International Journal of Advanced Research in Engineering Technology & Science

ISSN: 2349-2819

Email: editor@ijarets.org Volume-10 Issue-4 April-2023 www.ijarets.org

WHO STUDY ON FISHERY SUSTAINABILITY FROM ALTERNATIVE DEVELOPMENT POLICY AND MANAGEMENT OPTION

Dr. Dhankesh Meena

Assistant professor, scrs government college

Sawai Madhopur (Rajasthan)

ABSTRACT

While simultaneously working to improve the management of fishery practices, it is of the utmost importance to ensure that commercial or economic fisheries are moving in the direction of sustainability. It is imperative that individuals adjust their mindsets and comprehend the significance and necessity of sustainable management. In the realm of fisheries, the Maximum Sustainable Yield (MSY) must be achieved via a greater number of efforts than the Maximum Economic Yield (MEY). Some of the methods that are used to overfish include purse seining, long lining, gear boats, and large trawling nets. Additionally, fishing during the nesting season can also be harmful to birds, sea turtles, and other fishes. The fish population is steadily decreasing as a result of fishing practices that are so harmful, and it is impossible to replenish it. Recent studies have shown that fishermen are responsible for the removal of more than 77 billion kg of marine life from the ocean each year. Therefore, if we want to rely on the ocean as a reliable source of food for the long term, it is of the utmost importance that we adopt "Sustainable Fishing Practice." The best example of this is the blue-finned tuna, which is one of the largest and fastest fish on the planet. Nevertheless, the management of fishing resources in a sustainable manner is not a simple undertaking because it requires collaboration at all levels of government, ranging from grassroots communities to national governments and even throughout the entire world. The research was conducted by reviewing standard research articles, reports from non-governmental organizations (NGOs), and websites.

Keywords: *fishery sustainability, development policy and management.*

INTRODUCTION

The term "fisheries development" refers to the procedures that lead to advancements in harvesting, processing, selling, and making use of the products that are obtained from the natural resources of aquatic plants and animals for the benefit of the people and the nation. Fishing was a community-based activity that was carried out on a modest scale and was used for the purpose of providing nourishment. It is one of the oldest means of acquiring food that people who lived in close proximity to rivers or seas employed. Since the end of World War II, there has been a significant advancement in the field of fishing, and it is estimated that the global production of marine capture fisheries was 84.2 million metric tons in the year 2005. In the past, the resources of fisheries were far greater than the capacity of humans to exploit them. However, over the course of the previous twenty years, technical advancements have set the way for a situation in which increasing annual harvests of fish is no longer as simple as increasing fishing effort. As a result of many of the stocks having reached or even exceeded their limitations of sustainable exploitation, it is becoming increasingly difficult to continue the rate of rise in fish production. This is a consequence of the fact that the stocks have reached their limits. This is because fish is a significant contributor to the livelihood, nutritional, trade, and economic security of countries. As a result, concerns are being voiced about the rational development and management of fisheries, which is where new terminologies such as "sustainable development" and "responsible fishing" are currently being widely used.

OBJECTIVES

1. To study fishery sustainability.
2. To study development policy and management.

Fishery sustainability

It is not possible to find a definition of "sustainable fisheries" that is accepted on a global scale. This term is commonly understood to refer to fishing activities that can be performed on a sustained or indefinite basis. This is one popular interpretation of the term.28, a A methodological approach that is more methodological makes reference to the use of the maximum sustainable yield (MSY), which may be revised in some instances by taking into consideration economic and social factors. The strategy necessitates and is founded on the management of fish stocks that is based on scientific principles. Nevertheless, it is possible for such methodologies to ignore, depending on how they are designed, the fact that fishing practices may have a negative impact on the equilibrium of ecosystems and other species (if they are not well regulated and monitored), and that ecosystems that are impacted by pollution and other external factors may hinder the ability of fish and other marine stocks to reproduce and recover. Not only in the case of oceans, but also in connection to the conservation of biodiversity, this has resulted in the adoption of a more holistic approach to the conservation, resilience, and sustainability of ecosystems and the services that they create. This can be seen in the Sustainable Development Goals (SDGs) that were just recently established.

