



CARICOM Fisheries Unit



The Bahamas



European Union

Integrated Caribbean Regional Agriculture and Fisheries Development Programme - Fisheries Component

FIVE YEAR WORK PROGRAMME FOR THE BAHAMAS (April 2000 – March 2005)



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TABLE OF CONTENTS

LIST OF ACRONYMS.....	III
EXECUTIVE SUMMARY	IV
BACKGROUND.....	1
ABOUT THE WORK PROGRAMME.....	1
WBS 300: FISHERIES DATA AND INFORMATION MANAGEMENT SYSTEMS.....	3
WBS 310: CATCH, EFFORT, BIOLOGICAL AND SOCIO-ECONOMIC DATA MANAGEMENT SYSTEM	4
WBS 311/321: REVIEW THE DATA COLLECTION AND MANAGEMENT SYSTEMS	4
WBS 312: ENHANCE DATA COLLECTION PLANS COVERING THE MAJOR FISHERIES.....	5
WBS 313: TRAIN FISHERIES DIVISIONS STAFF IN DATA COLLECTION	6
WBS 314: DATABASE SOFTWARE FOR DATA STORAGE, BASIC ANALYSIS AND REPORTING.....	7
WBS 315: TRAIN FISHERIES DIVISIONS STAFF IN USING THE DATABASE SOFTWARE FOR, DATA ENTRY, ANALYSIS AND REPORTING	7
WBS 316: PROVIDE RESOURCES FOR IMPLEMENTATION	8
WBS 317/326: PREPARATION OF ARTICLES AND TECHNICAL REPORTS	8
WBS 318/327: MONITORING AND EVALUATION	8
WBS 320: LICENSING AND REGISTRATION DATA MANAGEMENT SYSTEM	9
WBS 322: ENHANCE LICENSING AND REGISTRATION SYSTEM	9
WBS 323: DATABASE SOFTWARE FOR DATA STORAGE, BASIC ANALYSIS AND REPORTING	9
WBS 320.4: TRAIN FISHERIES DIVISIONS STAFF IN USING THE DATABASE SOFTWARE FOR, DATA ENTRY, ANALYSIS AND REPORTING	10
WBS 400: FISHERIES ASSESSMENT	10
WBS 410: PELAGIC, REEF AND SLOPE FISHERIES ASSESSMENT.....	10
WBS 410.1: REVIEW AND ANALYSIS OF HISTORICAL DATA ON REEF, SLOPE AND PELAGIC FISH SPECIES	11
WBS 410.2: ENHANCEMENT OF FISHERY AND BIOLOGICAL SAMPLING FOR COMMERCIALY IMPORTANT REEF, SLOPE, AND PELAGIC SPECIES	12
WBS 410.3: STUDY OF THE SOCIO-ECONOMIC IMPORTANCE OF THE SPORT FISHERY AND DEVELOPMENT OF SAMPLING PROGRAM	13
WBS 411: PARTICIPATION IN ICCAT ACTIVITIES	16
WBS 412: ASSESSMENT OF COMMERCIALY IMPORTANT PELAGIC, REEF, AND SLOPE FISHERIES	17
WBS 413: NASSAU GROUPER SPAWNING AGGREGATION STUDIES.....	18
WBS 414: REEF HABITAT MAPPING STUDY	19
WBS 430 LOBSTER AND CONCH ASSESSMENT AND RESEARCH.....	20
WBS 430.1 ASSESSMENT OF CONCH FISHERY	20
WBS 430.2 ASSESSMENT OF CRAWFISH (SPINY LOBSTER) FISHERIES	22
WBS 410.1 BASELINE SURVEY IN MARINE PROTECTED AREAS.....	24
WBS 430.4: MODELLING OF THE FISHERIES BIOLOGICAL/ECOLOGICAL SYSTEM	25
WBS 400.1 MONITORING	25
WBS 500 FISHERIES RESOURCE MANAGEMENT.....	27
WBS 510: STRENGTHENED NATIONAL FISHERIES MANAGEMENT	27
WBS 511: NATIONAL FISHERIES POLICY, FMP AND ADVISORY/DECISION MAKING MECHANISM.....	29
WBS 512.1: STRATEGIC REVIEW AND UP-GRADING THE ORGANIZATIONAL STRUCTURE.....	30
AND CAPABILITY OF THE FISHERIES DEPARTMENT	30
WBS 512.2: THE BAHAMAS/DOMINICAN REPUBLIC FISHERIES COMMITTEES	31
WBS 512.3: MECHANISM FOR CONFLICT RESOLUTION/MANAGEMENT	32

WBS 520: STRENGTHENED REGIONAL FISHERIES MANAGEMENT	32
WBS 530 COMMUNITY INVOLVEMENT AND EDUCATION	34
WBS 530.1: MULTI-DISCIPLINARY SURVEY	35
WBS 532.0: NATIONAL FISHERIES WORKSHOP.....	35
WBS 533.1: COMMUNITY MOBILIZING AND INSTITUTIONAL STRENGTHENING	36
WBS 533.2: FISHERIES TRAINING PROGRAMS	36
WBS 533.3: EDUCATIONAL MATERIALS PRODUCTION	37
WBS 534.1: FIRST FISHERIES OFFICERS (EXTENSION) TRAINING WORKSHOP	37
WBS 534.2: SECOND FISHERIES FIELD OFFICERS TRAINING WORKSHOP	38
WBS 534.3: FIRST INSTITUTIONAL STRENGTHENING WORKSHOP FOR BAHAMAS FISHERS ORGANIZATIONS	
38	
WBS 534.4: SECOND INSTITUTIONAL STRENGTHENING WORKSHOP	38
WBS 535: INTRA-ISLAND DIALOGUE GROUPS	39
WBS 536: MONITORING.....	39
WBS 540: LONG TERM TRAINING.....	40
SCHOLARSHIPS AND SHORT-TERM TRAINING	40
WBS 550: SURVEILLANCE AND ENFORCEMENT	40
WBS 560: POST-HARVEST HANDLING PROCESSING AND MARKETING	41
 APPENDIX I: BUDGET SUMMARY	

LIST OF ACRONYMS

ACP	African, Caribbean and the Pacific States (associated to European Union)
BFIS	The Bahamas Fisheries Information System
BDC	Biological Data Collection
CANARI	Caribbean Natural Resource Institute
CARISEC	CARICOM Secretariat
CFO	Chief Fisheries Officer
CFU	CARICOM Fisheries Unit
CFRAMP	CARICOM Fisheries Resource Assessment and Management Program
CFTDI	Caribbean Fisheries Training and Development Institute
CIDA	Canadian International Development Agency
CRFM	Caribbean Regional Fisheries Mechanism
DM	Data Manager
DOF	Department of Fisheries
DRAO	Deputy Regional Authorising Officer
DSA	Daily Subsistence Allowance
ECU	European Currency Unit
EDF	European Development Fund
FAC	Fisheries Advisory Committee
FAO	Food and Agriculture Organization of the United Nations
FD	Fisheries Department
FISDC	Fisheries Institutional Strengthening and Development Component
FMP	Fisheries Management Plan
FRM	Fisheries Resource Management
GEF	Global Environmental Fund
HACCP	Hazard Analysis and Critical Control Point
IAC	International Agricultural Centre, Wageningen, The Netherlands
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICLARM	International Centre for Living Aquatic Resource Management
ICRAFDP	Integrated Caribbean Regional Agriculture and Fisheries Development Programme (EDF - funded)
IMA	Institute of Marine Affairs
LRS	Licensing and Registration System
MCS	Monitoring, Control and Surveillance
MTI	Maritime Training Institute
NGO	Non-Governmental Organisation
NFW	National Fisheries Workshops
NMFS	National Marine Fisheries Service (U.S.A.)
NRMU	National Resource Management Unit
OVI	Objectively Verifiable Indicators
PPCU	Programme Promotion and Co-ordination Unit
PRC	Program Review Committee
R & T	Research and Training
RAU	Resource Assessment Unit
RDP	Rural Development Project
SCMA	Standing Committee of Ministers of Agriculture
SFO	Senior Fisheries Officer
SVG	St. Vincent and the Grenadines
TA	Technical Assistance
TAP	Technical and Administrative Provisions (annexed to Financing Agreement)
TC	Technical Committee
TCDC	Technical Co-operation between Developing Countries
TIP	Trip Interview Program (Data collection software package)
T & T	Trinidad and Tobago
UNDP	United Nations Development Programme
UWI	The University of the West Indies
WBS	Work Breakdown Structure
WECAFC	Western Central Atlantic Fisheries Commission of the FAO, United Nations
WP	Work Programme (Work Plan/Cost Estimate/Financial Plan)

EXECUTIVE SUMMARY

This 5 – 6 years programme of support to the Fisheries Department of The Bahamas is made possible under the Financing Agreement between the Commission of the European Communities and the Member States of CARIFORUM by the ICRAFD programme. It will be implemented in two year Work Plan cycles within agreed areas of focus identified as sub-projects, and monitored annually under an agreed CARICOM Fisheries Unit (CFU) and Fisheries Department arrangement.

