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Quantification of nitrogen and phosphorus inputs from farming activities into the water bodies in the Leningrad and Kaliningrad regions

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Abstract Agricultural intensification leads to higher diffuse environmental pollution. Successful pollution control requires the continuous monitoring of farming activities, reliable baseline data, and tested computational models for the quantitative assessment of diffuse loads. The study aimed to quantify the diffuse inputs of manure nitrogen (N) and phosphorus (P) to the marine environment from large livestock farms and to identify the lowering effect of the best available techniques of manure/organic fertiliser handling. The study area was the Leningrad and Kaliningrad regions, found in the Russian part of the Baltic Sea catchment area. The total diffuse load in 2017 was estimated by the Russian and Belarus methodologies based on the calculations of the livestock density and the total field application of nitrogen and phosphorus with organic fertilisers. In the Leningrad Region, it was 4571.53 t N year^{-1} and 280.01 t P year^{-1}; in the Kaliningrad Region—6132.48 t N year^{-1} and 372.32 t P year^{-1}. The introduction of relevant best available techniques and the supply of all farms with waterproof manure storages and pads could reduce the diffuse load on the catchment in the Leningrad region by 1078.07 t N year^{-1} and 55.5 t P year^{-1} and in the Kaliningrad Region—by 1060.43 t N year^{-1} and 40.5 t P year^{-1}. Such a reduction would provide a marked contribution to fulfilling the nutrient input ceilings set

Highlights
- Intensive agriculture is a major source of nutrient diffuse inputs to water bodies.
- Large livestock farms in the Leningrad Region and livestock farming in the Kaliningrad Region were listed by HELCOM as Hot Spots.
- Only 40% of manure produced in the Leningrad and Kaliningrad Regions are used in organic fertilisation .
- The diffuse nitrogen and phosphorus inputs from both applied and unaccounted for manure were calculated by the Russian and Belarus methodology.
- The BAT introduction and the monitoring and control over the organic fertilisation can contribute to around 15% reduction of nitrogen input and above 8% reduction of phosphorus input.

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