

AQUATOX 應用於高雄愛河受截流站操作 影響感潮河段之浮游藻類模擬

Planktonic algae ecology simulation in the tidal reach under interception station operations of Love River in Kaohsiung by the estuary module of the AQUATOX model

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摘 要

高雄愛河整體的水文相當複雜，在中下游部分為感潮河段，會受潮汐及鹽度傳輸的影響產生逆流，且愛河沿線的支流有部分流入，部分則是設有截流站，起因於民國66年開始了愛河整治計畫，目的為興建截流站截取汙水以及汙水處理廠的建設，為使河水快速潔淨，且高雄愛河在中游段愛河之心處，形成類似小型滯留池的河段，偶爾會有藻類大量滋生造成藻華之現象，因此應用模式模擬，並經檢定驗證後可對中游龍心橋以及下游出海口處高雄橋兩橋之浮游藻類模擬，此外本研究也會多加探討截流站對於河川水質的影響，以及水質進而影響藻類增生的程度。

為了符合研究區域的需求，本研究選用了AQUATOX這個模式，此模式可以針對各式水域進行模擬，在水庫、湖泊、河川、河口等水域，進行生物生態及毒物等模擬。本研究因應模式的限制，配合現地藻類取樣點位及水質量測點位，將河段分割為15段，並作兩階段的模擬，兩個階段皆經過檢定驗證後，再以第二階段的河口模組模擬之結果分析藻類模擬的效能，並會對截流站的操作進行結果分析，用以得到各截流站對於水中營養鹽濃度與藻類的影響程度，資料來自於2020年6月至2021年1月間，分別在主流3個及支流6個點，進行為期八個月每月一次為時14小時的連續量測，施作基本的流量及水質量測，此外還有6個藻類的採樣點位，每月分組採樣，並以這些資料作為數據庫，用以評估模式在愛河營養鹽及浮游藻類的模擬結果是否良好，目的為得到一個有效的模式，用以模擬感潮河段的營養鹽及藻類，並藉由截流站的操作可得知此研究中各個截流站對於營養鹽濃度與藻類的影響程度，且由於雨量達標時截流站閘門必須開啟，因此，此分析結果也可協助後續評估整治的目標區域，例如可提升某特定截流站的處理水量，使得汙水不須被排入主流中。

關鍵詞：AQUATOX模式、截流站、營養鹽、浮游藻類、感潮河段

A b s t r a c t

The overall hydrology of the Kaohsiung Love River is quite complex. The middle and lower reaches are the tidal reaches, which will be affected by tidal and salinity transmission. Some of the tributaries along the Love River flow in, and some have interception stations. That's because of the Love River renovation project began in 1977. The mainly purpose is to intercept sewage and construction of sewage treatment plants, to make the river clean quickly. In addition, Heart of Love River Ruyi Lake is at the middle reaches of Love River, which forming a reach similar to a small retention pond. Sometimes there will be a algal blooms. Therefore, using the model to simulation, and after verification, it can simulate the planktonic algae of the Longxin Bridge in the middle reaches and the Kaohsiung Bridge at the downstream outlet. In addition, this study will also discuss the effect of the interception station to the water quality of the river, and how the water quality effect to algae.

In order to meet the needs of the research area, this study selected the AQUATOX model, which can simulate various water area, and simulate biological ecology and poisons in reservoirs, lakes, rivers, estuaries and other waters. Due to the limitation of the model , the river is divided into 15 reaches according to the local algae sampling points and water quality measurement points. Do two-stage simulations. After both stages have been verified, the effectiveness of the algae simulation is analyzed based on the results of the second- stage estuary model simulation. And will also analyze the results of the operation of the interception station. It is used to get the influence of each interception station on the nutrient concentration and algae in the water. Data from Water Quality Improvement and Planning in the Love River Region.. From June 2020 to January 2021, water flow and water quality measurements were carried out at 3 points of the main stream and 6 points of the tributaries, with continuous measurements every 14 hours per month. In addition, there are 6 algae sampling points for sampling every month. It is used to evaluate whether the model's simulation results of nutrients and planktonic algae in the Love River are good, and the purpose is to obtain an effective model for simulating nutrients and algae in the tidal reaches. And through the operation of the interception station, we can know the influence of each interception station on the nutrient concentration and algae in this study.

Keyword : A Q U A T O X 、 interception station 、 nutrients 、 planktonic algae 、 tidal river