

FAO/GOVERNMENT COOPERATIVE PROGRAMME



SCIENTIFIC BASIS FOR ECOSYSTEM-BASED
MANAGEMENT IN THE LESSER ANTILLES INCLUDING
INTERACTIONS WITH MARINE MAMMALS AND OTHER
TOP PREDATORS

ASSESSMENT OF FISHERIES MANAGEMENT ISSUES
IN THE LESSER ANTILLES AND THE ECOSYSTEM
APPROACH TO FISHERIES MANAGEMENT

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Report prepared for the
Lesser Antilles Pelagic Ecosystem Project
(GCP/RLA/140/JPN)

by

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ABSTRACT

Scientific Basis for Ecosystem-Based Management in the Lesser Antilles Including Interactions with Marine Mammals and Other Top Predators: Assessment of fisheries management issues in the Lesser Antilles and the ecosystem approach to fisheries management by Sandra Grant, FAO, Barbados, 2008. xi + 254 pp. 20 Tables and 25 Figures. FI:GCP/RLA/140/JPN. Technical Document No. 9.

The LAPE project aims to apply Ecosystem Approach to Fisheries (EAF) principles to ecosystem management planning for pelagic resources in the LAPE area by making use of the best scientific information available. Part one of this document reports on the outcome of nine national EAF workshops to identify and prioritize ecosystem issues covering ecological well-being, human well-being, and ability to achieve categories. The Ecologically Sustainable Development (ESD) reporting framework was used as the exploratory tool to identify the main issues and risk associated with the pelagic fishery. In total, 134 individuals participated in national workshops, including fisheries officers, fishers, and other government agencies. On average 123 issues were proposed and prioritized per workshop. Issues rated as moderate to extreme risk to the fishery were pooled to determine common issues and trends amongst countries. Twenty-four major priority issues were identified of which four were selected for policy exploration using Ecopath with Ecosim (EwE) and non EwE. The document concludes with operational objectives and management recommendations for issues selected for detailed policy exploration. Part two of this document reports on EAF management workshops conducted in LAPE participating countries.

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TABLE OF ACRONYMS AND ABBREVIATIONS

CERMES	Centre for Resource Management and Environmental Studies
CLME	Caribbean Large Marine Ecosystem Project
CRFM	Caribbean Regional Fisheries Mechanism
DoF	Department of Fisheries
EAF	Ecosystem Approach to Fisheries
ESD	Ecologically Sustainable Development
EwE	Ecopath with Ecosim
FADs	Fish Aggregating Devices
FD	Fisheries Division
HACCP	Hazard Analysis and Critical Control Point
IUU	Illegal, Unregulated, and Unreported fishing
LAPE	Lesser Antilles Pelagic Ecosystem
MCS	Monitoring, Control, and Surveillance
MoH	Ministry of Health
NGO	Non-Government Organization
OECS	Organisation of Eastern Caribbean States
UWI	University of the West Indies
WECAFC	Western Central Atlantic Fisheries Commission (FAO)

BACKGROUND

The implementation of the Ecosystem Approach to Fisheries (EAF) entails important changes in the way fisheries management is conceived and practiced. The FAO technical guidelines for the ecosystem approach to fisheries (2003) define EAF as follows: *“An ecosystem approach to fisheries strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries”*. Although the main principles that characterize EAF are not new, but already embedded in a number of international agreements and conference documents, there is limited practical experience in implementing them.

The project GCP/RLA/140/JPN (Scientific Basis for Ecosystem-based Management in the Lesser Antilles Including Interactions with Marine Mammals and Other Top Predators) addresses one of the challenges related to the implementation of the ecosystem approach to fisheries, i.e. the development of management strategies that take into account biological interactions among species, including cetaceans and other top predators and any species that may be of no direct importance to fisheries but yet, may play an important role in maintaining ecosystem structure and functioning.

The **medium-term objective** of the project is to enable fishery institutions in the region, by 2007, to carry out improved assessments and monitoring of the status of the pelagic resources and fisheries and the ecosystem of which they form a part, for continuous adaptation and improvement of optimum management strategies. **Immediate objectives** include:

1. obtaining improved estimates of the abundance of key components of the Lesser Antilles pelagic ecosystem, including cetaceans and other top predators;
2. the formulation of a food web model of the ecosystem as a means of investigating ecosystem interactions and impacts;
3. the development of an ecosystem management plan for the pelagic waters of the EEZs of the participating countries, which will include management strategies for key species of fishery interest in the sub-region, as well as for other affected and dependent species, and
4. the development of research and management capacity for ecosystem-based management of their pelagic waters at a national and sub-regional level.

Project activities in support of Objective 1 have included cetacean sighting surveys, both regional and offshore as well as national, nearshore surveys. There was a pelagic acoustic/trawling survey to obtain estimates of

abundance of forage species and environmental information. Work towards Objective 2 included collection, compilation and analysis of data to estimate model parameters regarding diets, physiology, fisheries and primary production. These were incorporated into a mass-balance model of the pelagic food web using the Ecopath with Ecosim software. To address Objective 3 the LAPE project first completed a series of stakeholder consultations in each of the participating countries to identify fisheries management issues with a particular view towards ecological issues and prioritizing the identified issues. In most countries this process continued by developing performance reports, including specific indicators, for at least one of the high-priority issues. There remains work to be done in each case to complete this process for the pelagic fisheries, and other sectors have not been started. The development of national and sub-regional capacity in this regard (Objective 4) primarily included training sessions associated with specific activities i.e. 'on-the-job' training. There was also training for smaller groups involved in specific tasks e.g. GIS modellers or diet analysts.

PART 1 – ECOSYSTEM APPROACH TO FISHERIES MANAGEMENT WORKSHOP REPORT AND MANAGEMENT RECOMMENDATIONS

INTRODUCTION

The Lesser Antilles Pelagic Ecosystem project undertook an assessment of ecosystem management issues and relevant management measures in the region. The objectives of this activity were:

- To conduct Ecosystem Approach to Fisheries (EAF) management workshops in participating countries using the Ecologically Sustainable Development (ESD) reporting framework.
- To prepare an analysis and a report to identify ecosystem management issues, relevant management measures, and application of the scientific products of the LAPE project.
- To assist participating countries to consider the implications of the scientific results for their national pelagic management planning and strategies for sub-regional approaches to management and planning.

This report documents the results of this activity. It includes a compilation of national structured framework results and an analysis of issues, including classification and extent. The report also includes selected cases of potential management intervention targeting specific issues and related to specific information requirements suitable for consideration in a draft ecosystem management plan.

Part one of this report analyses result of national EAF management workshops and makes recommendations to improve management of the pelagic fishery in the LAPE area. Section 2 describes the EAF management approach and the ESD framework which provide the means to identify and prioritize ecosystem issues. Section 3, illustrates strategies to implement the ESD framework at national workshops. In Section 4, an analysis is presented of common issues amongst LAPE participating countries to understand trends and commonalities while Section 5 highlights management recommendations. The report concludes with a summary of findings on EAF management planning in the LAPE area.

Part two presents results of national workshops held in each country and includes a detailed list of issues identified and prioritized and generic component trees.

AN ECOSYSTEM APPROACH TO THE MANAGEMENT OF PELAGIC RESOURCES IN THE LAPE AREA

Fishing has been and continues to be a major source of food, employment, and social and economic benefits to many Caribbean communities. This heavy dependency on fishing has left many coastal resources fully or overexploited; hence, both fishers and governments have turned their attention to several underexploited stocks of large pelagic fish. If these stocks are not to suffer the same fate as coastal resources much needs to be done to manage the pelagic resources (Mahon and McConney 2004).

Several international agreements, instruments, and conferences highlight the need to include ecosystem considerations in fisheries management. These include the 1972 UN Conference on Human Environment, 1982 UN Law of the Sea Convention (UNCLOS), 1992 UN Conference on Environment and Development (Agenda 21), 1993 Convention on Biological Diversity including the (1995) Jakarta on Coastal and Marine Biodiversity, 1995 UN Fish Stocks Agreement, 1995 FAO Code of Conduct for Responsible Fisheries, 2001 Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem, and the 2002 World Summit on Sustainable Development (WSSD). Although the Ecosystem Approach to Fisheries (EAF) principles are not new there has been limited implementation. This project aims to apply the EAF principles to ecosystem management planning for pelagic resources in the LAPE area. Specifically, to provide the critical link between the scientific information system developed by the project and the application of this information to fisheries management.

The purpose of an EAF is to plan, develop and manage fisheries in a manner that addresses the multiplicity of societal needs and desires, without jeopardising the options for future generations to benefit from the full range of goods and services provided by marine ecosystems. The definition follows as an EAF strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties about biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries. The principles and concepts of EAF are (FAO 2003:15):

- fisheries should be managed to limit their impact on the ecosystem to the extent possible;
- ecological relationships between harvested, dependent and associated species should be maintained;
- management measures should be compatible across the entire distribution of the resource (across jurisdictions and management plans);
- the precautionary approach should be applied because the knowledge on ecosystem is incomplete; and

- governance should ensure both human and ecosystem well-being and equity.

Implementing an EAF means broadening fisheries management to include ecosystem considerations. Instead of addressing single-species issues, the whole ecosystem and its components need to be considered. Definitions of management objectives will be broader, the number of reference points and indicators will increase, and thus the need to widen the scientific basis for management decisions. As a result, there will be the need to strengthen monitoring, control, and surveillance (MCS) and institutional arrangements to include non-fishery stakeholders. There is also provision to provide greater assistance to developing countries to increase their capacity to introduce this ecosystem concept (FAO 2003).

There are guidelines to produce fisheries management plans within EAF (Figure 1). As discussed in these guidelines, the plan should include major stakeholders, objectives covering economic, social, and ecological components for the fishery, implementation strategies, monitoring, and evaluation.

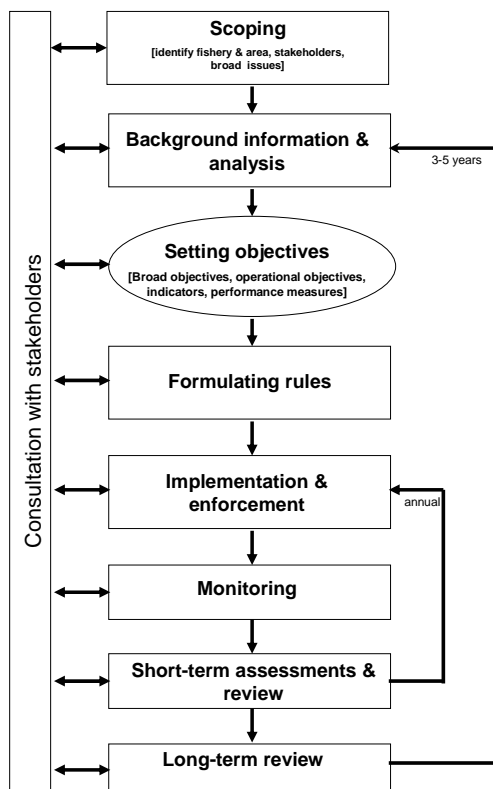


Figure 1 Developing, modifying and implementing an EAF management plan (Source: FAO 2003:45)

The LAPE project addresses the first three steps in Figure 1 to develop management recommendations based on issues identified by stakeholders and scientific information developed by the project.

Step 1, defining the scope to identify the fishery, area, stakeholders, in this case the LAPE study area as defined by the project, while at the national level, stakeholders defined pelagic fishery based on fish type, vessels, and gear operating within their EEZ (Part 2: National reports).

Step 2, gathering background information and analysis, the project collected and analyzed much of the data and used secondary data, where necessary, to address ecosystem issues related to the pelagic fishery.

Step 3, setting objectives, involves identifying high level policy goals, broad objectives for the fishery, priority issues, operational objectives, indicators and performance measures, monitoring review and performance evaluation. The tool chosen to address this step was the ESD reporting framework for Australian fisheries which is discussed in detail later.

Steps 4-8, rules, implementation and enforcement, monitoring and review are still required to complete the process. Consultation with stakeholders occurred at the national level (national workshops) and the regional level (Ecosystem Modelling Working Group (EMWG) meetings and scientific workshops).

OVERVIEW OF THE NATIONAL ESD REPORTING FRAMEWORK

The national ESD reporting framework for Australian fisheries (Fletcher *et al.* 2002 and Fletcher *et al.* 2005) is defined as ‘using, conserving, and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’. It is used by the project to (1) identify ecosystem risk/issue using generic component trees; (2) prioritize these issues using risk analysis, and (3) develop performance reports on issues rated moderate to extreme risk.

Identification of risk/issue using generic component trees

Scope

The scope of the framework is “the contribution of the fishery to sustainable development, where the fishery is the legislative entity as defined by the management agency” (Fletcher *et al.* 2005:178). It helps to draw the boundary of what should be included in an assessment. The impacts of other fisheries are not ignored, they are only considered in terms of their impacts on the ability of the fishery to meet agreed objectives.

Identifying issues using generic component trees

The method uses generic component trees to help participants identify the main issues or risks associated with a specific fishery (Fletcher *et al.* 2002). The fishery is first broken down into eight components grouped within three main

categories related to fisheries – contribution to ecological well-being, contribution to human well-being, and ability to achieve (Figure 2).

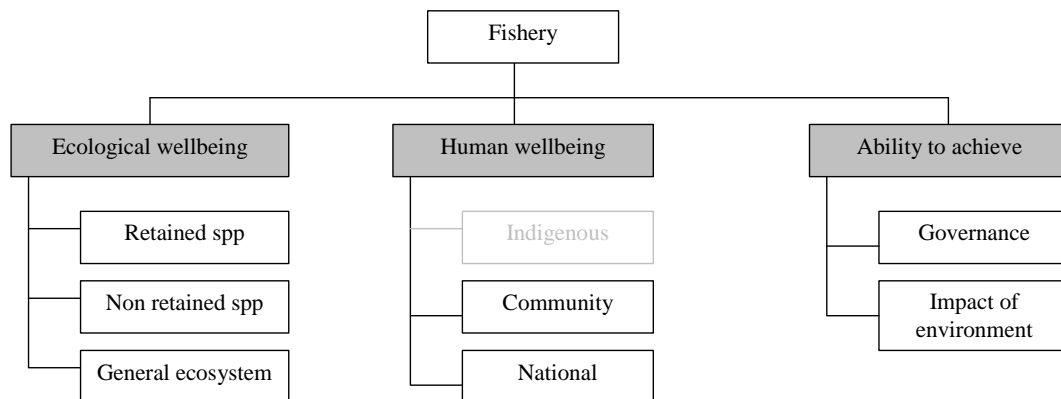


Figure 2: A diagrammatic representation of the eight major components of ESD for fisheries

Each component is further ‘deconstructed’ into more detailed sub-components. The Australian framework provides the starting-point on common themes; however, where necessary sub-components and sub-sub-components are added. In this case, the outline in Figure 2 is used for the pelagic fishery in the LAPE area, except indigenous well-being which is not applicable. The seven major components of sustainable development cover the ecological, social, economic, and institutional issues to allow a full assessment of the sustainability of the pelagic fishery (Fletcher *et al.* 2005:177, Fletcher *et al.* 2002:29).

Category: Contribution of the fishery to ecological well-being

Components:

1. *Retained species*: what is the impact of the fishery on the species that the fishery wants to capture?
Objective: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yield
2. *Non-retained species*: what is the impact of the fishery on species that are caught or directly impacted by the fishery but never kept or used?
Objective: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically viable level
3. *General ecosystem*: what are the potential indirect and more general environmental impacts of fishing – including effects on the habitat and trophic dynamics?

Objective: To manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes

Category: Contribution of the fishery to human well-being

Components:

4. *Community well-being*: are there local communities that are dependent on or affected by the fishery and are they supportive of, or negative about, its operation?

Objective: To contribute to community, regional well being, and cultural needs

5. *Social and economic well-being*: how does the fishery contributes to the demands of consumers, the need for fishers and associated industries to earn income and generate economic returns at the national level?

Objective: To contribute to national well-being, lifestyle, and cultural needs

Category: Factors affecting the ability of the fishery to contribute, ability to achieve

Components:

6. *Governance arrangements*: does the fishery have sufficient management processes and arrangements in place to enable an adequate level of performance?

Objective: Ensure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate peremptory and remedial actions

7. *Impact of the environment on the fishery*: are there issues that may reduce or improve performance of the fishery that are outside the direct control of the management agency/industry?

Prioritization of the issues

Identified issues are then prioritized using qualitative risk assessment methods (based on the Australian standard AS/NZS 4360 1999, Fletcher *et al.* 2002) to determine the appropriate level of management response. The risk assessment involves the examination of potential consequences for each issue/risk and the likelihood that it may occur from the activities of the fishery. A risk value is calculated as consequence (impact) * likelihood. Issues are categorized, according to their overall risk scores, as N-negligible (0), L-low (1-6), M-moderate (7-12), H-high (13-18), and E-extreme (>18).

Performance Reports

Only issues of sufficient risk (M-moderate, H-high, and E-extreme) or those requiring specific management actions need a full performance report completed. Performance reports are developed according to the following heading and description:

1. Operational Objective (with justification): *What are you trying to achieve and why?*
2. Indicator: What are you going to use to measure performance?
3. Performance Measure/Limit (with justification): What levels define acceptable and unacceptable performance and why?
4. Data Requirements/Availability: What monitoring programs are needed?
5. Evaluation: What is the current performance of the fishery for this issue?
6. Robustness: How robust is the indicator and/or the performance measure in assessing performance against the objective?
7. Fisheries Management Response:
 - 7.1. Current: What are the management actions currently being used to achieve acceptable performance?
 - 7.2. Future: What extra management is to be introduced?
 - 7.3. Actions if Performance Limit is exceeded: What will happen if the indicator suggests performance is not acceptable?
8. Comments and Action: Summarize what actions will happen in the coming years
9. External Drivers: What factors outside of the fisheries control may affect performance against the objective?

METHOD

Preliminary activities

At the second Scientific Workshop and Steering Committee Meeting (Meeting Report No. 3) and the second meeting of the Ecosystem Modelling Working Group (Field Document No. 6) participants were introduced to the need for EAF in the LAPE project and using the ESD framework to unpack relevant issues that should be included in high level policy goals for the pelagic fishery. At the third Scientific Workshop (Meeting report No. 4) participants discussed broad ecosystem issues and articulated the goal and broad objectives for the pelagic ecosystem in the LAPE area. Participants also

discussed national workshops including logistics and stakeholder participation.

Issue identification: National workshops

EAF management workshops, using the ESD framework, were conducted in participating LAPE countries and Trinidad and Tobago between March and August 2007. The aim was to introduce and demonstrate the ESD framework as a tool to identify and prioritize ecosystem issues, train Fisheries Officers to apply this tool, and gather information on issues related to the pelagic fishery in order to identify potential issues for policy exploration using Ecopath with Ecosim (EwE) Modelling.

The ESD framework was reviewed and tested with assistance from the Barbados Fisheries Division and fishers and changes incorporated into the workshop strategy. The main finding of this pilot was the need to simplify the framework to engage non-technical stakeholders, especially fishers. An EAF management workbook (Appendix 2) was developed (adapted from Fletcher *et al.* 2002) to simplify the generic component trees and risk assessment method. This workbook was distributed as a training guide. Consequence and likelihood tables, used for risk assessment, were further simplified (Table 1). Detailed consequence tables outlined by the framework (Fletcher *et al.* 2002) were not used, e.g. ecological well-being, information to rank consequences were not available. Instead, basic ranks for consequence and likelihood tables were used.

Table 1: Consequence and likelihood definitions used during the prioritization process

Consequences definitions	
Level	General impact
0 - Negligible	Insignificant
1 - Minor	Minimal
2 - Moderate	Maximum
3 - Severe	Widespread
4 - Major	Serious long-term impact
5 - Catastrophic	Irreversible damage or loss
Likelihood definitions	
Level	Description
1 - remote	Not likely to occur but not impossible
2 - rare	May occur in exceptional circumstances
3 - unlikely	Uncommon, but has been known to occur
4 - possible	Could occur
5 - occasional	May occur
6 - likely	Expected to occur

National workshops (Figure 3) were held over 1.5 or 2 days. Before each national workshop, existing management plans and other relevant documents reviewed to understand the pelagic fishery and landing site(s) visited to discuss with fishers their concerns regarding the pelagic fishery. Information

generated from field visits was incorporated into the workshop discussions, wherever possible. Workshops, for the most part, followed the same agenda (Appendix 1) except in Barbados and St. Vincent and the Grenadines where the performance report was not examined. Presentations prefaced each workshop task to ensure participants understood definitions and basic principles for activities that followed.



Figure 3: EAF management workshop in Grenada. Participants included members of the Fisheries Division, fish markets, Southern Fishermen’s Association, Melville Street Fishermen’s Association, Coast Guard, Ministry of Health and the Environment, fishers, fish vendors, and processors. Photo: J. St. Louis 2007

The major task on Day one was to complete generic component trees for the pelagic fishery. At the beginning of this task the pelagic fishery was defined, which includes vessel types, gear types, target species (primary, secondary, by-catch), and non-retained species. For each item outlined in the generic component tree, the consultant (also facilitator) asked a series of questions: Is this an issue? If yes, describe the issue? What is the cause? What is the scope? (What is the extent of the problem? e.g. did it affect all or a few fishers). If not an issue, the question was asked: Why is it not an issue? If a participant raised an issue and others thought it was not significant, the group was given time to discuss and decide if it should be recorded as an issue. To gain full participation in identifying and discussing the issues the consultant facilitated and recorded all issues identified during workshops.

On Day two, risk assessment, participants were given a second chance to review issues identified on Day one, make amendments where necessary, and decide whether it should be included as an issue. Then they were asked to assign consequence and likelihood values (Table 1); these values were based

on consensus. If participants had problems selecting a value, they were allowed to discuss further and then agree on a value. In the afternoon, the development of performance reports was introduced and participants selected an issue/theme for which they would prepare a sample performance report. Often, due to time constraints, participants were not able to complete a report, as more time was needed to think about the issue and make suggestions for data requirement/availability and management strategies.

After each workshop, preliminary reports were prepared and distributed to LAPE contact individuals in each country for review and comments. Late, completed national reports including a summary of the findings, a list of issues identified and prioritized, and the issues restructured into generic component tree format were prepared (Part 2: National reports). Information, both tabular and generic component trees, were collated and analyzed to determine common issues/themes amongst LAPE participating countries.

Management recommendations

Information generated by the LAPE project and results from EwE forecasts (Mohammed et al. 2007b) provided background information and analysis to advice management. Outlined below are steps taken by the project to develop management recommendations.

1. **Identify issues for policy exploration:** Issues for policy exploration using EwE and non EwE were identified after in-depth review of the main priority issues common amongst countries and discussions at the fourth and fifth EMWG meetings (Field Document No. 10, Field Document No. 11).
2. **Conduct assessment:** This project focused on conducting four EwE assessments to provide scientific results to inform management and planning. Policy exploration using Ecosim serve to identify the consequences of various management options and examine 'what if' scenarios that would identify a suite of management choices. These choices and associated uncertainties will be presented to managers; however, the ultimate management choice rests with them. Non-EwE policy exploration includes other assessments or suggestions from the EMWG.
3. **Complete performance report:** Results of EwE assessments allowed the formulation of detailed operational objective to begin drafting performance reports. The final outputs were management recommendations for pelagic resources in the LAPE area.

ISSUE IDENTIFICATION

Workshop participants

In total, nine EAF management workshops were conducted in eight countries and 134 individuals participated in identifying and prioritizing on average 123 issues per workshop (Figure 4). The number of participants per country ranged from 5 to 21 and included fisheries officers/staff (49 percent of total participants), fishers/cooperative members (32 percent), and other agencies such as Coast Guard, Cooperative Department, Ministry of Health (19 percent).

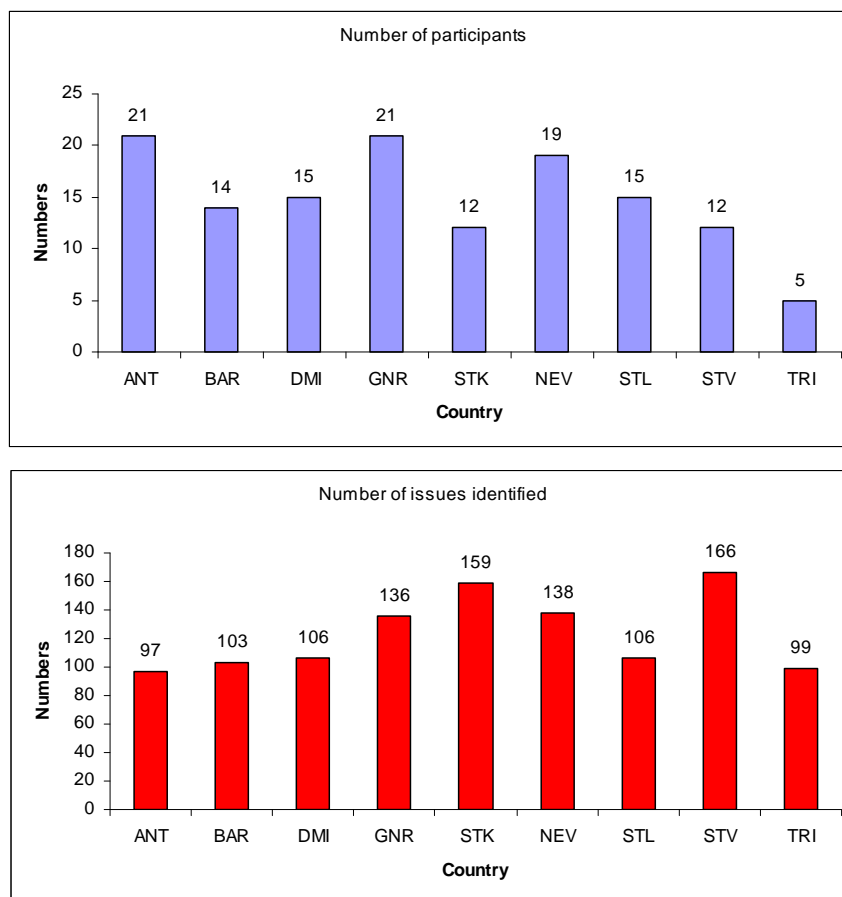


Figure 4: Numbers of participants and issues identified in each country. Only Fisheries staff attended the workshop in Trinidad and no meeting was held in Tobago.

Additions to the generic component trees

To ensure the generic component trees reflect the pelagic fishery in the LAPE area 12 sub-sub components were added (Table 2). These additions were based on discussions at the second Scientific Workshop and national workshops. Placing these additional sub-sub-components on the appropriate branch of the tree proved challenging at times, as components in the structured generic component tree did not fit exactly in one area but shared elements of other parts of the tree. For example infrastructure, if the issue relates to upgrading or building then it could be argued that it could be

placed under community well-being. However, if the issue relates to daily management and maintenance, then it could be considered a governance issue. Likewise food security, this issue could be considered a human well-being issue as it relates to achieving economic benefits or impacts of other drivers as it relates to external programmes and agencies involved in food security activities with fisheries as a subset. The additional sub-components are listed in Table 2.

Table 2: Additions of sub-sub-component to the generic component trees

Component	Sub-component - sub-sub-component additions to the trees
Community well-being	Fishery/Industry - Infrastructure
National socio-economic	Economic - Markets
Governance	Management - Data system
	Legal framework - Illegal fishing
	Consultation - Co management arrangement
	Industry - Fish Aggregating Devices (FADs)
	Industry - Private sector
	Industry - Expansion/Development
	NGO's - Collective Action (Fishermen organization)
Impacts of other drivers	Social - Food security
	Social - Poverty alleviation
	Economic - Fuel prices

ISSUES IDENTIFIED AND PRIORITIZED

Issues identified during national workshop did not necessarily represent all workshop participants and at times the information was based on perception, in the absence of scientific information. All countries combined, on average ability to achieve accounted for $54 \pm 8\%$ (mean \pm standard deviation) of the issues identified, followed by ecological well-being at $27 \pm 6\%$, and human well-being $19 \pm 3\%$ (Table 3). Average prioritization values of all countries combined resulted in 56% scored extreme, 20% high, 13% moderate, 8% low, and 3% negligible.

Table 3: Percentage of issues identified within each component by country

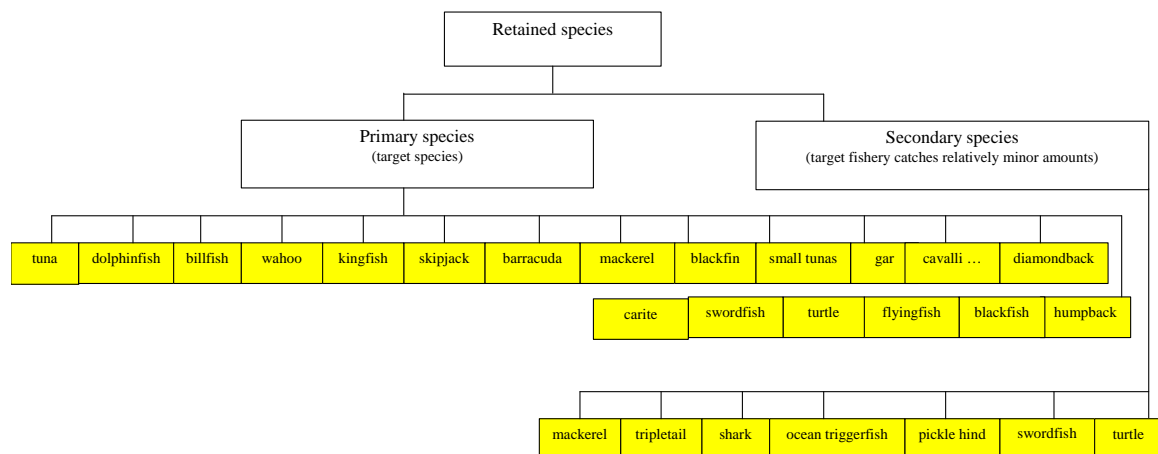
Issue	Country (%)									Mean	Stdev
	ANT	BAR	DMI	GNR	STK	NEV	STL	STV	TRI		
Ecological well being											
Retained spp	28	21	14	26	28	29	19	28	33	25	6
Non retained spp	1	0	0	0	0	0	0	0	0	0	0
General ecosystem	0	2	2	1	3	3	3	3	4	2	1
Human well being											
Community well being	14	10	10	8	5	7	12	10	19	11	4
National well being	5	6	8	9	12	11	7	9	6	8	2
Ability to Achieve											
Governance	41	54	56	44	39	38	53	41	30	44	9
External impacts	11	7	10	12	13	12	6	9	8	10	2

A table of major issues by countries was generated to determine the commonalities and difference amongst countries (Appendix 3). However, comparing countries is not recommended because there are differences in pelagic fishing activities, fleet capacity, landings and species composition (Mahon and McConney 2004, Mohammed *et al.* 2007a) hence only general findings are presented.

Below is a summary of major issues by component. Generic component tree by component is first presented followed by major issue(s). Filled boxes indicate that at least one country considered this an issue. Where five or more countries identified an issue as moderate, high, or extreme, it was classified as a major issue for further investigation or possible policy exploration. Part two of this report gives a complete list of issues and generic component trees by country. Local names of fish species and associated common and scientific names are listed in Appendix 4.

Ecological well-being

Retained species (primary and secondary):

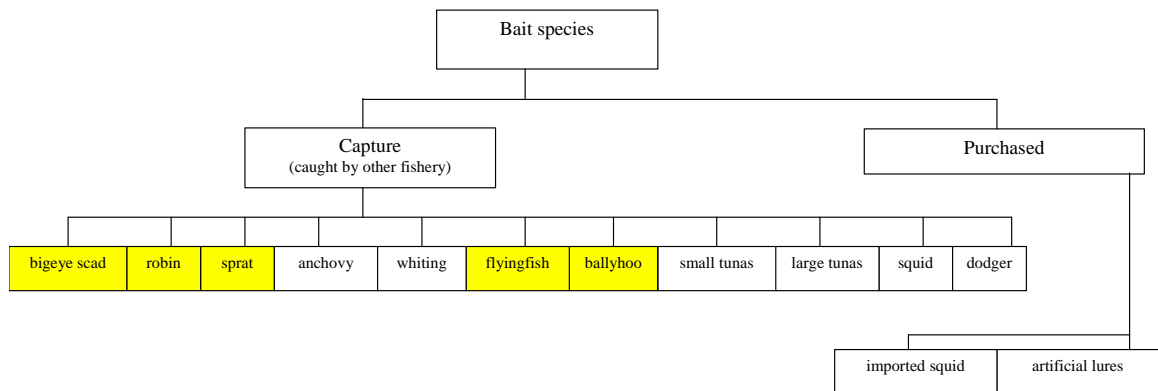


Note: Highlighted boxes indicate related to distribution, abundance, population structure and discards.

Major issue

1. Countries need to assess distribution, population structure, and abundance of retained species such as tuna (*Thunnus albacares*, *T. obesus*, *T. alalunga*), dolphinfish (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), kingfish (*Scomberomorus cavalla*) and blackfin tuna (*Thunnus atlanticus*). It is difficult to draw any conclusion on relative abundance of pelagic species in the LAPE area as information on abundance was based on stakeholders' perception of recent landings (Figure 5).

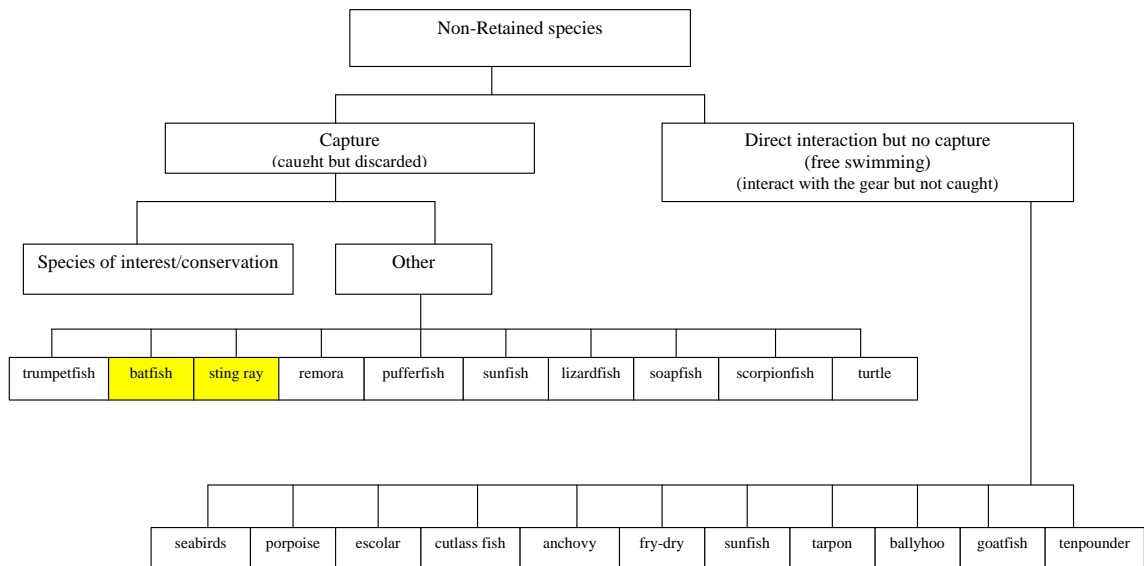
Retained species (bait fishery)



Major issue

- Overall there is a decline in the landings of species used as bait. Such species include flyingfish (*Hirundichthys* sp.), ballahoo (*Hemiramphus* sp.), scads (*Decapterus* sp.), and sprat (*Harengula* sp.). Of the species used as bait (or bait species), fishers observed a decline in landings (Figure 6). Other problems include the competing use of species for food or bait, demand for live bait locally and regionally, the need to assess the status of the bait fishery, and draft/enforce regulations to protect these species.

Non-retained species:

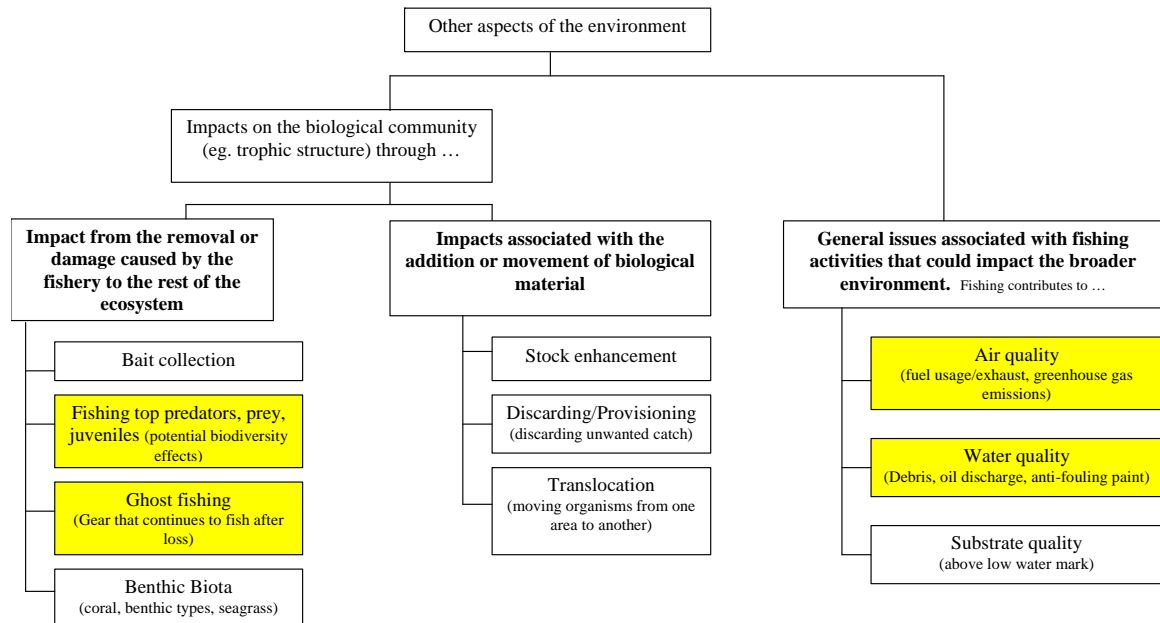


Major issue

- More needs to be done to assess the impact of fishing on non-retained species. Of the non-retained species caught and thrown back participants were concerned about batfish (*Dactylopterus volitans*) and sting ray (*Dasyatis americana*). There was limited information available

on the impact of fishing on the non-retained species that interact with the gear but are not caught.

General ecosystem:

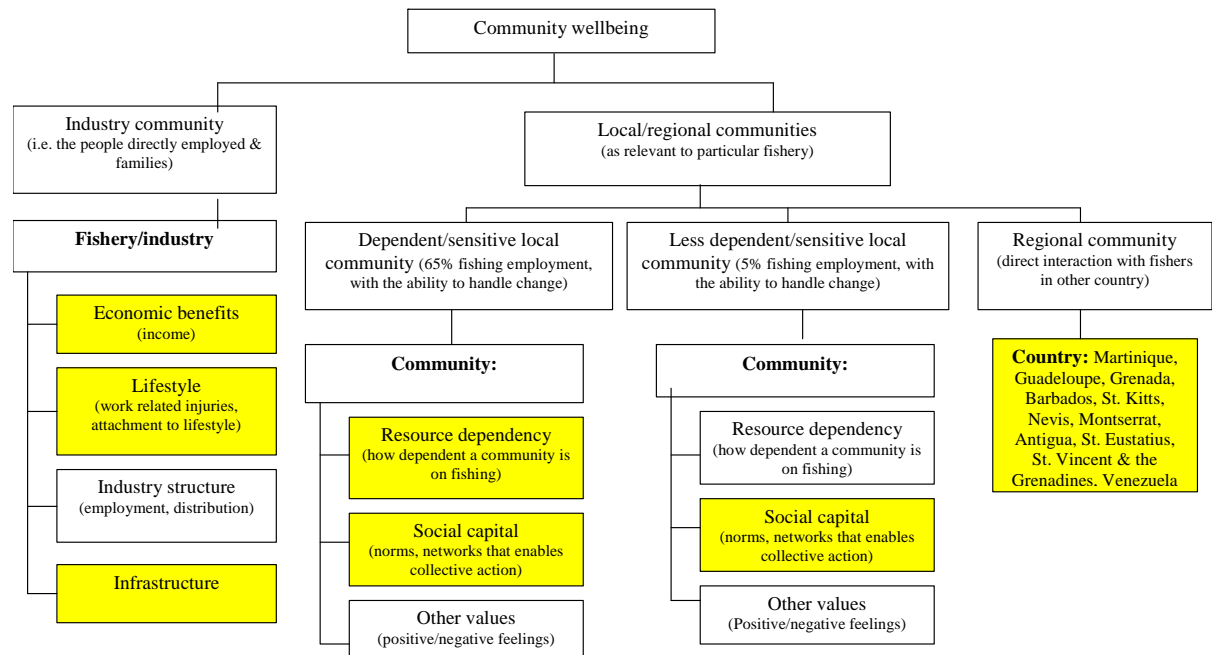


Major issue

4. Countries need to facilitate the proper disposal of used oil and containers. This activity is not part of the mandate of the FD/DoF; hence, collaboration with other agencies is needed.

Human well-being

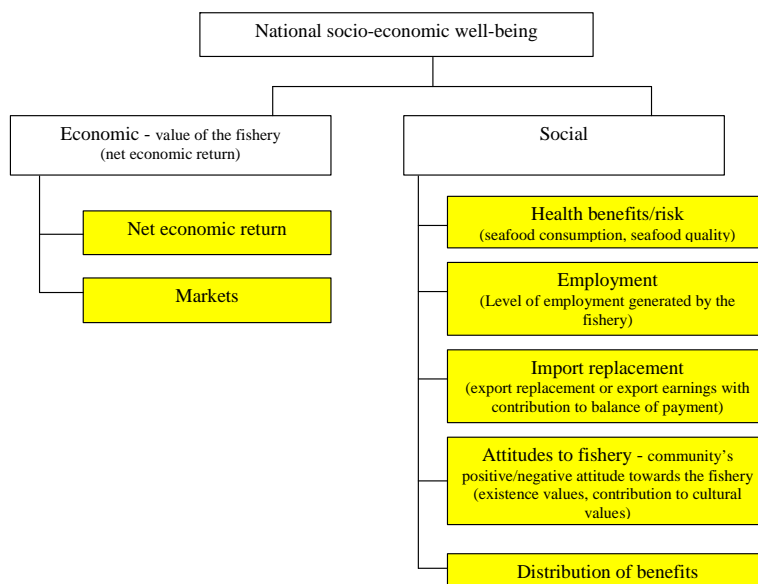
Community well-being:



Major issues

5. High fuel prices and rising costs of equipment and spare parts, have increased operating expenses which has resulted in an upward pressure on the unit price of fish.
6. To improve economic benefits from the fishery, fishers need to learn financial/money management.
7. Fishers' individualism, independent attitude, and lack of trust hinder collective action, participation, and consultation.
8. Community and fishers are willing to organize around mutual or business benefits but not as a group. They are also willing to organize when there is a crisis.
9. Infrastructure upgrades (bathroom, water, security, storage, etc.) are needed.

Social and economic well-being:

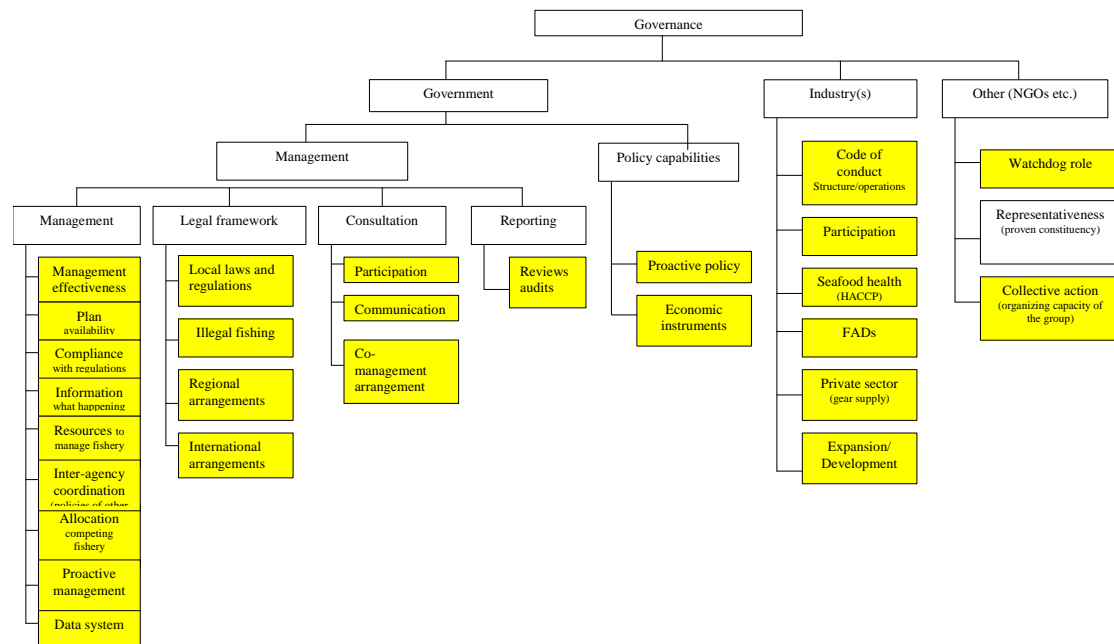


Major issues

10. Many FD/DoF are not able to value the fishery due to the lack of data.
11. Many countries need to develop export markets (particularly EU markets) for tuna and billfish. Countries need to develop fish quality standards and regulations to meet the requirements for these new markets.
12. Society needs to have a more positive view towards fishing, as many think the job is demeaning.

Ability to achieve:

Governance arrangements:

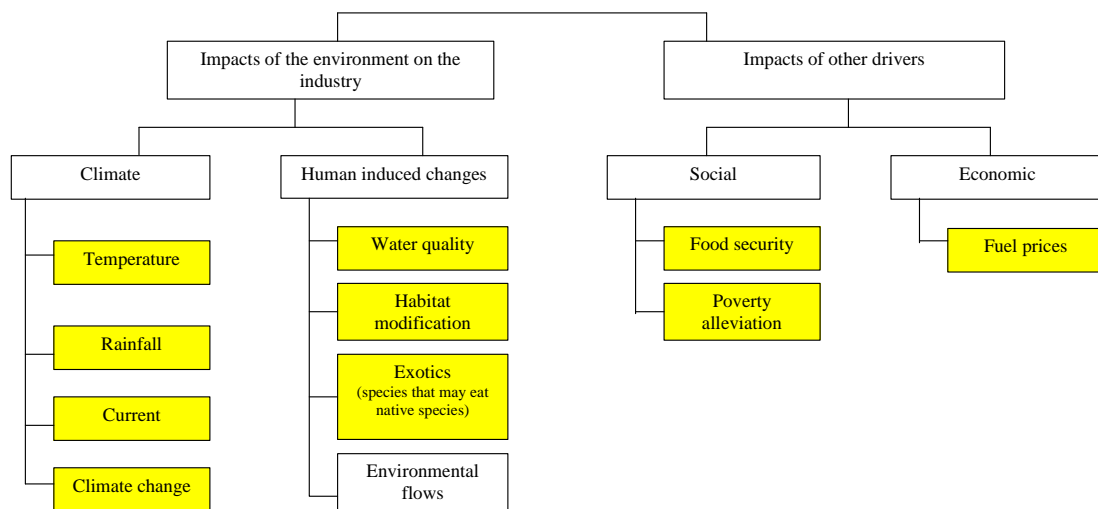


Major issues

13. Management of the pelagic fishery needs to improve due to limited implementation of plans, lack of adequate legislation, lack of resources, difficulties with overlapping jurisdiction and mandate, and policies and management not proactive.
14. In regard to information, many countries need to improve or lack the capacity to collect, organize, and disseminate information.
15. Need to revise/update data collection systems as many countries have limited biological, social, and economic data, little/no analysis of existing data, aggregated data, and changes in fishing practices have not been incorporated in the data collection strategy (See also Barnwell, 2007; Mohammed et al. 2007a).
16. Many laws and regulations need to be revised/updated, in some instances regulations regarding pelagic fishing need to be drafted.
17. There are problems with IUU fishing activities as many countries have limited/nil enforcement and resources to monitor this activity (Figure 7).
18. Need to improve the level of stakeholder participation in matters concerning the industry. Presently, stakeholders do not attend meetings because they feel their concerns are not heard or acted on.
19. Communication among fishers, FD/DoF, and government needs to be more effective.

20. More needs to be done to provide stakeholders with information on the industry. They need feedback on data collection activities, resources assessment, and activities of the FD/DoF.
21. The industry needs to improve seafood quality standards (maintain quality and training standards) and FAD management (proper fishing techniques, legislation).
22. NGOs often do not take on “watchdog” roles as there is no mandate or obligations. The problem is compounded by low stakeholder participation and poor communication.
23. Need to strengthen fishermen cooperative/association and build collective action. Problems faced by these cooperatives/associations are poor interpersonal relationship, fishers not able to attend to the responsibility of the cooperative, non-compliance attitude, lack of trust, and the lack of cooperation/participation in meetings and management planning. The FD/DoF needs assistance from the Cooperative Department and other agencies to strengthen fishermen cooperatives.

Impact of the environment on the fishery:



Major issue

24. Countries need to monitor human induced changes to protect the marine environment. Untreated sewage, domestic waste, and chemicals affect water quality, while coastal development affects mangroves, seagrass bed, and coral reefs. While these activities do not directly influence large pelagic species they affect coastal pelagic species such as those used as bait.

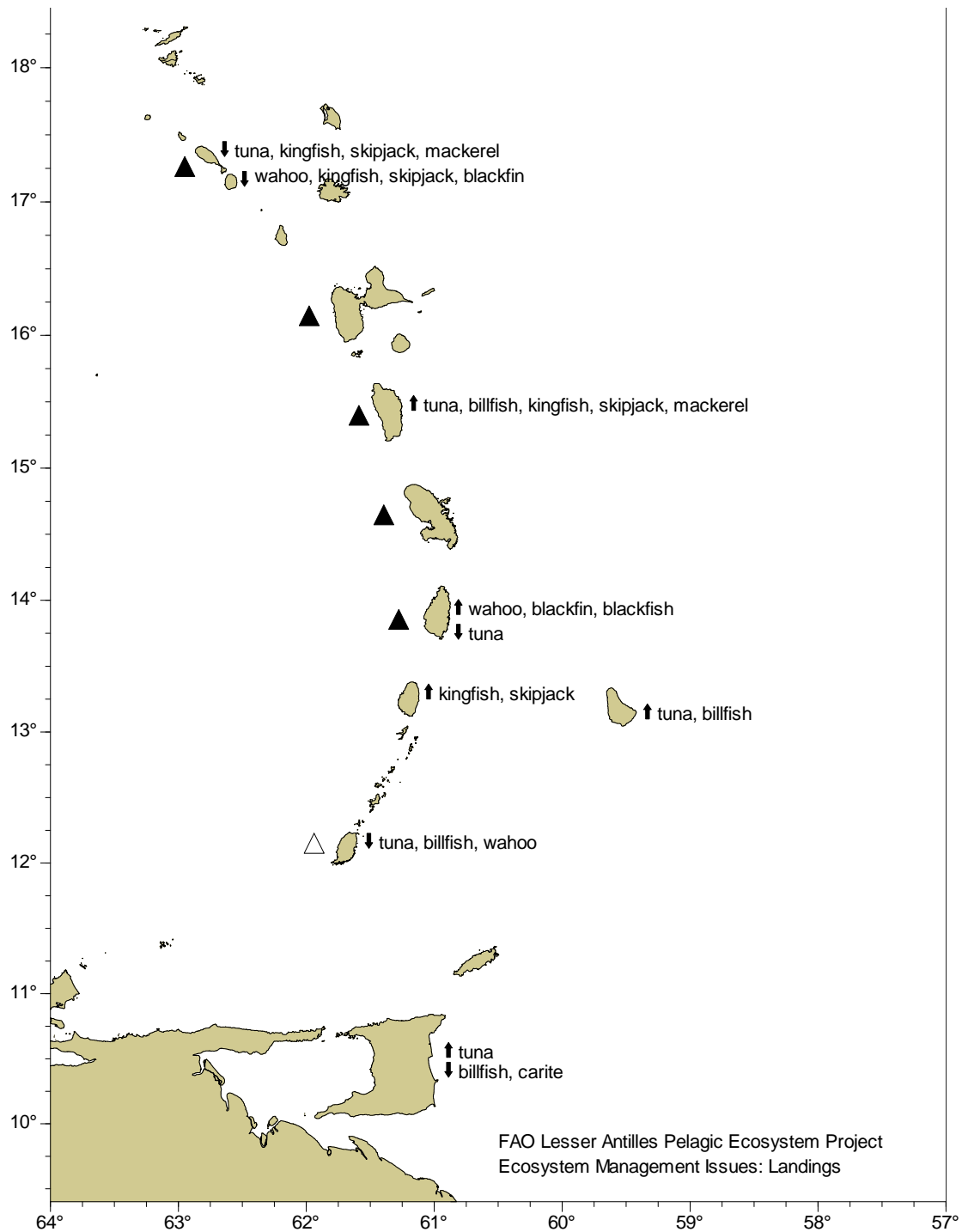


Figure 5: Map showing perception of stakeholders regarding recent trends of pelagic landings in the LAPE area. Arrows depicts increase and decrease in landings based on local knowledge. Triangles depict FAD activities (shaded triangles means extensive FAD use, and no-fill triangles mean limited use). From the information presented it is difficult to make any conclusion on relative abundance in the LAPE area. (Data source: Appendix 3)

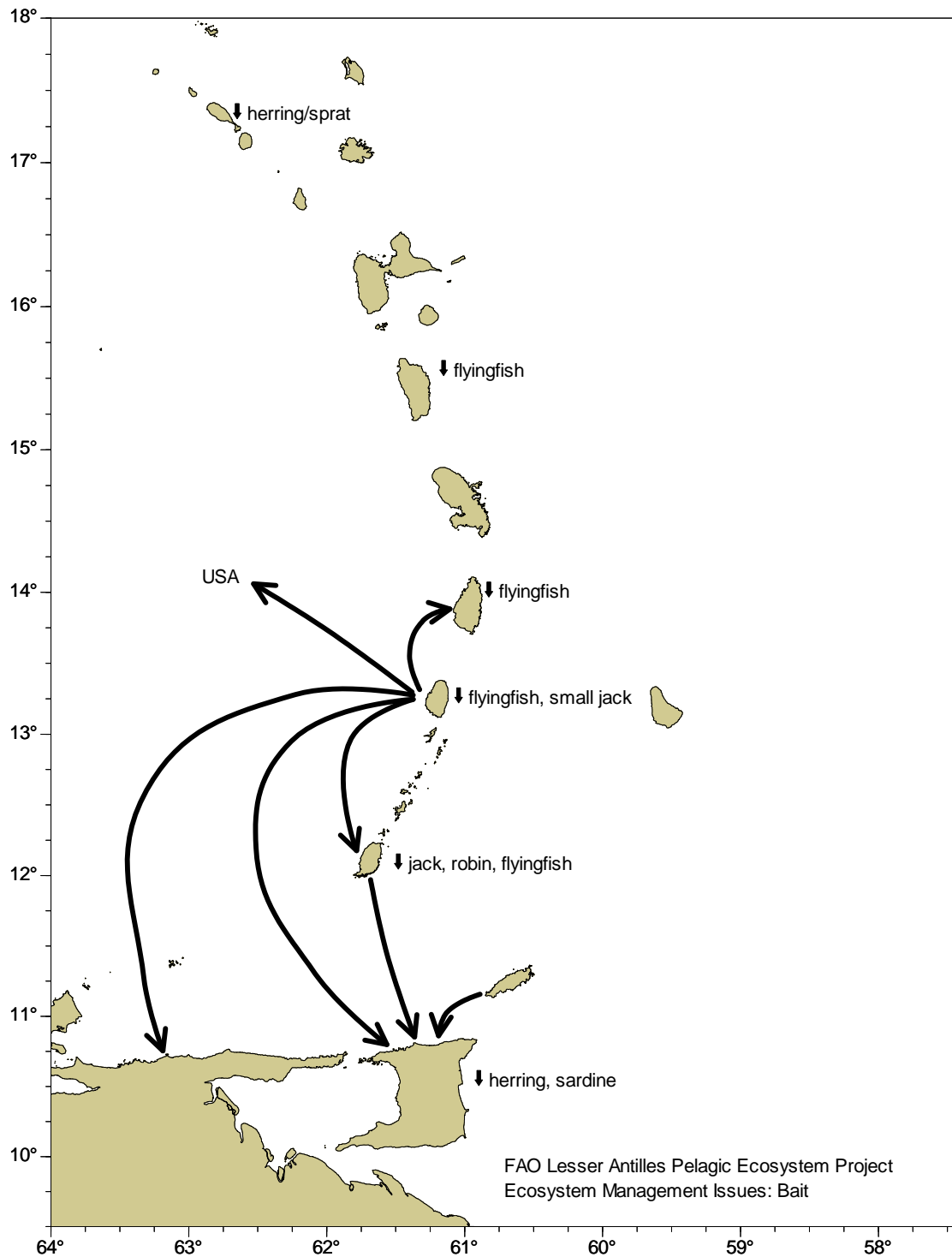


Figure 6: The large pelagic fishery is dependent on the supply of bait. The expansion of this fishery in southern countries (Trinidad and Grenada) has created an increased demand for live bait coupled with an overall decline in landings and individual fish size. In the absence of locally caught bait fishers have either been unable to fish, purchased imported frozen squid, or travelled to other countries (St. Vincent and the Grenadines, Grenada, and Tobago) to purchase live bait. Large arrows depict the exports of live scad. Small arrows pointing downwards represent a decline in perceived landings of species used as bait. (Data source: Appendix 3)

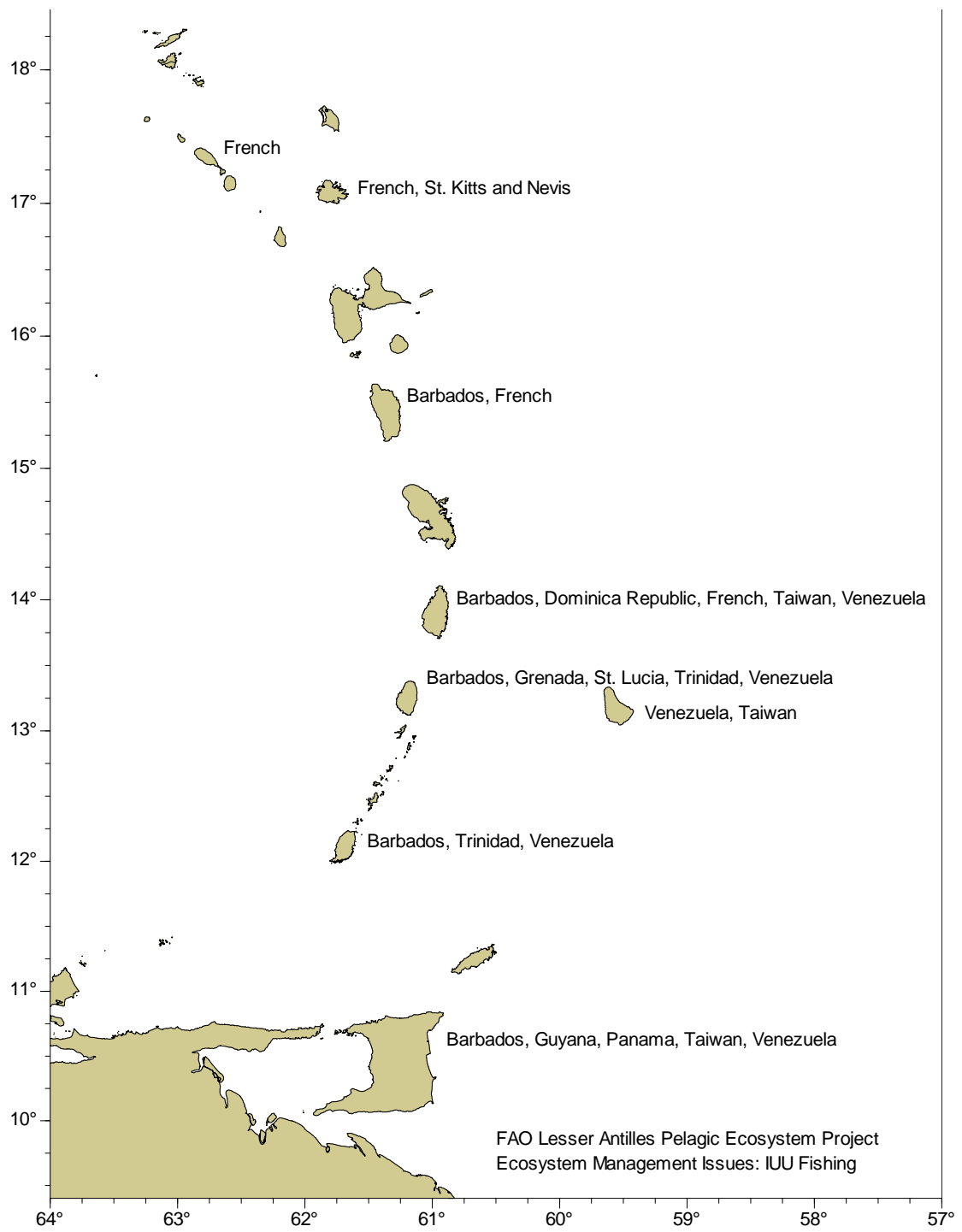


Figure 7: Map showing the perception of participants regarding IUU fishing activities in the LAPE area (Data source: Appendix 3).

