

Water quality changes according to the midstream weir construction in the Yeongsan River, Korea

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ABSTRACT

This paper describes the effects of weir construction on water quality in the Yeongsan (YS) River. In general, weirs affect aquatic environments of rivers and streams by interrupting natural water flow. To identify changes in water quality before and after weir construction, analysis of variance and autocorrelation tests were conducted on data from four monitoring stations. Seasonal variations in suspended solids (SS), biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), total nitrogen (TN), total phosphorus (TP), and pH were analyzed using data from six years of monitoring. No significant changes in mean BOD₅ or COD followed the construction of weirs. However, mean TN and TP were changed significantly during and after construction. Moreover, SS and pH changed significantly during construction, and TN and TP concentrations were slightly improved after weir construction. However, continuous monitoring and analysis of water quality changes in each weir are required to prevent environmental disasters such as algal blooms.

Keywords: Water quality change; Weir construction; Yeongsan River; ANOVA test

1. Introduction

Artificial structures, such as dams and weirs, in rivers generally affect both water quality and flow in aquatic systems [1,2]. Nonetheless, weirs and dams have several positive economic effects, providing social services, navigation, power generation, irrigation, flood control, and water resource management [1,3,4]. However, research has revealed that artificial structures, including dams and weirs, can negatively influence water quality in rivers or reservoirs, leading

to the accumulation of trace metals, nutrients, and organics, and establishment of obstacles to transport organic and inorganic materials [1,5–7]. Presently, dams and weirs with two faces are being constructed globally.

In Korea, 16 weirs were constructed from 2009 to 2011 to provide water security, flood control, and ecosystem vitality in the four rivers Han, Nakdong, Geum, and Yeongsan (YS). As of 2013, all weirs are operating, and water quality and flow are continuously monitored upstream and downstream of each weir. Of particular interest are two weirs in the

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