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Emission inventory of the German Baltic Sea catchment area

by

Dr. Miachael Gluschke

Landesamt für Umwelt, Natur und Geologie, Mecklenburg-Vorpommern

Summary

As a part of the scientific project “Emission inventory of the German Baltic Sea catchment area” several investigations of selected point source discharges as well as of important German Baltic rivers are performed. According of the HELCOM list of “priority harmful substances” balances are derived for the annual pollution input into the Baltic Sea from Germany. The objective of the project was to determine the point source discharges into surface waters in the whole German Baltic catchment area for 1998, in order better to fulfil the reporting requirements of the Helsinki Commission (HELCOM) from the German side.

The determining of point pollution emissions in the entire German Baltic catchment area, can be summarised as follows:

?? The presence of numerous substances in the “HELCOM list of priority harmful substances” could be established in discharges into the waters of the German Baltic catchment area.

?? The heavy metals zinc, copper, nickel, lead and chromium (and much lower levels of cadmium and arsenic) as well as the sum parameter AOX make up the greater part of the total annual emission. However, various (chloro-) organic compounds and a few pesticides on the HELCOM list are discharged in significant amounts directly into the Baltic Sea or into the Baltic inlets.

?? In the group of organic pollutants, besides AOX, annual emissions could also be determined for the volatile organochlorine hydrocarbons chloroform, trichloroethylene and tet-

rachloroethylene, the nonylphenolethoxylates, the 6 polycyclic aromatic hydrocarbons (PAH) of the German drinking water decree and for the wood preservative pentachlorophenol, banned as such in Germany since 1989.

?? Among the pesticides, only 5 compounds from the large group of "biocides" and additionally tested organochlorine pesticides of the measurement programme were significantly present in the point emissions from the German Baltic catchment area. These were dichlorvos, simazine, atrazine, the "ubiquitously" occurring lindane and trifluralin.

?? Many parameters on the HELCOM list could only be determined in isolated cases or not at all in the discharges of the monitored municipal and industrial wastewater sources and are thus of no practical significance for the emission inventory of the German Baltic catchment area. These included carbontetrachloride, 1,2-dichloro-ethane and 1,1,1-trichloroethane, the trichlorobenzenes, hexachlorobenzene and hexachlorobutadiene. In the biocide category they were endosulfan and the (thio-) phosphoric acid esters, e.g. malathion and parathion. The group of additionally tested parameters (PCB's, DDT + metabolites, HCH isomers excepting lindane) were also not detectable in any sample.

?? There are various reasons for the absence of the determinants in the tested samples. In the first place, determinants such as carbontetrachloride, PCB and DDT have been banned in the Federal Republic of Germany for many years.

?? A further important reason is however the poor solubility and concomitant absorption tendency into solid particles (sludge, sediment) particularly of high-molecular (chloro-) organic compounds. Sediment tests were not undertaken within the research project.

?? Some pollutants, especially among the pesticides used in Germany, which do not appear on the HELCOM list, possibly make up part of the emissions. These determinants should be taken account of in the future. The phenoxycarbon acids (e.g. mecoprop, dichlorprop and MCPA) and the urea derivative substance classes (e.g. chlorotoluron, isoproturon, linuron and diuron) are of particular interest here because of their varied and intensive use in agriculture and urban weed control.

?? Additional tests in the outflow of municipal wastewater treatment plants in the 1999 research project have shown that active pharmacological substances and their metabolites, organotin compounds and nonylphenol were discharged into the surface water via the wastewater of municipal wastewater treatment plants, although the tin species were rather to be found in the sludge than in the treated wastewater.

To assess the amount of pollution input from the German Baltic Sea catchment area into the Baltic Sea, sampling was carried out for the priority harmful substances on the HELCOM list in different German Baltic rivers (Oder, Lausitz Neisse, Trave and Warnow):

?? In agreement with other investigations in the Baltic Sea catchment area, these data show that, for some of the parameters tested (heavy metals, AOX), the major part of the loads were carried via the rivers into the Baltic Sea, whereby the municipal and industrial wastewater emissions turned out to be significant, anthropogenic sources of riverine pollution.

?? The pollution of rivers from diffuse sources (e.g. agriculture and forestry) was not investigated within the framework of the research project. The example of the pollution of the Lausitz Neisse with the pesticides simazine and atrazine made clear that, with regional variations, discharge from the surface runoff of pesticide-treated land could make up a significant proportion of the pollution of surface waters with pesticides.

?? Natural background pollution was enlisted as a further criterion for characterising the riverine loads. In the case of the heavy metal loads in the Oder it can be shown that a major part of the total heavy metal pollution of the river is attributable to natural background pollution.

?? The sampling of the rivers also showed that some pollutants, while indeed emitted from municipal wastewater treatment plants and industrial plants in the German Baltic catchment area, could only be detected in isolation, if at all, at the riverine monitoring stations and clearly no longer played a significant role in the pollution of the river at this point. The parameters in question included nonylphenolethoxylate, pentachlorophenol and the pesticides dichlorvos, trifluralin and lindane. Various processes in the water, e.g. degasification, adsorption by solid particles and bio-degrading could be the cause of this.