LINKS AMONG CATEGORIES

Discussions during national workshops highlight the impact of an issue on multiple categories. For example, uncertainty of pelagic stock status and the impact of the bait fishery on the large pelagic fishery, both ecological well-being issues could threaten human well-being as well as ability to achieve (Table 4). Hence, monitoring these ecological issues could reduce threats to industry and local community resource dependency (human well-being) and improve scientific-base advice for management (ability to achieve). Other examples, lifestyle and social capital could have an impact on ecological well-being and ability to achieve, while ineffective management, illegal, unreported, and unregulated (IUU) fishing, interagency coordination, expansion/ development of the fishery, and fuel prices could affect ecological and human well-being.

Table 4: Impact of an issue on other categories and components

Issue	Impact on category and component		
	Ecological well-being	Human well-being	Ability to Achieve
Ecological well-being			
Uncertainty of stock status; Potential to overexploit		Threats to industry and local community resource dependency	Ability to provide scientific-base advice for management
Impact of bait fishery on the pelagic fishery		Threat to food security (fish availability and price)	Ability to monitor and control the bait fishery
Human well-being			
Lifestyle Social capital	Affects fishing effort		Affects fishers taking ownership (stewardship) of fishing infrastructure, participation in fisheries management (co-management), and the strength of cooperatives
Ability to Achieve			
Governance Ineffective management	Lack of monitoring and assessment of important species Failure to control overfishing	Poor consultation with fishers and community Attitude towards monitor and control Ability to impose controls on fishers	

Issue	Impact on category and component		
	Ecological well-being	Human well-being	Ability to Achieve
IUU fishing	Problems with assessment as catch from the LAPE area landed in other country	Customary practices based on social relations that may differ from legal practices	
Inter-agency coordination	MCS of climate, water quality, and human induced activities in coastal areas	Threats to community dependency on resources. Ability to coordinate activities and policies of other agencies	
Expansion/ development	Uncertainty of stock status makes it difficult to determine the level of expansion	Requires lifestyle changes and infrastructure development	
Impact of other driver Fuel prices	Affects the number of fishing trips	Goods and services to/by the industry will be affected (production cost, price of fish, and equipment, ability to purchase fish)	

COMMENTS ON THE ESD FRAMEWORK

At the end of each national workshop, participants were asked to provide feedback on the framework. Comments on the strengths and weaknesses are presented below.

Strengths

- The workshop could be used to update/revise the fisheries management plan.
- The workshop is challenging and informative.
- Participants appreciate the participatory nature of the process and the diverse stakeholder group.
- Participants have a better appreciation of the resource and what the FD/DoF is trying to accomplish. They are also beginning to understand their role in fisheries management.
- The presentations and process are simple, hence stakeholders were able to follow.
- Ground rules are important to the process.
- The process is logical as it sets out in sequence how things should be done.
- It is a useful way to identify the issues.
- Revision of issues during prioritization (day 2) allowed for further clarification of the issues.

- The ecosystem approach allows participants to view the entire range of issues affecting the pelagic fishery.
- Participation and information exchange allow stakeholders to learn from each other.
- The process allows for transparency as stakeholders are involved in identifying problems and suggesting solutions.

Weaknesses

- The process would have been far more beneficial if more stakeholder groups (particularly fishers) attended the workshop.
- Consideration should be given to the timing of the workshop; it should be done when the pelagic fishery is not in season.
- There is not enough time to discuss the issues.
- Need more time to think through the prioritization, according to one participant “if we had time to think more on the prioritization we might change our minds”.
- Some participants are uncomfortable with the prioritization, especially fishers.
- Some participants would like the consequence/impact categories reduced from six to four.
- Some participants would like to see politicians and top managers involved in the process. On the other hand, many top managers did not attend the meeting fearing their presence would inhibit stakeholder participation.
- The process is a bit technical; further simplification is needed to reach more fishers. Need to use the language of fishers in the framework, especially in the impact and likelihood tables.
- The process is open to the whims of managers, i.e. if two issues have the same priority, it is left to the manager to decide which will be addressed.
- Participants are cautious about identifying and prioritizing governance issues. Consequently, important issues discussed are not recorded.
- With a highly diverse group, the views of some stakeholders are overruled by the majority, e.g. non-boat owners may consider an issue high priority; however, others consider it low.
- Facilitating multi-stakeholder workshops has its challenges. The main problem is to engage participants at different knowledge levels, for example, fisheries officers with technical knowledge and processors, boat owners, fishers, and vendors with local knowledge of fishing and the industry.

MANAGEMENT RECOMMENDATIONS

MANAGEMENT GOAL AND BROAD OBJECTIVES

Two options for articulating the management goal for the pelagic ecosystem of the LAPE area were proposed:

Option 1:

Optimize the utilization of pelagic resources in the LAPE area within the context of maximizing economic, social, and employment opportunities and benefits, and maintaining the ecosystem integrity, while taking into account the interaction with other sectors and based on the precautionary approach.

Option 2:

Optimization of social and economic benefits from the pelagic resources in the LAPE area while ensuring its sustainability, and maintaining ecosystem integrity based on the precautionary approach.

Preliminary core objectives need to be discussed further to ensure consistency between the goal, broad objectives, and operational objectives. Some objectives discussed under each category were:

Ecological well being:

Promote sustainable development of the pelagic fishery

Reduce the catch of undersize fish (target species)

Balance market demand (consumption versus bait)

Human well being:

Maintain and improve fisher net income

Ability to achieve:

Increase monitoring, control, and surveillance

Establish management linkages with international regulatory bodies to access information for management

Develop mitigation measures for near shore developments (pollution, development, deforestation)

POLICY EXPLORATION

At the third EMWG, the group discussed major issues common among countries and produced questions for possible policy exploration (Table 5). From the list of issues and questions five were selected for further

exploration: (1) an expanding large pelagic fishery and its implications for species used as bait, (2) the livelihood of fishing communities, (3) Capacity building in communities, (4) data collection systems, and (5) food quality standards. These issues were further divided into policy exploration using EwE or non-EwE.

Table 5: Questions for possible policy exploration based on common issues identified at national workshops. Shaded boxes indicate issues selected for further discussion and exploration.

Component	Major issue	Questions for policy exploration
Ecological well being Retained spp.	Need to assess abundance distribution, and population structure	How can information on distribution, population structure, and abundance be utilized for fisheries management? What can the available scientific data tell us about distribution, population structure, abundance and species interaction? What are ecologically viable stock levels (target and bait fishery)?
	Decline in the landings of species used as bait.	What is the present status of the small pelagics (bait species)? What is the extent of the small pelagic and large pelagic interaction (social, ecological, and economic)? What if fishing pressure (vessels, FADs) on the large pelagic fishery increases?
Non retained species	Needs to assess the impact of fishing on non retained species	What non retained mortality is occurring? What measures can be put in place to reduce incidental catch rates of these species? How can information on distribution, population structures, species interactions, and abundance be utilized for fisheries management in the context of protecting the stocks of non retained species? Should we explore options for utilization of non retained species?
General ecosystem	Need to facilitate the proper disposal of used oil and containers	What happens if the nursery areas are affected by poor water quality?
Human well being Community	High fuel prices and its effect on the price of fishing equipment and fish	What if fuel prices increase further? What impact will an increase in the price of fish to the consumer have on market dynamics? What if the demand for fish to feed tourist increased, what would be the impact on the price of fish and the ability of locals to purchase at higher prices?
	Improve economic benefits from the fishery	What is the value of maintaining existing fishing communities' structures within the wider social and economic fabric of the country? What happens if other major employment sectors of the economy crashes/booms?
	Community and fishers	What types of capacity building and/or incentives

Component	Major issue	Questions for policy exploration
	willingness to organize	are required to improve collective action?
	Infrastructure upgrades	What would be the effect if fishers are not able to participate meaningfully in the management of fishing infrastructure?
National	FD/DoF are not able to value the fishery	<p>What is the true value of the pelagic fishery (social, economic)?</p> <p>What is the value of non-consumptive use of the resources (diving, charter boats/sport fishing, whale watching)?</p> <p>What are the social and economic values?</p> <p>What would be the impact of loss of fish from society's diet (social)?</p> <p>What is the value of the consumptive use (value-added, gifts)?</p> <p>What if tourism non-consumptive use increases?</p>
	Need a positive view towards fishing	<p>How can fisherfolk improve their image within the wider population?</p> <p>How can the image of the fishing industry be improved to attract individuals including critical specialists roles e.g. boat repair and building and mechanics?</p>
Ability to achieve Governance	Management of the pelagic fishery needs to improve	<p>Are countries prepared to enforce management actions that displace fishers or have an impact on fisher?</p> <p>How can decision-making draw on existing information (data, local knowledge, technical advice)?</p> <p>What if ICCAT introduces regulations that strictly limit the harvesting of large pelagic species?</p>
	Improve information flow	How can the dissemination of relevant information to stakeholders be improved?
	Data collection	<p>What if countries are unable to continue/expand data collection activities?</p> <p>What important parameters should countries monitor and what data and information are required for management requirements?</p> <p>What types of data are required to continually assess the pelagic fishery?</p> <p>How to collect information on catch rates of non retained species?</p> <p>What can the available scientific data and information tell us about distribution, population structure, species interactions and abundance?</p>
	Revise/update laws and regulations	Do countries have the capability to monitor and control the fishery?
	Problems with IUU fishing activities	What if IUU fishing increases or decreases?
	Improve stakeholder	What can countries do to improve consultation

Component	Major issue	Questions for policy exploration
	participation	(participation, communication)?
	Improve communication	How does existing information get to stakeholders? Type of communication strategy.
	Improve seafood quality standard	What if export market collapses? Which fishery does the export market matters?
Impact of other drivers	Monitor climate and human induced changes	What are the impacts of deforestation/land use practices on the South American continent? What is the impact of sea level rise? What would be the affects of elevated sea water temperature? What is the impact of increased coastal development? What if increase tourism results in further destruction of habitat/nursery areas (mangroves)?

POLICY EXPLORATION USING ECOPATH WITH ECOSIM

Four issues identified for possible policy exploration using Ecopath with Ecosim (EwE) are outlined below. Details of EwE assessment completed are presented in Mohammed *et al.* (2007).

Issue No. 1: The bait fishery

Description of the issue: The large pelagic fisheries of the region are primarily hook and line (longline, trolling, sportfishing) all of which are dependent on bait supplies. The expansion of commercial large pelagic fisheries in the southern part of the region has created an increased demand for bait, with a preference for live bait, if available. Bait species include flyingfish (*Hirundichthys* sp.), ballahoo (*Hemiramphus* sp), scads (*Decapterus* sp) and sprat (*Harengula* sp.). In the absence of locally caught bait, fishers have either been unable to fish or have purchased imported bait supplies (e.g. frozen squid). The demand for bait has put upward pressure on small pelagic fish prices and created scarcity in the food fish supply of the same species. As a result, there are issues concerning ecological impact of the increased bait fishery, the economic impact of increased small pelagic prices and a potential social issue due to potential loss of a low-price source of protein in rural communities (Field Document No. 10:12).

Question: Can the required increase in catches of the small pelagic and flyingfish (bait) fisheries be sustained to meet the demands of an expanding large pelagic fishery?

Model assessment (EwE): Assess the likely impacts of the biomass of bait stocks (flyingfish and small pelagics) and target species (large and regional pelagics) on the resulting catches and the values of the respective fisheries.

Issue No. 2: Trophic linkages between flyingfish and dolphinfish

Description of the issue: Although fisheries tend to concentrate on higher trophic level species, there are numerous cases in which two or more commercially important species are linked by either direct trophic linkages or links mediated through other species. In these cases, the impacts of changes in one fishery may propagate into the catches and/or the biomass of other important commercial species. In the LAPE region there is a note-worthy example in the relation between dolphinfish and flyingfish. Both are already subject to well-developed fisheries. Flyingfish is a particularly important prey of dolphinfish, at least in the southern part of the LAPE. Several other large pelagic groups also prey on flyingfish although none as heavily as dolphinfish. Stakeholder views on the flyingfish fishery were mixed with some still seeing it as a potential expanding fishery while others perceive it as a declining fishery. So, in addition to a scenario for expansion of flyingfish fisheries there is also an interest in estimating if there would be any benefits

to a reduction of effort on the flyingfish fishery. (Field Document No. 10:13-14).

Question: What would be the impacts of increasing effort in the flyingfish fishery on the biomass, catch and value of dolphinfish and other large pelagic species?

Model assessment (EwE): Assess the impact of increased effort targeting dolphinfish on the biomass, catch and value of the flyingfish fishery? This is complicated by the fact that it would simultaneously remove a predator on flyingfish but increase the demand for flyingfish as bait.

Issue No. 3: Impact of cetaceans in the LAPE area on the fishery

Description of the issue: It was noted that most populations of oceanic marine mammals in the region seem to be increasing. This is due to being protected from fishing through most of their ranges and efforts to reduce incidental capture in fishing gear. Cetaceans may impact fisheries by competing with other species in the ecosystem for the same prey, or directly with fisheries for the same target species (Field Document No. 10:14).

Question: What would be the impact of increasing populations of marine mammals on the resources available for fisheries?

Model assessment (EwE): Assess the impact on catches of fish species if new or enlarged fisheries for marine mammals were developed. Consider the impact of 3-5 percent growth rate based on current catches to estimate the impact of consumption by cetaceans on their direct prey, on species that compete for the same prey and on fisheries for both prey and competitor species. The effects of increasing cetacean fisheries should also be considered.

Model output: Locally specific data from the cetacean diet composition study conducted under the LAPE project is insufficient as the basis for a model assessment.

Operational Objective: In the short term, to continue cetacean diet studies to improve data input for EwE modelling.

Issue No. 4: Climate change

Description of the issue: One prediction is that global warming will result in increased run-off from major rivers and hence increase primary productivity in the region.

Question: What would be the likely impact of increasing primary productivity on the biomass of fish available to fisheries in the region?

Model assessment (EwE): Examination of this scenario would include variation of the P/B input of phytoplankton and examination of the impacts on biomass, catch and value at the current effort and at varying levels of

increasing effort. (Estimates of likely increases in primary productivity will need to be obtained from the literature).

POLICY EXPLORATION NOT USING EWE

The non-EwE issues discussed, i.e. those not suitable for exploration solely with EwE, were the bait fishery, community livelihood, capacity building in communities, data collection, and food quality standards. A summary of operational objectives and management recommendations identified in discussions is presented in Table 6.

Table 6: Summary of management recommendations for analysis of non-EwE issues selected for further policy exploration

Issue selected for further exploration	Operational objective	Management recommendation
Ecological well-being		
1. An expanding large pelagic fishery and its implications for species used as bait	Investigate implications for expansion and quality acceptable levels of expansion to mitigate any negative impact	Determine the quantity of bait required to sustain present and projected levels of large pelagic fishing. Review existing policies and where appropriate modify/develop suitable policies to ensure they are in keeping with this objective.
2. Research on the bait fishery	Conduct a baseline study on the bait fishery in the LAPE area including how it is utilized, countries involved, trade distribution channels, quantities harvested, environmental pressures, and comparative value of species as bait or food fish	Develop research study/studies (UWI). This research should utilize fishers and community as researchers/data collector.
3. Alternative bait species	Conduct exploratory fishing to (1) investigate the use of artificial bait or lures, and (2) identify other possible bait species to reduce the demand for common bait species	Develop projects to research and achieve stated objectives. Implementing agencies could be a combination of local government collaborating through regional bodies such as CRFM, OECS, WECAFC, or UWI. This research should utilize fishers as researchers/data collectors.

Issue selected for further exploration	Operational objective	Management recommendation
Human well-being		
4. The economics of large pelagic fishing (cost of bait) and its implication for policy	Determine the economic risk of investing in large pelagic fishing and to influence policy	<p>Government should collect the necessary information to determine cost benefit analysis for the fishery and inform its own policy and would-be investors on cost benefits of the pelagic fishery.</p> <p>Government should also advise on sustainable practices and appropriate technologies.</p> <p>Review existing policies and where appropriate modify/develop suitable policies to ensure they are in keeping with this objective.</p>
5. Improve the livelihood of fishing communities	Improve economic benefits from the fishery	<p>Get communities involved in value-added activities.</p> <p>Encourage livelihood diversification in the fishing community (identify business opportunities).</p> <p>Facilitate small business development (e.g. seek technical assistance from the small business association).</p>
6. Community and fishers willing to organize	As appropriate, build capacity of the community (e.g. groups, cooperatives, NGO's) to participate in management and development of the fishery	<p>Identify with community the types of capacity building needed.</p> <p>Provide legislative framework/support.</p> <p>Support training (book-keeping, record keeping, fish handling, quality control, etc.).</p>
Ability to achieve		
7. Improve data collection systems	Improve/maintain data collection systems within the capacity of national management agencies to provide information for decision-making.	<p>Continue collaborating with regional and international organizations.</p> <p>Strengthen links between management planning and data systems.</p>
8. Improve food quality standards	Improve food quality to promote health and safety standards	<p>Incorporate fish standard into the broader food quality standards.</p> <p>Educate and train individuals involved in food handling.</p> <p>Monitor quality standards with other agency.</p>

CONCLUSIONS

The national ESD reporting framework is useful in identifying and prioritizing ecosystem issues and developing action plans in the form of performance reports to address issues ranked as moderate to extreme risk to the fishery. National workshops, for the most part, were representative and complete as every effort was made to invite a wide cross-section of stakeholders to participate in identifying and prioritizing the issues. However, it is not clear how much the issues reflect the interest of participants rather than that of the wider industry. Flexibility of the generic component trees allows the addition of sub-components to the tree which guarantees trees reflect the pelagic fishery in the LAPE area. Regarding prioritization, many stakeholders were not comfortable with the process but thought it was useful. More detailed consequence tables were abandoned for simplified ones sacrificing more precise measures of consequence values. It is recommended that countries consider the usefulness of this framework and where possible apply it to other fisheries, as the information generated could be used to revise/update fisheries management plans while including ecosystem considerations in fisheries management consistent with international agreements and instruments.

The project identified critical EAF issues that, if not addressed, could lead to unsustainability (Swan and Gréboval 2005). Therefore, to protect and conserve pelagic resources, ecological well-being issues such as the potential to overexploit and the decline in species used as bait (flyingfish and small pelagics) need to be addressed. To enhance human well-being through economic development, lifestyle changes are required and improvements to exports, food quality standards, and infrastructure. To provide effective governance structure, improvements are necessary in the areas of consultation (communication, participation), resources (human, financial), implementation, enforcement, data systems, and legislative systems, to mention a few. If the goal of optimizing economic and social benefits, sustainability, and ecosystem integrity for the pelagic fishery is to be realized, countries need to address these issues as they could lead to unsustainability.

Governance is essential to fisheries management planning. Of the seven ESD components, governance accounted for 44 percent of the issues identified. While the project is not able to address governance issues directly, activities started by this project could continue with the Caribbean Large Marine Ecosystem (CLME) Project and the Marine Resource Governance in the eastern Caribbean (MarGov) Project. The focus of the CLME Project is to improve governance for sustainability emphasizing transboundary ecosystem-based management at appropriate scales (Fanning *et al.* 2007). LAPE participating countries are one step ahead in diagnosing ecosystem issues and with assistance from the CLME Project they can begin to characterize and analyse root and underlying causes of transboundary issues. The MarGov research project focuses on understanding governance in relation to small-scale fisheries

and coastal management in the eastern Caribbean (CERMES 2007). It is recommended that countries continue working along these lines with these new projects to improve governance.

There are existing organizations that already have programmes or projects in place to address many of the issues identified. They include, but are not limited to, the Caribbean Regional Fisheries Mechanism, the FAO Western Central Atlantic Fisheries Commission (WECAFC), and the Organisation of Eastern Caribbean States. Continued collaboration with these and other organizations is critical to addressing issues related to data collection, management and analysis, legislative framework, fishermen organizations, and fisheries management planning.

Several management recommendations have been suggested to deal with issues related to the bait fishery (implications for expansion, baseline study, exploratory fishing, economic assessment, and the quantity of bait required to sustain the fishery), livelihood, capacity building, data collection, and food quality standards. The focus of these recommendations is broad. Countries need to look at recommendations that are applicable to national issues and expand on or develop their own, based on their needs. However, it is important that countries reflect on their current institutional capacity to manage the pelagic resources sustainably (Mahon and McConney 2004b). LAPE participating countries are small island developing states (SIDS) with small staff and oftentimes lack the capacity to do what is required to manage sustainably. They know what needs to be done, but they need to carefully consider how much they can effectively take on. For example, how can countries reduce input demands (e.g. data) to match their capacity? If they are not able to develop 'text-book' data systems or conduct full stock assessment, then they should consider monitoring low cost assessments that give good management indicators. Hence, countries need to develop appropriate management strategies that are realistic within existing structures.

Key messages

- Including ecosystem considerations in fisheries management, consistent with international agreements and instruments, is possible with the use of the Ecologically Sustainable Development (ESD) framework which allows countries to identify, prioritize, and develop action plans to address ecosystem concerns.
- The fisheries consultative process can become institutionalized by using the ESD approach.
- To achieve the goal of economic and social benefits, sustainability, and ecosystem integrity for the pelagic fishery then factors of unsustainable related to high demand for limited resources, complexity and inadequate knowledge, and the lack of governance need to be addressed.

- If conservation of pelagic resource is to be achieved, stakeholder knowledge of ecological issues need to be reinforced through education and communication.
- Social and economic issues in fishing communities are poorly understood. Greater effort is needed to document and include this knowledge in decision-making and fisheries management planning.
- Governance issues are rated as highest risk to the sustainability of the pelagic fishery. It is therefore critical that countries work with existing regional and international projects and organizations to address these issues.
- An ecosystem approach to the management of pelagic resources in the Lesser Antilles requires a large amount of data for ecosystem modelling and other assessments and as inputs for decision-making. Countries need to consider their current institutional capacity and choice low-cost monitoring options that give good management indicators.

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DAY 1 (8:30 – 4:00; coffee break and lunch)

Task 1: Introduction

Welcome

Introduction of participants

Task 2: Provide an overview of an Ecosystem Approach to Fisheries (EAF) management

Why an Ecosystem Approach to Fisheries management? (*PRESENTATION 1*)

Why are we here? What will we do today and much of tomorrow?

Task 3: Complete component trees for the pelagic fishery

Provide an overview of an Ecologically Sustainable Development (ESD) framework. (*PRESENTATION 2*)

Discuss each of the seven component trees; the discussion will be restricted to no more than 30 minutes each.

The facilitator will provide a five- minute introduction to each component tree to assist in the efficiency of the discussion.

DAY 2 (8:30 – 4:00; coffee break and lunch)

Task 4: Complete risk assessment for identified issues

1. Provide an overview of risk assessment (*PRESENTATION 3*)

2. Using the component trees developed on day 1, we will go through all the identified issues and determine risks associated with the operation of the fishery.

Task 5: Complete a sample performance report

1. Provide an overview of a performance report (*PRESENTATION 4*)

2. Provide one report from a component tree as an example. This may involve developing a report where there is already an objective, indicator, performance measure from the current fisheries management plan

Task 6: Obtain feedback from participants on the process

(Source: Fletcher, W.J., Chesson, J., Fisher, M., Sainsbury, K.J., Hundloe, T., Smith, A.D.M. and Whitworth, B. 2002. National ESD Reporting Framework for Australian Fisheries: The 'How To' Guide for Wild Capture Fisheries. FRDC Project 2000/145, Canberra, Australia, 120pp. http://www.fisheries-esd.com/a/pdf/HOW_TO_GUIDE_V1_01.pdf)

The aim of the Ecosystem Approach to Fisheries (EAF) management planning component to the Lesser Antilles Ecosystem Project, is to develop a description of what should be done to effect the management of fisheries resources. This process provides:

- the fishery agencies with stakeholder views on all aspects of ecosystem issues;
- recommendations for possible approaches to solving these issues, and
- guidance to the manager on appropriate action.

The conceptual framework applied in the Ecologically Sustainable Development (ESD) of Australian fisheries. The definition of ESD recognizes the need to integrate short and long-term economic, social and environmental aspects in that we should be:

'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'

What does ESD mean for fisheries?

In relation to fisheries, implementing ESD will mean that:

- We need to consider not only the effects on the target species, but also the rest of the ecosystem.
- We need to recognize the economic health of a fishery (such as the profits to commercial fishers or the satisfaction of recreational fishers) relies on sustaining the essential ecological processes.
- Furthermore, the ongoing utilization of fishery resources requires the community (with its often seemingly competing interests) to be content with the management of the fishery.
- Additionally, the processes and procedures involved in managing a fishery (its governance) have to be appropriate to meet the ESD challenge.
- Finally, the issues addressed within ESD are not fixed; instead, they are likely to be subject to an ongoing process of evolution. In this respect, ESD should be seen as a means, not an end.

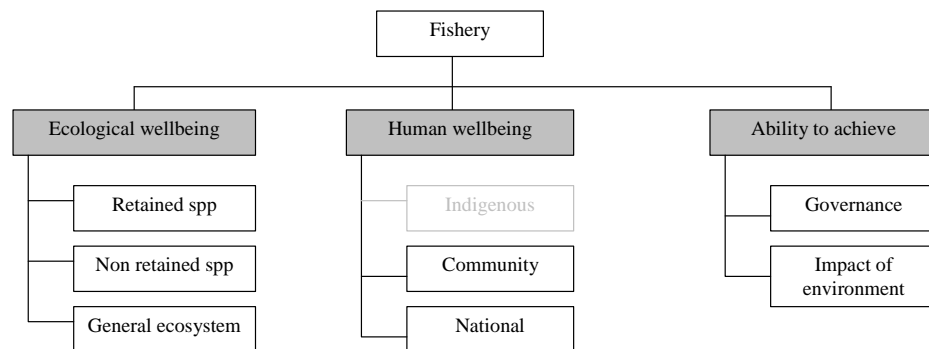
The National ESD reporting framework for Australian Fisheries relies on a three step process:

- Identification of risks/issues
- Prioritization of issues
- Development of Performance Reports

Identification of risks/issues:

Using 'generic' component trees - Notes

The national ESD reference group divided ESD into eight components, grouped within three main categories related to fisheries – contributions to ecological well-being, contributions to human well-being, and ability to achieve.



Objectives are set for each of the relevant components

Retained species	To manage within ecologically viable stock levels by avoiding overfishing and maintaining long-term yields
Non-retained species	To manage the fishery in a manner that does not threaten biodiversity and habitat via the removal of non-retained species (including protected species and ecological communities) and to manage the take of non-retained species at ecologically viable level.
General ecosystem	To manage the impacts of fishing on the ecosystem and the ecosystem on fishing, such that only acceptable impacts occur to functional ecological relationships, habitat and processes.
Community and national well-being	To contribute to regional and national well-being, lifestyle and cultural needs.
Governance	To ensure that ESD principles are underpinned by legal, institutional, economic and policy frameworks capable of responding and taking appropriate preemptory and remedial actions.

Each of the eight major components of ESD is too high-level i.e. conceptual, to develop operational objectives for an individual fishery. Consequently, each of these components needs to be 'deconstructed' into more specific sub-components. Under each of the main component issues were arranged into a series of 'generic' component trees. These trees are used as the starting-point for each assessment and are subsequently adapted into trees specific to each fishery, generally using an open consultative process involving all relevant stakeholder groups.

The benefits of using this system of generic component trees:

- Provides the mechanism for the assessments of fisheries to be completed in a consistent manner.
- Requires the explicit determination of whether an issue is relevant for a fishery.
- Helps focus people's attention and deals with all the different types of issues in a structured manner.
- Graphical depictions are useful ways of disseminating and communicating to others.

Identifying the issues (Workbook)

The following sections outline workbooks suitable to guide discussions and compile results from a consultative process to identify fisheries management issues in the ESD context and to subsequently prioritize the identified issues.

EAF Fisheries Management Consultation Workbook

Country: XXX **Fishery:** Pelagic (in this case)
Gear(s): specify types **Vessels:** specify types and numbers

Ecological wellbeing

Issues related to retained species

(i) Issues related to target species (those species that the pelagic fishery specifically seeks to capture)

Issue (concern or problem)	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Tunas (Scombroidei)			
a. distribution (migration pattern, recruitment)			
b. abundance (catching less now than 10 years ago)			
c. population structure (impact of fishing on species composition, age, & size structure)			
d. discards (is fish thrown away)			
2. Dolphinfin (Coryphaena hippurus)			
a. distribution			
b. abundance			
c. population structure			
d. discards			
3. Billfish (sailfish, marlin)			
a. distribution			
b. abundance			
c. population structure			
d. discards			
4. Whale, porpoise (Cetacean)			
a. distribution			
b. abundance			
c. population structure			
d. discards			
5. Swordfish (<i>Xiphias gladius</i>)			
a. distribution			
b. abundance			
c. population structure			
d. discards			

Issue (concern or problem)	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
6. Kingfish			
a. distribution			
b. abundance			
c. population structure			
d. discards			
7. Skipjack (<i>Katsuwonus pelamis</i>)			
a. distribution			
b. abundance			
c. population structure			
d. discards			
8. Flyingfish (<i>Hirundichthys affinis</i>)			
a. distribution			
b. abundance			
c. population structure			
d. discards			
9. Mackerels (<i>Scomberomorus</i> spp)			
a. distribution			
b. abundance			
c. population structure			
d. discards			
10. Blackfin tuna			
a. distribution			
b. abundance			
c. population structure			
d. discards			
11. Other ()			
a. distribution			
b. abundance			
c. population structure			
d. discards			

ii. Issues related to secondary species (target fishery catches relatively minor amounts) and by-product species (90% mainly caught by other fishery, by-catch species fishery catches relatively minor amounts)

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Species caught by other fishery (90%) - (1) list the species (2) identify the concerns			
a. Ocean triggerfish			
b. Shark			
b. Turtle			
2. By-product species fishery catches relatively minor amounts - (1) list the species (2) identify the concerns			
a.			

Issues related to bait and its impact on the pelagic fishery

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Species caught by other fishery (90%) - (1) list the gear, (2) list the species, (3) identify the concerns			
a. jack			
b. robin			

Issues related to non-retained species (caught or directly impacted by the fishery but not used) of the pelagic fishery

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Impact of species caught by the gear but discarded - (1) list the species (2) identify the concerns (3) Are any of these species of interest/conservation?			
a.??			
2. Are there fish species that interact directly with the gear by are not caught? - (1) list species (2) identify concerns			
a. Seabird			
b.			

Issues related to general ecosystem: impact of a fishery on the ecosystem

Identifying the impacts of fishing on the biological community and other aspects of the environment)

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem			
a. Bait collection			
b. Fishing			
c. Ghost fishing			
d. Benthic biota			
2. Impact associated with the addition or removal of material			
a. Stock enhancement			
b. Discarding/provisioning			
c. Translocation			
3. Is this fishery contributing to ...			
a. Air quality - fuel usage/exhaust - greenhouse gas emissions			
b. Water quality - debris - oil discharge - anti-fouling paint			
c. Substrate quality			

Human wellbeing

Contribution of the pelagic fishery to community well-being

Are there local communities that are dependent on the fishery, and whether they are supportive or negative about fishing operations?

Issue Pelagic contribution to ...	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
a. Economic benefit - income - price of fish - traditional subsistence			
b. Lifestyle - work related injuries - attachment to lifestyle - discipline			
c. industry structure - employment - distribution			
d. infrastructure			
Local communities (people who are directly employed and their families)			
i) Dependent/sensitive communities ()			
a. community dependent on fishing?			
b. are there norms and networks that enable collective action			
c. Is there community identity; does fishing contribute the social fabric of community			
ii) Less dependent/sensitive communities ()			
a. community dependent on fishing?			
b. are there norms and networks that enable collective action			
c. Is there community identity; does fishing contribute the social fabric of community			
Regional communities (direct interaction with fishers in other countries)			
Country			

Contribution of the pelagic fishery to socio-economic well-being

How does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.?

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Economic (value of the fishery)			
a. net economic return			
b. markets			
2. Social			
a. health benefits/ risk - seafood for the country - seafood quality			
level of employment - employment opportunities			
c. Import replacement			
d. Attitudes to fishing - existence values - contribution to cultural values			
e. Distribution of benefits			

Ability to achieve

Issues related to the governance of the pelagic fishery

Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

(i) Government - management and policy capabilities

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Management			
a. Management effectiveness			
b. Plan availability and comprehensiveness			
c. Compliance with regulations (enforcement)			
d. Information - know what is happening			
e. Resources to manage the fishery			

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
f. Inter-agency coordination (policies of other govt. dept. impacts fishery ability to meet objectives)			
g. Allocation amongst competing fishery			
h. Proactive management			
i. Data system that provides information for management (data collection, monitoring, and analysis)			
2. Legal framework			
a. Local laws & regulations			
b. Illegal fishing			
c. Regional arrangements (CRFM, WECAFC, OECS)			
d. International arrangements (ICCAT, IWC)			
3. Consultation			
a. Participation			
b. Communication			
c. Co-management arrangements			
4. Reporting			
a. Reviews audits			
5. Policy capabilities			
a. Proactive policy			
b. Economic instruments			

(ii) Industry and other issues

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Industry issues			
a. Code of conduct (structure, operations)			
b. Participation			
c. Seafood health (HACCP)			
d. FADs			
e. Private sector (gear supply)			
f. Expansion and Development			

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
2. NGOs, cooperatives etc.			
a. Watchdog role			
b. Representativeness (proven constituency)			
c. Collective action (organizing capacity of fishermen organizations)			

Issues related to the environment and other issues of the industry

Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?

(i) Impacts of the environment on the fishery

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Climate			
a. Temperature			
b. Rainfall			
c. Current			
d. Climate change			
2. Human induced changes			
a. Water quality			
b. Habitat modification			
3. Exotic species (Species that may eat native species)			
4. Environmental flows			

(ii) Impacts of other drivers

Issue	Is this an issue? If yes, describe the issue? If no, why not?	If yes, what is the cause?	If yes, what is the scope?
1. Social			
a. Food security			
b. Poverty alleviation			
2. Economic			
a. Fuel prices			

Prioritizing the issues (Workbook)

Prioritization of issues is done in the context of risk analysis. An introduction to risk analysis concepts, including consequence and likelihood tables is provided and an exercise in risk analysis is used to demonstrate the concepts.

A risk is the chance of something happening that will have an impact on an objective. The risk of a given event depends on both how likely the event is to occur and how bad the consequences of the event would be. For example, fishers must assess the risk of a hurricane destroying their fishing boats. This is written as:

$$\begin{aligned} \text{Risk} &= \text{consequence} * \text{likelihood} \\ &\text{or equivalently as} \\ &= \text{impact} * \text{probability} \end{aligned}$$

Risk management is a process which considers how much to invest to guard against a risk or set of risks. Risk analysis is a formal process of identifying the risks to consider, estimating the impact of their consequences, and estimating the likelihood that those consequences may occur. Risk analysis and risk management can be highly mathematical such as the methods used by insurers when assessing premiums for insurance cover. This may not be possible in cases where quantitative values are difficult to assign to the consequences e.g. what is the value of the loss of a species or a habitat. This is often the case in public policy situations e.g. consultations, where a qualitative approach to assessing risk can be used instead.

For the application of risk analysis in the ESD framework the consequences and likelihood information is first described in a qualitative scale and then a numeric level is assigned. The numeric scale for consequences is defined in qualitative terms based on a description of the expected impact as follows.

Consequences	General impact
0 - Negligible	Insignificant
1 - Minor	Minimal
2 - Moderate	Maximum
3 - Severe	Widespread
4 - Major	Serious long-term impact
5 - Catastrophic	Irreversible damage or loss

Similarly, the likelihood of a given event occurring is assessed on the basis of qualitative descriptions of probability as follows.

Likelihood	Description
1. remote	Not likely to occur but not impossible
2. rare	May occur in exceptional circumstances
3. unlikely	Uncommon but has been known to occur
4. possible	Could occur
5. occasional	May occur
6. likely	Expected to occur

These two scales, consequence and likelihood are combined into a risk matrix where the cells contain the risk values which are the product of the consequence and likelihood levels. The risk values are divided into five ranks of risk levels, shown colour coded in the risk matrix.

Risk Matrix		Consequence					
		Negligible	Minor	Moderate	Severe	Major	Catastrophic
Likelihood		0	1	2	3	4	5
Remote	1	0	1	2	3	4	5
Rare	2	0	2	4	6	8	10
Unlikely	3	0	3	6	9	12	15
Possible	4	0	4	8	12	16	20
Occasional	5	0	5	10	15	20	25
Likely	6	0	6	12	18	24	30

The associated ranges of risk values for each rank (i.e. colour value) are given in the table below.

The ESD framework assumes, as does risk management in general, that the higher the assessed risk, the more stringent the management measures should be and the higher priority assigned to the issue. Thus the final step is to associate the appropriate management response and reporting requirement with each level of assessed risk. As risk level is perceived to increase the expected responses should escalate accordingly. Similarly the requirement to document the issue, the risk assessment, the management actions and the apparent system responses to the management action increases. The management responses and reporting requirements specified under the ESD for given risk rankings and levels are given below.

Risk Ranking	Risk Values	Risk levels	Likely Management Response	Likely Reporting Requirements
Negligible	0	0	Nil	Short justification
Low	1-6	1	As considered necessary	Full justification
Moderate	7-12	2	Specified management action required	Performance report

High	13-18	3	Possible increase in existing management actions	Performance report
Extreme	>19	4	Additional management actions (exceptional circumstances)	Performance report

Using risk analysis - Exercise

Participants will use consequence and likelihood tables to prioritize issues identified in the consultative sessions. In preparation for using risk assessment as outlined above an exercise is used to assess risks of some more or less everyday events.

Issue	Consequence	Likelihood	Risk value	Ranking
struck by lightning				
10' of snow fall				
caught in a light shower of rain				
fishers behaving badly at the fish market				
decline in fish catch				

ESD Performance report

Under the ESD framework a detailed performance or assessment report should be prepared for any issues identified as having more than a low risk or priority. The set of standard headings for these ESD performance report are listed and described below.

Performance Report Heading	Description
1. Operational Objective (including justification)	What are you trying to achieve and why?
2. Indicator(s)	What are you going to use to measure performance?
3. Performance Measure or Limit (including justification)	What levels define acceptable and unacceptable performance and why?
4. Data Requirements and availability	What monitoring programs are needed? do they exist already?
5. Evaluation	What is the current performance of the fishery for this issue?
6. Robustness	How robust is the indicator or the performance measure in assessing performance against the objective?
7. Fisheries Management Response	
- Currently	What are the management actions currently being used to achieve acceptable performance?
- Future	What extra management is to be introduced if risk increases?
- Actions if Performance Limit is exceeded	What will happen if the indicator suggests performance is not acceptable?
8. Comments and Action	Summarize what actions will happen in the coming years.
9. External Drivers	What factors outside of the fisheries control may affect performance against the objective?

Component Class/specie Issue Sub-Issue	ANT	BAR	DMI	GNR	STK	NEV	STL	STV	TRI
C1 3 5					24		30	24	
C1 3 6						30			
C1 3 7							30		
C1 3 8							30		
C1 3 9							18		20
C2 1 1								24	
C2 2 2	24	24	18		24	24	24		
C2 2 3							24		9
C3 1 1	0	24	24	24		12	24	6	16
N1 1 1		24		24			18		
N1 1 2		24	24	24	24	24	30	24	20
N1 1 3				24					
N1 2 1	24		18		24	12			15
N1 2 2				18					
N1 2 3								24	
N1 2 4			24						
N1 2 5					24	24	18		
N2 1 1			18						
N2 1 2								6	
N2 1 3		3	24				24		20
N2 2 1				24					
N2 2 2				6					
N2 2 3	12			4	24		6		8
N2 3 1				6					
N2 3 2				18	24	30			
N2 3 3	24	24			24				
N2 3 4			24						
N2 4 1	24							12	
N2 4 2	12		0		24	18	24		18
N2 4 3			20				24		
N2 4 4				18					
N2 5 1	8								
N2 5 2							24	18	
G1 1 1	24	24	24	24	24	24		24	
G1 1 2							18		16
G1 1 3							30		
G1 1 4							30		
G1 2 1	24	18	24	24	24	24		24	20
G1 2 2							24		
G1 3 1					24				
G1 3 2		18	24		30	24		24	
G1 3 3									
G1 4 1		24			24	24		24	
G1 4 2		18			24				
G1 4 3				24					
G1 4 4							24		
G1 4 5	24						12		
G1 4 6									24
G1 5 1	24	24	24	24	24	18	24	24	
G1 5 2		24		24					24
G1 6 1		24			24	12		24	
G1 6 2							24	18	
G1 6 3								24	
G1 6 4	24							24	
G1 6 5	24								
G1 6 6		0		18	24			24	
G1 6 7			24						
G1 6 8							24		
G1 7 1			24		24	6	24	24	
G1 8 1	18	20	12	24	24	30		24	20
G1 9 1			24	24	24	24		24	
G1 9 2	24								
G1 9 3	0			0	24	0	24	24	
G1 9 4	0	24		24		24		24	20
G1 9 5								24	20
G2 1 1				24	12				
G2 1 2	0	24	24	24	0	30	24	24	
G2 1 3			24		24			24	
G2 1 4		24							
G2 2 1	18	12	18	24			24	24	
G2 2 2			8	24					20
G2 2 3								24	
G2 2 4							24	24	
G2 2 5					24	30			
G2 2 6							24		
G2 3 1					12	24		24	
G2 3 2					24			12	20
G2 3 3			15				18		
G2 3 4	12								
G2 3 5						30			
G2 4 1				12	24				
G2 4 2	24		4	24		4			
G2 4 3		24		24					12
G2 4 4									18
G2 4 5								24	
G2 4 6									18
G2 4 7		24							
G2 4 8		12		24				0	

Component Code

Code Description

R	Issues related to retained species
R1	Target species
R2	Secondary and by-product species
R3	Issues related to bait species
NR	Issues related to non retained species
GE	Issues related to general ecosystem
GE1	Impact from the damage or removal caused by the fishery to the rest of the ecosystem
GE2	Impact associated with the addition or removal of material
GE3	General issues associated with fishing activities that could impact the broader environment
C	Issues related to the contribution of the fisheries to community well-being
C1	Dependent fishing communities
C2	Less Dependent communities
C3	Regional communities
N	Issues related to the contribution of the fisheries to national socio-economic well-being
N1	Economic
N2	Social
G	Issues related to governance
G1	Management
G2	Legal framework
G3	Consultation
G4	Reporting
G5	Policy capabilities
G6	Industry
G7	Other (NGOs)
E	Issue related to the environment and other issues of the industry
E1	Climate
E2	Human induced changes
E3	Impacts of other drivers - social
E4	Impacts of other drivers - Economic

Priority ranking code

Ranking	Values
Negligible	0
Low	1-6
Moderate	7-12
High	13-18
Extreme	>19

Country code:

ANT - Antigua and Barbuda, BAR - Barbados, DMI - Commonwealth of Dominica, GNR - Grenada, STK - St Kitts, NEV - Nevis, STL - St. Lucia, STV - St. Vincent and the Grenadines, TRI - Trinidad.

Other codes used in the Table

A - abundance, P - population structure, D - distribution, X- indicates presence of a species, asterisk - average landings for Trinidad includes Tobago.

APPENDIX 4

LOCAL AND ASSOCIATED COMMON AND
SCIENTIFIC NAMES OF SPECIES USED IN THE EAF
MANAGEMENT REPORT

Local Name	Common Name	Scientific Name
Blackfish	False killer whale	<i>Pseudorca cassidens</i>
	Shortfin pilot whale	<i>Globicephala macrorhynchus</i>
Dolphin/Porpoise	Atl. Spotted Dolphin	<i>Stenella frontalis</i>
	Bottlenose dolphin	<i>Tursiops truncatus</i>
	Spinner dolphin	<i>Stenella longirostris</i>
	Pantropical spotted dolphin	<i>Stenella attenuata</i>
	Fraser's dolphin	<i>Lagenodelphis hosei</i>
	Striped dolphin	<i>Stenella coeruleoalba</i>
Humpback whale	Humpback whale	<i>Megaptera novaeangliae</i>
Swordfish	Swordfish	<i>Xiphias gladius</i>
Billfish	Atlantic blue marlin	<i>Makaira nigricans</i>
	Atlantic white marlin	<i>Terapturus albidus</i>
	Atlantic sailfish	<i>Istiophorus albidus</i>
Tuna	Yellowfin tuna	<i>Thunnus albacares</i>
	Bigeye	<i>Thunnus obesus</i>
	Albacore	<i>Thunnus alalunga</i>
Skipjack	Skipjack	<i>Katsuwonus pelamis</i>
Blackfin tuna	Blackfin tuna	<i>Thunnus atlanticus</i>
Small tunas	Atlantic bonito	<i>Sarda sarda</i>
	Bullet tunas	<i>Auxis spp.</i>
	Little tunny	<i>Euthynnus alletteratus</i>
Ocean triggerfish	Ocean triggerfish	<i>Canthidermis maculata</i>
Mackerel	Cero mackerel	<i>Scomberomorus regalis</i>
	Spanish mackerel	<i>Scomberomorus maculatus</i>
Kingfish	King mackerel	<i>Scomberomorus cavalla</i>
Carite	Serra Spanish mackerel	<i>Scomberomorus brasiliensis</i>
Wahoo	Wahoo	<i>Acanthocybium solandri</i>
Dolphinfish	Dolphinfish	<i>Coryphaena hippurus</i>
Sharks	Tiger shark	<i>Galeocerdo cuvier</i>
	Blacktip shark	<i>Carcharhinus limbatus</i>
	Caribbean sharpnose shark	<i>Rhizoprionodon porosus</i>
	Nurse shark	<i>Ginglymostoma cirratum</i>
Flyingfish	Flyingfish	<i>Hirundichthys affinis</i>
Jack	Blue runner	<i>Caranx crysos</i>
	Black jack	<i>Caranx lugubris</i>
	Crevalle jack	<i>Caranx hippos</i>
	Bar jack	<i>Caranx ruber</i>
	Yellowtail amberjack	<i>Seriola lalandi</i>
	Rainbow runner	<i>Elegatis bipinnulata</i>
	Palometa pompano	<i>Trachinotus goodei</i>
	Permit	<i>Trachinotus falcatus</i>
	Pompano	<i>Trachinotus carolinus</i>

Local Name	Common Name	Scientific Name
Barracuda	Barracuda	<i>Sphyræna barracuda</i>
Gar	Flat needlefish	<i>Ablennes hians</i>
	Hound needlefish	<i>Tylosurus crocodilus</i>
Jack	Bigeye scad	<i>Selar crumenophthalmus</i>
Ballyhoo	Ballyhoo	<i>Hemiramphus balao</i>
Sprat/herring	False herring	<i>Harengula clupeola</i>
	Redear herring	<i>Harengula humeralis</i>
	Scaled herring	<i>Harengula jaguana</i>
	Sprat	<i>Harengula pensacola</i>
Robin	Mackerel scad	<i>Decapterus macarellus</i>
Robin/Dodger	Round scad	<i>Decpaterus punctatus</i>
Anchovy	Anchovy	<i>Engraulidae spp.</i>
Whiting	Sand tilefish	<i>Malacanthus plumieri</i>
Batfish	Batfish	<i>Dactylopterus volitans</i>
Cutlassfish	Cutlassfish	<i>Trichiuridae spp.</i>
Escolar/prowler	Escolar	<i>Lepidocybium flavobrunneum</i>
Fry-dry	Fry-dry	<i>Sardinella aurita</i>
Goatfish	Goatfish	<i>Mulloidichthys martinicus</i>
Lizardfish	Lizardfish	<i>Saurida spp.</i>
Pufferfish	Pufferfish	<i>Tetraodontidae spp.</i>
Remora	Remora	<i>Remora remora</i>
Scorpionfish	Scorpionfish	<i>Lophiidae spp.</i>
Soapfish	Soapfish	<i>Rypticus saponaceus</i>
Sting ray	Sting ray	<i>Dasyatis Americana</i>
Sunfish	Sunfish	<i>Moliidae spp.</i>
Tarpon	Tarpon	<i>Megalops atlanticus</i>
Tenpounder	Tenpounder	<i>Albulidae spp.; Albula vulpes</i>
Trumpetfish	Trumpetfish	<i>Aulostomus maculatus</i>
Mojarra	Mojarra	<i>Eucinostomus spp.</i>
Tripletail	Atlantic tripletail	<i>Lobotes surinamensis</i>
Pickle hind	(Unknown)	(Unknown)
Turtle	Hawksbill	<i>Eretmochelys imbricata</i>
	Loggerhead	<i>Caretta caretta</i>
	Leatherback	<i>Dermodochelys coriacea</i>
	Green turtle	<i>Chelonia mydas mydas</i>
Diamondback squid	Diamondback squid	<i>Thysanoteuthis rhombus</i>

PART 2: NATIONAL REPORTS

ANTIGUA AND BARBUDA

Point Wharf Fisheries Complex Conference Room, 26 and 27 April 2007

Pelagic fishery defined

The pelagic fishery was defined as open pirogue and fibreglass launch vessels using vertical longline, trolling, handline, overnight line, gillnet, and cast net gears to catch tuna, dolphinfish, marlin, mackerel, blackfin tuna, wahoo, barracuda, gar, cavalli, rainbow runner, mojarra, and shark. Bait species included ballyhoo, sprat, flyingfish, anchovies, and imported squid, while non-retained species caught but discarded or released included sting ray and turtles. Species which interact with the gear but are not caught include anchovies, goatfish, and ballyhoo.

Identification of the issues

A total of 96 issues were identified of which 94 were prioritized. The ability to achieve accounted for 52% of the issues identified, ecological wellbeing 29%, and human wellbeing 19% (Figure 8). Governance and retained species accounted for 69% of all issues identified.

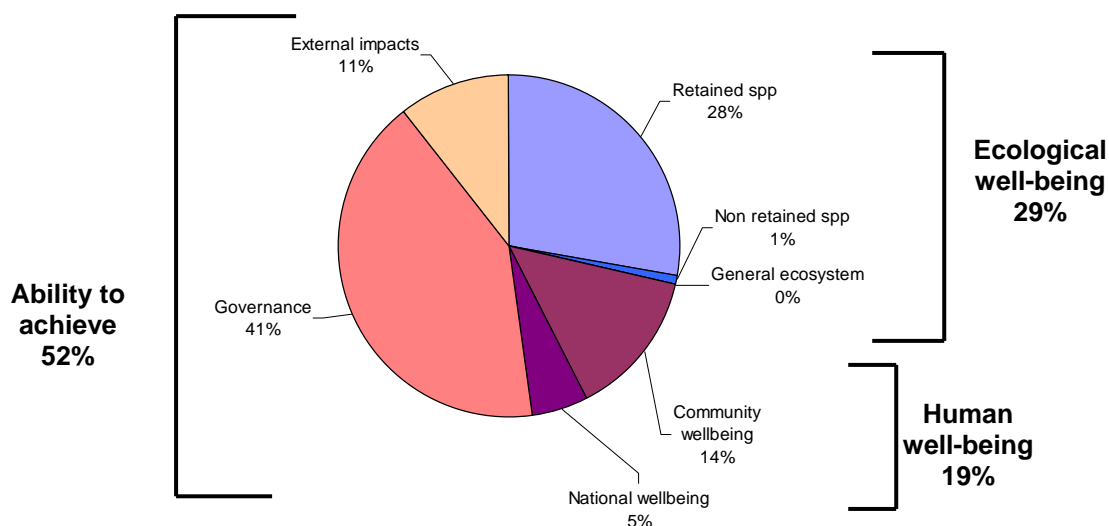


Figure 8 Percentages of issues identified within each component and category in the Antigua and Barbuda pelagic fishery

Prioritization of issues

The prioritization process resulted in 48% of the issues ranked as extreme and 12% high, only 1% and 12% fell within the negligible and low categories, respectively, the remaining 27% fell within the moderate category. When considering the spread of risk categories within each component a large

proportion of the issues under retained species, governance, and external impacts were rated extreme risks (Figure 9). Most issues listed under human well-being were of moderate rank.

