



Unexpected evolution of Thiof fisheries in Senegal: insight from mathematical and informatics bio-economic models

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Abstract

Fisheries constitute an economic sector that is much less regulated than terrestrial activities, because of the cost and difficulties of the control, especially in weak governance area. Thus self-regulation mechanisms of bio-economic equilibriums are the only rule. Understanding these mechanisms is crucial to detect how to influence the auto-organistaion of fisheries regulation. The thiof (*epinephelus aenus*) is a highly valuated commercial fish that have suffer intense exploitation in Senegal since several decades. However, in recent year some indicators suggest a slow recovery of the stock. Two bio-economic models accounting for artisanal fishers movement and variable price were implemented in mathematical and informatics formalism. The mathematical model was a set of differential equations with slow and rapid processes, solved analytically with the aggregation of variable method. The informatics was an individual based model explicitly representing each fishing boats. In both models, the international migration of fishermen in periods of low local abundance combined with variable price according to the market induced a shift from local over-exploitation to regional sustainable exploitation. We discuss the observed evolution of thiof landings and price in Senegal in the light of the bio-economic dynamic suggested by the models.



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