

Logical Framework Analysis as a Tool for Management of a Tropical Fishery

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ABSTRACT

With the current state of exploitation, and economic importance, of the marine fishery resources of the eastern Caribbean, it may be timely to consider the development of a new approach to management of fishery resources. It has been suggested that there should be a reorientation of fisheries science toward the management of small stocks such as those prevalent in developing countries, most of which are tropical. The perception that management, and management planning, cannot begin until the stocks have been assessed is a view which has proven detrimental to fishery management in developing countries. OECS States have followed a management sequence of: preliminary fishery assessment; policy establishment; management strategy formulation; fishery assessment, including stock assessment; and finally implementation. This sequence focuses more on individual stocks or species groups than on the fishery as a whole. In this paper we consider the utilisation of the Logical Framework Analysis approach for management of the shallow shelf and reef fishery of the island of Anguilla in the British West Indies. Based on the stated goals and objectives of fishery management in that territory, we derive a Logical Framework model; and suggest that this approach could provide for the comprehensive and holistic view of the industry that is required by Small Island Developing States like those of the Eastern Caribbean region.

KEYWORDS: Anguilla, fishery management strategy, Logical Framework Analysis

INTRODUCTION

Fishery management measures are normally based to some extent on statistics derived from fish catches, giving in most instances an incomplete picture of the state of targeted stocks. What is not often featured in the decision-making process is the impact of anthropogenic activities on the ecosystems

which these populations inhabit. The socio-economic patterns of resource allocation and distribution relative to access of the fishery resources, marketing or local importance of the fishery are also not given much consideration in the decision making process. Thus, current systems of management do not allow for timely interventions or in fact cater to the externalities created by resource use in other sectors. The recent experiences of developed countries in managing fisheries based strictly on mathematical models, have shown the limitations of this approach. It has also been suggested, elsewhere (Murray and Nichols, in press), that 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, or "analytical methods of stock assessment" approach, and the ecosystem approaches is in fact *Homo sapiens*, and his impact on the habitats which the populations of marine fishery resources inhabit. It is now timely to consider the development of a new approach to management of these resources, in a manner which considers all of man's interactions with the ecosystem: in other words, the whole fishery. This must be seen in the context of the current state of exploitation, and economic importance, of the marine fishery resources of the eastern Caribbean. This is more so with increased cognisance being given to the linkages between fisheries and other sectors/industries such as tourism. Palfreman and Insull (1994) have suggested a number of issues impacting on the development of the fisheries sector including (but not limited to):

- i) the fish resources as strategic assets
- ii) sustainable development
- iii) linkages
- iv) conflicts between interest groups
- v) monitoring and enforcement of management regulations
- vi) the role of human resources in the process of development
- vii) industry structure
- viii) foreign exchange
- ix) marketing
- x) hygiene standards, and
- xi) credit.

Any new approach should have the potential to address these issues as an integral part of the action plan for fisheries management and development.

In 1994, Member States of the Caribbean Community and Common Market (CARICOM) participating in the joint Canadian International Development Agency (CIDA)/CARICOM-funded CARICOM Fisheries Resources Assessment and Management Program (CFRAMP), recognised the stated purpose of the project to "enhance the basic institutional capacity and information base and to manage and develop fisheries ..." (CFRAMP 1994). It was concluded that the

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consequence of (the) deficiencies in knowledge concerning the status of the resource, is poor management, leading to possible overexploitation with increased demand and consequent degradation of the resource. It was also determined that "all this pointed out the need for proper assessments of the region's fish stocks ... (with) the major point to be grasped ... (being) that more information was needed on the scalefish resources in order for them to be assessed and managed on a sustainable basis" (*ibid.*: parenthesis and emphasis ours). CFRAMP went on to note that "these assessment activities would provide the raw data the analysis of which would guide the formulation of appropriate management actions for implementation by CARICOM countries".

Recently Mahon (1997) has suggested that there should be a reorientation of fisheries science toward the management of small stocks such as those prevalent in developing countries, most of which are tropical. He goes on to suggest that the perception that management, and management planning, cannot begin until the stocks have been assessed is a misplaced view, which has proven detrimental to fishery management in developing countries (*ibid.*). The CFRAMP conclusions noted above suggest that this perception of the primacy of stock assessment is widely held in the Eastern Caribbean. While distinguishing between fishery and stock assessment, Mahon (1997) goes on to suggest that management cannot begin until the fishery is assessed. Such a fishery assessment should incorporate not just an analysis of the biological status of the stocks, but also the social, cultural, economic, political, habitat and other considerations relevant to the fishery (see also Campbell and George 1994, Campbell and Townsley 1996). The holistic approach of fishery assessment would also incorporate consideration of the externalities created by resource use in other sectors. This management objective driven (MOD: *sensu* Mahon 1997) approach has the two advantages of (a) bringing industry input early in the action sequence, and (b) encouraging thought on the management actions which are feasible, so that the (often limited) financial and human resources can be optimally allocated early in the process (*ibid.*). We concur with Mahon (1997) that in the stock assessment driven (SAD) approach, industry input tends to be sought after implementation of the management strategy. Often by that time, problems in implementation start to be encountered.