The programme has been prepared by the Fisheries Department of The Bahamas in collaboration with the CARICOM Fisheries Unit (CFU) and is based on information obtained during the recent planning mission to The Bahamas by a team of four officers from the CFU, Belize, 23rd – 30th July, 2000. The team, gathered information through literature review of existing documents, discussion sessions with fisheries staff, and meetings with policy makers and other stakeholders in the fisheries sector. Some information was also collected from interaction with respondents of the interviews conducted with the multi-disciplinary survey instruments which were administered during the mission.

Based on the resources available under the CARIFORUM Project and the constraints faced by the Fisheries Division, it will not be possible to undertake activities in all areas needed to achieve sustainable development and conservation of the fisheries resources. The Work Plan will therefore seek to address some of the critical issues affecting the fisheries sector by focusing on:

- development of clear and adequate planning and policies framework;
- improving the fisheries database, information management systems and flow of information to stakeholders for planning and management decision making;
- strengthening human and institutional capacities for resource management and conservation;
- empowerment of resource users so that they can assume greater responsibility for sustainable use and management of the fisheries ; and
- improving public awareness of the benefits and importance of the fisheries sector and the need for sustainable resource management.

Fishery management decision-making and planning must be informed by quantitative information on the structure of the sector and the status of the resources. To this end, the Project will seek to address those issues associated with providing fisheries data for assessment and management and as an effective tool for monitoring and regulating catch and fishing effort.

Therefore, with the intention of providing information for management and decision-making on a continuous basis, the Project will assist the Fisheries Division to strengthen its data collection systems to collect data on length, weight, maturity and hard parts for selected species of fish and shell fish in the respective fisheries. The resulting data, along with catch, effort, economic, social and environmental data, should permit qualitative and quantitative evaluation of the impact of the fishery on the population structure, including estimates of fishing mortality, current abundance and status of exploitation, trends in recruitment and projected future abundance, and allowable catch under given management regimes. Biomass dynamic models, length based assessment techniques/models as well as bio-economic models will be utilized in these assessments.

The project will provide technical and financial assistance to the Fisheries Department for the collection of catch, effort, biological, social and economic data for selected species and fisheries within the refined data collection system. Training will be provided to Fisheries Department staff in data collection, management and analysis. A Socio-economic study of the sport/recreational fishery will be conducted. Technical support will be provided for the comprehensive assessment of the conch, lobster, shallow shelf reef and pelagic fisheries; and support will be provided for studies on marine reserves. The project will also provide support for the preparation and dissemination of the data and information obtained through the preparation of regular technical reports and articles.

Technical assistance will be provided to the Fisheries Department to strengthen the planning and policy framework and improve the system of governance. Specifically the Project will:

- prepare, finalize and support implementation of a comprehensive national fisheries policy;
- prepare and recommend implementation of a national fisheries management plan;
- enhance the mechanism for providing policy advice and support participatory approaches to decision-making regarding the fisheries sector; and
- support a review and preparation of recommendations for strengthening of the organisational structure and operational arrangements of the Fisheries Department.

The project will also seek to strengthen mechanisms for improved technical co-operation in the areas of fisheries between The Bahamas and the Dominican Republic. In addition, support will be provided to improve understanding of the types of conflicts in the fisheries sector and aid the establishment of mechanisms for management and resolution of these conflicts.

The Community Involvement and Education sub-project will directly consolidate the strengths of the department in this area whilst addressing the weaknesses through institutional strengthening and capacity building activities. Some of the existing programs such as public education and training, development of educational materials, and the impressive list of fisherfolk organizations will be improved and consolidated. The problems facing the industry such as poaching, over-fishing, fish piracy and bleaching of reef will be tackled by the Intra-island dialogue groups made up of stakeholder representatives. The Bahamas will also become the first of the four Cariforum countries to begin using videos for field education and awareness building activities. Capacity building training programs have been planned for the Fisheries Extension Officers and the fisher folk Organizations.

BACKGROUND

About The Work Programme

The Work Programme for The Bahamas is a key document under which project activities are planned, implemented, monitored, and assessed. All funds and technical assistance will be provided to The Bahamas and spending must be based on an approved work plan. The Work Programme has therefore been prepared with the aim of providing as clearly and concisely as possible a comprehensive description of the project activities, responsibilities, budget, implementation schedule and reporting requirements.

A 5 - 6 year programme of support will be implemented in two year work plan cycles. This work programme is based on preliminary data garnered during the recent planning mission to The Bahamas by a team of four officers from the CFU, Belize, 23rd – 30th July, 2000. The team gathered information through literature review of existing documents, discussion sessions with fisheries staff, meetings with policy makers and other informed stakeholders at the landing sites and communities. Some information was also collected from interaction with respondents of the interviews conducted with the multi-disciplinary survey instruments. The latter included:

- A Baseline Survey of fishing communities administered to 120 respondents in The Bahamas
- A Baseline Survey of the Fisheries Department of The Bahamas
- Key Informant Interviews (14 respondents)
- Interviews on the status of the Data Collection programs of The Bahamas (5 respondents)
- Interviews on the status of the fisherfolk organizations (3 respondents)

The Fisheries Department will be responsible for implementing the activities in this Work Programme. Technical assistance and support will be provided by the staff of the CFU, technical experts from the other CARIFORUM Countries (through TCDC arrangements) and consultants, where necessary.

Introduction

Fisheries and aquaculture presently make a significant contribution to the economies of CARIFORUM countries. This contribution can be enhanced by a combination of management and development interventions. Within the EDF funded Integrated Caribbean Regional Agriculture and Fisheries Development Program, there is a component designed to promote the sustainable utilization and management of the fisheries of the CARIFORUM countries. The overall objective of the fisheries program is optimal utilization of marine fishery resources in CARIFORUM countries through optimal sustainable harvesting and optimal post harvest utilization of marine fishery resources. Fishery management would be enhanced by strengthening the capacity of national Fisheries Departments and regional institutions which are responsible for formulation of fishery management policy and implementation. This project is being executed by the CARICOM Fisheries Unit, located in Belize, Central America.

It is recognized that one of the fundamental problems facing the fisheries of the region is the open access, common property nature of the resource system. Accordingly, one of the main challenges faced by countries is the transformation towards a closed access system with clearly defined and equitable rights of access to the resource. Other significant problems include:

- the lack of high level support and clear policy, particularly with respect to resource management and conservation *viz* fisheries development;
- lack of reliable data and information for planning, decision-making and policy formulation;
- inadequate human resource and weak institutional arrangements for research, planning and decision-making at both governmental and non-governmental levels;
- inadequate resource management regimes and lack of enforcement of regulations;
- limited involvement of resource users and other stakeholders in planning and decision-making; and;
- lack of public awareness of fisheries conservation and management issues and consequential lack of support for interventions designed to protect fisheries.

The CARICOM Fisheries Unit through the ICRAFD Programme will support the efforts of the Fisheries Department and seek to address some of these critical issues including: development of a clear and adequate policy framework; improving information management systems and information flow for management decision making; strengthening human and institutional capacities for resource management and conservation; empowerment of resource users and gradual transfer of responsibility for resource management to the users through co-management programs; and improving public awareness of the benefits and importance of fisheries management, thereby increasing public support and involvement in schemes for conservation and sustainable use of the fisheries resources.

It is recognized that this project does not have the resources to solve all the problems affecting the fisheries sector in The Bahamas. Stakeholders, including government departments, resource users organizations, NGOs, academic and research organizations in The Bahamas and throughout the Region must continue to commit themselves to sustainable fisheries and in this regard provide the human, financial and institutional resources needed to transform the sector into a more sustainable system.

