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ONLINE CONFERENCE "ACTUAL PROBLEMS OF RESEARCH OF BLACK SEA ECOSYSTEMS – 2020"

On the basis of A. O. Kovalevsky Institute of Biology of the Southern Seas of RAS, an online conference "Actual problems of research of Black Sea ecosystems – 2020" was held on 19–22 October 2020, with the financial support of Russian Foundation for Basic Research (project No. 20-04-22006). The scientific forum was organized by IBSS, Marine Hydrophysical Institute of RAS, Institute of Natural and Technical Systems of RAS, Sevastopol State University, Sevastopol Branch of Lomonosov Moscow State University, and Department of Education and Science of Sevastopol.

More then 140 researchers, representing 15 scientific and educational institutions from Sevastopol, Moscow, Yalta, Simferopol, Voronezh, Rostov-on-Don, and Novosibirsk, took part in the scientific forum. Using TrueConf video conferencing software, 24 oral reports and 16 poster ones were made. Most of the reports were prepared based on the results of the authors' work on projects, supported by RFBR grants, *inter alia* on the results of investigations, which were carried out under grants from regional competitions for the best fundamental scientific research projects, conducted by RFFR and the city of Sevastopol.

The participants of the online conference presented the results of scientific research in marine biology and ecology of aquatic and coastal systems and discussed the prospects of their practical use for the development of innovative technologies, environmental protection, rational use of natural resources, reproduction of biological resources, and aquaculture. Methods, technologies, and means were discussed of technical support of ecological monitoring of aquatic and coastal ecosystems, information technologies for managing sustainable development of an ecological and economic system coast – sea of Sevastopol region; they allow establishing the permissible volumes of marine resources withdrawal. Applied problematics of the reports is of considerable importance for planning sustainable development of Sevastopol coastal areas, monitoring the state of the abiotic component of aquatic and coastal ecosystems, and increasing the reliability of marine forecasts.

A project of a new methodology was presented of system modeling for managing scenarios of nominal seafood production volumes in a natural and economic complex coast – the Sevastopol Bay. The need was shown to use new models and digital information technologies for managing assimilation resources of the Sevastopol Bay and recreational potential of resort facilities in the Sevastopol region; indicators of pollution and biodiversity were proposed as criteria for assessing the ecological state of marine ecosystem, as well as level of ecological safety of marine environment for recreation. For rational planning

of sustainable development of agriculture in Crimea and Sevastopol, the speakers analyzed the effect of climatic conditions on viniculture by agroclimatic indicators; work in this field will help in predicting conditions for grapes growth throughout the life of vines. The mechanisms were studied of the effect of penalties for marine environment pollution of Sevastopol inner bays on the efficiency of economic systems, operating in coastal area. Based on bioindication methods, approaches were presented to ecological monitoring of the state of marine environment, aimed at assessing marine environment quality by biochemical response of fish blood parameters, as well as bioluminescence indicators of gelatinous animals. Such approaches expand the prospects of a comprehensive assessment, *inter alia* operational one, of the state of coastal area.

The need was substantiated to carry out microbiological research of aquaculture of Black Sea bivalve molluscs; methods were proposed of phage detection and phage identification of infections, caused by halophilic vibrios, which are pathogenic to Pacific oyster cultivated. The development of this research direction helps to solve the urgent problem of containing the spread of infectious diseases of molluscs during their industrial cultivation.

The current ecological state of Sevastopol coastal areas, water areas, and shelf zones, as well as their suitability for recreation were assessed by analysis of satellite data and using unmanned aerial vehicles. The results were presented of mathematical modeling of currents and eddies in the Kalamitsky Bay and Sevastopol area, as well as level of precipitation, *inter alia* extreme one, in Crimea and monitoring of coastal water subsequent pollution by storm runoffs, performed both by a surface unmanned vehicle and by a working model of an autonomous miniship with a set of sensors for physical and chemical indicators of marine environment and an intelligent control system. The assessment was carried out of changes and variability of anticyclonic activity indicators in Black Sea area. These works are of great applied importance; moreover, they serve as a key part of the system for forecasting atmospheric effects on hydrological situation. Experimental models of movement of landslide blocks were proposed; a project for reclamation of landslide-prone sectors of Sevastopol coastal area was presented.

