.;15.01.97-1 ind.
154.	Melanocorypha calandra						2	15.01.97-18 ind.
155.	Calandrella brachydacttyla	1						29.06.56-1 ind.(Prostov,1964)
156.	Galerida cristata		1					25.06.96-1 ind.;10.05.95-2 ind.;28.11.95-1 ind.
157.	Lullula arborea					1		06.10.95-6 ind.
158.	Alauda arvensis			2		2		18.03.95-11 ind.;06.11.94-35 ind..
159.	Riparia riparia*	3		2	2	4		13.07.96-150;03.05.95-55;1992-23br.pairs,06.09.66-2000ind.(Georgiev,1976)
160.	Hirundo rustica*			1	1	2		02.04.96-4 ind.;1995-5 br.pairs;10.10.96-13 ind.
161.	Delichon urbica*			1	1	3		09.04.96-5 ind.;25.06.96-5 nests;28.09.96-300ind.
162.	Anthus trivialis					1		11.09.12.-2 ind.
163.	Anthus pratensis					1		21.10.94-5 ind.(Iankov)
164.	Anthus spinoletta			1		1	1	26.03.95-1 ind.;24.11.96-8 ind.;17.12.96-9 ind.
165.	Motacilla flava*			2	1	3		02.05.95-26 ind.;1995-(1-2)br.pairs;18.09.95-150 ind.
166.	Motacilla cinerea			1		1		26.03.95-2 ind.;25.09.95-5 ind.
167.	Motacilla alba			3		3		19.03.95-130 ind.;(1-15).10.96-120 ind..
168.	Troglodytes troglodytes			1		1	1	25.03.95-1 ind.;05.11.96-2 ind.;02.12.96-4 ind.
169.	Prunella modularis					1		28.11.95-3 ind.
170.	Eeithacus rubecula			1		1	1	12.03.95-1 ind.;21.11.96-2 ind.;02.12.96-3 ind.
171.	Luscinia megarhynchos	1		1		1		18.06.95-2 ind.;07.05.96-2 ind.;04.08.95-1 ind.
172.	Phoenicurus ochrurus					1		15.09.95-1 ind.
173.	Phoenicurus phoenicurus			1		1		08.04.96-1 ind.;08.10.96-1 ind.
174.	Saxicola rubetra			1		1		09.05.95-2 ind.;29.09.96-6 ind.
175.	Saxicola torquata			1		1		05.03.96-1 ind.;23.09.96-1 ind.
176.	Oenanthe isabellina					1		19.09.95-2 ind.
177.	Oenanthe oenanthe*				1	1		1995-1 br.pair;15.08.96-1 ind.
178.	Turdus merula			1		1	1	26.03.95-6 ind.;19.09.95-5 ind.;06.12.92-5 ind.
179.	Turdus pilaris						1	15.01.97-8 ind.
180.	Turdus philomelos			1		1	1	12.03.95-4 ind.;26.09.95-6 ind.;24.12.95-2 ind.
181.	Turdus viscivorus						1	06.12.92-2 ind.
182.	Cettia cetti		1	1	?	1	1	05.03.96-2 ind.;24.09.96-2 ind.;15.01.97-3 ind.

1.	2.	3.	4.	5.	6.	7.	8.	9.
183.	Locustella fluviatilis	1		1				10.05.95-1 ind.;07.07.93-1 ind.
184.	Locustella luscinioides			1		1		02.05.87.-1 ind.;25.09.95-1 ind.
185.	Acrocephalus melanopogon			2				(6-20).04.95-13-31 ind.
186.	Acrocephalus schoenobaenus			1		1	1	25.04.96-1 ind.;29.10.96-5 ind.;15.01.97-9 ind
187.	Acrocephalus palustris	1						20.05.96-1 ind.
188.	Acrocephalus scirpaceus*			2	1	1		09.04.96-15 ind.;1995-5 br.pairs;14.10.96-2 ind.
189.	Acrocephalus arundinaceus*			1	1	1		16.04.96-1 ind.;1995-(3-4)br.pairs;26.08.96-4 ind.
190.	Hippolais pallida	1		1		1		16.05.96-5 ind.;13.04.96-1 ind.;28.08.95-1 ind.
191.	Sylvia curruca	1		1		1		24.06.95-1 ind.;09.04.96-1 ind.;28.08.95-2 ind.
192.	Sylvia communis	1		1		1		10.06.95-1 ind.;09.05.95-1 ind.;21.08.95.-1 ind.
193.	Sylvia atricapilla			1		1		05.06.95-2 ind.;30.04.96-2 ind.;09.09.95-5 ind.
194.	Phylloscopus sibilatrix			1		1		30.04.96-1 ind.;19.09.95-5 ind.
195.	Phylloscopus collybita			1		1	1	09.04.96-4 ind.;02.10.95-8 ind.;17.12.96-1 ind.
196.	Phylloscopus trochilus			1		1		23.04.96-3 ind.;10.10.95-3 ind.
197.	Regulus regulus						1	31.12.96-8 ind.
198.	Muscicapa striata			1		1		09.05.95-1 ind.;26.08.96-5 ind.
199.	Ficedula parva	1				1		06.07.95-2 ind.(Profirov);30.09.96-2 ind.
200.	Ficedula albicollis			1		2		23.04.96-1 ind.;04.09.95-12 ind.
201.	Ficedula hypoleuca			1		1		30.04.96-1 ind.;07.09.95-2 ind.
202.	Panurus biarmicus*		1		1			23.04.96-4 ind.;1995-1 br.pair;15.12.95-45 ind.
203.	Aegithalos caudatus*		1		1			30.04.96-4 ind.;1992-3 nests;30.09.96-6 ind.
204.	Parus palustris			1			1	08.03.95-5 ind.;17.01.93-2 ind.
205.	Parus montanus						1	02.01.93-5 ind.
206.	Parus ater					1		17.11.95-2 ind.
207.	Parus caeruleus		1				2	09.04.96-2 ind.;10.12.96-12 ind.;27.02.96-46 ind.
208.	Parus mayor		1					30.09.96-5 ind.
209.	Certhia familiaris						1	05.01.92-1 ind.
210.	Remiz pendulinus*			1	1	1		09.04.96-2 ind.;1995-1 br.pair;05.08.96-8 ind.
211.	Oriolus oriolus*			1	1	1		03.05.95-2 ind.;1995-1 br.pair;03.09.96-1 ind.
212.	Lanius collurio			1		1		09.05.95-2 ind.;10.09.96-6 ind.
213.	Lanius minor			1		1		09.05.95-1 ind.;15.08.96-2 ind
214.	Lanius senator			1				05.05.95-1 ind.

1.	2.	3.	4.	5.	6.	7.	8.	9.
215.	Garrulus glandarius		1					17.01.93-3 ind.
216.	Pica pica*		1		1			1996-2 nests;02.10.95-300 ind.
217.	Corvus monedula			2		2		07.03.96-32 ind.;22.09.96-11 ind.
218.	Corvus frugilegus			2		2	2	09.04.96-26 ind.;29.10.95-33 ind.;02.01.93-15 ind.
219.	Corvus corone			1		1	2	16.04.96.-2 ind.;12.11.96-2 ind.;15.01.97-16 ind.
220.	Corvus corax			1			1	10.05.95-5 ind.;14.10.96-1 ind.
221.	Sturnus vulgaris*			1	1		4	03.05.95-9 ind.;1995-1 br.pair;02.01.93-2000 ind.
222.	Sturnus roseus	2						04.04.47-10 ind.(Prostov,1964),30.05.96-7 ind.
223.	Passer domesticus		2					I-XII
224.	Passer hispaniolensis*				1			1996-(4-5) nests, IV-IX
225.	Passer montanus		1					I-XII
226.	Fringilla coelebs			1		2	2	12.03.96-7 ind.;21.10.96-39 ind.15.01.97-24 ind.
227.	Fringilla montifringilla						1	15.12.94-8 ind.
228.	Serinus serinus						2	06.02.96-18 ind.
229.	Carduelis chloris						2	07.01.96-23 ind.
230.	Carduelis carduelis					2	1	20.10.96-18 ind.;15.01.97-8 ind.
231.	Carduelis spinus					2	1	29.09.96-50 ind.;29.10.96-93 ind;15.01.97-4 ind.
232.	Carduelis canabina			2		2	1	12.03.95-11 ind.;20.10.96-11 ind.;20.12.95-8 ind.
233.	Coccothraustes coccothraustes			2		1	2	14.03.96-11 ind.;22.09.95-5 ind.;15.01.97-31 ind
234.	Emberiza cirlus			2		1	1	12.03.93-11 ind.;15.09.95-5 ind.;02.01.93-7 ind.
235.	Emberiza schoeniculus	1		2		2	2	17.06.96-1 ind.;02.04.96-13 ind.;29.10.96-41 ind.;02.12.96-36 ind.
236.	Emberiza melanocephala			1				31.05.96-1 ind.
237.	Miliaria calandra			1		3	2	02.05.87-5 ind.;12.11.96-300 ind.;07.01.96-30 ind
238.	Plectrophenax nivalis					1		29.11.96-1 ind. (Georgieva)

Table 12. Nature conservation status of the bird species established in PODA protected area till 15.01.1997.

LAW - Order N342 from 21.04.1986 г. for protection of the extinction and threatened with extinction bird species (SN,бр.42,1986).
RDB - "Red Data Book of Bulgaria" (1985).
rare: * threatened: ** extinct: ***
SPEC - Species with European conservation value (Tucker,Heath,1994).
SPEC 1 - Species of global conservation concern
SPEC 2 - Concentrated in Europe and with unfavourable conservation status
SPEC 3 - Not concentrated in Europe but with unfavourable conservation status
SPEC 4 - Concentrated in Europe and with a favourable conservation status
"W" - Category relates to winter populations
ETS - status of threatened (Tucker, Heath,1994).
E - Endangered L - Localized ( ) - Status provisional
V - Vulnerable S - Secure
R - rare D - Declining
RAMSAR - numerical criteria of the Convention for international important wetlands as habitats for waterfowl
"ALL" - all places where certain species could be found regularly are with international importance
BERN - Convention for protection of the wild European flora and fauna and nature habitats (App I,II)(SG.,бр.13,1991)
BONN - Convention for protection of the migrating wild animals (App I,II)
CORINE - CORINE Programme.

