

Management Issues in the Fisheries of OECS Member States

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ABSTRACT

Fisheries management is traditionally based on catch and effort data but in the majority of instances provides an incomplete picture of the state of targeted stocks. The impacts of anthropogenic activities on the habitats of these populations is rarely factored into the decision-making process of management. The fisheries sector of Member States of the Organisation of Eastern Caribbean States (OECS) continues to be of significance showing a steady increase in the net demand of fish over the past ten years. Draft Fishery Management Plans for seven of the nine OECS Member States were reviewed. Statistical methods were used to provide a decision rule in determining which management issues need to be given priority consideration. Three issues stood out as being of most concern to sub-regional fishery officers; inadequate data, habitat degradation and destruction, and destructive fishing methods. This paper looks at those "priority" issues, and considers their combined impact on fisheries management.

KEY WORDS: Fisheries Management Plans, impacts, OECS

INTRODUCTION

Instruments of management are normally based to some extent on statistics derived either from sampling the fishery or from fishery independent studies; both using catch and (nominal fishing) effort data. In most instances, such calculations give an incomplete picture of the state of targeted stocks. The impacts of anthropogenic activities on the habitats of these populations are rarely factored into the decision-making process of management. In basing fisheries management strictly on mathematical models, recent experiences of developed countries have exposed the limitations of this approach. However, the so-called "ecosystem" approaches also have their limitations in that they consider the fish as part of a multi-species ecosystem without including the impact of the top predator: man! The link between the strictly mathematical methods of stock assessment, and ecosystem approaches is in fact *Homo sapiens*, and his impact, over and above fishing, on the ecosystems which support the populations of marine fishery resources. Given the current state of exploitation and economic importance of the marine fishery resources of the eastern Caribbean, it is timely to consider the development of an alternative approach to managing these resources.

The fisheries sector in the Member States of the Organisation of Eastern Caribbean States (OECS) contributed some US\$ 23.59 million in 1995 (Anon., 1997), at an average of 1.48% of GDP across Member States (OECS, 1996). As for the years 1992 - 1994, this represented the second highest contribution within the agricultural sector (Anon., 1997; OECS, 1996), and in 1995 involved an estimated 11,130 fishermen, and 3690 commercial fishing vessels (OECS, 1996). Member States landed an average of 846 metric tonnes in 1995 (calculated from landings in Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines) at an average value of EC\$ 9.2 million per country (OECS, 1996). There was a 54% increase in the import of marine products from 1994 to 1995, with an 83% increase in value; average exports of fish and fish products increased nearly 25% over this same period. The fisheries sector, therefore is of more than a little importance to the OECS sub-region with the net demand for fish steadily increasing (c.f. OECS, 1993, 1994, 1995, 1996).

Seven of the nine OECS Member States have recently drafted Fishery Management Plans (FMPs) with the assistance of the CARICOM Fishery Resources Assessment and Management Program (CFRAMP) and the OECS Natural Resources Management Unit (NRMU). In all cases, the mission statement enunciated in the FMPs clearly indicates a commitment to the conservation and sustainable use of the fisheries resources for the benefit of the peoples of these Member States. In the development of these plans, technical officers in each country, and in some cases, representatives of fisher's organisations, identified the issues which would need to be resolved to allow for sustainable management (and development) of each species-defined fishery. A total of twenty-five (25) distinct issues were identified across the ten (10) "fisheries" being considered (Table 1).

We counted the number of occurrences of a given issue/fishery combination among the seven draft Fishery Management Plans. The resulting data in this matrix (Table 2) were analysed (ANOVA; Tukey's; Student-Newman-Keul's) with the software MSTAT (Nissen *et al.*, 1987). There was no significant difference in counts between fishery types, however this was not the case for the management issues. The management issue, counts of which contrasted most (at the 95% confidence level) was inadequacy of fishery-related data, with habitat degradation/destruction, and destructive fishing practices being ranked second and third respectively. Even at the 99% confidence level, inadequate data was most prominent among the multiple contrasts, and thus apparently stands out as being of most concern to fishery managers in OECS Member States.

