

Modeling of Interaction between Aquaculture and Capture Fisheries

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Abstract

To keep pace with growing demand, wild fisheries are subject to high pressure. An increasing trend in the percentage of overexploited, depleted and recovering stocks is observed since the mid-1970s. In contrast, the aquaculture sector has been the fastest growing food industry since 1970. It has become a substantial source of food and is increasingly viewed as a solution to the lack of production of capture fisheries. However, aquaculture faces an important issue: its production is reliant on reduction fisheries for the feeding of several farmed species. This concerns the farming of rather carnivorous or omnivorous species, responding to a demand from wealthiest populations. This article investigates to what extent aquaculture can alleviate pressure on wild edible fish stocks, taking into account two key components: (1) its dependence on a limited input; (2) consumer preferences. We develop a growth model encompassing the demand side and three sectors: the edible fish fishery, the reduction fish fishery and the aquaculture sector. We assume consumers preferences depend on fish species' diet and consider a distinction between the farmed and wild edible fish species. We demonstrate that consumer preferences profile plays a crucial role on the evolution of stocks and supply. Depending on this profile, we show that there may exist an optimal species type to farm, in terms of utility maximization and natural stock levels.