In the context of the United Nations Convention on the Law of the Seas (UNCLOS), the Food and Agriculture Organization (FAO), and the International Maritime Organization (IMO), or under binding trade agreements, such as those negotiated through the World Trade Organization (WTO), in relation to market entry (tariffs) and market access (sanitary and phytosanitary measures),29 technical regulations (such as harvesting and packing regulations), unfair practices (such as subsidies), and private standards and labeling (fishing practices), "sustainable fisheries" can be understood as fishing practices and actions that adhere to and effectively apply relevant international agreements, guidelines, and best practices that have been agreed upon by the United Nations.

Traditional Management of Fisheries:

Historically, fisheries management and the science that underpins it have been distorted due to the fact that it has a "narrow focus on target populations and the corresponding failure to account for ecosystem effects leading to declines of species abundance and diversity." Additionally, the fishing industry has been perceived as "the sole legitimate user, in effect the owner, of marine living resources." Throughout the course of history, scientists that specialize in stock assessment typically worked in government laboratories and considered their work to be similar to delivering services to the fishing industry. Concerns about conservation were disregarded by these scientists, and they distanced themselves from the other scientists and the scientific community that had brought up the difficulties. This occurred despite the fact that commercial fish supplies were declining and despite the fact that numerous governments had signed legally binding conservation agreements.

Research Methodology

This paper provides a concise summary of the continuous evolution of fisheries management, beginning with the concept of harvesting an autonomous single species in accordance with the deterministic laws of science and progressing towards the holistic management of ecosystems under situations of uncertainty. In addition, the advancements in management methods, the trends in strategic objectives, and the growing understanding of the uncertainties in fisheries systems are presented here.

Objectives: from Maximum Sustainable Yield to Optimal Sustainable Yield

From the 1930s until the 1970s, the notion of Maximum Sustainable Yield (MSY) was the most prevalent approach to fisheries management in terms of achieving its goals. The fundamental concept that underpins MSY will only be briefly discussed here. An annual surplus that can be harvested is something that can be produced by any species. In the event that catches do not surpass this surplus, it is possible for stocks to continue to be exploited continually while still maintaining equilibrium. The size of the stock determines the amount of harvestable excess production, also known as net production. In the virgin condition, unharvested stocks will not yield any surplus, and zero stocks will not produce any surplus either. In situations where overall stocks are smaller, the surplus that is generated per individual is higher. This is because compensating processes in mortality, growth, and reproduction are at work. In the situation when the product of the stock size and the individual rate of production is maximized, the surplus is maximized (Figure 1). The only thing that people responsible for assessment need to do in order to maximize the sustainable yield is to determine the fishing mortality, which is the mortality of fish that is caused by fishing and producing catch, and consequently, the stock size that maximizes output. The most basic assumptions of logistic growth suggest that this maximum is situated at the point that is exactly in the middle of the range between zero and maximum stock. Other functional forms, in addition to those already mentioned, have also been applied to various equities. Moreover, a variety of harvesting procedures have been implemented in order to assist in the achievement of the target MSY, which is to ensure that the stock is maintained at its maximum productive level. When it comes to stocks that are more dynamic, the total allowable catch (TAC) could be set annually rather than being constant in order to maintain stocks that are as close as feasible to their optimal level.

Even though there was a strong theoretical foundation for output rates and the objective itself was straightforward, the implementation of the sustainable yield target resulted in disastrous outcomes for a number of different reasons. At least one of these factors was related to the evaluation processes. There are certain unknowns associated with the estimations for MSY as well as the annual yield and effort targets. In the event that either the MSY or the TAC is overestimated and derived from a stock that goes through random fluctuations, this will result in a quick collapse of the stock. As a result of the following variables, the implementation of quotas presents additional challenges:

1) fisheries in many areas catch more than one species of fish;

2) It is difficult to correctly predict the number of new hires that will be coming in;

3) The establishment of landing limitations has been mostly ignored;

4) The database has been deteriorated as a result of underreporting; and

5) It has been determined that there is no longer any trust between scientists and fishermen.

