A 3-D coupled biophysical model was developed to reproduce the seasonal variation and spatial distributions of chlorophyll a and nutrients in the Yellow Sea (YS) and East China Sea (ECS). The hydrodynamic module is based on a nested model for the YS and ECS with a horizontal resolution of 1/18 degree. The biological module is based on lower trophic level interactions between two types of phytoplankton, three types of nutrients and biogenic organic materials. As first step of our modeling efforts on the ecosystem in the YS and ECS, we tried to reproduce the seasonal variation and spatial distributions of chlorophyll a and nutrients in the seas. Model results generally reproduced the well-known temporal variations and distribution patterns of major variables related to the ecosystem from the observations in YS and ECS. The factors such as light intensity, water temperature, water stability and nutrient concentrations limit the production of phytoplankton. In spring, water temperature, light intensity and water stability play an important role in the onset of phytoplankton bloom, while the nutrient concentrations in winter determinate the duration of the bloom. In summer, the nutrient concentrations become main limiting factor to the phytoplankton production except for the region surrounding the Changjiang river estuary, where the high turbidity limits underwater light intensity and the chlorophyll a is relative low throughout the year.