THE INDIVIDUAL ISSUES

The parametric statistics generated in the analysis of the data are based on the assumptions that the variables being compared are normally, or very close to

normally, distributed (Zar, 1984). Given that quantitative terms were used to describe qualitative (non-parametric) parameters, it could be argued that the tests used are not valid for the data analysed, hence the statistical analyses used in this review are seen as providing nothing more than a useful decision rule for prioritising the issues being discussed, in the absence of any other such rule. Having said this, the results suggest that OECS Member States share a common need to pay attention primarily to:

- i) the collection of adequate fishery related data;
- ii) the mitigation and prevention of habitat degradation, and
- iii) the prevention of destructive fishing methods.

OECS Member States have a number of possible mechanisms for addressing these priority issues. Consideration of these actions can provide the basis for a sub-regional strategy.

Inadequate fishery data

OECS Member States have identified essentially two actions to deal with the problem of inadequate fishery data, namely, 1) integrate and improve collection of biological and catch and effort data, primarily through improving the quality of data collected, and 2) accessing available research results on fisheries of concern.

From the standpoint of implementation, this means that States would need to develop integrated systems, as in Figure 1, for acquiring improved catch and effort, and biological data. These data which would be used for stock assessment. Effective systems for data collection would result in the availability of data of a quality which could be utilised for stock assessment. Any "shortfall" in the consequent information could be mitigated by accessing available research results from other, similar, fisheries elsewhere in the world (Pauly, 1994), or by pooling datasets in some fishery types (eg. pelagic species, including small coastal pelagic species groups). Countries might also wish to consider establishing a system for data collection such that the incorporation of earlier, anecdotal, knowledge into the present models can occur, thus helping us to understand and overcome what Pauly (1995) refers to as the "shifting baseline syndrome," wherein "each generation of fishery scientists accepts as a baseline the stock size and species composition that occurred at the beginning of their careers, and uses this to evaluate changes ... when the next generation starts its career, the stocks have further declined, but it is the stocks at that time that serve as the new baseline (resulting in) a gradual shift of the baseline ...and inappropriate reference points for evaluating economic losses resulting from overfishing, or for identifying targets for rehabilitation measures".

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Table 1. Listing of management issues and fishery types in (7 of 9) OECS Member States

Management Issue	Fishery type
1 Low abundance	1 Shallow shelf and reef
2 Lack of a fishery	2 Deep slope
3 Destructive fishing practices	3 Large pelagics
4 Habitat destruction/degradation	4 Coastal pelagics
5 Unknown potential of the fishery	5 Lobster
6 Lack of potential yield estimates	6 Conch
7 Illegal fishing (foreign or otherwise)	7 Flyingfish
8 Vulnerability of the stock	8 Sea urchins
9 Unsustainable/unregulated fishing effort	9 Turtles
10 Inadequate data (catch/effort/management)	10 Seamoss
11 Artisanal nature of the fishery	
12 Restricted fishing area	
13 Lack of regional management plan	
14 Excess mortality of juveniles	
15 Unknown extent of habitat	
16 Depletion of stocks	
17 Ciguatera	
18 Lack of proper management of marine reserves	
19 Pot theft	
20 Seasonal oversupply	
21 Impact of International agreements	
22 Conflict between artisanal and commercial	
23 Illegal/unrestricted landing/export	
24 Over-exploitation	
25 Inadequate regulatory mechanism(s)	

Table 2. Matrix of management issue versus fishery type in OECS Member States (Codes as in Table 1)

