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Mathematical modelling of sustainable fisheries management in Morocco

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Abstract: Moroccan Atlantic coast is considered as one of the richest fishing areas in the world that support a rich assortment of aquatic biological diversity. In the past decade, the fisheries sector has achieved considerable growth. However, the sector suffers from many serious problems that need to be resolved to ensure their sustainable development. Such problems include over-fishing in the coastal, degradation of the marine environment and coastal resources. In this study, a mass-balance Ecopath Model of the Moroccan Atlantic coast is constructed, for improving fisheries management and attaining sustainable development of coastal fisheries in this ecosystem. The results indicate that the ecotrophic efficiency (EE) values were very high for most of functional groups (EE > 0.5). The high EE values together with the MTI (Mixed Trophic Impact) analysis indicated the overexploitation and degradation of fishery resources. The total system size in terms of overall flows was 19096.69 t km\textsuperscript{-2} year\textsuperscript{-1}. Consumption and respiration dominated the flows in the system (47\% and 37\% respectively). The ratios of total primary production to respiration (TPP/TR) were 2.65, while the Ascendancy and Finn cycling index (FCI) of the system were estimated at 48\% and 0.06 \% respectively. Nevertheless, the connectance index (CI: 0.14) and system omnivory index (SOI: 0.21), suggesting a simplification of the food web, and consequently a system that is not fully mature and stable.

Keywords: Fisheries, Moroccan Atlantic Coast, Food Web Models.