

A PFAS mass balance– impact on the sediment (re)use policy

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Introduction: Due to the combination of subsidence, soil erosion and sea level rise, sediment use is essential for the Netherlands. While the sediment quality has improved greatly over the past 25 years, “new” substances of very high concern like PFAS have spoiled the party and legislation has severely limited the use of sediments. In this presentation we want to look at the mass balance of PFOS (one of the PFAS components) (see Figure 1) to evaluate what can be done on a system scale to limit the PFOS load in two Dutch rivers.

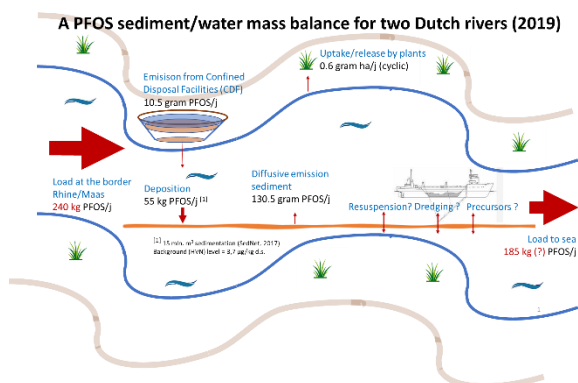


Figure 1 An indicative PFOS mass balance for the Rhine and Maas (2019)

Methods: To set up a PFOS mass balance and evaluate the role of sediment in the mass balance data has been collected on two of the main Dutch rivers, the Rhine and the Maas. Based on the discharge and PFOS concentration in the two rivers the incoming (border) and outgoing (sea) PFOS load has been calculated [2]. When combined with the average sedimentation rate [1] and the PFOS background concentration [3] a global PFOS balance can be made. To evaluate the impact of sediment related processes (erosion, dredging, use for nature development, storage in a CDF) batch and mesocosm experiments (Figure 2) have been carried out.



Figure 2 Mesocosm experiment for PFAS

Results: The results yielded some important insights how sediment, when disturbed (erosion, dredging, application) release PFAS and more specific PFOS (Figure 3).

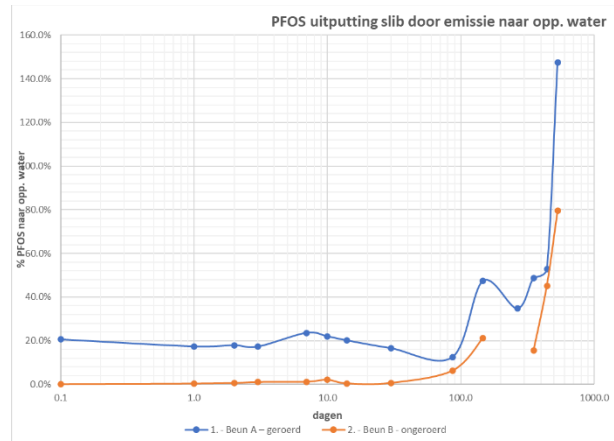


Figure 3 PFOS emission to water as % of sediment conc.

Discussion: What we can learn from the PFOS mass balance and sediment related processes is what we can do to avoid the release of PFOS as much as possible, and where the priorities should be to improve the water quality.

References:

- [1] Jos Brils et. Al., Sediment uit balans, SedNet, 2017
- [2] M.T.O. Jonker, Poly- en perfluoralkylstoffen (PFAS) in de Rijkswateren, concentraties in water en biota tussen 2008 en 2020
- [3] Handelingskader voor hergebruik van PFAS-houdende grond en baggerspecie, 2021