



## Developing a framework for ecosystem-based fisheries management in India

**Dr. Byju John<sup>1\*</sup>; Naveen Singh Rana<sup>2</sup>; Monika Nijhawan<sup>3</sup>;  
Dr. Gajendra Sharma<sup>4</sup>**

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### Abstract

One of the world's most huge fisheries assets is the 2.5 million square kilometres of freshwater area. It comprises Southeast Asian ponds and canals, lakes (Victoria, Nyasa, Chilka), and major river systems (Ganga, Nile, Amazon, etc.). In addition, India boasts an abundance of inland fisheries resources, including estuaries, flood plain lakes, marshes, reservoirs, tanks, and ponds. The potential for fish production is enormous because to these resources. One of the few freshwater fish biodiversity hotspots in the world is the North East (NE) area of India, which incorporates the provinces of Assam, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram, Tripura, and Sikkim. The water assets in the space are plentiful and different. A structure for biological system based fisheries the executives was made in this examination. NOAA Fisheries uses EBFM to help management partners make better decisions on trade-offs across commercial, recreational, ceremonial science, and management programs.

**Keywords:** Ecosystem, Aquaculture, National marine fisheries service, Ecosystem-based fisheries management

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1\*- Professor, Department of Management, Kalinga University, Raipur, India.

Email: ku.byjujohn@kalingauniversity.ac.in, ORCID: <https://orcid.org/0009-0003-1216-0810>

2- Department of Management, Kalinga University, Raipur, India.

Email: naveen.kumar.barai@kalingauniversity.ac.in, ORCID: <https://orcid.org/0009-0007-3607-5601>

3- Assistant Professor, Department of PGDM Marketing, New Delhi Institute of Management, New Delhi, India. Email: monika.nijhawan@ndimdelhi.org, ORCID: <https://orcid.org/0000-0002-7531-6996>

4- Professor, Department of PGDM Marketing, New Delhi Institute of Management, New Delhi, India. Email: gajendra.sharma@ndimdelhi.org, ORCID: <https://orcid.org/0000-0001-9246-5304>

\*Corresponding author

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## Introduction

For many years, NOAA Fisheries has been working towards EBFM. In 2016, the agency created and executed its EBFM Strategy and Guide (NMFS 2016a, NMFS 2016b). NOAA and NOAA Fisheries' environment work (like incorporated biological system appraisals, or IEAs) was educated by the administration setting and wide science needs settled by the 2016 EBFM Strategy and Guide (Juan-Jordá *et al.*, 2018). It additionally improved inward ability to produce biological system science and data for fisheries the board. NOAA Fisheries added to the improvement of best practices for distinguishing natural, social, financial, and oceanographic markers for fisheries the executives through these drives. To demonstrate that EBFM is both a process and a destination, the EBFM Policy offers six implementation guidelines that are shown in a continuous loop (see Figure 1). Implementing the Guidelines to suit local needs is preferable to following them in the order stated (Tsamenyi, Djalal and Palma, 1996). Before defining goals and objectives at the ecosystem level, some regions might choose to begin with Guideline 3 to have a better understanding of vulnerabilities and hazards.

## Back Ground

This Road Map's objective is to provide concrete activities under each of the EBFM Policy's goals that will direct and strengthen NOAA Fisheries' endeavors to complete the Approach all through the following five years (Islam *et al.*, 2022). It will advance environment -ready decision-making<sup>3</sup> for trust resources<sup>4</sup>