Sustainable fisheries development and management in The Bahamas will be enhanced by technical assistance to the Fisheries Department and other national and local organizations associated within the fisheries sector. That will be accomplished through the following activities:

- Strengthening National and Regional Fishery Management Policy and Planning capability;
- Promoting the establishment and formalizing Advisory/Decision-Making mechanisms at the national level;
- Establishing or Enhancing Fisheries data collection and Management Systems;
- Establishing or Enhancing Licensing and Registration Systems for fishermen and fishing vessels;
- Establishing Mechanisms for participation of fishers and fishing industries in Fishery Management;
- Enhancing public awareness of fisheries management issues;
- Enhancing Linkages and cooperation between Government fisheries officials and stakeholders in The Dominican Republic and Haiti;
- Strengthening national Human Resource Capability through Training;
- Assessing the Status and Potential of Critical Resources; and
- Conducting research to generate information for policy formulation.

The main thrust of the program will be undertaken through implementation of the following activities:

- Formulation of Draft National Fishery Management Policy and Plan;
- Strengthening of the catch and effort and biological data collection systems for major fishery resource type;
- Assistance and training in data analysis and interpretation;
- Design and support implementation of systems for Licensing, Registration and Monitoring of Fishermen and Fishing Vessels;
- Design and support implementation of programs to enhance the involvement of fishers in fisheries planning and management;
- Provide support for public education and awareness building programs;
- Long and short-term training for staff of the fisheries departments;
- Research to generate information for planning and policy formulation;
- Establishment of mechanism for closer co-operation between stakeholders in the fisheries sector in Bahamas, the Dominican Republic and Haiti;
- Establishment of mechanism for conflict resolution and conflict management in the fisher sector in The Bahamas;
- Provide support for improvement in monitoring, control and surveillance;
- Provide support for improvement in post-harvest handling and marketing of fish; and
- Participate in the RFM.

Introduction

Fishery management decision making and planning must be informed by quantitative information on the structure of the sector and on the status of resources. Information collected during the Planning Mission to The Bahamas from informal discussions and interviews with the Fisheries Department staff highlighted the strengths, weaknesses and some of the problems in the current Data Management Systems. Some of the current problems include:

1. Inadequate coverage of the landing sites due to the distance between the Islands and lack of transportation.
2. The need to obtain data on the sports fishing industry to aid in characterizing this fishery and determine its socio-economic contribution to the national economy.
3. Collection of biological data for additional commercially important species, as biological data is currently collected for only Conch and Nassau Grouper.
4. The Bahamas Fisheries Information System (BFIS) is a DOS-based software, which is out dated and does not adequately address the evolving needs of the fisheries sector. The program should either be upgraded to the Windows environment to increase its functionality and allow easy manipulation and extraction of the data or it should be replaced.
5. Training for data collectors, as some data collectors and senior fisheries officers felt that lack of proper data collection techniques and insufficient training are issues that need to be addressed.
6. Lack of sufficient data collectors, especially on the Family Islands.

The Fisheries Data and Information Management Systems will consist of two broad components, (i) **Catch, Effort, Biological and Socio-economic Data Management System (WBS 310)** and (ii) **Licensing and Registration Data Management System (WBS 320)**. Within each system, data collection, data storage, data analysis and reporting will be main activities. As much as possible, these activities will be combined across the systems.

The Bahamian fishing sector operates mainly at a commercial level, with over 75 million Bahamian dollars worth of marine products exported in 1999. The commercial industry mainly targets spiny lobster (*Panulirus argus*), queen conch (*Strombus gigas*), stone crabs (*Menippe mercenaria*), snappers (*Lutjanus* spp. and *Ocyurus chrysurus*), groupers (*Epinephelus* spp and *Mycteroperca* spp), grunts (*Haemulon* spp), jacks (*Caranx* spp and *Selar* spp) and sponges.

The Fisheries Department coordinates the data collection effort for Nassau, Grand Bahama and the Family Islands (Bimini, The Berry Islands, Abaco, Eleuthera, the Exumas, Andros, Cat Island, Long Island, San Salvador, Rum Cay, Inagua, Acklins and Crooked Island). The main islands currently covered are New Providence, Grand Bahamas and Abaco. The department commenced data collection in 1969 to provide information that would guide the management of the fisheries in a sustainable manner. Limited human resources, the distance between the landing sites, and lack of adequate transportation affects the coverage and frequency of data collection.

Data is collected, using a Daily Landing Form, to record catch and effort from fishing vessels. This includes weight, species (there is a lot of lumping of species data), trip duration and number of days fished, gear type, number of fishermen and number of boats respectively. The current Daily Landing form does not adequately record the fishing effort associated with a given catch. More recently Biological data elements such as length and weight frequencies, maturity and sometimes morphometric data are recorded only for Conch and Groupers. In addition weight frequency data is being collected for lobsters at the processing plants. Data on prices, exports and imports are also recorded. Import data is collected by the Government Department of Statistics. The processing facilities submit a Monthly Purchase Report with details on species, cost and source of all purchases for the month. There is a coverage gap in the

catch and effort data as the Department is not capturing catch and effort data for all the major landing sites and needs to expand the sampling program to include these sites. At the processing plants only wholesale prices are recorded whereas at the landing sites retail prices are collected by the Data Collectors. The Fisheries Department expressed the desire to be able to collect biological data for lobster and improve the current data collection system for conch, stone crab, groupers and snappers.

Data collectors collect data from the landing sites and processing plants. Sometimes information is lost through private consumption and/or sale to restaurants and hotels, which do not keep accurate purchase records. There seems to be a lack of human resource, as persons assigned to collect data have other responsibilities such as enforcement, extension work and resource inspection for export. The data collectors need additional training in data collection, analysis, reporting and in communication skills.

The Bahamas Fisheries Information System (BFIS), which is used to store fisheries data and information is a D-base III database software, and although it is functioning there is a need for a more modern and efficient Database software program. Annual reports are produced from the data collected and distributed to major stakeholders.

The aim of the Fisheries Data Management Systems component of the ICRAFD project is to provide the necessary resources to help The Bahamas Fisheries Department to manage, in a sustainable manner, their marine resources through the availability of adequate data and information.

Objective of the Work Plan

The primary objective of this sub-project is to improve the data and information management systems in order to provide fisheries data for assessing, managing, monitoring and regulating fish catch and fishing effort.

WBS 310: Catch, Effort, Biological and Socio-economic Data Management System

WBS 311/321: Review the Data Collection and Management Systems

A review of the current data management system will identify the strengths and weaknesses, explore the possibility of improving the sampling plan to cover the major landing sites in a cost effective manner, and examine the possibility of obtaining more complete and accurate data, particularly on fishing effort, from areas like Spanish Wells where fishing is done mainly on a commercial level.

The issue of improving the current database software will be examined and the review would look at whether data on sports fishing exists and is adequate for characterizing the fishery and its contribution to the economy. Recommendations from the review will allow improvement of the current data and information management system in The Bahamas.

Purpose

The aim of the review will be to:

- Generate information from which to make recommendations for improvements.
- Determine if adequate data exists for assessing growth and mortality parameters for the main commercial species and advise on the appropriate data required and the most economical and statistically sound method of collection.
- Review the type of economic and social data that exist and advise on additional data to be collected in order to monitor the performance of the different fisheries as well as provide information for management.
- Review the type of data collected in the sports fishing industry and suggest, if necessary, additional data to be collected to effectively monitor and manage the industry.

- Prepare a product pathway from the fishers to the consumers (domestic and foreign) for marine resources.
- Make recommendations for refining and strengthening the integration of the catch, effort, biological, economic and social data collection programs. Special attention will be given to the collection of fishing effort data to ensure the data collected is species specific and adequately reflects fishing effort.

Approach

- A resource person, with experience in designing and implementing data collection systems (background in fisheries/familiarity with methods used in fisheries data collection systems would be an asset) from CFU/TCDC or from within the country or a consultant, will undertake the assignment including preparation of the necessary reports with recommendations for implementation.
- The resource person will work in close collaboration with the Director of Fisheries, Data Manager, Fisheries Officers and Data Collectors to conduct the assignment and to facilitate technology transfer to these personnel.
- The resource person will visit The Bahamas and conduct a thorough review and analysis of the data collection program in keeping with the above stated objectives. This will include review and analyses of the existing catch, effort, economic, social and licensing and registration data, the data collection forms, the computerised databases and reports. Visits to selected landing sites, wharves and processing plants to observe data collection activities will be made and interaction between the fisheries personnel and the fishers will also be done.

Outputs

The outputs of this activity will be:

- Review and analysis of the data collection and management program for the fisheries, including the data collection forms, the field data collection program, computerised databases (BFIS) and reports in The Bahamas, with recommendations for refinement.
- Indication as to whether adequate data exists to determine population parameters such as growth and mortality for the main commercial species and/or provide advice on the appropriate method of obtaining such data for analysis.