It must be admitted that, in recent times, English speaking member countries of the Caribbean Community and Common Market (CARICOM) have begun to use an approach which combines elements of both MOD and SAD management. We suggest that fisheries management in the region has followed the MOD sequence of: preliminary fishery assessment; policy establishment; management strategy formulation; fishery assessment, including stock assessment; and finally implementation; but that the focus in this sequence has been more on individual stocks or species groups rather than on the fishery as a

whole. This can be referred to as a Astock/species-related management objective driven (SMOD) approach. This sequence of management events has been followed in OECS Member States, in one way or another (by accident or design), since at least the early 1980s.

It has been stated that while the “balancing act between present-day benefits and future rewards had been at the forefront of fishery management long before it became popularized under the name of ‘sustainable development’, the focus in the fishery had been on output ... (but) it is time to replace (the) old emphasis on sustainable output with a new emphasis on sustainability of the fishery system as a whole” (Charles 1998a, parentheses ours). Mahon (1997) puts forward the treatise that “fishery management could be approached using one of the structured project development approaches now required by most international funding agencies, for example, Logical Framework Analysis ...”. The LogFRAME matrix is considered (Sartorius, 1996) to be “the embodiment of the design decisions and agreements reached by a project team, it is the team process and corresponding exchange of ideas that increases the overall quality, appropriateness, realism and responsiveness of the design ... The underlying core concept of the approach is Management by Objectives”. In this paper we consider the utilisation of the Logical Framework Analysis approach (Sartorius 1996, EEAA 1997, European Commission 1993, cited in Mahon 1997) as a management and development tool for the shallow shelf and reef fishery of the island of Anguilla in the British West Indies. Based on the stated goals and objectives of fishery management in that territory, we derive a Logical Framework model for utilisation by the fishery authorities.

THE SHALLOW SHELF AND REEF FISHERY OF ANGUILLA

The target species for the shallow shelf and reef fishery of Anguilla are: Hinds (*Serranidae*); Parrotfishes (*Scaridae*); Squirrelfishes (*Holocentridae*), Grunts (*Pomadasyidae*), Surgeonfishes (*Acanthuridae*), Triggerfishes (*Balistidae*), Angelfishes (*Balistidae*), Groupers (*Serranidae*), Butterfish (*Ephinephelus fulvus*), Snapper (*Lutjanidae*), Spotted eagle ray (*Aetobatus narinari*); and Stingray (*Dasyatis sp.*). While lobsters (*Panulirus argus*) are also caught on the shallow shelf and reef areas, the lobster fishery is so important as to be considered in its own right. The fish are caught primarily by wood framed traps, preferred due to their tendency to harbour moss which are said to attract fish. However, metal framed traps are also used, and have greater longevity although they are more expensive to manufacture. Traps are laid at various depths throughout the extensive shelf area. The bank targeted and depth at which the pot is laid will determine the size of the species caught. A boat will typically haul a set of traps twice per week. Each vessel hauling on average 40 - 50 traps. Handlining is also a common method used for reef fish. Hinds (*Serranidae*), Butterfish

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(*Ephinephelus fulvus*), and Snapper (*Lutjanidae*) are mainly targeted using hand lines. Yellowtail snapper (*Ocyurus chrysurus*) are primarily targeted using handline or bamboo rods from land. Beach - seine netting is practiced from Crocus Bay, Meads Bay and Island Harbour. Spear fishing is practiced by a few persons for home consumption.

The management unit of the Anguillian shallow shelf and reef fishery is considered to be the island shelf for juveniles & adults (Anguilla shares an island shelf with St. Martin/St. Maarten and St. Bartholomew: the "Anguilla Bank") and the eastern Caribbean for planktonic larvae. Resource status is largely unknown. However, fishermen complain of having to lay pots further offshore suggesting that there is a decline of stocks on near-shore reefs. Further study is required to determine resource status and to establish a base line for future monitoring. High value species such as Grouper are largely found on offshore reefs. While a Coastal Resource Atlas was prepared for the Department of Fisheries and Marine Resources and published in 1995, a substantial decline in coral cover is described by fishermen in the aftermath of Hurricane Luis in 1995. Monitoring is therefore required to update the current habitat map. Species, area or gear specific catch and effort data are not recorded. There has been no catch and effort data collection post Hurricane Luis.