N	SPECIES	LAW	RDB	SPEC	ETS	RAMSAR (numerical criteria)				BERN	BONN	CORINE
						nesting pairs		wintering				
							PODA		PODA			
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*	*13.*
1.	Gavia stellata	+			V					II	II	+
2.	Gavia arctica	+	*	3	V					II	II	+
3.	Tachybaptus ruficollis*	+			S					II		+
4.	Podiceps cristatus	+			S					III		
5.	Podiceps grisegena	+	*		S					II	II	
6.	Podiceps nigricollis	+	**		S					II		
7.	Phalacrocorax carbo	+	**		S	100		1000	350	III		+
8. .	Phalacrocorax pygmeus*	+	**	2	V	50	30/92	250	175	II	II	+
9.	Pelecanus onocrotalus	+	***	3	R	800				II	I\II	+
10.	Pelecanus crispus	+	**	1	V	ALL		25	203	II	I\II	+
11.	Botaurus stellaris	+	**	3	(V)	25				II	II	+

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
12.	Ixobrychus minutus	+		3	(V)					II	II	+
13.	Nycticorax nycticorax*	+		3	D	200	30	600		II		+
14.	Ardeola ralloides	+		3	V	40		120		II		+
15.	Egretta garzetta*	+			S	130	70	400		II		+
16.	Egretta.alba	+	**		S	5		120	131	II	II	+
17.	Ardea cinerea*	+			S					III		
18.	Ardea purpurea*	+	**	3	V	65	20	200		II	II	+
19.	Ciconia ciconia	+		2	V			4000		II	II	+
20.	Ciconia nigra	+	**	3	R			350		II	II	+
21.	Plegadis falcinellus*	+	**	3	D	35	30/94	100		II	II	+
22.	Platalea leucorodia*	+	**	2	E	20	32	60		II	II	+
23.	Cygnus olor	+	**		S			200	62	III	II	
24.	Cygnus.cygnus	+		4^{w}	S			170	46	II	II	+
25.	Cygnus columbianus	+		3^{w}	L^{w}			170	10	II	II	+
26.	Anser albifrons				S			2500	1810	II	II	+
27.	Anser anser*	+	**		S			250	25	III	II	
28.	Branta ruficollis	+	**	1	L^{w}			650	15	II	II	+
29.	Tadorna ferruginea	+	**	3	V			200		II	II	+
30.	Tadorna tadorna*	+	**		S			600	65/95	II	II	
31.	Anas penelope				S			6000	28/95	III	II	
32.	Anas strepera	+	**	3	V			750	25/96	III	II	
33.	Anas crecca				S			10000	414	III	II	
34.	Anas platyrhynchos*				S			20000	950	III	II	
35.	Anas acuta			3	V			3000	43/93	III	II	
36.	Anas querquedula			3	V			2500	150/95	III	II	
37.	Anas clypeata				S			2200	350	III	II	
38.	Netta rufina	+	*	3	D			500	8	III	II	
39.	Aythya fuligula				S			6000	12800	III	II	
40.	Aythya ferina*	+	**	4	S			12500	7600/93	III	II	
41.	Aythya nyroca*	+	**	1	V			750	12/92	III	II	+
42.	Aythya marila	+		3^{w}	L^{w}			500	5/93	III	II	
43.	Somateria mollissima	+	*		S			10000	2/95	III	II	
44.	Clangula hyemalis	+			S					III	II	
45.	Melanitta fusca	+		3^{w}	L^{w}			2000	46/89	III	II	

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
46.	Bucephala clangula				S			200	68/93	III	II	
47.	Mergus merganser	+			S			100	13	III	II	
48.	Mergus serrator	+			S			500	18	III	II	
49.	Mergus albellus	+		3	V			650	200	II	II	
50.	Oxyura leucocephala	+	*	1	E	ALL		170	183/93	II	I\II	+
51.	Pernis apivorus	+	**	4	S					II	II	+
52.	Milvus migrans	+	**	3	V					II	II	+
53.	Milvus.milvus	+	*	4	S					II	II	+
54.	Haliaeetus albicilla	+	**	3	R					II	II	+
55.	Neophron percnopterus	+	**	3	E					II	II	+
56.	Gyps fulvus	+	**	3	R					II	II	+
57.	Circaetus gallicus	+	**	3	R					II	II	+
58.	Circus aeruginosus*	+	**		S					II	II	+
59.	Circus cyaneus	+	*	3	V					II	II	+
60.	Accipiter gentilis	+	**		S					II	II	+
61.	Accipiter nisus	+	**		S					II	II	+
62.	Buteo buteo	+			S					II	II	+
63.	Aquila pomarina	+	**	3	R					II	II	+
64.	Aquila clanga	+	*	1	E					II	II	+
65.	Aquila heliaca	+	**	1	E					II	II	+
66.	Aquila chrysaetus	+	*	3	R					II	II	+
67.	Hieraaetus pennatus	+	**	3	R					II	II	+
68.	Pandion haliaetus	+	**	3	R					II	II	+
69.	Falco tinnunculus*	+		3	D					II	II	+
70.	Falco vespertinus	+	*	3	V					II	II	
71.	Falco columbarius	+			S					II	II	+
72.	Falco subbuteo	+	**		S					II	II	
73.	Falco eleonorae	+		2	R					II	II	+
74.	Falco peregrinus	+	**	3	R					II	II	+
75.	Perdix perdix*			3	V					III		+
76.	Coturnix coturnix			3	V					III	II	+
77.	Rallus aquaticus*	+			(S)					III		
78.	Crex crex	+	**	1	V					II		+
79.	Gallinula chloropus*	+			S					III		

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
80.	Fulica atra*				S			20000	2500	II	II	
81.	Grus grus	+	***	3	V			200		II	II	+
82.	Haematopus ostralegus*	+	**		S			7500	3/95	III		
83.	Himantopus himantopus*	+	**		S	50	25	150		II		+
84.	Recurvirostra avosetta*	+	*	4/3^{w}	L^{w}	100	5	250	1/95/	II	II	+
85.	Glareola pratincola	+	**	3	E	30		100		II		+
86.	Charadrius dubius*	+			(S)					II	II	
87.	Charadrius hiaticula	+			S			1000		II	II	
88.	Charadrius alexandrinus*	+	*	3	D	100	2	250		II	II	
89.	Charadrius morinellus	+			(S)					II	II	+
90.	Pluvialis squatarola	+			(S)			800	7	III	II	
91.	Hoplopterus spinosus	+		3	(E)					II	II	+
92.	Vanellus vanellus	+			(S)			20000		III	II	
93.	Calidris alba	+			S			500	7	II	II	
94.	Calidris minuta	+			(S)					II	II	
95.	Calidris temminckii	+			(S)					II	II	
96.	Calidris ferruginea	+								II	II	
97.	Calidris alpina	+		3^{w}	V^{w}			20000	90/93	II	II	
98.	Limicola falcinellus	+		3	(V)					II	II	
99.	Philomachus pugnax	+		4	(S)					III	II	+
100.	Gallinago gallinago		***		(S)					III	II	
101.	Gallinago media	+	*	2	(V)					II	II	+
102.	Scolopax rusticola		*	3^{w}	V^{w}					II	II	
103.	Limosa limosa	+		2	V			3500	6/93	III	II	
104.	Limosa lapponica	+		3^{w}	L^{w}			5500		III	II	
105.	Numenius phaeopus	+		4	(S)			500		III	II	
106.	Numenius.tenuirostris	+		1		( )		3		II	I/II	+
107.	Numenius arquata	+		3^{w}	D^{w}			3000	11	III	II	
108.	Tringa erythropus	+			S					III	II	
109.	Tringa totanus	+	**	2	D					III	II	
110.	Tringa stagnatilis	+	*		(S)					II	II	
111.	Tringa nebularia	+			S					III	II	
112.	Tringa ochropus	+	**		(S)					II	II	
113.	Tringa glareola	+		3	D					II	II	+

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
114.	Xenus cinereus	+			(S)					III	II	
115.	Actitis hypoleucos	+			S					III	II	
116.	Arenaria interpres	+			S					II	II	
117.	Phalaropus lobatus	+			(S)					II	II	+
118.	Stercorarius pomarinus	+			(S)					III		
119.	Stercorarius parasiticus	+			(S)					III		
120.	Larus melanocephalus	+	*	4	S					II	II	+
121.	Larus minutus	+		3	D					II		
122.	Larus ridibundus	+	*		S					III		
123.	Larus genei	+	*		(S)					II	II	+
124.	Larus canus	+		2	D					III		
125.	Larus fuscus	+		4	S							
126.	Larus cachinnans				(S)					III		
127.	Gelochelidon nilotica	+	**	3	(E)	20		200		II	II	+
128.	Sterna caspia	+	*	3	(E)					II	II	+
129	Sterna sandvicensis	+		2	D	400		( )		II	II	+
130.	Sterna hirundo*	+			S	700	51			II	II	+
131.	Sterna albifrons*	+	**	3	D	100	6/95			II	II	+
132.	Chlidonias hybridus	+	**	3	D	750				II		+
133.	Chlidonias niger	+	**	3	D	200		600		II	II	+
134.	Chlidonias leucopterus	+			S					II	II	+
135.	Columba livia domestica*											
136.	Columba oenas	+	**	4	S					III		
137.	Columba palumbus			4	S					III		+
138.	Streptopelia decaocto				(S)					III		
139.	Streptopelia turtur			3	D					III		
140.	Cuculus canorus	+			S					III		
141.	Tyto alba	+	*	3	D					II		
142.	Otus scops	+		2	D					II		
143.	Asio flammeus	+	*	3	(V)					II		+
144.	Caprimulgus europaeus	+		2	(D)					II		+
145.	Apus apus	+			S					III		
146.	Alcedo atthis	+		3	D					II		+
147.	Merops apiaster*	+		3	D					II	II	

