

CHANGES IN COASTAL ECOSYSTEMS NEAR VLADIVOSTOK, RUSSIA

ALEXANDER TKALIN AND TATIANA BELAN

Far Eastern Regional Hydrometeorological Research Institute (FERHRI), Vladivostok 690990, Russia

Vladivostok is situated on the peninsula between Amursky Bay to the west and Ussuriysky Bay to the east. The outer harbour of Vladivostok port is located in Amursky Bay, the inner harbour is in the very enclosed Golden Horn Bay (in downtown) and in the East Bosphorus Strait. Total population of Vladivostok with suburbs is about one million. Annual discharge of industrial and municipal wastewaters to the sea is about $450 \cdot 10^3 \text{ m}^3$. About 18% of these wastewaters are not treated at all. Annual volume of dredged material dumping comprises about $350 \cdot 10^3 \text{ m}^3$. Accidental oil spills during the last years varied from <10 to 60 tons.

Due to above mentioned anthropogenic factors, the marine environment near Vladivostok changed drastically during the last decades. At dredged material dumping area in Amursky Bay geochemical anomaly has been formed. Trace metal contents in this area are 5-10 times higher than average values for Amursky Bay. According to the recommendations of FERHRI specialists, dumping area in Amursky Bay have been closed. Now dredged material dumping is carried out in Ussuriysky Bay, at the area with higher depths and better water exchange.

Benthos ecology in Amursky Bay, including dumping area, also changed drastically. Comparing with 1930s, total benthos biomass decreased by 33%. Biocenoses of high productivity were replaced by pollution-tolerant species (mostly *Polychaeta*). Habitat areas of *Echinodermata* and *Bivalvia* biocenoses decreased significantly.

The most dramatic changes of the marine environment are observed in Golden Horn Bay, the inner harbour of Vladivostok port. In bottom sediments the "dead areas" are observed in some places where living benthos organisms can not survive. Content of petroleum hydrocarbons in bottom sediments often exceed 1-2%. Surface petroleum slicks and floating litter is also common in Golden Horn Bay.