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**THE BLACK SEA  
ECOLOGICAL PROBLEMS**

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Цей збірник наукових доповідей присвячений основним підсумкам виконання Стратегічного плану дій по реабілітації і охороні Чорного моря (1996-2000 рр.), підсумкового документа першого етапу виконання Міжнародної Чорноморської Екологічної Програми ООН. У цьому зв'язку надруковані матеріали відображають основні розділи Програми, а саме: швидке реагування при надзвичайних ситуаціях, моніторинг забруднення і стандарти якості навколишнього середовища, захист біологічної різноманітності, розробка загальної методології управління прибережною зоною моря, рибальство, освіта і громадська поінформованість в природоохоронній області. В статтях представлені результати раніше не надруковані результати наукових досліджень. Подані дані, їх інтерпретація і закінчення належать авторам повідомлень і ні в коєму разі не можуть бути приписані членам організаційного комітету, які склали даний збірник.

Збірник призначень для широкого кола спеціалістів у галузі біології і екології моря, океанографії, техногенної безпеки і охорони природи.

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Present issue is devoted to the main results of Strategic Action Plan for the Rehabilitation and Protection (SAPRP) of the Black Sea (1996-2000) implementation. The SAPRP is a resulting document of the Black Sea Environmental Program (GEF/UN/UNDP) first step. The published materials have been reflected by the main Program sections: emergency response, pollution monitoring and environmental quality standards, protection of biodiversity, integrated coastal zone management, fisheries, environmental education and public awareness. These papers are the results of scientific research haven't been unpublished earlier. The findings, interpretations and conclusions expressed in papers, are in own property of the authors and should not be attributed in any manner to the members of organization committee, which prepared this issue.

The issue was design for specialists in the field of marine biology and ecology, oceanology, technogenic safety and environmental protection.

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**ABOUT NECESSITY OF SMALL PHYLLOPHORA FIELD  
BIOCENOSIS (KARKINITSKY BAY) PROTECTION**

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Red algae supplies preservation is one of the major aspects of Black Sea ecosystem protection. The pontic endemial ribbed Phyllophora (*Phyllophora nervosa*) was the key species, which formed specific association on North-Western shelf of Black Sea. In a whole, existence of about 60 species of living organisms have been connected more or less with Phyllophora biocenosis, from which 10 chronicled Red Ukraine, and 24 species, in that number, Phyllophora ribbed, in International Red Book of Black Sea (Black Sea Red Data Book).

The preservation of red algae biocenosis is directly connected with supporting and restoring of Black Sea ecosystem biodiversity in a whole. At present time it is necessary to understand, that only protecting of integral associations, but not separate species can in this case find oneself effective.

In North-Western part of Black Sea have been marked two main regions where the red layer-forming algae were accumulated - Big Phyllophora field (or «Zernov field»), and Small Phyllophora field.

The Zernov field (ZF) was situated in a central part of North-Western part of Black Sea shelf. It's area in 1908-1940 years valued in 11 th. km<sup>2</sup>, reserve of Phyllophora - in 10 millions of tons (Zernov, 1909; Zenkevitch, 1963). At present time one can is says about actual end of its existence as the single ecosystem; sharp reducing of its area, biomass of algae and their production.

At first, Phyllophora mass death on ZF have been marked in 1974, whereupon it's biomass and reserve steadfastly became lowered. Already in 1978 it's reserve valued in 726000 tones, and in 1985 - 492000 tones. The average biomass of Phyllophora from 1973 to 1985 reduced in 3,34 times. Progressing ZF depression is accounted for by lowering of water transparence, along of that the photosinthetic processes can not take place with normal intensity.

In 1984 ZF researches realized by submarine habitable vehicle "Argus" have taken place. It was discovered, that on 2 inspected areas Phyllophora accumulations covered less than 1 - 2 % of bottom. There were fixed almost full absence animals of zoobenthos, which was related to Phyllophora fauna poorness; the covering color of many species of invertebrates and fishes which lived here lost its significance (Zaitsev and oth., 1987).

