The impacts of climate change and rapid economical development in China on the ecosystem in the Changjiang Estuary and in the East China

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The circulation and marine environment in the Bohai, Yellow and East China Seas are influenced by the discharges from major nine rivers (Changjiang, Minjiang, Ou, Oiantangjiang, Huanghe, Hai, Liao, Yalu, and Han), tides, meteorological conditions and the Kuroshio Current, but the Changjiang River is the major source of freshwater, sediments and nutrients that flow into the East China Sea. Economic development in the Changjiang catchment, including industrialization, agriculture and water-resource development, such as the construction of the Three Gorges Dam, may affect the water and elemental cycles in the catchment. Ultimately, the supply of freshwater, sediments and nutrients into the East China Sea will be altered and, therefore, the Changjiang river discharge gives the biggest influence on the ecosystem in the Changjian estuary and the East China Sea as well as in the Yellow Sea. Climate change in recent years caused the change in precipitation pattern which resulted in big floods during wet season (June-September) and drought during dry season (January-March). In 1998 the second biggest flood occurred in Changjiang catchment and the discharge of Changjiang river at Daton hydro-station recorded over 80 000 m³/s on August, 1998. Pollutant accumulated in the Changjiang catchment run-off during big flood and discharged to the East China Sea. Therefore the increase in flood event due to climate change will result in increase of pollutant load to the East China Sea, which will cause heavy eutrophication and red tide outbreaks.

In 2006 severe drought occurred in Changjiang catchment and the discharge at Daton hydrostation dropped significantly on March, 2006. Salinity intrusion into the Changjiang river will be caused by the decrease in the fresh water discharge from the Changjiang river due to drought and the increase in the fresh water intake for industries and municipalities along the Changjiang river. Salinity intrusion will damages the economy in Shanghai city in the area of drinking water, industrial water and agriculture.

This paper presents the environmental impacts on the ecosystem services in the Changjiang catchment, estuary and the East China Sea under the condition of climate change and rapid economical development in China by using the integrated model for management of environmental resources.

The followings will be presented.

1. Environmental pollution loads from the Changjiang catchment

2. Salinity intrusion in the Changjian river during drought period

3. Trans-boundary fllow in the East China Sea caused by the 1998 big flood in the Changjiang catchment

4. Heavy eutrophication and red-tide outbreaks in the East China Sea

N in applied chemical fertilizer



Fig. 1 Nitrogen load as chemical fertilizer in the Changjiang catchment



Fig. 2 Salinity intrusion in the Changjiang river



Fig.3 Predicted chl-a distribution and TN distribution (Sep.15, 1998)