Landscape Pattern Changes and Their Environmental Effects of Coastal Wetlands in Jiaozhou Bay

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Abstract: Based on the classification of wetland landscape, and by using remote sensing and GIS techniques, the Landsat 5 and Landsat 7 false color TM images of coastal wetlands in Jiaozhou Bay in 1986, 1995 and 2010 were obtained, and the landscape pattern changes and their cumulative environmental effects were studied with patch dynamic index, patch density index, landscape diversity index and patch fragmental index. From 1986 to 2010, the total area of the coastal wetlands in Jiaozhou Bay decreased, but the area of river and estuary wetland increased slightly, the area of inter-tidal wentland and supper tidal wetlands increased and their patch numbers decreased. To artifical wetland landscape, the area and patch numbers of culture ponds increased, but the area of salt fields decreased and their patch numbers kept approximate constant, and wetland park has been congstructed since 2008 at eastern suburbs of Jiaozhou city. In correspponding, the patch density index, landscape diversity index and patch fragmental index of the coastal wetlands in Jiaozhou Bay increased. The changes of area and landscape patterns of coastal wetlands in Jiaozhou Bay were induced by land reclamation, urbanization, port and road construction, runoff and sediment discharge decrease, coastal erosion, global warming, sea level rise, etc. The changes above lead to many cumulative environmental effects, such as biodiversity and environment purification service decrease, harmful alien plants invasion, contamination and red tidal getting more srious, coastal wetland vegetations and fishery resource degradation and coastal wetland ecosystem service value deciline. To reduce the harmful cumulative environmental effects of the coastal wetlands in Jiaozhou Bay and to protect the coastal wetlands, some countermeasures, such as constructing natural reserve, limiting culture ponds and salt fields scale, developing cyclic economy and ecological agriculture to reduce fresh water usage and contamination are put forward.

Keywords: Jiaozhou Bay; coastal wetland; landscape pattern index; change; environmental effect

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