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Ecological Planning Method of Reclamation Area Based on Ecological Management of Spartina Alterniflora: A Case Study of Xihu Harbor in Xiangshan County

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Abstract : The study region Xihu Harbor in Xiangshan County, Ningbo City is located in the central coast of Zhejiang Province. Concerning the wave dispating issue, Ningbo government firstly introduced Spartina alterniflora in 1980s. In the 1990s, S. alterniflora spread so rapidly thus a 'grassland' in the sea has been created nowadays. It has become the most important invasive plant of China's coastal tidal flats. Although S. alterniflora had some ecological and economic functions, it has also brought series of hazards. It has ecological hazards on many aspects, including biomass and biodiversity, hydrodynamic force and sedimentation process, nutrient cycling of tidal flat, succession sequence of soil and plants and so on. On engineering, it courses problems of poor drainage and channel blocking. On economy, the hazard mainly reflected in the threat on aquaculture industry. The purpose of this study is to explore an ecological, feasible and economical way to manage Spartina alterniflora and use the land formed by it, taking Xihu Harbor in Xiangshan County as a case. Comparison method, mathematical modeling, qualitative and quantitative analysis are utilized to proceed the study. Main outcomes are as follows. By comparing a series of S. alterniflora managing methods which include the combination of mechanical cutting and hydraulic reclamation, waterlogging, herbicide and biological substitution from three standpoints – ecology, engineering and economy. It is inferred that the combination of mechanical cutting and hydraulic reclamation is among the top rank of S. alternifora managing methods. The combination of mechanical cutting and hydraulic reclamation means using large-scale mechanical equipment like large screw seagoing dredger to excavate the S. alterniflora with root and mud together. Then the mix of mud and grass was blown off nearby coastal tidal zone transported by pipelines, which can cushion the silt of tidal zone to form a land. However, as man-made land by coast, the reclamation area's ecological sensitivity is quite high and will face high possibility of flood threat. Therefore, the reclamation area has many reasonability requirements, including ones on location, specific scope, water surface rate, direction of main watercourse, site of water-gate, the ratio of ecological land to urban construction land. These requirements all became important basis when the planning was being made. The water system planning, green space system planning, road structure and land use all need to accommodate the ecological requests. Besides, the profits from the formed land is the managing project's source of funding, so how to utilize land efficiently is another considered point in the planning. It is concluded that by aiming at managing a large area of S. alterniflora, the combination of mechanical cutting and hydraulic reclamation is an ecological, feasible and economical method. The planning of reclamation area should fully respect the natural environment and possible disasters. Then the planning which makes land use efficient, reasonable, ecological will promote the development of the area's city construction.

Keywords : ecological management, ecological planning method, reclamation area, Spartina alternifora, Xihu harbor
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