Consequently, regulating catches is not an effective method of controlling mortality rates in the fishing industry. When viewed from a biological perspective, the concept of MSY is also insufficient. This is due to the fact that it does not take into account the impact that fishing has on the age structure of the catch, the genetic properties of the population, the presence of subpopulations that have varying levels of productivity, and the challenges that are associated with multi-species fisheries.

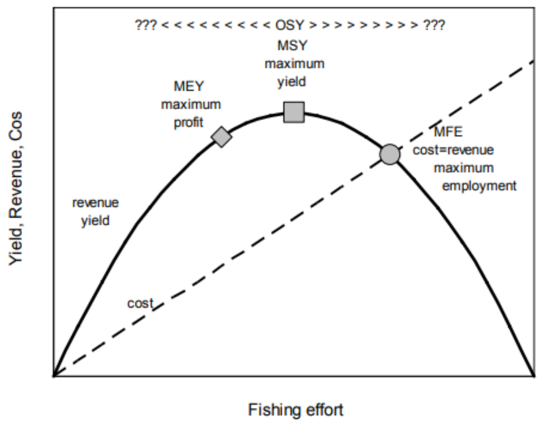

Fig. 1. A Gordon-Schaefer diagram showing annual sustainable yield or revenue and operating costs in relation to the annual fishing efforts.

From the perspective of yield stability, which is beneficial for fishermen and the industry as a whole, MSY involves a greater number of possible instability aspects than are typical of stocks that have not been exploited. As a consequence of this, the fishing mortality that results in MSY has been turned from a target reference point to a limit reference point, which represents the greatest limit of exploitation, and has been replaced by lower level targets.

From both an economic and a social point of view, the straightforward maximization of the production of fish for human consumption inside MSY was called into question. It became clear, after applying economic theory to production models and taking into account the costs of fishing, that the fishing effort and yield that maximize the total profit obtained from a fishery were frequently lower than those for MSY. This was the case when the costs of fishing were taken into consideration. As a result of the fact that commercial fishing is largely a way of accumulating economic riches, the Maximum Economic Yield (MEY) that maximizes profits would be an ideal aim for sustainable fisheries. The construction of any additional fisheries that are unregulated and open to the public would result in a rise in mortality; this would continue until there is no longer any profit to be made. Due to the failure to manage rises in fishing mortality and sustaining government subsidy programs even for fisheries that are only moderately lucrative, large numbers of fisheries have been pushed to this point and even beyond. This is the case despite the fact that the notion of MEY is well understood.

After the biologists and economics had identified the locations along the fish production curve that corresponded to their respective theoretical optimums, the social scientists started to voice their own opinions. By the 1970s, it had been brought to people's attention that, in the same way as fishing serves economic purposes, economics serves social purposes. As a result, the goal ought to be to achieve the highest possible sustained output of social benefits. The novel idea of the Optimum Sustainable Yield (OSY) brought together the ideals of biology, economics, society, and politics through its conceptualization. Considerations such as the non-monetary values of recreational fisheries, the conservational value of fish stocks, the sustainability of fishing communities, and the integrity of ecosystems were able to be incorporated into the OSY, which was a characteristic that was very much appreciated. As a consequence of this, OSY has been critiqued for being difficult to define and agree upon, and as a result, it is susceptible to overuse. It was because of this that Larkin came up with the following criticism that could not be refuted: "sometimes the optimal yield will be almost zero; other times it will be MSY except when it is more; still other times it will be the maximum net economic yield; and for some species, it will be all they can stand without becoming extinct."

This is the current situation, in which, having begun with the straightforward management objective of MSY, a new objective has emerged for the purpose of maximizing the sum of many different utility curves from various sectors of society. Each of these utility curves possesses different weighting factors in the sum total, which will be negotiated by the various stakeholders. The straightforward biological maximization of productivity has evolved into a form of social politics that could be described as hazy. As a result, the concept of OSY has made the management of fisheries extraordinarily difficult. Nevertheless, all of these concepts are fully pertinent in this context, taking into consideration the ultimate goal of fisheries, which is to generate long-term social and economic advantages for society while simultaneously maintaining the health of aquatic ecosystems.

