The work is dedicated to the development of the system of coastal zone environmental assessment, grounding on the principles of integrated approach to the management of resource and environmental safety in the Azov and Black Sea region. The methodological approaches and applied assessments of the quality control analysis of sea water and benthic sediment according to the monitoring data were formed. The methods of the marine environment biomonitoring were offered; its results have a universal basis and can serve both as the index of investigated cenosis structure and its physiological state.

Key words: ecosystem, integrated management, the coastal zone

The problem of environmental conservation is of crucial importance at present. The intensive natural resources development by Man, the further development of navigation, hydro-electric engineering take place in the coastal area. The aquatic bioresources’ contribution to the maritime regions’ economy under these conditions turns out to be rather insignificant in comparison with oil, gas or recreational resources. Furthermore, different users of resources enter into various conflicts with one another by creating spatial interferences and competition, polluting the environment and leading to the degradation of water ecosystems in general. In this connection the knowledge of biology of hydrobionts only is not enough any longer for their protection and rational use. The holistic approach to solving coastal zone problems of the Russian Federation is required.

The coastal management is a new trend which is determined as a coordinated activity aimed at the coastal zone management and administration. The integrated coastal zone management is a continuous process of elaborating and taking decisions aimed at harmonizing socio-economic development of coastal regions for the purpose of their sustained development. The development is sustained, if it guarantees economic growth, improvement of the quality of life of population, establishment of the democratic forms of social influence on the development process, cultural preservation and if it does not lead to the environmental deterioration of territories, habitat quality, water (sea water and continental waters) and air quality, biological diversity and variety of terrains. [16].

The task of the integrated coastal zone management is to find an effective balance among different kinds of activity in the coastal zone, to work out the strategy aimed at creating such its economic and social structure, which would correspond to the fullest extent to the common interests of the territory development and would minimize conflict situations arising among different participants of this activity.
The increase in the anthropogenic effect on the ecosystem of the Black and Azov Seas becomes apparent in the degradation of biological, recreational and other resources. The measures taken for protecting the environment have led to the equalization of marine environment pollution and the uptrends emerged. However, the pollution level of benthic sediment, which is the source of secondary pollution in the water column, remains high as before. As a result of it, it is long past time to look for the ways of improving the natural resource exploitation and recreating the reproduction in the ecosystem of the Black and Azov Seas. The urgency of the chosen topic is determined by the necessity of creating the integrated system of environmental assessment of the coastal zone, grounding on the principles of integrated approach to the management of resource and environmental safety of the Azov and Black Sea region [16].

The environment status observations are made in the coastal zone of the Black Sea, but the works are not of a systemic nature: territorial one, by typology and networks for monitoring, parametric one, comparing indices, chronological, metrological, informative ones and the ones having other aspects. The absence of the integrated monitoring system does not make it possible to assess correctly the ecological state of territories in order to take important management decisions in the economic activity. Therefore, the maximum monitoring utilization is required, as well as its integration into the integrated system to provide assessments, predictions, recommendations. The creation of the integrated eco-monitoring system, in which the regional subsystems are provided for, will make it possible to give information and analysis support at regional and local levels. In this connection, the development of the system of environmental assessment of the coastal zone of the Sevastopol region, grounding on the principles of integrated approach to the management of resource and environmental safety in the Azov and Black Sea region is one of the up-to-date sectors of hydrobiological research for the moment.

The ever-growing demands of society for the development of new materials lead to the increase in the number of chemical compounds of anthropogenic origin which affect the biota [7; 17]. It reduces the value of numerous laboratory experiments related to the toxicant effect upon model communities, as they, firstly, cannot “trace” the full range of toxic compounds and, secondly, do not take into account the synergetic effects which appear because of their influence.

The off-shore strip is characterized by high dynamism, as well as by the presence of alongshore circulation. The shallow household wastewater outlet with organic pollutants, and also the secondary pollution coming from the benthic sediment, present in the off-shore strips, are involved into the interconnected system of coastal flows, which results in the degradation of any integral part of its water area and may irreversibly affect the ecological situation of the sea in general [2 – 4; 18].

It is necessary to find new methods of marine environmental biomonitoring, whose results would be of universal (integral) nature and could serve as an index of both the chorologic structure of investigated cenosis and its physiological state [7; 14; 19 – 21]. At that, the responses which, firstly, manifest themselves already within the first tens of minutes after the pollutant exposure and, secondly, the ones which are determined using instrumental control of registration of the observed effects out of all diversity of populations’ “post-impact” responses, undoubtedly, are of the greatest interest [13; 15; 17]. So, biophysical methods can serve as a sensitive indicator of the degree of resistance of plankton to pollutant exposure and as an express-indicator of regional marine pollution [5; 6; 18]. One of the tasks of our work is to assess the possibility of application of bioluminescent properties of plankton organisms and the light field created by them for the express assessment of neritic water area pollution.
An ecological system, or an ecosystem, is a basic functional unit in ecology, as it comprises organisms and inorganic environment, i.e. the components interfering with one another's properties and the conditions required for maintaining life in that very form which exists on the Earth. An ecosystem is understood to be a community of living organisms (communities) and their habitat, which form a stable life system thanks to the circuit of substances. Coastal ecosystems occupy a special place in ecology. At present the coastal zone is an important target of ecological, economic and hydrobiological researches because of its special geopolitical value within the framework of environmentally sustained development and national security.

