

LETTER FROM COPENHAGEN



## Bad times for a multi- national sea

**Sewage, industrial  
waste and pesticides  
are building a gloomy  
future for the Baltic**

by H. J. Barnes

**T**he Baltic, a closed-in sea surrounded by industrial nations, is exceptionally sensitive to pollution. Everything from raw sewage to paper-waste mercury to insecticides and industrial wastes is poured into its confined waters, and the future is beginning to look threatening.

Particularly disturbing, according to a report of the International Council for the Exploration of the Sea, was the discovery last year of hydrogen sulfide in the Baltic's Landsort Deep. The gas had already been detected in other deep Baltic waters, and if it spreads much more, says the report, it could turn the Baltic deeps into the kind of ocean desert found in the Black Sea.

The source of the hydrogen sulfide has not been determined: It may be natural or man-made. The gas is produced by dead organic matter when there is little oxygen, and the breakdown further deoxygenates the water.

Two factors are adding to the lack of deep-water oxygen. One is increased salinity, of unknown cause, which may be leading to greater stability of the halocline. This is a sharp discontinuity in salinity at 50 to 70 meters depth, with the lower waters being more salty. A stable halocline impedes oxygen exchange between the upper and lower waters. Another factor is an observed decrease in the oxygen of the inflowing water from the North Sea.

Whether or not man is mainly responsible for the appearance of hydrogen sulfide, he is certainly making matters worse.

Sewage demands oxygen for the process of breaking down. The waste dispersed into the sea at the moment is either untreated or only mechanically treated. The waters near every major Baltic city are polluted by sewage, with conditions being worst near the major population centers of Leningrad and Copenhagen-Malmö at the entrance to the Baltic.

Several countries have plans for building biological treatment plants, and it is at least conceivable that the sewage problem could be solved.

The prospect of solving the Baltic's phosphorus problem are not as good. The phosphorus compounds act as fertilizer, stimulating the growth of organic matter, increasing the oxygen demand once more, and adding to the burden imposed on the deep waters by sinking dead organic matter. The phosphate content of the deep waters of the Baltic has trebled in 15 years, says the report. Synthetic detergents are primarily to blame, as is the case

elsewhere (SN: 12/27, p. 591). The authors of the report were unable to unearth any plans anywhere for the building of plants for the chemical precipitation of phosphorus compounds.

The deoxygenation due to sewage and phosphorus is the fundamental problem tackled by the report, but the sections on industrial pollution, pesticides and mercury also make discouraging reading.

Waste from the pulp and paper industries of Sweden, Finland and the U.S.S.R. is the major source of industrial pollution, contributing to oxygen demand, suffocating bottom life and destroying fish spawning grounds. But the report concludes that this problem has passed its peak and may improve.

The chemical, metallurgical and food processing industries are other sources of contamination. Toxic heavy metals, cyan compounds, polychlorinated biphenyls (SN: 3/28, p. 321) phenols and others discharged in small quantities may have dangerous long-term consequences. Most countries, especially in Scandinavia, are moving to strengthen control, however.

Pesticides are another problem. Baltic seals have ten times the concentration of DDT in them as Canadian seals, and fish in the Swedish west coast River Viskan were found to have such a high concentration of dieldrin that a fishing prohibition was imposed on the lower waters and surrounding sea area. But several countries have recently moved to control the use of pesticides. Sweden has banned the use of DDT experimentally for two years, and the U.S.S.R. has not used DDT and several chlor-organic compounds since 1968. Denmark has banned the use of DDT in agriculture. Sweden has banned the use of dieldrin, aldrin and, particularly, lindane, from January this year.

Mercury is also in decreasing use, although in several Swedish inland and coastal waters it has reached such high concentrations in fish that these areas have been declared prohibited fishing areas. Mercury was widely used in the chlor-alkali paper bleach factories. This is now on the decline, but some of the substitutes, such as penta-chlor phenol, have also been shown to have negative effects on fish.

All these factors are posing a serious threat, and one that will take heroic efforts and a long time to eliminate. And disaster could strike very quickly.

"A few disasters like the Torrey Canyon accident," says the report, "could annihilate the marine life and fisheries."