SEWAGE SLUDGE IMPACT ON SEDIMENT QUALITY AND BENTHIC ASSEMBLAGES OFF THE MEDITERRANEAN COAST OF ISRAEL – A LONG-TERM STUDY

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Abstract

A long-term study at a sewage sludge disposal site off the Mediterranean coast of Israel showed a marked but localized, seasonally dependent, impact on the benthic assemblages and sediment quality in the area. The effect was mostly northward of the outfall, in the direction of the prevalent longshore current. Measurements showed that the disposal site is dispersive and no evidence of increased accumulation of sewage sludge with time was found, nor of pollutants associated with it.

Keywords: sewage sludge, marine disposal, heavy metals, benthic assemblages

The distributions of benthic assemblages, heavy metals and organic carbon (C_{org}) in sediments were examined during a long-term study at a sewage sludge disposal site off the Mediterranean coast of Israel. The disposal of sewage sludge has a marked but localized, seasonally dependent, impact on the benthic assemblages and sediment quality. Elevated concentrations of C_{org}, Hg, Cd, Cu, Zn, Pb, and to a lesser degree Ni in the sediments were detected mostly northward of the sewage outfall, in the direction of the prevalent longshore current (Fig. 1). High concentrations of C_{org} and metals were reflected by elevated populations of tolerant and opportunistic polychaetes in spring and by an azoic zone in fall (Fig. 2). The impacted area extended mainly towards the north (up to ca. 4 Km) and to a lesser extent south of the outfall (up to ca. 2.5 Km). No evidence of increased accumulation of sewage sludge with time was found, nor of pollutants associated with it. We suggest that the seasonal pattern found is due to the stratification of the water column from spring to fall on one-hand and winter storms on the other. Winter storms resuspend and disperse the fine organic particles, sweeping the site clean of sludge; accumulation of sludge takes place throughout the quiescent periods of the year, when stratification is reestablished.

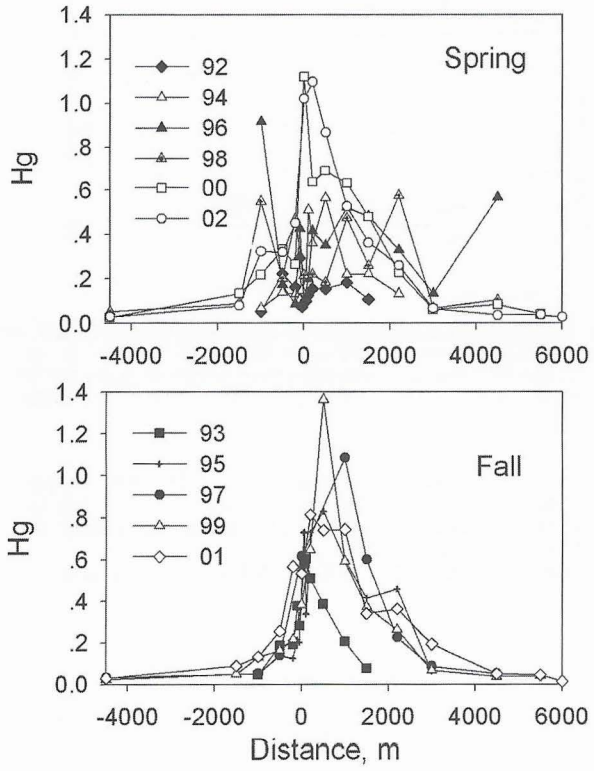

Fig. 1. Distribution of Hg (μg g^{-1} dry wt) in spring and fall along the south-north transect. Negative and positive distances are southwards and northwards of the outfall, respectively.

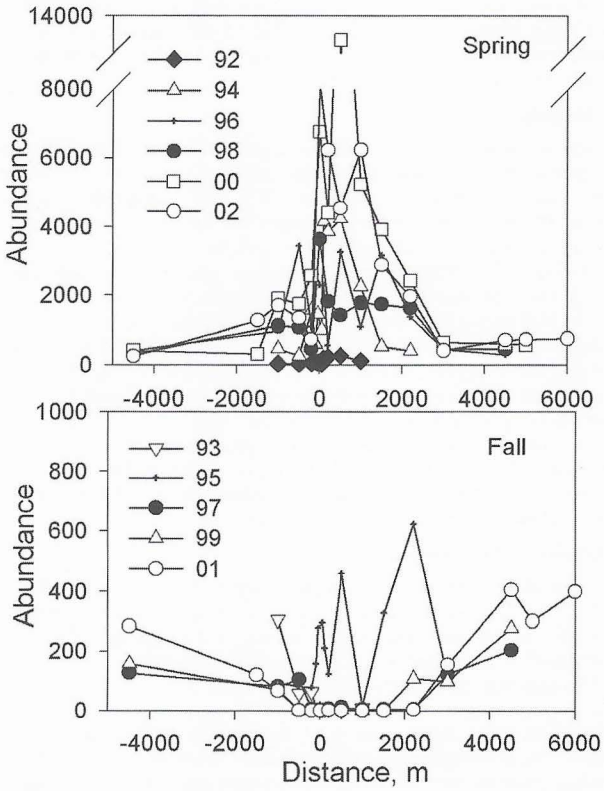

Fig. 2. Distribution of abundance (no of individuals) in spring and fall along the south-north transect. Negative and positive distances are southwards and northwards of the outfall, respectively. Please note difference abundance scale for spring and fall.