



How can we routinely monitor suspended sediment in rivers? A case study from a New Zealand River Monitoring Network based on relationships between visual clarity, turbidity and suspended sediment.

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ABSTRACT

Despite the interest in suspended particulate matter (SPM) for its multiple effects on aquatic ecosystems, many state-of-environment (SoE) monitoring programmes on river water quality do not measure SPM mass concentration. One reason is that pseudo-random (e.g. regular monthly) sampling design for river water quality usually intercepts rivers in base flow when suspended sediment mass concentrations are low (and fluxes very low) and not of particular interest. New Zealand's National Rivers Water Quality Network (NRWQN; comprising 77 sites on 35 river systems draining half the country's land area, has not included measurements of SPM mass concentrations, although visual clarity and nephelometric turbidity are routinely measured. In order to better characterize SPM in NZ rivers, total suspended sediment (TSS) and related assays were (temporarily) added to the NRWQN. As expected, the variables turbidity, visual clarity, and TSS are mutually inter-related over all 77 sites in the NRWQN. But while turbidity and visual clarity are fairly closely (inversely) correlated, these optical variables correlate appreciably less well with TSS – reflecting wide diversity in the optical properties of river SPM. However, within individual rivers, in which SPM optics are less variable (and trend mainly with flow), turbidity and visual clarity are typically fairly closely related to TSS and provide fair to excellent surrogates. Combining SPM measurements with water quality in this way is expected to yield important insights into fine sediment as a multiple stressor of rivers and downstream waters.