WBS 312: Enhance data collection plans covering the major fisheries

This activity will involve enhancing the current sampling plan to include catch, effort, biological, social, economic and licensing and registration data elements that are currently not being collected, but are required for stock assessment and fisheries management.

The following data elements should be collected:-

- monthly details on the total catch and or landings taken by the fishing unit;
- monthly details on the total effort exerted by the fishing unit, e.g. total days at sea, trap hauls and total number of hooks; etc.,
- number of crew per trip per fishing unit;
- reliable estimates of catch and effort for a representative subset of the fleet, if it is not possible to sample the whole fleet;
- monthly details on the species taken by fishing unit;
- the number of fish caught per time period by species or the mean mass of fish caught per time period by species;
- estimates of discards or fish not marketed (e.g. kept for home use) giving details of size where possible;
- for each species or stock, length frequency, hard parts for ageing and maturity data;
- rainfall, temperature, salinity and current patterns will be recorded, to address the effects of environmental factors on stock parameters;

- social and economic data such as
 - i. cost of inputs e.g. capital expenditure-boats, gears, operational costs-fuel, labour etc
 - ii. price or value of catch
 - iii. revenue
 - iv. profit
 - v. subsidies
 - vi. distribution of benefits
 - vii. employment – fishermen, processing, marketing, support sector (e.g. boat building), provision of supplies, gear etc.
 - viii. family size
 - ix. educational levels
- data on the sports fishing industry such as the number and type of vessels, where they fish, the origin of the boat (local or foreign), crew type, type of gear used, the value of the catch, the weight of the catch, the demographics of the fishers/crews /captains, operational costs, the revenue earned, where the boats are based (e.g. in Nassau etc.), license information, target species, information on tournaments and sports fishing associations. Data could be collected from sports fishers using log books or data card, depending on the duration of the trip.

Purpose

To provide an integrated data collection system which will collect catch, fishing effort, biological, environmental, social and economic data. The analysis of this data will provide information for the major stakeholders and to allow sustainable management of the marine resources in The Bahamas.

Approach

- The sampling plan will be reviewed under WBS 311/321 and the results used to refine and enhance the data collection program.
- The staff of the Bahamian Fisheries Department, with technical support from the CFU staff, will be responsible for preparation of the revised and enhanced sampling plan for the major fisheries to facilitate the collection of catch, effort, biological, environmental, social and economic data elements.
- Implementation of the modified sampling plan will be the responsibility of the Fisheries Department with technical assistance by CFU staff, regional experts and consultants as required.
- Provide additional human resource and equipment for data collection, management, analysis and reporting.

WBS 313: Train Fisheries Divisions Staff in Data Collection

Following the modification of the current sampling plan, all existing staff involved in data collection and management will participate in workshops on data collection and management. At these workshops, the participants will be trained in data collection, species identification, quality control and reporting.

Purpose

The purpose of this activity will be to upgrade the skills of existing data collection and management staff.

Approach

The training will be delivered by resource personnel from CFU or regional personnel under TCDC and the Fisheries Department (The Bahamas).

Outputs

Fisheries staff trained in areas of catch, effort, biological, environmental, social and economic data collection.

WBS 314: Database Software for Data Storage, Basic Analysis and Reporting

Currently the department has a software (BFIS) for data (catch, effort, biological and economic) entry, storage and minimal manipulation. Data analysis is currently being done in Microsoft Excel. The Fisheries Department expressed the need for an upgrade of the current Dos-based software to a Windows type environment (that is a system with a graphical interface).

Purpose

The purpose of this activity will be to:

- Provide a database software or upgrade BFIS.
- Consider the suitability of TIP for data entry, storage, manipulation, basic analysis and reporting.
- Identify and train suitable persons to manage/operate the system.

Approach

- A resource person with data management skills and experience in using database software from CFU/TCDC or a consultant will undertake the assignment in collaboration with the Fisheries Department. This individual will have a working knowledge of TIP, experience in data storage, manipulation, basic statistical analysis and reporting.
- The resource person will visit The Bahamas and conduct a thorough review of The Bahamas Fisheries Information System (BFIS). This activity will be merged with WBS 323.

Output

- Review of BFIS with recommendations for an enhanced data management software.
- An implementation plan, with schedules to implement the recommendations for the refinement of the software.
- The availability of database software for data storage, manipulation, basic analysis and reporting.
- Fisheries Department staff identified and trained to operate the system

WBS 315: Train Fisheries Divisions Staff in Using the Database Software for, Data Entry, Analysis and Reporting

All existing staff involved in data collection and management will participate in workshops on data entry, manipulation, quality control, basic analysis and reporting, using the database software.

Purpose

The purpose of this activity will be to upgrade the skills of existing data collection and management staff.

Approach

The training will be delivered by resource personnel from CFU or regional personnel under TCDC and the Fisheries Department (Bahamas).

Outputs

Fisheries staff trained in areas of data entry, manipulation, quality control, basic analysis and reporting.

WBS 316: Provide resources for implementation

The catch, effort, biological and socio-economic data system will require at least one computer, with adequate resources, and software to support data entry, basic analysis and reporting. To address the issue of lack of adequate coverage of landing sites on the Family Islands, transportation allowance will be provided, rather than employing more data collectors.

WBS 317/326: Preparation of Articles and Technical Reports

The Fisheries Department, assisted by the CFU team, will prepare articles and technical papers to facilitate communication with major stakeholders. These will include:

- Monthly summaries of catch, effort, fish prices, and export earnings
- Annual statistical reports on the fisheries sector, documenting the performance and trends in the fisheries.
- A National Fisheries Marine Atlas for The Bahamas
- Updating information for input in the National Fisheries Management Plans
- Preparation of scientific articles for publication or presentation at regional /international seminars.

WBS 318/327: Monitoring and Evaluation

The Data Manager will be making visits to The Bahamas at the rate of 2 visits per annum, over the life of the program, to evaluate the progress of the activities associated with data collection system and to provide assistance and advise during implementation of the project activities.

WBS 320: LICENSING AND REGISTRATION DATA MANAGEMENT SYSTEM

WBS 322: Enhance Licensing and Registration System

The current licensing and registration system include (1) registration of boats and (2) the issuing of permits. There is a basic registration system for those persons who wish to obtain duty free concessions on investment in fishes. The fishers are not registered. The data is stored in the BFIS database.

Purpose

The purpose of this activity is to:

- Improve the existing licensing and registration system to make it a more effective tool for monitoring the fisheries. This activity will be guided by the review of the data collection system.

Approach

- A resource person with data management skills and experience in using database software from the CFU/TCDC or a consultant, will undertake the assignment in collaboration with the Fisheries Department. This individual should have a working knowledge of LRS, experience in data storage, manipulation, basic statistical analysis and reporting.
- The resource person will visit The Bahamas where s/he will conduct a thorough review of the existing Licensing and Registration System. Possibly, this activity will be merged with WBS 323.

Output

- An improved licensing and registration system.
- An implementation plan, with schedules to implement the recommendations for the refinement of the licensing and registration system.

WBS 323: Database software for data storage, basic analysis and reporting

Currently the department has a database software (BFIS) for data (licensing and registration of vessels) entry, storage and minimal manipulation. Data analysis is currently being done in Microsoft Excel. The Fisheries Department expressed the desire to have the current Dos-based software upgraded to a Windows version.

Purpose

This activity will:

- Review the current database software.
- Consider LRS for data entry, storage, manipulation, basic analysis and reporting.
- Identify and train Fisheries Department staff to manage/operate the system.

Approach

- A resource person working in close collaboration with the, Data Manager, Fisheries Officers and other personnel responsible for Licensing and Registration will review the system.
- The Data Manger will introduce LRS to the Fisheries Department.

- The Fisheries Department will identify suitable persons to manage/operate the system.

Outputs

- Review of the existing database software with recommendations for its refinement and computerization.
- An implementation plan, with schedules to implement the recommendations for the refinement of the software.
- The availability of database software for data storage, manipulation, basic analysis and reporting.
- Individuals identified and trained to operate the system

WBS 320.4: Train fisheries divisions staff in using the database software for, data entry, analysis and reporting

All existing staff involved in data collection and management staff will participate in a workshop on data entry, manipulation, quality control, basic analysis and reporting using the database software for the Licensing and Registration System.

Purpose

The purpose of this activity will be to upgrade the skills of existing data collection and management staff.

Approach

The training will be delivered by resource personnel from CFU or regional personnel under TCDC and the Fisheries Department (The Bahamas).

Outputs

Fisheries staff trained in areas of data entry, manipulation, quality control, basic analysis and reporting using LRS or any other database software.