Studies of fish taxonomic characters and biological peculiarities were carried out; the data obtained were used, *inter alia*, to form the basis of computer taxonomic guides. Modern data are presented, describing the state of taxonomic diversity and quantitative development of several groups of Black Sea hydrobionts (diatoms and cyanobacteria – foulers of polymer substrates on marine farms, as well as polychaetes, ascidians, molluscs and crustaceans, soft-shelled foraminifera and gromiids, trematodes, and phytoplankton complex of Black Sea pelagic zone). Current molecular genetic approaches were presented to the analysis of taxonomy and phylogeny of Black Sea hydrobionts, with the corresponding results. The obtained data on AqE gene representation, structure, and evolution in aquatic vertebrates help in analyzing its differential expression under various conditions, and this is to contribute to a better understanding of mechanisms of hydrobiont resistance to stress.

The participants of the online conference presented the results of theoretical and experimental studies of the state of the Black Sea and the atmosphere above it in the Crimea region. A method was proposed of environmental air monitoring for meteorological monitoring of coastal areas and, as a part of gas analytical complexes, for atmosphere monitoring at toxic and explosive enterprises.

Analysis of the dynamics of ecosystem abiotic parameters of Sea of Azov coastal area helps to make a near-term forecast of their changes in relation to the effects of global warming. Reduce of the volume of Don River annual runoff, changes in water hydrochemical composition, and radical transformations of its intra-annual distribution are considered the main factors of a possible ecological disaster

in Tsimlyansk Reservoir area and in Lower Don basin. The need was emphasized to make a state comprehensive target programme on the recovery and development of the water management complex of the Don River and Sea of Azov to ensure food security in Russia. The study of the long-term dynamics of the hydrochemical indicators of Sea of Azov water shows a persistent tendency towards its significant salinization.

A new approach was presented to the development of wireless power transmission systems when charging batteries of autonomous electric vehicles; this assumes a complete absence of spurious radiation, and, accordingly, of a harmful effect on human and the environment. The use of wireless methods of energy transmission is very promising for the development of urban transport infrastructure, especially in coastal areas (recreation-oriented ones).

Several reports were focused on the results of biogeochemical studies. An original technique of sorbent production for lead extraction from seawater was presented. Results of field measurements of cosmogenic phosphorus and bismuth in Sevastopol area seawater were shown. Taking into account the relevance of studying alternative sources of water supply in the region, the researchers presented the results of the analysis of submarine groundwater discharge volumes in one of Sevastopol coastal areas and of water quality by a number of physical and chemical indicators. A balance estimate was carried out of the inflow into the Black Sea with Chernaya River water of biogenic elements, organochlorine compounds, trace elements, and anthropogenic radionuclides. The biogeochemical role of suspended matter was studied; as shown, it can significantly accelerate the biogeochemical cycles of turnover of heavy metals in the marine environment, as well as promote water self-purification.

The participants noted high methodological level of the works presented, good theoretical basis of the studies, their practical significance, and the need to coordinate research and practical activities of scientists to solve the pressing problems of Sevastopol. The participants agreed on the importance of regular scientific conferences.

The abstracts of the reports can be found in the conference proceedings: https://elibrary.ru/item.asp?id=44110968. Videos of oral and poster presentations are available on the scientific forum webpage: http://ibss-ras.ru/science/scientific-activities/actual-problems-of-research-of-black-sea-ecosystems-2020/.

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ОНЛАЙН-КОНФЕРЕНЦИЯ «АКТУАЛЬНЫЕ ПРОБЛЕМЫ ИЗУЧЕНИЯ ЧЕРНОМОРСКИХ ЭКОСИСТЕМ — 2020»

Приведены результаты работы онлайн-конференции «Актуальные проблемы изучения черноморских экосистем — 2020», состоявшейся 19–22 октября 2020 г. на базе ФИЦ ИнБЮМ. В форуме приняли участие более 140 исследователей, представлявших 15 российских научных и образовательных учреждений.