and habitats, as well as climate-informed science and management planning. The vast and varied marine and estuarine ecosystems under U.S. management are closely linked to one another and to the consequences of Earth's changing climate. The Magnuson-Stevens Fishery Protection and The executives Act (MSA), which requires fishery preservation and the board measures to guarantee that wild-gotten fisheries support a stock of food and different items, as well as sporting advantages, on a continuous premise without compromising the drawn out capacities of our environments to give those advantages to the country into what's in store, is fixated on NOAA Fisheries' liability to boost the advantages from fisheries inside each U.S. marine environment (Christie *et al.*, 2007). The reliance of biological system parts is recognized by EBFM as being significant to the upkeep of strong and productive environments as well as related human networks, exercises, and prosperity. The local Fisheries Science Focuses (FSCs), NOAA Fisheries' Provincial Workplaces (ROs) and base camp workplaces, Territorial Fishery the Board Committees (Chambers), highway Marine Fisheries Commissions, Territorial Fishery the Executives Associations, States, Clans, Native people group, and other significant homegrown and global accomplices, partners, and NOAA line workplaces are all supposed to coordinate EBFM efforts through this Road Map (Elayaperumal, Hermes and Brown, 2019). The Road Map is not an extra prerequisite for fulfilling the various mandates that it supports. This Road Map will make use of the several EBFM

initiatives that are currently in progress both inside and outside of NOAA Fisheries in order to better organize them. By enhancing coordination and integration within NOAA Fisheries, EBFM and its Road Map aim to make better use of the effort and expertise already in existence (Mathew, 2003). This Road Map describes anticipated future work with accomplices, partners, and general society, as well as a refined approach to accomplices, partners, and NOAA line workplaces for NOAA Fisheries to execute EBFM. NOAA Fisheries acknowledges that management partners have a significant influence on the policies, strategies, and objectives for managing trust resources and implementing EBFM. In collaboration with partners, this Guide gives Things to do to logical and the board techniques that develop NOAA Fisheries' authentic extent of movement (Pitcher *et al.*, 2009). The Guide's Things to do are planned by need, need, extension, and assets. While some things to do will be easily accomplished, others may be aspirational for some or all locations. While maintaining flexibility to accommodate different regional EBFM implementation plans, NOAA Fisheries encourages national uniformity across common concerns. As conditions and information availability change, EBFM keeps evolving. This Road Map focuses on the advancements NOAA Fisheries and its partners can achieve in comprehending and more comprehensively managing NOAA trust

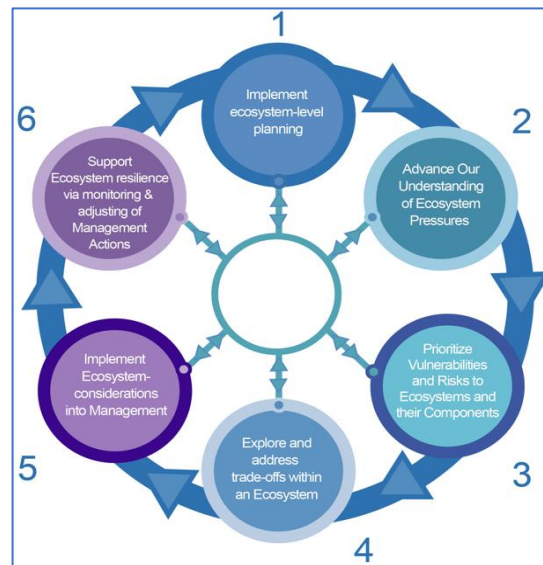
resources during the next five years (Karim, Techera and Al Arif, 2020).

### **Implementation of EBFM**

In order to operationalize EBFM, NOAA Fisheries must use annual guidance memoranda, staffing and performance plans, strategic planning documents, annual priorities, goals, milestones, and geographic strategic plans to integrate also, adjust the EBFM Rules, Objectives, and Things to do into tentative arrangements.

