Bio economic modelling of multi-species fisheries: Balancing economic and ecological objectives.

Chang Suman*

Department of Marine Fisheries, Pukyong National University, Busan, Republic of Korea

Introduction

A careful balance between commercial interests and ecological sustainability is required for fishery management. Attaining this equilibrium becomes a challenging problem in the context of multi-species fisheries, where interactions between many species and their habitats are complex. A useful tool for negotiating this complexity is bioeconomic modelling, which offers a framework for integrating biological, economic, and environmental factors. In order to understand the interaction between economic goals and ecological factors for wise and sustainable fisheries management, this study explores bioeconomic modelling in the context of multi-species fisheries. In multi-species fisheries, several species that coexist in the same ecosystem are simultaneously harvested. A degree of complexity that is difficult for conventional single-species models to account for is introduced by the interactions between various species, including competition, predation, and ecosystem dynamics.[1]

The management of fisheries must balance two goals: protecting the biological integrity of marine ecosystems and optimising financial gains for fishing communities. It takes an integrated strategy that takes into account the interdependencies between the ecological and economic aspects of multi-species fisheries to achieve this equilibrium. A quantitative framework for simulating the relationships between fish populations, their surroundings, and the economic factors influencing exploitation is offered by bioeconomic models. Bioeconomic modelling helps to explore trade-offs and identify the best management solutions by capturing the feedback loops between ecological and economic components.The purpose of this study is to investigate the uses and consequences of bioeconomic modelling in relation to multispecies fisheries.[2]

This work aims to clarify how bioeconomic modelling helps to understand and manage the intricate dynamics present in multi-species fisheries by a synthesis of the literature already in existence, an examination of model structures, and an analysis of case studies. A thorough analysis of bioeconomic modelling techniques used in multi-species fisheries is included in the study. The strengths, weaknesses, and practical applicability of various modelling approaches—such as dynamic optimisation models, game-theoretic models, and ecosystem-based models—will be evaluated in light of the various fisheries contexts.The potential of bioeconomic modelling to inform sustainable fisheries management methods is what makes it significant. Through the explicit consideration of trade-offs between ecology and economy, these models aid in the creation of solutions that improve the resilience of fish populations and the communities that depend on them.[3]

A more sophisticated grasp of how bioeconomic modelling may direct the management of multi-species fisheries is one of the research's expected contributions. The study's conclusions may influence the formulation of policies, adaptive management techniques, and plans that strike a balance between short- and long-term economic gains and the long-term health of marine ecosystems.Bioeconomic modelling serves as a compass to help us navigate the difficulties of managing fisheries in a time of global change, pointing the way towards a more sustainable and integrated strategy. In order to promote resilience and guarantee the longevity of multi-species fisheries, the intersection of ecological and economic factors is crucial, as this research aims to add to the growing conversation on fisheries management. Bioeconomic models offer a comprehensive comprehension of the dynamics present in multi-species fisheries, recognising the interdependencies among various species, their habitats, and the economic factors propelling their exploitation. To fully understand the intricacies arising from the interactions among many components of marine ecosystems, it is imperative to adopt a holistic approach.The study emphasises how important bioeconomic modelling is for determining trade-offs between financial gain and ecological sustainability. Through the simulation of several scenarios, these models provide valuable insights into the outcomes of alternative management strategies.[4]

This aids in the discovery of the most effective ways that strike a compromise between the twin goals of maximising economic returns and guaranteeing long-term ecological resilience. Diverse bioeconomic modelling techniques, such as game-theoretic and dynamic optimisation models, provide versatility in representing the many dynamics of multi-species fisheries. These models' versatility enables its implementation in many fisheries situations, customising the strategy to the unique features and difficulties of each system. The study highlights how bioeconomic modelling might help guide policy choices related to fisheries management. These models help build policies that support both the well-being of fishing communities and more general sustainability goals by

***Correspondence to**: Chang Suman, Department of Marine Fisheries, Pukyong National University, Busan, Republic of Korea, E-mail: chang@suman.kr

***Received:**-03-Dec-2023, Manuscript No. aajfr-23-124611; **Editor assigned**:04-Dec-2023, PreQC No. aajfr-23-124611(PQ); **Reviewed**:18-Dec-2023, QC No.aajfr-23- 124611; **Revised:** 22-Dec-2023, Manuscript No. aajfr-23-124611(R); **Published**: 31-Dec-2023, DOI: 10.35841/aajfr-7.6.185*

***Citation:** Suman C. Bio economic modelling of multi-species fisheries: Balancing economic and ecological objectives. J Fish Res. 2023;7(6):185*

giving decision-makers quantitative insights into the effects of various management scenarios.[5]

Conclusion

This research is expected to contribute to the larger objective of attaining sustainable fisheries. The research attempts to support the adoption of more informed and adaptable management techniques that address the issues presented by global change and human exploitation by illuminating the uses and implications of bioeconomic modelling.Essentially, when it comes to managing multi-species fisheries, bioeconomic modelling acts as a link between ecological and economic factors. The integration of ecological and economic insights offered by these models becomes essential to promoting resilience and guaranteeing the long-term survival of marine ecosystems and the populations who depend on them as we navigate an era of growing environmental unpredictability. The current discussion on sustainable fisheries management is enhanced by this research, as the harmonisation of economic and ecological objectives is paramount for a thriving future.

References

1. Abrigo MR, Love I. Estimation of panel vector autoregression in Stata. Stata J. 2016;(3):778-804.
2. Bi M, Zhang Z, Guo X, et al. Evaluation of Sustainable Utilization of African Marine Fishery Resources. Fishes. 2022;(1):4.
3. Ji J, Li Y. The development of China's fishery informatization and its impact on fishery economic efficiency. Marine Policy. 2021;133:104711.
4. Fu XM, Wu WY, Lin CY, et al. Green innovation ability and spatial spillover effect of marine fishery in China. Ocean Coast Manag. 2022;228:106310.
5. Sigmund M, Ferstl R. Panel vector autoregression in R with the package panelvar. Q Rev Econ Finance. 2021; 80:693-720.
6. Bondad-Reantaso MG, Subasinghe RP, Josupeit H, et al. The role of crustacean fisheries and aquaculture in global food security: past, present and future. J Invertebr Pathol. 2012;110(2):158-65.
7. Han LM, Li DH. Blue food system: Guarantee of China’s food security. Issues Agric. Econ. 2015;36:24-9.
8. Bi M, Zhang Z, Guo X, et al. Evaluation of Sustainable Utilization of African Marine Fishery Resources. Fishes. 2022;(1):4.
9. Tuğan M. Panel VAR models with interactive fixed effects. J. Econom.2021;24(2):225-46.
10. Alvarez J, Arellano M. The time series and cross-section asymptotics of dynamic panel data estimators. Econometrica. 2003;(4):1121-59.