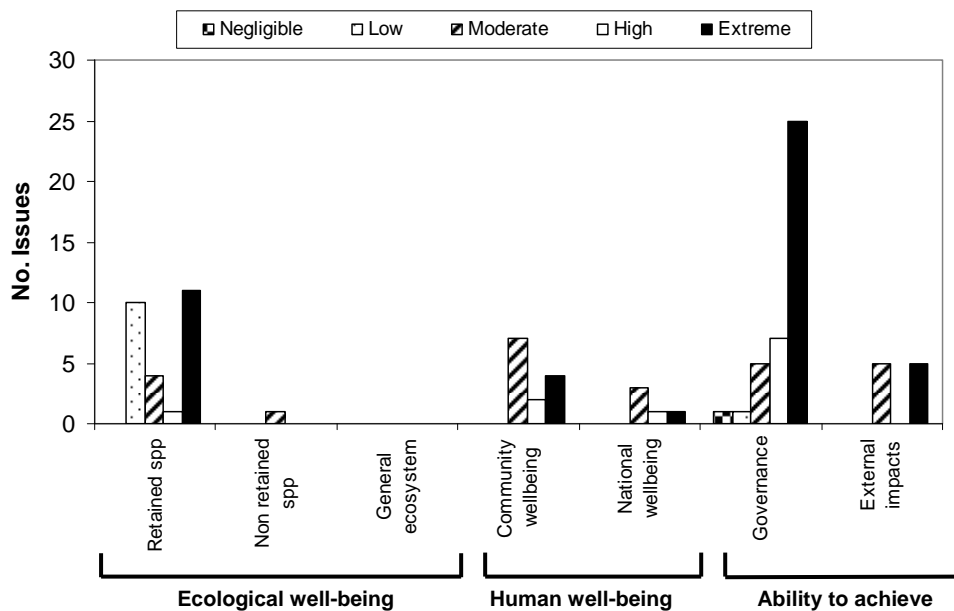


Figure 9 Proportion of issues within given risk categories for Antigua and Barbuda

MAIN ISSUES AND THEMES

Ecological well-being

In general the pelagic fishery was underdeveloped and underexploited. The fishery was exploited by sport-fishers and very few commercial fishers; hence, there was little or no data/information on distribution, abundance, and population structure.

Human well-being

The economic benefits from large pelagic species was not yet realized as many fishers complained about low fish prices and marketing difficulties (ciguatera and flesh worms). The main concern for local fishing communities was poor collective action as people only came together when there was a crisis.

Ability to achieve

a. Governance

Management of the pelagic fishery was difficult because it was a very small fishery with many part-time fishers. To develop the fishery, fishers would need information on technology, ecology, and a development plan; to achieve this, the Fisheries Division would need to adjust its information gathering and dissemination strategy. Consultation was ranked as extreme risk to the fishery. The main concerns were fishers' unwillingness to participate in planning and management or to take the time to seek out their own interest.

In regard to seafood health, it was important to raise quality control standards. Participants noted that vendors and fishers did not apply their knowledge of HACCP in the workplace (the laws were in place but the practice was limited). The public also needed to be educated on seafood health standards. Issues of extreme risk to the development of the fishery were: the unwillingness of fishers to invest in large pelagic fishing technology (fishers were concerned about the high cost of out-fitting a vessel and operating expenses); the need for an export market; and high fuel prices.

The need for active fishermen’s organizations was discussed; participants noted that if these organizations were in place, the Fisheries Division could better circulate information and fishers could take on problems at the government level.

b. External impacts

Climate change was ranked as an extreme risk to the fishery because changes in temperature, fish location, and storm intensity all affect coral reef, mangroves, spawning area, and fish migration. The fishery was affected by human induced activities such as dredging on the west coast, sewage runoff into the marine environment, warm water runoff from the desalination plants, small oil spills, and mangrove and seagrass removal.

PERFORMANCE REPORT

A proposed draft performance report was developed to improve seafood health in Antigua and Barbuda based on issues identified (ID 66-69) (Table 7).

Table 7 Proposed performance report on improving seafood health in Antigua and Barbuda

Major issue	Improve seafood health in Antigua and Barbuda
Issue ID	66-69
Operational objective	To provide high quality seafood through awareness, education, and training “treat fish as food: quality fish, healthy people”
Indicators	High quality fish for sale Check public health records Check surroundings of boats and markets Evaluate public practice Number of persons trained
Performance measure	Number of persons trained by 2009 Reduction in the number of fish poisoning by 2009
Activities/Data requirement	Education – message, how (media), laws and regulations Knowledge – training (what, who, when, how) Monitoring – Ministry of Health and the Fisheries Division (see, smell, touch, temperature)
Fisheries management response	License suspension Seafood health condition attached to license Ban individuals from selling in market or fishing Random checks
External drivers	

Attendance

The workshop was attended by 21 participants, and was well represented by Fisheries Division (FD) staff, fishers, and processors (Table 8).

Table 8: List of participants in Antigua and Barbuda

Name	Organization
Cheryl Appleton	Fisheries Division, Chief Fisheries Officer
Philmore James	Fisheries Division, Conservation, MPA
George Looby	Fisheries Division, Gear Technology
Hilroy Simon	Fisheries Division, Data Collection
S. McIntosh	Fisheries Division, Enforcement
Tricia Lovell	Fisheries Division, Conservation
Nikisha Frederick	Fisheries Division, LRS
Mark Archibald	Fisheries Division, Dive Master
St. Clair Simon	Fisheries Division, Extension
Brent Simon	Fisheries Division, Processing
Errol Simon	Fisher (Point Wharf)
Tony James	Fisher (Falmouth)
Baptiste Sylvester	Fisher (Jolly Harbour)
Clive Pelle	Fisher (Urlings)
Jameson Mannix	Fisher (Urlings)
Reginald Nichaas	Fisher (Urlings)
Winston Hazzard	Fisher (Urlings)
Mitchel Lay	Fisher (Pachem/Crabbs Mariner)
Charlie Simon	Antigua and Barbuda Alliance
Yvonne Harris	Antigua Fisheries Ltd., (Processor)
Lt (N) M. James	Antigua and Barbuda Defense Force, Coast Guard
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme). Note: The pelagic fishery (large and small) is not a target fishery in Antigua and Barbuda

Antigua and Barbuda **Fishery** pelagics (large and coastal)
 Gear handline, gillnet, trolling, vertical longline, overnight line, castnet (bait)
 Vessels open pirogue and otherwise (commercial), fiberglass launch (sport-fishers)

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
Issue related to retained species (those species that the large pelagic fisheries wants to capture and use)						
<i>(i) Issues related to target species (distribution, abundance, population structure, discards)</i>						
1. Tunas (Scombroidei)	1	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	2	No data	4	6	24	E
2. Dolphinfish (<i>Coryphaena hippurus</i>)	3	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	4	Dolphinfish travels about 120 miles E and NE of Antigua. Many fishers do not target this specie because they need better equipment, navigation, search and rescue, fuel efficient engines (gas, insurance), and fish storage capacity (HACCP)	2	5	10	M
	5	Fishers observing more dolphinfish this year (could be due to increased effort or abundance), they are also bigger	2	6	12	M

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
3. Billfish (marlin)		Underexploited and underdeveloped fishery done mainly by sport-fishers, therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	6	No data	4	6	24	E
4. Mackerel (Scomberomorus spp)	7	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	M
	8	Limited data	4	6	24	E
5. Wahoo	9	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	10	Limited data	4	6	24	E
6. Blackfin tuna (<i>Thunnus atlanticus</i>)	11	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	12	Limited data	4	6	24	E
7. Barracuda (<i>Sphyraena barracuda</i>)	13	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	14	Limited data	4	6	24	E
8. Gar (<i>Ablennes hians</i> & <i>Tylosurus crocodiles</i>)	15	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	16	Limited data	4	6	24	E
	17	The body has flesh worm, not targeted	4	6	24	E
9. Jack (cavalli, pompano, permit, rainbow runner, scad)	18	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	19	Limited data	4	6	24	E
10. Mojarra (<i>Eucinostomus</i>)	20	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	21	Limited data (difficult to get net data)	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
11. Sharks (tiger, bull, black tip, nurse, Caribbean reef)	22	Underexploited and underdeveloped fishery; therefore, the distribution, abundance, and population structure needs to be assessed	1	6	6	L
	23	Limited data	4	6	24	E
<i>ii. Issues related to secondary species (target fishery catches relatively minor amounts)</i>						
Issues related to bait species and its impact on the pelagic fishery						
a. Ballyhoo (nets)	24	Need to store ballyhoo when around (ballyhoo better for near-shore trolling while flyingfish is better for offshore fishing)	3	6	18	H
	25	Need to find another source of bait when ballyhoo is not available (could use flyingfish, robin, and bigeye scad) [economic impact]	2	6	12	M
b. Sprat (Redear herring) (<i>Harengula humerali</i>)		No				
c. Flyingfish		No				
d. Anchovies		No				
e. Imported squid		No				
f. Artificial lures		No				
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. Sting ray (<i>Dasyatis Americana</i>)	26	Incidental catch - caught in the gillnet and discarded	2	6	12	M
b. Fry (small bait fish)		(pass through the net)				
b. Anchovies		(pass through the net)				
d. Goatfish (<i>Mulloidichthys martinicus</i>)		(pass through the net)				
e. Ballyhoo		(pass through the net)				
f. Turtles (Hawksbill)		(caught and released, gillnet)				
Issue related to general ecosystem: impact of a fishery on the ecosystem						

		HUMAN WELLBEING					
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category	
Contribution of the pelagic fisheries to community well-being							
a. Economic benefit	27	Fish price low compared to salt fish and canned fish	2	6	12	M	
	28	Many pelagic fish (e.g. barracuda) have ciguatera (reason unknown), thus not targeted, difficult to market	4	5	10	M	
b. Lifestyle	29	Some fishers do not want to go fishing for extended trips	2	4	8	M	
	30	Non-compliance attitude of fishers - they do not want to pay for basic amenities, do not obey regulation	4	6	24	E	
d. Infrastructure	31	Need extra freezer, chill store, blast freezer capacity	2	4	8	M	
	32	As fishing gets bigger and more profitable we need to improve facilities at landing sites	2	4	8	M	
	33	Need refrigerated van to transport fish	2	4	8	M	
	34	Need to change policy on duty free concessions to include vans	3	4	12	M	
1. Local communities (people who are directly employed and their families)							
<i>i) For sport-fishing communities (Falmouth Harbour)</i>							
Local communities (people who are directly employed and their families)							
<i>i) For fishing communities (Point Wharf, Grace Farm, Urlings, English Harbour, Falmouth Harbour, Jennings/Bolans)</i>							
b. Are there norms and networks that enables collective action	35	Not the typical fishing communities (not centred around fishing), only when there is a crisis they come together	4	6	24	E	

		HUMAN WELLBEING					
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category	
<i>ii) regional communities</i>							
Contribution of the pelagic fisheries to national socio-economic well-being							
1. Economic (value of the fishery)							
b. Markets	36	Need to develop our export market	4	6	24	E	
	37	Need a fisheries body to purchase fish from locals to sell to foreign (French) fishers so that all fishers can benefit, not just independent fishers	4	6	24	E	
	38	Unstable - e.g. if a boat from another country promises to come and buy fish and they don't the fisher is left with the fish	3	6	18	H	
	39	Wholesalers not paying a good price for fish and they don't pay on time	3	6	18	H	
2. Social							
b. Level of employment	40	Need to encourage present fishers into new pelagic technique	4	4	16	H	
c. Import replacement	41	Imports replacing local fish - Importing cheaper dressed fish from overseas (e.g., dolphinfish, tuna, swordfish, marlin, wahoo)	4	6	24	E	
d. Attitudes to fishery	42	Society's views of fishing is demeaning					
	43	Society prefer to pay higher prices for imported preserved fish rather than fresh fish	2	6	12	M	
e. Distribution of benefits	44	Need proper arrangement between fishers and middle-men for the sale of fish	2	4	8	M	

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries						
1. Government						
<i>i) Management</i>						
a. Management effectiveness	45	Very small fishery, difficult to manage effectively, too many part-time fishers	4	6	24	E
b. Plan availability and comprehensiveness	46	There is no plan, it is a developing fishery	4	6	24	E
d. Information	47	Disconnect between fishers and the FD, the FD needs adjust their information gathering and dissemination strategy	3	6	18	H
	48	Attempts made to disseminate information, however, fishers do not participate in meetings	4	6	24	E
	49	The problem is the way the message is delivered	2	6	12	M
e. Resources to manage the fishery	50	Small fishery, resources limited to concentrate on the pelagic fishery	4	6	24	E
	51	Need more resources to sustainably exploit and manage the fishery	4	4	16	H
f. Inter-agency coordination	52	At the national planning process, they do not take fisheries and marine resource issues into account	4	6	24	E
	53	Conflicts between FD, tourism, environment (if not on the 'same page' (e.g. mangrove)	4	6	24	E
	54	Practices of other departments different from their policies	3	6	18	H
h. Proactive management	55	Generally reactive	3	6	18	H
i. Data system	56	Landings of dolphinfish never enter the public market they go straight to hotels, hence, the data is not captured by the data collection program	4	6	24	E
	57	Fishers are not willing to give data, hence, the FD has no data to report	4	6	24	E
<i>ii) Legal framework</i>						

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
b. Illegal fishing	58	French fishers use destructive fishing practice and Antiguan fishers cannot fish in their water	3	6	18	H
	59	Antiguan fishers share common grounds with St. Kitts and Nevis fishers (e.g., west edge)	0	6	0	N
c. Regional arrangements (OECS, CRFM, WECAFC)	60	Some regional policies are not ratified, don't know legal standings	2	6	12	M
d. International arrangements (ICCAT, IWC)	61	Antigua and Barbuda not a member of ICCAT	4	6	24	E
iii) Consultation						
a. Participation	62	Informal consultation is effective, but not formal ones, however, fishers need more formal meetings as they take formal meetings more seriously	3	6	18	H
	63	Fishers are not willing to give up a good fishing day, they lack the confidence in government and themselves, they want everybody to do their business, they do not make time to deal with their issues	4	6	24	E
	64	If fishers knew what the information collected is used for, maybe they would participate better	4	6	24	E
b. Communication	65	Need effective two way communication between fishers and the FD	4	6	24	E
c. Co-management arrangements	66	Informally there is some co-management, if groups share more information this could lead to better co-management	4	6	24	E
iv) Reporting						
a. Reviews audits	67	Difficult to send reports to individual fishers, if their are active fishers organizations the FD could circulate the information	4	6	24	E
v) Policy capabilities						

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
2. Industry						
b. Participation	68	Lack participation of fishers to invest in new technology for large pelagic fishing	2	4	8	M
	69	Need comprehensive education for fishers related to persuading fishers of the economic benefits of the pelagic fishery	3	4	12	M
c. Seafood health (HACCP)	70	Vendors and fishers not applying their knowledge in HACCP	4	6	24	E
	71	Need to educate the public in quality control to raise the standards	4	6	24	E
	72	The laws are in place to monitor health standards at markets (Health dept.) but the practice is limited	4	6	24	E
	73	Some fishers do not want to buy ice to preserve fish (fishers say ice is too expensive they can not afford it)	4	6	24	E
e. Private sector	74	Equipment is expensive	1	6	6	L
	75	Suppliers import equipment duty free but the mark-up on the goods is high	3	6	18	H
f. Expansion/ Development	76	Development of the fishery - Inadequate knowledge of gear technology, use of FADs, and behaviour of large pelagic species, sea conditions, current, wind pattern, and new technology, habitat, geographic	4	6	24	E
	77	For large pelagic species there is constraints with marketing, fishing shelf area, and international regulations	4	6	24	E
	78	The FD have inadequate knowledge, therefore we need a vessel to gain experience and demonstrate large pelagic fishing to fishers	4	6	24	E
	79	Development plan is not available to stakeholders, thus, they cannot determine if they should invest in the fishery	2	6	12	M
	80	Cost of out-fitting and operating expenses for pelagic fishing is perceived as being too expensive	4	6	24	E

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
3. Other (NGOs - South Coast United Fisherfolk Cooperative, Antigua and Barbuda Fishermen Cooperative Society Ltd., Antigua and Barbuda Fishermen Alliance, Sport Fishers Association)						
a. Watchdog role	81	Fishers have no confidence that the information they provide will lead to action by the FD	4	6	24	E
c. Fisher organization and collective action	82	Fishers need to realize that the FD is a government institution and they need to form organizations to take the time and deal with their issues. They cannot depend on government workers to deal with their problems (e.g. when vendors and sport fishers have an issue they make representation)	4	6	24	E
	83	If fishers had active organizations the FD could disseminate information better				
	84	Fishermen organizations are dysfunctional				
	85	Getting fishers to join the bodies is difficult, they do not trust each other				
	86	Some fishers do not like to conform to the rules of the organization				E
Issue related to the environment and other issues of the industry						
1. Impacts of the environment on the fishery						
<i>i) Climate</i>						
a. Temperature	87	Has the potential to affect fishing	2	6	12	M
d. Climate change	88	Affects temperature, where to find fish, and the intensity of storms all of which affects coral reefs, mangroves, spawning areas (coastal pelagic)	4	6	24	E
<i>ii) Human induced changes</i>						
a. Water quality	89	When the west coast was dredge to build hotels fine particles and sand smothered the reef and seagrass, affecting fish catch (coastal)	4	6	24	E
	90	No national sewage treatment plant (only some hotels) thus sewage runoff into the marine environment which affects coastal pelagic	4	6	24	E
	91	Desalination plant causes warm water runoff and high salt concentration which affects water quality	2	6	12	M
	92	Small oil spills from sea travels adds up	2	6	12	M

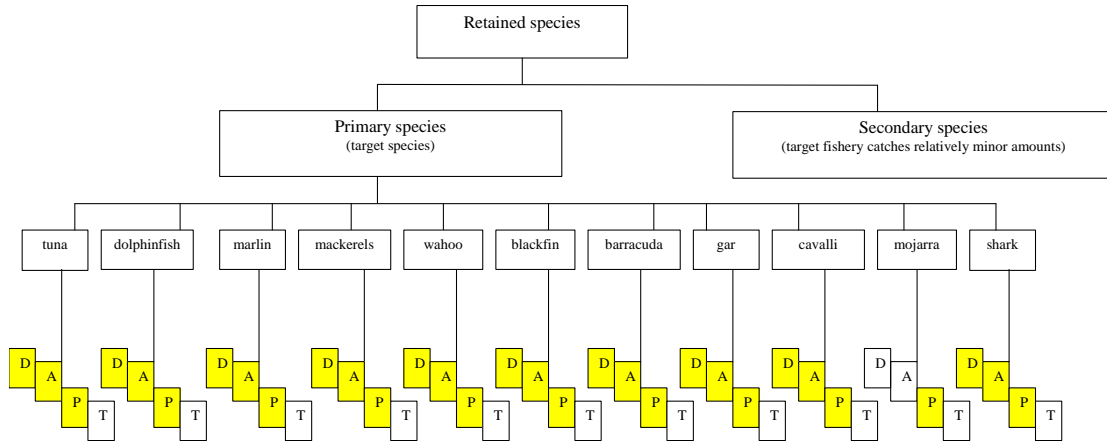
ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
b. Habitat modification	93	Mangroves and seagrass removed for coastal development	4	6	24	E
	94	Since hurricanes, broken corals coming ashore covering seagrass	2	6	12	M
2. Impacts of other drivers						
<i>i) Social</i>						
b. Poverty alleviation	95	For large pelagic the operating cost too high to contribute to poverty alleviation	2	4	8	M
<i>ii) Economic</i>						
a. Fuel prices	96	Fuel is expensive	4	6	24	E

GENERIC COMPONENT TREES (ANTIGUA AND BARBUDA)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE LARGE AND SMALL PELAGIC FISHERY

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.



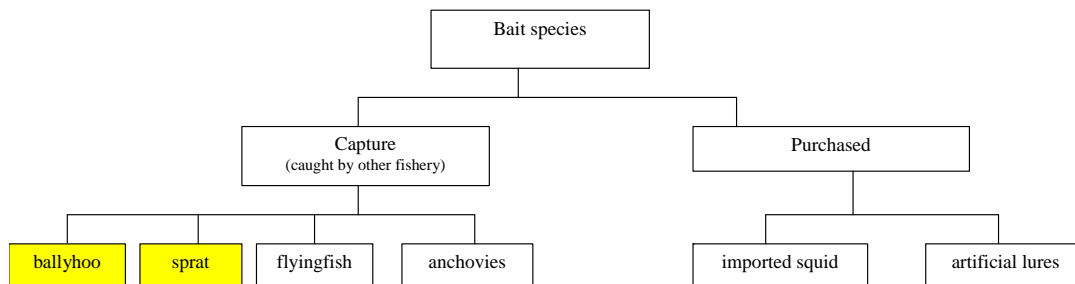
KEY: D-distribution; A-abundance; P-population structure; T-discard

Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE LARGE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

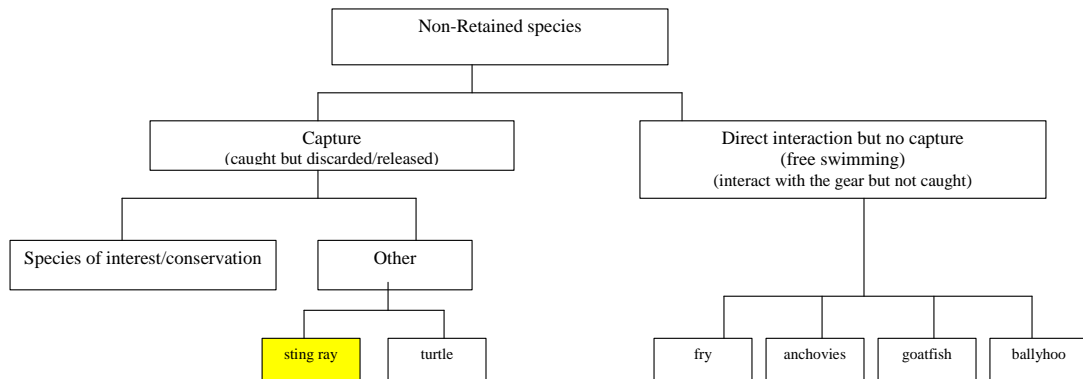
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

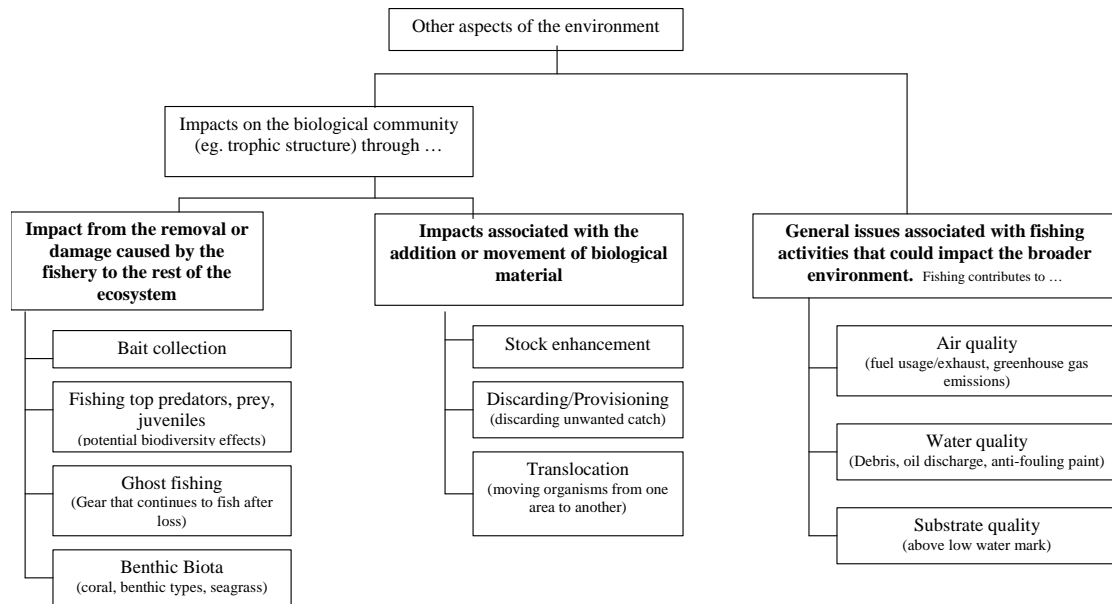
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

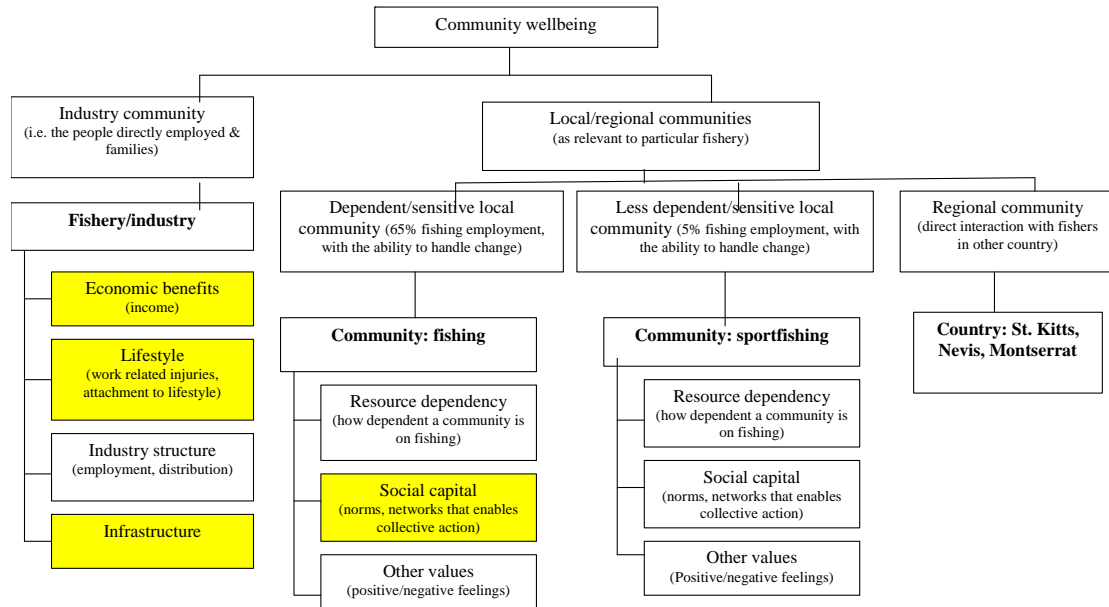
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

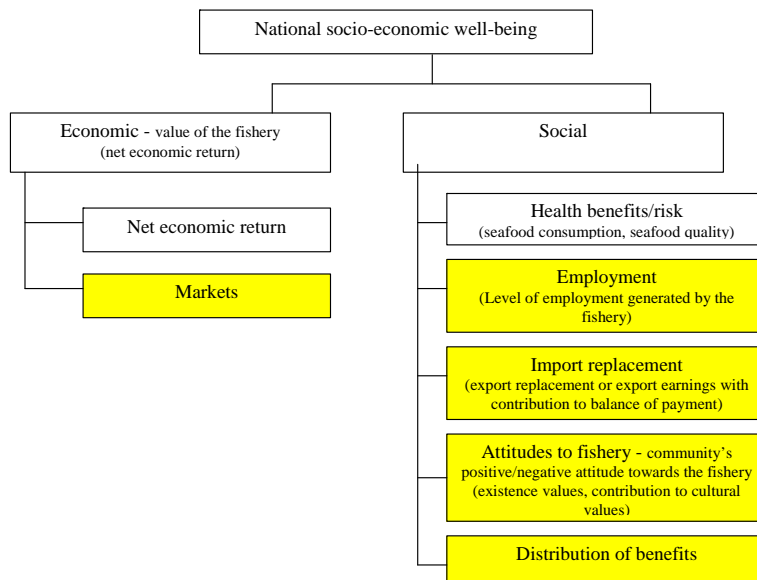
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

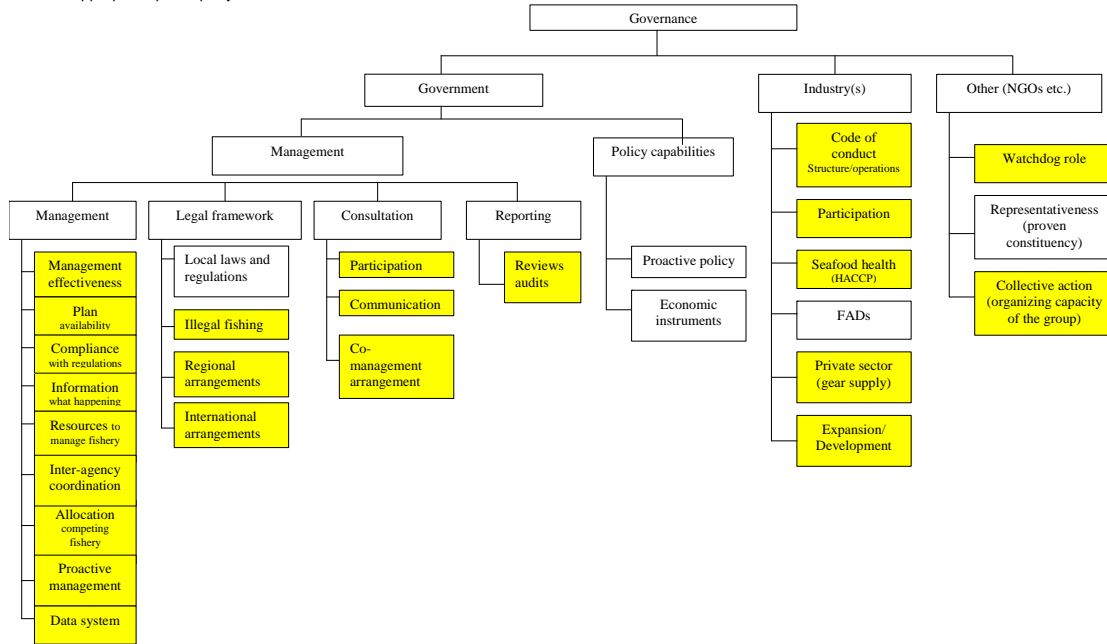
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

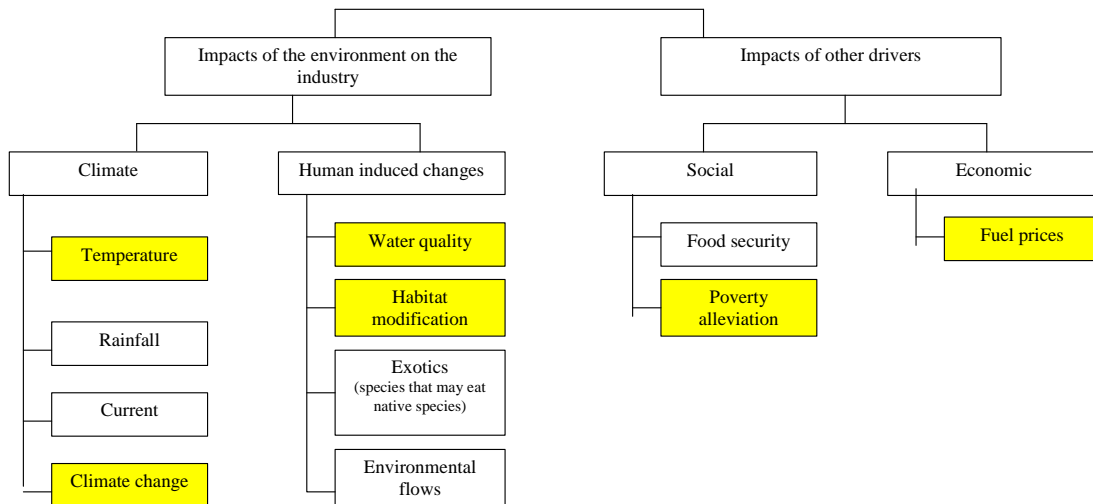
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



BARBADOS

Fisheries Division Conference Room, 1 and 2 March 2007

Pelagic fishery defined

The pelagic fishery was defined as vessels (dayboats, iceboats, and longliners) using specific gears (trolling, longline, handline, gillnet) to catch pelagic fish (tuna, dolphinfish, billfish, wahoo, swordfish, and flyingfish).

Identification of the issues

A total of 103 issues were identified and of these, 97 were prioritized. The ability to achieve accounted for 61% of the issues, ecological well-being 23%, and human well-being 16%. The highest single issue was governance which accounted for 54% of all issues identified (Figure 10).

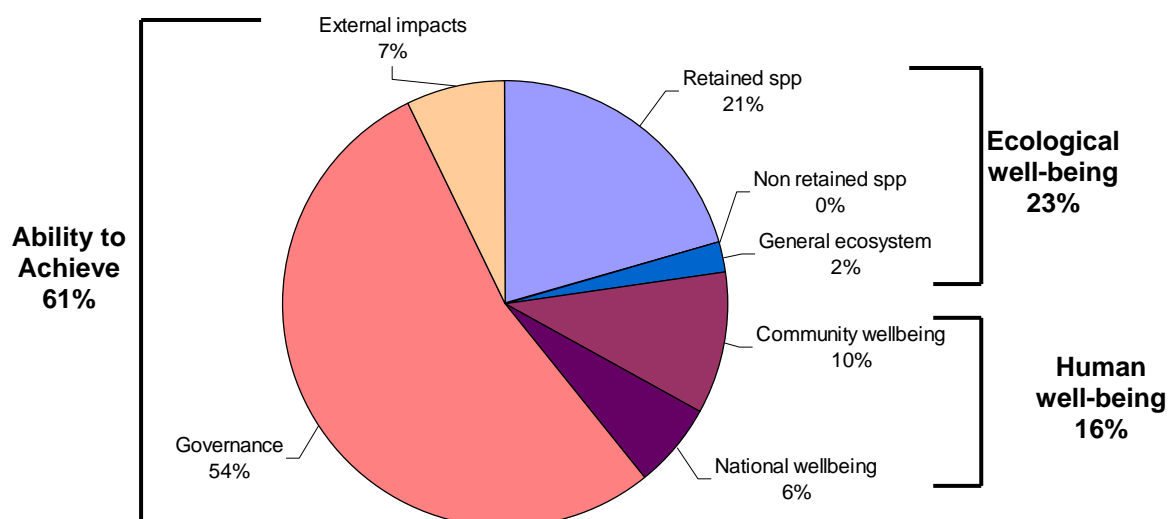


Figure 10: Percentages of issues identified within each component and category in the Barbados pelagic fishery.

Prioritization of issues

The prioritization process led to the distribution of issues into various risk categories, where 6% and 10% of the issues fell into negligible and low categories, and 21%, 21%, and 42% respectively fell with moderate, high, and extreme risks categorize. When considering the spread of risk categories within each component (Figure 11) a large proportion of the issues under the governance component was rated extreme, high, or moderate risk. Most of the issues prioritized under retained species rated negligible to moderate.

The issues as identified and prioritized by participants are shown in Section 2.1 and generic component trees are presented in Section 2.2. The discussion presented in this section only highlights the main issues and themes under each of the major components. No performance report was prepared in Barbados.

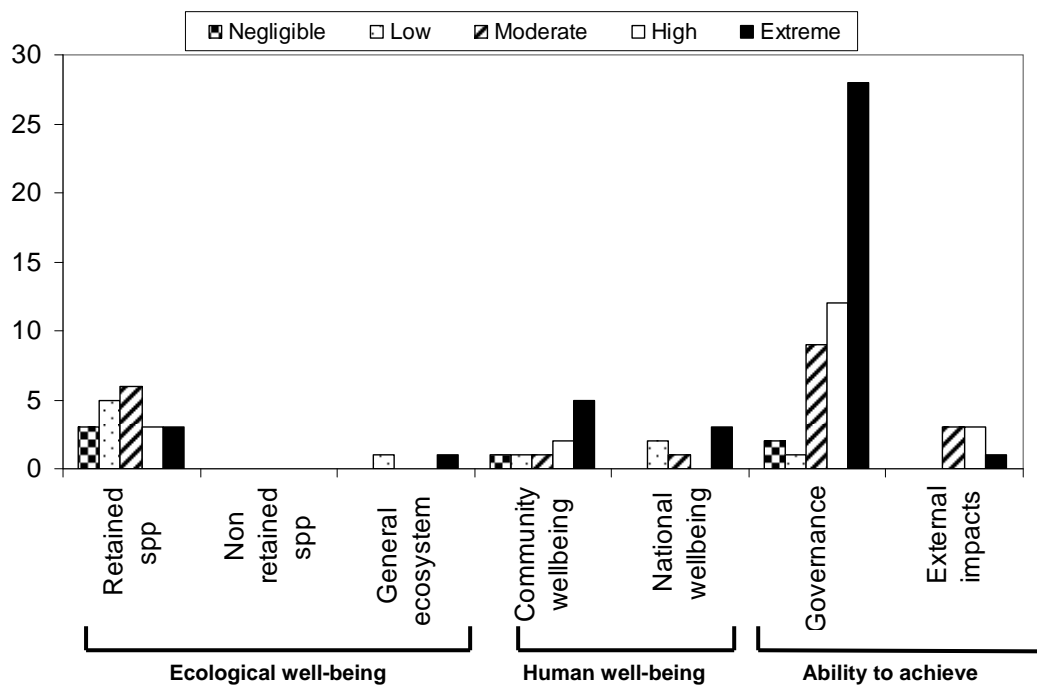


Figure 11: Proportion of issues within given risk categories (Barbados)

MAIN ISSUES AND THEMES

Ecological well-being

Of the species harvested, in most cases, issues were rated negligible to high risk to the ecological well-being of the fishery. The need to assess the distribution, abundance, and population structure of flyingfish was rated as extreme risk. Poor water quality caused by debris and oil discharge in the Bridgetown Harbour was also ranked as extreme risk.

Human well-being

The main community well-being concern was the inability of community members (including fishers) to organize and form sustainable groups, as they only came together when there was a crisis. The problem of poor interpersonal relationship amongst fishers was considered extreme risk to the industry. The size of the Bridgetown Fishing Complex (BFC) was of concern to participants as they noted that over the years the number and size of the fishing fleet increased.

Fishing being undervalued in the national context and not considered a government priority, was a major socio-economic concern. Also, the problem of import replacement as processors purchased cheap fish abroad which undermined local fish sale.

Ability to achieve

a. Governance

Governance was the subject of much debate and was ranked as high to extreme risk. The general consensus was that the division in management

responsibilities that currently exists in the Ministry reduces overall fisheries management efficiency by government. For example, the management of fish markets by the Markets Division and the bulk of other fisheries issues falling under the purview of the Fisheries Division. The existing fisheries management plan (2004 to 2006) was weak in defining management implementation strategies. Existing management legislation had several loopholes, while monitoring and enforcement capacity was made even more difficult by a shortage of manpower and in some cases, a lack of a formal structure for inter-agency collaboration.

The government provided training in seafood health, technology, etc. However, fisherfolk did not attend the meetings and there is limited implementation of this training. In terms of seafood health, although health standards were advocated, there were no legal requirements for Hazard Analysis and Critical Control Point (HACCP) only standards of hygiene.

b. External impacts

Of all the human induced changes, water quality was ranked as the highest risk. Participants cited the lack of adequate waste disposal (debris, oil, offal) at fish landing sites, in particular, the Bridgetown Fishing Complex.

Attendance

The workshop was attended by 14 participants mainly from the Fisheries Division, boat owners, and members from the fisher-folk organization BARNUFO (Table 9). There was a noticeable lack of fishers at this meeting due to increased fish landings prior to the workshop.

Table 9: List of participants in Barbados

Name	Organization
Joyce Leslie	Fisheries Division
Christopher Parker	Fisheries Division
Mercille Earle	Fisheries Division
Colvin Taylor	Fisheries Division
Gregory Franklin	Fisheries Division
Angelic G	Fisheries Division
Oliver Grant	BARNUFO
Angela Watson	BARNUFO
T. Felicia Corbin	Boat owner (Bridgetown)/ FAC Chairman
C. Jones	Boat owner (Bridgetown)
Chelston Thomas	Boat owner (Oistins)
Vernel Nicholls	Central Fish Processors Association
Fabian Hinds	Coastal Zone Management Unit
Hazel Oxenford	CERMES, UWI
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme).

Barbados **Fishery** pelagics
 Gear troll, longline, handline, gillnet
 Vessels longliners, iceboats, and dayboats

Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
ECOLOGICAL WELLBEING						
Issue related to retained species (those species that the large pelagic fisheries wants to capture and use) (i) <i>Issues related to target species</i>						
1. Tunas (Scombroidei)						
a. distribution	1	Distribution varies with temperature (migration pattern)	2	5	10	M
b. abundance	2	Not able to say as abundance varies with species	0	6	0	N
	3	Fish landings is increasing due to the development in longline fishing (ecological implications)	2	5	10	M
	4	Fish landings is increasing due to the development in longline fishing due to better export prices (economic implications)	0	5	0	N
c. population structure	5	FD not doing any assessment as all are done by ICCAT and the FD provides them with data	2	6	12	M

		ECOLOGICAL WELLBEING								
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category				
2. Dolphinfish (<i>Coryphaena hippurus</i>)										
c. population structure	6	Dolphinfishes are smaller and slimmer, thus the need to determine if there are changes in length-weight relationship	2	3	6	L				
	7	Do not have enough sample data to do assessment	2	6	12	M				
3. Billfishes (sailfish, marlin)										
b. abundance	8	ICCAT has blue and white marlin under stock rebuilding program yet Barbados is increasing catch	1	5	5	L				
c. population structure	9	Not able to do any assessment on billfish because we are not able to identify species when landed undress (headless, finless)	3	6	18	H				
4. Wahoo (<i>Acanthocybium solandri</i>) - called "kingfish"										
a. distribution	10	Migration pattern needs to be assessed	1	6	6	L				
	11	Stock status needs further investigation - previous assessment conducted produced unreliable results	3	6	18	H				
5. Swordfish (<i>Xiphias gladius</i>)										
6. Flyingfish (<i>Hirundichthys affinis</i>)										
a. distribution	12	Lack of an access agreement between Barbados and Trinidad	4	6	24	E				
b. abundance	13	Total catches is declining reason unknown	4	5	20	E				
	14	Variation in catches due to environmental issues (heavy siltation and high temperature)	3	6	18	H				
c. population structure	15	Stock status needs to be assessed	4	6	24	E				
ii. Issues related to secondary species (target fishery catches relatively minor amounts)										
a. Sharks (<i>Prionace glauca</i> , <i>Carcharhinus falciformis</i>)	16	The livers of sharks are removed then the shark discarded because fishers do not want to waste ice and space onboard longline vessels (issue of discarded sharks)	1	2	2	L				
	17	Under the radar of CITES, FAO, ICCAT; may need to spend time investigating (not much information is collected on sharks, since it is a by-	2	6	12	M				

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
		catch species)				
b. Ocean triggerfish - turpits (<i>Canthidermis maculata</i>)	18	Do not know much about the biology of this increasing by-catch species (study underway)	2	6	12	M
c. Congalee - triple tail (<i>Lobotes surinamensis</i>)	19	By-catch numbers are increasing	0	6	0	N
d. Mackerels (<i>Scombermorous spp.</i>)		No				
e. Turtle (leatherback, hawksbill, green)	20	Turtles are caught in the longline gear	1	2	2	L
Issues related to bait species and its impact on the large pelagic fishery						
Flyingfish		No				
Artificial lures		No				
Imported squid		No				
Issue related to general ecosystem: impact of a fishery on the ecosystem						
<i>1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem</i>						
c. Ghost fishing	21	Ghost fishing by gillnets and foreign nets fragments	1	2	2	L
<i>3. General issues associated with fishing activities that could impact the broader environment</i>						
b. Water quality	22	Debris and oil discharge affects water quality in the Bridgetown harbour	4	6	24	E

		HUMAN WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Contribution of the pelagic fisheries to community well-being						
a. Economic benefit	23	Problems between fishers and vendors re fish price	3	6	18	H
b. Lifestyle	24	Incidence of work related injuries (hooks)	1	5	5	L
	25	Loss of lives at sea	5	2	10	M
	26	Some fishers not satisfied with safety equipment and condition of vessels	5	1	5	L
	27	The 'ageing out' of boat-builders	4	6	24	E
	28	Discipline problem amongst fishers - poor interpersonal relationships	4	6	24	E
d. Infrastructure	29	The Bridgetown Fishing Complex (BFC) is too small - increased fishing fleet and size	4	6	24	E
1. Local communities						
<i>i) Dependent communities: (Oistins, Skeete's Bay, Conset Bay, Payne's Bay, Weston, Speightstown, Six Mens Bay, etc</i>						
<i>ii) Less dependent communities: Bridgetown</i>						
b. Are there norms and networks that enables collective action	30	Fishers have a strong sense of independence, thus collective action is difficult	3	6	18	H
	31	People will organize around division of labour but not to form other groups, only when there is a problem	4	6	24	E
<i>iii) regional communities</i>						
Norms and networks	32	In terms of regional agreements, fishers at sea do not have a problem with where each other fish, the problem is at the government/ political level	4	6	24	E
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						
a. Net economic return	33	Fishing industry undervalued in national context, the price of landed catch is recorded but the	4	6	24	E

		HUMAN WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
		value-added and spin-off activities are not taken into account				
	34	Fishing is not a government priority	4	6	24	E
	35	Loss of fishing to the national economy	4	3	12	M
2. Social						
a. Health benefits/risk	36	Health risk associated with eating a tuna or dolphinfish if not handled properly (day boats)	1	3	3	L
	37	Speed of access to ice on return from sea (day boats and moses)	1	2	2	L
c. Import replacement	38	Processors can purchase foreign fish cheaper than local fish	4	6	24	E

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries						
1. Government						
<i>i) Management</i>						
a. Management effectiveness	39	Management is made less effective because of the structure of the ministry and the division of labour between Markets Division and the FD	4	6	24	E
	40	Weak co-management structure for management	2	6	12	M
	41	Lack of follow through on management and policy issues	4	6	24	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Plan availability and comprehensiveness	42	Current plan is unavailable	3	6	18	H
	43	The plan does not explicitly deal with solid waste at fish markets	4	6	24	E
	44	The plan is weak in terms of defining action plans	4	6	24	E
c. Compliance with regulations	45	Lack of adequate regulations as it relates to markets and fisheries	4	6	24	E
	46	Regulations have no teeth (there are loop-holes)	4	6	24	E
	47	Lack of management skills and procedural guidelines as relates to markets	4	6	24	E
	48	Lack of wider community participation in reporting violations	2	5	10	M
	49	Low value place on fisheries matters in the judiciary system	4	6	24	E
	50	Little enforcement	3	6	18	H
d. Information	51	Not collecting adequate information for management (social and economic aspects)	4	6	24	E
	52	Lack of trained human resources to collect and analyse social and economic data	4	6	24	E
	53	Limited structure in-place for collecting social and economic data	4	6	24	E
	54	Little information to the public	3	6	18	H
	55	No system to record and use anecdotal information from fishers in institutional memory	4	6	24	E
e. Resources to manage the fishery	56	Manpower shortage at the FD	4	6	24	E
	57	Insufficient funds in general for completion of projects	3	5	15	H
f. Inter-agency coordination	58	No effective formal structure for collaboration, each agency has its own mission (CZMU, Market Division, FD) - limits the FD's ability to meet objectives	4	6	24	E
h. Proactive management	59	Generally crisis management, difficult to be proactive (so many things to fix)	4	5	20	E
i. Data system	60	The inconsistency of dividing catches by species and recording landed weight (e.g. mackerel data often lumped with wahoo at the market)	4	6	24	E

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
<i>ii) Legal framework</i>						
a. Local laws & regulations	61	Local laws and regulations inadequate, some laws need updating (eg. Markets Division's laws 30 years old)	4	6	24	E
	62	Difficulty moving from draft laws/regulations to implementation	4	6	24	E
b. Illegal fishing	63	IUU fishing by foreign vessels in Barbados water	2	6	12	M
c. Regional arrangements	64	Consensus amongst regional countries is difficult, not all arrangements are working	3	5	15	H
d. International arrangements	65	Barbados is a member of ICCAT but not attending meetings	4	6	24	E
	66	Inequitable allocation of quotas by ICCAT	4	6	24	E
	67	Barbados has no ICCAT quota for bluefin tuna	0	6	0	N
	68	Imposition of ICCAT trade sanction against Barbados for billfish quota overruns	2	4	8	M
	69	Have a substantial ICCAT quota for swordfish; however, catches are incidental, if Barbados does not increase catch they could loose it	1	6	6	L
	70	ICCAT has blue and white marlin under stock rebuilding program yet Barbados is increasing catch (economic consideration)	0	6	0	N
<i>iii) Consultation</i>						
a. Participation	71	Initial participation good, but eventually fades				H
b. Communication	72	Poor communication and feedback between fishers and management	3	6	18	H
c. Co-management arrangements	73	Fisher-folks not committed to the process, they do not stay together to work on a plan	4	6	24	E
<i>v) Policy capabilities</i>						
a. Proactive policy	74	Policies on some issues are outdated (eg. trade issues)	4	6	24	E
	75	Policy development is largely crisis driven loses momentum when the crisis pass (eg. fish kill, sea urchins).	4	6	24	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Economic instruments	76	Budget allocation for fisheries is subordinate to other industries (eg. tourism)	4	6	24	E
Industry						
a. Code of conduct (structure, operations)	77	Callous treatment of their own environment in terms of sanitation	3	4	12	M
	78	Poor collection/disposal of waste oil	4	6	24	E
	79	Lack of adequate waste disposal leaving inadequate facilities to place garbage	4	6	24	E
	80	Lack of a comprehensive utilization of fish offal	3	6	18	H
d. Seafood health (HACCP)	81	Government provides seafood handling training but fisherfolks are not attending the meetings	4	3	12	M
	82	Government provides fishermen training but they do not attend the meetings	4	5	20	E
	83	Improper fish handling practices by some vendors	2	5	10	M
	84	Inadequate facilities in markets for persons to put their training into practice	4	6	24	E
	85	Quality control officers are not dealing with seafood health issues at fish markets as consistently as they should	3	4	12	M
	86	No legal requirements for HACCP only standards for hygiene	4	6	24	E
h. Fishery expansion/Development	87	ICCAT constraints on billfish catches, a major target species group				
	88	ICCAT regulations to cap fleet size to 1991 levels				
3. Other (NGOs - BARNUFO, Barbados Marine Trust, Central Fish Processors Association, Fisherfolk organization (Oistins, Weston, Sand Pit), Barbados Fishing Cooperatives)						

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
a. Watchdog role	89	High incidence of knowing the issues only after the fact, therefore cannot make an input	3	5	15	H
	90	The NGO's ability to perceive their role as watchdog and policy developers	3	4	12	M
	91	Response to issues is crisis driven, then participation fades	3	5	15	H
	92	Fisherfolk often do not act in a business-like manner	3	5	15	H
c. Fisher organizations and collective action	93	Lack of good leaders for fisher organization (necessary to keep the group focus & together)				
	94	Decline in the number of fisher organizations				
	95	Move towards vendor focus organizations rather than fisher focus organizations				
	96	Need professional guidance to improve the functionality of fisher organizations				
Issue related to the environment and other issues of the industry						
1. Impacts of the environment on the fishery						
<i>i) Climate</i>						
b. Rainfall	97	Siltation level in the water is high due to heavy flooding which reduces fish catches of certain species (eg. flyingfish)	3	5	15	H
c. Current	98	Fish availability is affected by current (eg. Current patterns once in the north now coming to the south)	2	5	10	M
<i>ii) Human induced changes</i>						
a. Water quality	99	Water quality in BFC fishing harbour not monitored	3	6	18	H
	100	BFC fishing harbour does not have a proper flushing system	4	6	24	E

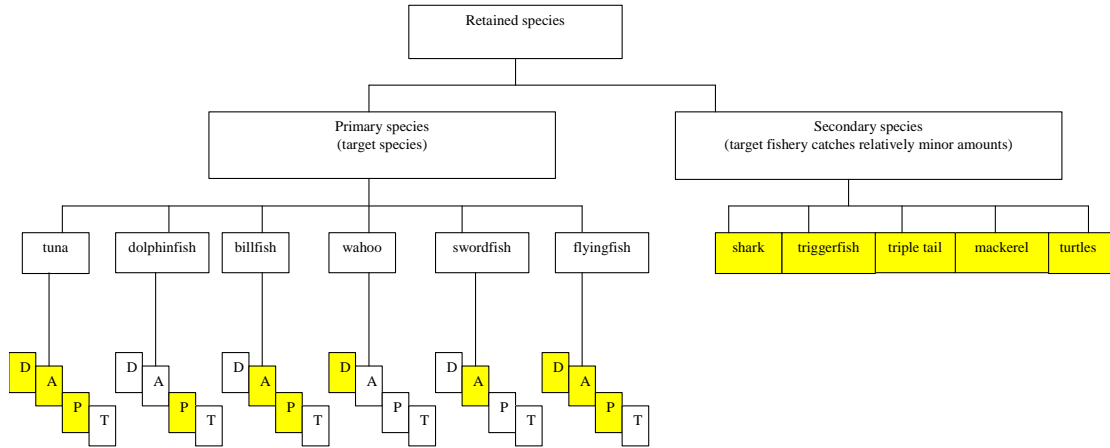
ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	101	Impacts of deforestation and soil erosion in South America on water quality	3	5	15	H
2. Impacts of other drivers						
<i>i) Social</i>						
a. Food security	102	If there is an outbreak in bird flu or mad-cow to guarantee food the country the industry will have to increase fish catch	4	2	8	M
b. Poverty alleviation		(as ID 102)				
<i>ii) Economic</i>						
a. Fuel prices	103	High fuel prices could increase the price of fish	2	4	8	M

GENERIC COMPONENT TREES (BARBADOS)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE PELAGIC FISHERY

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.



