ECOLOGY AND THE PROBLEMS OF WORLD OCEAN
INTEGRATED GLOBAL MONITORING

YU. A. IZRAEL
U.S.S.R. State Committee for Hydrometeorology and the Control of the Natural Environment

and

A.V. TSYBAN
Natural Environment and Climate Monitoring Laboratory under U.S.S.R. State Committee for Hydrometeorology and the Control of the Natural Environment, and U.S.S.R. Academy of Sciences

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Abstract. Modern ecological state of the World Oceans is analysed, stressing the need for organization and development of a scientific basis for global ocean monitoring. The tasks and basic principles of integrated global ocean monitoring are described.

Complex of natural processes determines the assimilative capacity of marine ecosystems, which can serve as a basis for the study of ecological reserves of the World Oceans and ecological rationing of the anthropogenic impact.

A broad spectrum of investigations aimed at the evaluation of the role of the ocean in the geophysical and biological processes occurring on our planet and that of large-scale ecological problems, the assessment of the state of pollution, the determination of the adverse effects of the anthropogenic impact and forecasting the salubrity of the World Ocean are among the most urgent problems confronting modern society. They attract widespread attention by the community of scientists all over the world and acquire a keen international character.

The oceans cover 70% of the Earth’s surface and interact actively with other spheres of the natural environment. These are the processes of the ocean-atmosphere interaction, to a great extent determining the climate (and, hence, biological processes) of our planet, the biochemical cycles of most of the important chemical elements closely related to the circulation of energy and the substance in natural photosynthetic activity of algae regulating the oxygen-carbon dioxide balance and other global phenomena.

Meanwhile, the anthropogenic load on the World Ocean nowadays creates a stressed ecological situation in a number of its areas and can affect the ecological situation of the whole planet. Fields of chronic pollution and concentrations of heavy metals, petroleum and chlorinated hydrocarbons critical for the normal ecosystem functioning appear in the affected zones of the Ocean. Anthropogenic pollutants are becoming a powerful constantly acting ecological factor producing an effect on marine ecosystems, due to which their functioning, and first of all the production of organic matter, are exposed to the ever-growing anthropogenic impact [2].

Ensuing from an urgent need to isolate man-made changes in the structure and
functioning of marine ecosystems and to regulate the anthropogenic impact on the World Ocean, a demand arose for the organization and realization of integrated global ocean monitoring.

In the last decade, a concept of the integrated global monitoring of the biosphere was advanced by a number of scientists [7]. Soviet scientists contributed much to the development of this concept which is noted in the UNEP Publication *10 Years After Stockholm*. The concept is considered in numerous publications including those by the present authors. It was discussed, among other things, at the international symposia on integrated global environmental monitoring in Yurmala (U.S.S.R.) in 1979 and Tbilisi (U.S.S.R.) in 1981.

The system of monitoring the anthropogenic impact on the natural environment, and its consequences, is, as stated in our works earlier, of multipurpose informative character [7]. The system is supposed to comprise observations, estimations and forecasts of the biosphere, analysis of the extent of the impact on the environment, isolation and assessment of the impact factors and sources.

Monitoring is a most important element in the process of understanding the biosphere, and of evaluating and forecasting its health, as well as in the strategy of regulating the environmental state.

World Ocean integrated global monitoring occupies a specific place within the system of biosphere monitoring since it contemplates the assessment and forecasts of the state of the most important sphere covering two thirds of the surface of the globe, and its huge ecosystem, and has as its ultimate aim the conservation of the biological resources of the ocean and the protection of its health.

Over the past decade, quite a number of countries initiated broad investigations of water circulation in the World Ocean, of the state of its pollution and of the interaction processes between the ocean and the atmosphere; the study of the ecological and physical consequences of ever-growing anthropogenic impact on the ocean environment has been carried out.

Problems related to the monitoring of the pollution of the World Ocean and the health of its ecosystems are the subject of study included in a number of national and international programmes implemented within the framework of the United Nations Environment Programme (UNEP), the International Council for the Exploration of the Sea (ICES), the World Meteorological Organization (WMO), the International Oceanographic Commission (IOC) and the Council for Mutual Economic Assistance (CMEA).

Integrated global ocean monitoring assumes a new importance in connection with the implementation of the World Climate Programme. Within the framework of this programme much consideration is given to the study of the dominating effect of ocean properties and dynamics on global cycles of heat, water and various chemical elements, especially those of carbon, in the climate system.

In the U.S.S.R., the ecological basis for ocean monitoring is developed in the process of investigating pollution and its adverse ecological effect, which was carried out at institutions under the U.S.S.R. State Committee for Hydrometeorology and