What are the sources of microbiological pollution of coastal waters?

In most of the polluted areas, the river and sewage outfalls discharging to the estuaries or marine bays have high levels of bacteria and viruses. Different sources of contamination are currently identified on sites where bathing activities are present or shellfish are farmed (Figure 2.1):

- Sewage discharges including sewage outfall, combined sewer overflows and storm water discharges. The type of treatment applied to sewage waters plays an important role in the faecal load discharged into marine waters (physical, biological or tertiary treatments).
- Sewage network failures: many storm water events could contribute to this pollution and could trigger persistent faecal contamination even during dry weather.
- River discharges and possible run-off from agricultural activities.
- Other specific discharges could also come from ships, wild birds, bathers, sediments or other diffuse urban sources such as seagulls, dogs or cats.

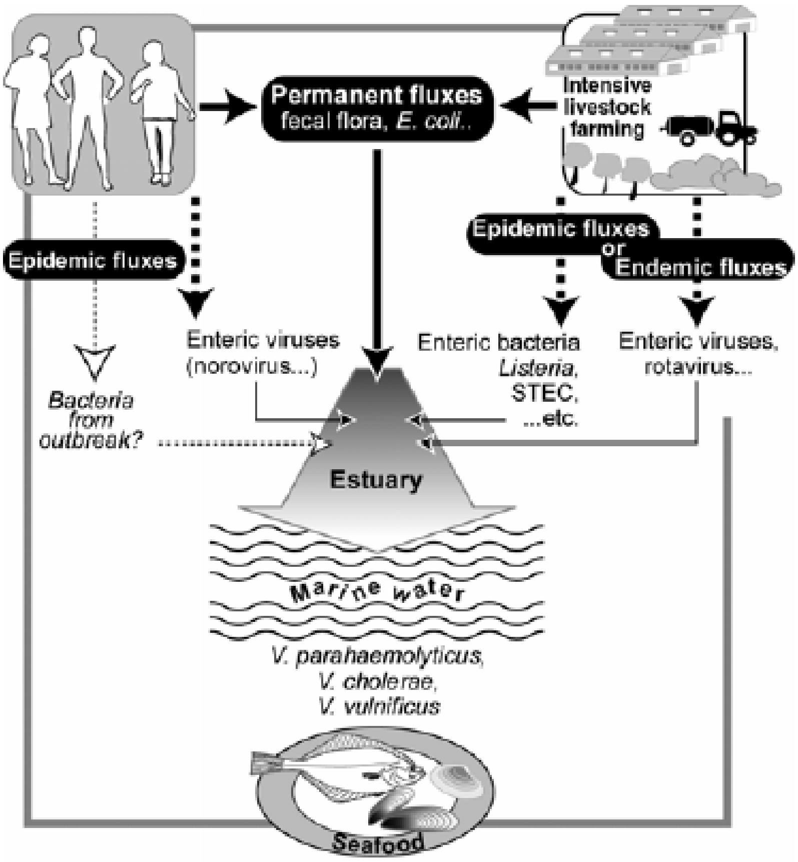

Figure 2.1 *Origin and pathways of microbiological contamination of marine waters.(Pommepuy* et al., *2005)*

A recent review of the impact of rainfall on microbiological pollution, identified point source intermittent discharges as one of the major sources of shellfish contamination (Lee *et al*., 2003). These discharges can result from

- heavy localized intense storms that result in a rapid flushing of stored material and associated contaminants from within the sewerage system, and;
- periods of heavy rain that may overload sewerage infrastructure.

The highly contaminated first flush from combined sewer overflows or storm tank overflow may pass in a few tens of seconds. As currently observed, the combined sewer overflows receive rainfall water, untreated wastewater and runoff during high precipitation events - all sources of faecal contamination – and can seriously impact bathing waters or shellfish areas (Lequette *et al.*, 2006). These events are of the utmost importance given the persistence of micro-organisms in the environment (see Table 2.1). Moreover a recent publication suggests that the specific binding of viral particles to the oyster digestive tract will increase the difficulty of removing viruses from contaminated oysters during depuration processes (Le Guyader *et al.*, 2006 and 2007b).

Table 2.1 Persistence of micro-organisms in the environment. The persistence is measured with the T90, which is the time observed for a 90% decrease of the concentration of the bacteria or virus. The table gives examples of literature data on T90 in estuarine and marine waters. (Decimal reduction time is expressed in hours: minimum-maximum according to depth and intensity of light and turbidity) In Pommepuy et al., 2006.

Pathogen	**Seawater**		**Estuarine water**	
	18 – 22°C	**4 – 5°C**	**18 – 22°C**	**4 – 5°C**
Listeria innocua	5 – 45	54 – 89	6 – 24	57 – 96
Listeria monocytogenes	22 – 39	-	80	-
Escherichia coli	5 – 35	67 – 81	96 – 500	120 – 235
Salmonella. tyohi	33 – 84	33 – 79	-	-
Salmonella panama	13 – 72	108 – 316	15 – 34	96 – 144
Poliovirus-1	10 – 72	158 – 170	-	-
F+RNA	60 – 76	-	-	-
Hepatitis A virus	72 – 672	-	-	-
Astrovirus	384 – 432	648 – 720	-	-

➥*Go to full QSR assessment report on the impacts of microbiological contamination on the marine environment of the North-East Atlantic (publication number 466/2009)*