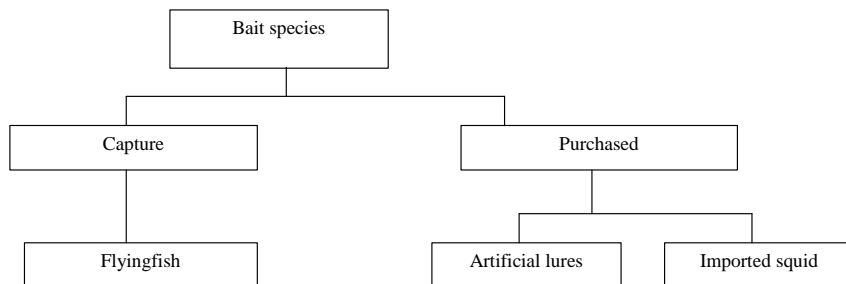
KEY: D-distribution; A-abundance; P-population structure; T-discard

Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

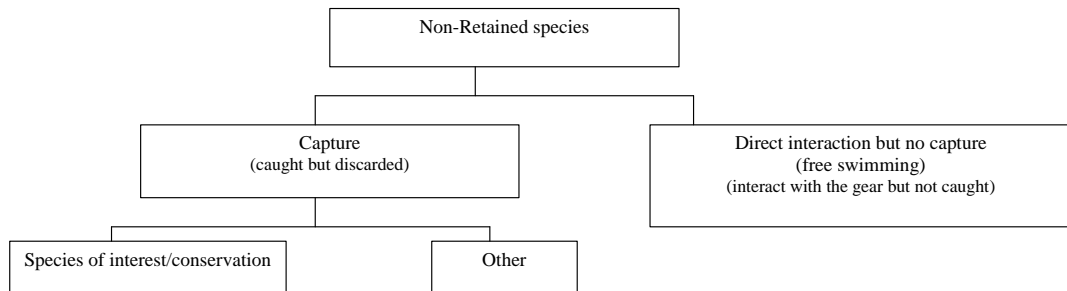
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

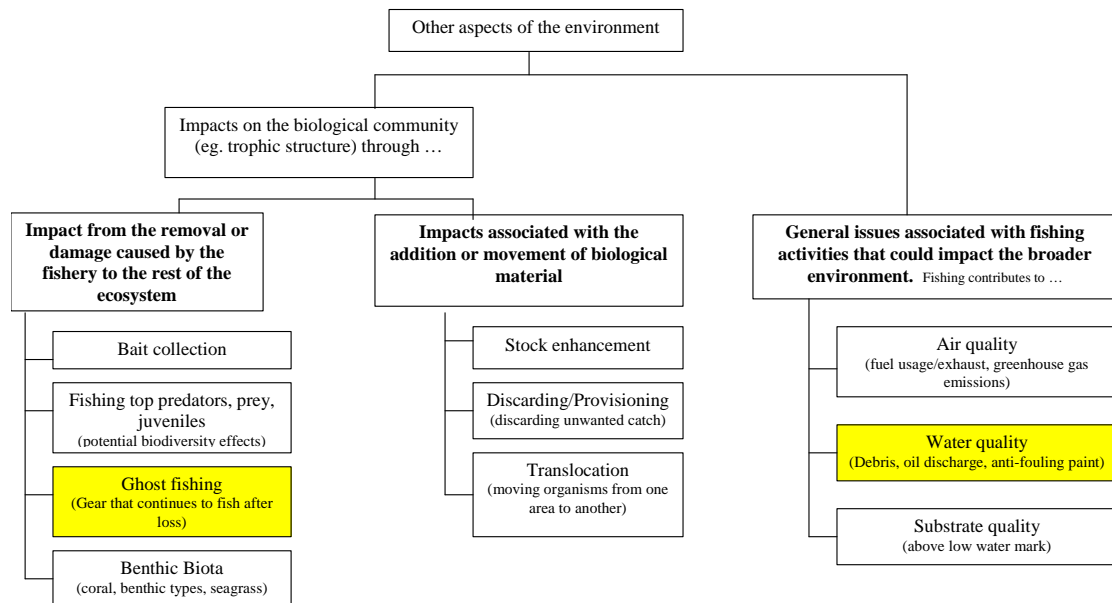
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

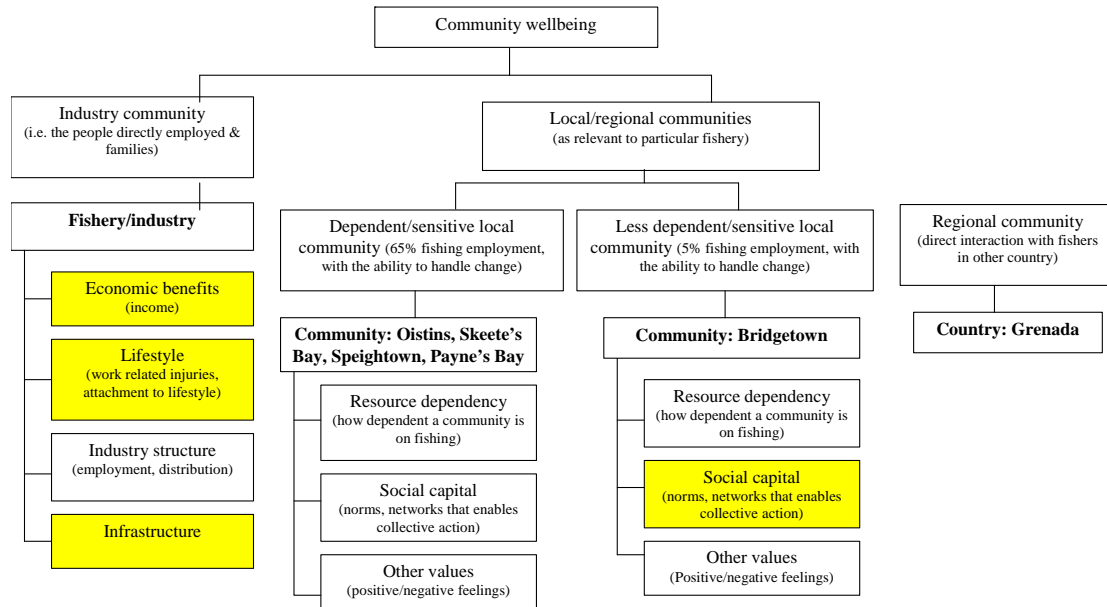
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

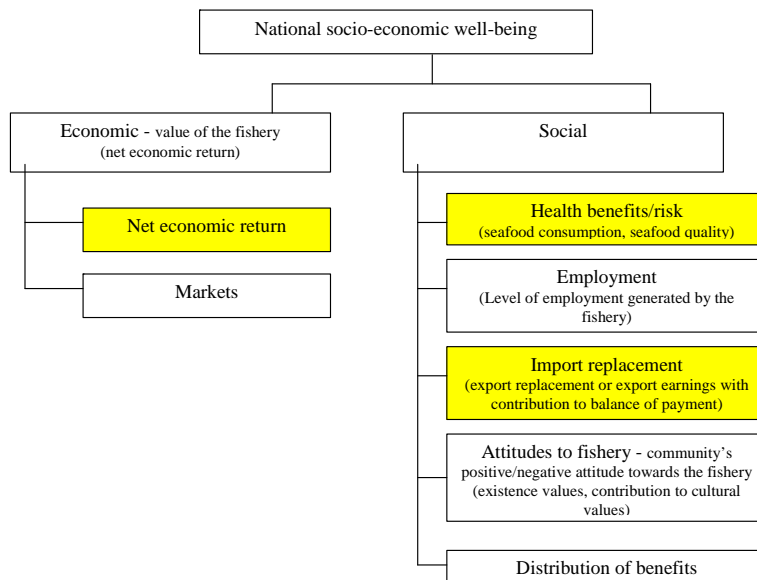
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

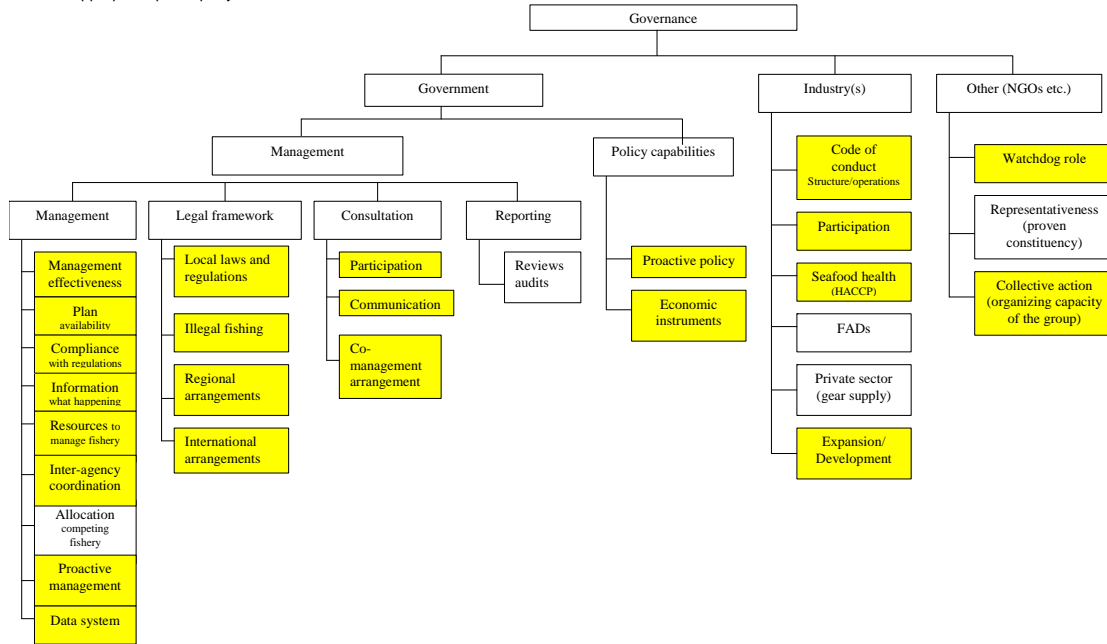
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

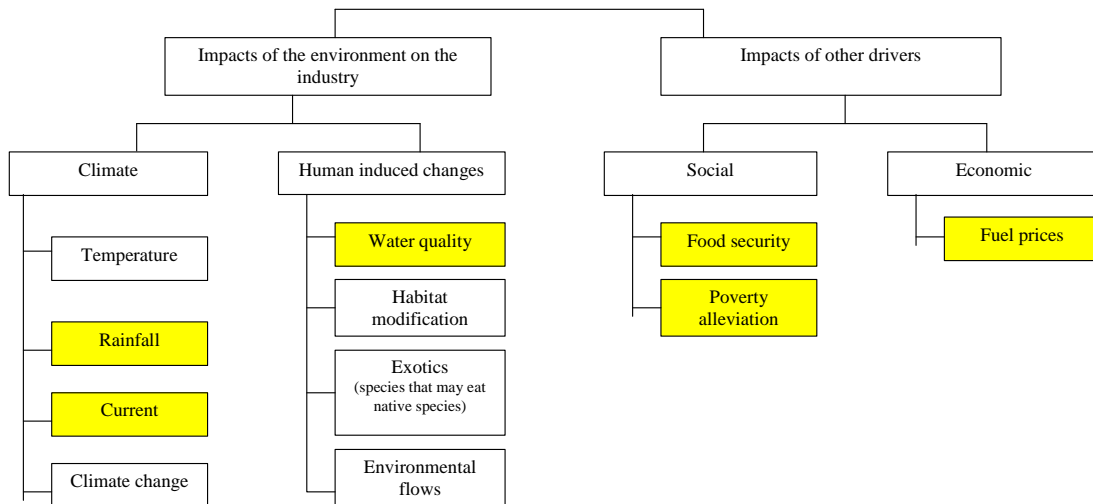
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



COMMONWEALTH OF DOMINICA

Roseau Fisheries Complex Conference Room, 17 and 18 May 2007

Pelagic fishery defined

The pelagic fishery was defined as vessels (canoes, keel, fibreglass) using specific gears (vertical handline on FADs, trolling, and surface longline) to catch fish types (tuna, dolphinfish, marlin, blackfin tuna, wahoo, skipjack, and kingfish). Secondary species included shark, swordfish, turtle, and ocean triggerfish. Bait species included bigeye scad, flyingfish, ballyhoo, small tunas, and squid. Non-retained species included cutlassfish and seabird.

Identification of the issues

A total of 106 issues were identified and prioritized (Section 3.2). The ability to achieve accounted for 66% of the issues identified, ecological wellbeing 16%, and human wellbeing 18% (Figure 12). Governance accounted for 56% of all issues identified followed by retained species at 14%.

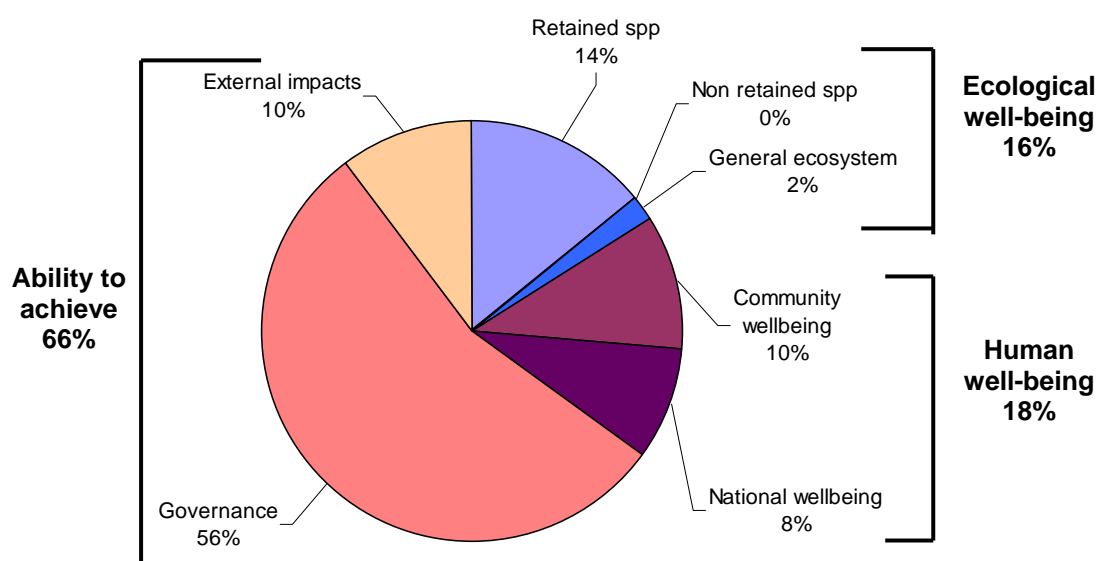


Figure 12: Percentages of issues identified within each component and category in the Commonwealth of Dominica pelagic fishery.

Prioritization of issues

During the prioritization process most of the issues fell within the high and extreme risk categories, 39% and 47% respectively, while only 8% scored moderate and 6% fell within the low and negligible categories. Ninety-four percent of issues were rated as moderate or higher. When considering the spread of risk categories within each component a large proportion of the issues under ability to achieve (governance, external impacts) were rated high or extreme risks (Figure 13).

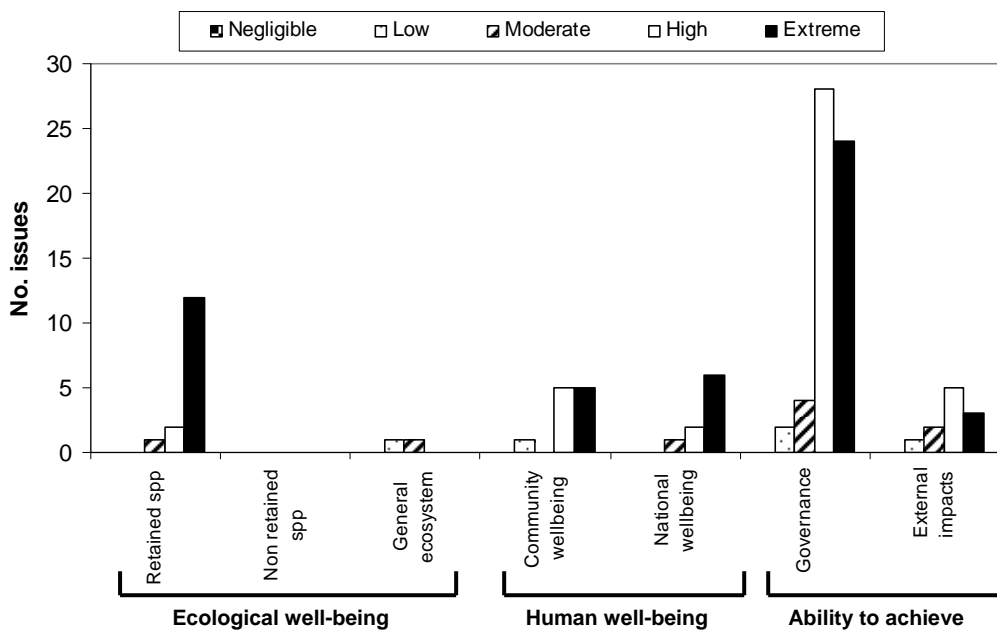


Figure 13: Proportion of issues within given risk categories (Dominica)

MAIN ISSUES AND THEMES

Ecological well-being

Pelagic landings increased recently due to the use of Fish Aggregating Devices (FADs); thus, participants did not observe any noticeable changes in distribution and abundance. Population structure was ranked as extreme risk because the Fisheries Division had limited biological data on the ten primary target species. The decline in several bait species and competing demand for food fish and bait were considered moderate to high risk. In regard to general ecosystem, participants were concerned about the indiscriminate disposal of used oil, ranked moderate risk level.

Human well-being

Fishers were concerned about low fish prices, as up to three quarters of fishers' income was operating expenses. On the other hand, participants agreed fishers could improve economic benefits from fishing if they practice better money management.

A lifestyle change was needed to further develop the fishery as it was ranked high risk. Such lifestyle changes included (1) fishers' individualistic and territorial attitude, (2) the need to increase the average number of fishing days per week from 2.35, and (3) the difficulties in getting community members to work together. These lifestyle changes will have an impact on any plan to expand the large pelagic fishery in Dominica.

While fishers were happy with the general improvements in infrastructure at landing sites, they considered it a matter of urgency to have a gas pump and tank installed at Fond St. Jean and an ice machine at Marigot, as both facilities

could help to reduce operating expenses and increase economic benefits for fishers.

The Fisheries Division was not able to value the pelagic fishery because they did not have the necessary data; hence, this was ranked as extreme risk to the fishery.

The lack of formal export markets both regionally and internationally, poor fish distribution system on the island, and the need to increase storage capacity were viewed as being high or extreme risk to the fishery.

A change in the attitude of young people towards fishing is needed. Many view the occupation as an employment of last resort. The Division needs to encourage younger people to get involved as the average age of fishers is about 40 years.

Ability to achieve

a. Governance

Management of the pelagic fishery could be more effective. Currently, there were no regulations (the Division relied on volunteer compliance), no current plan in place, generally no compliance, and limited resources. Even with limited biological data and landing statistics from major landing sites, the Fisheries Division did not have the resources (tools, equipment, finances, and manpower) to increase data collection activities.

Fisher lack of attendance to meetings was ranked high risk. Fishers commented that they did not like to attend meetings because there was no satisfactory follow-up, other participants stated fishers did not feel the need to attend meetings and they felt challenged or embarrassed to participate. A major concern was the need for better cooperation amongst fishers and better managed fishermen's cooperatives.

There were mixed risk values allocated to issues related to the industry. It was clear from the discussion that several issues needed improvement, e.g. the quality of seafood, monitoring and regulation of FAD fishing, and the processing industry.

b. External impacts

Participants were concerned about coastal activities (e.g. airport construction and quarries) that were destroying marine habitats which could have an impact of the bait fishery. They were also concerned about the high cost of fish to consumers which could limit consumption and reduce health benefits to society. In addition, high fuel costs which increased operating cost and reduced fishing effort, could further increase the price of fish .

PERFORMANCE REPORT

Participants agreed to develop a draft performance report to address data and information needs to assess distribution, abundance, and population structure and the effects of changes in fishing activities due to FAD fishing (Table 10). These issues (ID 1-11) were ranked as extreme risk to the fishery.

Table 10 Proposed performance report on data and information needs in Dominica

Major issue	Data and information needs to assess distribution, abundance, and population structure and the effects of changes in fishing activities due to FAD fishing.
Issue ID	1 - 11
Operational objective	Improve the data collection, management, and analysis system to better understand the pelagic resources around Dominica
Indicators	
Activities/Data requirement	Analyze existing data – catch and effort data by major landing sites Literature review – determine what information exists Stock assessment – catch, effort, biological (otoliths, length, gonads; need data from other countries; type of models to use) Institutional capacity Budget Training lab
Fisheries management response	Current: Catch and effort data are collected at major landing sites
External drivers	Resources; Officer trained in stock assessment and/or statistical analysis

Attendance

Fifteen participants attended the workshop, including officers from the Fisheries Division, data collectors, fishermen cooperatives members, fishers, and the Coast Guard (Table 11).

Table 11: List of participants in Dominica

Name	Organization
Harold Guiste	Fisheries Division, Senior Fisheries Officer
Norman Norris	Fisheries Division, Fisheries Officer
Riviere Sebastian	Fisheries Division, Fisheries Officer
Derrick Theophile	Fisheries Division, Fisheries Liaison Officer
Kerr Serrant	Fisheries Division, Fisheries Liaison Officer, Extension
Sharon Corriette	Fisheries Division, Data Operator/Supervisor
Rosette Lewis	Fisheries Division, Data Collector (Bioche)
Hevelyn Adams	Fisheries Division, Data Collector (Scotts Head)
Al Philbert	Retired Fisheries Officer, Fisheries Expert
Baylon Fontaine	Fond St. Jean Fisheries Cooperative, Data Collector, Marketing Associate
Vaughn Casimir	Newtown Fisheries Cooperative, Officer in Charge of Roseau Fisheries Complex, Fisher
Oliver Victor	Roseau Fisheries Complex
Caleb Seraphine	Fisher (Marigot)
Oliver Frederick, Insp.	Coast Guard, Commandant
Cornelins Francis	Coast Guard (Police)
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme).

Commonwealth of Dominica **Fishery** pelagics
 Gear vertical handline (FADs), trolling, surface longline (large vessels)
 Vessels canoes, keel, fibreglass

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
Issue related to retained species (those species that the pelagic fisheries wants to capture and use)						
<i>(i) Issues related to target species</i>						
1. Tunas (Scombroidei)						
a. distribution	1	Needs to be assessed, limited data (FADs changed fishing practice)	4	6	24	E
c. population structure	2	Needs to be assessed (size decreasing), have catch and effort data but no biological	4	6	24	E
2. Dolphinfish (<i>Coryphaena hippurus</i>)						
c. population structure	3	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
3. Billfishes (blue, white, and stripe marlin)						
c. population structure	4	Needs to be assessed, have catch and effort data but no biological	4	6	24	E

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
4. Wahoo						
c. population structure	5	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
5. Kingfish						
c. population structure	6	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
6. Skipjack (<i>Katsuwonus pelamis</i>)						
c. population structure	7	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
7. Barracuda						
c. population structure	8	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
8. Mackerels (Scombermorous spp) - king mackerels,						
c. population structure	9	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
9. Blackfin tuna						
c. population structure	10	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
10. small tunas (bonitos)						
c. population structure	11	Needs to be assessed, have catch and effort data but no biological	4	6	24	E
<i>ii. Issues related to secondary species (target fishery catches relatively minor amounts)</i>						
a. sharks (Elasmobranchii)		No (not targeted but caught in small quantities)				
b. ocean triggerfish 'boost'		No (caught in large quantities around FADs)				
c. turtles	12	The legislation is conflicting as the Fisheries Division is responsible when the turtle is at sea and the wildlife/forestry is responsible when they are ashore	3	6	18	H
d. swordfish		No (incidental catch)				
e. sailfish		No (incidental catch)				

ECOLOGICAL WELLBEING			Consequence	likelihood	Risk	Category
Issue	ID	Description of issue				
Issues related to bait species and its impact on the pelagic fishery						
a. jack		(As ID 14)				
b. flyingfish (Hirundichthys affinis)	13	Abundance declined in the last 5 years	4	6	24	E
c. ballyhoo (Hemiramphus balao)		(As ID 14)				
d. squid (local)		No (not a direct fishery, however, when caught used as bait)				
e. small tunas		No (caught around FADs then used to catch larger fish)				
f. artificial lures	14	No Problems with the seine fishery, thus some fishers are unable to go fishing because they do not have bait (e.g., jack, flyingfish, ballyhoo)	2	4	8	M
	15	Competition between using fish as food or bait (e.g., cast net fishers are choosing to eat the fish rather than sell as bait)	3	6	18	H
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. cutlass fish		(catch and release)				
b. seabirds		No				
Issue related to general ecosystem: impact of a fishery on the ecosystem <i>1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem</i>						
c. Ghost fishing	16	There is the concern that the amount of lost ropes and monofilament lines could have an effect on the bottom type but the impact needs further investigation	1	1	1	L
<i>3. General issues associated with fishing activities that could impact the broader environment</i>						
b. Water quality	17	Indiscriminate disposal of 'used oil' (nowhere to dispose the oil)	2	6	12	M

		HUMAN WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Contribution of the pelagic fisheries to community well-being						
a. Economic benefit	18	The price of fish is high for consumers but low for fisher (operating expenses)	4	6	24	E
	19	Fishers need better money management to improve economic benefits	3	6	18	H
	20	¼ - ¾ of fishers income is operating expense	4	6	24	E
	21	Will not provide traditional subsistence, fishers want to sell large fish whole	3	6	18	H
b. Lifestyle	22	Fishers need to increase the average number of fishing days per week from 2.35 days/week to further develop the pelagic fishery. The lifestyle of fish today, stay home tomorrow needs to change.	3	6	18	H
	23	Fishers are individualistic and territorial which affects collective action	3	6	18	H
d. Infrastructure	24	Need a gas pump and tank at Fond St. Jean	4	6	24	E
	25	Need a ice machine at Marigot	4	6	24	E
	26	Fishermen lockers are not being utilized at Scotts Head (needs light and water)	1	6	6	L
1. Local communities (people who are directly employed and their families)						
<i>i) For major communities</i> (Marigot, Portsmouth, Dublanc, Bioche, Colihaut, Batalie, St. Joseph, Layou, Fond Cole, Roseau Fisheries Complex (RFC), Newtown, Scotts Head, Fond St. Jean, San Sauveur, ...)						
b. Are there norms and networks that enables collective action	27	Community members generally do not work together	3	6	18	H
<i>iii) regional communities</i> (Martinique, Guadeloupe)						
Norms and networks	28	For years a social relationship has developed between Dominican fishers and fishers from the French islands (e.g., joint FAD investment, the French provides protection, gifts of bait, line, soap, wine, oil, etc.) which may affect national security and foreign FADs deployed in Dominica water.	4	6	24	E
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
a. Net economic return	29	Not able to value fishery, limited data	4	6	24	E
b. Markets	30	Do not have export markets because of quality control issues, consistency in quantity, fish type, and limited air transportation	3	6	18	H
	31	Need a better fish distribution system - coastal villages flooded with fish, while internal communities have no fish	4	6	24	E
	32	Need to increase storage capacity for fish	4	6	24	E
	33	Need fish processing industry (smoking, salting, sun-drying, filleting) to add value to primary fish production	3	3	9	M
2. Social						
a. Health benefits/risk	34	Seafood quality needs improvement	4	6	24	E
	35	Price of fish limits consumption	3	6	18	H
c. Import replacement	36	Some importers are importing seafood products without import certification from the Fisheries Division; we do not know the extent of the situation	4	6	24	E
	37	Hotels, supermarkets, etc. need to import seafood because local supply cannot meet demand	3	6	18	H
d. Attitudes to fishery	38	Young people do not want to become fishers or get involved in fishing (employment of last resort). Need to get more young people involved as the average age of a fisher is about 40 years.	4	5	20	E

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries						
1. Government						
<i>i) Management</i>						
a. Management effectiveness	39	Management is not effective because the fishery is not regulated	4	6	24	E
	40	Need specific regulations for the pelagic fishery	4	6	24	E
b. Plan availability and comprehensiveness	41	The management plan was done in 1995 by CFRAMP, but there is no current plan in place	4	6	24	E
	42	Decision-makers are not seeing the management plan as a priority	4	6	24	E
c. Compliance with regulations	43	There is no consequence for action, and it is getting worst (The attitude of some fishers is that I fish what I want and do what I want)	4	6	24	E
	44	Need bigger boat(s) for MCS, especially to deal with illegal fishers	4	6	24	E
e. Resources to manage the fishery	45	Limited resources ('we brokes')	4	6	24	E
f. Inter-agency coordination	46	Policies and the lack of policies in other government departments impact the Fisheries Division (e.g. tourism development, beach front development, quarries). Generally works well both formally and informally with Social Security Board, Bureau of Standards, Coast Guard, Environment, and Health	4	6	24	E
g. Allocation amongst competing fishery	47	Resources are not allocated to fishery (not enough to allocate)	4	6	24	E
h. Proactive management	48	Sometimes management is proactive	2	6	12	H
i. Data system	49	The Fisheries Division does not have the necessary resources (tools, equipment, finances) to increase data collection activities to include biological data	4	6	24	E
<i>ii) Legal framework</i>						

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
a. Local laws & regulations	50	Need to gazette draft regulations – the Division does not have any regulations in place on the Fisheries Act #11 of 1987, they rely on other Acts and Regulations to prosecute offenders (e.g., laws of the land to deal with activities at sea within the 12 miles limit)	4	6	24	E
	51	The Fisheries Division relies on volunteer compliance from fishers which restricts the action of the Division and Coast Guard	4	6	24	E
	52	The lack of political will makes it difficult to legalize/ gazette fisheries regulations	4	6	24	E
	53	Even when Fisheries Officers and the Coast Guard apprehend fisher(s) the authorities release the individual	4	6	24	E
	54	Fishers should pressure government to put regulations in place	4	6	24	E
b. Illegal fishing	55	Illegal Bajan and French fishers	$\frac{3}{4}$	6	18/24	H/E
	56	Foreign fishers put gun on fishers in our own waters (the Channel), Dominican fishers give boat number, etc. to the authorities yet they are not prosecuted	4	2	8	M
d. International arrangements (ICCAT, IWC)	57	Not a member of ICCAT, hence, we are not able to influence decisions	2	2	4	L
<i>iii) Consultation</i>						
a. Participation	58	Fishers do not like to attend meetings because there is no satisfactory follow-up	3	6	18	H
	59	The same set of people attend meetings all the time, need to include other stakeholders	3	6	18	H
	60	Fishers feel embarrassed/challenged to participate in meetings because they are uneducated	3	6	18	H
	61	It is a cultural thing, they do not see the need to participate	3	6	18	H
b. Communication	62	Lack of due consideration for technical advice from Officers and fishers	3	6	18	H
c. Co-management arrangements	63	The Fisheries Division generally work with people, however, participation is restricted by legislation	3	6	18	H
<i>v) Policy capabilities</i>						

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
a. Proactive policy	64	Not proactive, no formal fisheries policies	4	6	24	E
2. Industry						
a. Code of conduct (structure, operations)	65	Fishers who follow recommended quality control procedures at higher operating expenses and fishers who do not follow such procedures are selling fish at the same price. This is a disincentive to those who follow the rules, something should be done about fishers who do not follow the rules	3	6	18	H
	66	100% effort and 0% result - the Fisheries Division has structures in place to deal with issues but not able to produce effective results	4	6	24	E
b. Participation	67	Fishers are not willing to give up a day of fishing to participate in meetings or activities related to the industry.	3	6	18	H
c. Seafood health (HACCP)	68	No HACCP plan in place at Marigot fisheries complex (there is no ice making machine, freezers not certified, ungutted fish contaminates gutted fish in the freezer, incorrect chemical used to clean the complex, cutting fish on wood, conditions on the boats, conditions of the fishers (smoking, etc.) while cleaning fish, and throwing fish on the beach)	4	6	24	E
	69	<1% of fishers are practicing quality control (most fishers are not icing fish at sea)	4	6	24	E
	70	Bad handling of fish (at sea and on land)	3	6	18	H
	71	Need to change society's attitude towards iced fish (they believe that once fish is on ice it is not good)	2	5	10	M
	72	The storage of fish needs upgrading at the Roseau Fisheries Complex	2	5	10	M
	73	Storage of fish needs upgrading at Marigot	4	2	8	M
	74	While there is ice capacity to supply current production levels, the problem is distributing ice from the RFC to the rest of the island	4	6	24	E
	75	Will need to increase ice making capacity if fish production increase or quality control improves	4	6	24	E
76	Need continuous training and education in quality control to sensitize fishers and	3	6	18	H	

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	77	consumers More needs to be done in regards to monitoring and compliance (MoH)	3	6	18	H
d. FADs	78	Fishers need to carry out proper fishing practice around the FAD (e.g., FADs attracts small fish which brings larger fish, fisher are catching small fish)	3	6	18	H
	79	Legislation required to regulate FADs in the waters of Dominica (e.g., if a fisher wants a FAD, the Fisheries Division cannot tell them what to do)	3	6	18	H
	80	User conflicts amongst fishers	3	6	18	H
	81	Need to regulate IUU fishing on FADs in Dominica waters	3	6	18	H
	82	The Fisheries Division needs a boat for research and development	4	1	4	L
	83	Fishers need to give their FAD location to the Fisheries Division and Coast Guard	4	6	24	E
	84	Fishers are indiscriminately setting FADs (improper measurement, in shipping lanes, the Fisheries Division is not informed, no proper navigation signals etc. - i.e., 'they set FADs and pray').	3	6	18	H
	85	The purpose of the FAD is defeated - It was intended to bring fish closer to shore, thus, fishers would travel shorter distances, but fishers are 'hiding' FADs further offshore because of user conflict	3	6	18	H
	86	Problem of piracy	3	6	18	H
	87	Need to register the owner and position of FADs for navigation and search and rescue purposes	3	6	18	H
e. Private sector	88	Price of fishing gear is too expensive	4	6	24	E
	89	Unavailability of different types of gear	4	6	24	E
3. Other (NGOs – Marigot Fisheries Cooperative, St. Peters Fisheries Cooperative*, Fond St. Jean Fisheries Cooperative*, Dominica Fisheries Cooperative*, Newtown Fisheries Cooperative*, St. Marks Fisheries Cooperative, Vielle Case Fisheries Cooperative)						
*active cooperative						
a. Watchdog role	90	Not doing their watchdog role	3	6	18	H

		ABILITY TO ACHIEVE				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
c. Fishers Cooperative and collective action	91	Fishers do not cooperate, only one set working all the time	3	6	18	H
	92	Poor management of cooperatives (power struggle, greed, politics, education, dependency syndrome)	3	6	18	H
	93	Fishers cannot handle the added workload and responsibilities of the Cooperatives (e.g., fishing, marketing, distribution, management of cooperatives, management of fishing infrastructure)	3	6	18	H
	94	Fisheries Cooperatives need more assistance from the Cooperative Department (the Department left much of the responsibility to the Fisheries Division)	3	6	18	H
	95	Fishermen Cooperative need to reinvent itself	3	6	18	H
	96	Fishers need to better utilize fishing infrastructure	3	6	18	H
Issue related to the environment and other issues of the industry						
1. Impacts of the environment on the fishery						
<i>i) Climate</i>						
a. Temperature	97	At present water temperature is very hot (catch more fish when the water is cooler)	3	6	18	H
d. Climate change	98	We do not have enough evidence of climate change, however, it is believed that global warming is affecting fishing activities	3	6	18	H
<i>ii) Human induced changes</i>						
a. Water quality	99	Airport construction dumps soil from excavation into the sea, fishers are not seeing red fish or lobster in the area as before, the reef is being smothered to death, yet, nobody pays any mind to fisheries (potential impact on bait fishery)	4	6	24	E
	100	Needs to be assessed; no water quality test done to determine the status	2	4	8	L
b. Habitat modification/destruction	101	Quarries wash sand and stone with hot water which creates a plume that smothers and kill corals (impact on bait fishery)	2	6	12	M

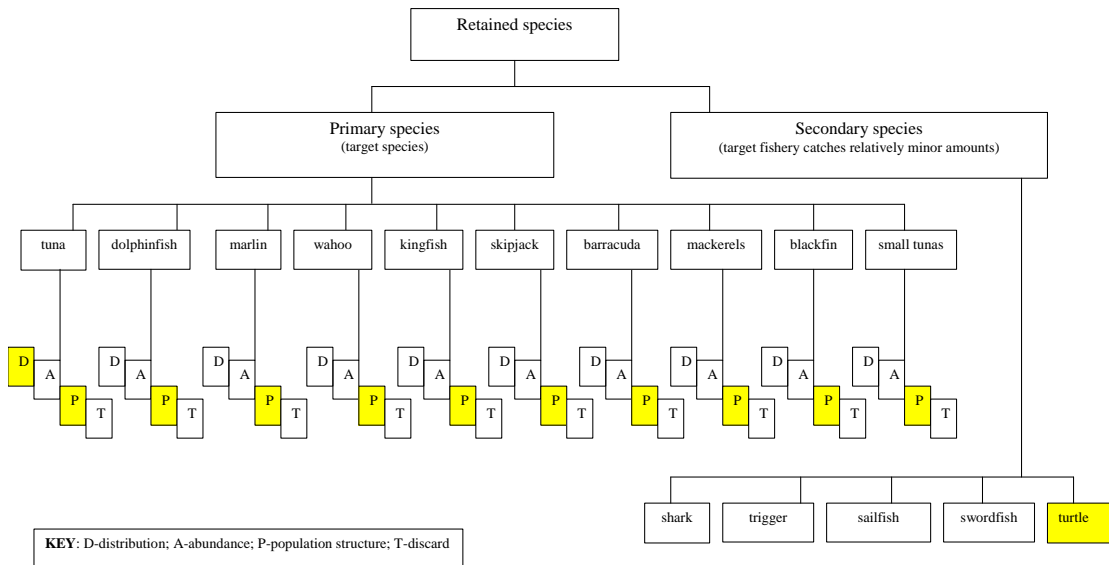
ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
c. Species that may eat native species	102	Needs to be assessed; vessels discharge ballast water in Dominica waters	3	6	18	H
2. Impacts of other drivers						
<i>i) Social</i>						
a. Food security	103	Consumers rather capture than cultured species (prawn and tilapia) which is important for food security (Many would like to go into aquaculture but people are not familiar with the taste)	2	5	10	M
	104	Coastal pelagic fishery declined, therefore, not contributing to food security which has an impact on seine fishers and the community	3	6	18	H
<i>ii) Economic</i>						
a. Fuel prices	105	Too high (\$11.79/gal)	4	6	24	E
	106	The price of fuel has impacted fishing effort, fishers are making fewer trips to sea	4	6	24	E

GENERIC COMPONENT TREES (DOMINICA)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE PELAGIC FISHERY

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.

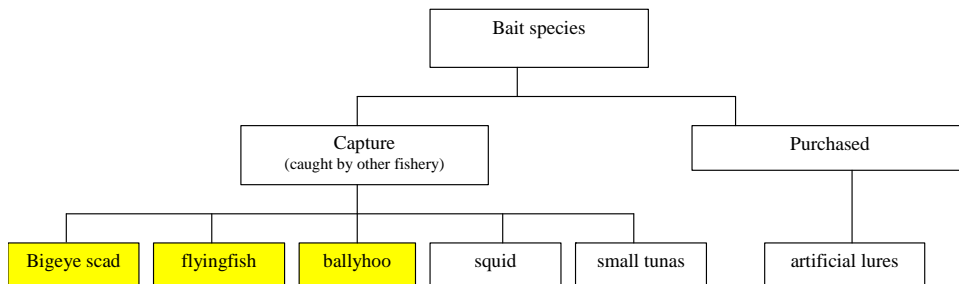


Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

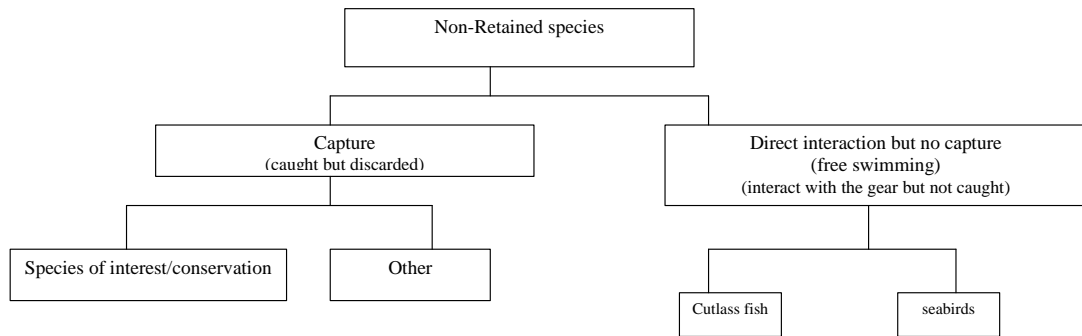
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

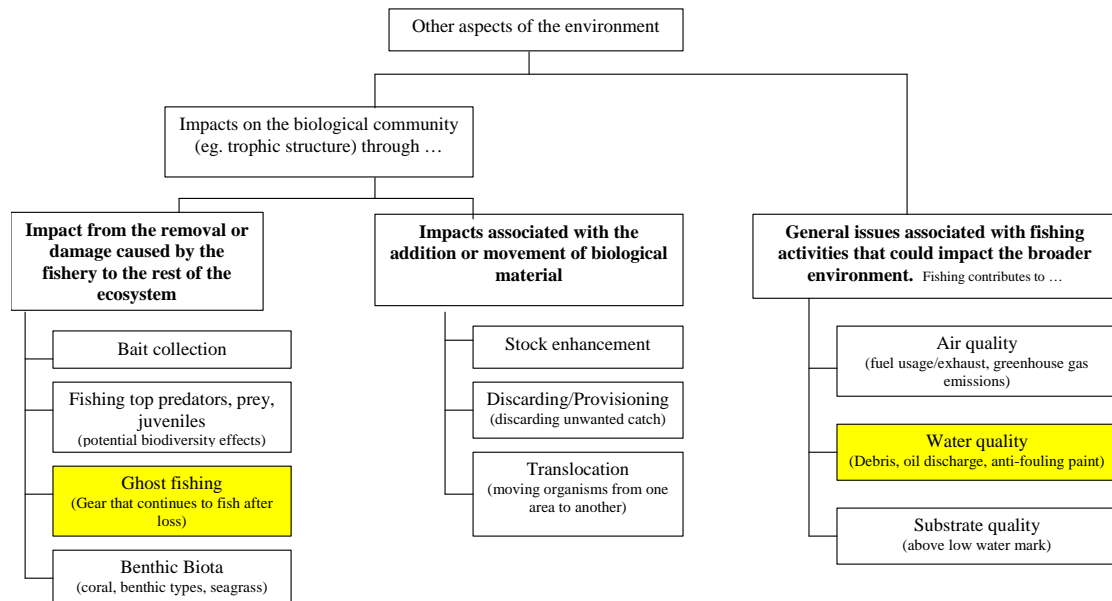
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

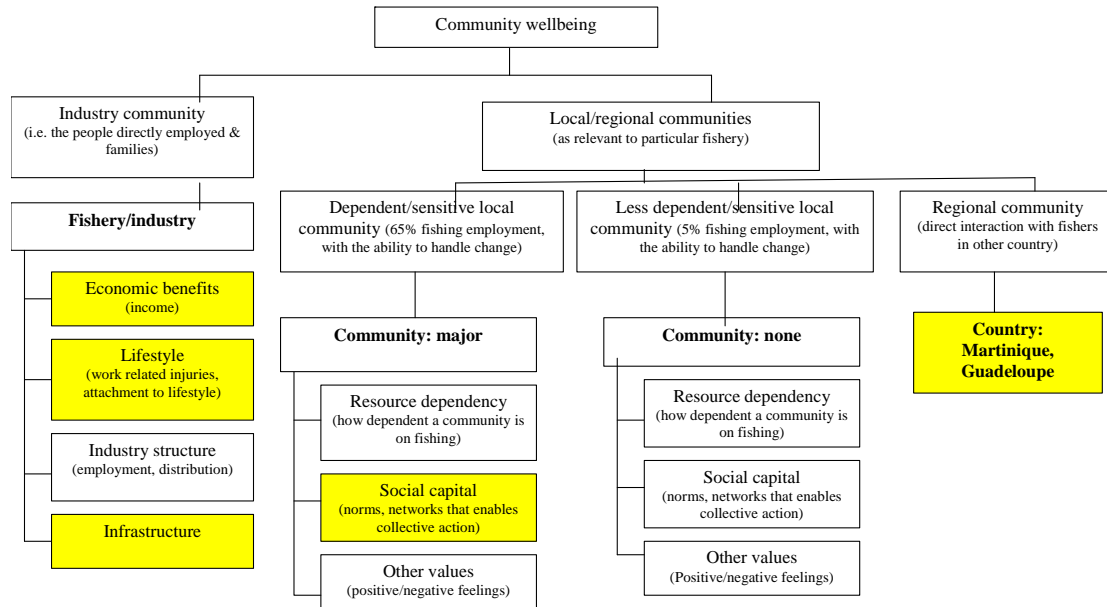
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

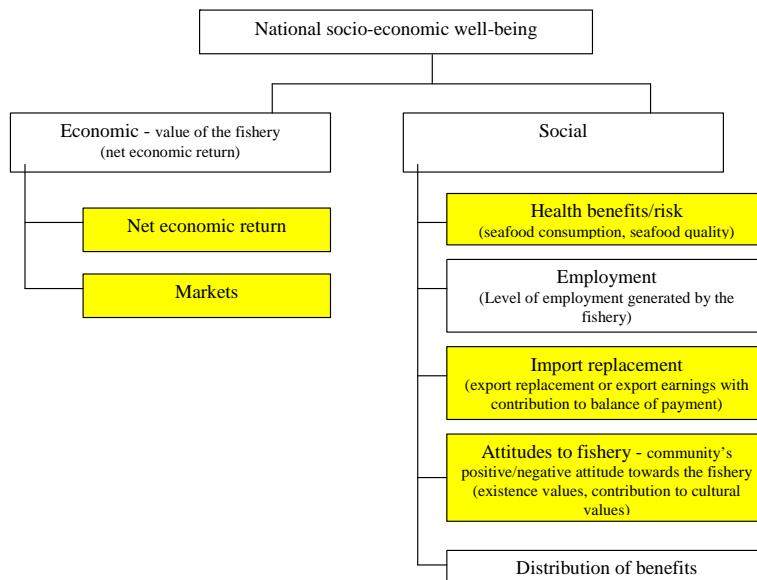
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

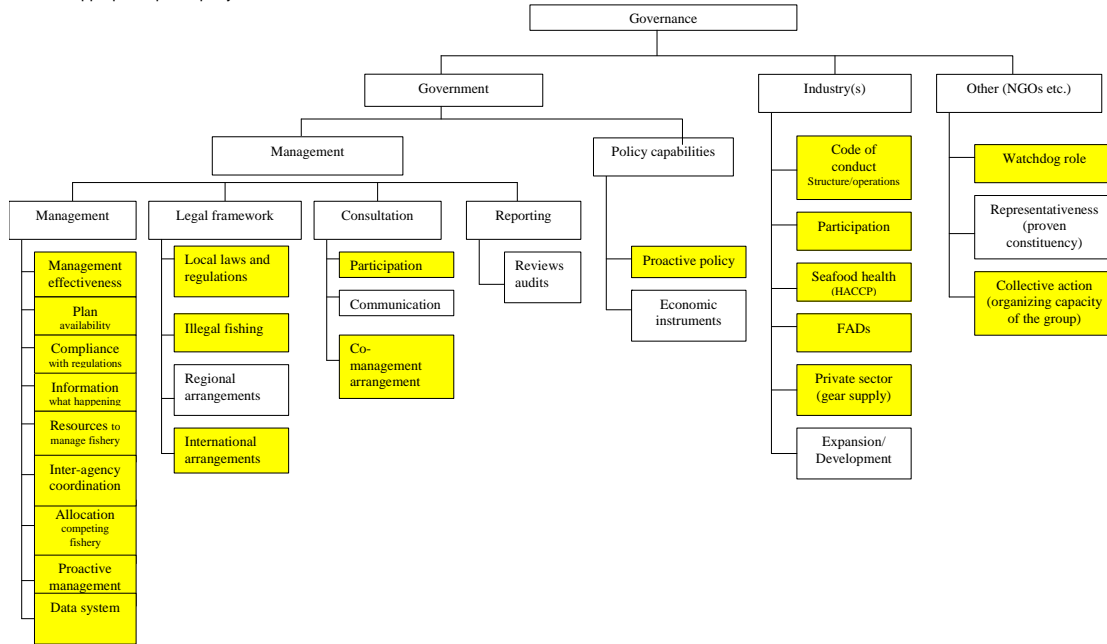
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

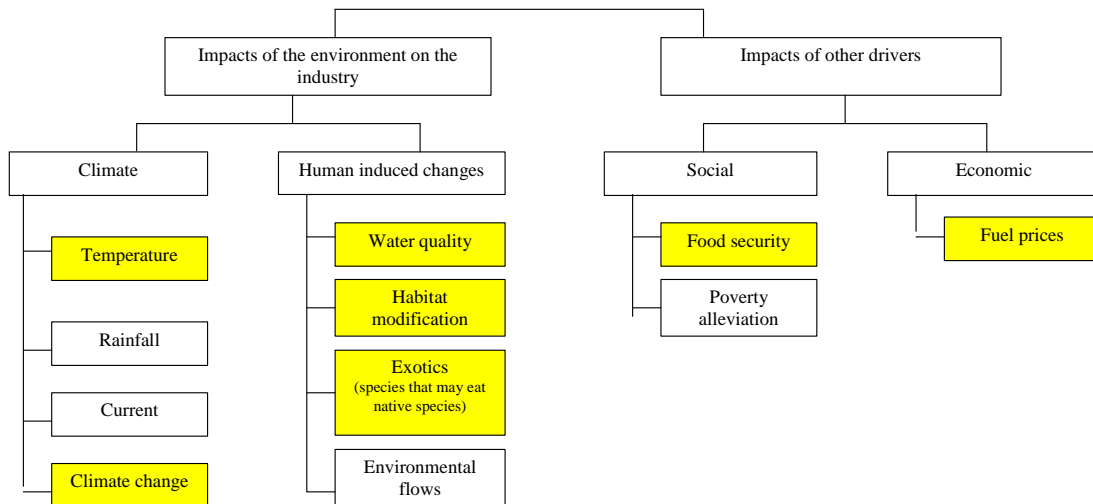
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



GRENADA

Melville Street Conference Room, St. George's, 14 and 15 March 2007

Pelagic fishery defined

The pelagic fishery was defined as vessels (pirogues and longliners) using specific gears (trolling, longline, handline, gillnet) to catch large pelagic fish (tuna, dolphinfish, billfish, blackfin tuna, wahoo, skipjack, and flyingfish). Secondary species included shark, swordfish, mackerel, turtle, and guineaman. Non-retained species included cetacean and escolar.

Identification of the issues

A total of 136 issues were identified for this fishery of which 134 were prioritized (Section 4.2). Ability to achieve accounted for 56% of the issues identified, ecological well-being component accounted for 27%, and human well-being component 17%. Governance and retained species issues accounted for 70% of all issues Figure 14.

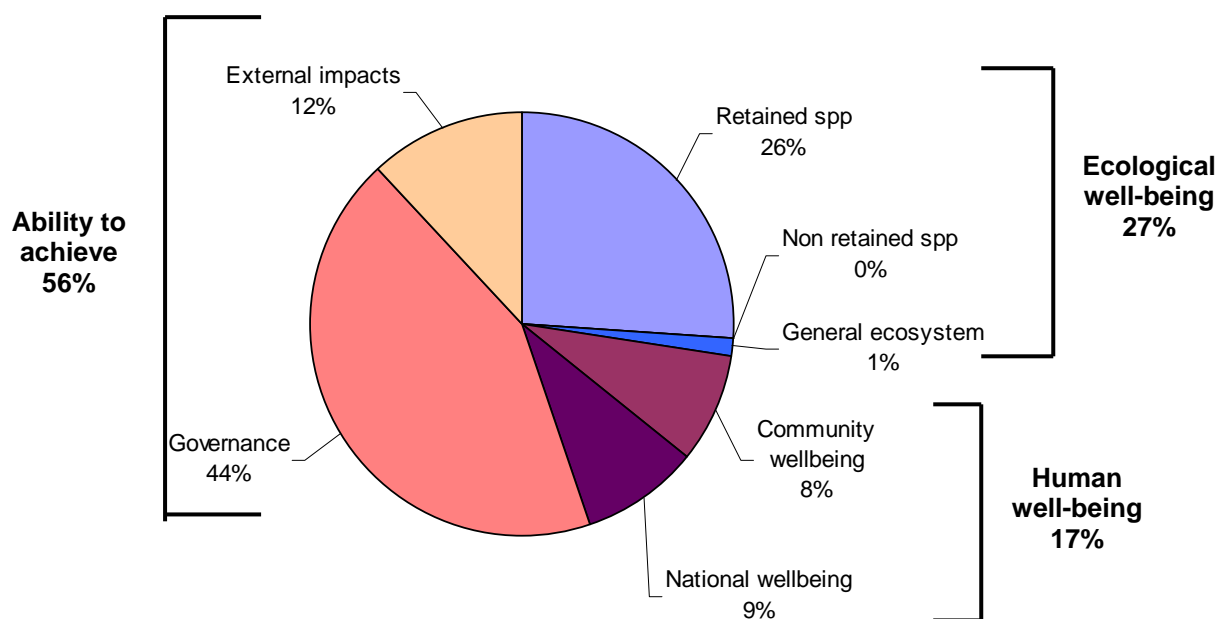


Figure 14: Percentages of issues identified within each component and category in the Grenada pelagic fishery.

Prioritization of issues

The prioritization process resulted in uneven distribution of issues in the various risk categories. Of the 134 issues prioritized, participants considered 53% of the issues extreme, 26% high, 10% moderate, and 11% low risk values. When considering the spread of risk categories within each component (Figure 15) a large proportion of the issues under the governance and retained

species components rated extreme or high risk. Issues related to community well-being, human well-being and external impacts were rated as extreme.

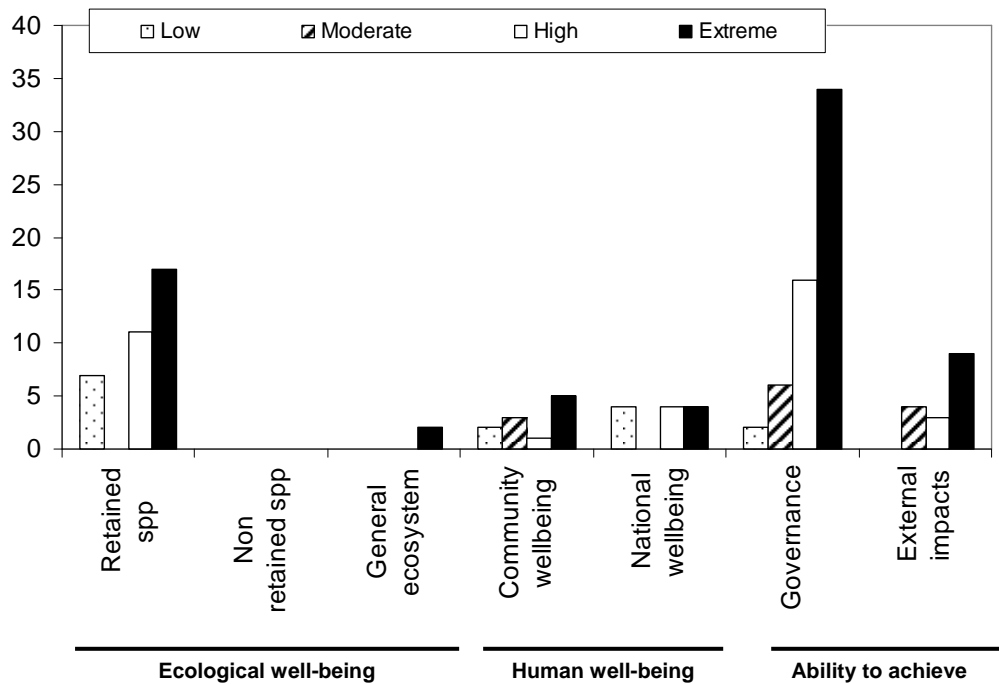


Figure 15: Proportion of issues within given risk categories (Grenada)

MAIN ISSUES AND THEMES

Ecological well-being

Observed changes in distribution, abundance, and population structure of pelagic fish were rated as the high risk. This fishery also impacted stocks of other commercial secondary species such as sharks, swordfish, mackerel, and loggerhead turtle.

Discussed was the impact of the bait fishery (jack, flyingfish, robin, ballyhoo) on the pelagic fishery. The main issues were the inability of fishers to go pelagic fishing due to the lack of bait which was rated as the second issue of highest rank. Participants were also concerned about external impacts such as improper sewage and domestic waste, chemicals, and coastal development which might have contributed to the decline in coastal pelagic (the bait fishery).

Lack of data regarding the impact from the damage or removal caused by fishing (legal and otherwise) on the general ecosystem was ranked as extreme risk.

Human well-being

High fish prices, poor financial management by fishers, and cheap imports were ranked as high or extreme risk to human well-being.

Conservation and management activities are limited by the belief of some fishers and officers alike, that marine resources are inexhaustible .

Over the years the Fisheries Division has consistently improved/upgraded infrastructure, fishing technology, and safety-at-sea. They would like to see further increases in boat capacity, provision of 'safe haven' or berthing facilities (especially during a hurricane) and increase of ice machine capacity on the west coast. These issues were the basis of many problems rated as being of moderate risk to the fishery.

Ability to achieve

a. Governance

Participants agreed that management could be more effective as the draft management plan was not available. The lack of MCS and limited resources were rated as being of extreme risk to the objectives of the fishery. Participants were concerned about Grenada's reluctance to participate fully in regional and international meetings and projects. Of extreme risk to the fishery was Grenada's indecision to join ICCAT and participate fully in its activities. These issues were rated of highest risk to the ability to achieve this fishery.

The data collection system needed to be revised or updated to capture changes in the fishery (e.g. many traditional beach seine sites were getting involved in longline fishing). Likewise the Fisheries Division needed to implement a biological data collection system to improve assessment of stocks and economic and social data to determine the value of the fishery. Data collection, analysis, and dissemination coupled with the lack of resources and capacity were rated as the issue of highest risk to the fishery.

Of great concern to the management of the fishery was the lack of capacity to collect, analyze, and disseminate catch, effort, biological, social, economic, and local knowledge data/information to fishers groups, fishers, among Fisheries Division staff, within government agencies, politicians, and regional and international agencies. Likewise, to use analyzed data/information for management.

There was little or no communication between the Fisheries Division and fishers, the Fisheries Division and fishers organizations, or among staff of the Fisheries Division . Also, there was the need to strengthen fishermen organization to participate in co-management arrangements and fisheries planning.

More needs to be done to get fishers, vendors, and market staff involved in maintaining quality control standards of fish from the vessel to the consumer which was rated high risk to the fishery.

b. External impacts

Water quality affected by inappropriate disposal of used oil and debris were a cause of concern, ranking high or extreme.

Of extreme risk was high fuel price which increased operating cost (boat, electricity, transportation).

PERFORMANCE REPORT

Two proposed draft performance reports were developed from issues rated as a moderate risk or higher. It should be noted that this was a first attempt at a draft report suggested by the participants. However, more needs to be done to develop these even further (Table 12).

Table 12: Proposed performance report on the data collection system in Grenada

Major issue	1. The lack of data for monitoring pelagic species	2. The lack of data for assessing pelagic species
Issue ID	8, 10, 14, 20, 23-25, 27-29	
Operational objective	To develop a biological data collection system (catch, effort, length-frequency, sex, stomach content, maturity) to provide information on pelagic species	To provide preliminary analysis of stock caught in Grenada's EEZ
Indicators	x biological samples/species/month Monthly catch and effort data	Estimates of stock status from stock assessment
Data requirement	Baseline data Census of boats (effort) Sampling programme/strategy including data entry and management Analysis (basic statistical analysis to ensure quality dataset)	Records of length distribution Total catch and effort
Fisheries management response	Current - collect catch and effort data Future -	Current - collect catch and effort data Future - develop biomass estimates
External drivers	Resources	Officer with stock assessment experience

Attendance

The workshop was attended by 21 participants mainly from the fishermen associations, the Fisheries Division, Fish markets (including vendors), and fishers (Table 13).