From false determinism to accepting uncertainty and managing risk

In the past, one of the causes for the failures that occurred in the management of fisheries was that fundamental uncertainties in fisheries research were not grasped. It is now generally acknowledged that the magnitude of such uncertainties and the difficulties that result from them in the implementation of fisheries management measures are significantly bigger than was previously assumed. Furthermore, it is now widely acknowledged that fisheries management is an issue that arises from the process of decision-making in the face of ambiguity. According to the Food and Agriculture Organisation of the United Nations this uncertainty concerns “The incompleteness of knowledge about the state or processes (past, present, and future) of nature”. This situation involves a number of different kinds of uncertainty.

1) The process uncertainty refers to the stochasticity that lies beneath the dynamics of the population, such as the variability in recruitment. Rather than being the result of any kind of error, this kind of uncertainty is caused by natural fluctuation.

2) The process of data gathering might lead to some degree of uncertainty regarding observations. This uncertainty can be caused by errors in measurement and sampling, poor data collection techniques, and misreporting.

3) Incomplete information on the population and community dynamics of the system is the source of model uncertainty, which originates from the lack of complete knowledge. When referring to fisheries scientists and managers, the term "model" refers to the conceptual model that they employ as a tool to assist them in drawing conclusions and making decisions on fish populations and fisheries itself.

4) estimate uncertainty is a specific sort of uncertainty that is associated with the process of parameter estimate. It can be derived from any one of the three types of uncertainty that were discussed earlier.

5) Uncertainty over implementation refers to the degree to which management policies will be successfully implemented in actual practice.

6) The difficulties that occur as a result of the interaction between individuals and groups (such as scientists, economists, fishermen, and so on) inside the management process are the source of institutional uncertainty. It is important to note that O'Boyle (1993) proposed that this could go beyond "quantifiable" sources of uncertainty in stock evaluations. As a result, it is possible that this kind of uncertainty was the most significant factor associated with the lack of success in management in many instances.

The fact that a lack of knowledge invariably results in risk draws attention to the significance of uncertainty for management. A straightforward definition of risk is the likelihood that something unfavorable may occur (or will occur). In this sense, risk is a quantitative measure because it is expressed as a probability. Assessing risks and managing them are the two processes that comprise the process of dealing with risks.

Risk management focuses on the ways in which managers use this advice to make decisions, to devise and implement management policies, strategies, and tactics that reduce the risks to fish stocks as well as, as mentioned, to the communities that exploit them. Risk assessment is concerned with the formulation of advice for fisheries managers, while risk management focuses on the ways in which managers use this advice to make decisions. Instead of offering a "best" option from among a number of different strategies, risk assessment eliminates some of the challenges that were previously encountered in management by demonstrating the potential outcomes that might result from implementing each of the available options. The results of the risk assessment are presented in the form of probabilities, which are also known as expected values. This acknowledges and includes various forms of uncertainty. In addition to this, it makes an effort to provide the information that is required by people who are responsible for making judgments.

Result and Discussion

Understanding management as a system

It is possible that the failures of fisheries management are the result of a general failure to include the management of fisheries as a whole system in their considerations. In many instances, it appears that there is an insufficient interaction between the science of fisheries and the process of decision-making. This is especially true with regard to the manner in which decision-makers utilize any quantitative knowledge that is available on those aspects of uncertainty. On the subject of fisheries, a management-oriented paradigm (MOP) has been proposed as a means of enhancing communication and management. This paradigm transcends the conventional barriers that have traditionally existed between scientific, economic, and policy research. The Management of Performance (MOP) process involves the formulation of management objectives that are quantifiable, the specification of sets of rules for decision-making, and the specification of the data and methods that will be utilized, all in a manner that allows for the properties of the resultant system to be evaluated in advance. The use of computer simulations and the establishment of performance measures that reflect the likelihood of management systems being successful in reaching their objectives are both components of the prospective evaluation of management systems.