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
148.	Coracias garrulus	+		2	(D)					II	II	+
149.	Upupa epops	+			S					II		
150.	Jynx torquilla	+		3	D					II		
151.	Picus viridis	+		2	D					II		
152.	Dendrocopus mayor	+			S					II		+
153.	Dendrocopus syriacus	+		4	(S)					II		+
154.	Melanocorypha calandra	+		3	D					II		+
155.	Calandrella brachydactyla	+		3	V					II		+
156.	Galerida cristata	+		3	(D)					III		
157.	Lullula arborea	+		2	V					III		+
158.	Alauda arvensis	+		3	V					III		
159.	Riparia riparia*	+		3	D					II		
160.	Hirundo rustica*	+		3	D					II		
161.	Delichon urbica*	+			S					II		
162.	Anthus trivialis	+			S					III		
163.	Anthus pratensis	+		4	S					III		
164.	Anthus spinoletta	+			S					III		
165.	Motacilla flava*	+			S					II		
166.	Motacilla cinerea	+			(S)					II		
167.	Motacilla alba	+			S					II		
168.	Troglodytes troglodytes	+			S					II		+
169.	Prunella modularis	+		4	S					II		
170.	Erithacus rubecula	+		4	S					II	II	
171.	Luscinia megarhynchos	+		4	S					II	II	
172.	Phoenicurus ochruros	+			S					II	II	
173.	Phoenicurus phoenicurus	+		2	V					II	II	
174.	Saxicola rubetra	+		4	S					II	II	
175.	Saxicola torquata	+		3	(V)					II	II	
176.	Oenanthe isabellina	+			(S)					II	II	
177.	Oenanthe oenanthe*	+			S					II	II	
178.	Turdus merula	+		4	S					III	II	
179.	Turdus pilaris	+		4	S					III	II	
180.	Turdus philomelos	+		4	S					III	II	
181.	Turdus viscivorus	+		4	S					III	II	

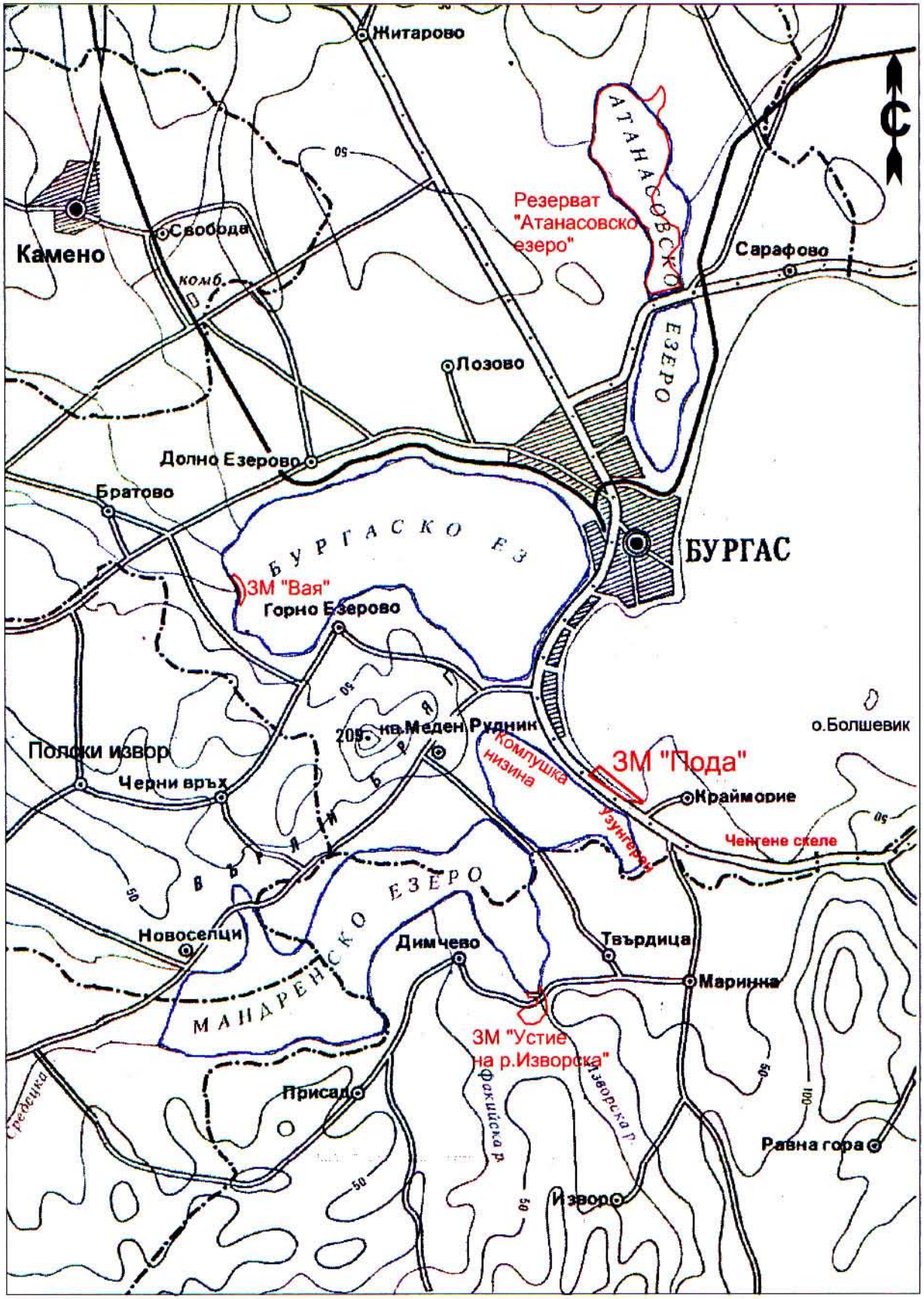
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
182.	Cettia cetti	+			S					III	II	
183.	Locustella fluviatilis	+		4	S					II	II	
184.	Locustella luscinioides	+		4	(S)					II	II	
185.	Acrocephalus melanopogon	+			(S)					II	II	+
186.	Acrocephalus schoenobaenus	+		4	(S)					II	II	
187.	Acrocephalus palustris	+		4	S					II	II	
188.	Acrocephalus scirpaceus*	+		4	S					II	II	
189.	Acrocephalus arundinaceus*	+			(S)					II	II	
190.	Hippolais pallida	+		3	(V)					II	II	
191.	Sylvia curruca	+			S					II	II	
192.	Sylvia communis	+		4	S					II	II	
193.	Sylvia atricapilla	+		4	S					II	II	
194.	Phylloscopus sibilatrix	+		4	(S)					II	II	
195.	Phylloscopus collybita	+			S					II	II	+
196.	Phylloscopus trochilus	+			S					II	II	
197.	Regulus regulus	+		4	(S)					II	II	
198.	Muscicapa striata	+		3	D					II	II	
199.	Ficedula parva	+			(S)					II	II	+
200.	Ficedula albicollis	+		4	S					II	II	+
201.	Ficedula hypoleuca	+		4	S					II	II	
202.	Panurus biarmicus*	+	*		(S)					II		
203.	Aegithalos caudatus*	+			S					III		
204.	Parus palustris	+			S					II		
205.	Parus montanus	+			(S)					II		
206.	Parus ater	+			S					II		
207.	Parus caeruleus	+		4	S					II		
208.	Parus mayor	+			S					II		
209.	Certhia familiaris	+			S					II		
210.	Remiz pendulinus*	+			(S)					III		
211.	Oriolus oriolus*	+			S					II		
212.	Lanius collurio	+		3	(D)					II		+
213.	Lanius minor	+		2	(D)					II		+
214.	Lanius senator	+		2	V					II		
215.	Garrulus glandarius				(S)							

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
216.	Pica pica*				S							
217.	Corvus monedula			4	(S)							
218.	Corvus frugilegus				S							
219.	Corvus corone				S							
220.	Corvus corax	+			(S)							
221.	Sturnus vulgaris*				S					II		
222.	Sturnus roseus	+	*		(S)							
223.	Passer domesticus				S							
224.	Passer hispaniolensis*	+			(S)					III		
225.	Passer montanus				S					III		
226.	Fringilla coelebs	+		4	S					III		+
227.	Fringilla montifringilla	+			S					III		
228.	Serinus serinus	+		4	S					II		
229.	Carduelis chloris	+		4	S					II		
230.	Carduelis carduelis	+			S					II		
231.	Carduelis spinus	+		4	S					II		
232.	Carduelis canabinna	+		4	S					II		+
233.	Coccothraustes coccothraustes	+			S					II		
234.	Emberiza cirlus	+		4	S					II		
235.	Emberiza schoeniculus	+			S					II		
236.	Emberiza melanocephala	+		2	V					II		
237.	Miliaria calandra	+		4	S					III		
238.	Plectrophenax nivalis	+			S					II		

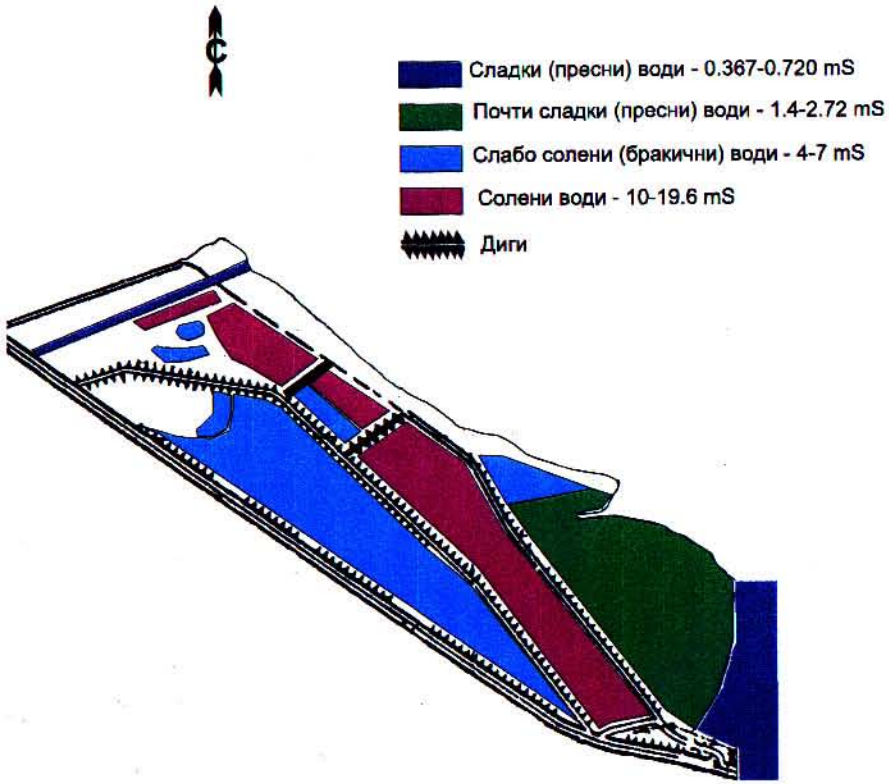
Table 13. Check list of the mammal species occurring in PODA protected area.