Table 13: List of participants in Grenada

Name	Organization
Justin Rennie	Fisheries Division, Chief Fisheries Officer
Paul Phillip	Fisheries Division, Biologist
Crafton Isaac	Fisheries Division, Biologist
Roland Baldeo	Fisheries Division, Technologist
Johnson St. Louis	Fisheries Division, Quality Control/Extension
Francis Calliste	Fisheries Division, Extension, Grenville Fish Market
Junior McDonald	Fisheries Division, Carriacou
Evlyn Alexander	Melville Street Fish Market, Manager
Jerry St. Louis	Melville Street Fish Market
Shermain Charles	Victoria Fish Market
Dave John	Duquense Fish Market
Dencid John	Market Clerk
Aldwyn James	Fishing vessel captain
Elvis Alexis	Fisher, Melville Street
Leroy John	President Melville Street Fishermen Association
Everett Dowden	Boat owner, Southern Fishermen Association
James Nicholas	President Southern Fishermen Association (Processor)
James Ince	Alex Swan Ltd (Processor)
Hennie Alexis	Melville Street Market, Fish vendor
ST. John Thomas	Coast Guard Department
Kelvin Dottin	Ministry of Health and the Environment
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED AND PRIORITIZED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme)

Grenada
Fishery pelagics
Gear trolling, longline, handline, gillnet
Vessels longliners, pirogues (open, cabin)

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Issue related to retained species (those species that the large pelagic fisheries wants to capture and use)						
<i>(i) Issues related to target species</i>						
1. Tunas (Scombroidei)						
a. distribution	1	In the 1980s they were abundance to the SSW but in the past five years it has shifted to NW	1	6	6	L
	2	Peak harvesting change from Feb/March to April/June	3	6	18	H
b. abundance	3	Based on the FD statistics fish landings are declining	4	6	24	E

ECOLOGICAL WELLBEING			Consequence	Likelihood	Risk	Category
Issue	ID	Description of issue				
c. population structure	4	More albacore tuna being caught (economic implications)	1	6	6	L
	5	More albacore tuna being caught (ICCAT implications)	4	4	16	H
2. Dolphinfinch (<i>Coryphaena hippurus</i>)						
b. abundance	6	Peak harvesting season change from Jan to Feb/March	3	6	18	H
	7	Needs to be assessed, lack data	3	6	18	H
	8	Considerably smaller in size (from 15-20 lbs to 8-10 lbs)	4	6	24	E
c. population structure	9	Status needs to be assessed, do not have data on stock structure	4	6	24	E
3. Blackfin tuna (<i>Thunnus atlanticus</i>)						
b. abundance	10	Main landing season was Jan-June, but catching fish throughout the year	1	6	6	L
	11	Size are smaller	4	6	24	E
	12	Blackfin not plentiful on the west coast, but present on the east coast	1	6	6	L
c. population structure	13	Status needs to be assessed; do not have data to do the assessment	4	6	24	E
e. other	14	Hotels do not want to buy small BFT because it is too small to fillet	1	6	6	L
4. Billfishes (sailfish, marlin)						
b. abundance	15	Based on FD statistics, sailfish landings are declining	3	6	18	H
c. population structure	16	Not doing any assessment, all is done by ICCAT and the FD provides data	4	6	24	E
5. Wahoo (<i>Acanthocybium solandri</i>) - called 'ralay'						
a. distribution	17	Needs to be assessed, lack data	3	6	18	H
b. abundance	18	Landings are declining	3	6	18	H
c. population structure	19	Fish are smaller in size	3	6	18	H

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
6. Skipjack (<i>Katsuwonus pelamis</i>)						
a. distribution	20	Needs to be assessed, lack data	4	6	24	E
b. abundance	21	Needs to be assessed, lack data	4	6	24	E
c. population structure	22	Population parameters needs to be assessed, lack data	4	6	24	E
e. other	23	Not a good seller (not the fresh fish of choice)	2	6	12	H
7. Flyingfish (<i>Hirundichthys affinis</i>)						
a. distribution	24	Needs to be assessed, lack data	4	6	24	E
b. abundance	25	Needs to be assessed, lack data	4	6	24	E
c. population structure	26	Needs to be assessed, lack data	4	6	24	E
e. other	27	Not targeted as food fish as in the past, instead used as bait, catch is not monitored	4	6	24	E
ii. Issues related to secondary species (target fishery catches relatively minor amounts)						
a. Sharks (Elasmobranchii)	28	Too many and no markets	3	6	18	H
b. Swordfish (<i>Xiphias gladius</i>)	29	Too expensive to fish	1	6	6	L
	30	Cannot export from Grenada	4	6	24	E
	31	Has a lot of parasites	1	6	6	L
c. Mackerels (Scomberomorus spp.)	32	Plentiful on the west coast but fishers are not catching them, not coming near-shore as they used to (economic implications)	3	6	18	H
d. Turtle (loggerhead)	33	Eyes damaged by jellyfish	4	6	24	E

ECOLOGICAL WELLBEING			Consequence	Likelihood	Risk	Category
Issue	ID	Description of issue				
e. Guineaman		No				
Issues related to bait and its impact on the pelagic fishery						
a. Jack (bigeye scad)						
b. Robin (round scad)						
c. Flyingfish						
d. Ballyhoo						
e. Imported squid						
f. Artificial lures	34	Decline in coastal pelagic fishery (jack and robin) and they are seasonal	4	6	24	E
	35	Fisher prefer to buy live bait from shore rather than fish flyingfish (impact on beachseine fishery)				E
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. Porpoise (Cetacean)		No				
b. Escalar ('prowler') (Lepidocybium flavobrunneum)		No				
Issue related to general ecosystem: impact of a fishery on the ecosystem						
1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem						
b. Fishing	36	Needs to be assessed	4	6	24	E
3. General issues associated with fishing activities that could impact the broader environment						

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Water quality	37	Need facility to collect and dump used oil and dispose of dangerous chemicals	6	4	24	E

		HUMAN WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Contribution of the pelagic fisheries to community well-being						
a. Economic benefit	38	Many fishers use their income on gambling, drinking, and womanizing	4	6	24	E
	39	The lack of financial management (fishers irresponsible in spending)	4	6	24	E
	40	Price of fish is above other meat	3	6	18	H
	41	Not able to meet traditional subsistence, chicken is cheaper	3	4	12	M
b. Lifestyle	42	East coast not demonstrating the level of self consciousness (education and exposure) as the west and south coasts	4	6	24	E
d. Infrastructure	43	Need a 'safe haven' or berthing facility for vessels (especially during an hurricane)	5	2	10	M
	44	Generally at landing sites there is no water, bathroom facilities, security of moored boats after fishing trips	4	6	24	E
	45	Need to increase the capacity of ice machine for west coast fish markets	4	3	12	M
	46	There is a workshop in Grand Mal but no tools	2	3	6	L

		HUMAN WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	47	The Coast Guard needs additional personnel and equipment (vessel, helicopter) to deal with MCS	4	1	4	L
<i>iii) regional communities</i>						
Norms and networks	48	Although Bajans are fishing illegally a social relationship has developed between Grenadian and Bajan fishers	4	6	24	E
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						
a. Net economic return	49	The value of the fishery is not recognized by the policy makers, if there was due recognition it would be translated into management	4	6	24	E
	50	Fishing should be recognized as a separate entity and not tied up with agriculture, forestry, etc.	4	6	24	E
	51	FD does not have the capacity to generate the information to value the fishery	4	6	24	E
b. Markets	52	Competing with the rest of the world therefore prices fluctuates	3	6	18	H
	53	Whatever happens in the international market affects the industry	3	6	18	H
	54	In terms of local market, need long-term storage for fish caught during the peak season	2	2	4	L
2. Social						
b. Level of employment	55	Should not increase effort (fishers) on primary production	3	2	6	L
	56	Consider value-added employment, the problem is fish production varies	1	4	4	L
	57	Unfair treatment of fishers in sharing finances between owners and crew members	4	6	24	E
c. Import replacement	58	Import only when there is a shortage	1	6	6	L
	59	There needs to be a written policy on how, what species, and when to import fish	3	6	18	H
d. Attitudes to fishery	60	Some fishers and officer(s) who believe our resources are inexhaustible	3	6	18	H

Issue	ID	Description of issue	consequence	likelihood	Risk	Category
ABILITY TO ACHIEVE						
Issue related to the governance of the pelagic fisheries						
1. Government						
i) Management						
a. Management effectiveness	61	Not as effective as we would like it to be, as structures are not in place	4	6	24	E
b. Plan availability and comprehensiveness	62	The draft plan is not available to stakeholders, not even to some fisheries staff	4	6	24	E
c. Compliance with regulations	63	In terms of fish quality and sanitation, there is compliance on the west and south coasts but not enough on the east.	4	6	24	E
	64	Some fishers are not aware of the laws related to size limits of certain fish species	4	6	24	E
	65	Lack of enforcement by fishers and government due to the lack of capacity	4	6	24	E
d. Information	66	The Division has little or no information on the stocks but the necessary resources have not been made available to the FD	4	6	24	E
	67	Information from meetings are not passed to individual fishers	4	6	24	E
	68	The National Fishermen Association is one means to 'trickle' information to fishers, but the organization is ineffective	4	6	24	E
e. Resources to manage the fishery	69	Need scientists for research activities	4	6	24	E
	70	Resources limited/exhausted to manage the pelagic fishery	4	6	24	E
	71	Need additional personnel as it relates to manpower space/capacity	4	6	24	E

Issue	ID	ABILITY TO ACHIEVE				
		Description of issue	consequence	likelihood	Risk	Category
f. Inter-agency coordination	72	In terms of collaboration and coordination there appears to be no central authority	1	6	6	L
	73	Customs allows exportation of seafood without proper documentation	3	6	18	H
	74	Information on fish exports (customs form) has to be changed after being signed (e.g. weight of fish for export)	3	6	18	H
h. Proactive management	75	We are reactive managers because managers has not been able to make a case to invest in measures to control crisis	4	6	24	E
	76	In some cases we are not even reacting to the issues (e.g. fish kill crisis)	4	6	24	E
	77	The Division has been proactive on conservation regulations (e.g. restrictions)				
i. Data system	78	Data collection system does not adequately capture landings from the beachseine fishery	4	6	24	E
	79	The FD depends on ICCAT for assessment and information	4	6	24	E
	80	FD not doing any assessment as all are done by ICCAT and the FD provide data	4	6	24	E
<i>ii) Legal framework</i>						
a. Local laws & regulations	81	Delays in formulating new regulations (e.g. increase fees)	2	6	12	H
	82	Needs to be updated, particularly the fees	4	6	24	E
b. Illegal fishing	83	Illegal Bajan fishers in Grenadian waters using small mesh sizes (flyingfish)	4	6	24	E
	84	Illegal Unregulated and Unreported Fishing enforcement nil and there is foreign fishing occurring in Grenadian waters	4	6	24	E
	85	Everybody fishes in Grenadian waters (but we don't fisher in others)	4	6	24	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	consequence	likelihood	Risk	Category
c. Regional arrangements	86	Grenada's reluctance to participate in regional projects (e.g. LAPE)	4	6	24	E
	87	Grenada not complying with regional agreements (e.g. beachseine mesh size)	2	6	12	M
	88	Conflict between Barbados and Trinidad over 'squatters' right', which affects Grenada flyingfish fishery. Grenada should have been involved in the process.	4	6	24	E
	89	CARICOM common fisheries policy and its implications (regarding open seas)	4	6	24	E
d. International arrangements	90	Grenada's is yet to make a decision to join ICCAT	4	6	24	E
	91	Limited ability (building capacity, training, resources) to participate fully in international meeting	4	6	24	E
	92	ICCAT recommendations have not been made part of the national fisheries regulations	2	6	12	M
	93	Guided by ICCAT's regulations	4	6	24	E
<i>iii) Consultation</i>						
a. Participation	94	Many in the industry do not understand what participation is all about, they do not understand their roles and responsibility	3	6	18	H
b. Communication	95	There is overall little or no communication between (1) the FD and the 'bodies' of fishers (2) FD and individual fishers (3) the FD and other government agencies and (4) between FD staff	4	6	24	E
c. Co-management arrangements	96	The concept, process, and how it operates is not fully understood	4	6	24	E
	97	The need for institutional arrangement as the Division in moving from top-down to co-management	2	4	8	M
<i>iv) Reporting</i>						

Issue	ID	ABILITY TO ACHIEVE Description of issue	consequence	likelihood	Risk	Category
a. Reviews audits	98	The FD take data from fishers but the analyzed information never comes back to the stakeholders	3	6	18	H
<i>v) Policy capabilities</i>						
a. Proactive policy	99	Policy is reactive	3	6	18	H
	100	Needs to be structured, have to fit into the Ministry's objectives	4	6	24	E
b. Economic instruments	101	The lending rate at the Grenada Development Bank is higher than commercial banks	3	6	18	H
2. Industry						
a. Code of conduct (structure, operations)	102	Political directorates need to support technical work/issues	4	6	24	E
c. Seafood health (HACCP)	103	Not maintaining quality control workers	4	6	24	E
	104	Not maintaining fish quality at sea (recommending ice-box or ply)	4	6	24	E
	105	Not maintaining proper quality control in fish markets (e.g. the management of fish storage facilities; quality control of fish on its way to the storeroom; protection of fish on the stand, not getting ice regularly)	3	6	18	H
	106	Implementation and enforcement of sanitation in fish markets	3	6	18	H
	107	Vendors should maintain their standards after training (e.g. vendors not adhering to the proper dress code)	3	6	18	H
	108	Vendors complains not going beyond the floor managers	2	5	10	M
d. FADs	109	Vendors intimidating health officers	3	6	18	H
	110	Fishers do not know how to fish FADs properly (targeting small tunas not the large ones)				M
	111	FADs tend to break from the mooring and drifts away (lost 2 of 5 FADs in the last 2 years)				M

Issue	ID	ABILITY TO ACHIEVE Description of issue	consequence	likelihood	Risk	Category
e. Private sector	112	Cost of equipment too high	3	6	18	H
	113	Recreational vessels have easy access to concession, while fishers have to go through a long process	1	6	6	L
	114	Some private sector get concession while importing goods which is not passed on to fishermen	3	6	18	H
f. Expansion/ Development	115	Fishers want bigger better boats	3	4	12	M
	116	We have too many boats, yet government is giving loans to fishers to buy small boats with high gas consumption engines				
3. Other (NGOs – Southern Fishermen Association, Melville Street Cooperative, St. John’s Fishermen Association, Soubise Fishermen Cooperative, Petite Martinique Fishermen Cooperative, St. Andrew Fishermen Association, Calliste Divers Cooperative, Duquesne Cooperative, Woburn Cooperative, Waltham Cooperative, GRENCODA, ART)						
a. Watchdog role c. Fisher organizations and collective action	117	They do not understand their watchdog role	3	6	18	H
	118	The need to strengthen fishermen organizations	4	4	16	H
	119	Fishers are difficult to organize/cooperate				E
	120	Problem with trust				E
	121	Vote one person as the leader, the others leave that person to do all the work, but when things go wrong they blame that person				H
Issue related to the environment and other issues of the industry						
1. Impacts of the environment on the fishery						
<i>i) Climate</i>						
a. Temperature	122	Intensifies histamine production level	4	6	24	E
	123	When the temperature of water is cooler closer to shore you will catch the fish, however, warmer temperature the fish travels further offshore	2	6	12	M
	124	High temperature attracts hurricane	3	6	18	H

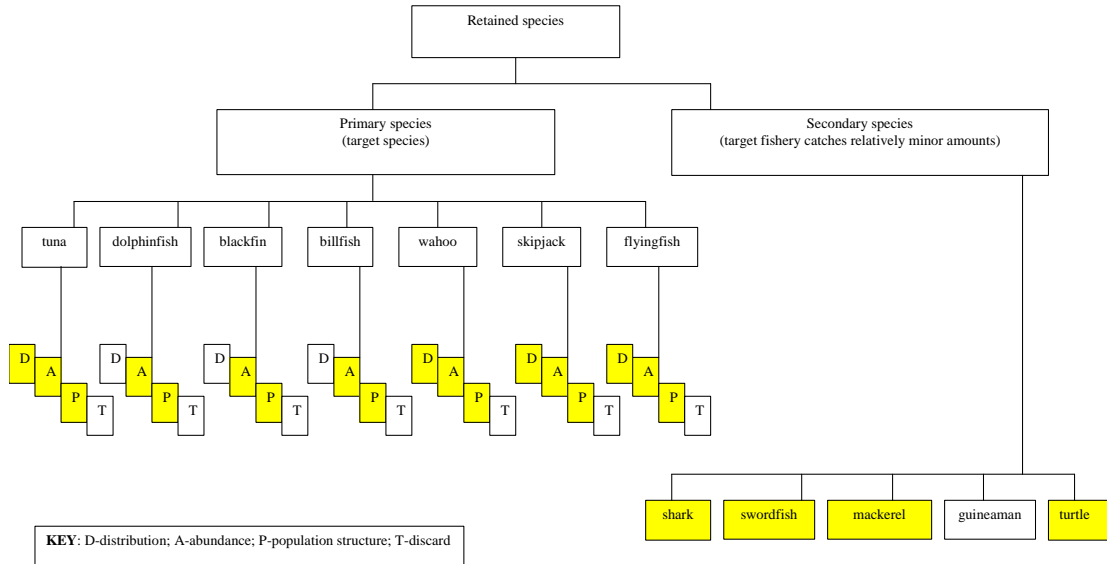
Issue	ID	ABILITY TO ACHIEVE Description of issue	consequence	likelihood	Risk	Category
b. Rainfall	125	More freshwater in seawater, the fish will travel further offshore (When there is constant rain on land fishers do not catch pelagic fish close to shore)	2	6	12	M
c. Current	126	The food chain on which the pelagic fish feeds move with the current, therefore if the current is too strong the pelagic move away	3	6	18	H
<i>ii) Human induced changes</i>						
a. Water quality	127	Untreated sewage affecting coastal areas killing the reef (e.g. Point Saline)	4	6	24	E
	128	Poor water quality from sewage, domestic waste, and chemical affects primary production in coastal areas resulting in coastal species being scarce (bait for the offshore fishery)	4	6	24	E
	129	Improper waste disposal in the mangrove areas (and coastal areas) affecting fish nursery areas for coastal pelagics used as bait	4	6	24	E
b. Habitat modification	130	Coastal development (marinas) that removes mangroves and seagrass beds which is important for coastal pelagics (bait) and the food chain	5	6	30	E
	131	Large destruction of coral reef by the same pollutants, affecting the food web	5	6	30	E
	132	Destruction of beach, removing sand to build houses affects marine environment (particularly the bait fishery)	5	6	30	E
	133	No monitoring of development projects	4	6	24	E
2. Impacts of other drivers						
<i>i) Social</i>						
a. Food security	134	Not able to supply the population, we do not have the capacity to produce and store fish	2	4	8	M
b. Poverty alleviation	135	Pelagic fish is not going to low income earners, the main money earner	3	6	18	H
<i>ii) Economic</i>						
a. Fuel prices	136	Increased operating costs (boat, electricity, transportation - air and ground handling)	4	6	24	E

GENERIC COMPONENT TREES (GRENADA)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE LARGE PELAGIC FISHERY

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.

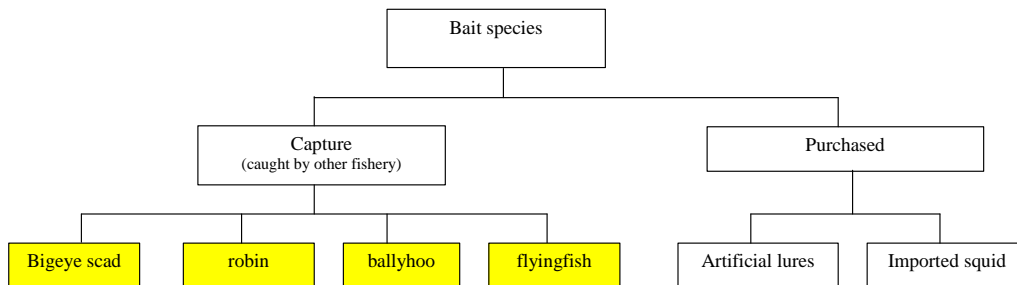


Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE LARGE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

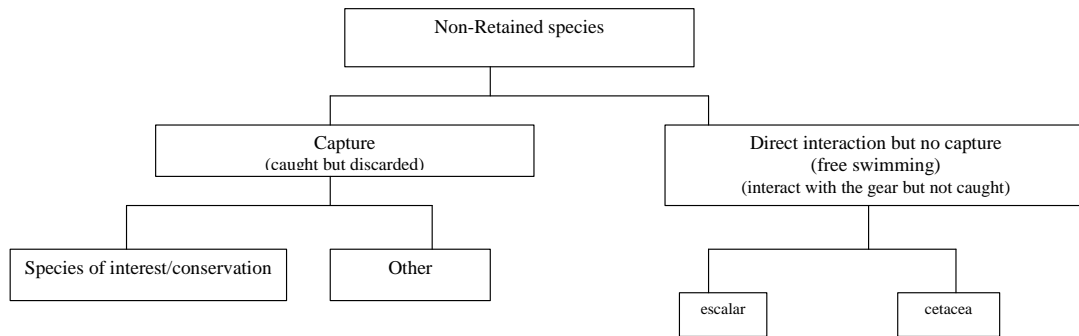
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

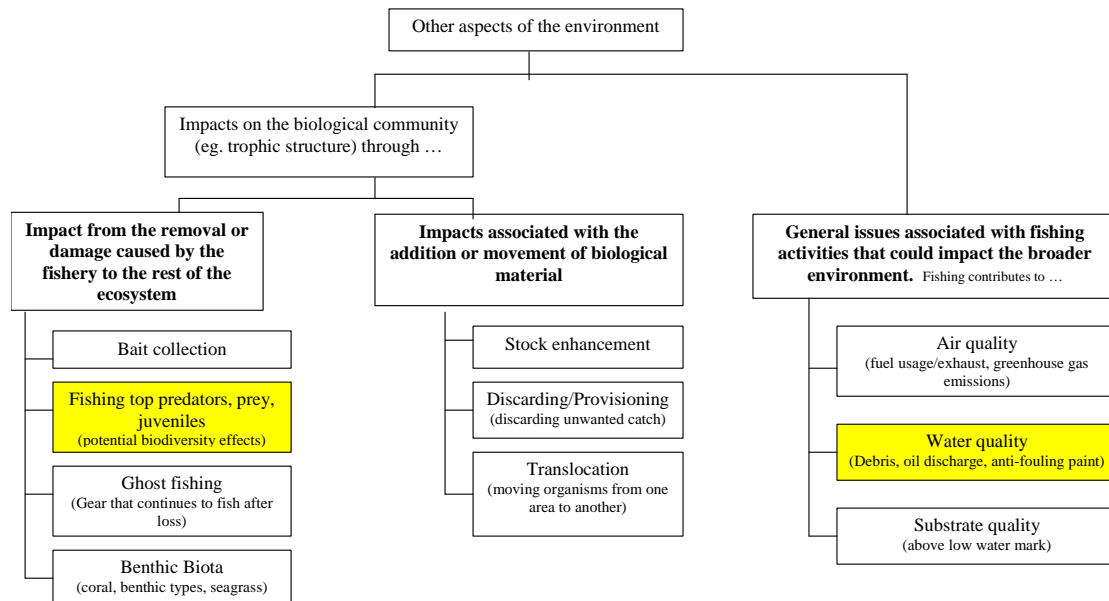
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

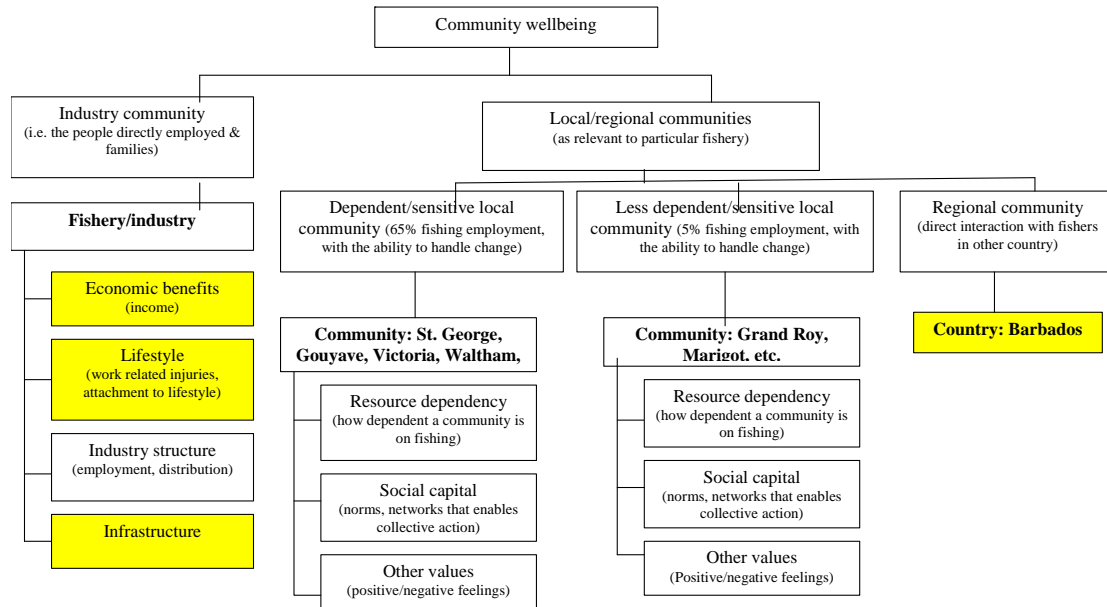
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

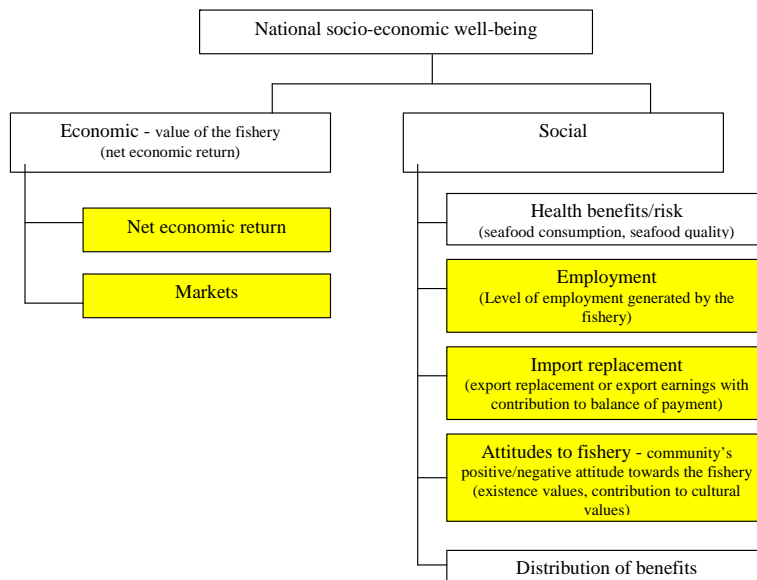
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

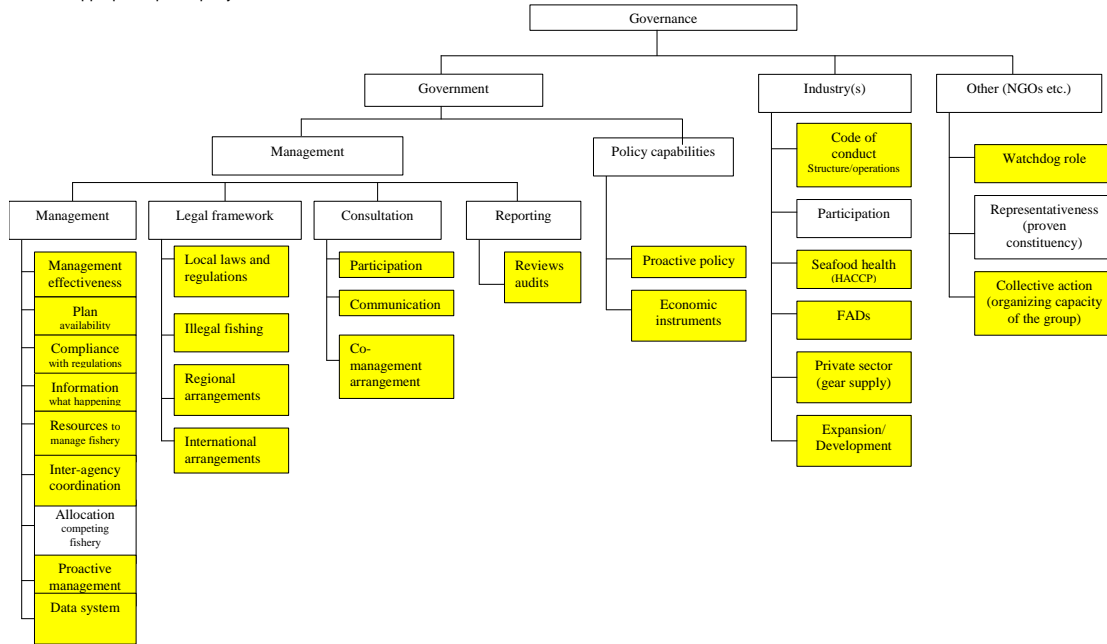
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

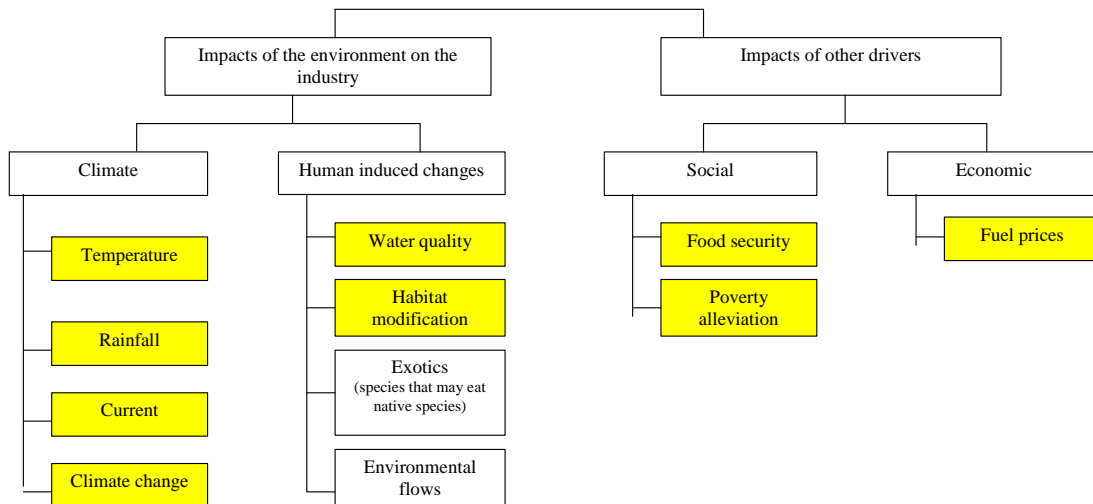
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



ST KITTS AND NEVIS

St. Kitts:

Foundation for National Development Conference Room, April 18 - 19, 2007

Pelagic fishery defined

The pelagic fishery was defined as open pirogue and sport fishing vessels using vertical longline around FADs, trolling, rod and reel, and seine gears to catch primary species tuna, dolphinfish, mackerel, wahoo, kingfish, skipjack, blackfin tuna, gar, and cavalli. Secondary species included shark, swordfish, marlin, and barracuda. Bait species included ballyhoo, sprat/herring, flyingfish, and small jacks. Non-retained species caught but discarded or released included batfish, lizardfish, and ocean triggerfish, while those that interact with the gear but not caught were tarpon and seabird.

Identification of the issues

A total of 159 issues were identified and prioritized (Section 5.2). The ability to achieve component accounted for 52% of the issues identified, ecological wellbeing 31%, and human wellbeing 17% (Figure 16). Of all the issues, governance accounted for the highest at 39%.

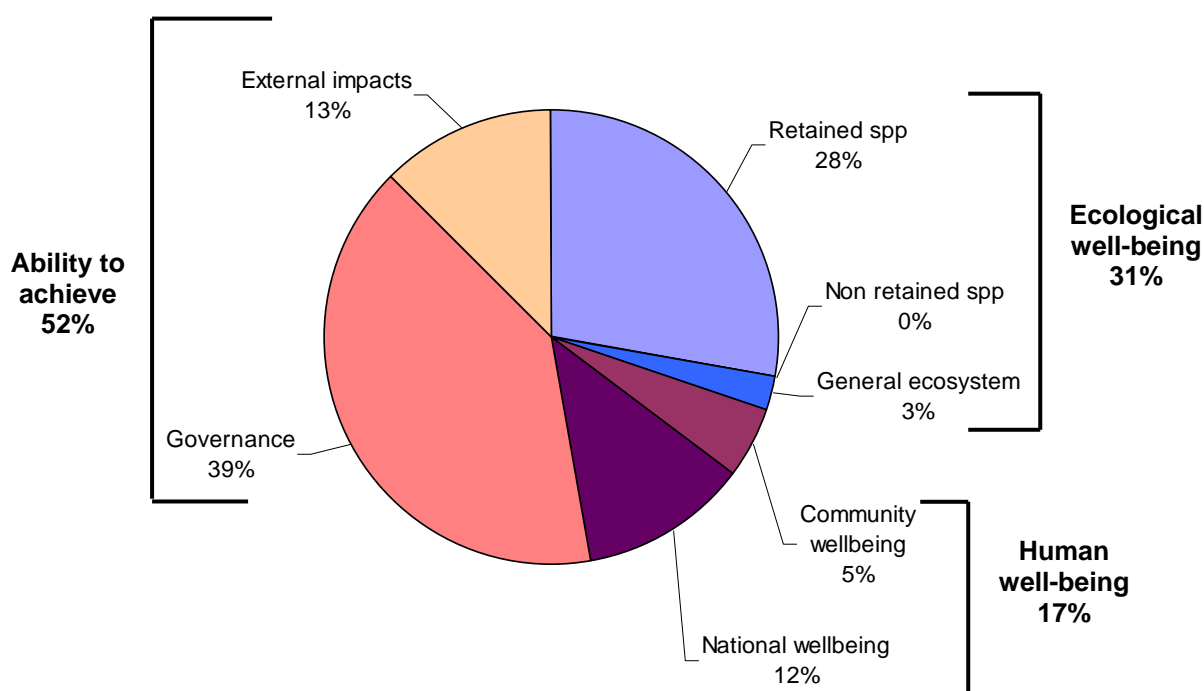


Figure 16: Percentages of issues identified within each component and category in the St Kitts pelagic fishery.

Prioritization of issues

The prioritization process led to the risk category extreme accounting for 72 percent of the issues ranked, high, moderate, and high ranked 8 percent each, while negligible ranked 4 percent. When considering the spread of risk categories within each component a large proportion of the issues under retained species, national well-being, governance, and external impacts were rated extreme risks (Figure 17). Most issues listed under human well-being were of moderate risk.

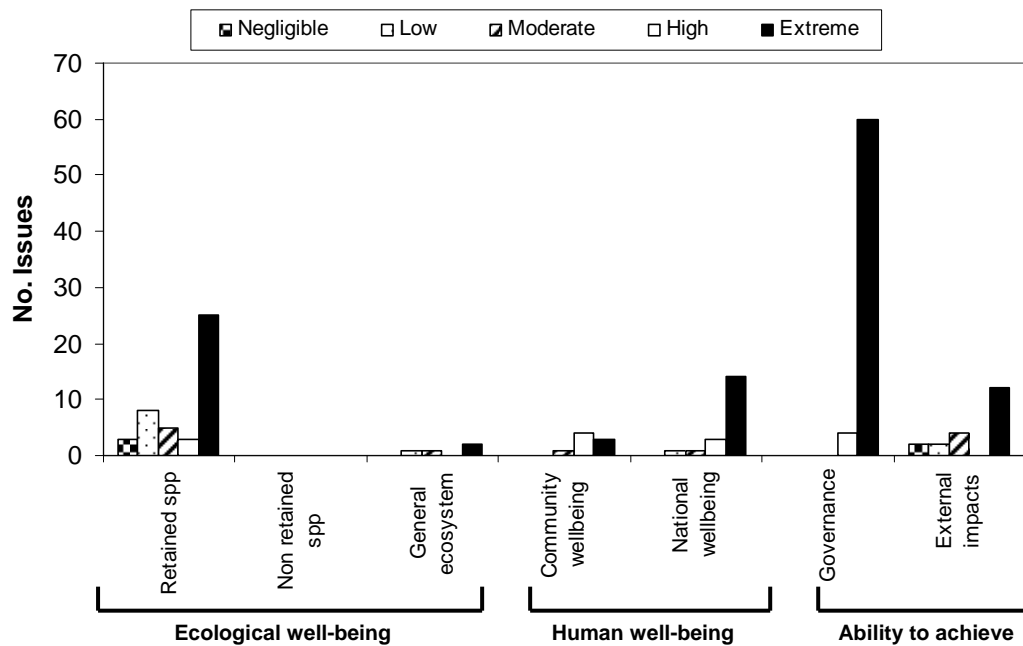


Figure 17: Proportion of issues within given risk categories (St Kitts)

MAIN ISSUES AND THEMES

Ecological well-being

Generally, the stock status of the pelagic fishery needed to be assessed. The Department of Fisheries (DoF) had catch and effort data and some biological; however, a lot more work needed to be done with data collection and analysis. Since the 1980s the landings of most pelagic species declined due mainly to FAD fishing in neighbouring countries, scarcity of bait, and fish moving farther offshore. Participants were concerned about the practice of discarding excess sprat/herring at sea especially since fishers were observing a decline in bait fish landings.

Human well-being

The main human well-being issue was poor cooperation amongst fishers and community members. It was also difficult to get fishers to participate in management activities, as there are more part-time individuals working in the fishery. The Department of Fisheries was not able to value the industry, as the social and economic data was not available to do the estimations. In regard to

import replacement, fishers could not compete with lower priced imported fish and there was no structure in place to monitor fish imports. The Department was concerned that although there were employment opportunities in marketing, distribution and processing, very few young people were getting involved in fishing. It was the general sentiment amongst participants that society needed a positive view towards fishing.

Ability to achieve

a. Governance

The DoF was partially successful in managing the pelagic fishery, as a management plan was presently under revision and more needed to be done to enforce the regulations. Information dissemination was a problem, as there were not enough meetings involving stakeholders. Whenever there was a meeting, stakeholders did not attend because they were not confident that the DoF will make good on their promises. Consultation was also a problem; stakeholders were reluctant to come together and discuss their needs due to political differences, personal conflict, and the fear of taxation. While the DoF was aware of the importance of one-on-one communication, the Department needed an effective communication programme.

The island had limited quality control standards; while there were agencies to deal with food safety, there was no enforcement or monitoring. Training was identified as an issue; however, some participants believed that trained individuals did not use their skills while on the job. Thus, better collaboration between the DoF and the Ministry of Health is imperative to establish proper legal frameworks and safety standards.

To reduce fishing pressure on the reef, participants discussed the large pelagic fishery as the alternative. In order to expand the large pelagic fishery the Department needed to improve quality control and boat technology, train fishers in FADs and fishing technology, and assess the number of boats this fishery can sustain. Participants were cautious about the expansion as St Kitts and Nevis has a small marine space and the maritime boundary was not established.

b. External impacts

Human-induced changes were ranked in the extreme risk category. Runoff and the dumping of garbage destroy coastal marine habitats on which small pelagic species depend.

PERFORMANCE REPORT

Participants developed a draft performance report for the expansion of the large pelagic fishery, the discussion focused on capacity building. More needs to be done to develop this report (Table 14).

Table 14: Proposed performance report on the need to expand the large pelagic fishery in St Kitts and Nevis

Major issue	Need to expand the large pelagic fishery
Issue ID	132-135
Operational objective	To build the capacity of fishers to improve large pelagic fishing
Indicators	Number of individuals trained Number of fishers involved in large pelagic fishing
Activities/Data requirement	Train Fisheries Officer and fishers in: biological analysis collection of data quality control processing and packaging marketing (how, strategies) gear technology and practices basic seamanship safety at sea conservation
Fisheries management response	
External drivers	

Attendance

The workshop was attended by 12 participants, a mix of Officers from the Department of Fisheries and fishers from Dieppe Bay fishing community (Table 15).

Table 15: List of participants in St Kitts

Name	Organization
Joe Simmond	Department of Fisheries, Chief Fisheries Officer
Dion Weekes	Department of Fisheries, Data Collector
Ralph Wilkins	Department of Fisheries, Fisheries Officer
Samuel Heyliger	Department of Fisheries, Resource Manager
Kishmo Clarke	Department of Fisheries, Fisheries Assistant Data
Ivan Mason	Dieppe Bay Fisher Cooperative, fisher
Anderson Williams	Dieppe Bay Fisher Cooperative, Fishing Enterprise
Kenneth Millard (Jr.)	Dieppe Bay Fisher Cooperative, BO/Captain
Wilmoth Jules	Dieppe Bay Fisher Cooperative, Captain
Audra Barrett	Nevis Department of Fisheries
Lt. Lynn Wilkin	SKN Coast Guard
Clyde Thompson	Department of Cooperative
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme).

St. Kitts Fishery pelagics (large and small)
 Gear trolling, rod and reel, vertical longline around FADs, seine
 Vessels open pirogues (commercial), sport fishing vessel

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
Issue related to retained species (those species that the large pelagic fisheries wants to capture and use)						
<i>(i) Issues related to target species</i>						
1. Tunas (Scombroidei)						
a. distribution	1	Used to see a lot of bonitos behind the reef, but now they moved more to the ocean; do not know why	4	6	24	E
	2	Yellowfin tuna and albacore are further offshore now; not accessible as before	4	6	24	E
b. abundance	3	In the 1960s-80s, at Old Road there used to be a of skipjacks and bonitos, now not as much as before	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
c. population structure	4	Because fishers are not able to sell YFT they do not target them	2/3	5	10/15	M
	5	Status of stocks needs to be assessed	4	6	24	E
	6	Much of the research is done on the Caribbean side, we do not know what is happening on the Atlantic side	4	6	24	E
e. other	7	People believe tunas are 'course' meat, thus nobody wants it to buy. We need to educate consumers how to utilize and eat tunas	3	6	18	H
2. Dolphinfinch (<i>Coryphaena hippurus</i>)						
a. distribution		No				
b. abundance	8	Dolphinfinch on the Caribbean side much bigger than the ones on the Atlantic side	1	6	6	L
	9	Development of FADs south of the migration route affecting dolphinfinch abundance in St. Kitts	4	6	24	E
c. population structure	10	Status of the stocks needs to be assessed, the DoF has catch and effort data, some biological (length, stomach content), however a lot more work needs to be done	4	6	24	E
	11	Difficult to say, there are changes each year, e.g., in 2005 the size was big (15 lbs) and catch large, in 2006 both catch and size decrease, and 2007 the size is small and catch increasing.	4	6	24	E
	12	There seem to be a relationship between catches in St. Kitts verses those in SVG. When catch is small in St. Kitts it is large in SVG. Don't know why this is the case: Is it that they are disappearing or are they moving fast?	2	6	12	M

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
e. other	13	Small dolphinfish (8 lbs) is easier to sell than the adult (20 lbs) which encourages the exploitation of small fish	2	6	12	M
3. Mackerel (<i>Scomberomorus spp.</i>)						
b. abundance	14	Not catching much mackerel due to the scarcity of the school of bait fish (sprat and small jack)	4	6	24	E
c. population structure	15	Needs to be assessed, no data	4	6	24	E
e. other	16	Problems with fish poisoning (ciguatera)	4	3	12	M
4. Wahoo						
5. Kingfish						
a. distribution	17	Needs to be assessed	4	6	24	E
b. abundance	18	Need to investigate why kingfish is scarce (taken mainly during tournament)	1	5	5	L
c. population structure	19	Status needs to be assessed, no data	4	6	24	E
6. Skipjack (<i>Katsuwonus pelamis</i>)						
b. abundance	20	In the 1970s they were closer to shore, but not anymore they have become scarce	4	6	24	E
c. population structure	21	Status needs to be assessed, no data	4	6	24	E
e. other	22	Consumers only purchase small size fish between 3-4 lbs. Bigger fish not a good seller	3	6	18	H

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
7. Blackfin tuna (<i>Thunnus atlanticus</i>)						
a. distribution	23	Needs to be assessed	4	6	24	E
b. abundance	24	Around the FADs but exploitation rate low	1	6	6	L
c. population structure	25	Status needs to be assessed, no data	4	6	24	E
e. other	26	As with tunas, people do not eat this fish much, consumers need education	4	6	24	E
8. Jack (<i>Selar crumenophthalmus</i>)						
a. distribution	27	Needs to be assessed	4	6	24	E
b. abundance	28	Seasonal, abundance needs to be assessed	4	6	24	E
c. population structure	29	Status needs to be assessed - Need information on this species urgently (where they come from, where they are going, what time eggs hatch)	4	6	24	E
9. Gar (<i>Belonidae</i>)						
a. distribution	30	Needs to be assessed	4	6	24	E
b. abundance	31	There are two types, flat and round. The flat ones tend to go under the net in January and March making them hard to catch. Don't know why.	1	6	6	L
c. population structure	32	Status needs to be assessed	4	6	24	E
<i>ii. Issues related to secondary species (caught in small quantities but are marketed)</i>						

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
a. sharks (Elasmobranchii)	33	Need to develop a national plan to utilize sharks	2	2	2	L
	34	Sharks will always be there, can't destroy them even when we cut the line when a shark is on it	0	2	0	N
b. swordfish (<i>Xiphias gladius</i>)		No				
c. barracuda		No				
d. turtle	35	Turtle meat, oil, and eggs are utilized discretely in villages	2	2	4	L
e. marlin	36	Used to be a rare fish, but this year they are present in the landings, don't know why	0	6	0	N
Issues related to bait species and its impact on the pelagic fishery						
a. sprat/herring (<i>Harengula clupeiola</i>)	37	When fishers catch too much sprat, they take it back to sea and dump it	4	6	24	E
	38	Need proper species identification of sprat species	1	4	4	L
	39	In the 1960s-70s fishers used to catch sprat by the boat loads and sell (food fish), now it is not as abundant	0	6	0	N
b. flying fish	40	Need to know how to de-bone for food consumption	4	4	16	H
c. ballyhoo (Exocoetidae)		No (80% food fish, 20% bait)				

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
d. artificial lures (squid, feather, spoon)		No				
e. small jacks	41	Need to know the size association with food fish specie (jack)	1	4	4	L
	42	No size limit, need to discourage the exploitation of small jacks	3	4	12	M
f. general issue	43	Large pelagic fishery is dependent on a bait fishery	4	6	24	E
	44	Bait fish are algae feeder, if the jack and sprat do not feed on seagrass bed, the grass bed will have slime	4	5	20	E
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. bass/tarpon (<i>Megalops atlanticus</i>) - hook		(indirectly interacts with the hook)				
b. batfish (<i>Dactylopterus volitans</i>) - seine		(caught in the seine and thrown back)				
c. lizard fish (<i>Saurida</i> spp.) - seine		(caught in the seine and thrown back)				
d. seabirds		No				
Issue related to general ecosystem: impact of a fishery on the ecosystem						
<i>1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem</i>						

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Fishing	45	The removal of parrot fish from the reef creates problems, they are grazers controlling the health of the reef (e.g. at sandy point there used to be a lot of parrotfish and mackerel, now with the parrotfish gone the mackerel have moved away from the area)	4	6	24	E
c. Ghost fishing	46	Lost Japanese netting material act as a FAD but can also smother the reefs	2	5	10	M
<i>3. General issues associated with fishing activities that could impact the broader environment</i>						
a. Air quality	47	Needs to be assessed, not measured	1	4	4	L
	48	Improper mixing of fuel contributing to poor air quality	4	6	24	E

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Contribution of the pelagic fisheries to community well-being						
b. Lifestyle	49	Individualistic – they own it, they pay for it, therefore, no one can tell them what to do with it. Have to get them to understand the need to cooperate	4	5	20	E

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
d. Infrastructure	50	Many fishing vessels are not seaworthy	2	5	10	M
	51	There is no insurance policy for small boats, the DoF is encouraging fishers to take out a self employed coverage with social security	3	6	18	H
	52	Dieppe Bay and Sandy Point needs lockers, small handling and processing facility (clean fish), bathroom and toilet facilities, net repair area, and the ability to haul boats to shore	4	6	24	E
	53	In planning infrastructure development, facilities must be able to accommodate future development	4	4	16	H
1. Local communities (people who are directly employed and their families)						
<i>i) For major communities on the mainland (New Town, West Basseterre, Old Road, Sandy Point, Dieppe Bay)</i>						
b. Are there norms and networks that enables collective action	54	No togetherness, people do not like each other, community not pulling together	4	6	24	E
<i>ii) regional communities</i>						
Norms and networks	55	Little interaction (resource sharing, information sharing) between St. Kitts and Nevis fishers	3	6	18	H
	56	Not much interaction with the St. Eustatius fishers	3	6	18	H
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						
a. Net economic return	57	Value of the fishery needs to be assessed, presently undervalued	4	6	24	E
	58	Social and economic data not available to do estimation	4	6	24	E
	59	Difficult to find cosigner for personal loans	4	6	24	E

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Markets	60	Need to identify or create more local and export markets to sell fish	4	6	24	E
	61	Need to explore different preservation methods (smoking, drying, etc.) and work towards developing a market	4	6	24	E
	62	Fisher want to maximize their benefits by selling at high prices	3	6	18	H
	63	The public does not like the way the BFC sells the fish, they should develop value-added product (e.g. de-bone ballyhoo and flyingfish)	4	6	24	E
	64	We have to consider the needs of consumers, therefore, if they want clean fresh fish, why give then value added products	2	3	6	L
	65	The Basseterre Fisheries Complex (BFC) was established to market fish, however, fishers are still selling there own fish and more fish than the complex	4	6	24	E
2. Social						
b. Level of employment	66	More part-time individuals working in the fishery, difficult to get them to participate in the fisheries management activities	4	6	24	E
	67	There are employment opportunities (marketing, distribution, seine fishing, processing) but young people are not taking up the offer	4	6	24	E
c. Import replacement	68	Fishers cannot compete with lower priced imported fish	4	6	24	E
	69	CARICOM single market could put pressure on St. Kitts fishers to reduce fish prices	4	4	16	H
	70	No structure in place at the DoF to monitor fish imports	4	6	24	E

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
d. Attitudes to fishery	71	Young people do not want employment in the fisheries sector, they say it is too hard, others are ashamed to be associated with this type of work	4	6	24	E
	72	Cultural shift by young people from sprat meals to burger and pizza	2	6	12	M
	73	Young girls do not want to be vendors or work in the fishing industry, they consider this type of work to be demeaning	3	6	18	H
	74	Attitudes towards fishing needs to change at all levels of government and society; need a more positive view	4	6	24	E
	75	Fishers need to think of fishing as a business (e.g. need to go fishing for extended periods to make better catches) - Fishers rather fish everyday, return home to be with their wife and children. According to one fisher making \$200/day is good enough for him	4	6	24	E

Issue	ID	ABILITY TO ACHIEVE				
		Description of issue	Consequence	Likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries						
1. Government						
i) Management						
a. Management effectiveness	76	Yes and no. In some areas not able to enforce regulations. Partially successful	4	6	24	E
b. Plan availability and comprehensiveness	77	It exists and undergoing revision, needs to be made available to stakeholders	4	6	24	E
c. Compliance with regulations	78	Fishers are not educated enough or aware of the laws because they do not put themselves in a position to learn or change old habits	4	6	24	E
	79	One person at the DoF is responsible for enforcement, however, he is not trained to do the work	4/5	6	24/30	E
	80	The DoF does not have the ability to enforce the laws	5	6	30	E
	81	The DoF needs an enforcement team (fishers, FO, coast guard), not one person	4	6	24	E
	82	The DoF need to educate fishers not just about the regulations, but the why behind it	4	6	24	E
	83	There is no regulations regarding large pelagics, the department only recently go involved in this fishery	4	6	24	E
	84	Fishers have to police each other	5	6	30	E
d. Information	85	The DoF does not give much information to fishers (e.g. landings results, update on LAPE)	4	6	24	E
	86	There is not enough meeting involving stakeholder	4	6	24	E
	87	When there is a meeting, stakeholders do not attend	4	6	24	E

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
	88	The DoF needs to improve information dissemination		4	6	24	E		
e. Resources to manage the fishery	89	With the combined experience and knowledge, staff needs to be more effective.		4	6	24	E		
	90	Limited financial resources (boat, not able to reach sites to collect data, staff)		4	6	24	E		
f. Inter-agency coordination	91	Has been informal, but the DoF follows protocol; it has worked for the DoF in the past		4	6	24	E		
	92	Sport fishers get concession through tourism, yet the DoF is responsible for the vessel		4	6	24	E		
	93	Ministry of Finance determines subsidies (concession, consumption tax, custom service charge, and duty fees). When fishers do not get the concession it erodes the DoF ability to expand the large pelagic fishery		4	6	24	E		
	94	Fishers in Nevis are able to obtain concession but not St. Kitts fishers		4	6	24	E		
	95	Roles of Customs, Coast Guard, Police, and Fisheries need to be clearly defined; problems with the overlapping roles		4	6	24	E		
g. Allocation amongst competing fishery	96	Within the budget it is difficult to say. There is no allocation towards competing fishery.		4	6	24	E		
	97	60% of Fisheries Officers' time and effort is going towards large pelagic development, and it will continue in the future		4	6	24	E		
h. Proactive management	98	Recently, not as proactive as in the past		4	6	24	E		
i. Data system	99	Needs to be revised/updated, need to improve biological data collection					E		
<i>ii) Legal framework</i>									

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
a. Local laws & regulations	100	Need more defined regulations related to pelagics, including size restrictions etc.		4	6	24	E		
b. Illegal fishing	101	There is no discussion with neighbours regarding boundary delimitation, therefore we are not certain who is fishing illegally (Netherlands and France) (in relation to country)		4	6	24	E		
	102	If we are going to develop large pelagic we need to establish out boundaries (in relation to fishery)		4	6	24	E		
c. Regional arrangements (OECS, CRFM, WECAFC)	103	Need to bring regulations and management plan inline with regional requirements		4	6	24	E		
d. International arrangements (ICCAT, IWC)	104	Need to bring regulations and management plan inline with international requirement include ICCAT regulations and FAO code of conduct		4	6	24	E		
<i>iii) Consultation</i>									
a. Participation	105	Not regular, we talk about involving stakeholders but not much is done		4	6	24	E		
	106	Politics, personal conflicts, fear of taxation prevent people coming together to discuss their needs		4	6	24	E		
	107	Stakeholders complain that they go to meetings and talk but nothing happens, therefore the reluctance to participate in meetings		4	6	24	E		
	108	People do not understand their role, thus they do not come to meetings		4	6	24	E		
	109	Sometimes fishing is not a priority at the Ministry level		4	6	24	E		

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
b. Communication	110	Not much communication amongst fishers they rely on assistance from the DoF and the Department of Cooperative		4	6	24	E		
	111	Need one-to-one communication but we also need a proper communication program and implementation		4	6	24	E		
c. Co-management arrangements	112	New venture, hence the structures are not in place, people need to know their roles and responsibilities		4	6	24	E		
	113	The regulation has provision for a FAC, but nothing is in place. An FAC is required to assist in advising on fisheries matter.		4	4	16	H		
	114	Government do not take technical advise from technical staff		4	6	24	E		
<i>iv) Reporting</i>									
a. Reviews audits	115	The DoF only reports to the Ministry, nothing goes to stakeholders		4	6	24	E		
<i>v) Policy capabilities</i>									
a. Proactive policy	116	The DoF needs to develop clear policies for specific fishery		4	6	24	E		
	117	Policies need to be structured, documented, and circulated		4	6	24	E		
2. Industry									
a. Code of conduct (structure, operations)	118	Operational structures are not fully in place		3	6	18	H		
	119	Management of new buildings - there needs to be a tentative arrangement until key users and government can come together to deal with it		4	6	24	E		
b. Participation		As ID 93-97							

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
c. Seafood health (HACCP)	120	Very limited quality control standards; health safety standards not in place		4	6	24	E		
	121	Even through there are agencies to deal with safety, there is no enforcement or monitoring by the Ministry of Health and Trade department		4	6	24	E		
	122	DoF should enforce quarantine at all ports of entry		4	6	24	E		
	123	Need more trained personnel for inspection		4	6	24	E		
	124	Some health officers have been trained in HACCP, but it is not being utilized		4	6	24	E		
	125	Better collaboration between the DoF and Ministry of Health regarding quality control standards and monitoring		4	6	24	E		
	126	Need to establish proper legal framework for quality control in fisheries		4	6	24	E		
	127	At the BFC facilities relating to HACCP were in place but the use has been discontinued. There needs to be proper code of conduct		4	6	24	E		
	128	Fishers need training in preparation and processing to fish (e.g. sharks)		4	6	24	E		
d. FADs	129	The rules related to FADs and the fishing of FADs needs to be defined (e.g. fishing practice and gear)		4	6	24	E		
e. Private sector	130	Cost of fishing gears too expensive		4	6	24	E		
	131	Can not get certain gear to buy (e.g. longline)		4	6	24	E		

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
f. Expansion/ Development	132	The DoF does not know the number of boats that the pelagic fishery can sustain, this is critical to the expansion of the fishery		4	6	24	E		
	133	In order to explore large pelagics 40-60 miles from base/shore boat technology needs to improve. Need safer and larger vessels		4	6	24	E		
	134	Need continuous training in FADs, longline, trolling, safety at sea, seamanship (navigation), and captaincy certification from a recognized institution.		3	6	18	H		
	135	St. Kitts and Nevis has the least amount of marine space, therefore, we have to be careful with expansion of the pelagic fishery		3	5	15	H		
3. Other (NGOs - Basseterre fisher group, Old Road Fisher Cooperative, Dieppe Bay Fisher Cooperative, Sandy Point Fisher Cooperative, Heritage Society, St. Kitts Turtle Monitoring-Ross University)									
a. Watchdog role	136	'not barking hard enough'		4	6	24	E		
	137	Tying to implement but fishers are reluctant to report on each other		4	6	24	E		
	138	They do not understand their role		4	6	24	E		
c. Fisher organization and collective action	139	The cooperatives need serious management assistance		5	6	30	E		
Issue related to the environment and other issues of the industry									
1. Impacts of the environment on the fishery									
<i>i) Climate</i>									
a. Temperature	140	Hot surface temperature reduces landings as fish go further offshore or deeper		2	4	8	M		
b. Rainfall	141	Brings nutrients, muddy water and fish go further offshore; also nutrients brings bait fish		0	5	0	N		

Issue	ID	ABILITY TO ACHIEVE				
		Description of issue	Consequence	Likelihood	Risk	Category
e. Phase of the moon	142	Changes the weather and behaviour of fish	1	4	4	L
<i>ii) Human induced changes</i>						
a. Water quality	143	Strong current (windward tide) pulls mud from land to sea thus no fish	4	6	24	E
	144	People dump stuff in gutters and when it rains a lot the gutter water empties into the sea	4	6	24	E
	145	The sugar industry used to build sluice to control the flow of water (entrapment for water), since the demise of the industry these sluice have not been maintained, therefore, we can expect more runoffs during rainy season	4	6	24	E
b. Habitat modification	146	Developers given permission to dig-up seagrass beds to accommodate swimming beach and ships dropping anchor (SE peninsula) destroyed seagrass and reef vital to the coastal pelagics	4	6	24	E
	147	The facility to swim with the dolphins at Friars Bay is near a mangrove area, they filled in swamp, grade beach and hillside, the environmental activities were not considered	4	6	24	E
	148	EIAs always done in favour of developers	4	6	24	E
	149	Build groin to create sandy beach and in the process destroy coastal pelagic habitats	4	6	24	E
	150	Projects are first approved, then EIAs are done. The DoF is consulted after the EIA and the project has started	4	6	24	E
	151	No proper consultation with technical experts (e.g. golf course and marina) where activities can lead to the destruction of habitats for coastal pelagics	4	6	24	E
	152	Need to protect the SE peninsula because it is the last marine habitat frontier	5	6	30	E
c. Species that may eat native species	153	Need to know more about marine invasive species brought to St. Kitts in ballast waters	2	5	10	M
2. Impacts of other drivers						
<i>i) Social</i>						
a. Food security	154	Still need to reduce high import bill	4	6	24	E
	155	Present fishery will not meet food security needs, we will have to utilize species such as sharks and whales	1	2	2	L

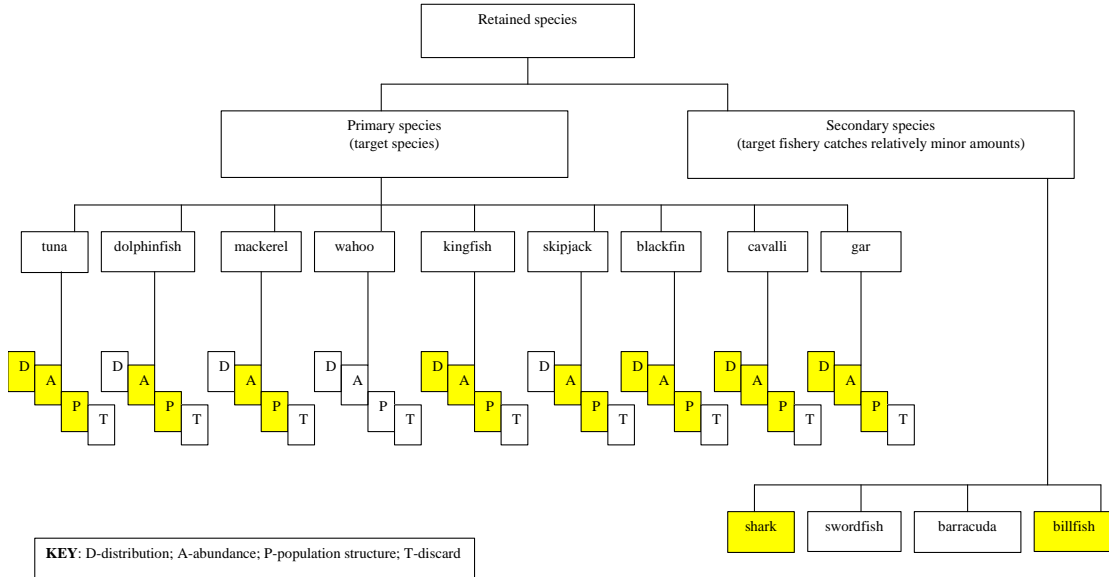
Issue	ID	ABILITY TO ACHIEVE				
		Description of issue	Consequence	Likelihood	Risk	Category
	156	To meet food security we might have to develop aquaculture further	2	4	8	M
b. Poverty alleviation	157	Could ease the tension, but not wipe out poverty	0	2	0	N
	158	With proper exploitation and development large pelagics can provide jobs for people (e.g., value-added activities such as smoking, salting)	3	4	12	M
<i>ii) Economic</i>						
a. Fuel prices	159	Big, big problem. Prices fluctuate and consumers still have to pay extra taxes	4	6	24	E

GENERIC COMPONENT TREES (ST. KITTS)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE LARGE AND SMALL PELAGIC FISHERIES

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.

