

ANNEX 5

Case Study 2.4 Data Sources

Shelf seas nitrate data

A statistical (Generalised Additive) model of nitrate concentrations over the entire north-west European shelf sea (waters shallower than 200 m) was developed by FRS from a database of 45,561 observations collected between 1 January 1960 and 31 December 2003, and supplied by the ICES Oceanographic Data Centre. The model produced monthly synoptic maps of nitrate concentration in the surface and bottom waters at a grid resolution of 0.5° latitude x 1° longitude. Summing the concentrations at each grid node between the sea surface and the seabed depth gave the monthly mass of nitrate in the water column, and the difference between the annual maximum and minimum values was then an estimate of the amount consumed from the water column to support potential new primary production (PNP).

Hydrology and river nutrients

The amount of oxidised inorganic nitrogen (nitrate plus nitrite, NO_x) discharged to the sea from rivers is the product of flow rate and nitrate concentration in the river water. Data from flow gauging stations on UK rivers and rainfall data from UK Meteorological Office monitoring sites were statistically analysed to derive the total volume of freshwater discharged each month between January 1960 and December 2005 through a set of approximately 30 km coastline segments around the UK. To estimate the corresponding river nutrient concentrations, data from the UK Harmonised Monitoring Scheme (HMS) were statistically analysed to derive the monthly mean concentrations in waters discharged through each coastline segment, extrapolating back to 1960 from the earliest observations as necessary. By combining the statistically modelled discharge volumes and concentrations, a 1960-2005 time series of monthly fluxes of nitrate plus nitrite was estimated (kg NO_x-N month⁻¹) for each coastline segment. Equivalent analyses were also carried out for continental European and Irish coastline segments adjoining the north-west European shelf.

Atmospheric deposition

Oxidised nitrogen is deposited on the sea surface with rainfall and as dust particles. The material originates from a variety of sources including the burning of fossil fuels, volcanic activity, and lightning. Modelled data on the amount arriving at the sea surface in the years 1980, 1985, 1990, 1995 and 2000, were obtained from the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air pollutants in Europe (EMEP) which models the spatial patterns of emissions, their dispersal in the atmosphere, and deposition. EMEP data are produced on a 50 x 50 km grid, which was averaged over each of the regions presented in Figure 1.7 in Chapter 1.