WBS 325: Provide Resources for Implementation

The Licensing and Registration System will require at least one computer, with adequate resources, and software to support data entry, analysis and reporting.

WBS 400: FISHERIES ASSESSMENT

Introduction

WBS 410: Pelagic, Reef and Slope Fisheries Assessment

The lobster (crawfish) fishery is the most developed in The Bahamas, yielding the highest production and estimated value among the species harvested. Notwithstanding, the reef, and slope finfish fisheries also make a notable contribution to overall production, with groupers and snappers ranking among the first four species/ species groups in importance for production, and estimated value. The potential for further growth and development of the reef and deep-water fisheries has been noted (Johnson and Deleveaux, 1998; FAO, 1989; Giudicelli, 1978; González Alberdi, 1975). In recognizing the potential for further development of these fisheries, Johnson and Deleveaux (1998) noted the need for cautious expansion, and recommended that assessments be conducted on both the shallow water resources and deep water slope demersal species. These authors further recommended that an assessment of coral reef resources be conducted and comprehensive mapping of the shallow water marine habitats. Other recommendations included the development and implementation of appropriate management plans and designation of

integrated coastal and marine protected areas. González Alberdi (1975) emphasized the requirement of good statistical information systems, covering the collection of catch and effort data, as well as biological data, essential for adequate monitoring growth and to determine appropriate levels of optimum effort. Examination of the Fisheries Department's 'Marine Resource Landing Form', which is a daily form, revealed that current data collection covers catch and effort data at the species level for the main species only.

Noting the extensive presence of reefs in The Bahamas, the contribution to production and estimated value of the Nassau Grouper and other similar finfish fisheries, the significant potential for expansion of the reef and slope fisheries, the need to update/refine estimates of potential yield, and to determine the status of the resources for management planning purposes, the following reef and slope fisheries activities are proposed:

1. Review and analysis of historical data on the reef and slope fisheries;
2. Enhancement of fishery and biological sampling for reef and slope species;
3. Assessment of commercially important reef and slope fisheries;
4. Application of data on Nassau Grouper spawning aggregations in further development of current management approaches for this species;
5. Mapping of the different habitats in key reef areas, for estimation of potential yield and to provide reference data for management purposes, including the establishment and management of marine reserves.

At present pelagic species do not comprise a major portion of catches reported by Bahamian fishers. However, The Bahamas is a popular tourist destination, and several sport fishing tournaments are held every year. Sport fishing catches comprise mainly dolphinfish, barracuda, wahoo, bonefish, blue and white marlins and tunas (CFU, 2000; Deleveaux and Higgs, 1995). Furthermore, a significant number of fishing permits (more than 6,000) is issued annually to foreign fishing vessels for the purpose of sport/recreational fishing (Deleveaux and Higgs, 1995). These authors also acknowledged that sport fishing makes an important contribution to the Bahamian economy. The detailed catch and effort by these foreign fishing vessels are not recorded and hence are currently unknown. Although there are specific sport fishing regulations, without effective surveillance, these vessels may be collectively harvesting significant quantities of large pelagic species. At present, The Bahamas Fisheries Department obtains information on the total catches and nominal effort of local sport fishing tournaments. NMFS has monitored the international billfish tournaments. Johnson and Deleveaux (1998) also noted the need to conduct assessment of coastal and large pelagic resources.

Noting the extent of sport fishing activities in The Bahamas which could be having a significant impact on large pelagic resources that are highly migratory and hence shared and jointly managed by regional and international organisations such as the International Commission for Conservation of Atlantic Tunas and Tuna-Like Species (ICCAT), the contribution of sport fishing to the economy, the potential for further growth and development, and the benefit of applying more cost effective measures for management of the industry, the following pelagic fisheries activities are proposed:

1. Review and analysis of historical data on the sport fisheries;
2. Enhancement of fishery and biological sampling for reef, slope and pelagic species;
3. Development of sampling program for sport fisheries/ Socio-economic study of the sport fishery;
4. Assessment of commercially important pelagic fisheries;
5. Participation in ICCAT activities.

PLANNED ACTIVITIES

WBS 410.1: Review and Analysis of Historical Data on Reef, Slope and Pelagic Fish Species

In preparation for further development of the infrastructure for monitoring and managing The Bahamas fisheries, it is essential to review and analyse available historical data. This information will provide an updated analysis of the status of The Bahamas fishing industry to facilitate general management decisions, as well as highlight the areas within the data information system in need of improvement.

Purpose

- To review and analyse fully all the available historical data on the pelagic, reef, and slope fisheries of The Bahamas, for provision of management advice.
- To update estimates of the relative commercial importance of the different pelagic and reef and slope fish species.
- Where possible, to obtain first estimates of fish stock parameters, pertaining to growth and mortality, required for input into stock assessments.
- To identify errors, gaps, and shortcomings of the historical data information system and field sampling program.

Approach

- A resource person (s), with appropriate skills and experience in statistical and assessment analyses from CFU or from within the country or a consultant will be identified to undertake the assignment.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and fisheries officers responsible for data entry and analysis.
- The resource person will undertake a detailed review and analysis of the available historical data on pelagic, reef and slope fisheries, including conducting new stock assessments where possible, or identifying suitable approaches to these stock assessments given available data.
- The resource person will be responsible for preparation of the report(s) of activity items outlined above.

Outputs

- A current evaluation of the status of The Bahamas fishing industry for the selected species, useful for management purposes.
- Updated estimates of the relative importance of individual species and species groups to The Bahamas fishing industry.
- In cases of available data, first estimates of fish stock parameters, pertaining to growth and mortality, required for input into stock assessments.
- Information on the status of stocks not recently assessed, or the identification of suitable approaches to assessment of these stocks, given the available data.
- Identification of errors, gaps, and shortcomings of the historical data information system, and field sampling program, for consideration in future improvements that may be recommended.
- Training of fisheries personnel in statistical analyses of fisheries data.

WBS 410.2: Enhancement of Fishery and Biological Sampling for Commercially Important Reef, Slope, and Pelagic Species

The current field data collection program captures catch and effort data at the species level for the main species only: 'crawfish' (assumed reserved for spiny lobster only); 'conch' (assumed reserved for queen conch only); 'Nassau Grouper'; 'green turtle'; 'loggerhead turtle'; 'stone crab claws'. The other species categories noted are general categories. Interviews with field data collectors revealed that the catches of other species were not always recorded at the individual species level. In consequence, the current field sampling program does not provide for continuous capture of detailed fisheries and biological data at the individual species level for most reef, slope and pelagic fish species.

Purpose

- In collaboration with efforts to improve the present data information system, to develop improved field sampling program.
- In collaboration with efforts to improve the present data information system, to develop improved data collection forms.
- To train fisheries personnel in executing improved field sampling program, including completion of upgraded field data collection forms.

Approach

- A resource person (s), with appropriate skills and experience in finfish fisheries statistical sampling design, including design of the relevant data collection forms, from CFU or from within the country or a consultant, will be identified to undertake the assignment.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and fisheries officers responsible for design of the field sampling program for finfish and the collection of these data.
- The resource person (s) will undertake a full review and analysis of the nature and design of the current field sampling program for finfish fisheries.
- The resource person (s) will be responsible for preparing a report on activity items outlined above, and for making specific recommendations for improving the current field sampling program.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and other relevant fisheries staff to develop an improved sampling program for finfish fisheries, in accordance with accepted recommendations noted in the report.
- The resource person (s) will be responsible for training the relevant fisheries staff in carrying out the revised field sampling routines and completion of revised data collection forms if necessary.
- The resource person (s) will be responsible for monitoring the implementation of the improved sampling program (s) for the finfish fisheries of The Bahamas, conducting quality control checks, and data analyses during at least the first two years of implementation of the improved sampling program (s).

Outputs

- An improved field sampling program for finfish, that allows the collection of the types of data required for conducting quantitative stock assessments and hence provision of sound management advice.
- Training of fisheries staff in statistical sampling design.
- Training of fisheries staff in collection of fisheries and biological data at the individual species level.

WBS 410.3: Study of the Socio-economic Importance of the Sport Fishery and Development of Sampling Program

Within the Caribbean region and in The Bahamas fisheries are important not only as a source of food and employment for commercial and subsistence fishers but also for a growing population of tourist and local recreational fishers. Recreational fishing is defined as fishing conducted for the purpose of pleasure and relaxation rather than for commercial gain or subsistence by the fisherman. Popular sport fishing magazines such as Marlin, Salt Water Sportsman and Sport Fishing, consistently rate The Bahamas as a prime destination for international anglers for billfishes such as marlins and sailfish, and for several other species of game-fishes. Several international and national fishing tournaments are held each year in The

Bahamas. Despite the popularity of sport fishing, there is a lack of data and information on the recreational fishing industry in The Bahamas and in the region more generally. Research is needed to better understand the scope, economic importance, impact on the resource and management requirements of the recreational fisheries in the region. Recreational marine fisheries and related industries are believed to be a multi-million dollar industry and provides thousands of jobs. The multiplier effect of these industries also generates millions of dollars in economic activity in The Bahamas.

