



Global analysis of population growth and river water quality

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Human-related pressures on river water quality are a concern of global proportions.. However, little is known about the more specific impact of increasing population on river water quality and how it provides a vital environmental reference for water management. Combining global gridded data on population and river discharge with digitized river networks, we conduct numerical simulations to demonstrate the direct impact of population growth on river water quality. Our model traces the transport, dilution, and degradation of anthropogenic organic matter (BOD) emissions into rivers. Spanning the period from the early 20th century to the present, our analysis indicates that the pressure on downstream river networks markedly increased since the population explosion starting in 1950, especially in developing countries. The ratio of population to river discharge reveals the link between impact severity and dilution capacity. In addition, a denser population is found to be correlated with higher impact severity. Consideration of direct population influences on global river water quality becomes limited as society develops and should be studied as a fundamental reference for human-related river water management.

Keywords: Population growth, River water quality, Space-time analysis, Human activities, Water Management