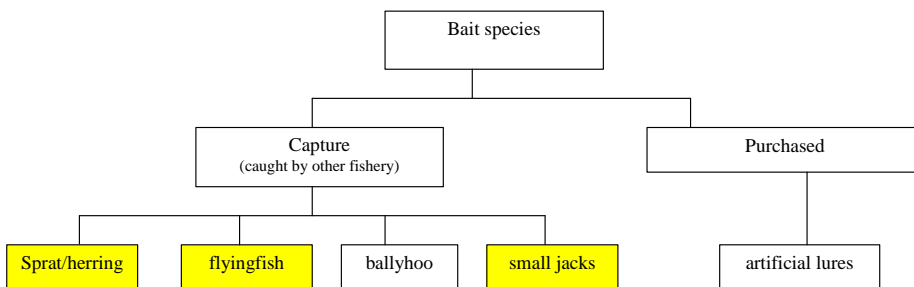


Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE LARGE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

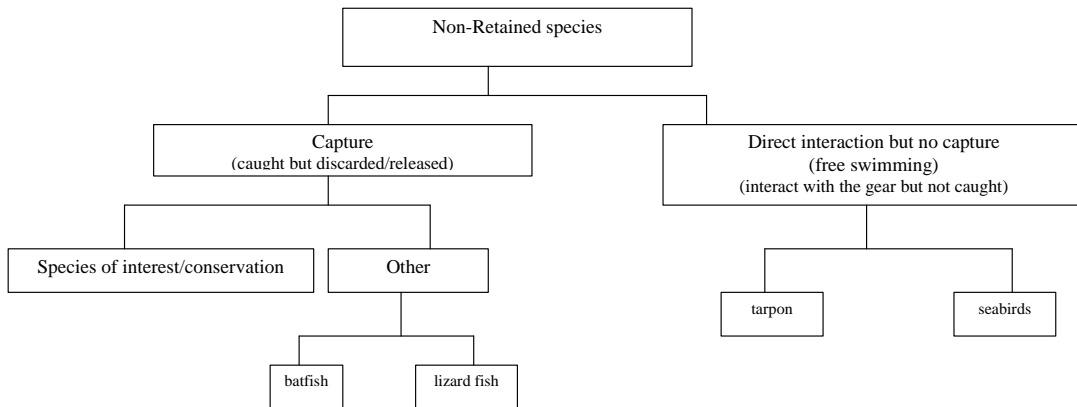
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

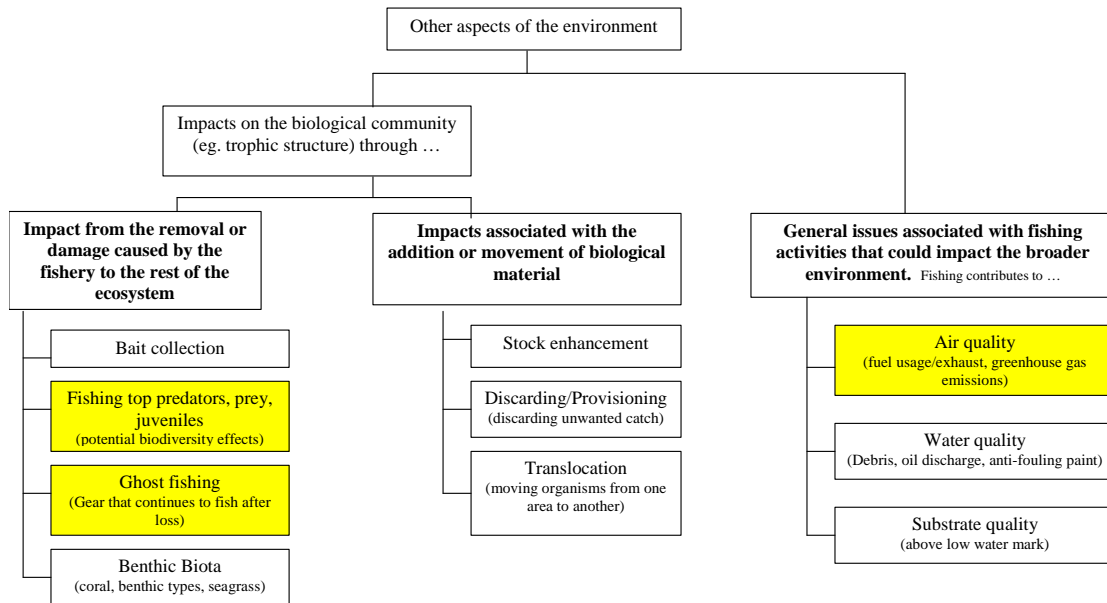
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY:

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

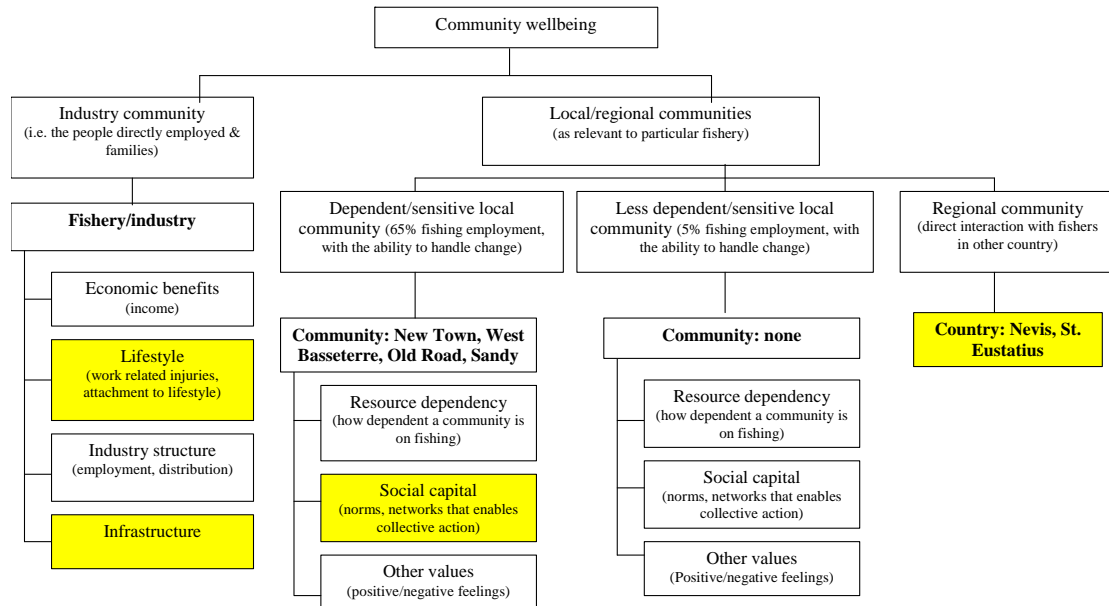
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING:

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

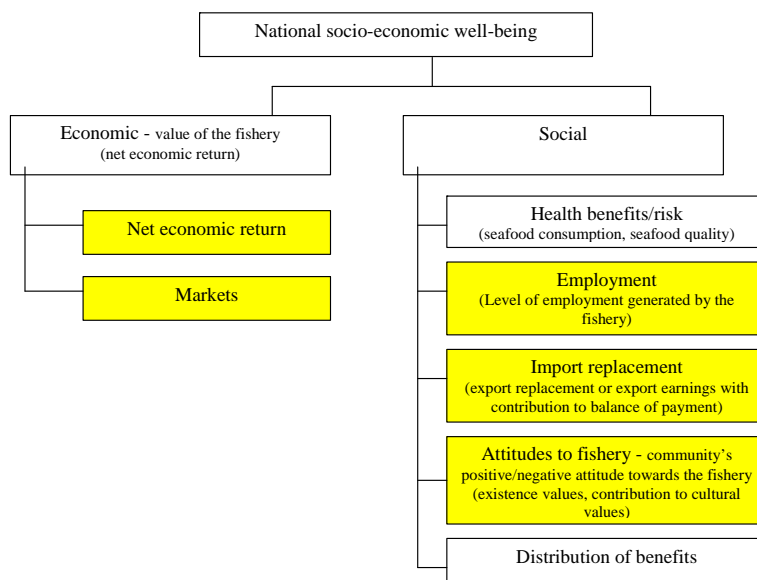
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING:

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

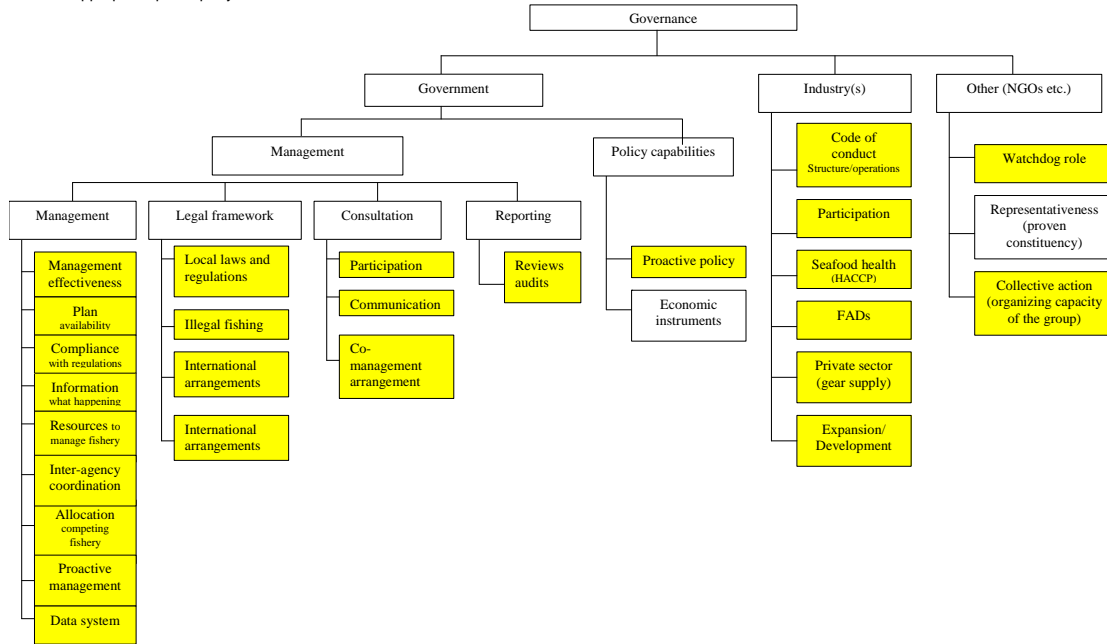
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

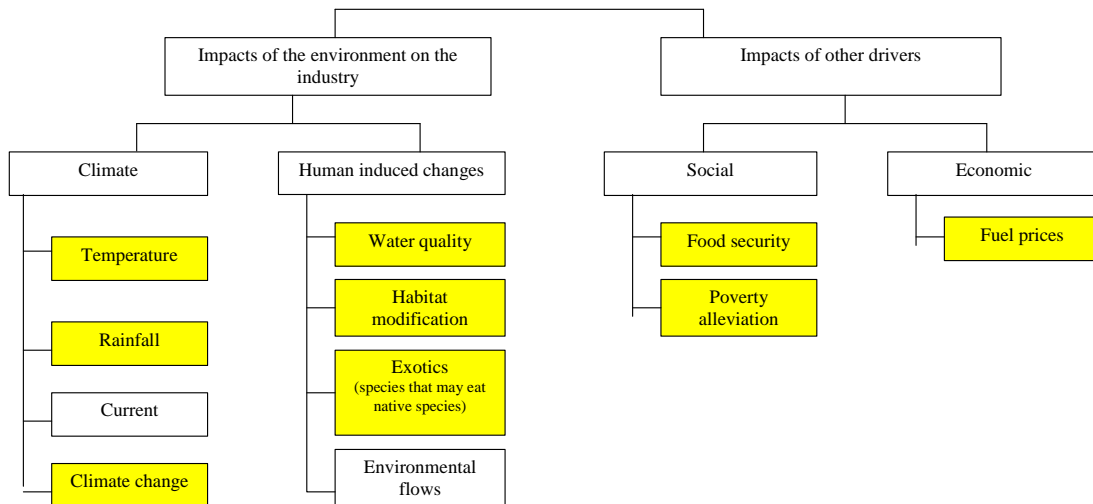
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



Nevis

Foundation for National Development Conference Room and Nevis Red Cross Building, 23 and 24 April 2007

Pelagic fishery defined

The pelagic fishery was defined as open pirogue and sport fishing vessels using trolling, rod and reel, and seine gears to catch tuna, dolphinfish, wahoo, kingfish, skipjack, blackfin tuna, gar, cavalli, and diamondback squid. The secondary species included shark, barracuda, mackerel, swordfish, ocean triggerfish, billfish, and turtle.

Identification of the issues

A total of 138 issues were identified of which 135 prioritized (Section 5.4). The ability to achieve component accounted for 50% of the issues identified, ecological wellbeing 32%, and human wellbeing 18% (Figure 18). Of all the issues, governance accounted for 38% followed by retained species at 29%.

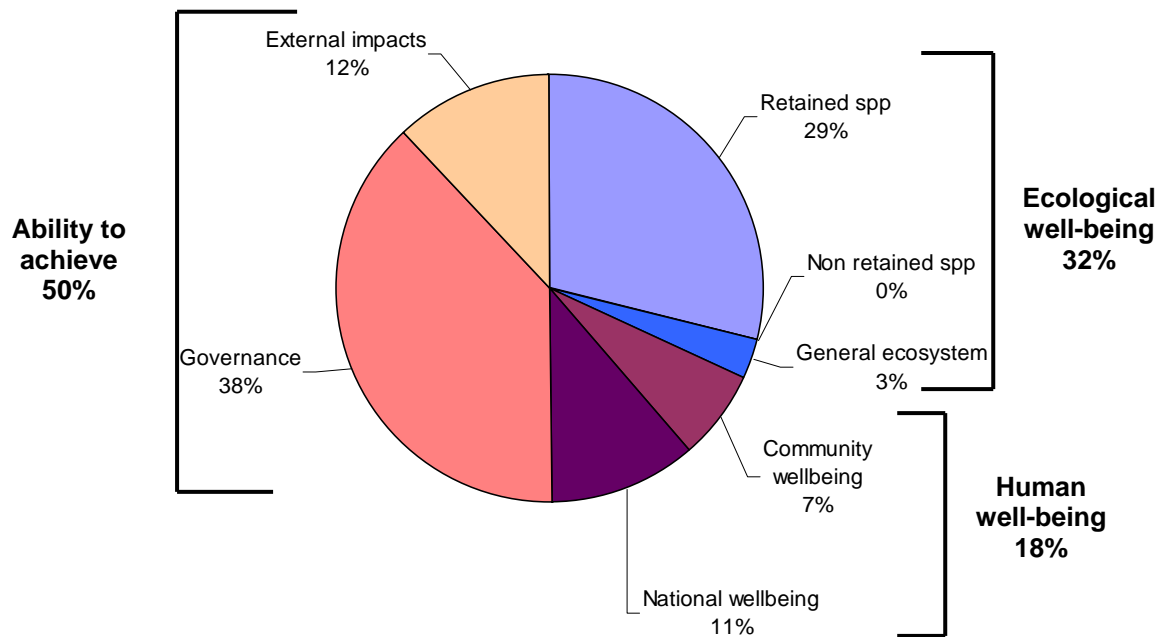


Figure 18: Percentages of issues identified within each component and category in the Nevis pelagic fishery.

Prioritization of issues

The prioritization process led to 76% of the issues assigned a risk category of extreme, 14% high, 4% moderate, 6% low, and 0% negligible. When considering the spread of risk categories within each component issues participants assigned ratings of extreme risk to most issues identified (Figure 19).

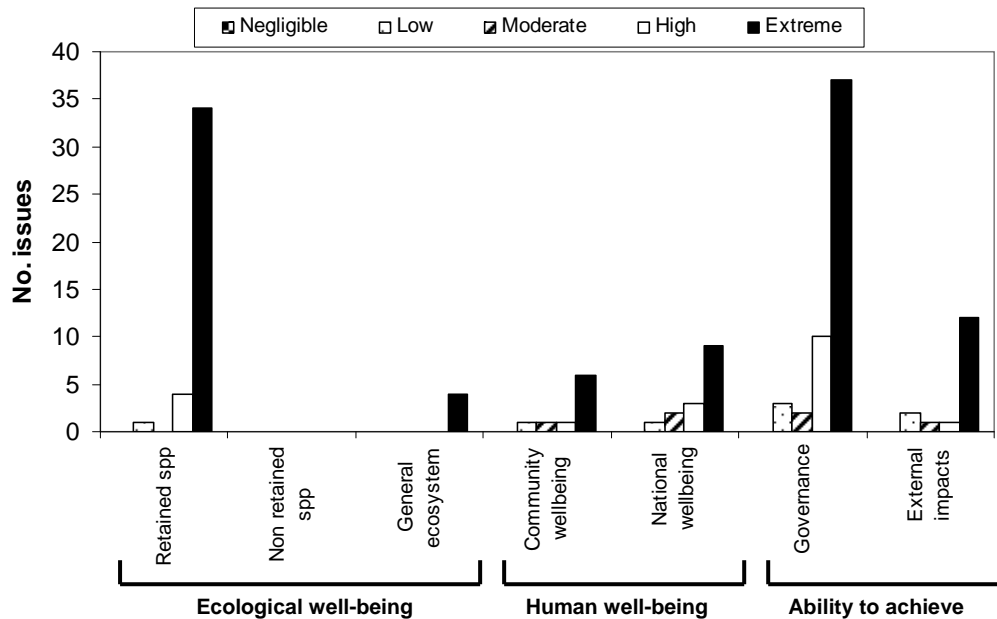


Figure 19: Proportion of issues within given risk categories (Nevis)

MAIN ISSUES AND THEMES

Ecological well-being

Ecological well-being was generally rated as an extreme risk to the fishery. The Department of Fisheries (DoF) had limited/no catch, effort, biological data, social, and economic data to evaluate distribution, population structure, or the value of the fishery. Participants observed a decline in the abundance of many species, even with the use of FADs. Although there were provisions to dispose of used oil and containers, many fishers dump these items on the beach.

Human well-being

The greatest risks to human well-being were the high price of fish, no restriction or policy on fish imports, the need to persuade more young people to work in the industry, and the inability of community members to pull together. Infrastructure was rated as extreme risk to the industry as the island was in need of a fisheries complex and proper facilities to moor vessels around the island.

Ability to achieve

Management of the pelagic fishery needs to improve as there was no available plan (being updated), no enforcement, limited resources (manpower), and management was not proactive. Stakeholders' participation in the management of the fishery was limited; participation and collaboration could improve with more effective communication and a participatory style of management. The data collection program needed to be revised as: data collectors did not record information on species such as mackerels, billfish,

and cavalli at landing sites; data were not collected before/after DoF working hours; total landings were not documented (no information from hotels); and the Department needed an expert to conduct fisheries assessments.

Seafood health was also a major problem, as fishers preferred to sell fish by the roadside and not in the fish market. In regards to the Nevis fishermen cooperative a manager was urgently needed and there were problems related to fish storage, marketing, and equipment supply.

Attendance

The workshop was attended by 19 participants (Table 16). The group included officers from the Fisheries Department, fishers (commercial, sport), Nevis fishermen cooperative, and representatives from other government departments (agriculture, cooperatives, and planning).

Table 16: List of participants in Nevis

Name	Organization
Perlivan Wilkin	Permanent Secretary, Ministry of Agriculture and Fisheries
Lemuel Pemberton	Fisheries Development Officer
Audra Barrett	Fisheries Officer
Shawn Isles	Fisheries Department, Trainee
Alex Percival	Fisheries Department, Trainee
Inga Lawrence	Fisheries Department, Secretary
Winston Hobson	Fisher (Charlestown)
Dave Small	Fisher (Newcastle)
Claude Nisbit	Fisher (Newcastle)
Kenwick Jeffers	Fisher (Newcastle)
Benny Hodge	Sport fisher (Jones Bay)
Tracy Rigby	Nevis water sports, Fisher (Jones Bay)
Dr. Kelvin Daley	Department of Agriculture, Director
Eric Evelyn	Department of Agriculture
Edread Ward	Department of Cooperative, Senior Officer
Lillith Richards	Department of Planning (DOPPNRE)
Captain A. Anslyn	Nevis Island Administration
John Guilbert	Nevis Historical and Conservation Society
Emanuel Richards	Sport teacher, Cooperative Organization
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme).

Nevis
Fishery pelagics (large and small)
Gear trolling, rod and reel, seine, use of FADs
Vessels open pirogues (commercial), sport fishing vessel

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
Issue related to retained species (those species that the large and small pelagic fisheries wants to capture and use)						
(i) Issues related to target species						
1. Tunas (Scombroidei)						
a. distribution	1	Needs to be assessed	3	6	18	H
b. abundance	2	Under-fished, do not know enough about this fishery	4	6	24	E
c. population structure	3	Needs to be assessed, no data	4	6	24	E
2. Dolphinfish (<i>Coryphaena hippurus</i>)						
a. distribution	4	Needs to be assessed	4	6	24	E
b. abundance	5	Catch declining	4	6	24	E
c. population structure	6	Needs to be assessed, have catch and effort data but no biological data	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
	7	Get some biological information from fishing tournament, but need additional staff to continue the effort	4	6	24	E
3. Wahoo						
a. distribution	8	Needs to be assessed	4	6	24	E
b. abundance	9	Catching less even with the use of FADs	4	6	24	E
	10	Need to determine what is in the water keeping the wahoo in Nevis (although sport fishers call Nevis wahoo country, without the scientific evidence it is difficult to say)	4	6	24	E
c. population structure	11	Needs to be assessed	4	6	24	E
4. Kingfish						
b. abundance	12	Of all the species, kingfish is showing the greatest decline in catch (not catching due to fish poisoning)	3	6	18	H
c. population structure	13	Needs to be assessed, don't know enough about the fishery	4	6	24	E
5. Skipjack (<i>Katsuwonus pelamis</i>)						
a. distribution	14	Needs to be assessed	4	6	24	E
b. abundance	15	Catching less fish now	1	6	6	L
	16	Hard fish to sell, they have worms	4	6	24	E
	17	Fishers do not bleed the fish, thus flesh is dark (marketing implications)	3	6	18	H
c. population structure	18	Needs to be assessed, no catch data, no biological data	4	6	24	E
6. Blackfin tuna (<i>Thunnus atlanticus</i>)						
b. abundance	19	Catching less fish now	4	6	24	E
c. population structure	20	Needs to be assessed, no catch and effort data, no biological	4	6	24	E
7. Diamonback squid						
a. distribution	21	Needs to be assessed	4	6	24	E
b. abundance	22	Needs to be assessed	4	6	24	E
c. population structure	23	Needs to be assessed	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
e. other	24	Need equipment to catch squid. Got initial equipment from JICA but many fishers are not fishing the specie, yet they will not make the equipment available to fishers willing to fish this specie	5	6	30	E
8. Round and flat gar (Belonidae)						
a. distribution	25	Needs to be assessed	4	6	24	E
c. population structure	26	Needs to be assessed, catch and effort data, no biological data	4	6	24	E
	27	Gar have a lot of worms borrowing through the flesh (none in the flat gar) - some people refuse to eat gar while others have been eating it for years	4	6	24	E
9. Jack (cavalli, pompano, permit, rainbow runner, scad)						
a. distribution	28	Needs to be assessed	4	6	24	E
b. abundance	29	Not getting full landings, not enough data collectors to capture data (the DoF does not know where they are going to set the seine)	4	6	24	E
	30	Pompano can be poisonous	4	6	24	E
c. population structure	31	Hard to say, have catch and effort data, no biological data	4	6	24	E
d. discards	32	Fishers haul the seine remove the large ones and discard the small jacks	5	6	30	E
ii. Issues related to secondary species (caught in small quantities but are marketed)						
a. sharks (Elasmobranchii)	33	Too much, some people do not buy shark they rather beg it. Fishers cut the line to let it go	4	6	24	E
	34	Fishers remove shark fins and discard the rest	4	6	24	E
b. barracuda	35	Do not sell, usually poisonous, catch not monitored	4	6	24	E
c. ocean triggerfish (mandingo)		No				
d. billfish (sailfish, marlin)	36	Under-fished, do not know enough about the fishery	4	6	24	E
e. swordfish	37	Import a lot of swordfish although fishers can catch this fish, don't have data on the amount imported	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
f. mackerel (Scomberomorus spp.)	38	Landings declining	3/4	6	18/24	H/E
g. turtle	39	Undersized turtles caught out of season	5	6	30	E
Issues related to bait species and its impact on the pelagic fishery						
a. jack (<i>Selar crumenophthalmus</i>)		No				
b. sprat (Engraulidae spp.)		No				
c. fry		No				
d. whiting (<i>Malacanthus plumieri</i>)		No				
f. flyingfish		No				
g. ballyhoo (Exocoetidae spp.)		No				
h. small tuna (bonito, skipjack, barracuda)		No				
e. imported squid		No				
i. artificial lures (squid, feather, spoon)		No				
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. fry (small bait fish)		(pass through the net)				
b. batfish (<i>Dactylopterus volitans</i>)	40	Caught and thrown back in the water or left to die on the beach				
c. sting ray	41	Caught, fed to dogs, used as lobster bait, eaten, thrown back, remove the barb				
d. sunfish (eagle ray) (Moliidae spp.)		(caught and released)				

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	likelihood	Risk	Category
e. pufferfish (Porcupine fish)		(caught and released, eaten)				
f. lizard fish (Saurida spp.)		(caught and released, eaten)				
g. soap fish (<i>Rypticus saponaceus</i>)		(caught and released)				
h. scorpion fish		(caught and released)				
i. trumpet fish (<i>Aulostomus maculatus</i>)		(caught and released)				
j. suckfish (<i>Remora remora</i>)		(caught and released)				
k. seabirds		No				
Issue related to general ecosystem: impact of a fishery on the ecosystem						
1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem						
b. Fishing	42	The removal of larger predator fish will have an effect on the ecosystem	4	6	24	E
	43	We are not using the correct tool for fishing (e.g. small mesh size)	5	6	30	E
	44	Use gillnet to target sharks and permit, fishers catch all types of fish, take out what they want and discard the rest	5	6	30	E
3. General issues associated with fishing activities that could impact the broader environment						
b. Water quality	45	Fishers dispose 'used oil', gear containers, oil on the beach although there are provisions to dump the oil (solid waste, gas stations)	4/5	6	24/30	E

Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
HUMAN WELLBEING						
Contribution of the pelagic fisheries to community well-being						
a. Economic benefit	46	Price of fish is not controlled, it is inherited. Current price of fish too high, fish is becoming a luxury	4	6	24	E
	47	Fishing equipment not subsidized in Nevis only in St. Kitts, thus equipment are more expensive in Nevis	2	6	12	H
b. Lifestyle	48	Hook and line causes injury; however, fishers usually deal with the problem	1	6	6	L
d. Infrastructure	49	Need to secure land tenure for fishing beach and public space	5	6	30	E
	50	Need a fisheries complex (have to consider how many fishers will use the complex)	4	6	24	E
	51	No proper facility for beaching boats	4	6	24	E
1. Local communities (people who are directly employed and their families)						
<i>i) For major communities on the mainland (Charlestown, Jessups, Cotton Ground, Jones Bay, Newcastle, Indian castle, Longhaul)</i>						
b. Are there norms and networks that enables collective action	52	People quickly 'cut you down' rather than working together	4	6	24	E
<i>ii) regional communities</i>						
Norms and networks	53	Funding agencies deal with the protocol (i.e. the federal government) not with Nevis directly	5	6	30	E
	54	More a community with fishers from Antigua and Montserrat	2	6	12	M
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						
a. Net economic return	55	Requested and awaiting information from the statistical department to reflect the GDP in Nevis	4	6	24	E
	56	Missing a lot of catch data, thus we would not be able to value the fishery accurately	4	6	24	E
b. Markets	57	Need to modernize our marketing techniques for fish and equipment (we are stock piling items which are not moving, we should buy specifically what fishers want); Need new ideas for marketing (e.g. properly packaged product)	4	6	24	E

		HUMAN WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	58	No export market for pelagic fish	4	3	12	M
	59	Local market 'flood' in a day	4	6	24	E
	60	Need value-added processing, fishers should convert rejected fish into something useable	4	6	24	E
	61	Need training in processing (smoking, pickling, drying)	2	6	12	M
	62	Can not just say process fish, need access to resources, need support services (facilities, equipment, capital, packaging)	4	6	24	E
2. Social						
b. Level of employment	63	Need additional crew members	1	4	4	L
c. Import replacement	64	No restriction or policy on imported fish to protect the local fishers	5	6	30	E
	65	In order to protect the local market we need better communication between the DoF, hotels, and supermarket re: when to import fish or when to purchase local fish. We have to be mindful that fishers and hotels are unpredictable in terms of supply and demand	3	6	18	H
d. Attitudes to fishery	66	Not preserving our maritime/fishery history	4	6	24	E
	67	Society looks down on fishers, stigma attached to fishing profession	3	6	18	H
	68	Young people do not see the value, 'want to walk before they creep', therefore, DoF need to continue encouraging young people to be more involved in fishing	3/4	6	18/24	H/E
	69	Fishing is not appealing to young people (why? – the sun, the smell, not organized, not a mature industry, long working hours)	4	6	24	E

Issue	ID	<p style="text-align: center;">ABILITY TO ACHIEVE</p> <p style="text-align: center;">Description of issue</p>	Consequence	Likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries 1. Government <i>i) Management</i>						
a. Management effectiveness	70	Need management to be more effective	4	6	24	E
	71	Politicians over-ride management actions	4	6	24	E
	72	Need fisheries to be a statutory body so that politicians do not interfere with management	4	6	24	E
b. Plan availability and comprehensiveness	73	Not available, the plan is being updated	3	6	18	H
c. Compliance with regulations	74	Unregulated activities in seine net – e.g. smaller bunt, St. Kitts fishers coming to Nevis to catch bait fish using < 1” mesh size, dumping of bait fish on the beach	5	6	30	E
	75	There is no enforcement, the St. Kitts and Nevis coast guard focuses on drugs and there is only one enforcement officer in St. Kitts	4	6	24	E
d. Information	76	To some extent – information dissemination needs improving	3	6	18	H
e. Resources to manage the fishery	77	Limited access to capital. Government says Fisheries is not bringing in money, therefore, when we ask for a budget they cannot give us, yet the country exports approximately 10,000 lbs/mth. of conch	3	6	18	H
	78	Lack manpower	3	6	18	H
	79	Fishers and Fisheries Officers lack training	3	6	18	H
f. Inter-agency coordination	80	Could be better, we have good informal relations with planning, agriculture, and cooperatives. Our first attempt at formal coordination is the environmental committee and food security, however, there is still some antagonism	2	6	12	M
g. Allocation amongst competing fishery	81	There is no allocation of resources to different fisheries	1	6	6	L

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
h. Proactive management	82	People need to see a problem before management occurs	5	6	30	E
i. Data system	83	Billfish data logged as miscellaneous in data collection system	4	6	24	E
	84	No resources assessment of the pelagic fishery has been done due to the lack of expertise to conduct the assessment	4	6	24	E
	85	Fishers have log book to record ocean pelagic catch, they give information to the DoF yet the DoF is still not capturing total pelagic fish catch, Nevis fishers land fish in St. Kitts yet the data is not recorded in Nevis.	4	6	24	E
	86	Need total catch data for St. Kitts and Nevis to be disaggregated by St. Kitts and Nevis	4	6	24	E
	87	Not capturing data from part-time fishers	4	6	24	E
	88	Fisheries Officers (data collectors) work weekdays (8-4 pm) and some sat. (8-12 noon), therefore not capturing data outside these time periods	4	6	24	E
	89	Need to monitor the bait fish to maintain current status (special attention to the ballyhoo)	4	6	24	E
	90	Not getting information from the hotels, they started to provide the information of fish purchased from fishers but not anymore	4	6	24	E
	91	The catch of some fish species (e.g., mackerel) not reflected in the landings, when the data collector get to the beach the catch is already sold	4	6	24	E
<i>ii) Legal framework</i>						
a. Local laws & regulations	92	Not up to date, amendments on-going, the DoF have to take it back to fishers for their input (St. Kitts does not involve Nevis, they are only involved after decisions have been made)	5	6	30	E
	93	Legally St. Kitts and Nevis does not have proper sea-space boundary	5	6	30	E
b. Illegal fishing	94	Needs to be assessed, fishers do not stay long at sea to notice	3	6	18	H
	95	Nevis fishers fish illegally on Barbuda/Nevis bank	2	6	12	M
c. Regional arrangements (OECS, CRFM, WECAFC)	96	Not incorporated into St. Kitts and Nevis laws and regulations (e.g. LRS)	5	6	30	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
d. International arrangements (ICCAT, IWC)	97	Federal government should sign on to ICCAT	1	4	4	L
<i>iii) Consultation</i>						
a. Participation	98	DoF takes a top-down management approach, fishers are not involved in management planning (there is the mindset that fishers cannot learn)	3	6	18	H
	99	Invite fishers but they do not attend meetings	4	6	24	E
	100	Difficult to get participation on conservation, fishers are more concerned about what they can get (money, duty free concession)	4	6	24	E
b. Communication	101	Lack of communication and respect between fishers, DoF Nevis, and the DoF St. Kitts	4	6	24	E
	102	Need to improve communication between the DoF and fishers	4	6	24	E
c. Co-management arrangements	103	Need to move from a top-down approach to more participatory	4	6	24	E
<i>v) Policy capabilities</i>						
a. Proactive policy	104	Not proactive	4	6	24	E
2. Industry						
a. Code of conduct (structure, operations)	105	Laws are in place but nothing else, the DoF need to go to the Nevis representatives in the Federal parliament to assist with the management of the fishery	4	6	24	E
	106	Local assembly in Nevis needs to put structures in place (as far as they can go) to get things done	4	6	24	E
	107	The formulation of a Fisheries Advisory Committee (FAC) is needed to put pressure on government	4	6	24	E
b. Participation	108	Fishers do not think they have a responsibility to the industry, they think it is the responsibility of government	3	6	18	H
c. Seafood health (HACCP)	109	Problem with ciguatera - no reliable field test to prevent toxins (only 80% effective)	3	6	18	H

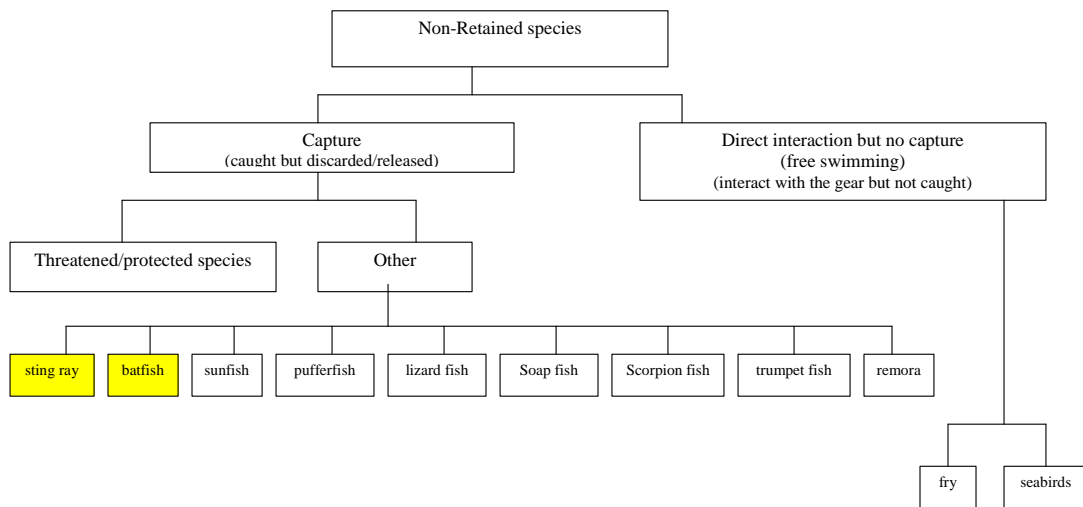
ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	110	Fishers not landing catch at the fish market, they rather sell fish by the side of the street	4	6	24	E
	111	Fish box to hold fish onboard is not clean	4	6	24	E
	112	Environmental Health is not monitoring conditions at the fish markets	4	6	24	E
	113	Nobody is checking fishers scales to test accuracy	4	6	24	E
	114	Need training in how to maintain quality control at sea for large pelagics (e.g. icing, bleeding)	4	6	24	E
e. Private sector	115	Problem of gear availability	1	6	6	L
f. Expansion/ Development	116	With the decline in coastal pelagic landings the DoF needs to encourage fishers to move from the shelf area to deeper water (large pelagic fishing)	4	6	24	E
3. Other (NGOs – Nevis Fishermen Cooperative, Nevis Historical and Conservation, Nevis Turtle Group)						
a. Watchdog role	117	The Nevis Fishermen Cooperative (inactive) not performing their watchdog role	4	6	24	E
c. Fisher organization and collective action	118	Need an effective manager for the fishermen cooperative. The cooperative will not reopen until one can be sourced	4	6	24	E
	119	Need a vibrant fishermen cooperative to bring fishers together and participate in planning	4	6	24	E
	120	Cooperative responsible for marketing and supply. In terms of marketing, they were not able to take all the fish from fishers; regarding supply the cost of equipment was too high and fishers credited equipment and did not repay	3	6	18	H
	121	Don't see any benefit being part of a cooperative (e.g., get fishing equipment cheaper outside the cooperative)	4	6	24	E
	122	Cooperatives do not want to buy all the fish because they do not have the storage (closed)				
Issue related to the environment and other issues of the industry						
1. Impacts of the environment on the fishery						
<i>i) Climate</i>						
a. Temperature	123	Water is too warm, it is pushing fish further offshore	4	6	24	E
	124	No data collection to monitor this activity (e.g. where and how deep)	4	6	24	E
b. Rainfall	125	Sprat do not come close to shore when runoff and sediment is high	5	6	30	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
c. Current	126	Big effects but no data	4	6	24	E
	127	Fish used to travel 25 miles West, now they are traveling SW	1	6	6	L
ii) Human induced changes						
a. Water quality	128	Atlantic side has more garbage, including debris from Antigua and Guadeloupe	2	6	12	M
	129	LEFCO wash sand and the 'muck' goes into the sea, this is a very big problem	5	6	30	E
	130	Some areas of the reef are dead from smothering due to sedimentation (no whelks, lobster)	5	6	30	E
	131	Problem with sedimentation and siltation from quarries (coastal pelagic)	5	6	30	E
	132	Animal grazing on the land has caused erosion which increases land runoff	3	6	18	H
	133	Runoff of grey water (sewage) affect water quality for coastal pelagic	1	6	6	L
b. Habitat modification	134	Coastal development removing coastal vegetation (mangroves), nothing holding the soil together	4	6	24	E
	135	Fill-in of mangrove swamps and lagoons which used to filter silt, not effective anymore	4	6	24	E
	136	Do not know if chemical fertilizer have any effect on the marine environment	4	6	24	E
2. Impacts of other drivers						
i) Social						
ii) Economic						
a. Fuel prices	137	Oil control everything, it goes up everything follows	5	6	30	E
	138	Fishers have to be more efficient in gas use (better technology for boats, engine, and fishing technology) and money management (expenditure - too much gambling)	5	6	30	E

ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

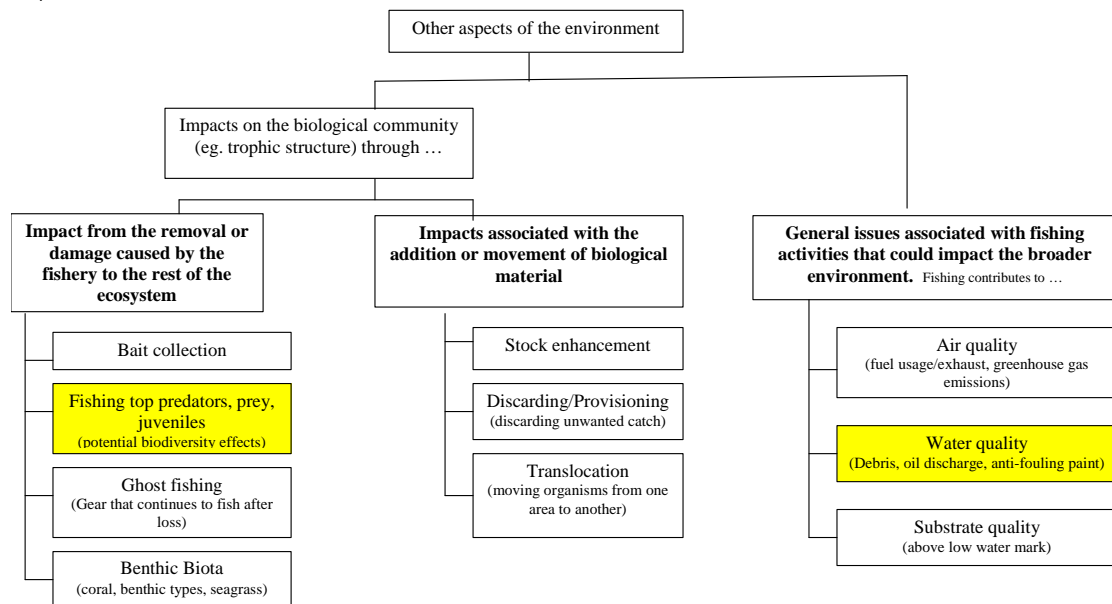
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

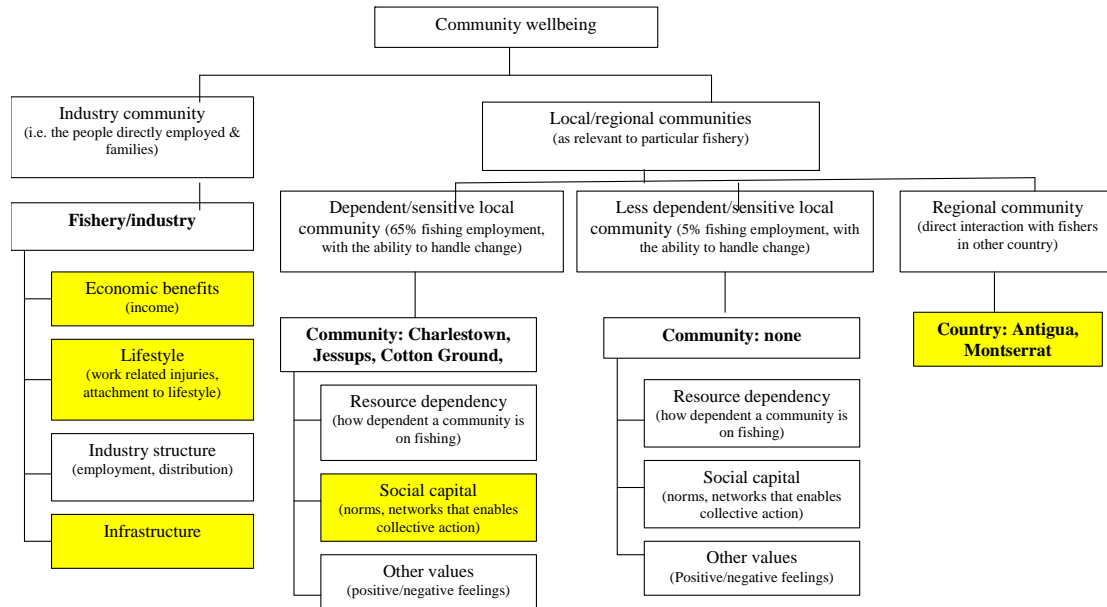
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

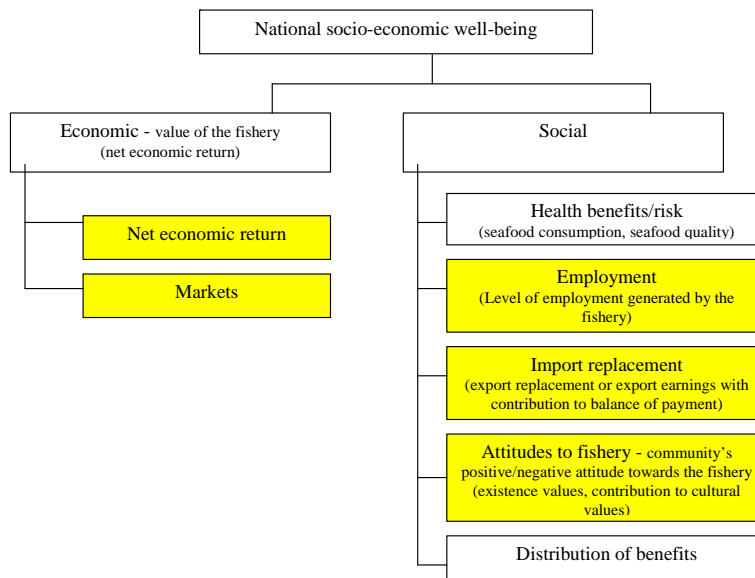
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

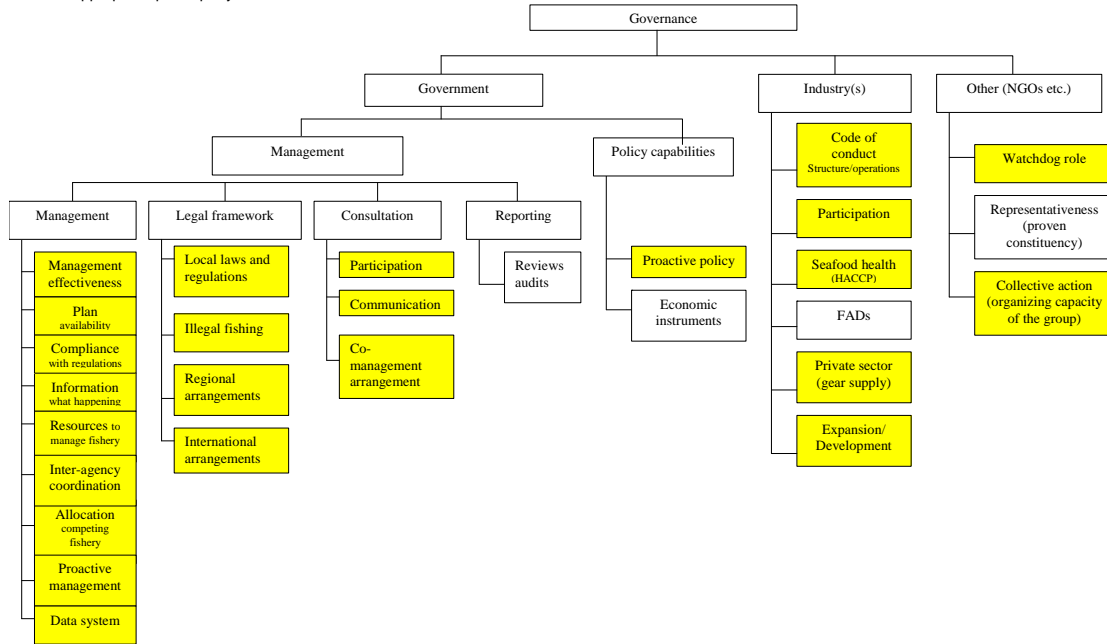
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

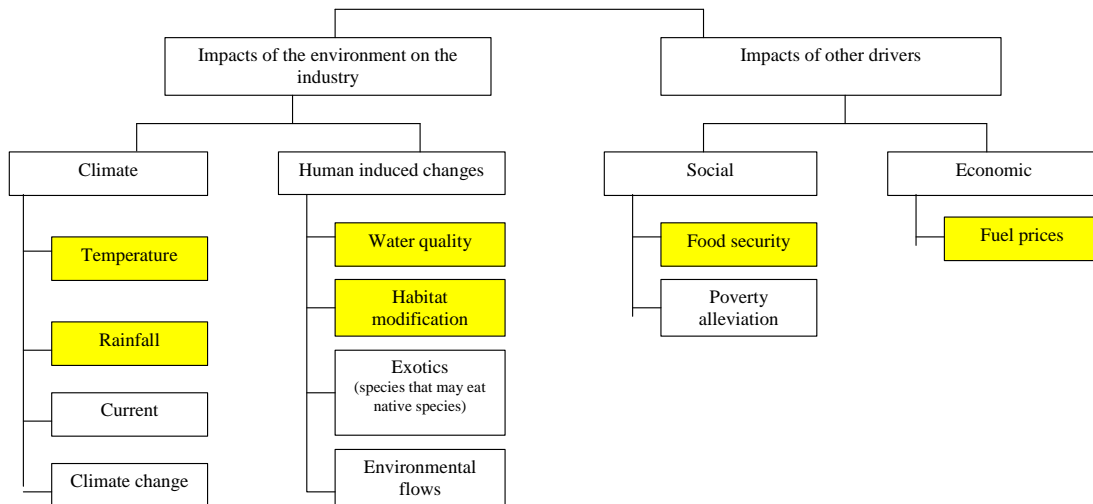
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



ST. LUCIA

Vieux Fort Fishing Port Conference Room, 24 and 25 July 2007

Pelagic fishery defined

The pelagic fishery was defined as vessels (canoe, pirogue, shaloo, longliner, whaler) using trolline, longline and gillnet to target primary species tuna, dolphinfish, billfish, blackfish, blackfin tuna, and wahoo. Secondary species included king mackerel, skipjack, barracuda, sharks, ocean triggerfish and turtles. Bait species included tuna, flyingfish, ballyhoo, bigeye scad, herring, skipjack, wahoo, and small tunas. Non retained species included turtles and seabirds.

Identification of the issues

A total of 106 issues were identified and prioritized for this fishery (Section 6.2). The ability to achieve accounted for 59% of the issues identified, ecological well-being 22%, and human well-being 19% (Figure 20). Governance accounted for 53% of all the issues identified followed by retained species at 19%.

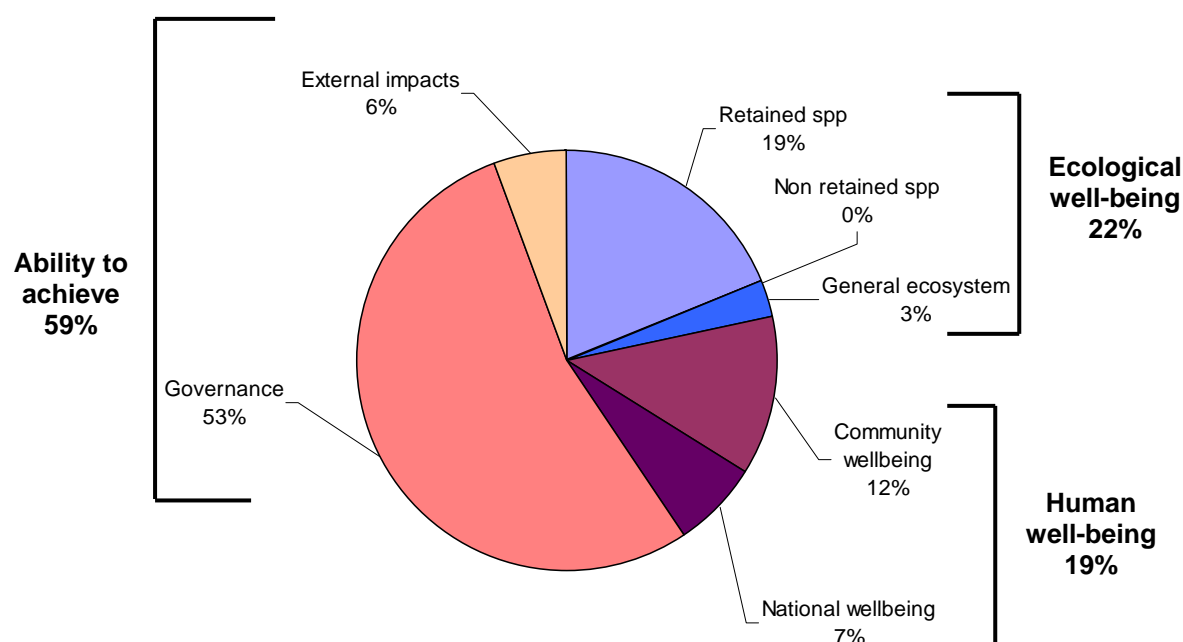


Figure 20: Percentages of issues identified within each component and category in the St. Lucia pelagic fishery.