Management Issues	Fishery type									
	1	2	3	4	5	6	7	8	9	10
1	4	0	0	0	0	0	0	1	0	0
2	0	0	0	0	0	0	1	0	0	0
3	7	3	0	5	7	6	0	0	1	2
4	7	0	0	7	7	5	0	3	4	2
5	0	0	3	0	0	0	0	0	0	0
6	7	0	0	7	0	0	0	0	0	0
7	3	7	6	0	0	0	3	0	0	0
8	0	7	0	0	0	0	0	0	0	0
9	0	0	0	1	0	0	0	2	0	0
10	0	7	6	7	6	6	6	2	0	2
11	0	0	2	1	0	0	1	0	0	0
12	0	0	7	0	0	0	0	0	0	0
13	0	0	7	0	0	0	4	0	0	0
14	0	0	1	4	0	0	0	0	0	0
15	0	0	0	0	7	7	0	0	0	0
16	0	0	0	0	7	7	0	0	0	0
17	3	4	0	1	0	0	0	0	0	0
18	1	0	0	0	0	0	0	0	0	0
19	3	3	0	0	0	0	0	0	0	0
20	0	0	3	0	0	0	0	0	0	0
21	0	0	0	0	0	1	0	0	0	0
22	0	0	1	0	0	0	0	0	0	0
23	0	0	0	0	2	1	1	1	0	2
24	3	0	0	0	0	0	0	0	5	0
25	0	1	0	1	0	0	0	0	5	0