The main market for reef fish is for consumption within Anguilla and in French St Martin. The majority of reef fish caught by fishers from southern and western ports are sold twice a week in St Martin. Fishers from northern and eastern ports are essentially lobster fishermen who partake in some finfishing. This catch is sold locally on Anguilla, mainly to a company called Fishery and Fishing Supplies. Groupers and Snappers may be sold to hotels and restaurants and are high value species.

FISHERY MANAGEMENT IN ANGUILLA

The overall goal of fishery management in Anguilla is to ensure that the fishery is effectively managed (c.f. also Campbell and George 1994), and that development objectives are identified, prioritised and implemented towards obtaining maximum sustainable benefits for the people of Anguilla. This is seen as taking place within a multiple use framework, while promoting intersectoral co-operation and co-ordination. This should ensure that fishery and marine resource management policies and legislation are integrated within the national decision making framework. The stated national fishery management objectives are to:

- i) develop a framework for sustainable exploitation of the national marine resource base without compromising the potential for future use;
- ii) promote development of responsible marine resource use, specifically the rational exploitation of under-utilised marine resources for the optimum

- benefit of the people of Anguilla;
- iii) meet national nutritional needs by maximising sustainable exploitation of the fishery and through development of marketing and processing systems that ensure the development of equitable benefits for the people of Anguilla; and,
 - iv) facilitate participatory management, through development of management tools which enable consensus based regulation and monitoring of the multiple systems of use of the national marine resource base.

Current regulations include mesh size regulation. The use of gillnets is banned. The use of dynamite, poisons and other noxious substances is prohibited; and spear fishing is only permitted by local fishermen. The specific management objective for this fishery is summarised in the draft fishery management plan (OECS 1998) as being to ensure sustainable exploitation without any conflict resulting from multiple use of the resources. The Government of Anguilla perceives the primary management measures for this fishery as being 1) effort control; 2) closed areas and / or seasons; 3) size and gear limits; and 4) co-management arrangements

The relevant management issues can be summarised as:

- i) lack of stock assessment data;
- ii) inaccurate habitat inventory coupled with potential habitat destruction;
- iii) no catch and effort data for management;
- iv) lack of socio-economic data on the dynamics of the fishery to guide management and development;
- v) inadequate market research;
- vi) pot theft;
- vii) ciguatera poisoning;
- viii) lack of a participatory management framework for integrating multiple use; and,
- ix) destructive fishing practices.

From the developmental point of view, the Government of Anguilla has the perception that the required measures are: some form of supply and demand control; and the need to improve quality of the product. The issues pertinent to these measures are the fixed price of fish; the absence of adequate market research; the inadequacy of berthing, moorings, and fish storage; and the growing demand by importing countries for adherence to international health and safety regulations.

LOGICAL FRAMEWORK ANALYSIS AS A FISHERY MANAGEMENT TOOL

The need for a fishery assessment (*sensu* Mahon 1997), as opposed to stock

assessment, is predicated on the necessity to have a comprehensive and holistic view of the industry. Such a view in turn will better inform a development policy and management plan for the fisheries industry. To date very little effort has gone into understanding the fishery; into conflicts among users; or into developing policies and management strategies. Consequently, essentially uninformed decisions have been made regarding the level of investment in the industry.

It has been suggested (Mahon 1997) that "the greatest hope of managing the myriad of low total-revenue stocks that sustain the majority of fishers worldwide lies in a greater emphasis on planning and process in fishery management problem solving and decision making where financial and human resources are severely limited". Additionally the requirements of recent international agreements in fisheries emphasise responsible fishing and the adoption of a precautionary approach. This creates an urgent need in small states in general, and the OECS sub-region in particular, to re-conceptualise the management and development of fisheries. The conceptual changes must also lead to the inclusion of mechanisms that incorporate greater participation of all stakeholders in the industry, and that will promote better organisation and thus more sustainable development.

Underscoring the urgent need for a new initiative and approach to fisheries, we propose that the conceptual change required to meet the real needs of the fisheries industry can be approached by modeling the management and development of the industry within a logical framework matrix (EEAA, 1997). Such an analytical tool will assist in developing a management strategy and action plan which is clearly thought out, and which will include only those activities which will achieve the stated objectives (c.f. Campbell and George, 1994). In the current context, the Logical Framework Matrix can be used as the basis of the action plan for the management and development of the Anguillan shallow shelf and reef fishery, over the two-year lifespan of the draft fishery management plan (OECS, 1998).

