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Social-environmental analysis of water quality in a populous urban estuary, case study of Tamsui River estuary

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Abstract

Estuary is a habitat that can provide unique ecosystem services to benefit mankind and maintain marine ecosystem health. However, the coastal environment including estuary and the ecosystem services they provided are facing fast degradation due to the increasing pressures and changes in the near future. Estuaries are highly dynamic, unique, and diverse ecosystems. It has been regarded as naturally stressed areas that are caused by the great variability of the physico-chemical characteristics in the water column. In addition, they are exposed to high degrees of anthropogenic influence, especially in a populous urban estuary. The high population density, the increasing anthropogenic pressures and ongoing environmental alteration, such as climate change and sea-level rise, which synergized the problems. Social-environmental analysis integrates not only scientific information but also social activities therefore provide a comprehensive knowledge for multi-parties jointing decision-making process in reaching successful sustainable management. In recent decades, Asia has been experiencing rapid urbanization, industrialization, and economic growth. Taiwan had been experienced the early economic growth in Asia and was one of the four Asian dragons, which underwent rapid industrialization and maintained exceptionally high growth rates between the early 1960s and 1990s. However, like many other countries, the environment has been sacrificed for economy growth. In 1990s, the pollution was getting serious and water quality of the rivers and estuaries went bad. In order to improve the water quality, several measures have been implemented. Notably, Taiwan is an island so its estuary systems are only governed in sole regime, which makes Taiwan one if not only ideal place to study. In this study, the historical data and information are employed in the social-environmental frameworks, driver-pressure-state-impact-response (DPSIR) framework and the systems approach framework (SAF), to analyze the water quality in the most populous urban estuary, Tamsui River estuary, in Taiwan.

Keywords

Social-environmental framework, DPSIR, systems approach framework, Tamsui River estuary