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Book Review

1196 Title: Artificial reef evaluation with application to Natural Marine Habitats

Edited by : William Seaman, Jr.
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Increasing fishing pressure to meet the ever-growing demand for fishery products has resulted in overexploitation and decline in yield and diversity in several fisheries and irreparable damage to many aquatic habitats. Artificial reef structures (ARS) or artificial fish habitats (AFH) have been deployed all over the world for various purposes, especially for restoration of habitat and for enhancing fish production. However, the deployment of ARS had often been done without proper mechanisms to assess and evaluate their performance in different aspects. There is an urgent need to educate the people concerned about the importance of conceiving and incorporating proper evaluation methods right from planning of ARS. The book *Artificial Reef Evaluation with Application to Natural Marine Habitats* is a relevant and timely publication catering to the information need. The book contains seven judiciously chosen articles (Chapters) by experts in the field.

The introductory Chapter clearly explains the purpose and practices of artificial reef evaluation. Traditionally artificial reef research has focused on the physical stability of the reef or ecology of species assemblage and less attention has been paid on socio-economic aspects. Presenting a framework for reef evaluation, the authors stress that effective evaluation must be 'objective driven'. The general and specific objective must outline the assessment concept and form the basis for selecting criteria for measurement of success. The study design, data collection and analysis, synthesis of information all must converge to the effective evaluation of criteria and meeting the objectives.

Thus a successful reef assessment program must have clearly defined objectives, appropriate measurement techniques, adequate and effective sampling and powerful statistical analysis. The second Chapter outlines principles of design and statistical analysis of artificial reef assessment study. Answering a set of 17 questions at the design phase would generate necessary information on the reef assessment concept, study objectives, type of assessment etc. The Chapter discusses the implications of selection of measurable characteristics as well as time and space of sampling and provides the theoretical background of various statistical analyses.

The physical processes, apart from influencing the chemical and biological process in the

aquatic environment, play a crucial role in the stability of the installed reef structure. The third Chapter discusses about the physical aspects and suggests sampling protocol for these characteristics at the reef site. The processes of burial of reef structure, scouring of sediments etc. are illustrated and the stability of reef structure is discussed in the context of various vertical and horizontal forces acting on it. Three types of assessment are elaborated before discussing data collection methods.

The trophic structure in the reef environment, starting with nutrients, primary and secondary production to the ultimate community structure of biotic assemblage is the most interesting aspect from ecological point of view. These aspects and the appropriate sampling and analytical methods are discussed in Chapter four. Since the major reason for artificial reef deployment is to improve the fishery resources in the reef site, assessment of fish and macro invertebrates assumes great importance. In the fifth Chapter, the authors elaborate the abiotic and biotic factors that have an impact on the faunal assemblage, discuss the design criteria for studies and present an overview of methods of assessment.

The sixth Chapter deals with the evaluation of the social and economic efficacy of the reef project. Social assessment is used to isolate and measure changes that could occur in established social relationship, social structure and normative system whereas economic impact analysis focuses on the change in sales, income and employment resulting from the reef project. Generally it is desirable to have a before-and-after measurement of various parameters for impact assessment and evaluation. Efficiency analyses which look into cost-benefit relations and cost effectiveness can be used to understand the level of utilization of the artificial reef. The concluding Chapter brings together the general issues encountered in the process of evaluating artificial reefs. The enlightening discussions, generalized frameworks and examples would enable the reader to tackle the constraints of time and money in designing and implementing an evaluation strategy leading to meaningful results.

The book is a comprehensive multidisciplinary guide to strategies and methods for evaluating performance of artificial reef, especially the much neglected and most important socio-economic aspects. Most of the issues and aspects discussed in the book are pertinent to the Indian context, though many of them have often been taken for granted. Case studies and illustrations are helpful to comprehend the subject by readers of different background. The extensive lists of reference at the end of each chapter and a comprehensive index add to the utility of the book as an invaluable reference. This book is recommended as an indispensable companion for anyone working or aspiring to work on artificial reefs.

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