Ideally, the Logical Framework Approach begins with a situational/stakeholder analysis in which a problem tree is developed, identifying the core problem affecting the fishery. Possible solutions are then determined for dealing with this and other perceived problems. In the next step, the actual development of the Logical Framework Matrix with the stakeholders effects a multi-disciplinary, participatory, management approach. This permits an analysis of the fishery which provides a clearer picture of the current situation and the management and development objectives. As a consequence, one of the primary functions of the MOD (*sensu* Mahon 1997) approach is achieved. Another advantage of the Logical Framework Approach is that it can help point to and account for inter-

and intra- sectoral linkages which impact on management decision making. Additionally the approach allows for flexibility in the planning process, providing a foundation on which clear actions can be implemented to meet the management and development objectives.

Table 1 shows the proposed Logical Framework Matrix (LFM) for the management and development of Anguilla's shallow shelf and reef fishery. The Logical Framework matrix incorporates some actions to deal with the broad issues suggested by Palfreman and Insull (1994) and mentioned in the introduction to this contribution. These matrices can include externalities created by resource use in other sectors as critical assumptions or risks.

We recognise that within the context of the broader regional or even national situation, a separate logical framework matrix will have to be developed for each individual fishery. This may appear a tedious process, but in the final analysis, the Logical Framework approach allows for "the design of fishery management that is robust, adaptive and precautionary, and ... the development of appropriate institutions to implement such a management approach ... (and thus) may be exactly what is needed to move us in the right direction, towards sustainable fisheries" (Charles 1998b: parenthesis ours). We are of the view that this approach will provide for the comprehensive and holistic view of the industry that is required by Small Island Developing States like those of the Eastern Caribbean region.

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Table 1. Logical Framework Matrix for the management and development of the Anguillian Shallow Shelf and Reef Fishery

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification	Critical Assumptions
<p>GOAL The provision by the fishery of maximum sustainable benefits for the people of Anguilla is ensured</p>	<p>Contribution to GDP is increased by 5% by 2001 Contribution to the nutritional needs of increased 15% by 2001</p>	<p>National accounting publications</p>	<p>Political will Availability of human and financial resources</p>
<p>PURPOSE A participatory framework for sustainable exploitation of the shallow shelf and reef fishery is developed</p>	<p>Fisheries Advisory committee is established and effectively functional by 2001 Fishery contribution to sectoral outputs increases by 5% by 2001 Fisheries Management Plan operational by 2001</p>	<p>Reports of meetings of Fisheries Advisory Committee Reports of meetings of Executive Council Annual reports of Department of Fisheries and Marine Resources National accounting publications</p>	<p>Stakeholders willingness to co-operate Availability of human and financial resources Mechanisms for monitoring fisheries and fishery related habitats in place</p>

Table 1 continued.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification	Critical Assumptions
<p>OUTPUTS Sustainable increases in economic rent are achieved</p>	<p>Catch composition increased Fishers' profits increased by 5%</p>	<p>Annual reports of Department of Fisheries and Marine Resources National accounting publications</p>	<p>Availability of human and financial resources Fisheries registration and Licencing system is developed, utilised and operational</p>
<p>Full stakeholder involvement in decision making is provided</p>	<p>Capital availability to fishers improved Stakeholder participation in resource management enhanced</p>	<p>Licensing and registration database</p>	
<p>ACTIVITIES Fishery management information is collected</p>	<p>A system for collection and analysis of catch, effort, biological and socio-economic data is developed and implemented</p>	<p>National accounting publications</p>	<p>\$\$\$ Money available</p>
<p>Fishing effort is regulated</p>	<p>An efficient vessel inspection registration and licencing regime is operationalized</p>	<p>Licensing and registration database</p>	<p>Resource persons Data base system Sampling frame</p>

Table 1 continued.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification	Critical Assumptions
Fishery-related habitat management improved	Habitat information is updated and monitoring system established Fisher involvement in monitoring the adverse effects of other sectors is encouraged	Updated Coastal Resources Atlas Reports of Development Control Authority Department of Fisheries and Marine Resources reports	Fishers are willing to participate Government is willing to share decision making power/responsibility
Participation of all stakeholders in the formulation of policy related to fishery management is increased	Habitat degradation/destruction is discouraged Formation of fisher organisations encouraged Formation of effective Fisheries Advisory Committee is facilitated Community level consultations to discuss Fisheries Management and Development decisions are held.	Reports of Fisheries Advisory Committee	

Table 1 continued.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification	Critical Assumptions
Factors affecting marketing of fish are improved	Collaboration with other sectors in the management of intersectorial impacts of/on the fishery is encouraged	Consultants' reports	
Fishery-related infrastructure is improved	Research into all aspects of marketing is supported The results of market research incorporated into the management strategy		
Economic status of fishers is improved	Berthing and mooring facilities for fishing vessels are improved Storage facilities for fish and fish products are improved Capital, insurance, social security and other economic instruments for fishermen made available	Central Bank Commercial Banking and National Accounts Statistics Fisher organization reports	

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