Prioritization of issues

Most of the issues prioritized fell within the extreme category (65%), followed by high risk at 19%, moderate risk (8%) and low risk (8%). When considering the spread of risk categories within each component all major categories, except external impact, were rated extreme risk (Figure 21).

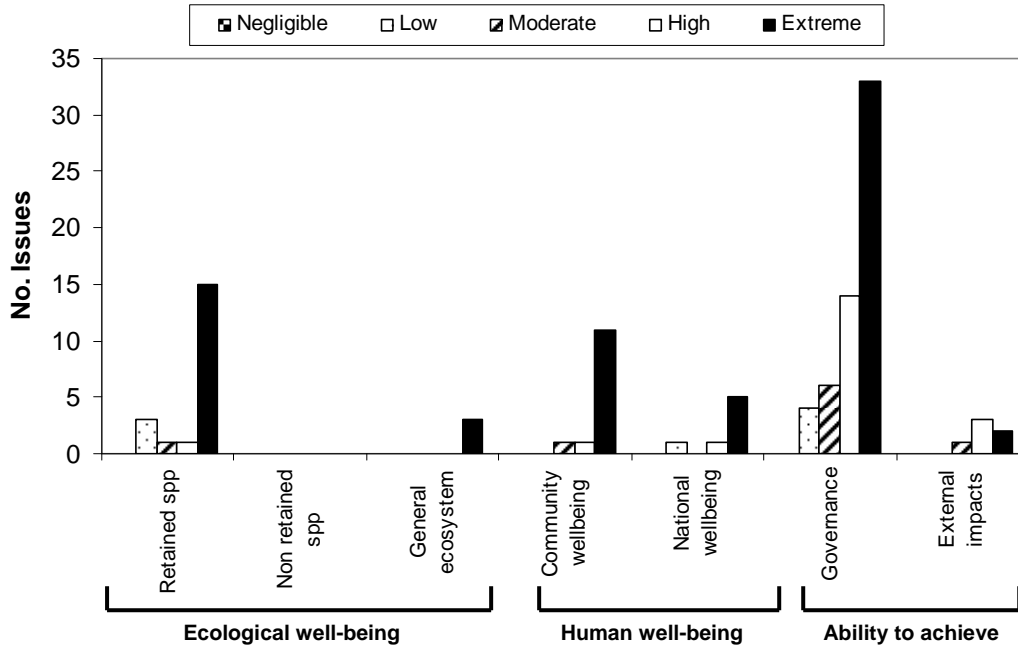


Figure 21: Proportion of issues within given risk categories (St. Lucia)

MAIN ISSUES AND THEMES

Ecological well-being

Estimates of distribution, abundance, and population structure of many primary and secondary species need to be assessed. Fishers observed increased landings of several target species, except tuna and flyingfish. This increase could be the result of FADs around the island.

Of extreme risk to the fishery was a decline in bait species, forcing fishers to travel to St. Vincent and the Grenadines to purchase bait.

Human well-being

Of extreme risk to the economic benefit of the fishery was the price of fish, which fishers considered to be low when compared to their operating expenses, yet too high for consumers. Also of extreme risk was fishers' lack of time and business management of their small-scale fishing operations. Participants were concerned that at retirement many fishers did not have enough money to take care of themselves.

In regard to the problem of economic benefits, many participants were concerned that non-boat owners received the least benefits from the industry, while middlemen and hoteliers received more. This was an issue the Cooperatives would like to see change.

Fishers needed to contribute to the maintenance and take ownership of fishing infrastructure.

The Department was not able to value the fishery as available data collected during the agriculture census was not yet analyzed.

Of extreme risk to human well-being of the fishery was society's view of fishers, as they were considered the lowest class in society. This view was attributed to how fishers portray themselves.

Ability to achieve

Management of the fishery needs to be improved as there were problems implementing the management plan, no specific regulations for the pelagic fishery, and limited financial and human resources for data collection and management.

Issues related to the industry ranked moderate to extreme risk. In regard to seafood health, much needed to be done to improve quality control standards aboard vessels, fish markets, and processing plants. Conflict amongst fishers and improper fishing techniques around FADs were high risk issues. Of concern to the expansion of the fishery were the high cost of out-fitting longline vessels, technological knowledge (vessel, gear), and the need for HACCP certification.

There were problems with fishermen cooperatives: fishers did not actively participate in activities; the coop needed more assistance from the Cooperative Department (which was left to the Department of Fisheries); and non-boat owners (80%) were not well represented as there was little/no incentive for them to become members.

Stakeholders were not clear on the roles and responsibilities of the Department of Fisheries and other agencies that were involved in fishing in some way (e.g. National Development Corporation, Ministry of Health, Cooperative Department, St. Lucia Fish Marketing Corporation, Marine Police, Bureau of Standards, Village Councils, Sustainable Development (Coastal Zone Management Unit)). During the workshop participants reviewed the roles and responsibilities of these agencies.

PERFORMANCE REPORT

Participants developed a draft sample performance report to improve seafood quality (Table 17). More needs to be done to develop this report.

Table 17: Proposed performance report on improving seafood quality in St. Lucia

Major issue	To improve seafood quality in St. Lucia
Issue ID	68 - 72
Operational objective	Meet HACCP standard To improve health benefits from the fishery To improve economic benefits
Indicators	Number of vessels, markets, processors maintaining quality standards

	Number of reported defaults Number of food poisoning
Activities/Data requirement	Education/public awareness (especially politicians, courts) Training in HACCP standards (Trainers MoH/DoF/BS) Infrastructure, boats, equipment up to standard Enforcement, monitoring, legislation
Fisheries management strategies	Penalties Enforcement Random checks
External drivers	Resources

Attendance

Fifteen participants attended the workshop including fishers/cooperative members from major pelagic landing sites and fisheries staff (Table 18).

Table 18: List of participants in St. Lucia

Name	Organization
Jeannine Rambally	Department of Fisheries, Biologist
Christopher James	Department of Fisheries, Head of Extension
Marcel Edwin	Department of Fisheries, Extension
Petronila Polius	Department of Fisheries, Extension
Shepherd Joseph	Department of Fisheries, Warden
Elvis Jn Baptiste	Department of Fisheries, Boat Maintenance
Lambert Vitalis	St. Lucia Fish Marketing Corp. Manager, President Goodwill Fishermen Cooperative (Vieux Fort)
Regis Maxwell	St. Lucia Fish Marketing Corperative, Fisheries Complex
Matthew Benoit	Fisher (Choiseul), Choiseul Fishermen Cooperative,
George Wilfred	Fisher (Laborie), Laborie Fisheries and Consumer Cooperative
Richie Roberts	Fisher (Savannes)
A. Daniel	Fisher (Dennerly)
Augustin Anthony	Fisher (Vieux Fort)
Peter Philip	Fish vendor
Cpl. 203 Kentry Frederick	Police Marine Unit
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED AND PRIORITIZED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme).

St. Lucia Fishery pelagic
 Gear troll, longline, gillnet
 Vessels canoe, pirogue, shalooop, longliner, whaler

Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
ECOLOGICAL WELLBEING						
Issue related to retained species (those species that the pelagic fisheries wants to capture and use)						
<i>(i) Issues related to target species</i>						
1. Tunas (Scombroidei)						
a. distribution	1	First time not seeing tuna on the Channel; Moved from the Channel to the first bank, reasons unknown (fishery)	1	6	6	L
b. abundance	2	Less this year, reasons unknown	1	6	6	L
c. population structure	3	No data specific for St. Lucia, needs to be assessed	4	6	24	E
2. Dolphinfish (<i>Coryphaena hippurus</i>)						
c. population structure	4	Known regionally, specific studies not done in St. Lucia, needs to be assessed	4	6	24	E
3. Billfishes (marlin, sailfish)						
a. distribution	5	Caught mainly around FADs; distribution needs to be assessed	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
c. population structure	6	Needs to be assessed	4	6	24	E
4. Blackfish						
b. abundance	7	Catch increased due to an increase in demand (community fish fry activities), no abundance estimates	4	6	24	E
c. population structure	8	Needs to be assessed (small fishery)	4	6	24	E
5. Blackfin tuna						
a. distribution	9	Move from outside to inside bank	3/4	6	18/24	H/E
b. abundance	10	Landings increasing, reasons unknown, no abundance estimates	4	6	24	E
c. population structure	11	Needs to be assessed	4	6	24	E
6. Wahoo						
a. distribution	12	Needs to be assessed	4	6	24	E
b. abundance	13	Landings increased (not a preferred species for marketing), no abundance estimates	4	6	24	E
c. population structure	14	Needs to be assessed	4	6	24	E
7. Flyingfish						
a. distribution	15	Needs to be assessed	4	6	24	E
b. abundance	16	Very rare now, used to have two peak seasons but not anymore (major prey species); no abundance estimates	4/5	6	24/30	E
c. population structure	17	Needs to be assessed	4	6	24	E
<i>ii. Issues related to secondary species (target fishery catches relatively minor amounts)</i>						
a. king mackerel						
b. skipjack (<i>Katsuwonus pelamis</i>)	18	Not a preferred species (marketing), it has worms	1	6	6	L
c. barracuda						
d. sharks (Elasmobranchii)						

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
e. ocean triggerfish 'boost'						
f. turtles						
Issues related to bait species and its impact on the pelagic fishery						
a. skipjack						
b. flyingfish		(<i>Hirundichthys affinis</i>)				
c. ballyhoo		(<i>Hemiramphus balao</i>)				
d. jack (bigeye scad)						
e. herring		(Clupeidae – <i>Opisthonema oglinum</i> , <i>Harengula</i> spp. and <i>Sardinella</i> spp.)				
f. wahoo						
g. sardines		(Engraulidae – <i>Cetengraulis edentulous</i>)				
h. blackfin tuna						
i. small tunas						
j. squid (local & import)						
k. artificial lures						
	19	Boats do not have bait-well to carry live bait to sea	2	6	12	M
	20	Lack of bait, fishers have to travel to St. Vincent and the Grenadines to purchase bait	4	6	24	E
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. turtles						
b. seabirds						
Issue related to general ecosystem: impact of a fishery on the ecosystem						
<i>1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem</i>						
a. Bait collection	21	When harvesting robins and jacks a lot of juvenile fish are destroyed	5	6	30	E
<i>2. Impact associated with the addition or removal of material</i>						

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
<i>3. General issues associated with fishing activities that could impact the broader environment</i>						
b. Water quality	22	The indiscriminate disposal of waste into near-shore water; the same seawater is used to clean fish, storage box, and vessel	4	6	24	E
	23	Used oil (fishing and other industry) is dumped in drains which ends up in the sea	4	6	24	E

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Contribution of the pelagic fisheries to community well-being						
a. Economic benefit	24	Consumer – price of fish too high; fisher – price does not reflect expenses; vendors – price expensive	4	6	24	E
	25	Need to determine the cost of producing a pound of fish to determine the selling price of fish	4	6	24	E
	26	Fishers do not consider fishing as a business (improper time and business management). At the end of the day some fishers have no money, they cannot pay bills, they are a burden to society	4	6	24	E
	27	Thief and tampering of boats and equipment	3	6	18	H
b. Lifestyle	28	When they get older, they do not have money to take care of themselves	5	6	30	E
	29	Fishers need to take safety-at-sea more seriously	5	6	30	E
	30	Fishers are not self motivated towards human development	4	6	24	E
	31	After a fishing trip, some fishers do not return to sea until the money is finish (alcohol, etc)	2	6	12	M

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	32	Fishers do not want to stay at sea for extended period	5	6	30	E
d. Infrastructure	33	During the peak season there is not enough storage space at markets, hence fishers are forced to sell fish in the community	2	6	12	M
	34	Fishers do not want to contribute to the maintenance of fishing infrastructure	5	6	30	E
	35	Fishers need to accept ownership of fishing infrastructure	5	6	30	E
	36	The management aspects of fishing infrastructure is not enforced (delinquents are not being dealt with)	4/5	6	24/30	E
1. Local communities (people who are directly employed and their families)						
<i>i) Dependent/sensitive communities (Denmery, Laborie, River Doree, Choiseul, Micoud, Praslin, Savannes Bay, Soufriere, Vieux Fort, Gros Islet, Castries, Bananes, Anse-la-Raye, Canaries)</i>						
b. Are there norms and networks that enables collective action	37	Do not trust anyone (when given information to commercial/sport/community they do not trust)	4	6	24	E
	38	Community depend on crisis or problems to enable collective action	4	6	24	E
<i>iii) regional communities (Martinique, St. Vincent and the Grenadines)</i>						
Norms and networks	39	Close social relationship between neighbours; however, there is the problem of drug trafficking, illegal fishing, and thief	4	6	24	E
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						
a. Net economic return	40	Not able to value the fishery (was done during the agriculture census, but it has not been analyzed)	5	6	30	E
	41	Fishing is low priority, hence, it does not command budgetary support (tourism and agriculture have higher priority)	3/4	6	18/24	H/E

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Markets	42	Need to offer diverse value-added to fish (e.g. stake, fillet, salt, smoke)	3	6	18	H
2. Social						
a. Health benefits/risk	43	Not placing fish on ice could be a health risk	4	6	24	E
b. Level of employment	44	Pelagic resource not fully exploited, hence there is possible employment for fishers, processors, and vendors	1	6	6	L
c. Import replacement	45	Cheap foreign fish displacing local fish	4	6	24	E
d. Attitudes to fishery	46	Society 'looks down' on fishers as the lowest class in society. This is attributed to how fishers portrays themselves	4	6	24	E
	47	Industry is not attracting young people to the industry, the average age of fishers is 35-65	4	6	24	E
e. Distribution of benefits	48	Crew members/grass-root fishers (about 80%) do all the work but receive the least benefit, while middlemen and hoteliers receive maximum benefit from the fishing industry	4	6	24	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries						
1. Government						
<i>i) Management</i>						
a. Management effectiveness	49	There is room for improvement	3	6	18	H
	50	Cannot effectively manage migratory stocks, if not managed by other countries	5	6	30	E
	51	Not enough research on the biological side, we do not know what is there to effectively manage the fishery (neashore already collapsing, and push fishers into pelagic and you do not know what is there)	5	6	30	E
b. Plan availability and comprehensiveness	52	Plan is available and being revised, the problem is the implementation	4/5	6	24/30	E
c. Compliance with regulations	53	No specific regulations for the pelagic fishery	4	6	24	E
d. Information	54	Information is available yet fishers are not interested in accessing the information	4/5	6	24/30	E
	55	Fishers not willing to give information	2	6	12	M
e. Resources to manage the fishery	56	Need financial and human resources	4	6	24	E
f. Inter-agency coordination	57	The DoF is doing other agency's work (e.g. MoH, Cooperatives Dept., etc.)	4	6	24	E
	58	There is no clear guidance as to the roles and responsibilities of agencies involved in the fishing industry (e.g. DoF, National Development Corporation, MoH, Cooperative Dept., St. Lucia Fish Marketing Corporation, Marine Police, Bureau of Standards, Village Council, Sustainable Development)	4	6	24	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
g. Allocation amongst competing fishery	59	Have limited resources to work with initially	4	6	24	E
h. Proactive management	60	50:50 proactive	2	6	12	M
i. Data system	61	Limited resources to collect biological data	4	6	24	E
	62	Need to update licensing and registration system	4	6	24	E
<i>ii) Legal framework</i>						
b. Illegal fishing	63	Citing of IUU fishing (French, Barbados, Venezuela, Dominica Republic, Taiwanese vessels)	4	6	24	E
	64	Difficult to differentiate vessels involved in the drug trade, transporting fish, fishing illegally, visiting	4	6	24	E
c. Regional arrangements (OECS, CRFM, WECAFC)	65	Backdoor diplomacy of other countries (say one thing but do another)	3	6	18	H
<i>iii) Consultation</i>						
a. Participation	66	Fishers do not participate, they attend meetings only if it is important to them	4/5	6	24/30	E
	67	DoF approach to meetings with fishers need to change	1	6	6	L
b. Communication	68	There 'appears' to be a disconnect between fisher-boat owners-DoF (the DoF know the issues but due to circumstances they are not addressed, miss-conception, understanding roles and responsibility)	2/3	6	12/18	M/H
<i>iv) Reporting</i>						
a. Reviews audits	69	Reports only to the ministry not to stakeholders	2/3	6	12/18	M/H
<i>v) Policy capabilities</i>						
a. Proactive policy	70	In some cases the department is proactive, but not in others	2/3	6	12/18	M/H

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
2. Industry						
a. Code of conduct (structure, operations)	71	In place but not being utilized	4	6	24	E
b. Participation	72	If the DoF wants to do certain things, fishers' interest and level of cooperation is not there	3	6	18	H
c. Seafood health (HACCP)	73	Quality control standards in-place but not enforced or implemented, hence, the quality of fish are not good (e.g. some vendors do not iced fish for 12 hours)	4	6	24	E
	74	Need to educate society on fish standards (e.g. they believe fish on ice is stale fish)	4	6	24	E
	75	The MoH needs to do a better job at maintaining quality standards it is not the responsibility of the DoF	4	6	24	E
	76	Fishers do not carry ice to sea, fish are exposed at sea, not gutted, do not bleed the fish, storage/ice box not sanitized	4	6	24	E
	77	Fishers, middlemen, and vendors need to utilize their quality control training	4	6	24	E
d. FADs	78	Conflict amongst sport and commercial fishers, fishers and fishers (west & south coast)	3/4	6	18/24	H/E
	79	No regulations on fishing by FADs (in new regulations)	1	6	6	L
	80	FADs do not last a long time, it is cut away by ships, humans, etc.,	3	6	18	H
	81	Fishers tampering and removing buoys	3	6	18	H
	82	The problem of territorial wars around FADs	3	6	18	H
	83	Fishers are targeting the small fish; why? (1) many do not know how to target large fish and others do not share their knowledge about how to target large fish (2) market demand for whole fish forces fishers to target small fish (big fish harder to sell)	4	6	24	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
e. Private sector	84	Parts for Yamaha engines not readily available	4	6	24	E
	85	Not able to get a variety of fishing equipment	1	6	6	L
	86	Gear/equipment are expensive	4	6	24	E
	87	Banks should be more supportive towards helping fishers (loans/grants)	1	6	6	L
	88	Fishers do not service their loans	4	6	24	E
	89	Insurance agency will not insure fishing boats, they say high risk	3/4	6	18/24	H/E
f. Expansion/ Development	90	High cost of out-fitting a longline vessels and trained persons to operate the vessel	5	6	30	E
	91	Not able to export fish due to the high purchase price of fish and the country is not HAACP certified	4	6	24	E
	92	Fishers need training in technology (GPS) and equipment	3	6	18	H
3. Other (NGOs – Goodwill (Vieux Fort), Laborie, Choiseul, Soufriere, Anse-la-raye/Canaries, Castries, Gros Islet, Dennery Fishermen Cooperatives)						
a. Watchdog role	93	Some NGOs are very good at their watchdog role while others are not	3	6	18	H
c. Fishers Cooperative and collective action	94	Cannot get fishers to participate in activities	5	6	30	E
	95	Some have leadership problem	3	6	18	H
	96	Fishermen cooperatives see more extension officers then cooperative dept. officers	4	6	24	E
	97	Need to attract new leaders and strong successive leadership	4/5	6	24/30	E
	98	Cooperatives not representative of grass-root fishers (only boat owners benefiting, there is no incentive for grass root fishers whom make up about 80% of the total fishing population)	3	6	18	H
	99	Need to make cooperatives more attractive to grass-root fishers (but how?)	3	6	18	H
	100	Members are making decisions without fully understanding what is happening	5	6	30	E

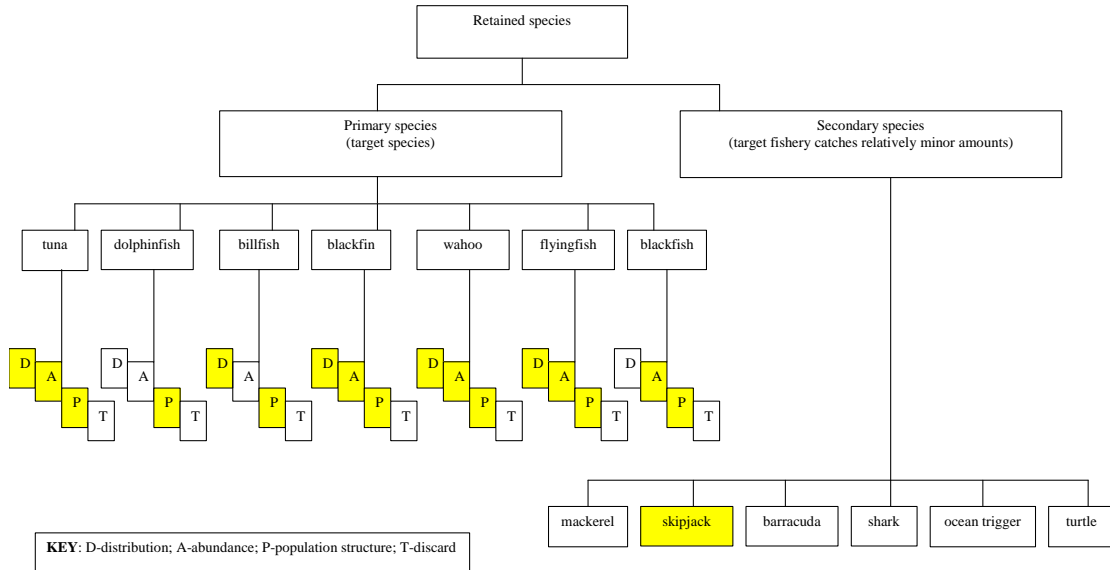
ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Issue related to the environment and other issues of the industry						
1. Impacts of the environment on the fishery						
<i>i) Climate</i>						
a. Temperature	101	Temperature affects fishing, needs to be assessed	2	6	12	M
<i>ii) Human induced changes</i>						
a. Water quality	102	Runoffs from farms, road and hotel construction, raw sewage, garbage affects water quality	5	6	30	E
	103	Structure are in place to dispose of garbage but people do not adhere to the rules	4	6	24	E
b. Habitat modification/destruction	104	Mangrove removal (charcoal, housing, etc.)	3/4	6	18/24	H/E
2. Impacts of other drivers						
<i>i) Social</i>						
<i>ii) Economic</i>						
a. Fuel prices	105	High fuel prices	3	6	18	H
	106	Need more efficient equipment (e.g. 4-strokes engines)	3	6	18	H

GENERIC COMPONENT TREES (ST LUCIA)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE PELAGIC FISHERY

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.

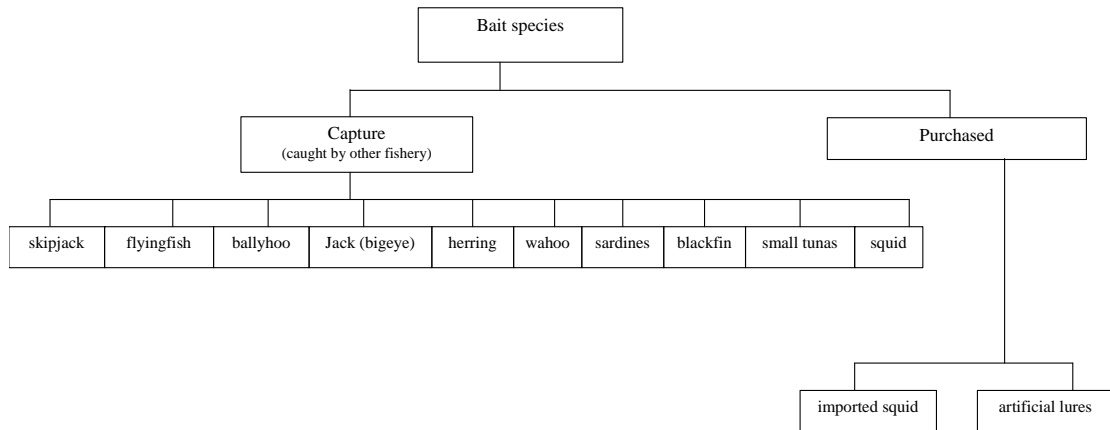


Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

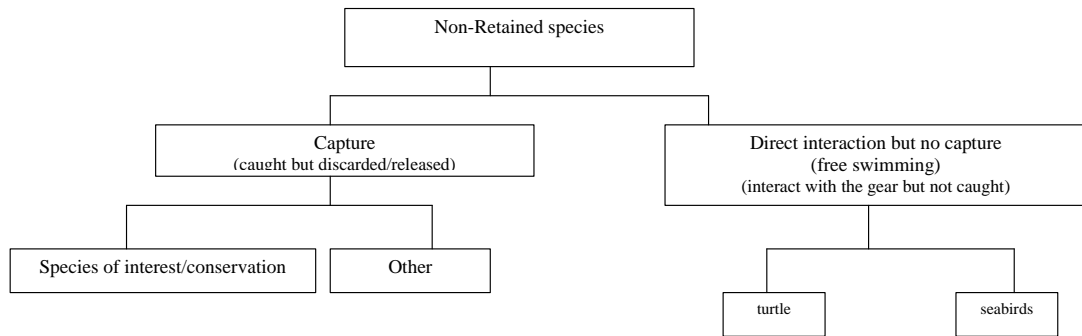
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

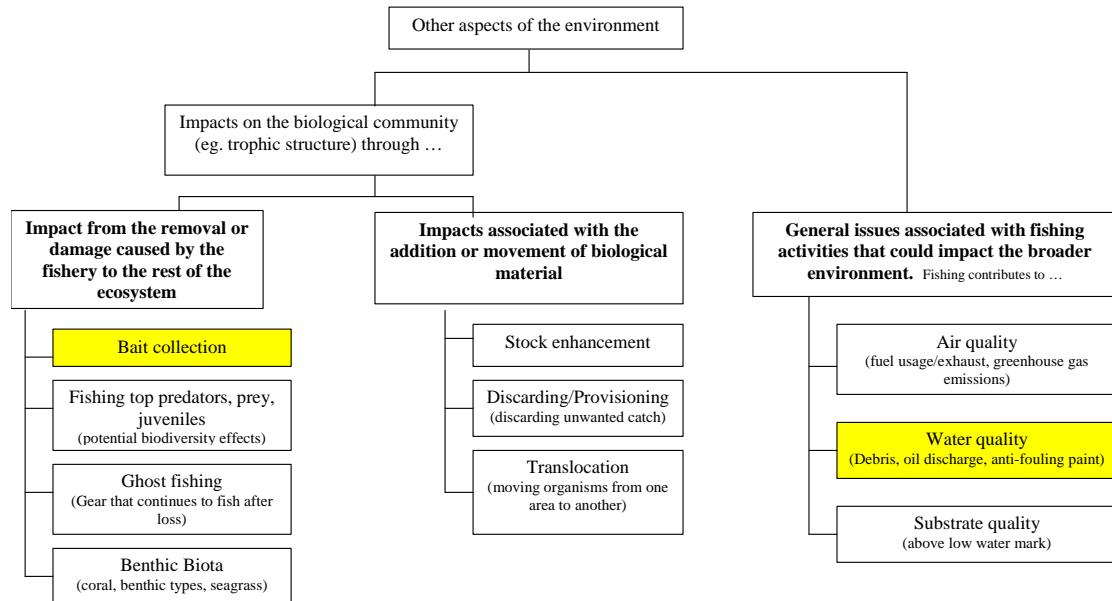
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

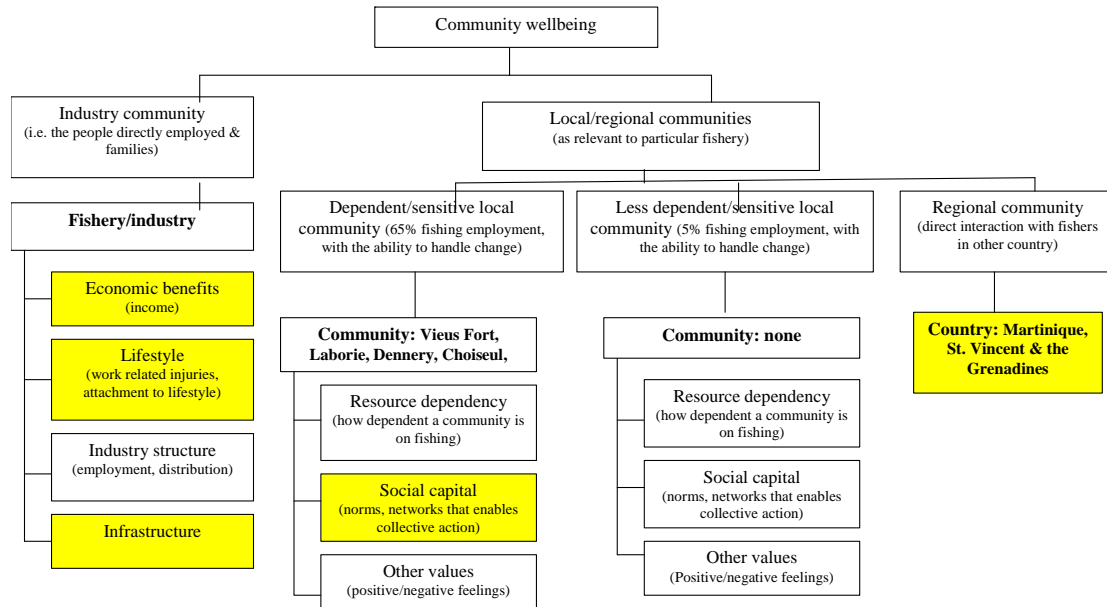
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

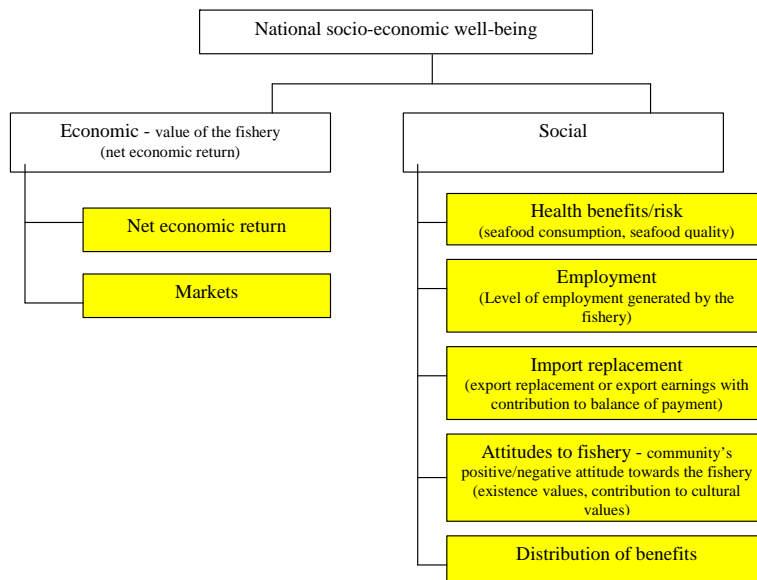
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

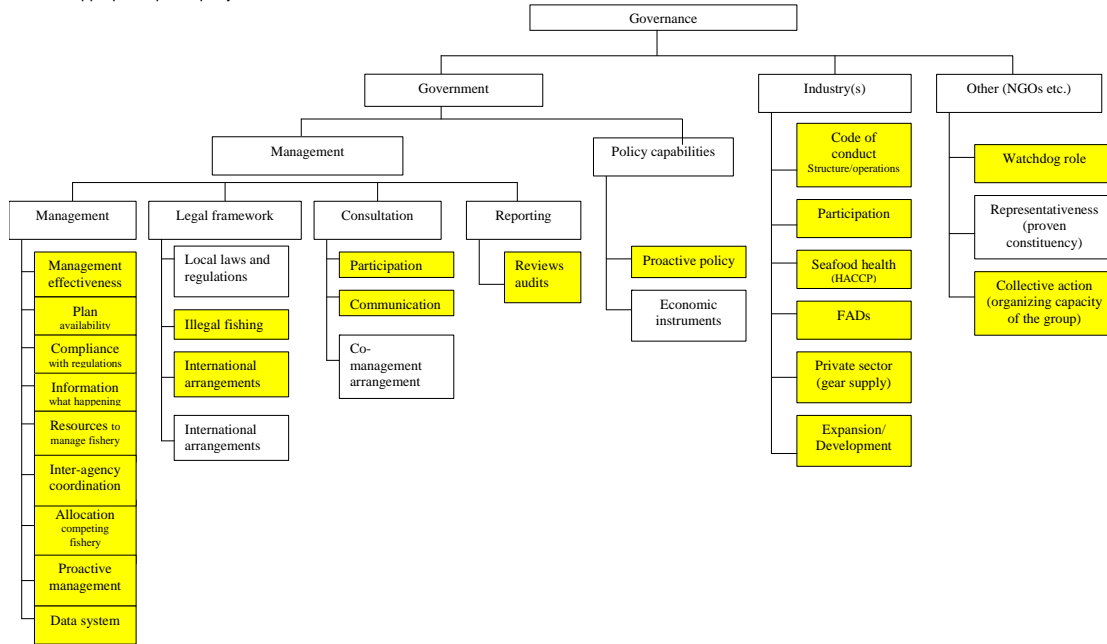
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

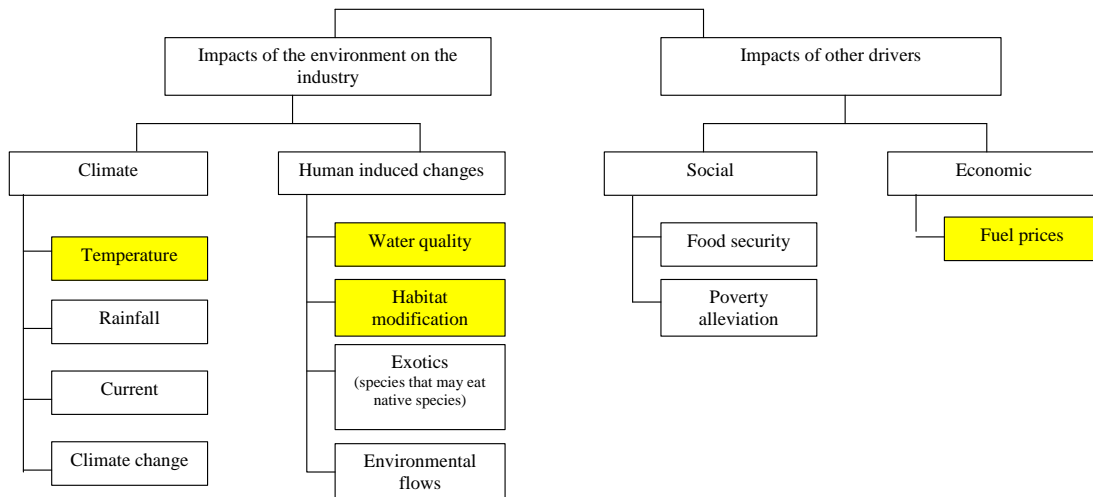
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



ST. VINCENT AND THE GRENADINES

Fisheries Division Conference Room, 22 and 23 March 2007

Pelagic fishery defined

The pelagic fishery was defined as vessels (flat transom, pirogues, longliners, launches) using specific gears (trolling, longline, handline, seine, harpoon) to catch fish types (tuna, dolphinfish, whale, kingfish, skipjack, blackfin tuna, small tunas, rainbow runner, and cavalli).

Identification of the issues

A total of 166 issues were identified for this fishery of which 162 were prioritized (Section 7.1). The ability to achieve component accounted for 50% of the issues, ecological well-being 31% and human well-being component 19% (Figure 22). Governance and retained species issues accounted for 69% of all issues.

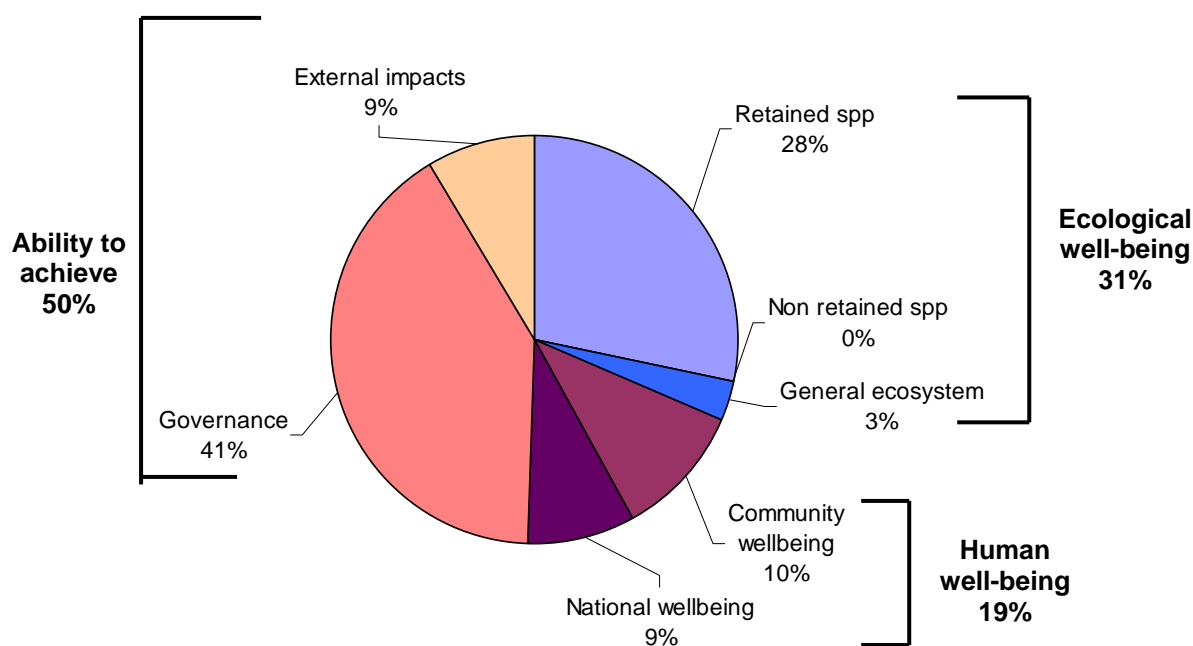


Figure 22: Percentages of issues identified within each component and category in the St. Vincent and the Grenadines pelagic fishery.

Prioritization of issues

The prioritization process resulted in uneven distribution of issues in the various risk categories. Of the 163 issues prioritized, participants ranked 67% extreme, 19% high, 7% moderate, 6% low, and 1% negligible risk. When considering the spread of risk categories within each component a large proportion of the issues under governance were rated extreme or high risk (Figure 23). Similarly, issues under retained species, community well-being,

and external impacts were also rated as extreme or high. Issues related to national well-being was rated moderate.

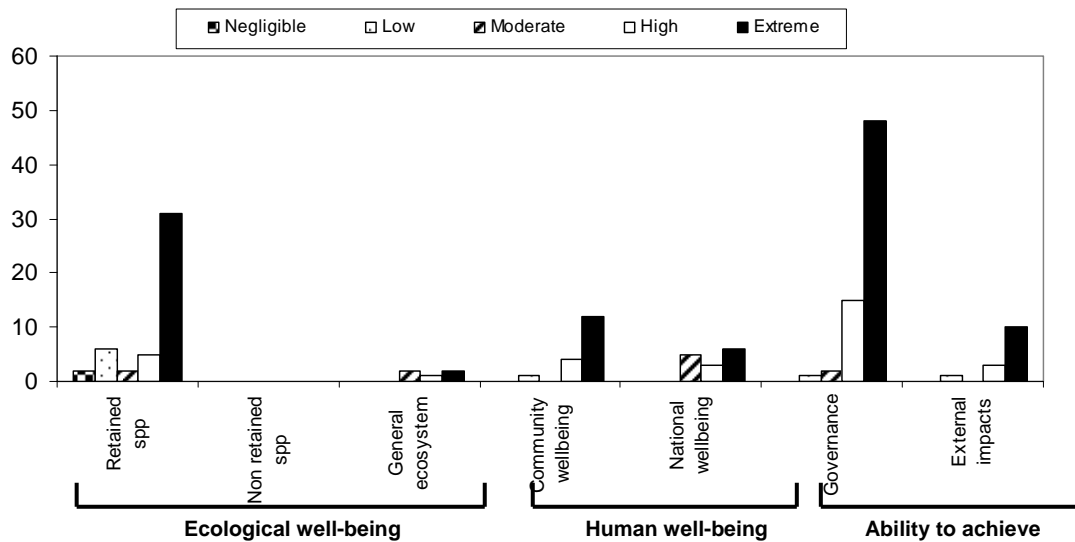


Figure 23: Proportion of issues within given risk categories (St. Vincent)

MAIN ISSUES AND THEMES

Ecological well-being

The lack of analysed data to understand the distribution, abundance, and population structure of pelagic fish caught was rated as the issue of highest risk to the ecological well-being of this fishery. Although the Fisheries Division had on-going catch and effort data collection activities, there were limited biological data and no assessment of natural mortality, migration pattern, status of pelagic species using model predications. There appeared to be an increase in dolphinfish and kingfish landings, but participants did not know why the increase; hence, mixed review concerning the level of risk.

Discussed at length was the impact of the bait fishery (jack, robin, ballyhoo) on the pelagic fishery. The main issues were the inability of fishers to go fishing due to the lack of bait which was rated as the second issue of highest risk. Participants were also concerned about external impacts such as debris, coastal development, and runoffs which might have contributed to the decline in bait species.

Lack of data regarding the impact from the damage or removal caused by fishing (legal and otherwise) on the general ecosystem was ranked as extreme. Water quality affected by inappropriate disposal of used oil and debris were a cause of concern, ranking high or extreme.

Human well-being

Low fishers' income coupled with high fuel prices, high fish prices, and fishers not managing their income well were the basis of many human well-being problems which were rated as being of extreme risk to the fishery.

Inadequate boats venturing farther offshore with little or no safety-at-sea equipment and no ship-to-shore communication resulted in increased injuries and loss of lives. Although the Fisheries Division worked to improve fishing infrastructure, some operations at landing sites have outgrown the facilities, while others needed proper management. This was rated as being of extreme risk to the objectives of the fishery.

The dependency of certain communities (especially the Grenadines) on the pelagic fishery is not clearly understood; thus, this was seen as high or extreme risk.

Ability to achieve

Participants agreed that management was not effective as there was no monitoring, control, and surveillance, institutional arrangement inadequate, limited resources, the fishery was open access, there was no current management plan, and the problems with overlapping jurisdiction and mandate from other departments. Also, the legislation needed to be revised to capture international and ecosystem issues.

Of great concern to the management of the fishery was the lack of capacity to collect, analyze, and disseminate catch, effort, biological, social, economic, and local knowledge data/information to fishers groups, fishers, among Fisheries Division staff, within government agencies, politicians, and regional and international agencies. Likewise, to use analyzed data/information for management.

The need for a stronger consultative mechanism was recognized as an issue; one that helps to improve stakeholder organizing, builds trust, and where individuals' views were valued. However, there were underlying problems with fishers' attitude and the 'fishing culture' that need to change.

More needed to be done to get fishers involved in maintaining quality control standards and to think about conservation and management and not just development. Fisheries officers (quality control and extension) needed new skill-sets aimed at changing attitudes and behaviour.

Attendance

The workshop was attended by 12 participants mainly from the fishermen cooperatives and the Fisheries Division (Table 19). There was a notable lack of fishers and processors at this meeting.

Table 19: List of participants in St. Vincent and the Grenadines

Name	Organization
Raymond Ryan	Fisheries Division, Chief Fisheries Officer
Jennifer Cruichshank	Fisheries Division, Extension
Sophia Punnett	Fisheries Division, Biologist
Rowie Kirby-Straker	Fisheries Division, Education Officer
Lucille Grant	Fisheries Division, Quality Control
Hyrone Johnson	Fisheries Division
Shermane Glynn-Johnson	Fisheries Division, Data and boat owner
Calvin Lampkin	Goodwill Fishermen Cooperative, fisher
Palma Gibson	Calliaqua Fishermen Cooperative
Velda Gumbs	National Fisheries Marketing Ltd.
Deon Henry	SVG Coast Guard
Terrence Phillips	CRFM Sec.
Sandra Grant	FAO consultant

ISSUES IDENTIFIED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme).

St. Vincent and the Grenadines	Fishery	pelagics
	Gear	trolling, longline, handline, seine, harpoon
	Vessels	flat transom boats, pirogues, longliners, launches

Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
ECOLOGICAL WELLBEING						
Issue related to retained species (those species that the large pelagic fisheries wants to capture and use)						
<i>(i) Issues related to target species</i>						
1. Tunas (Scombroidei)						
a. distribution	1	Not able to say - data collected but not analyzed regularly	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. abundance	2	Catch juveniles (2.5 years, 8-9 lbs) at the surface (we have been catching a lot of juveniles for years)	4	6	24	E
c. population structure	3	Do not catch much albacore because it passes at deeper depths	0	3	0	N
	4	Have catch and effort, little biological (years 2000 - 2004) but not analyzed	4	6	24	E
2. Dolphinfish (<i>Coryphaena hippurus</i>)						
b. abundance	5	This is an unusually good year, the best in years, do not know why	1/2	6	6/12	M/H
	6	Lots of small ones (5-7 lbs.), they are also slim and thin	4	6	24	E
c. population structure	7	Smaller size and fewer bowheads	4	6	24	E
	8	Have catch and effort, little biological (years 2000 - 2004) but not analyzed	4	6	24	E
3. Billfishes (sailfish, marlin)						
a. distribution	9	Needs to be assessed, not targeted by pirogues and not a lot of sport fishing	1	3	3	L
b. abundance	10	Needs to be assessed, not targeted, difficult to determine (not much data)	1	3	3	L
c. population structure	11	Needs to be assessed - not targeted, little catch and effort, no biological data, no analysis	1	3	3	L
4. Whale: blackfish (false killer whale, pilot, porpoise)						
a. distribution	12	Needs to be assessed - limited data collected (not at species level) at Barrouallie fishing community (main landing site)	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. abundance	13	Limited catch data; need to conduct sighting surveys	4	6	24	E
	14	Areas where they have gone in the past not their anymore. Fishers say there is something in the water (hearing sounds) forcing the whales to other areas.	4	6	24	E
c. population structure	15	Needs to be assessed, lack data	4	6	24	E
5. Whale: humpback						
a. distribution	16	Needs to be assessed - limited data, the FD depends on regional information	4	6	24	E
b. abundance	17	Limited data, anecdotal information not documented	4	6	24	E
	18	Need annual sighting surveys	4	6	24	E
c. population structure	19	Needs to be assessed, limited data	4	6	24	E
6. Kingfish						
a. distribution	20	Limited data	4	6	24	E
b. abundance	21	Lots this year like the dolphinfish, do not know why	4	6	24	E
	22	Good size (15-20 lbs) but have no scientific data to verify	1	6	6	L
c. population structure	23	Catch and effort data, little biological (years 2000 - 2004), no analysis	4	6	24	E
7. Skipjack (<i>Katsuwonus pelamis</i>)						

Issue	ID	ECOLOGICAL WELLBEING				
		Description of issue	Consequence	Likelihood	Risk	Category
a. distribution	24	Needs to be assessed, limited data	4	6	24	E
b. abundance	25	More and bigger fish, do not know why	1	6	6	L
c. population structure	26	Catch and effort, little biological (years 2000 - 2004), no analysis	4	6	24	E
e. other	27	Not a good seller (not a fish of choice, loses value fast) (economically)	1	6	6	L
8. Blackfin tuna (<i>Thunnus atlanticus</i>)						
9. Rainbow runner and Cavalli (<i>Caranx latus</i>, ...)						
a. distribution	28	Needs to be assessed, limited data	4	6	24	E
b. abundance	29	Declining - used to come from the Grenadines not much as before	3/4	6	18/24	M/H
c. population structure	30	Limited catch and effort, no biological, no analysis	3	6	18	H
<i>ii. Issues related to secondary species (target fishery catches relatively minor amounts)</i>						
a. Sharks (Elasmobranchii)	31	Demand is increasing so too will fishing effort	2/3	6	12/18	H
b. Swordfish (<i>Xiphias gladius</i>)	32	Distribution, abundance, population structure needs to be assessed - not targeting/catching swordfish anymore because the country ceased exports to the USA	0	6	0	N
c. Mackerels (Scomberomorous spp.)		No				
d. Ocean triggerfish (pig fish)	33	Landings are increasing, don't know why	3	6	18	H

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
e. (prickly hind)	34	Landings are increasing, don't know why	3	6	18	H
f. Turtle	35	Problems with undersized, catching out of season, and poaching	4	6	24	E
	36	Need to review legislation on fishing season	4	6	24	E
Issues related to bait species and its impact on the pelagic fishery						
a. jack (bigeye scad - (<i>Selar crumenophthalmus</i>)	37	Hardly seeing big jacks for food fish	4	6	24	E
	38	Catching small fish for longliners from Grenada, Venezuela, Trinidad and Tobago, and USA	4	6	24	E
	39	Need regulations to protect small jacks (undersized) and quotas on quantities	4	6	24	E
	40	The longline fishery needs a constant supply of fresh live bait	4	6	24	E
	41	In the past fishers used to throw away small fish, which may have an impact on the fishery now	4	6	24	E
b. robin (<i>Dacapterus macarallus</i>)	42	Robins are never too small for people to eat	4	6	24	E
	43	They do not survive well as live bait	3	6	18	H
c. ballyhoo (<i>Hemiramphus balao</i>)	44	Needs to be assessed, limited data	4	6	24	E
d. dodger (<i>Decapterus punctatus</i>)	45	Have not seen much of this specie, they were abundant in the past	4/5	6	24/30	E

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
e. pelagic fish (skipjack, YFT, Kingfish)		No				
f. artificial lures		No				
Other	46	There is a FD administrative arrangement on the amount of fish in a pound for jack and robin, but there is controversy among fishers and consumers. The policy is not enforced due to lack of resources.	4	6	24	E
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. fry-dry (<i>Sardinella aurita</i>) - Seine		No (underutilize, eaten by seabirds)				
b. sunfish (Moliidae spp.) - longline		No				
c. cutlass fish (Trichiuridae spp.) - longline		No				
d. ten pounder (Albulidae spp.) - seine		No				
e. seabirds		No				
Issue related to general ecosystem: impact of a fishery on the ecosystem						
1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem						
b. Fishing	47	Needs to be assessed - no data, no research	4	6	24	E
c. Ghost fishing	48	There is some impact as sport divers found nets and lines on the reef but the level of impact needs to be assessed	2	5	10	M

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
<i>3. General issues associated with fishing activities that could impact the broader environment</i>						
a. Air quality	49	Will continue with continued use of 2-stroke engines	2	6	12	M
b. Water quality	50	Debris from land, especially when it rains (solid waste disposal legislation not enforced)	3	6	18	H
	51	No facility for appropriate dispose of used oil and containers (dumped into the sea)	4	6	24	E

HUMAN WELLBEING						
Issue	ID	Description of issue	consequence	likelihood	Risk	Category
Contribution of the pelagic fisheries to community well-being						
a. Economic benefit	52	Income lower than normal, fishers having difficulty surviving	4	6	24	E
	53	Price of fish driving the cost of production versus low income levels	4	6	24	E
	54	Fishers do not manage their income well	3/4	6	18/24	H/E

HUMAN WELLBEING						
Issue	ID	Description of issue	consequence	likelihood	Risk	Category
b. Lifestyle	55	Fishers have safety equipment but they do not carry them to sea resulting in deaths	5	6	30	E
	56	Boats are no longer adequate (going longer distances) resulting in injuries (back and joint)	4	6	24	E
	57	Very few fishers join national insurance, although the provision is there	4	6	24	E
	58	Fishes waste money (gambling, womanizing, alcohol) which affect family security	3/4	6	18/24	H/E
	59	Proud people (insecurity leads to aggression)	4	6	24	E
	60	Fishers and vendors are not easy to deal with (loud mouth, part of the culture) which creates problems for managers (fishery managers, quality control officers)	3	6	18	H
d. Infrastructure	61	Operations at some landing sites have outgrown the facilities, need upgrading (e.g. Union, Calliaqua, Bottom Town)	4	6	24	E
	62	Need radio communication system (safety at sea)	4	6	24	E
	63	Need people to manage the infrastructure (maintenance philosophy)	4	6	24	E
1. Local communities (people who are directly employed and their families)						
<i>i) For major communities (Kingstown, Barrouallie, Buccament Bay, Calliaqua, Canash, Canouan, Chateaubelair, Clare Valley, Fancy, Fitz Hughes, Great Head Bay, Indian Bay, Layou, Lowmans Bay, Ottley Hall, Owia, Petit Bordel, Questelles, Rose Bank, Sandy Bay, Troumaca, Villa)</i>						
<i>ii) For communities in the Grenadines (Admiralty Bay, Ashton, Clifton, Friendship Bay, Hamilton, La Pompe Bay, Lower Bay, Mustique, My-Mayreau, Paget Farm, Port Elizabeth)</i>						
a. Community dependent on fishing	64	Dependent on fishing, with fewer alternative employment	4	6	24	E

HUMAN WELLBEING						
Issue	ID	Description of issue	consequence	likelihood	Risk	Category
b. Are there norms and networks that enables collective action	65	The FD does not have much understanding of the issues (fishery, social, economics) due to a lack of a presence in the Grenadines.	4	6	24	E
	66	There are studies (socio-economic) being done, the FD needs to develop stronger networks with NGOs and researchers (Union Island Attackers, Youth and Sports, CERMES/UWI) to access the data/information in a consistent manner	3	6	18	H
<i>iii) regional communities</i>						
Norms and networks	67	Grenada and SVG fishers have good social relations (close geographic relationship - the Grenadines), not so for St. Lucia and Barbados (social implications)	1	6	6	L
	68	Unreported fishing from Grenadian, St. Lucian, and Bajan fishers in SVG water which is recorded in other countries	4	6	24	E
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						
a. Net economic return	69	Not able to value fishery, very limited data	4	6	24	E
b. Markets	70	Limited pelagic fish supply, hence, cannot meet the growing demand created by tourism	4	6	24	E
	71	Tourism industry requires better quality (cruise ships)	3	5	15	H
	72	Local market - price of fish is high (consumers not able to afford fish)	4	6	24	E
	73	Local market - vendors not dropping the price of fish	4	6	24	E
	74	Local market - need to assess the operations of the artisanal fishers to determine cost of operation and market opportunities	4	6	24	E
	75	Export market - quality control standards and price	3	6	18	H

HUMAN WELLBEING						
Issue	ID	Description of issue	consequence	likelihood	Risk	Category
	76	Export market – Not able to meet quantity and consistency of supply	3	4	12	M
2. Social						
a. Health benefits/risk	77	Too expensive to provide seafood for the country (price of fish too high)	4	6	24	E
b. Level of employment	78	Need to maintain and rationalize employment in the fisheries sector	3	4	12	M
	79	The pelagic fishery is the only avenue for development, has the greatest potential to increase employment	2	4	8	M
d. Attitudes to fishery	80	Fishers not interested in fishermen week/month, they would like others to make arrangements and they participate	2	6	12	M
	81	People are now more interested in fishing. Initially fishing was not one of the favoured profession but now that is changing	2	6	12	M
e. Distribution of benefits	82	Vendors benefiting more financially from the fishery while fishers are putting in more effort	3/4	6	18/24	H/E

Issue	ID	ABILITY TO ACHIEVE				
		Description of issue	Consequence	Likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries						
1. Government						
i) Management						
a. Management effectiveness	83	Not effective as it should be (no monitoring, no management regime for ICCAT, open access fishery, infrastructure and institutional arrangement inadequate)	4	6	24	E
b. Plan availability and comprehensiveness	84	No current management plan in place	4	6	24	E
c. Compliance with regulations	85	Limited compliance, limited enforcement	4	6	24	E
d. Information	86	Lack of capacity to collect, organize, and disseminate information	4	6	24	E
e. Resources to manage the fishery	87	Limited financial, human, and technical resources	4	6	24	E
f. Inter-agency coordination	88	Little awareness of each others' role	3	6	18	H
	89	The will to collaborate with the FD is there but they too suffer from a lack of resources	4	6	24	E
	90	There is informal collaboration but no formal management regime in place (e.g. no mandate for planning to consult with the FD).	4	6	24	E
	91	Overlapping jurisdiction and mandate (e.g. foreign vessels - Customs, Port Authority, FD, and Coast Guard)	4	6	24	E
	92	Difficult to get collaboration on environmental/conservation issues	4	6	24	E
g. Allocation amongst competing fishery	93	Limited resources, allocations given on a 'dire' needs basis	4	6	24	E