RDB - species included in Bulgarian Red Data Book
CORINE - species included in Corine list of threatened species

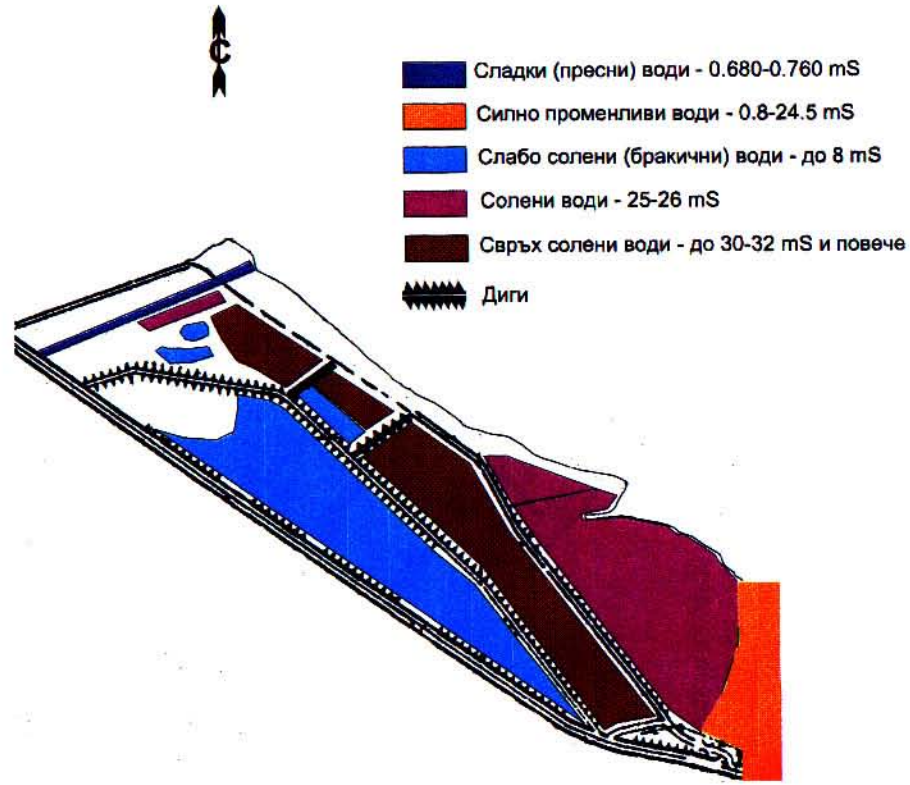
N	ORDER	SPECIES	STATUS	COMMENTS
	Insectivora			
1.		Erinaceus concolor		Single individuals in the N part of the protected area.
2.		Crocidura suaveolens		Numerous. In the whole protected area.
3.		Neomys anomalus		Numerous by the "Komlouk channel"
4.		Suncus etruscus		Rare for the country. In PODA it is found by the "Komlouk channel"
	Chiroptera			
5.		Vespertilio murinus		One dead individuals on the road by village Tchernomoretz. Possibly occurred in PODA.
	Rodentia			
6.		Micromys minutus		Rare for the protected area.
7		Apodemus sp.		Common for the protected area.
8.		Rattus sp.		Common for the protected area.
9.		Mus sp.		Numerous for the protected area.
10.		Arvicola terrestris		Common for the protected area. Around the pool "Lopatarskata lokva".
11.		Microtus arvalis		Common for the protected area.
12.		Myocastor coypus		Common for the protected area. In the E part among the reedbeds in the sea.
	Carnivora			
13.		Mustela nivalis		One individual in the N part close to the ship yard fence.
14.		Mustela putorius		One dead individual on the road.
15.		Lutra lutra	*RDB CORINE*	Two dead individuals on the road in the NW part by the "Komlouk channel".



Фиг.1. Географско местоположение на защитена местност "Пода" спрямо комплекса езера около Бургас.

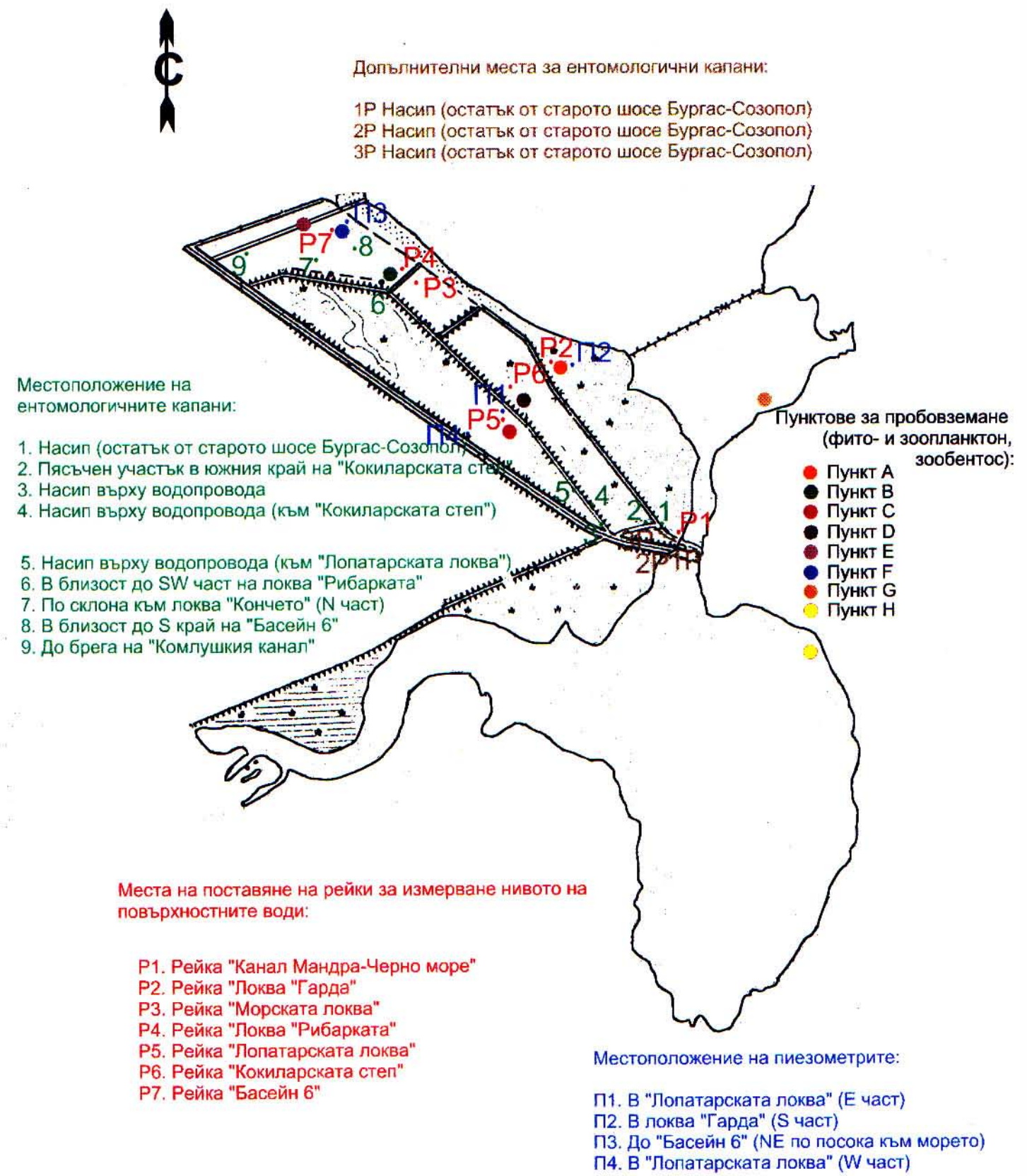


Март 1996 г.

