



Application of Species distribution models and River2D to assess riverine ecosystems: A case of *Sicyopterus japonicus* in Datuan stream

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Riverine ecosystems are usually under the risk of anthropogenic contamination and climate change. With an eye to improving this situation, it is imperative to formulate corresponding policies. To provide the government with better policy-making standard, understanding of the future development of the ecosystems is quite necessary. Species distribution models (SDMs) is an ideal tool to understand the relationship between environmental variables and species occurrence. There are various species distribution models (SDMs) that have been developed and used in stream ecology. However, consensus on the selection among different models has not yet been reached. The results of inappropriate model selection include increasing uncertainty and high occurrence of prediction errors. How to choose the model that best fits the scenario among many is, therefore, of paramount importance. This study collects river channel data and *Sicyopterus Japonic* data in Datuan stream. We uses River2D as an efficient tool for simulating the two-dimensional flow condition of a stream segment. Then we combine six SDMs with the outputs of River2D and quantify the relationship between environmental variables and species occurrence by using six SDMs, which are respectively generalized linear model (GLM), generalized additive model (GAM), random forest model (RF), support vector machine (SVM), artificial neural network model (ANN), and ensemble model (the average of other five SDMs). We randomly split the fish data to train(70%) and validate(30%), and each model repeats this step for 1000 times. Finally, through Akaike information criterion, root-mean-square error and Kullback–Leibler divergence, we can know which model has better performance. The results demonstrated that the accuracy of River2D is greatly affected by measurement , and that *Sicyopterus Japonic* likes areas where the water is deep. Moreover, through the result, it is observed that ensemble model outperforms the others. Therefore, next time we can use the ensemble model when it is hard to determined which model to use.

Keywords: SDMs, ensemble model, River2D, habitat suitability, uncertainty, suitability models, Datun Stream, *Sicyopterus Japonicus*