Multiple criteria decision-making

On the one hand, the incorporation of uncertainty and its repercussions within the scope of fisheries management has assisted us in recognizing some of the major limits that hinder our capacity to observe and manage systems. This should assist us in avoiding making judgments that are not appropriate or at the very least in recognizing the dangers associated with making decisions that are not appropriate. It would appear that all of this uncertainty makes management challenges more complicated by necessitating the use of complex instruments for decision-making based on various criteria. In spite of this, it is important to emphasize that the majority of the rules of decision-making in ambiguous situations are simply common sense. We need to take into account a wide range of plausible hypotheses regarding the world; we should also take into account a wide range of possible strategies; we should favor actions that are able to withstand uncertainties; we should hedge our bets; we should favor actions that will be informative; we should probe and experiment; we should monitor the results; we should update assessments and modify policy accordingly; and we should favor actions that are reversible. In each and every circumstance, decisions should only be made if the facts are sufficiently clear and if they permit the alternatives to be straightforward. When communicating with scientists working in the field of fisheries, decision-makers should be sure to emphasize the significance of the preceding factors. There are many instances in which all of the required information is genuinely accessible; nonetheless, decision-makers are unable to make difficult judgments, and all too frequently, inefficient compromises fail to prevent collapses and conserve fish stocks. This is the message that scientists working in fisheries need to convey to those who make decisions.

New, holistic risk-averse approaches

It is now possible to compute and analyze the probabilistic repercussions of various combinations of assessment assumptions, data treatments, and management strategies thanks to the technical development that has occurred in integrated and Bayesian assessment approaches of risk assessment. This methodological foundation ought to be embraced, and the precautionary approach ought to be incorporated, in order to lessen the dangers that fishing communities are exposed to. On the other hand, the uncertainty of the biological basis for fisheries management can be significantly decreased by analyzing data sets from a large number of distinct populations, and then merging the results in a meta-analysis, employing a variety of statistical approaches. It is necessary to establish new risk-averse management strategies that are capable of withstanding uncertainties regarding the effects of fishing on the ecosystem as well as the implications of regulations. However, as has been pointed out, risks can be evaluated and reduced, but they cannot be completely avoided. This is due to the fact that the significant uncertainties that surround management decisions need the existence of risk nonetheless. However, it is feasible to reach the conclusion that risk management can be initiated in situations when players in the fishing industry are successful in preserving stable fishing communities.

Common knowledge shared between various interest groups

Approaches that are holistic are sensitive to disputes, which are frequently caused by traditional views, a lack of knowledge, and a lack of communication between the players. Holistic approaches are multiobjective, ecosystem-based, negotiated by multiple interest groups, and directed by multicriteria decision-making. One of the most significant benefits of effective comanagement, which involves the sharing of decision-making and management responsibilities between the government, owners, and other user groups, is that all participants in the process are able to educate themselves and share the information pool that is collectively available. It is necessary to process and intercalibrate information from the scientific, local, and administrative settings simultaneously. The processing of this information ought to be active; yet, it is also possible for it to take place in a passive manner, and these alternative processes may once again result in disputes.

In any event, the process of providing support need to aim to improve the trust that exists between the various interest groups. Information that is universally acknowledged among participants is the only kind of information that can serve as the foundation of a sustainable fishing community. If the community comes to the conclusion and makes the decision to establish the OSY as an aim, then the only way for it to be successfully executed is if the majority of the interest groups will be in agreement with this objective. The scientific understanding of the entire fisheries system is required to serve as the foundation for sustainable management. However, this all-encompassing perspective must be conveyed in such a way that the majority of stakeholders comprehend and accept the significance of this information and the repercussions it causes.

In Finnish inland fisheries the joint knowledge includes inter alia:

1) scientific data and its interpretation by fisheries scientist, ecologists, limnologist etc.;
2) the experiences and observations of professional and recreational fishers;
3) the experiences and observations of the stakeholders in the associations of owners of fishing rights;
4) the knowledge of fisheries managers in local and central government;
5) the knowledge of local advisor organizations; and
6) the experience of lakeside residents.