#### *Implement Ecosystem-level Planning*

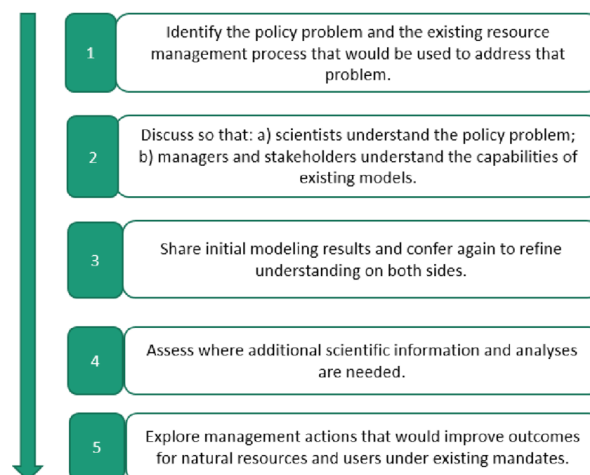
Different ways to deal with EBFM and environment level arranging will result from local contrasts in interest in and comprehension of biological system level preparation, as per NOAA Fisheries. To coordinate NOAA Fisheries' work on EBFM, environment prepared fisheries, and new science drives under CEFI and other subsidizing programs, it is basic to lay out biological system arranged objectives and goals at the local level. Without significant support from its accomplices and intrigued partners, NOAA Fisheries can't carry out EBFM. The time and exertion the executives accomplices have contributed on appropriate key arranging papers is recognized by NOAA Fisheries. Many accomplices use these essential arranging archives to plan for the impacts of various tensions on fisheries inside a biological system and to make sense of and incorporate environment objectives, goals, and needs across various fisheries.



**Figure 1: 6 EBFM guidelines (source: web).**

Long haul environmental, financial, and social objectives, goals, and needs will be clarified through biological system level preparation and correspondence across NOAA Fisheries' different orders and as a team with its great many partners. The national and regional IEA programs, as well as the roles for a national EBFM coordinator and a Senior Scientist for ecosystem-based management, have all been maintained in order to integrate EBFM aims and objectives into operational and strategic planning. NOAA Fisheries prioritizes its activities using a range of

operational and strategic planning procedures. The ROs, FSCs, and headquarters offices of NOAA Fisheries establish priorities across programs and research areas through strategic plans and yearly guidance documents. National priorities for work in certain particular emphasis areas are established by topic-specific operational guideline documents. NOAA Fisheries' communication and coordination efforts encompass both general communication materials and focused communication materials in order to incorporate, address, and coordinate.



**Figure 2: Layout of the means for integrating data for biological system models into the executives, adjusted from Townsend *et al.* 2020.**

### *Advance our Understanding of Ecosystem Processes*

Through a deeper comprehension of the ecosystem processes, causes, risks, status, and trends of the country's marine ecosystems, NOAA Fisheries' research endeavors under Rule 2 help public living marine asset the executives objectives and commitments. Understanding the human parts of fisheries and networks that rely upon them, as well as appropriate organic cycles that rise above biological system borders, are all important for logical endeavors for an environment-based approach. Multidisciplinary information, coordination and joint effort, and a longing to grasp processes critical to live marine assets both inside and between biological systems are qualities of environment level science. As well as guaranteeing that staff and the executives accomplices know about the benefits and limitations of NOAA Fisheries' most ideal that anyone could hope to find biological system and environment science, direct collaboration among researchers and the board accomplices will ensure that researchers grasp the arrangement questions tended to by supervisors (see Figure 2).

### *Prioritize Vulnerabilities and Risks to Ecosystems and their Components*

As ecological changes move environments into novel circumstances, it will be vital to figure out which species, living spaces, fisheries, and networks are helpless against these changes. Rule 3 unites ideas from environment science and U.S. living marine asset the board regulations to work on how we might interpret the individual and combined

drivers for the physical, compound, natural, social, and monetary parts of marine biological systems. Together, these ideas assist with focusing on the administration needs of the weakest environment parts. By getting it and overseeing for environment maintainability, supervisors can attempt to support fish and safeguarded assets, fisheries, living spaces, and human networks inside those biological systems against the adverse consequences of changing environment and sea conditions, moving social and financial circumstances, and expanding requests on assets across many human exercises.

