

HEAVY METAL POLLUTION IN THE BLACK SEA

Project Leader: Prof. Dr. Mustafa ÜNSAL¹

Researchers: Prof.Dr. Namık ÇAĞATAY¹, Yılmaz BEKİROĞLU², Y.Doç.Dr. Nur KIRATLI¹, Nigar ALEMDAĞ², Muammer AKTAŞ², Erol SARI¹

¹ **Middle East Technical University, Erdemli Marine Sciences Institute**

² **Ministry of Agriculture and Rural Affairs, Central Fisheries Research Institute**

This report contains the findings dealing with the land-based sources of mercury, copper, lead, cadmium and zinc which were studied within the framework of two projects "Heavy Metal Pollution in the Black Sea" conducted at the same time along the western and eastern Black Sea coasts of Turkey.

During these projects, Hg, Cu, Pb, Cd and Zn concentrations were measured in sediment and mussel samples taken in August, October and in December from 6 source and 4 control stations in the eastern Black Sea. Also the sediment samples collected in December from 2 source and 2 control stations in the western Black Sea were analysed for their Hg, Cu, Pb, Cd and Zn concentrations and the sea water samples for only Hg concentrations. From the results obtained, the main sources of these metals in the Black Sea and the temporal changes in their concentrations were evaluated.

In the eastern Black Sea, the highest mercury concentrations were found in sediment samples taken from the effluent discharge point of the Copper Refinery in Hopa (St. D1) and from the mouth of Harşit Stream (St. D2) in Tirebolu-Giresun. The highest mercury concentrations were again measured in mussels sampled from St. D1, was followed by those taken from the mouth of Pazar Stream (St. D3) in Bulancak-Giresun. In the western Black Sea, the highest mercury concentrations were obtained from sediments at Şile (St. BR2), followed by the samples taken from the discharge point of Sakarya River (St. B2). The sea water samples from St. B2 also contained the highest mercury concentrations.

The copper concentrations in the eastern Black Sea were at their highest levels both in sediment and mussel samples from St. D1. In the western Black Sea the highest values were obtained again for sediment samples from Sts. BR2 and B2.

The highest lead concentrations were contained in sediment samples from Sts. D1 and D2 and in mussel samples from St. D1 in the eastern Black Sea. The mussel samples taken from Sinop (St. D6) also displayed

significantly high lead concentrations. In the western Black Sea, the highest values were obtained from the Şile (St. BR2) samples.

The pattern of cadmium both in sediment and mussel in the eastern Black Sea was similar to that of lead; with respect to mercury, sediments from Sts. D1 and D2 and mussels from St. D1 were found to have the highest concentrations. Additionally, mussels from St.6 also contained a remarkably high cadmium concentration. In the western Black Sea, samples from the mouth of Sakarya River had the highest cadmium concentrations.

The zinc concentrations in sediment from the eastern Black Sea were again highest at Sts. D1 and D2. However, the zinc concentrations in mussels showed a different pattern from that for above-mentioned metals; highest values were measured in the samples from Sinop (St. D6). In the western Black sea the sediment samples from Şile (St. BR2) had abnormally high zinc concentrations.

At some stations a correlation was observed between metal concentrations in sediment and those contained in mussels. This correlation is dependent on metal species, season and also environmental conditions.

As a result, the main sources of Hg, Cu, Pb, Cd and Zn in the eastern Black Sea are the effluent discharged from the Copper Refinery in Hopa (St. D1) and the mouth of Harşit Stream (St. D2) in Tirebolu-Giresun. The next most important source following these two areas was Sinop Central Industry (St. D6). In addition, important amount of copper and lead and a remarkable amount of mercury and cadmium reach the eastern Black Sea through the Kızılırmak and Yeşilirmak Rivers and Pazar Stream.

In the western Black Sea, Şile was found to be the most polluted area, although it was chosen as a control station, followed by the Sakarya River mouth. It is obvious that pollutants discharged by the River Danube into the western Black Sea and carried by currents in an eastern direction have a significant role in the pollution occurring at Şile.