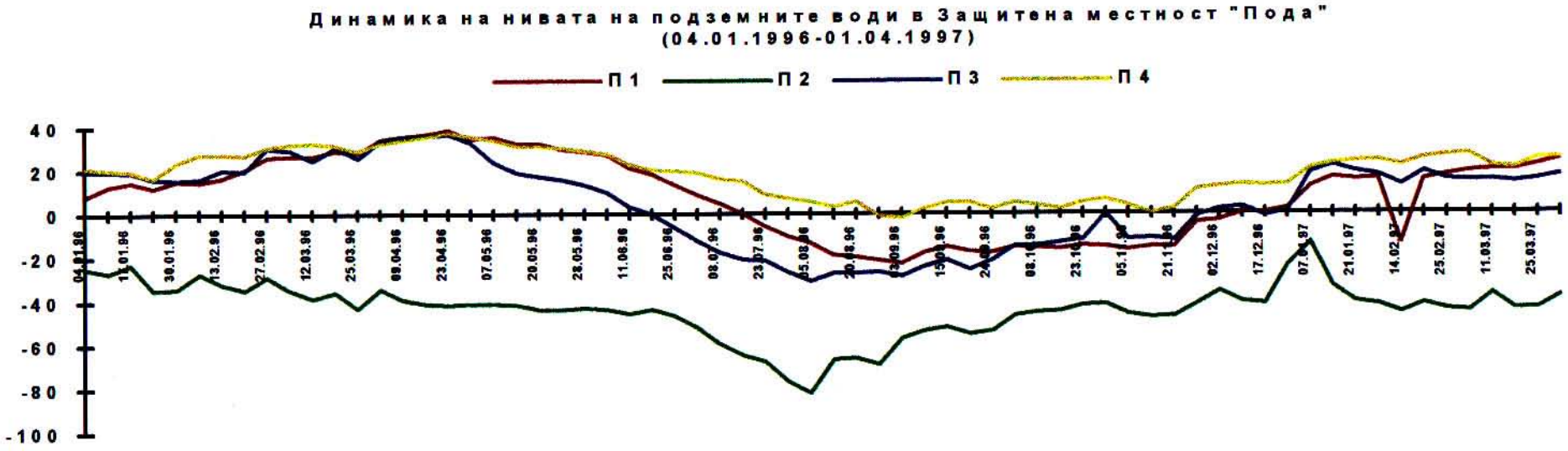


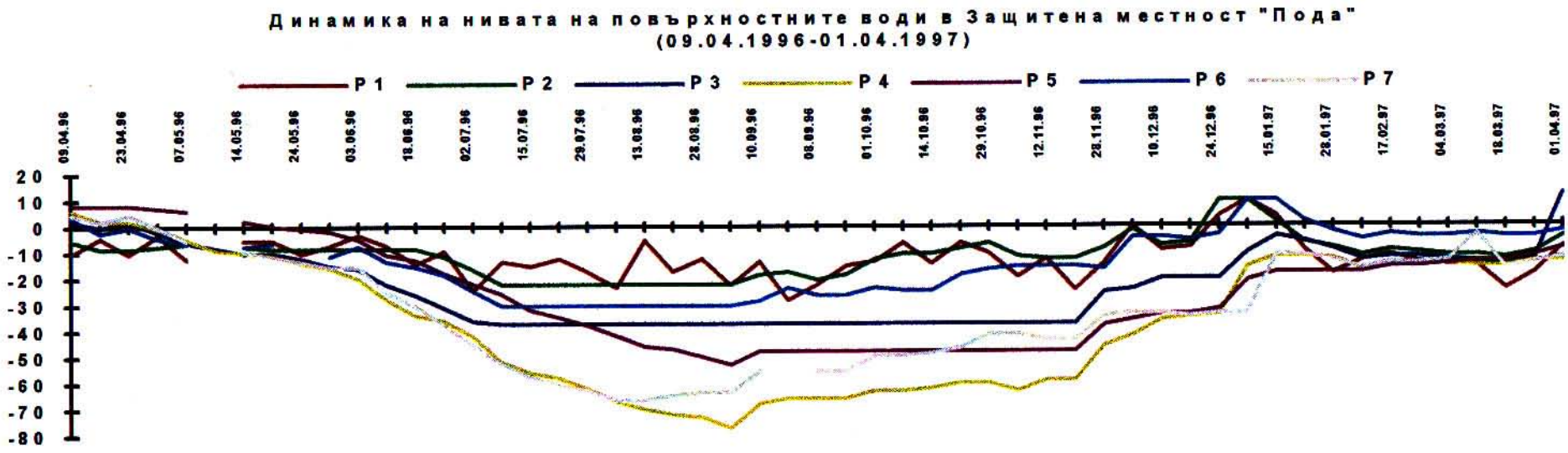
Август 1996 г.

Фиг.2. Промяна в степента на обща минерализация на водоемите в защитена местност "Пода" през годината.

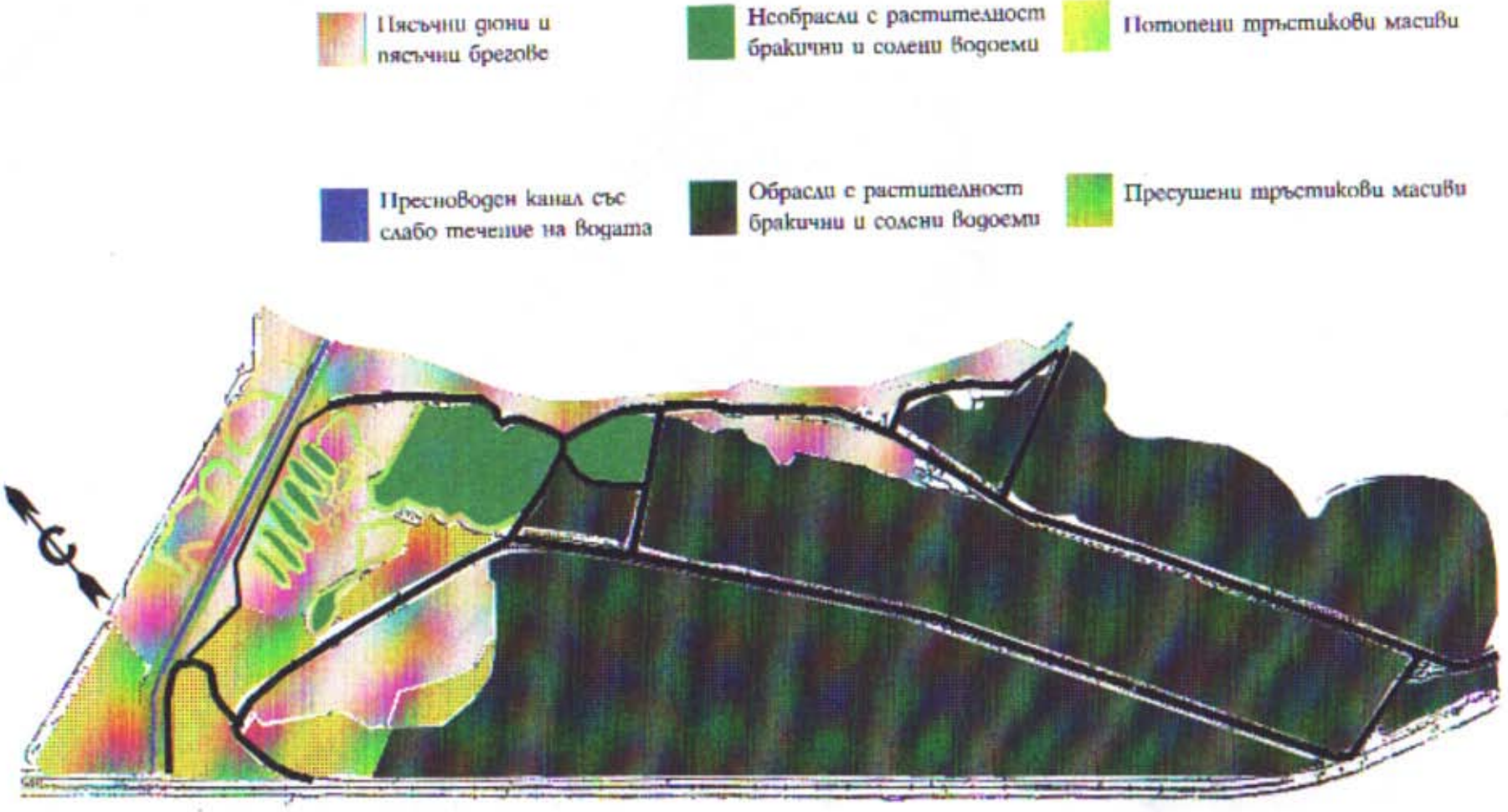


Фиг.3. Разположение на пунктовете за пробовземане - (фитопланктон; зоопланктон; зообентос; ентомологични капани; рейки и пиезометри).

