Integrating natural capital into CGE modelling

Topic: IO modeling: Computable General Equilibrium Modeling and Social Accounting Matrices
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An increased emphasis on the valuation of natural capital has led to the need for incorporating natural capital accounts into economic modelling. The valuation estimates aim to raise awareness of the economic significance of natural capital and better inform policy making. Computable General Equilibrium (CGE) models have recently been used to link natural capital to the whole economy since CGE models can incorporate monetised natural capital in a quantitative and consistent framework.

The rapid development in offshore wind energy industry over the last decade has raised concerns on its environmental and socioeconomic impacts on the fishery industry and the wider economy. Both offshore wind and fish are two important types of natural capital provided by the marine environment. CGE models can be used to assess the impacts of one industry on the other based on their interactions with each other and the wider economy. Both fishery and offshore wind are important industries in Scotland, where fishery is commercially important to the economy while the offshore wind industry is under rapid development. We have developed a static CGE model for Scotland, with an environmental extension in marine natural capital, using the 2009 Scottish Social Accounting Matrix (SAM) data. The model assumes disaggregated marine natural capital as a production factor competitively used by the energy sector and fishery-related sectors. An established fish harvest function is used to connect the fishery industry to natural capital within the CGE model structure in order to simulate potential shocks on the fish stock or fishing effort. A case study is used to evaluate the impact of offshore wind on fish stock changes in the context of natural capital and economic performance, the impact of economic changes on the production of fish, and the feedbacks between them. This modelling approach provides an illustration of the potential for incorporating natural capital into CGE models in practice.