Characterization of urban stream water quality using water quality index

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Industrialization and urbanization have increased anthropogenic pollutant loads, attributing to the deterioration of the nation's stream water quality in South Korea. The deterioration of water quality in urban streams, which have a variety of designated uses, such as public water supply, recreation, or conservation of wildlife, can pose a risk to human and ecosystem health. Water quality assessment and management are conducted based on monitored data, but such monitoring efforts, especially monitoring a large number of water quality variables, requires costs and manpower, often becoming a burden to local government agencies. This study attempted to identify which water quality variables are the major cause of water quality deterioration in urban streams, and prioritize the monitoring needs of these variables. As study sites, 128 monitoring sites for streams located within the metropolitan cities, which have the population greater than one million in South Korea, were selected. The water quality data for 17 water quality variables and land cover data were obtained from the national water quality monitoring network. Water Quality Index (WQI), whereby the information on multiple water quality variables is integrated, was developed based on the National Sanitation Foundation-WQI approach. Based on the calculated WQI, the sensitivity analysis was performed in order to identify important water quality variables in determining integrated stream water quality in urban-dominated subwatersheds. The analysis indicated that total and ammonia nitrogen, and chemical oxygen demand are the most important variables that determine the water quality of urban streams. Our result would be useful to provide guidelines for developing monitoring strategies in urban streams.