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
h. Proactive management	94	Largely reactive		4	6	24	E		
i. Data system	95	Catch and effort data, no reliable biological data, no analysis (biological dataset 2002-04)		4	6	24	E		
	96	Need human resources to continue biological data collection		4	6	24	E		
	97	A lot of fish is going to the growing tourism sector and not captured in the data collection program, thus the need to reorganize the data collection system to capture these changes		4	6	24	E		
<i>ii) Legal framework</i>									
a. Local laws & regulations	98	Lack of regulations to deal with certain issues		4	6	24	E		
	99	Legislation should be reviewed to capture international and ecosystem issues		4	6	24	E		
	100	Current laws on enforcement not adequate		4	6	24	E		
	101	There is an awareness program in place but still laws and regulations are largely ignored. More needs to be done specific to target audience and not an ad-hoc approach.		3	6	18	H		
	102	Not enforcing regulations (e.g. mesh size for the bait fishery)		4	6	24	E		
	103	Not observing the regulations on undersized large pelagics		4	6	24	E		
b. Illegal fishing	104	Illegal fishers from Barbados, Grenada, St. Lucia, Venezuela, Trinidad and Tobago, and USA (some)		4	6	24	E		
	105	Management of the distance water fleet (ecological and economic consequences)		4	6	24	E		
c. Regional arrangements (OECS,	106	Implementing regulations is a problem because there is limited resources to monitor and put things in place		4	6	24	E		

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
CRFM, WECAFC)	107	Development of common fisheries policies and what it means	2	6	12	M
d. International arrangements (ICCAT, IWC)	108	Imposition of stringent measures (reporting system, observer, VMS) for small island states who have limited resources	3/4	6	18/24	H/E
	109	IWC is divided on resource management (conservation vs. sustainability) thus nothing major happens in terms of resource management	4	6	24	E
	110	Inability to influence decision-making process (e.g. ICCAT)	4	6	24	E
	111	Smaller pelagics (dolphinfish and kingfish) are not being addressed by ICCAT, the region should consider managing these resources in collaboration with ICCAT	4	6	24	E
	112	Pressure from other countries to support their position at international fisheries forum	3	6	18	H
	113	SVG is not catching its full whale quota	2	6	12	M
<i>iii) Consultation</i>						
a. Participation	114	Lack of attendance and interest in stakeholder meetings because nothing seems to be achieved	4	6	24	E
	115	Inadequate stakeholder organization/organizing	3	6	18	H
	116	Not preparing stakeholders to participate in meetings	4	6	24	E
	117	Issue of trust, cooperatives in the past had failed	4	6	24	E
	118	Fishers feel their contribution is not accepted or valued (due to their level of education) thus they are not comfortable at meetings. They do not understand a lot of the material	4	6	24	E

Issue	ID	ABILITY TO ACHIEVE				
		Description of issue	Consequence	Likelihood	Risk	Category
	119	presented. The need to take alternative communication strategies to impart information to fishers, politicians, and the general public	4	6	24	E
	120	The need to deal with fisheries issues but incorporate education and literacy	4	6	24	E
b. Communication	121	Lack of information dissemination to (1) fishers 'bodies', (2) individual fishers (3) between fisheries officers	4	6	24	E
	122	Transforming roles of fisheries extension from development to conservation and management; however, the skill sets are not in place	4	6	24	E
c. Co-management arrangements	123	Poor cooperative structure, would like to see strong structured organization to take part in FAC	4	6	24	E
	124	There is provision in the Fisheries Act for a FAC, but it is not in place	3/4	6	18/24	H/E
	125	Democratization of the process to make it representative	4	6	24	E
	126	Need a strong consultative mechanism for two way flow of information	4	6	24	E
<i>iv) Reporting</i>						
a. Reviews audits	127	Not enough reporting to the industry (fishers), reports are skewed towards international organizations and government (e.g. Calliaqua fishers would like to get some feedback on catch and effort data submitted to FD)	4	6	24	E

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
<i>v) Policy capabilities</i>						
a. Proactive policy	128	No legal framework - difficult to develop and execute policy	4	6	24	E
	129	Politicians make statements of policy without adequate consultation with FD and other stakeholders	2/3	6	12/18	H
b. Economic instruments	130	Pressure from international bodies who implement significant subsidies but seeking to remove ours	3	6	18	H
	131	Economic instruments are applied across the board, although it may apply to one fishery but not the other	3/4	6	18/24	H/E
2. Industry						
a. Code of conduct (structure, operations)	132	Operational structures are not fully in place (trying to put things in place especially for fish quality assurance)	3	6	18	H
b. Participation	133	Many fishers not interested in conservation only development	4	6	24	E
	134	The FD have their views on development and fishers have other ideas, there is need for more consultations	4	6	24	E
	135	Fishers tend to discuss problems among themselves but not bring it up at larger meetings	4	6	24	E
	136	We are asking fishers group to be advocate but not equipping them	4	6	24	E

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
c. Seafood health (HACCP)	137	Quality requirement should begin from the time the fish is caught (boats not taking ice to sea)		4	6	24	E		
	138	Calliaqua is not up to standard - there is no place to process and clean fish		5	6	30	E		
	139	The need to change consumer attitude by public awareness re icing of fish (consumers think 'stale fish goes on ice')		3	6	18	H		
	140	Inadequate participation by fishers in training programmes on quality control aboard vessels		4	6	24	E		
	141	Vendors get training, advice, workshops yet they are slow to change		3/4	6	18/24	H/E		
	142	Behaviour of vendors towards quality control officers and consumers		1	6	6	L		
	143	Governance of markets to comply with rules and regulations (Kingstown)		3/4	6	18/24	H/E		
	e. Private sector	144	Cost of fishing gears too expensive		4	6	24	E	
f. Expansion/ Development	145	SVG's ability to meet ICCAT regulations							
	146	Cultural limitations, used to fishing daily not >2 days as required for pelagic fishing							
	147	Fishers are not able to afford the equipment required for large pelagic fishing							
3. Other (NGOs - Calliaqua/CALFICO, Goodwill Fishermen Cooperative, Barrouallie Fishermen Cooperative)									
a. Watchdog role	148	They do not understand their watchdog role		3	6	18	H		
	149	FD not taking action when NGO's report violation		4	6	24	E		

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	150	Fishers need greater awareness for self-policing (watchdog for self)	4	4	16	H
c. Fisher organization and collective action	151	Trust issues				E
	152	Group members are unclear of the benefits of the organization				
Issue related to the environment and other issues of the industry						
1. Impacts of the environment on the fishery						
<i>i) Climate</i>						
a. Temperature	153	Temperature affects but the FD lack data and anecdotal information	4	6	24	E
b. Rainfall	154	Needs to be assessed – available data not analysed	4	6	24	E
c. Current	155	Needs to be assessed – not much monitoring	4	6	24	E
d. Climate change	156	Not much data on this effects; not that we noticed	4	6	24	E
<i>ii) Human induced changes</i>						
a. Water quality	157	Lots of debris (especially plastics)	4	6	24	E
	158	Runoffs from rivers, construction on shoreline, and flooding in the hills affects coral, food, and the ecosystem	4	6	24	E
	159	Effects of chemical such as detergents (bleach) used in fish markets and agricultural run-offs in the marine environment	4	6	24	E
	160	Soil erosion and land runoff increase sediment loads	3	6	18	H

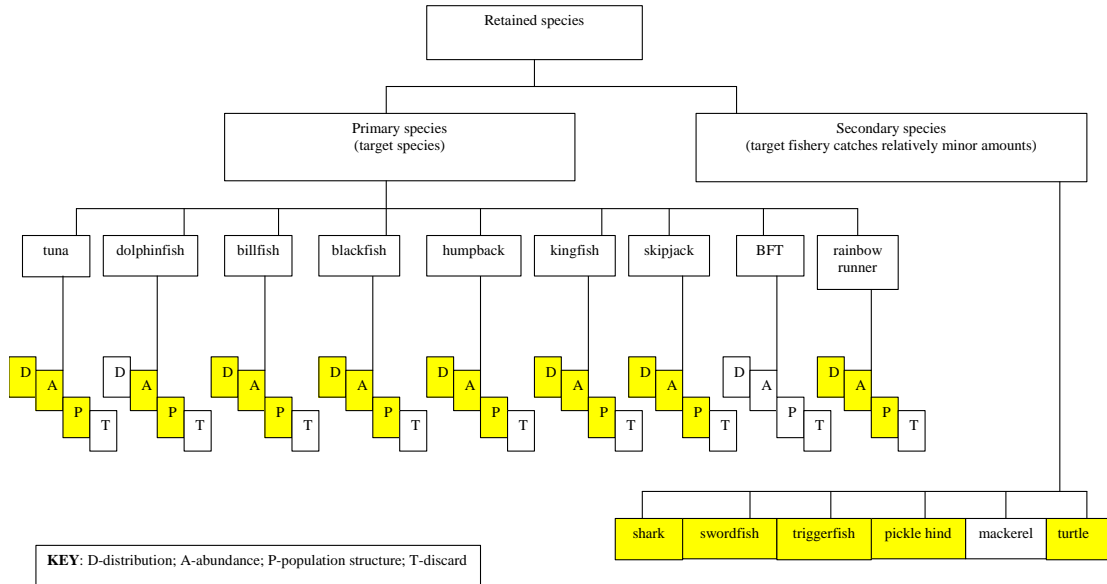
ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Habitat modification	161	Coastal development affects coral reef, mangroves, and seagrass which will affect food source distribution and abundance of large pelagic	4	6	24	E
c. Species that may eat native species	162	Needs to be assessed, have inadequate information	1	4	4	L
2. Impacts of other drivers						
<i>i) Social</i>						
a. Food security	163	Not at present fish prices	3	6	18	H
b. Poverty alleviation	164	Will not help to alleviate poverty	2/3	6	12/18	H
<i>ii) Economic</i>						
a. Fuel prices	165	High, affects all aspect of fishing activities (total cost, freezing, startup, fish price)	4	6	24	E
	166	Fuel efficiency in terms of engine selection and vessel	4	6	24	E

GENERIC COMPONENT TREES (ST. VINCENT AND THE GRENADINES)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE LARGE AND SMALL PELAGIC FISHERIES

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.

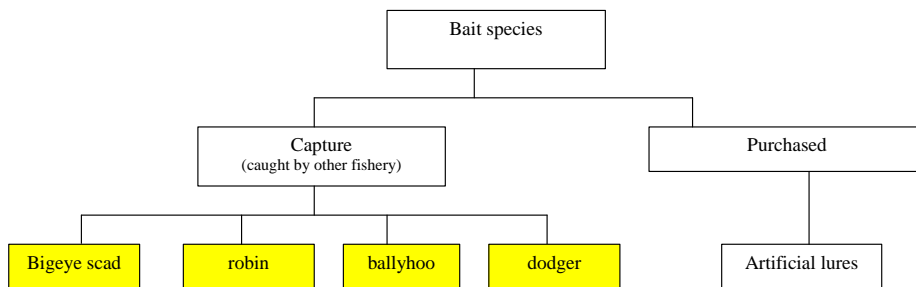


Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE LARGE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

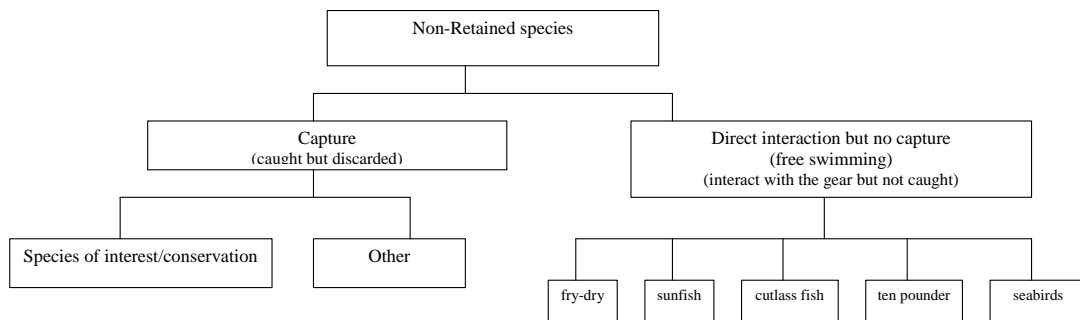
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

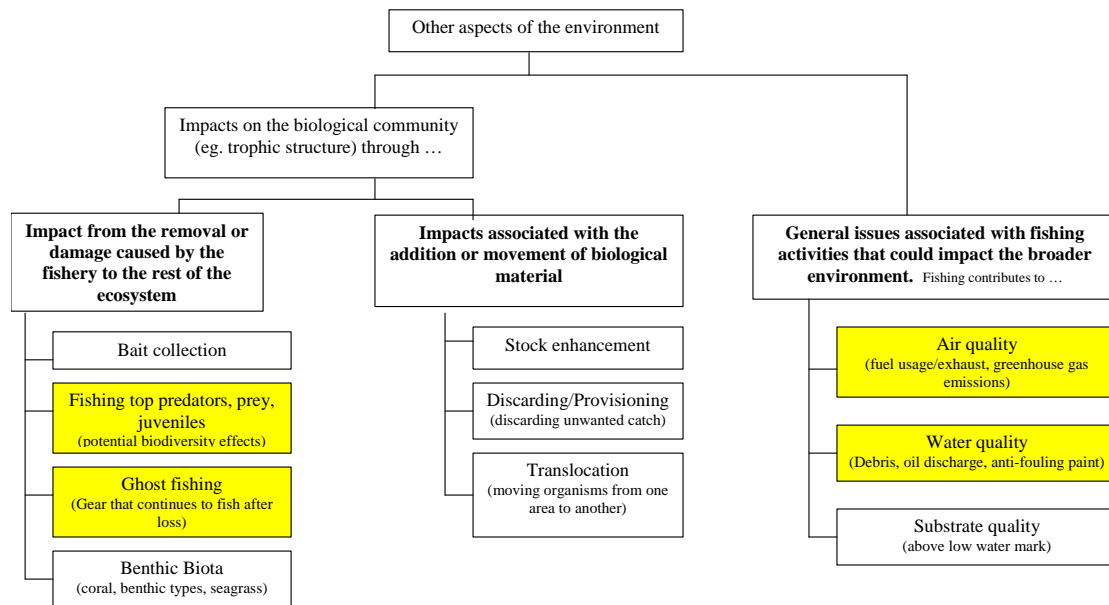
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

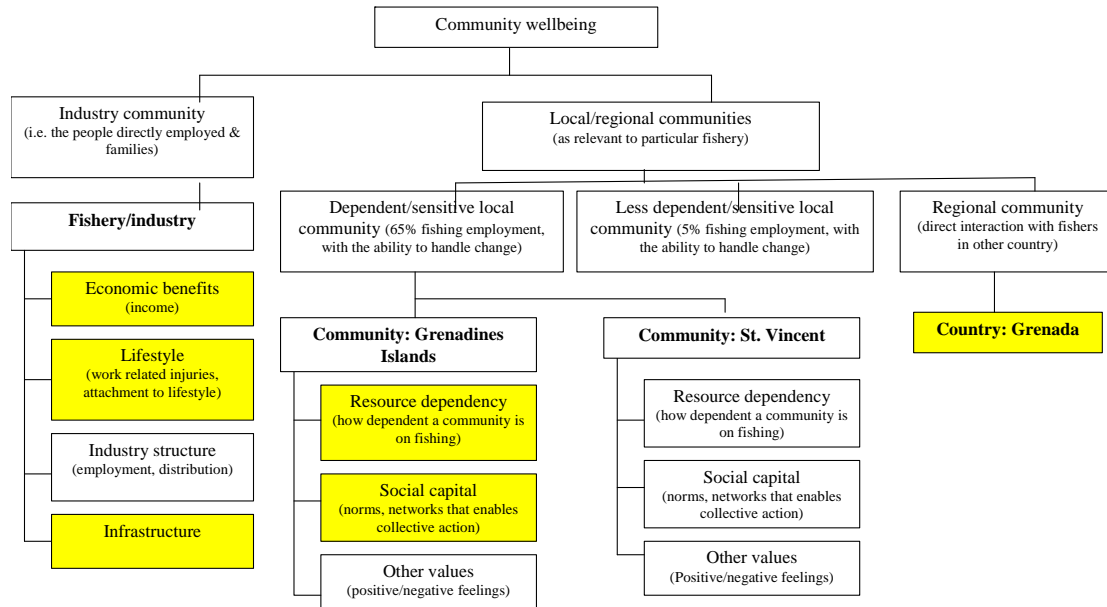
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

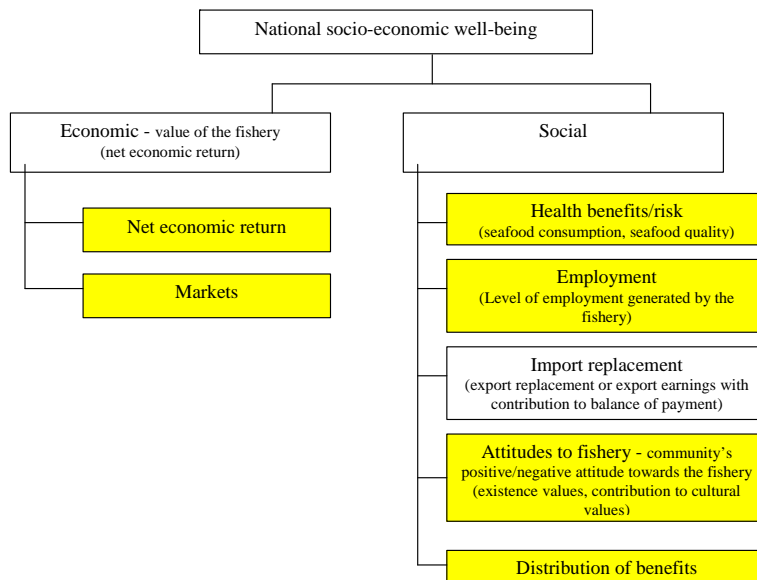
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

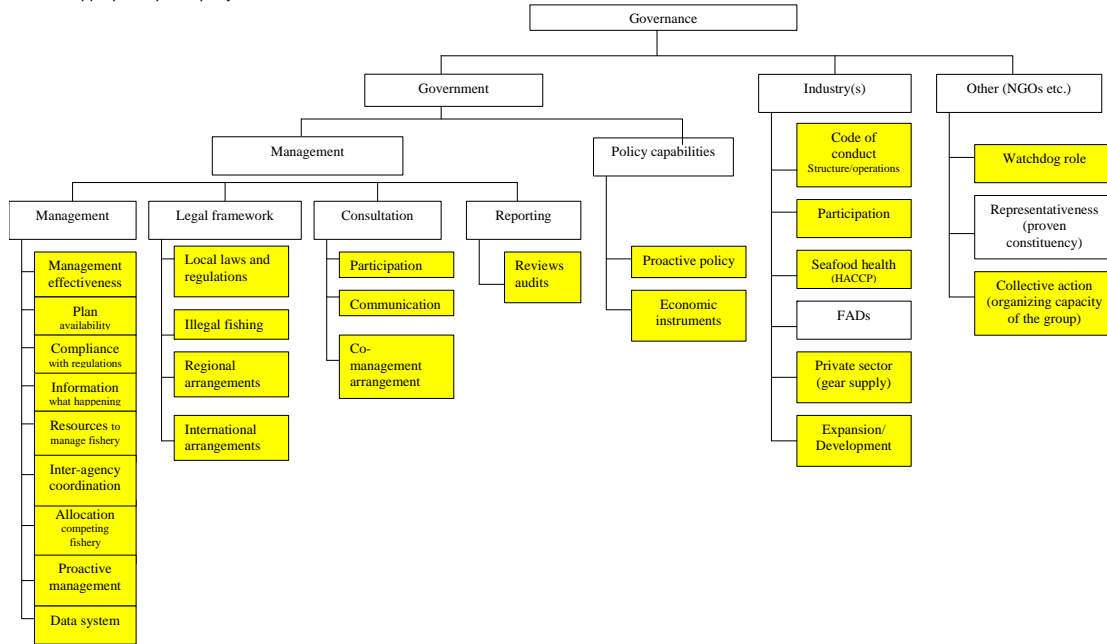
AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

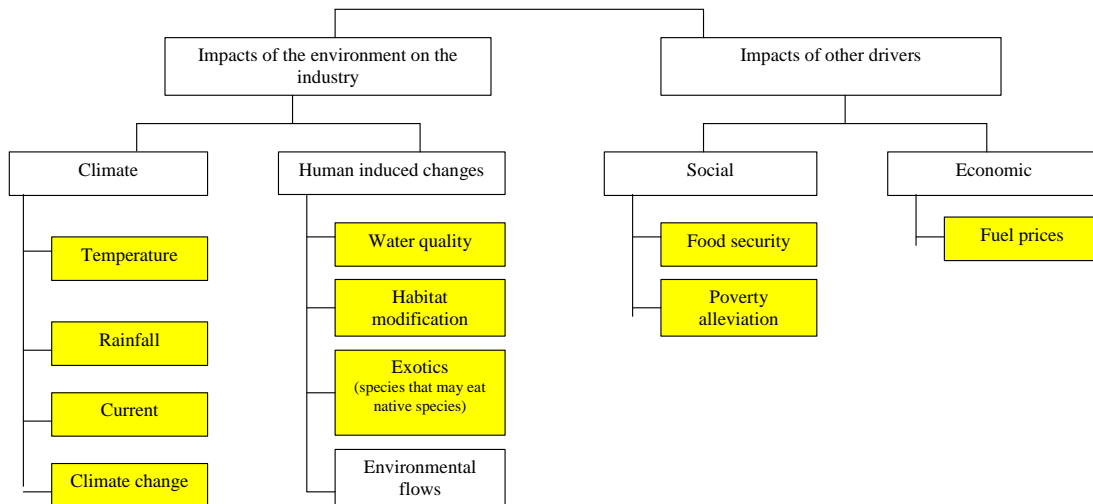
GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?

AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?



TRINIDAD AND TOBAGO

Trinidad

Marine Fishery Analysis Unit Conference Room, 2 and 3 August 2007

Pelagic fishery defined

The pelagic fishery was divided into two categories: commercial and recreational activities. Commercial activities involved pirogue and semi-industrial vessels using trolling, a-la-vive, switchering, gillnet, and palangue gear. Recreational activities involved pirogues to cabin cruisers using rod and reel gear. The pelagic fishery targets carite, kingfish, tuna, swordfish, and billfish. Bait species included herring, anchovies, sardines, bigeye scad, ballyhoo, flyingfish. Non-retained species included turtle and seabird, however, there are instances when these are retained.

Identification of the issues

A total of 99 issues were identified and prioritized (Section 8.2). The ability to achieve accounted for 38% of the issues, ecological well-being 36%, and human well-being 25% (Figure 24). Issues identified were a combination of those raised during the workshop and public consultations held a year ago.

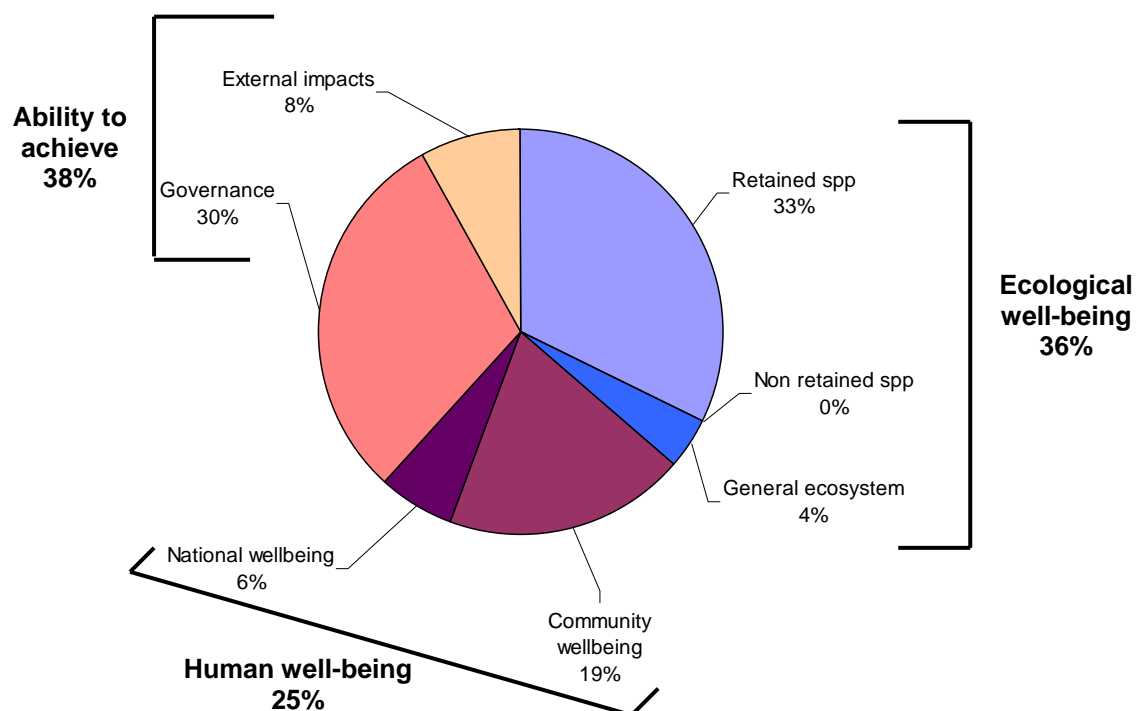


Figure 24: Percentages of issues identified within each component and category in the Trinidad pelagic fishery.

Prioritization of issues

Fisheries officers prioritized issues mainly within the moderate to extreme risk; extreme 48%, high 25%, moderate 22%, and low 5%. When considering the spread of risk categories within each component, retained species and governance had the highest number of issues ranked extreme risk to the fishery (Figure 25).

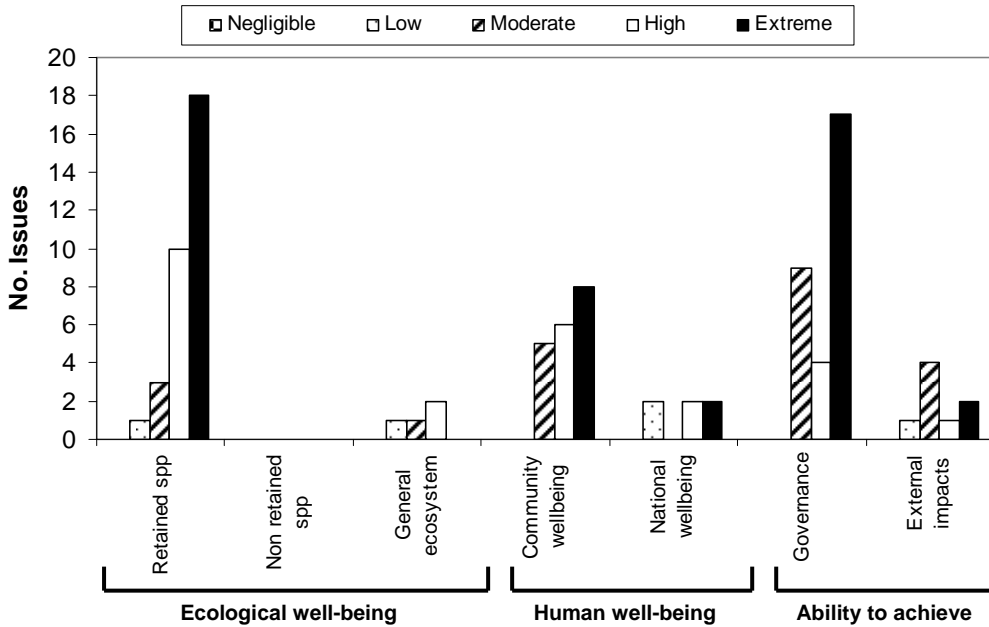


Figure 25: Proportion of issues within given risk categories (Trinidad)

MAIN ISSUES AND THEMES

Ecological well-being

More information is needed to assess stock boundary and abundance of carite and kingfish. Officers were concerned about the discard of juvenile carite and kingfish in the seine fishery and fish size reduction observed in the data collected.

Except for carite and kingfish, the distribution, abundance, and population structure of other target species needs to be assessed.

Ranked as high risk to the fishery was the decline in bait species landings. However, because much of the data was aggregated and the catches were not well monitored, it was difficult to determine the magnitude.

Human well-being

The Fisheries Division needs to assess the social and economic aspects of fishing communities involved in pelagic fishing. At the national level, they do not have the data to value the fishery.

Ability to achieve

The Division is moving towards effective management with some initiatives (e.g. draft policy document). Officers agreed that all aspects of management and consultations could be improved.

Problems in the industry were ranked moderate to extreme. The main issues were seafood health.

Officers were concerned about human-induced factors that affected water quality and marine habitat.

If fishermen cooperatives are to be sustainable, much needs to be done to strengthen these organizations.

Attendance

Five fisheries officers participated in the workshop (Table 20).

Table 20: List of participants in Trinidad

Name	Organization
Louanna Martin	Fisheries Division, Fisheries Officer
Suzette Soomai	Fisheries Division, Fisheries Officer
Lara Ferreira	Fisheries Division, Fisheries officer
Elizabeth Mohammed	Fisheries Division, Fisheries Officer
Kieron Draper	Fisheries Division, Transshipment Monitoring Supervisor
Sandra Grant	FAO, Facilitator

ISSUES IDENTIFIED AND PRIORITIZED

Complete list of issues raised at the pelagic fisheries Ecosystem Approach to Fisheries Management Workshop, and scores allocated to the consequence/impact, likelihood, overall risk score and category (N= negligible, L=low, M=moderate, H=high, E=extreme).

Trinidad	Fishery	pelagic
	Gear	commercial - trolling, a-la-vive, switchering, gillnet, palangue (sharks); recreational - rod & reel
	Vessels	commercial - pirogues, semi-industrial; recreational - from pirogue to cabin cruiser

Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
ECOLOGICAL WELLBEING						
Issue related to retained species (those species that the pelagic fisheries wants to capture and use)						
<i>(i) Issues related to target species</i>						
1. Carite (<i>Scombridae</i> – <i>Scomberomorus brasiliensis</i>) – commercial (pirogues) and recreational (Trinidad has ICCAT category 2 due to Carite)						
a. distribution	1	Limited information on stock boundary	3	4	12	M
b. abundance	2	Need data from other countries to assess abundance	4	6	24	E
	3	Local landings declining	4	6	24	E
c. population structure	4	Fish size reduction (relates to size structure of the population)	4	6	24	E

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
d. discards	5	Juvenile carite discarded in the seine fishery	4	6	24	E
2. Kingfish (Scombridae - Scomberomorus cavalla) – commercial (pirogues) and recreational						
a. distribution	6	Limited information on stock boundary	3	4	12	M
b. abundance	7	Need data from other countries to obtain an indicator of abundance	4	6	24	E
c. population structure	8	Need data from other countries to estimate population structure	4	6	24	E
	9	Need a better/more reliable estimate of growth and therefore mortality	4	6	24	E
	10	Not able to obtain good growth estimates due to data inconsistency (missing data)	4	6	24	E
	11	Fish size reduction	4	6	24	E
	12	Stocks status assessment inconclusive	3	6	18	H
d. discards	13	Juveniles discarded in the seine fishery	4	6	24	E
3. Tunas (Scombroidei) – yellowfin tuna, albacore, bigeye						
a. distribution	14	Needs to be assessed (have a young fleet)	1	2	2	L
b. abundance	15	Catching more now; abundance needs to be assessed	3	6	18	H
4. Swordfish – semi-industrial fleet (large quantity)						
a. distribution	16	Needs to be assessed	3	6	18	H

		ECOLOGICAL WELLBEING				
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
5. Billfish (sailfish and marlin) - target for recreational; by-catch for semi-industrial longliner						
a. distribution	17	Needs to be assessed	4	6	24	E
b. abundance	18	Recreational - decline in landings	4	6	24	E
c. population structure	19	ICCAT thinks young billfishes are found around the island (Managed by ICCAT, send data to be analysed)	4	6	24	E
<i>ii. Issues related to secondary species (target fishery catches relatively minor amounts)</i>						
a. dolphinfish (<i>Coryphaena hippurus</i>)						
b. skipjack (<i>Katsuwonus pelamis</i>)	20	Need additional information from Tobago to assess the distribution, abundance, and population structure	3	6	18	H
c. wahoo	21	Recreational fishers - distribution, abundance, population structure needs to be assessed; also need additional data from Tobago	4	6	24	E
d. bechine						
e. turtle	22	Caught in gillnet - fishers suffer gear loss; Catching endangered species (longliners)	4/5	6	24/30	E
	23	Need to rectify conflicting legislation (fisheries/forestry) regarding turtle catches	4	6	24	E
<i>iii. Issues related to by-product species (90% of catch caught by other gear)</i>						
d. sharks (Elasmobranchii)	24	Some changes in distribution; abundance, distribution, and population structure needs to be assessed	4	6	24	E
	25	Quantities declining	4	6	24	E
Issues related to bait species and its impact on the pelagic fishery (gear - gillnet and seine)						

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
a. herring (Clupeidae - <i>Opisthonema oglinum</i> , Harengula spp. and <i>Sardinella</i> spp.)	26	Landings declining; catches not well monitored	3	6	18	H
b. anchovies	27	Catches not well monitored; data aggregated with other fish caught in the gear	3	6	18	H
c. sardines (Engraulidae - <i>Cetengraulis edentulous</i>)	28	Landings declining; catches not well monitored	3	6	18	H
d. ballyhoo	29	Catches not well monitored, needs to be assessed	3	6	18	H
e. bigeye scad	30	Trinidad not able to supply fishers with live bait year round, vessels have to purchase bait in Tobago (6 mths/yr), Grenada and SVG the remaining months (e.g. semi-industrial vessels need about 100lbs of live bait per trip)	3	6	18	H
f. flyingfish (Exocoetidae - <i>Hirundichthys affinis</i> , <i>Cheilopogon</i> spp., and <i>Cypselurus</i> spp.)						
g. Atlantic bonito						
h. squid (import)						

ECOLOGICAL WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
i. artificial lures						
	31	Need to enforce the law prohibiting the sale of bait fish for food	3	6	18	H
	32	A discard of the bait fishery is redfish (Lutjanidae)	2	5	10	M
Issue related to non-retained species (caught or directly impacted by the fishery but not used)						
a. turtles						
b. seabirds						
Issue related to general ecosystem: impact of a fishery on the ecosystem						
<i>1. Impact from the damage or removal caused by the fishery to the rest of the ecosystem</i>						
b. Fishing	33	There is an impact but it is difficult to define the magnitude and direction of that impact due to the inter-relationships	3	6	18	H
c. Ghost fishing	34	Gillnet – the loss of fish is not accounted for in an assessment (e.g. fish, turtles)	2	6	12	M
<i>2. Impact associated with the addition or removal of material</i>						
<i>3. General issues associated with fishing activities that could impact the broader environment</i>						
b. Water quality	35	Need to improve enforcement on the disposal of used oil, marine garbage, and paint	3	6	18	H

Issue	ID	<p style="text-align: center;">HUMAN WELLBEING</p> <p style="text-align: center;">Description of issue</p>	Consequence	Likelihood	Risk	Category
Contribution of the pelagic fisheries to community well-being						
a. Economic benefit	36	Fishers do not manage fishing as a business, they do not save, and they do not keep records. If fishers would do these things they would do much better.	4	6	24	E
	37	High price of fish	3/4	6	18/24	H
	88	Recreational fishers with fishermen identification cards enjoy the same benefits as <i>bona fide</i> fishers, this needs to change – Public consultation	2	5	10	M
	89	Foreign vessels have access to subsidized fuel	3	4	12	M
b. Lifestyle	38	Safety at seas - essential safety equipment are not used; culturally fishers do not take safety equipment to sea	3	6	18	H
	39	Fishers do not utilize the training available to them from FD/CFTDI	3	5	15	H
	40	Fishers need to do better at collective bargaining	4	5	20	E
	41	Fishers are independent and they lack trust (in themselves and government)	4	5	20	E
d. Infrastructure	73	Artisanal fleet - needs to be up-graded and conform to local sanitary standards (e.g. the lack of cold storage, ice machine, lockers, etc.)	4	6	24	E
	74	Semi-industrial fleet – the need for one common facility	3	5	15	H
	75	Fishers need to take care of the fishing facilities (assist with maintenance)	4	6	24	E
	76	Accessing fuel can be difficult for some communities – public consultation	2	4	8	M

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
	84	Piracy and security at landing site	4	5	20	E
Other	85	Landing sites are used as drug shipment points	4	4	16	H
	86	Fishers displaced by oil rigs (i.e. loss of traditional fishing grounds)	4	5	20	E
	87	Need to improve the monitoring of transshipment (tunas, swordfish, marlin)	3	4	12	M
1. Local communities (people who are directly employed and their families)						
<i>i) Dependent/sensitive communities (north and east coasts)</i>						
a. Community dependent on fishing	42	Difficult to say, needs to be assessed	4	5	20	E
b. Are there norms and networks that enables collective action	43	Problem with trust	3	3	9	M
<i>iii) regional community (Venezuela, Barbados, Grenada)</i>						
Norms and networks	44	There are social relationships that include illegal activities (e.g. contraband activities)	4	4	16	H
Contribution of the pelagic fisheries to national socio-economic well-being						
1. Economic (value of the fishery)						
a. Net economic return	45	Inadequate or lack of data to value the fishery	4	5	20	E

HUMAN WELLBEING						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Markets	80	Need access to the EU market	3	5	15	H
2. Social						
a. Health benefits/risk	46	Mercury poisoning from the consumption of fish	3	2	6	L
	47	Fish quality standards are not enforced; limited testing	4	5	20	E
c. Import replacement	48	Some fish caught by local fishers not available to the local market	1	6	6	L
d. Attitudes to fishery	49	People think it is an employment of last resort	3	6	18	H

ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
Issue related to the governance of the pelagic fisheries						
1. Government						
<i>i) Management</i>						
a. Management effectiveness	50	Moving towards effective management with some initiatives (Fisheries management is ineffective as there are no working policies - Public consultation)	4	4	16	H

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
b. Plan availability and comprehensiveness	51	No current plan is available		4	5	20	E		
c. Compliance with regulations	52	Enforcement is new to fishers, fishers not accustomed to officers checking mesh sizes etc.(Unit recently established - FMSEU)		3	5	15	H		
d. Information	53	Needs improvement		4	6	24	E		
e. Resources to manage the fishery	54	Need human resources (the FD does not have the range of expertise to perform duties expected of them – Public consultation)		4	6	24	E		
f. Inter-agency coordination	55	Needs to strengthen and formalize		3	4	12	M		
	56	Links with Tobago Fisheries needs to be formalized		4	5	20	E		
h. Proactive management	57	Crisis management		4	5	20	E		
i. Data system	58	Need to revise the data collection system		3	4	12	M		
	59	Need an ongoing program to collect and analyse social and economic data		4	5	20	E		
	60	There are data gaps (C&E, biological) by fleet over time		4	6	24	E		
	61	Need to do more analysis; analysis is not actively used in decision-making and management		4	5	20	E		
	62	Need to disaggregate data as small tuna and coastal pelagic species are aggregated, hence, it is difficult to conduct assessment on specific species		4	5	20	E		
	63	Need information from Tobago to assess the fishery		4	6	24	E		

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
<i>ii) Legal framework</i>									
b. Illegal fishing	64	Inadequate enforcement of fisheries legislation regarding illegal foreign fishing in the EEZ (by Venezuela, Guyana, Barbados, Taiwan, Panama); need to monitor other IUU activities				4	5	20	E
c. Regional arrangements (OECS, CRFM, WECAFC)	65	CARICOM Common fisheries policy and its implication				4	5	20	E
d. International arrangements (ICCAT, IWC)	66	Problems attending ICCAT				3	4	12	M
<i>iii) Consultation</i>									
a. Participation	67	Could be improved				4	4	16	H
b. Communication	68	Needs improvement and to be more effective (poor and infrequent communication between the industry and the FD – Public consultation)				4	5	20	E
c. Co-management arrangements	69	Problem with practical implementation; limited co-management arrangements				4	5	20	E
<i>iv) Reporting</i>									
a. Reviews audits	70	Some reporting to stakeholders needs to be regularized				3	4	12	M
<i>v) Policy capabilities</i>									
a. Proactive policy	71	Policy reactive				3	4	12	M
2. Industry									
a. Code of conduct (structure, operations)	72	Limited structures in place for the artisanal fishery				4	5	20	E

Issue	ID	ABILITY TO ACHIEVE				Consequence	Likelihood	Risk	Category
		Description of issue							
c. Seafood health (HACCP)	77	Country does not have HACCP certification		3	5	15	H		
	78	Artisanal fishers - needs to utilize quality standard, need training		4	5	20	E		
	79	Sanitary conditions needs to be addressed during fish distribution		4	5	20	E		
d. FADs	81	Oil rigs act as FADs, some fishers fish around the rigs although they are not allowed (man-made FADs more common in Tobago)		3	4	12	M		
e. Private sector	82	Equipment and spare parts expensive		3	4	12	M		
	83	Essential safety equipment (hand-held radios, flare guns) not easily accessible		3	4	12	M		
3. Other (NGOs - National Organization of Fishing and Allied Cooperative Society (NOFACs) Ltd., etc.)									
c. Fishers Cooperative and collective action	90	Need to strengthen fisher cooperative/organization; they are not sustainable, only reactive to issues/crisis		4	5	20	E		
Issue related to the environment and other issues of the industry									
1. Impacts of the environment on the fishery									
<i>i) Climate</i>									
a. Temperature	91	Yes, however, difficult to link to any one factor		2	5	10	M		
b. Rainfall	92	Affecting salinity, nutrients, might affect distribution		3	4	12	M		
d. Climate change	93	Yes, however, not much is known locally of the effects		4	4	16	H		
<i>ii) Human induced changes</i>									
a. Water quality	94	Industry, agriculture, housing, sewage, debris, dumping waste at sea, oil spills affect water quality		4	5	20	E		

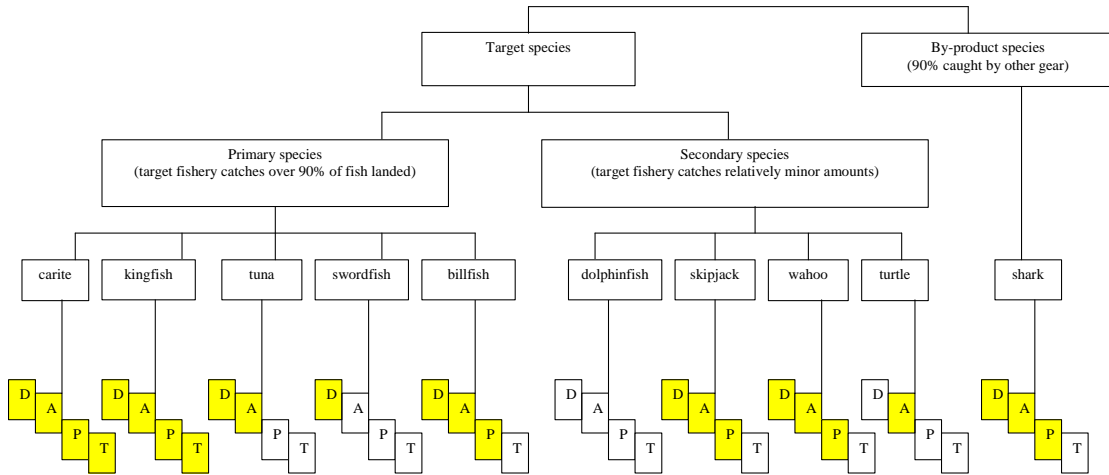
ABILITY TO ACHIEVE						
Issue	ID	Description of issue	Consequence	Likelihood	Risk	Category
b. Habitat modification/destruction	95	Mangrove removal, oil spills, seagrass bed destruction, coastal development affects marine habitats	4	5	20	E
c. Species that may eat native species	96	The proliferation of <i>Perna viridis</i> (mussel) on man-made structure	2	3	6	L
2. Impacts of other drivers						
<i>i) Social</i>						
a. Food security	97	Should contributes more to food security	2	4	8	M
<i>ii) Economic</i>						
a. Fuel prices	98	Price of fuel is expensive	2	4	8	M
	99	Fuel for fishing vessels is taxed	1	6	6	L

GENERIC COMPONENT TREES (TRINIDAD)

ISSUES RELATED TO THE RETAINED SPECIES FOR THE PELAGIC FISHERY

RETAINED SPECIES: those species that the fishery wants to capture and use

AIM: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.



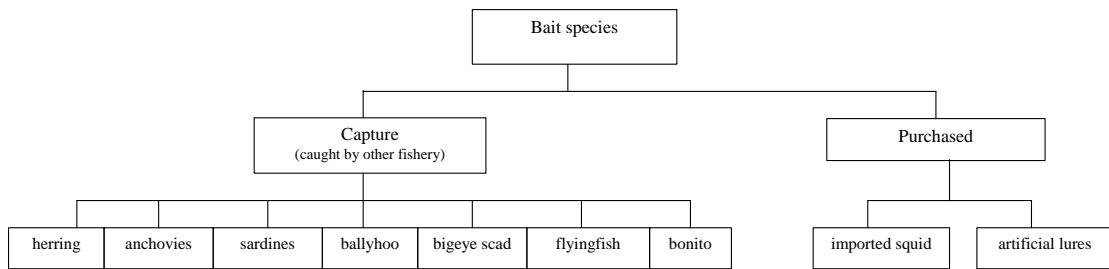
KEY: D-distribution; A-abundance; P-population structure; T-discard

Yellow boxes indicate that this issue was rated. White boxes indicate that this issue was not considered.

ISSUES RELATED TO BAIT SPECIES AND ITS IMPACT ON THE PELAGIC FISHERY

BAIT SPECIES: those species that are caught by other fishery and used to capture target species

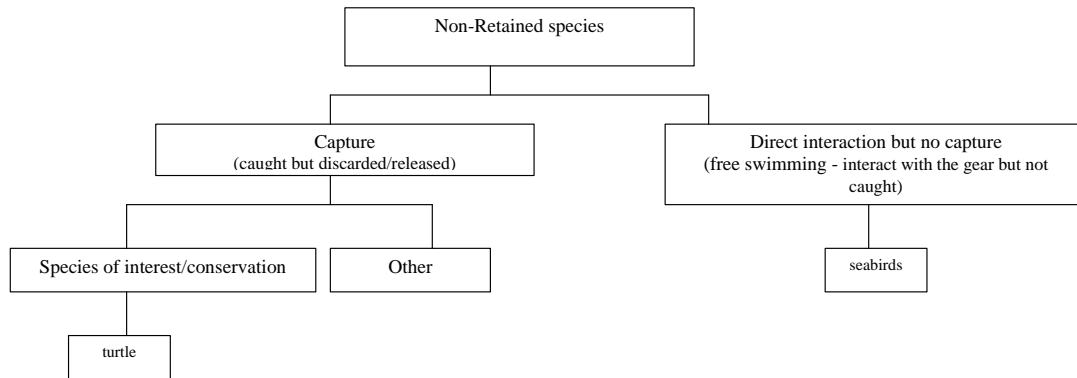
AIM: To manage the take of bait species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields



ISSUES RELATED TO THE NON-RETAINED SPECIES OF A FISHERY (Separate trees for commercial and recreational by gear type)

NON-RETAINED SPECIES: Species caught or directly impacted by the fishery but not used

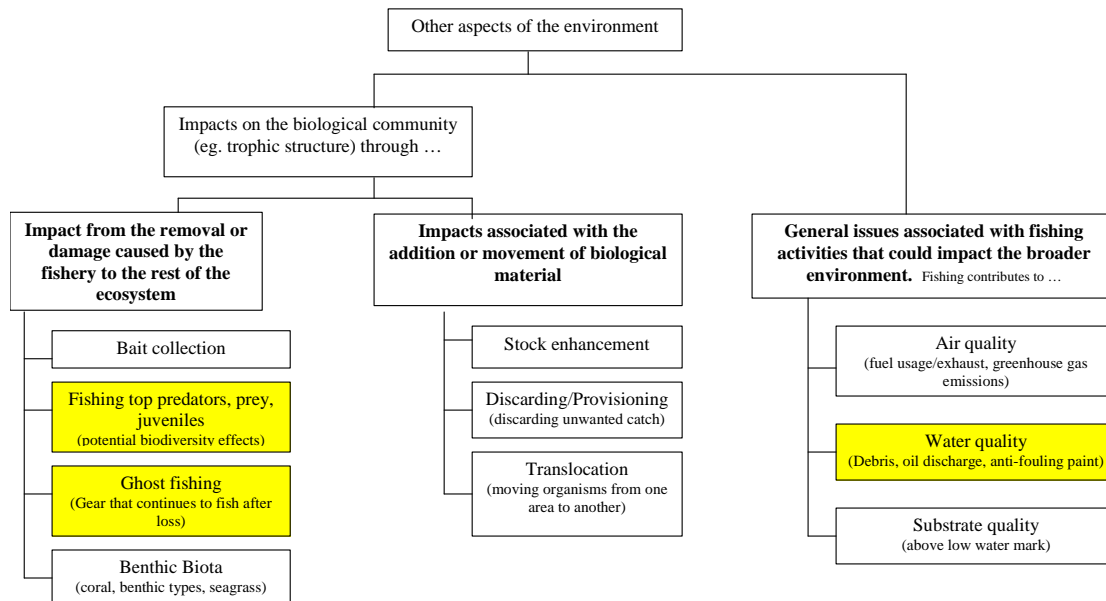
AIM: To manage without threatening biodiversity and habitat by removing non retained species; manage at an ecologically-viable stock level.



ISSUES RELATED TO THE GENERAL ENVIRONMENT IMPACTS OF A FISHERY: (Separate tree for commercial and recreational)

GENERAL ECOSYSTEM IMPACTS: The potential indirect and more general environmental impacts the fishery may have

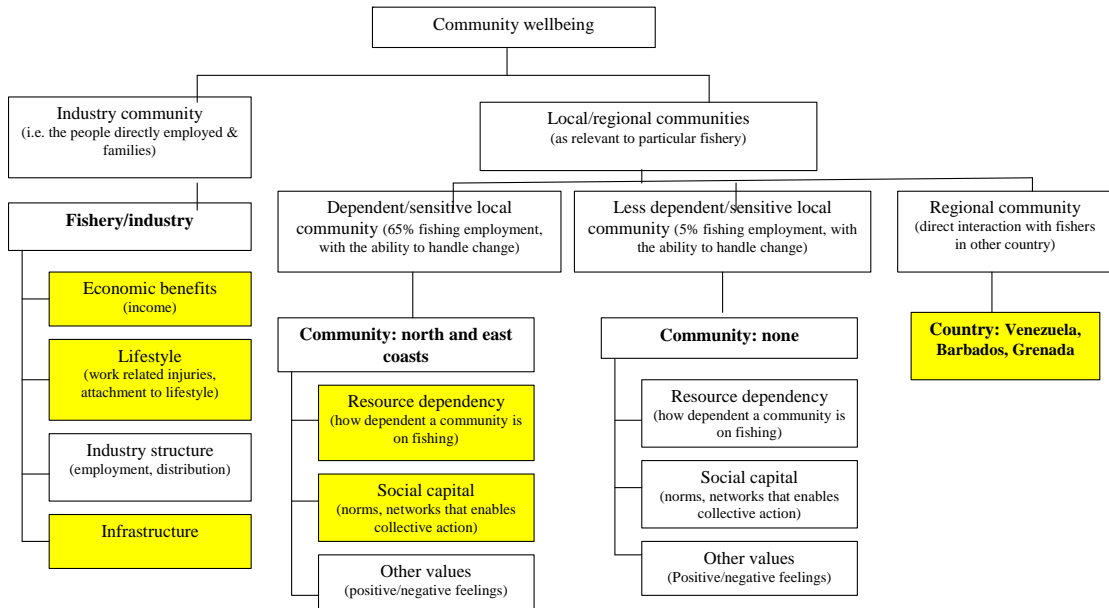
AIM: manage impacts of fishing such that only acceptable impacts occur to functional ecological relationships, habitats, and processes.



CONTRIBUTION OF THE FISHERY TO COMMUNITY WELLBEING: (separate trees for commercial and recreational sectors)

COMMUNITY WELLBEING: Are there local or regional communities that are dependent on the fishery, and whether they are supportive/ negative about fishing operation?

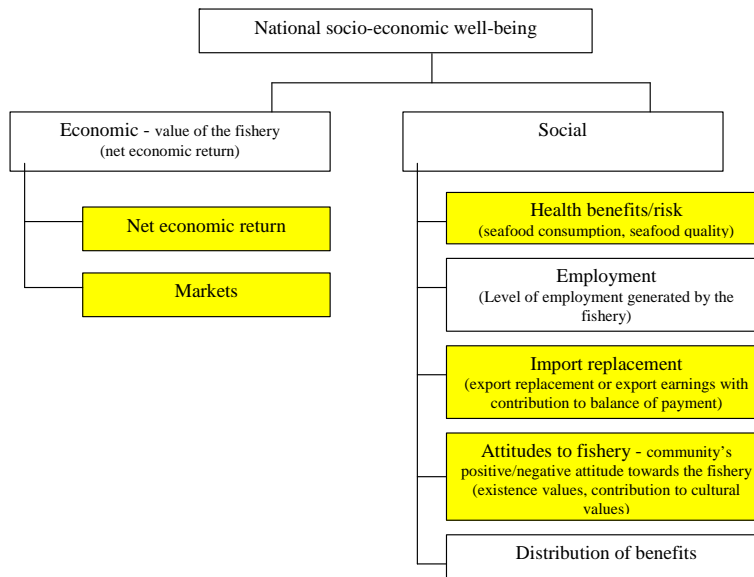
AIM: to contribute to community, regional well being, lifestyle, and cultural needs



CONTRIBUTION OF THE FISHERY TO NATIONAL SOCIO-ECONOMIC WELLBEING: (Separate trees for commercial and recreational sectors)

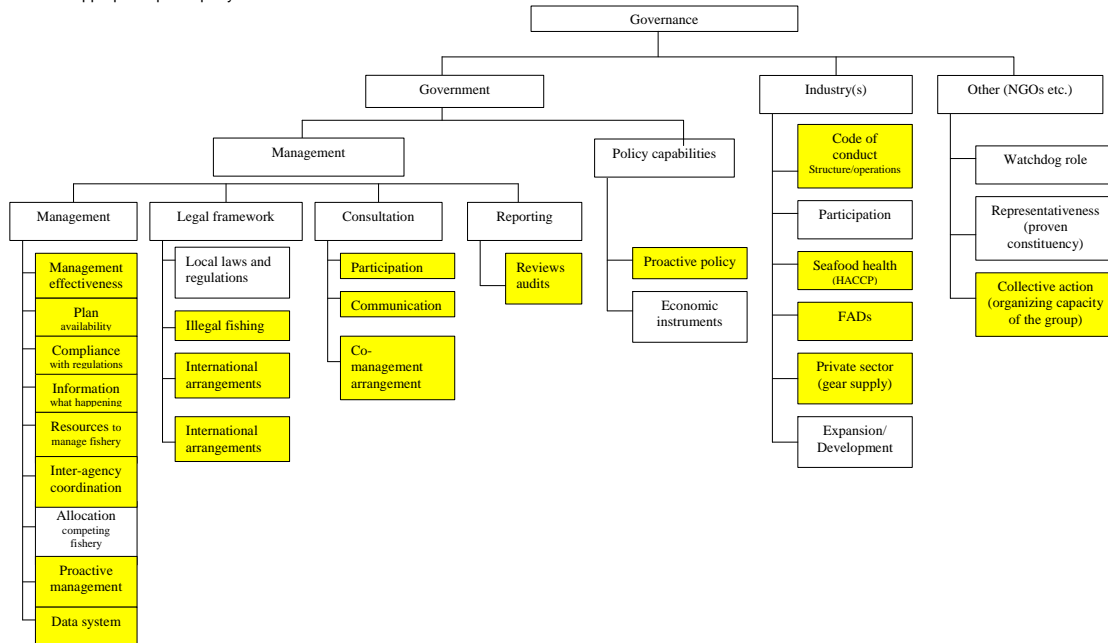
NATIONAL WELLBEING: how does the fishery contribute to national issues such as employment rate, supply of fish, economic returns, reductions in trade deficit etc.

AIM: to contribute to national wellbeing, lifestyle, and cultural needs



ISSUES RELATED TO THE GOVERNANCE OF THE FISHERY

GOVERNANCE: Does the fishery have sufficient management processes and arrangements in place to enable the other elements to achieve an adequate level of performance?
AIM: endure ESD principles are underpinned by legal, institutional, economic, and policy framework capable of responding and taking appropriate preemptory and remedial actions.



IMPACT OF THE ENVIRONMENT AND OTHER ISSUES ON THE INDUSTRY

IMPACTS OF THE ENVIRONMENT: Are there issues that may reduce or improve performance of the fishery that are outside of the direct control of the management agency/industry?