At present, The Bahamas Fisheries Department obtains information on the total catches and nominal effort of local sport fishing tournaments only. There is no sampling program in place to capture data on the daily fishing activities of non-resident sport/ recreational fishing boats. In consequence, the true significance of The Bahamas sport/ recreational fisheries is likely under-estimated. This information is essential for proper local management of the sport/ recreational fisheries, in tandem with internationally co-ordinated efforts for management of the species concerned. Sport fishers may not land their catches at the same landing sites as the commercial fishermen, and their daily pattern of fishing may not be as predictable as those of commercial fishers. In view of this, it may be advisable to establish a logbook system of data recording and reporting for the resident sport/ recreational fishers. In the case of non-resident sport fishing operations, the logbook format could be modified to produce a data card which could be posted to the Fisheries Department within a given period of time, following cessation of fishing operations in Bahamian waters.

Purpose

- Conduct a socio-economic study to determine the size and nature of the sports/recreational fisheries and their contribution to the Bahamian economy.
- To review the nature and magnitude of resident and non-resident sport/ recreational fishing operations in The Bahamas.
- To review the current sampling program for resident and non-resident sport/ recreational fisheries.
- To develop an appropriate improved sampling program for resident and non-resident sport/ recreational fisheries of The Bahamas including the development and refinement of field data collection and/or logbook forms.
- Develop recommendations for sustainable development and management of the sport/recreational fisheries.

Approach

WBS 410.3.1: Socio-economic Study of the Sport/Recreational Fisheries

- This study would determine the importance of the fishery including the contribution it is making the Bahamian economy, by examining the revenue, cost structure and profitability of the industry.
- This study could be conducted by either a staff of the fisheries department, a staff from the fisheries department who receives a scholarship to do an advanced degree under this project, or a student from another CARIFORUM state, or a local or regional consultant.
- If the study will be undertaken by a student, then the CFU in collaboration with the Fisheries Department will make the necessary arrangement with an appropriate university to take the lead role in conducting the study and supervising the student.
- The detailed proposal for the study would be developed by the student in collaboration with the CFU, the student's supervisor at the university and the Fisheries Department.
- The student will undertake the field work with support provided by the Fisheries Department and the CFU

WBS 410.3.2: Development of Sampling Program for the Sport/recreational Fisheries

- A resource person (s), with appropriate skills and experience in sport/ recreational fisheries statistical sampling design and surveys, including design of the relevant data collection forms, from CFU or from within the country or a consultant, will be identified to undertake the assignment.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and fisheries officers responsible for monitoring resident and non-resident sport/ recreational fishing activities and for the statistical sampling program (s) for these fisheries.
- The resource person (s), with support and assistance from The Bahamas Fisheries Department, will undertake a full review and analysis of the nature and magnitude of resident and non-resident sport/ recreational fishing operations in The Bahamas, as well as the current sampling program.
- The resource person (s) will be responsible for preparing a report on activity items outlined above, which will include specific recommendations for improving the current sampling program(s) for resident and non-resident sport/ recreational fisheries.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and other relevant fisheries staff to develop improved sampling program (s) for both resident and non-resident sport/ recreational fisheries, in accordance with accepted recommendations noted in the report.
- The resource person (s) will be responsible for training the relevant fisheries staff in carrying out the revised field sampling routines and completion of revised data collection forms if necessary.
- The resource person (s), with support and assistance from staff of The Bahamas Fisheries Department, will meet with the resident sport/recreational fishers to explain the need for improved sampling of these fisheries, and where necessary, to train fishers in completing the data forms.
- The resource person (s) will be responsible for monitoring the implementation of the improved sampling program (s) for the sport/ recreational fisheries of The Bahamas, conducting quality control checks and data analyses during at least the first two years of implementation of the improved sampling program (s).

Outputs

- A report on the nature and magnitude of the sport/ recreational fisheries in The Bahamas. The report will highlight/ report on social and economic contributions of the sub-sector including the employment and earnings generated.
- Identification of errors, gaps, and shortcomings of the current statistical sampling program (s) for resident and non-resident sport/ recreational fisheries, and specific recommendations for improvements.
- Improved statistical sampling program (s), and revised/updated field data forms for the resident and non-resident sport/ recreational fisheries of The Bahamas.
- Training of fisheries staff in statistical survey, and sampling design.
- A graduate student trained to the masters degree level with expertise in recreational fisheries assessment and management.

WBS 411: Participation in ICCAT activities

The Bahamas is an important tourist destination, with sport fishing being a notable attraction. Bonefish continues to be a popular target species for sport fishers. However, there are certain sections of sea in The Bahamas, such as the 'Tongue of the Ocean', and the 'Northeast Providence Channel', which are world renowned for the abundance of tuna and tuna-like species, and dolphinfish particularly during certain months of the year (Schultz, 1990). Recognising this fact, and noting the high number of fishing permits issued annually to non-resident sport fishing vessels in The Bahamas (Deleveaux and Higgs, 1995), it is important to determine the full impact of both resident and non-resident sport/ recreational fisheries of The Bahamas, as described in WBS Activity 410.3. In addition, many of the species concerned are highly migratory, and are shared with several other countries harvesting these species in the Atlantic Ocean and adjacent seas. In consequence, these species are monitored, assessed and managed through internationally coordinated efforts under the auspices of the International Commission for Conservation of Atlantic Tunas and Tuna-like Species (ICCAT).

It is therefore in the interest of The Bahamas to become a 'Cooperating Party' of ICCAT, and to participate in relevant ICCAT activities, so that the current extent of the large pelagic fisheries in The Bahamas and its contribution to the local economy is internationally recognised and respected. In addition, participation in ICCAT will ensure that monitoring of the local sport/ recreational fisheries for tuna and tuna-like species is coordinated with the efforts of other countries harvesting the same stocks.

Purpose

- To participate in relevant ICCAT activities (workshops/meetings), which provide information on the status of Atlantic tuna and tuna-like resources and current management regulations.
- To contribute at least basic fisheries data to the ICCAT database and to coordinate local management measures with those imposed by ICCAT.
- To demonstrate cooperation with ICCAT, and so enjoy the benefits of being a Cooperating Party of ICCAT.

Approach

- This activity can be implemented most easily by incorporating the Bahamian participation in ICCAT into the current regional effort for the same activity carried out by a number of CARICOM countries.
- The current regional effort involves CARICOM representation/participation in the annual ICCAT scientific and Commission meetings, as well as other relevant inter-sessional meetings. The CARICOM representative reports to ICCAT (e.g. statistics, fisheries developments) on behalf of countries, and is responsible for reporting to countries on ICCAT meetings attended and issues of concern.
- Submission of annual large pelagic fisheries statistics to ICCAT, and other pertinent information on the large pelagic fisheries (sport/ recreational) fisheries of The Bahamas. This information can be reported directly to ICCAT, and also be included in the annual CARICOM report to ICCAT.

Outputs

- Annually updated information on the status of Atlantic tuna and tuna-like stocks, including the marlins, and on ICCAT management measures adopted or modified.
- 'Cooperating Party' status in ICCAT and attendant benefits, as it may become necessary.
- Avoidance/ minimisation of economic dislocation that could be caused if ICCAT management measures do not recognise/ consider the existence of significant large pelagic sport/recreational fisheries in The Bahamas.

WBS 412: Assessment of Commercially Important Pelagic, Reef, and Slope Fisheries

Not surprisingly, most of the effort to date in stock assessment in The Bahamas has focused on the spiny lobster and the queen conch species. Notwithstanding, the reef, and slope finfish fisheries also make a notable contribution to overall production, with groupers and snappers ranking among the first four species/ species groups in importance for production, and estimated value. The potential for further growth and development of the reef and deep-water fisheries has been noted (Johnson and Deleveaux, 1998; FAO, 1989; Giudicelli, 1978; González Alberdi, 1975). In recognizing the potential for further development of these fisheries, Johnson and Deleveaux (1998) noted the need for cautious expansion, and recommended that assessments be conducted on both the shallow water resources and deep water slope demersal species. The need to conduct assessment of coastal and large pelagic resources was also noted (Johnson and Deleveaux, 1998).