Conclusion

The management of fisheries is an ongoing and interactive process that involves the understanding of economic, social, and ecological costs and benefits, as well as the design of remedies. The implementation of improved systems of marine governance, which provide incentives for all stakeholders (fishermen, scientists, and managers) to make decisions that will be in their interest as well as contribute to societal goats, is the key to successful Fisheries management. This is not limited to better science, more reference points, and precautionary approaches; rather, it provides incentives for all of these things. Recent years have seen an increase in the significance of cooperative research, which is a form of scientific research that is carried out in collaboration with specific industries.

References

1. Anon (2020). Report of the Working Group for revalidating the Potential Fishery Resources in the Indian EEZ, Ministry of Agriculture, Govt. of India, 43 p.

2. Anon (2019). Comprehensive Marine Fishing Policy, Government of India, Ministry of Agriculture, Department of Animal Husbandry & Dairying, New Delhi: 26 p.

3. Anon (2018). Report of the Technical Consultation on the International Guidelines for the Management of Deep Sea Fisheries in the High Seas, Rome, 48 Feb and 25-29 August 2008: 16 p.

4. CMFRI (2019). Vision 2020-CMFRI Perspective Plan. (Murty, V.S., Ed.) Central Marine Fisheries Research Institute, Cochin: 70 p.

5. FAO (2018). Report of the FAO Workshop on vulnerable ecosystems and destructive fishing in Deep sea fisheries, FAO Fish Rep. No. 829, FAO, Rome:18 p.

6. Johnson, TR. and van Densen, W.l.T (2017). The benefits and organization of cooperative research for fisheries management, ICES J. Mar. Sci. 64: 834-840.

7. Joshi, K. K., Balachandran, K., Raje, S.G. (2018). Changes in the shark fishery at Cochin, J. Mar. BioI. Ass. India 50 (1): 103-105.

8. Krishnakumar, P.K., Mohamed, K.S., Asokan, P.K., Sathianandan, T.v. Zacharia, P.U., Abdurahiman, K.P Shettigar, V. and Durgekar, R.N. (2018). How environmental parameters influenced fluctuations in oil sardine and mackerel fishery during 1996 - 2005 along the south west coast of India. Mar. Fish. Infor. Serv., T& E Ser. 198: 1-4.

9. Pillai, N.G.K. (2016). Pelagic fisheries of India. Handbook of Fisheries and Aquaculture in India, Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi: 56-77.

10. Anderson, L.G. 2019. The economics of fisheries management. The Johns Hopkins University Press, Baltimore & London. 296 p.

11. Arlinghaus, R., Mehner, T. & Cowx, G.I. 2020. Reconciling traditional inland fisheries management and sustainability in industrialized countries, with emphasis on Europe. Fish and Fisheries 3: 261-316.

12. Hilborn, R., Maguire, J.-J., Parma, A.M. & Rosenberg, A.A. 2021. The Precautionary approach and risk management: can they increase the probability of successes in fishery management? Canadian Journal of Fisheries and Aquatic Science 58: 99-107.

13. Karjalainen, J., Auvinen, H., Helminen, H., Marjomäki, T., Niva, T., Sarvala, J. & Viljanen, M. 2020. Unpredictability of fish recruitment: interannual variation in young-of-the-year abundance. Journal of Fish Biology 56: 837-857.

14. Lane, D.E. & Stephenson, R.L. 2019. Fisheries-management science: a framework for the implementation of fisheries-management systems. ICES Journal of Marine Science 56: 1059-1066.

15. MacGarvin, M. 2021. Fisheries: taking stock. European Environmental Agency, Environmental Issue Report 22: 17-30.

16. McVey, J.P. 2021. Maximizing value to coastal communities through fisheries and aquaculture. marine aquaculture and the environment: A Meeting for Stakeholders in the northeast. Cape Cod Press. Falmouth. pp. 244-248.

17. Rose, K.A. & Cowan Jr., J.H. 2019. Data, models and decisions in US Marine fisheries management: lessons for ecologists. Annual Review of Ecology, Evolution and Systematics 34: 127-151.

18. Weeks, H. & Berkeley, S. 2016. Uncertainty and precautionary management of marine Fisheries: Can the Old Methods Fit the New Mandates? Fisheries 25: 6-15.