# Summary

As a party to the Ospar (Channel, North Sea, Atlantic Ocean) and Medpol (Mediterranean) international conventions, France conducts annual evaluations of fluxes of pollutants reaching the sea via rivers and waterways. The input of additional nutrients contributes to the problem of marine eutrophication. Evaluation makes use of a methodology developed and implemented by the Ospar commission.

Calculations cover the 1990–2009 period but the availability of data often only allows exhaustive studies from the late 1990s onwards. With reservations already expressed as to the methodology used, some trends can be discerned.

Phosphorous fluxes to all coasts have been decreasing markedly – by half or even more – since the late 1990s. This improvement can be explained by reduced use of phosphate fertilisers, as well as by improved performance of sewerage treatment plants. Corsica is the only exception, with rising emissions in recent years.

Moreover the phosphorous fluxes, when viewed in relation to the surface area of catchments, are of comparable orders of magnitude.

The trend is less marked for nitrogen fluxes, especially for the Mediterranean. Ammonium fluxes have certainly decreased greatly, especially in the Channel and North Sea, as a result of better sewerage plants but they are, at the least, ten times lower than those relating to nitrates. The slight decreases observed on the Atlantic coast – Channel, North Sea – do not reach the fifty per cent levels of reduction observed for phosphorous. The Mediterranean flux remains more or less stable; nitrate fluxes are, however, highly dependent on river flow rates.

Viewed in terms of catchment areas, the nitrogen containing fluxes (whether nitrates or ammonium) are greater in the Channel and North Sea, in spite of lower flow rates, than in the Bay of Biscay: use of fertilisers, on average, is higher there and population densities are greater. The lowest surface nitrogen fluxes are observed in the Mediterranean.

The wide year-on-year variations make it all but impossible to show a trend in fluxes of suspended matter. These are large in the Mediterranean, which can lead to an under-estimation of the actual flux, as only dissolved pollutants are included.

Year-on-year variations in nitrate fluxes are closely linked to variations in flow rates: the repeated droughts in 2003 and 2005 therefore influenced trends. Conversely, ammonium fluxes are much less influenced by hydrological conditions.

The fluxes reaching the North Sea, the Atlantic Ocean or the Mediterranean are, overall, determined by the contributions of four major rivers: the Seine (for the Channel, North Sea coast), the Loire and Garonne (for the Atlantic side) and the Rhône (for the Mediterranean) as their catchments represent more than half of the surface area considered (three-quarters for the Mediterranean fluxes). They thus contribute at least half of the flux or more, as illustrated by the Seine for ammonium (three-quarters of Channel, North Sea fluxes). However, in recent years contributions from 'secondary water courses' have tended to exceed those of the major rivers and are proportionally greater in relation to the areas they drain.

The longer series of observations of these rivers confirm the downward trend for the phosphorous containing fluxes and for nitrogen fluxes related to ammonium. The situation is less clear for nitrate fluxes, with only the Loire showing a slight decrease.

The Seine is the river making the greatest contribution in relation to the area of its catchment. It is also the only one for which the historical data on metals are usable (from 1995). The cadmium and mercury fluxes are seen to be rising, those of other metals (zinc, copper and lead) are stable.