

Keynote Address

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Far-eastern sea shelf ecosystems of yesterday, today, and tomorrow

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Systematical research of the far-eastern shelf began in 1950 with the cruises of the famous R/V *Vityaz*. These studies provided the outline for shelf and continental slope areas, composition and distribution of bottom sediments, general characteristics of physical conditions, fish and invertebrates abundance and distribution. The total area of the far-eastern seas shelf exceeds 1 million km². The shelf is extremely rich in living resources, including about 362 million tons of macrozoobenthos, 25 million tons of macrophytobenthos, 165 million tons of macrozooplankton and about 100 million tons of planktonic algae in the warm season. Some of these estimations need a more accurate definition due to the progress of sampling methods and techniques. Benthos quantity estimations can be increased due to the underestimation of bivalve mollusk abundance. Meanwhile, benthic surveys in large parts of the far-eastern shelf conducted at about 20-year intervals have confirmed the relative stability of benthos quantitative characteristics. Fish biomass in the shelf zone could reach 12.5 million tons with a predominance of common pelagic species. Many commercial fish species use the shelf zone as spawning and nursery areas which emphasizes the shelf's significance in the fish productivity. Resources of micro- and meiobenthos, bacterio- and microzooplankton, and large gelatinous macrozooplankton still remain an enigmatic value.

Some important processes and phenomena were recently revealed which can affect shelf biotopes, communities, and ecosystems functioning on long-term time scales. Silt accumulation seems to be a fluctuating process, changing with water circulation intensity under the climate change. Sedimentation rates can vary and are sometimes higher than estimated by sediment core studies. Regular acoustic surveys of bottom type and characteristics are promising in the study of these processes. Changes in biological diversity and composition of the shelf communities often reflect the current processes of sea floor landscape deformation. Kelp bushes and sea grass bed replacement by coralline algae, so-called "isoyakes", occur even in areas where human impact is not heavy. The question remains whether these processes are reversible in the long-term.

The shelf zone is first, and to the greatest degree, involved with the anthropogenic activity at sea. Artificial reef installations are widely applied around the world. This activity creates the necessity to accelerate studies of man-made material biodegradation and biofouling. The territory of the shelf around Russia exceeds 6.2 millions square kilometers, of which 4 million square kilometers are promising for oil and gas development. The initial extracted resources of hydrocarbon raw materials from the shelf are evaluated at 136 billion tons of standard fuel (25% of world-wide resources of hydrocarbons). The Ministry of Natural Resources of Russia plans to increase the federal budget expenditure for regional works in shelf exploration from 700 million rubles in 2005 to 2,8 billion rubles by 2020. Dissolved oxygen deficiency, pollution due to toxic organic chemicals and heavy metals can be expected, if shelf resources are to be explored in a reckless way.