Assessment analyses are essential for determining the health of the fisheries concerned, and for development of appropriate management strategies. Given available data, both traditional methods of assessment, as well as recently developed methods such as bioeconomic analyses and ECOPATH, should be undertaken. The various assessment approaches will allow an examination and understanding of the different perspectives to the same problem, and adoption of more balanced approaches to fisheries management.

Purpose

- To train fisheries staff in statistical and assessment analyses.
- To conduct quantitative stock assessments of commercially important species, given available data.
- Participation of fisheries staff in regional fisheries assessment and management meetings.
- Preparation of management advice, based on results of fisheries assessments conducted.

Approach

- It is recommended that this activity be accommodated with a similar effort being carried out at present by a number of CARICOM countries.
- A resource person (s), with appropriate skills and experience in fish stock assessment, from CFU or from within the country or a consultant, will be identified to undertake the assignment.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and fisheries officers responsible for data compilation, analyses and assessment.
- The resource person (s) will work with staff of the Fisheries Department to conduct assessments of selected commercially important reef, slope and pelagic fisheries.
- The resource person (s) will work with staff of the Fisheries Department to prepare reports of the completed assessments, which will include management advice for the fisheries concerned.
- Staff of the Fisheries Department will participate in relevant regional pelagic, reef, and slope fisheries assessment and management workshops or working group meetings, to discuss and present the results of their assessments.

Outputs

- Assessment reports providing management advice for fisheries assessed.
- Training of Fisheries Department staff in techniques of stock assessment.

- Further development of regional network of expertise, as well as regional collaboration in the assessment and management of reef, slope and pelagic fisheries.
- Peer-reviews of completed assessments.

WBS 413: Nassau Grouper Spawning Aggregation Studies

In striving to achieve sustainable management of a fishery, it is important to ensure that the spawning stock is not fished down to levels at which there is risk of reduced recruitment or recruitment failure. In the case of the Nassau grouper, this species is particularly vulnerable to this type of overfishing, known as recruitment overfishing, owing to the fact that spawning aggregations are targeted heavily by the commercial fishery. Spawning stock biomass per recruit (SSBR) analyses can be used to determine the effects of fishing mortality and age (size) at first capture on spawning biomass. In consequence, an optimal fishing effort/ spawning aggregation size ratio could be usefully applied in managing fishing effort on Nassau grouper spawning aggregations, based on the total optimum fishing mortality that safeguards against recruitment overfishing.

Purpose

- To identify and quantify the number of measurable spawning aggregations in a major fishing area for Nassau grouper.
- To monitor changes in the occurrence and density of spawning aggregations in response to different levels of fishing effort.
- Using a suitable target reference point (say, 30% or 40% of initial spawning biomass obtained from SSBR analyses), to determine an optimal fishing effort/spawning aggregation size ratio for management purposes.

Approach

- A resource person (s), with appropriate skills and experience in acoustic surveys and fish stock assessment, from CFU or from within the country or a consultant, will be identified to undertake the assignment.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and fisheries officers responsible for monitoring the Nassau grouper fishery and for conducting field work at sea.
- The resource person (s) will work with staff of the Fisheries Department to conduct acoustic surveys of Nassau grouper spawning aggregations over a selected area and time period.
- The resource person (s) will work with staff of the Fisheries Department to record detailed catch and effort data for the spawning aggregations surveyed.
- The resource person (s) will work with staff of the Fisheries Department to analyse the survey data, together with the fisheries catch and effort data, in order to determine the impact of different effort levels on different sizes of spawning aggregations.
- The resource person (s) will work with staff of the Fisheries Department to prepare a report on the activity items outlined above. The report will include recommendations for management of the Nassau grouper spawning aggregations, based on applying the information gathered by the present study to an independently obtained recruitment over-fishing reference point at the stock level. This study could also be conducted by a Fisheries Department staff who receives a scholarship to undertake a masters degree. In this case the student would work under the the supervision of the professor, CFU staff and Fisheries Department staff to conduct the study and deliver the planned outputs.

Outputs

- Direct measurement of fishing operations on selected Nassau grouper spawning aggregations, and the reductions in spawning biomass caused by such effort.
- Given available information from completed assessments on the optimal fishing effort for safeguarding against recruitment overfishing for Nassau grouper stock (s) concerned, recommendations for management of spawning aggregations.
- Training of DOF staff in field research.

WBS 414: Reef Habitat Mapping Study

Estimates of the biomass or potential productivity of island shelves provide important components of fisheries management plans. Using available satellite imagery data, together with visual dive surveys (groundtruthing), detailed maps of the various types of benthic habitats can be produced for selected major island shelf areas in The Bahamas. These data will be used to develop theoretical estimates of potential yield, useful for specific fishery management planning purposes. In addition, these data will provide important reference data for general management purposes, including the establishment and management of marine reserves.

Purpose

- To develop maps of the various habitat types in key reef areas.
- To estimate areas of different types of reef habitat, and so develop a preliminary estimate of potential yield of the reef fisheries concerned.
- To provide reference data for guiding management decisions, e.g. determining appropriate boundaries and areas for establishment of marine reserves.
- To provide reference data for monitoring the success of marine reserves, and the impact of development of fisheries activities in other areas.

Approach

- A resource person (s), with appropriate skills and experience in visual dive surveys, processing and interpretation of satellite imagery data, and the application of suitable area-based models of standing stock and secondary productivity from CFU or from within the country or a consultant, will be identified to undertake the assignment.
- The resource person (s) will work closely with the Director of The Bahamas Fisheries Department, the Data Manager, and fisheries officers responsible for the management of reef fisheries.
- The resource person (s), with support and assistance from The Bahamas Fisheries Department, will undertake to obtain, process and interpret the appropriate satellite images, and to identify the different types of marine habitat based on production potential.
- The resource person (s), with support and assistance from The Bahamas Fisheries Department, will undertake to conduct visual dive surveys, in order to verify and rectify the classifications obtained using the remotely sensed images.
- The resource person (s) will supply the classified images as thematic base maps (both hard and digital formats) of marine habitat to a specified depth.
- The resource person (s) will train staff of the Fisheries Department in the interpretation and use of the thematic maps.

- The resource person (s) will be responsible for preparing a report on activity items outlined above, which will include estimates of areas of habitat types and estimates of potential yield.

Outputs

- Classified satellite images and thematic maps of selected major island shelf areas in The Bahamas, useful as reference data for establishment and monitoring of marine reserves.
- Area measurements of the different marine production zones.
- Estimates of potential yield for shelf areas studied.
- Training of Fisheries Department staff in the interpretation of satellite imagery data and the use of thematic maps.

WBS 430 LOBSTER AND CONCH ASSESSMENT AND RESEARCH

Planned Activities

WBS 430.1 Assessment of Conch Fishery

The Queen Conch, *Strombus gigas* is considered the only species of the genus *Strombus* with large commercial value in the Caribbean region. In The Bahamas, the fishery of conch represents an important supplementary income for fishermen during the Spiny lobster's closed season from April to July. During this period about 60-70% of the total annual conch harvest is made, accounting for approximately 10% of the weight of all fishery products landed in the country. The queen conch also is a fundamental item in the diet of The Bahamian people, so the sustainability of this fishery resource also has social implications (Ehrhardt and Deleveaux, 1999). Several studies and reports have been conducted on conch in The Bahamas (Higgs, 1987; Wicklund and Hepp, 1987; CFMC/CFRAMP, 1999). Apparently most of the conch resource is not threatened in The Bahamas because in some islands the platform area is large and the community of fishermen is small. Also the cost involved in traveling long distances would exceed the earnings from the harvest. However, the fact that many important stocks of conch are close to population centers is an important factor to take into account when considering the potential for stock depletion. For these reasons, the species is vulnerable to over-exploitation. Rational management decisions for this resource have to be based on a good understanding of the biology and population dynamics of the species. Although some initial studies on stock assessment, including distribution and abundance of the queen conch have been done in selected areas of The Bahamian marine platform, more studies should be conducted to improve understanding of the state and condition of the conch fisheries and to facilitate planning and decision making. The studies will seek biological, economic and social information on the conch fisheries and on the resource system.

Purpose

- To undertake a census of areas, people, gears, fleet, involved with the exploitation of the Queen Conch in The Bahamas
- To collect catch and effort data for selected fishing grounds and landing sites of the *Strombus gigas*, in order to determine the current status of this fishery.
- To conduct an economic and marketing study on the queen conch (from fishers selling at landing sites, small vendors, entrepreneurs, cooperatives, processing plants, and export agencies) and on the economic contribution of the queen conch fisheries to the local and national economy.
- To determine biological parameters of the queen conch (length, weight, sex, maturity/spawning, genetics, migration,)
- Undertake census on distribution and abundance of juvenile and adults queen conch in selected habitats.
- To determine the positions and dimensions of juvenile conch beds and the linkages between juveniles beds and adult populations and spawning sites.