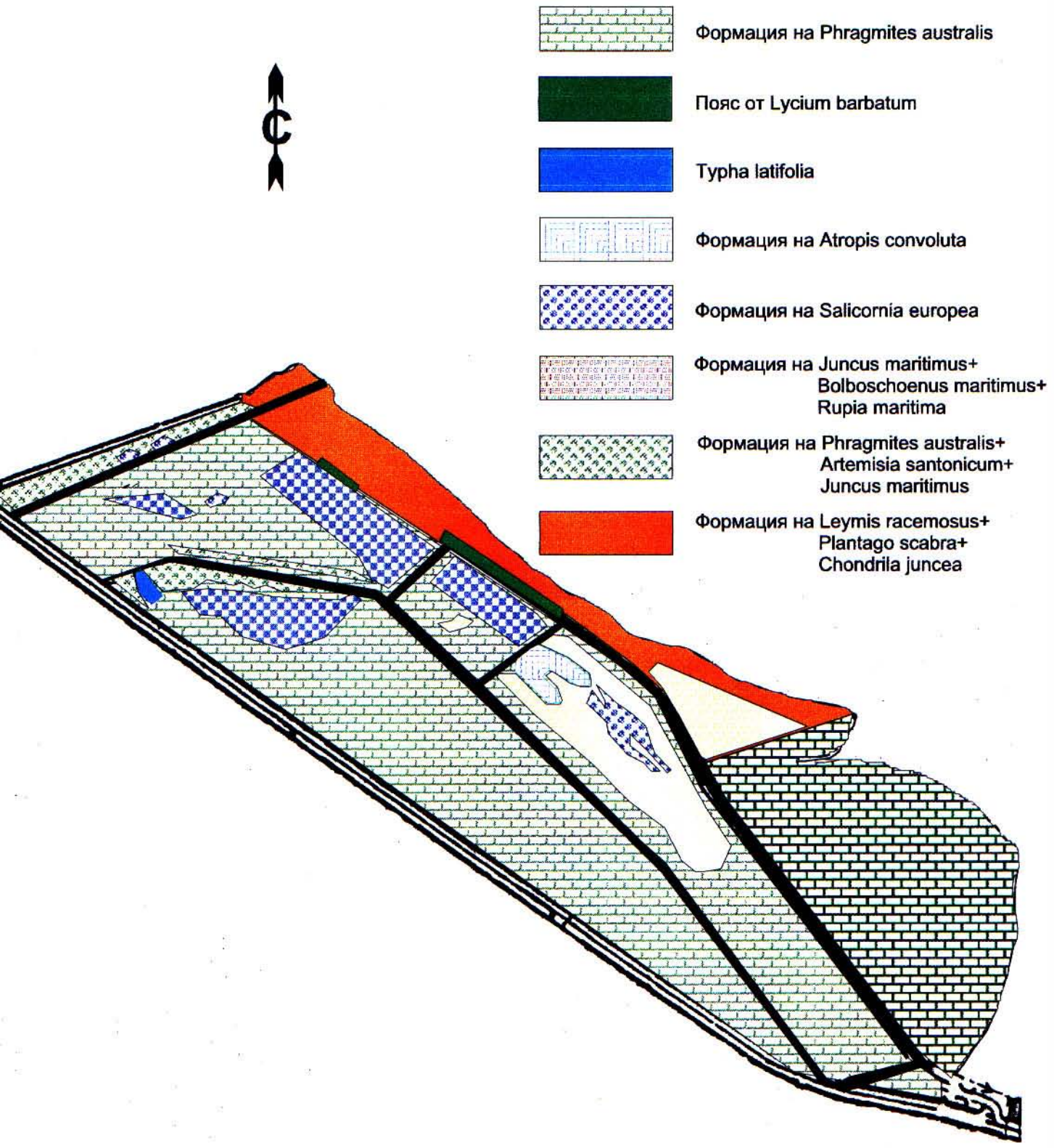




Фиг.4. Динамика на нивата на подземните и повърхностни води в защитена местност “Пода”.
П1-П4 (пиезометри); Р1-Р7 (рейки); за допълнителна информация - фиг.3.



Фиг.5. Хабитати в защитена местност "Пода" (по CORINE).



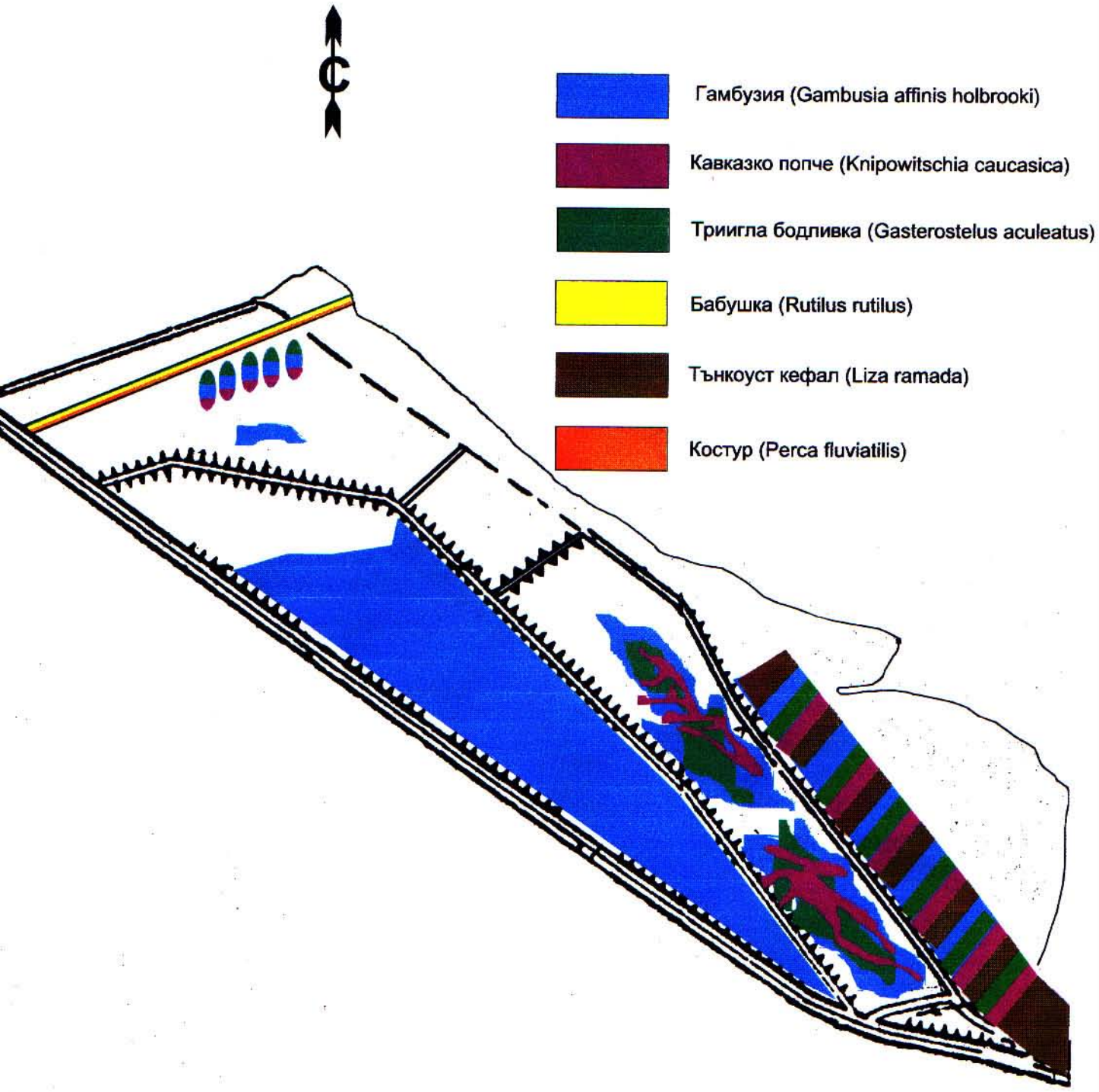
Фиг.6. Карта на растителността в защитена местност "Пода".

Фиг. 7. Развитие на пръстеновидни масиви на територията на защитена местност "Пода"(аерофото снимка от 1965 г.).

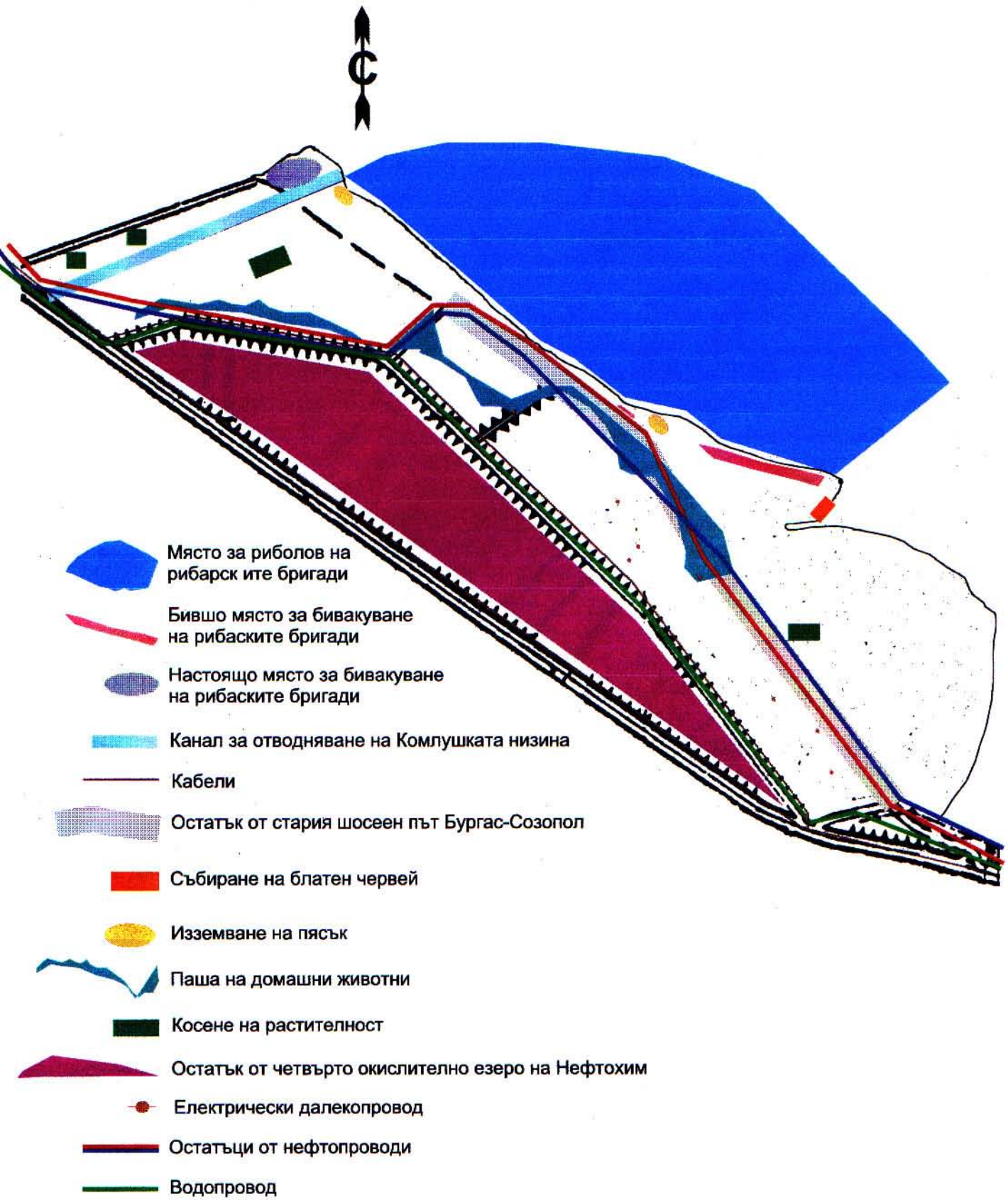
Фиг. 8. Развитие на тръстиковите масиви на територията на защитена местност "Пода"(аерофото снимка от 1978 г.).

