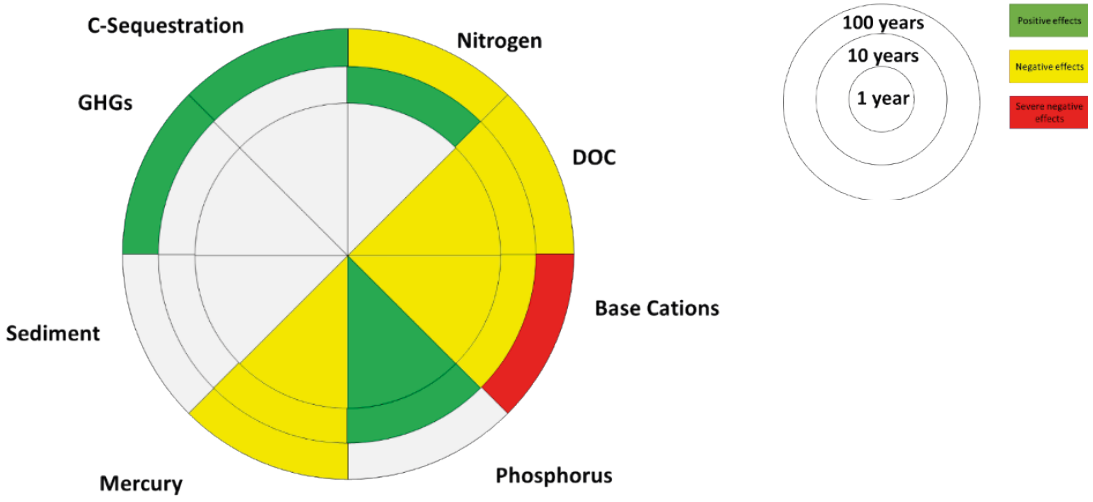
Theme 3: Visualizing possible effects of intensified forestry on surface waters by a conceptual biogeochemical framework for forested catchments

With the increasing need for climate mitigation activities and demands for a low carbon economy, Norway is undertaking an ambitious program of intensified forest management. While the carbon and climate mitigation benefits offered by more intensive forestry are clear, the consequences of these actions for water quality have been inadequately explored. Specifically, there are important questions about the water quality consequences of forest fertilization, greater rates of biomass removal at harvest, afforestation and increased seedling density when replanting. Here, we use a structured framework to assess and visualize the potential consequences of these activities based on existing literature on a series of key forest ecosystem processes: deposition, weathering and element accumulation, recirculation and fluxes.

Based on literature available from Norway and other Nordic countries with similar conditions there are still knowledge gaps regarding the trade-off between increased biomass yield and consequences for surface water quality. Examples of such knowledge gaps are post-harvest effects of fertilized stands on nitrogen leaching, forest harvest effects on mercury speciation and leaching, and the role of buffer zones to mitigate negative impacts. Lack of country- or site-specific data might to some extent be compensated by spatial data from neighboring countries, international studies in similar ecosystems and similar climate zones, and by use of dynamic and process-based catchment models.



Example on use of structural framework to visualize possible effects of forest management (here: afforestation on new areas) on different time scales. Green, yellow and red colours denote positive, negative and strong negative effects, respectively.

Reference: Futter M, Clarke N, Kaste Ø, Valinia S. 2019. The potential effects on water quality of intensified forest management for climate mitigation in Norway. NIVA report 7363, 39 pp.

Contact: Salar Valinia (salar.valinia@naturvardsverket.se)

SURFER – Surface waters: The overlooked factor in the forestry climate mitigation debate.

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