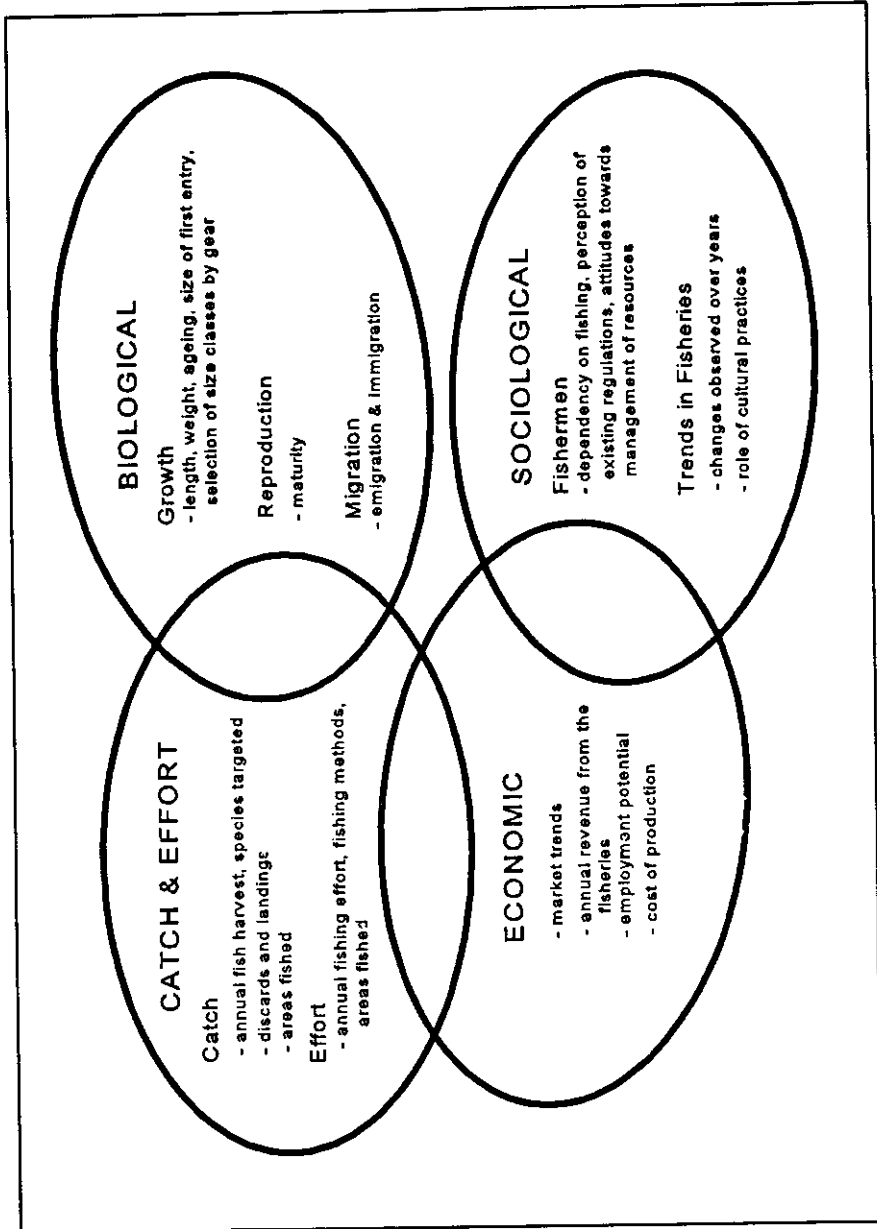


Figure 1. Aspects of Field Data Collection Programme in seven OECS member states (after Murray, Barnwell and Clemetson, 1996)

Given that some of the fish species targeted by OECS Member States are believed to be either migratory, straddling, and (as a consequence of the planktonic nature of parts of their life cycles) shared stocks, the harmonised development of national data collection systems appears advisable. The limited resources of finance and manpower in and among OECS Member States is further reason for taking a sub-regional view of data collection. States could share personnel thus reducing the cost of analysing the data which would have been collected within a common sampling design.

Habitat degradation and destruction

It is only fairly recently that the issue of habitat degradation and destruction and its impact on the fisheries of the OECS has been given any consideration in fisheries management. While it is still a way off before this becomes an integral part of the management of fisheries within the sub-region, it is nevertheless an important consideration in the scheme for enhanced fisheries management. Unfortunately the relationships between degraded habitats and declining marine resources are not well established, neither are those of the links between the effects of anthropogenic activities on the viability of these same resources (Nichols, 1996). Anecdotal information points to a decline in nearshore stocks, particularly where areas are known to be physically impacted by anthropogenic activities, and where species have a direct relationship with the substrate as in the case of benthic organisms.

However, the relationship between habitat and pelagic organisms is less clear though some studies appear to shed a little light in that regard. Donaldson and Clavijo (1994) through their studies on the diet of round scad (*Decapterus punctatus*) have suggested a direct relationship between the holozooplanktonic prey of the former, to hard-bottom areas as well as natural and artificial reefs. Tobias (1991) on the other hand suggests that "bigeye scad will school and remain in areas on the lee of islands or points of land where strong currents sweep past and create eddies where abundant zooplankton organisms are found." The preceding is indicative of the link between species abundance/availability and the nature of the nearshore habitats. It stands to reason however that if species are directly dependent on particular habitats, then a change in ambient conditions will impact the species one way or the other. If such changes exceed the critical limit for survival, then a decline in the species must be expected.

Very little information is available on the migrations or spawning behavior of small coastal pelagics (Tobias, 1991; Coblent, 1995; Clark and Privitera, 1995; Shaw and Drullinger, 1990; Finlay and Rennie, 1984), and it is this lack of available information which has served to encourage the harvesting of these and other marine species without due consideration for the effects of overfishing. This dearth of information has also conveniently accommodated the

unbridled development and use of shore areas without due consideration given to the impacts on species in the nearshore.

Small Island Developing States (SIDS) are particularly susceptible to the impacts of anthropogenic activities. The diminutive size of small islands means that development and the physical environment are closely related and interdependent, and it is the mix of anthropogenic activities which contributes to the development of complex and often conflicting and competing issues for resources users and managers (Nichols, 1996; Nichols and Chase, 1995). Increasing pollution of nearshore waters from land and marine sources, the degradation and destruction of coral reefs, shoreline alteration from construction, as well as the indiscriminate use of fishing gear in nearby fisheries, are contributing to the reported decline in commercial and non-commercial species. These problems cannot be addressed by the seemingly weak and often inadequate management instruments in most of the islands. Current systems of management however do not allow for timely interventions or in fact cater to the externalities created by resource use in other sectors.

