

Quantification of interdependencies between economic systems and ecosystem services using green Input-output modeling in support to integrated coastal zone management: The case of the Seine estuary

Abstract

The aim of this paper is to test inside an input-output model, three precepts advocated by the sustainable strategy of integrated coastal zone management. The strategy recommends the use of decision support tools that offer holistic perspectives and lend themselves to social deliberation, both to handle uncertainty. Unsustainability is partly due to the fact that “narrow-system-boundary” tools fail to capture important ecosystem services and ignore interdependencies between them. An input-output model that respects the holistic precepts is developed in this paper. First, our method focuses on physical flow exchanges between the economic and the ecologic systems. Second, it integrates the work of recent researches. Both make possible to enlarge the amount of ecosystem services considered. A numerical application to the Seine estuary addresses the impacts of maritime transportation on flat-fish habitats. The ecosystem services covered are life support and resources provisioning services. Preliminary results show that the restoration of half of the sand flat surfaces destroyed in the Seine estuary on the period 1834-2004 would increase its stock of soles by 22%. However, the contribution of the Seine estuary to the sole stock in the Eastern channel would raise only from 14,2% to 16,18% instead of 30% in 1834. It is due to high uncertainty that impedes to consider the effect of improved sediment quality although it is a major influencing factor that prevails on physical destruction of surfaces. As a result, the fishing economic production raises only by 3,2 %. Social deliberation inside multi-criteria analysis could partly palliate this drawback.