Фиг. 9. Развитие на пръстиковите масиви на територията на защитена местност "Пода"(аерофото снимка от 1986 г.).

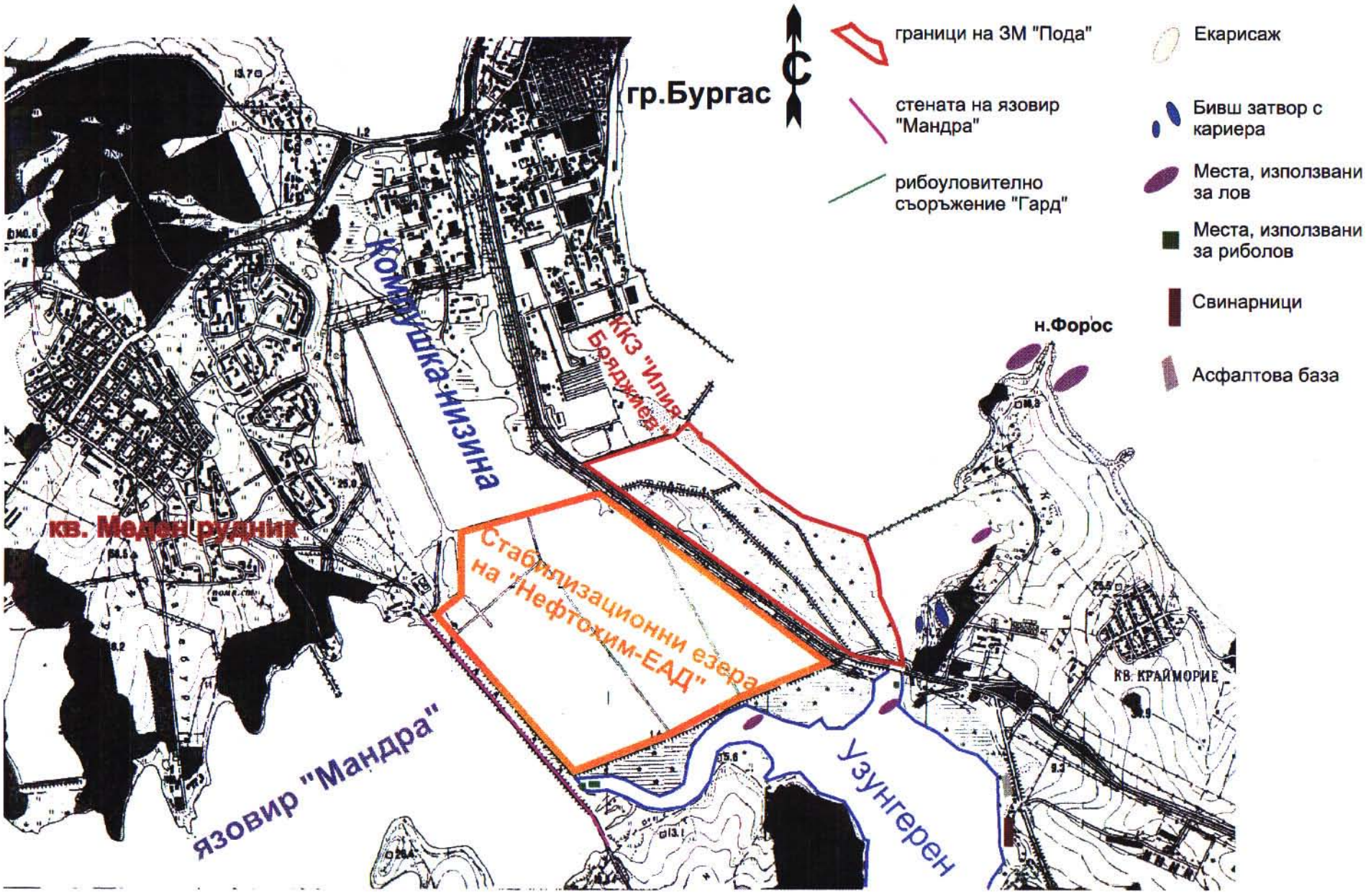
Фиг. 10. Развитие на тръстиковите масиви на територията на защитена местност "Пода"(аерофото снимка от 1995 г.).



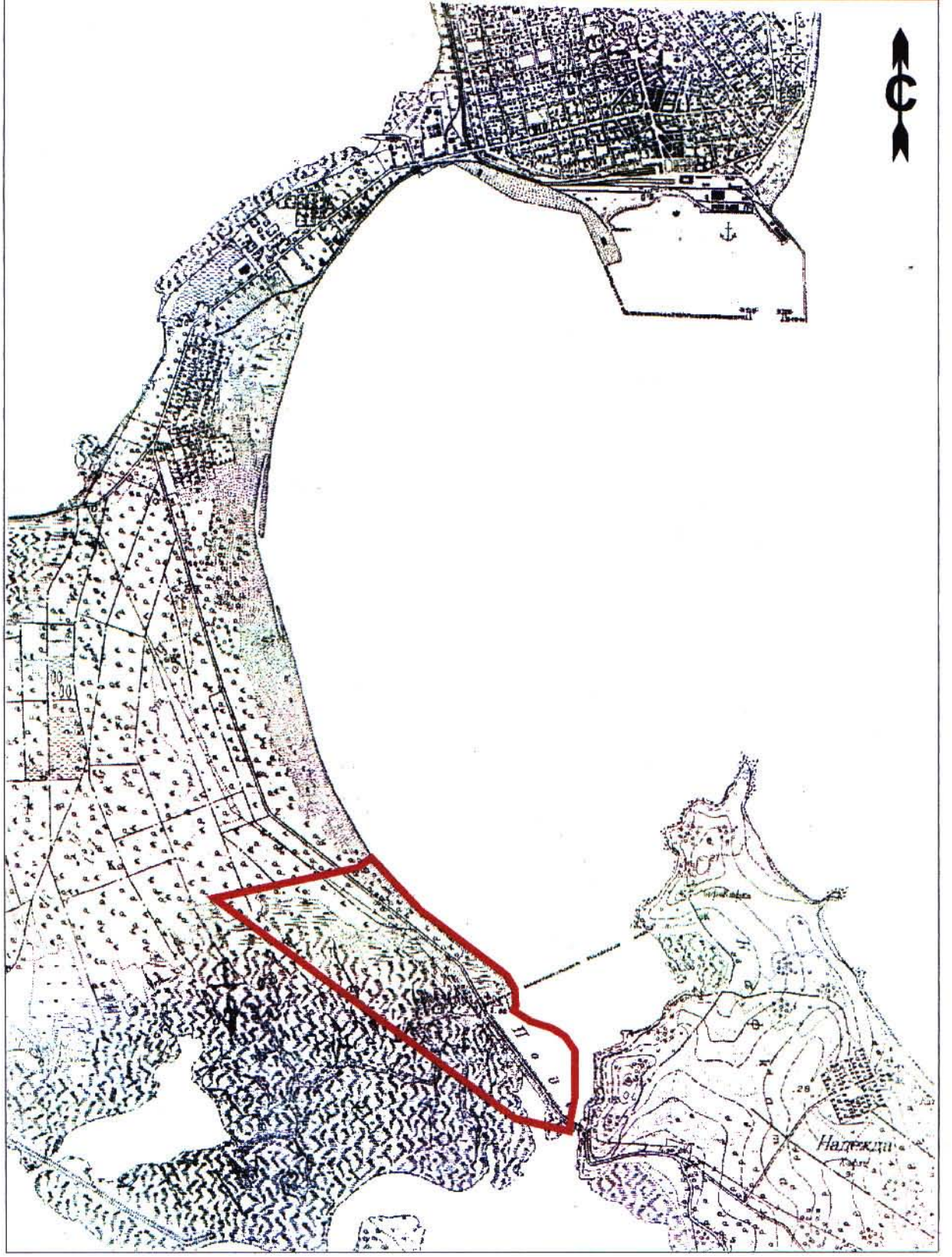
Фиг.11. Разпространение на рибите в защитена местност "Пода".



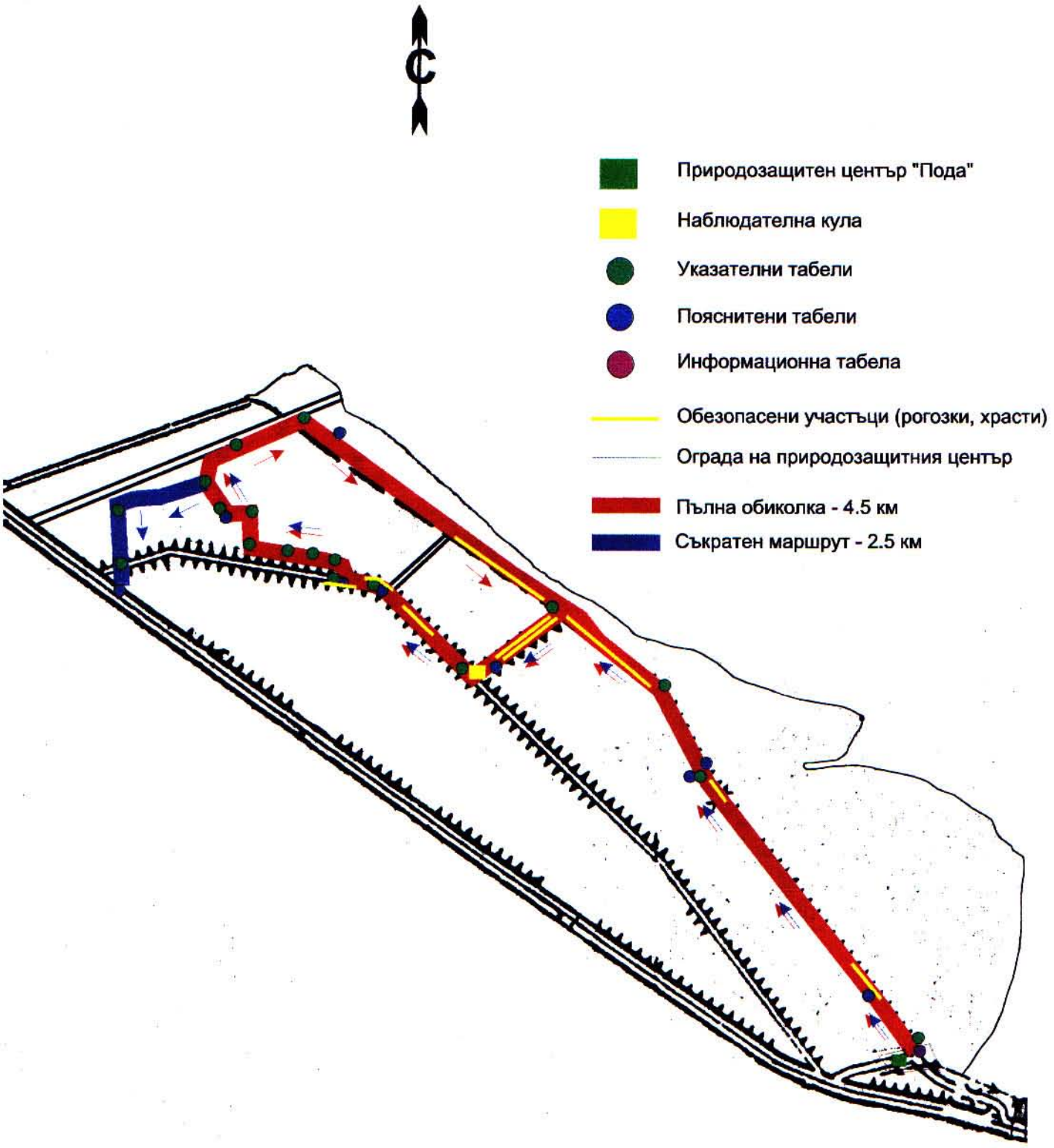
Фиг.12. Минало и настоящо използване на територията на защитена местност "Пода".



