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## **Estimating concentrations from sewage effluent in rivers: Simple example for the River Thames at Kingston (the tidal limit above London)**

Simple estimate of the daily concentration =  $(P_{Ld\_inf_X} * Pop\_B * Con_B * (1 - R_X)) / (365 * MDF)$

- $P_{Ld\_inf_X}$  (g/cap/year) is the European average per capita load of ENP X entering the sewer system
- $Pop\_B$  is the total population in the basin above the point of interest = 6 million for the Thames basin.
- $Con_B$  is the fraction of the population connected to sewage treatment in the basin
- $R_X$  is the removal efficiency of ENP X in STPs (0-1)
- $MDF$  is the mean daily flow m<sup>3</sup>/day = 7,000,000

The task is simply to derive estimates of the concentrations of nano-Ag or nano-Zn using suitable values for these parameters. Compare the results with PNECs and consider the implications.

The tables below will give you some realistic values for these parameters.

Start with conservative values i.e. values likely to give a worst case PEC.

Assume the sewage treatment removes 0% of the nano-particles and that all the populations is connected to sewage treatment.

Consider how this estimate might be refined using other values for the parameters. Looking at how the PEC compares with the PNEC would it need refining?

Table 1 has some values that will help with the calculations

**Table s1** Parameters used for estimating soils concentrations of nano-particles (Keller et al in prep)

Parameters	Nano Ag	Nano ZnO
Mass released to Sewer in the EU27 (tonnes/year) <sup>1</sup> – $EU27\_Ld\_inf$	8.85	1050

Fraction of the population connected to sewage treatment plants <sup>3</sup> - <i>Con</i>	The values for each country are given in Table S2 (see soil exercise document)			
Scenario	Best	Expected	Best	Expected
Fraction captured in Sludge $R_x^*$	0.99	0.93	0.88	0.85

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