Figure 1. provides the block diagram of a new approach to the environmental assessment in the system of integrated management of the resource and environmental safety of the coastal area of the Black Sea.

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Fig. 1. Block diagram of a new approach to the environmental assessment in the system of integrated management of the resource and environmental safety of the coastal area of the Black Sea.

Block 1, or coastal management, unites the rest of the blocks. The coastal management is defined as a coordinated activity on the coastal zone management and administration. The integrated coastal zone management is a continuous process of elaborating and taking decisions aimed at the harmonious development of coastal regions for the purpose of their sustained development. A coastal zone is understood to be a land-sea contact zone, including natural complexes, both coasts and adjacent sea surface within the borders that ensure environmentally
balanced development of coastal territories, prevention of pollution and destruction of coastal landscapes, seascapes and ecosystems; it is the territory where economic and other activities are limited and regulated. A coastal zone is an area, where human interaction with the environment is particularly intensive.

**Block 2** - quality control of sea water and coastal sediments. It is planned in this block to investigate routinely the pollutant dynamics, including oil and oil products, on the predetermined grounds of the coastal area of the Black Sea, as well as the number of main groups of organisms taking part in the transformation of pollution.

**Block 3** – study of environmental situation in the coastal area of the Black Sea, it will make it possible to assess the ecological state of the littoral environment of the recreation zone. At that, such points as pollution, coastal wastewater flow are considered; the pollution sources are controlled, the amount of floating craft pollution and the pollution resulted from dumping rubbish is studied, pollutants are assessed and monitored.

**Block 4** - study of the role marine organisms play in organics utilization; it is aimed at studying and further usage of marine organisms for organics utilization. The organics getting into the water serve as food for microorganisms; therefore the water enrichment with these substances definitely results in increasing growth of microflora. Microorganisms are bioindicators of the presence of different types of pollutants in the sea water. Heterotrophic bacteria use readily available organics as their food. The quantitative content of oil oxidizing microorganisms evidences the process in progress of natural self-purification from oil and oil products in the marine environment [11; 12; 16].

**Block 5** – creation of system of multipurpose utilization of coastal water resources, in this block we consider the issues of industrial exploitation of resources, biological diversity conservation, habitat and landscape protection, estimation of environment impact level and integrated coastal zone management.
Block 6 – Study of bioluminescence parameters and environmental background characteristics in situ for the rapid assessment of functioning of aquatic ecosystems. Planktonic organisms play the main role in creating bioluminescent potential of the sea. The bioluminescent potential in the Black Sea is formed by thirty-six algae belonging to the Class Dinophyceae of the genera Neoceratium, Protoperidinium, Scrippsiella, Gonyaulacaceae, Noctiluaceae, Lingulodinium, as well as by three species of comb-bearers, some species of Copepoda and two genera of luminous bacteria (Fig.2) [8; 10; 17]. The planktonic bioluminescence parameters can serve as a sensitive express-indicator of the degree of their resistance to the impact of pollutants and as an expressive indicator of the degree of the regional marine pollution [1; 8; 10; 17; 18]. In this connection, the study of the dynamics of bioluminescence parameters and environmental background characteristics in situ is of current importance for the rapid assessment of functioning of aquatic ecosystems [8; 10; 17].

Blocks 7, 8, 9 make it possible to elaborate and propose practical recommendations for providing ecological safety of the population in the recreational zone of the Black Sea.

The constant growth of anthropogenic ecosystem load in the coastal zones results in the irreversible processes of exhaustion and deterioration of quality of natural resources, in more frequent and large-scale manifestation of crisis economic-environmental situations in the Black and Azov Seas. The results of the proposed study in the aggregate solve the scientific development of the system of environmental assessment of the coastal zone of the Black Sea, grounding on the principles of integrated approach to the management of resource and environmental safety in the Azov and Black Sea region.

The forecast of the nearshore ecosystem development, its protection against adverse natural and anthropogenic processes are the most important tasks during the coastal development. The execution of the present work will make it possible to propose an integrated approach to solving problems of using Crimean coastal zones and to outline the ways for the development of the promising directions of coastal management in the Russian Federation and to bring them closer to the international level.

Fig. 2. Planktonic bioluminescent organisms of the Black Sea.
CONCLUSIONS

1. The proposed approach to the environmental assessment of the Crimean coastal zone in the system of integrated management of resource and environmental safety in the coastal zone will make it possible to elaborate practical recommendations for managing the aquatic habitat quality and exploiting off-shore strips, as well as for developing recreation and tourism in the Black Sea region.

2. The biota participation in the process of self-purification makes it possible to use marine organisms purposefully for the biomonitoring and pollution prevention, as well as for developing hydrobiological systems of conditioning of polluted sea waters.

3. The planktonic bioluminescence parameters can serve as a sensitive express-indicator of the degree of their resistance to the impact of pollutants and as an expressive indicator of the regional marine pollution.

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