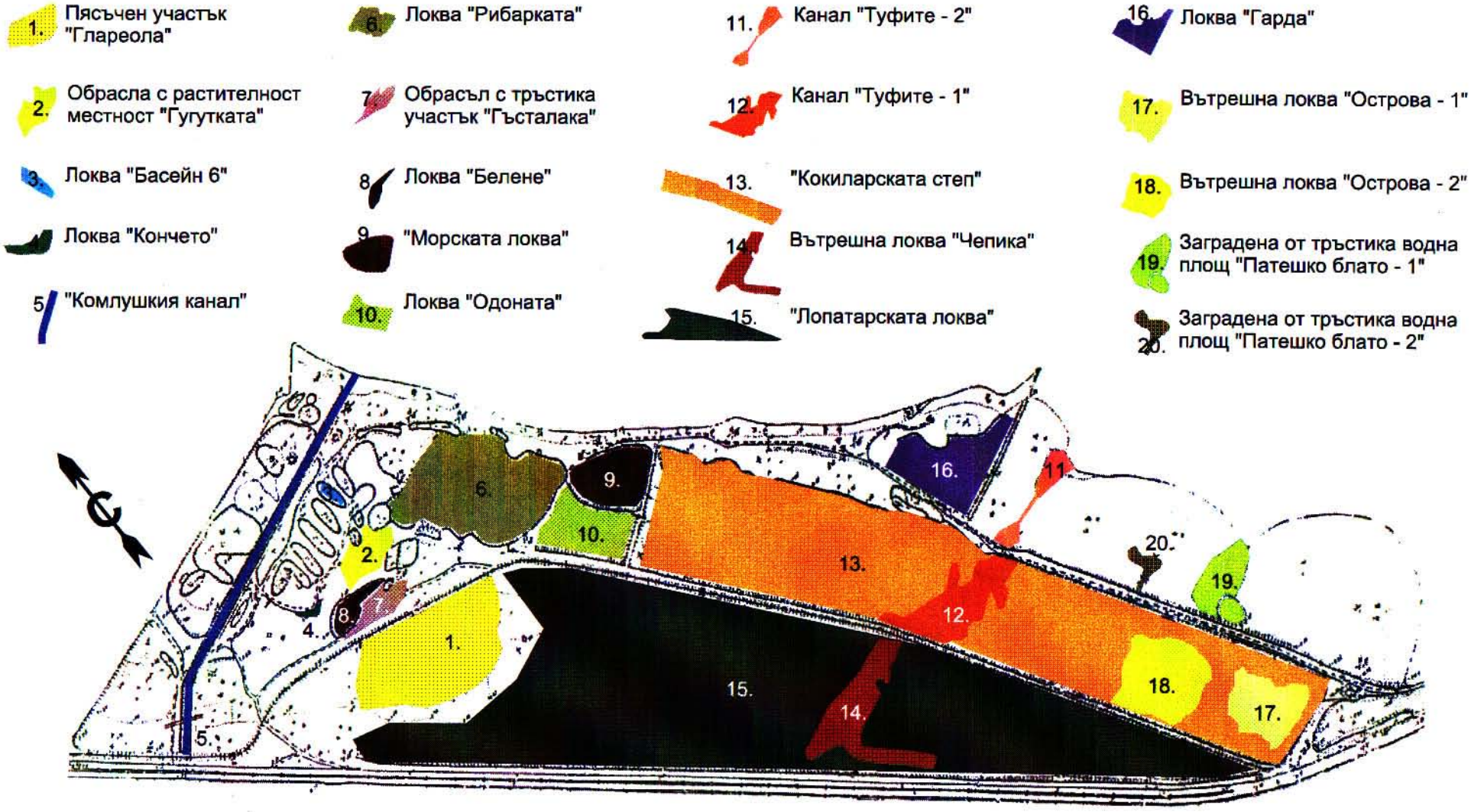
Фиг.13. Използване на земята в съседни територии на защитена местност "Пода".



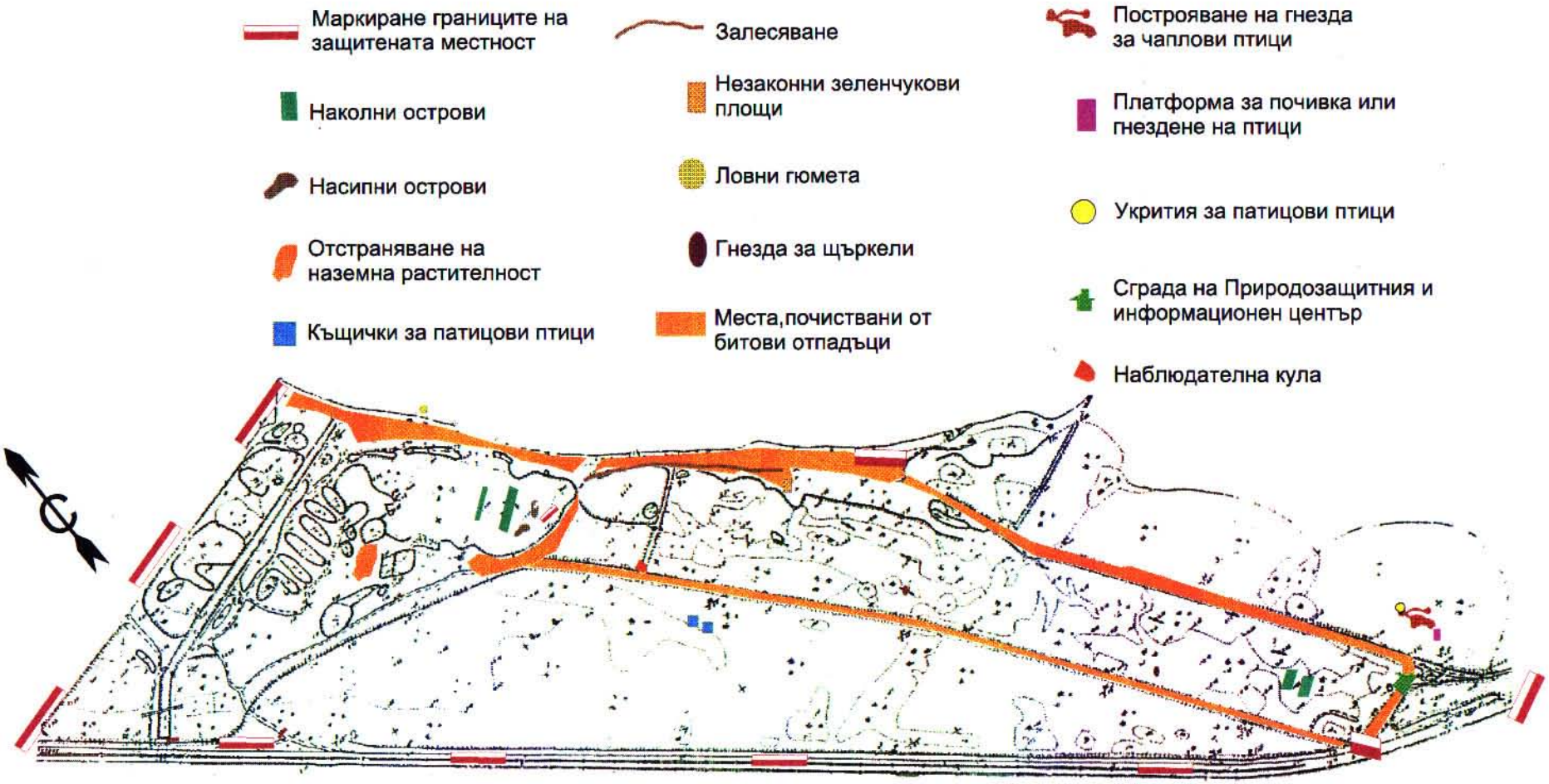
Фиг.14. Територията на защитена местност "Пода" в миналото (карта от 1937 г.).



Фиг.15. Маршрут на познавателната пътека.



Фиг.16. Условно зониране на защитена местност "Пода"



Фиг.17. Дейности на БДЗП за проучване и опазване на ЗМ "Пода".