The investigation of the bacterial indicators and point sources of pollution for the Nanshih River, Taiwan: a case study

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ABSTRACT

The objective was to evaluate representative bacterial indicators found in the Nanshih River, a resource having multiple uses including recreation, water supply, and agriculture. Human activities were investigated in order to clarify the relationship between bacterial indicators and point source pollution discharged into this river. The optimal bioindicator was evaluated using four approaches by two-dimensional principal component analysis (PCA), which included ten water parameters, the median river pollution index parameters, bacterial numbers and specific fluorescence in situ hybridization indicators. The results indicate that \textit{Bifidobacterium} spp. with the range of 1.80 ± 0.96–14.14 ± 1.24% were identified as the best bioindicator for the Nanshih River and these bacteria are able to identify four characteristic groups of point pollution sources using PCA. It is suggested the specific bacterial indicator need to be used for the regular monitoring of the Nanshih River in addition to the present regulation requirements of total coliforms counts. The major contributor to the biological pollutants was determined to be hot spring resort activity, which implies that tourists may be vulnerable to waterborne recreational illnesses. An effective strategy aimed at controlling point source pollution should be able to reduce drinking water resource and recreational activity public health risks associated with the Nanshih River.

Keywords: Bacterial indicators; Median river pollution index (RPI-M); Fluorescence in situ hybridization (FISH); \textit{Bifidobacterium} spp.; Total coliforms (TC)

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