According to results of YugNIRO scientists researches, carried out in may 2000, it turned out, that on "zhelob snosa" area, where last years traditionally conducted industrial Phyllophora extraction, the industrial accumulations was absent. On much areas practically haven't been checked off algae increase; also there have been registered a multitude of dying algae. A general reserve here have been valued in a whole in 8400 tones. Such essential changes of Phyllophora State and reserve had a great bad influence on a whole biocenosis state. This is born out by episodic researches in region ZF. During the 2000 year researches together with algae in catches have been registered only a dead «ballast» from mussels shells leaves and other dead mollusks (Information YugNIRO report, 2000).

Small Phyllophora field (SPF) with it's area by 300-400 km<sup>2</sup> is situated in shallow (corner) part of Karkinitzky bay of Black Sea to the east from Bakalskaya spit and Bakalskaya shoal. This area is considered the wetlands of international significance.

SPF is by most full analogue of ZF in North-Western part of Black Sea shelf. Although on comparison with ZF, SPF has a row of distinctive peculiarities, related to it's littoral location, the considerable number of species, which have disappeared on ZF, and in present time can be observed only in Karkinitzky bay on SPF. Follows also to mark, that the SPF region differs by significant water transparence and practically not liable to hypoxydation phenomenon.

The key association of SPF biocenosis becomes the layer-forming red algae Phyllophora ribbed (*Phyllophora nervosa* subf. *sphaerica*), the state of which last years was relatively stable. On this account the biocenosis here practically fully preserved.

In august 2000 it was realized a complex SPF research by forces of OF IBSS. The results testified that species association's variety of benthos and their biomass are on sufficiently high level. The amount of species have been registered comparable with biodiversity of benthos ZF in 1950-60\* years when state of ZF biocenosis have been comparatively normal (tables 1,2).

The Phyllophora's inspections on SPF showed, that on the end of 80-th it's biological state and reserve size remained relatively stable. A middle

Phyllophora biomass, registered as a result 2000 year survey on SPF, took average 645 g/m<sup>2</sup>. A general reserve in present time can be priced as 250000-300000 tones.

Table 1. Correlation of quantitative indexes of main systematic macrozoobenthos groups on the SPF in august 2000

| Main systematic groups | Number of spesies | Quantity           |       | Biomass           |       |
|------------------------|-------------------|--------------------|-------|-------------------|-------|
|                        |                   | sp.m <sup>m2</sup> | %     | g.m <sup>m2</sup> | %     |
| Wormes                 | 23                | 686                | 36,4  | 5,74              | 2,5   |
| Mollusks               | 24                | 875                | 46,4  | 206,76            | 89,9  |
| Crustacea              | 21                | 273                | 14,5  | 3,17              | 1,4   |
| Others                 | 7                 | 52                 | 2,7   | 14,31             | 6,2   |
| Total                  | 75                | 1886               | 100,0 | 229,98            | 100,0 |

Table 1. Correlation of quantitative indexes of main systematic macrozoobenthos groups on the ZF (Vinogradov, Zakutsky; 1967)

| Main systematic groups | Number of spesies | Quantity           |       | Biomass           |       |
|------------------------|-------------------|--------------------|-------|-------------------|-------|
|                        |                   | sp.m <sup>m2</sup> | %     | g.m <sup>m2</sup> | %     |
| Wormes                 | 17                | 171                | 36,9  | 1,96              | 0,4   |
| Mollusks               | 30                | 204                | 44,1  | 440,56            | 96,2  |
| Crustacea              | 21                | 64                 | 13,8  | 5,18              | 1,1   |
| Others                 | 20                | 24                 | 5,2   | 10,55             | 2,3   |
| Total                  | 88                | 463                | 100,0 | 458,25            | 100,0 |

The given example demonstrated, as far are associated in the sea plants and animal associations, and once more testifies on behalf of complex approach to biocenosis protection.

Relatively normal state of SPF biocenosis (both Phyllophora and benthic associations) explains as by some improvement of ecological state in region, so and by timely cessation of short duration Phyllophora trade, so far as attached to work of ground trawls did damage ground biocenosis in a whole.

In present time it is necessary to take urgent measures for the protection of SPF, which is the last area, where Phyllophora biocenosis preserved in almost unchanged appearance. The SPF conservation represents a unique chance for restoring of primary ecosystem state in North-Western part of Black sea hereafter. Its loss can find oneself irreplaceable for all us.

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