Destructive fishing methods

The combined effect of habitat degradation from anthropogenic activities with the use of inappropriate fishing gear would be the primary causes for the apparent decline in nearshore stocks. Although the trend is borne out by the data collected in the field, and no doubt that other environmental factors are also contributors, what is highly visible is what is deemed controllable, through the appropriate management instruments. In fact Moore *et al.* (1992) have made recommendations on regulatory enforcement measures which would help discourage the use of a number of specific fishing gear. The use of destructive fishing gear and methods is usually predicated on indications of declining stocks, and in order to maintain catch levels without any increase in fishing effort the methods usually employed further exacerbate the problem. Sometimes the financial investment in inappropriate gear is quite substantial, complicating the approaches to effecting change.

The absence of alternatives and the desire to secure a balanced livelihood drives the practices of those fishers irrespective of the sustainability of these practices. Unfortunately enforcement measures alone do not provide the solution to these problems. The use of the consultative process coupled with a rigorous sensitization program aimed primarily at but not limited to fishers has the potential to lead to a change in fishing practices alongside the appropriate legislation and enforcement.

SYNTHESIS

The management of fishery resources in OECS Member States requires a

holistic approach. Such an approach should be geared towards mitigating not only the deficiencies with regard to one specific management issue, but rather combining the "treatment" to combat all the symptoms of the "disease". In other words, there is need to address, collectively, the issues of inadequate data, habitat degradation/destruction, destructive fishing gear, and all other management issues.

OECS countries should attempt to increase the involvement of fishery managers in the development control process to ensure that due consideration is given to the impacts of development projects on fisheries resources. Due regard would also need to be given to the direct and indirect impacts that agricultural and construction practices can have on the near-shore marine habitats. Legal instruments become important in this instance since there is a need to regulate the activities creating externalities. The mandatory requirement of Environmental Impact Assessments (EIAs) and the possible inclusion of the fisheries departments on the relevant development control authorities would be a step in the right direction.

The use of the legislative process is necessary as a control mechanism to ensure compliance with the regulations governing practices which cause physical damage to marine habitats. Rigorous enforcement of regulations would need to be coupled with the use of the consultative process primarily as a means of increasing the awareness of all stakeholders to the long term impacts of destructive fishing methods. The consultative approach also has the potential to lead to a change in attitudes reducing the need for regulations. Educating stakeholders, particularly fishers, and engaging them in discussion may make it possible to convince them to make the changes to fishing gear that would lead to a reduction in habitat destruction and degradation, or overfishing. By way of example, modification of fish traps by the provision of escape vents, the increase in mesh size, or inclusion of biodegradable panels for the mitigation of ghost fishing, would more likely become part of the local fishing culture if introduced through a process that resulted in the voluntary installation by fishers. Consultation with and discussion among fishers, in fora conducive to their sharing and learning would increase the chances of voluntary changes in fishing practice.

The development of a national consultative process is also conducive to the setting up of a co-management arrangements. The benefits will accrue to those organisms which inhabit the near-shore particularly the more sedentary and sessile species which by virtue of their limited, or lack of, mobility are much more susceptible to the ravages of destructive fishing gear.

In support of the above, improvement in the collection of fishery (-related) data, either from the point of view of the collection system devised, or the willingness of fishers in providing data, is an imperative. Analysis of the data

provides a basis for feedback to the stakeholders with regard to the effectiveness of the measures put in place as a result of the consultative process.

CONCLUSION

Nichols and Chase (1995) have suggested that "small islands are influenced by their surrounding marine environment and themselves impact the seas around them in a time frame much shorter than for larger land masses". They go on to state that "in fact definitions now being proposed suggest that the entire land mass and its juridical marine area constitute the coastal area of small islands (and thus) any management framework must consider the intricate interactions and linkages between biological systems on small islands, in a sector which becomes multisectoral in focus" (ibid.: parentheses and emphases ours). The management of fishery resources is dependent on the broader aspects of development within the island system as well fishery-specific issues. This Islands Systems Management (ISM) framework can provide a useful mechanism for working towards sustainable fisheries management and development. It is thus incumbent on Small Island Developing States, including OECS Member States, to consider ISM as an alternative approach for effecting greater efficiencies in the management of the use of fisheries, and other natural resources.

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