### *Explore and Address Trade-offs within an Ecosystem*

It catches the crossing point between environment science and the board needs for residing marine assets, where NOAA Fisheries and its accomplices should assess compromises among exercises and parts inside biological systems. Developing NOAA Fisheries' work under the 2016 EBFM Guide, NOAA Fisheries' Cutting-edge Stock Appraisal Endeavor (Lynch et al. 2018) incorporates unequivocal strides for extending the extent of the stock appraisal worldview with the goal that it is more all-encompassing and biological system connected. Essentially, NOAA Fisheries' Territory Evaluation Improvement Plan (Peters et al. 2018) incorporates proposals to help living space exploration and evaluations to work on stock appraisals and backing EBFM Rules, especially with regards to environmental change. This Guide upholds NOAA Fisheries' objectives of growing single-species stock evaluations and living space appraisals, and of utilizing

research-track evaluations to test novel thoughts and to bring environment and environment data into appraisals.

### *Implement Ecosystem Considerations into Management*

It recognizes NOAA Fisheries' objective to ensure that drives under the 2024 EBFM Guide reinforce ties among science and the board systems, particularly on the side of the making of guidelines and direction for fishery the executives for environment prepared fisheries. The Approach and Guide likewise accentuate that it is so vital to consider social and monetary ties, habitat quantity and quality, and species interactions when making decisions on fisheries and conservation. To make it easier to apply EBFM policy and ecosystem science to the problems posed by a changing ocean environment.

### **Execution of the EBFM and Effective Dates**

The NOAA Fisheries Head of Logical Projects and Boss Science Counselor, in a joint effort with the Delegate Collaborator Chairman for Administrative Projects, will be liable for observing and directing the execution of this arrangement. Through the administration of the NOAA eAOP, in addition to other things, the NOAA Fisheries Vital Preparation and Execution Assessment Division of NOAA Fisheries' Office of the executives and financial plan will aid creating benchmarks and initiatives to promote advancement toward the objectives of this Road Map. The EBFM Workgroup and the National EBFM Coordinator will help coordinate EBFM activities. The country's living marine resource management can be

improved thanks to the EBFM Policy and Road Map. Longer-term timelines included in the actions mentioned above can be used to monitor the implementation of EBFM. This guidance will be reviewed by NOAA Fisheries every five years. One month following the Road Map's final clearance date, the execution of the Road Map that builds on previous efforts will begin. Taking resource availability into account, this Guide will direct the appraisal of NOAA Fisheries' advancement toward Guide Things to do. Under the bearing of the Public EBFM Organizer, the NOAA Fisheries EBFM Workgroup will contain contacts from the FSC, RO, and central command office. The ideas illustrated in this paper and best practices created nationwide will serve as the foundation for oversight of EBFM implementation. An assessment of EBFM progress will be provided annually through prioritizing and the identification and accomplishment of milestones.

### **Conclusion**

NOAA Fisheries will put a high need on the thorough quantitative mix of financial information into evaluation models and cycles (like portfolio examination) to survey changes in the advantages to the nation related with moving fishery gather levels in U.S. marine environments. This will assist with working on the utilization of financial examinations and data in fisheries the executives. To survey changes in the advantages to the nation connected to changing fishery collect levels in U.S. marine biological systems, NOAA Fisheries should likewise focus on the thorough quantitative assortment and reconciliation of monetary and social information into the stock, safeguarded

asset, and environment appraisal models. This will assist the office with bettering utilize financial examinations and data in fisheries the executives. NOAA Fisheries should uphold inward and the board accomplice vital arranging endeavors for environmental change, give strategy direction on multi-species and multi-rules navigation, and audit and prompt on where adaptabilities could be added to fisheries guidelines cycles and structures to understand and construct the administration pathways and the executives entrances for new science. Philosophies can be routinely explored in both science and the board to survey their adequacy and add new information on a case by case basis.

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