- Develop a comprehensive management plan for the queen conch fishery based on the scientific information obtained.

The queen conch study will include six interrelated but discrete components which will be conducted to improve understanding of the state of the queen conch stocks and to formulate recommendations for their management and conservation. Some of these activities could be undertaken by students leading to a master degree, by a private consultant or through TCDC assistance, with the support of the CFU team.

1. The first activity will be a census to identify, quantify and document the areas, people involved, gears used, fishing methods, type and number of boats used in the exploitation of the Queen Conch. This will be done by the Department of Fisheries with technical support provided by the CFU.
2. The second activity will be directed to the collection of catch and effort data directly from selected landing sites, while fishing is taking place especially during the closed season for the lobster fishery.
3. An economic and marketing study on the queen conch fishery (from fishers selling at landing sites, small vendors, entrepreneurs, cooperatives, processing plants, and export agencies) will be conducted. The purpose of the study is to better understand the marketing situation and the economic contribution of the queen conch fisheries to the local and national economy. The study will make recommendations for improving the contribution of the resource to local stakeholders and local communities. A student from the College of The Bahamas or a regional university could undertake the study as a thesis or the study can be done by a private consultant with the support of CFU.
4. The fourth component will be a biological study to determine i) migration patterns of juveniles and adults by tagging, ii) spawning period and size at maturity, iii) population parameters by collecting and analyzing length and weight frequency data and, iv) genetic studies to determine population structure.
5. This component will be a visual underwater census survey to determine the spatial distribution, abundance and population structure of the queen conch. Special note will be taken of the juvenile and adult habitats and abundance, as well as potential spawning stocks. This activity would also try to determine the positions and dimensions of juvenile conch beds and the linkages between juvenile beds and adult populations and spawning sites. The approach for these activities will include tagging of small juveniles to later recapture as large juveniles or adults. That data could be complemented with studies on the comparative morphology of the queen conch. This study could be implemented by the Fisheries Department in collaboration with local or international NGOs or by students, with the support of CFU.
6. The results of the above studies along with the catch and effort information will be integrated and used to formulate a comprehensive plan for sustainable development and management of the queen conch fisheries in The Bahamas

The CFU staff will provide technical support to the Fisheries Department staff on the design and implementation of these studies. University and/or College students from The Bahamas or another CARIFORUM country and staff from NGOs will be able to assist with the research on the biological parameters as well as economic, marketing and social aspects of the fishery, with the advice and supervision of the supervising professor at the University, the Fisheries Department and CFU staff. CFU will provide TCDC support if needed.

Outputs

- Reports on the finding and recommendations of the various studies will be prepared.
- A better understanding of the status of the queen conch resource and, the tools and information needed for sustainable co-management of the *Strombus gigas* fisheries in The Bahamas and recommendations for improving the social and economic conditions of the resource users.
- Preparation of a management plan.

WBS 430. 2 Assessment of Crawfish (Spiny Lobster) Fisheries

The spiny lobster *Panulirus argus* (crawfish) is the most important fishery resource in The Bahamas, accounting for more than 80% of the annual catch in weight and with 90.3% by value of the total recorded landings of fishery products in this country. By 1999 the value of the crawfish exported from The Bahamas accounted for B\$ 71,586,006 (Fisheries Department Report, 1999). The Bahamian Spiny lobster fishery is therefore the single most economically important fishery in the Caribbean Region. The Bahamas has been the number one exporter of frozen crawfish tails, to the USA, replacing Cuba which was the previous leader before the United States's embargo. The main devices used in The Bahamas to catch crawfish are the "casitas" or "condos". These devices are placed on the seabed to attract lobsters by providing shelter from predators. Approximately 650,000 casitas are reported to be in use in recent years. About 2 – 3 small boats called dinghy operate close to a large vessel, ranging in size from 45 feet to 100 feet. These large boats act as operation base providing food, sleeping quarters and catch storage and let the boats spend up to four weeks at sea. The larger fishing vessels usually sell the crawfish to processing plants. The Fisheries Department collects the landing data from these processing plants. Several studies have been conducted on the status of the resource, but in most cases these were based on sparse empirical data (Thompson, 1980; Smith, G. B. and M. V. Nierop, 1984; FAO, 1991; Department of Fisheries Report, 1997; Ehrhardt et al. In press; Lipcius,). In 1995 the Spiny lobster management options project was conducted by the Department of Fisheries in order to assess the management options for the spiny lobster fishery. A minimum size for harvesting crawfish needed to be defined in order to maximize the optimum yield in a sustainable manner. Nevertheless, data on growth, mortality, maturity/spawning, age of recruitment to the fishery, distribution of juveniles, migration, abundance and recruitment of post-larva should be collected to improve understanding and management of this important fishery. Studies of the social and economic aspects of the crawfish fishery are also needed. Studies should also be conducted to facilitate the development of new options for international marketing.

Purpose

- To review and analyze historical data of the crawfish fisheries activity
- To determine the number and location of landing sites of the crawfish *Panulirus argus* in The Bahamas, as well as their fishing grounds, volume of landings, fishing gears, catch and effort.
- To undertake a biological study of the crawfish, including data on growth, maturity/reproduction, mortality and migration patterns for *P. argus* as well as standardization of effort.
- To establish systems for monitoring puerulus settlement and juvenile recruitment of *P. argus*.
- To conduct a visual census underwater survey in selected areas to determine the spatial distribution, abundance and population structure of the crawfish in Bahamian waters
- To conduct a census on the "casitas" and to monitor the number, location, and selectivity of these devices in catching crawfish of specific length. Also the possible impact of the casitas on the sea bottom should be determined
- To undertake studies of economic and marketing aspects of lobster at local, national and international levels

Approach

The study of the crawfish resource will involve conducting 8 discrete and closely related activities. These activities will help to formulate recommendations for the management and conservation of the resource.

1. The first component will be a detailed review and analysis of historical data of the crawfish fishery in The Bahamas. Data from the past years have been collected from the processing plants. The information obtained could be used to know past trends in the lobster fishery in The Bahamas and to compare with the recent information that could help to better understand the dynamics of the resource.
2. The second component will deal with an update of the activities regarding crawfish fishing. This will be a census to identify, quantify and document the areas, people involved, gears used, fishing methods, type and number of boats (when possible) involved in the exploitation of the crawfish, together with catch and effort information.
3. The third component will be a biological and population study of the crawfish. Since the data collected and recorded by the FD are usually based on tail length, others measures and

parameters should be collected by sampling of landings (size, sex, morphometrics). No research has been done in The Bahamas to determine crawfish's natural mortality. Natural mortality has been determined based on information found in the literature. The resulting information of the mortality studies can be used in assessment of the crawfish stocks. Maturity and spawning studies are needed to know the potential of the individual crawfish to replenish the population with new recruits and, combined with studies of age and growth, it will be possible to determine the length and age at which the crawfish starts its reproduction. This component will also determine the sex ratio of the local population of crawfish. The migration patterns of juveniles and adults will be addressed by tagging and recapturing of the individuals. Tagging individuals can bring information on the movement of the crawfish in the different stages of the life cycle and will permit students to know if the individuals are residents of one area or not and also know their distribution in space and time. This can be conducted by one or two graduate students, who will be able to present the final report for their thesis or by the Fisheries Department with the support of CFU staff or TCDC.

4. The fourth component will deal with the establishment of a post-larval monitoring program to determine the period and intensity of post larval settlement in various selected sites of The Bahamas marine waters.
5. The fifth component will be a visual census underwater survey in selected areas to determine the spatial distribution, abundance and population structure of the spiny lobster. Special note will be taken of the juvenile and adult habitats and abundance as well as location of potential spawning stocks. This can be undertaken by the Fisheries Department in collaboration with local NGO's and the technical support of CFU staff.
6. The-sixth component will be a study of the use and impact of casitas in the fishery. This component will give us an estimation of the number, location and distribution of the casitas by working directly with crawfish fishers and locating the casitas using GPS. Also the selectivity of the casitas for specific length of crawfish should be determined. That will facilitate the interpretation of past trends in CPUE. The impacts of the casitas in the sea bottom should be determined by visual survey. Data on current size frequency of landings could be use to determined any increase in fishing mortality of younger age groups. This study could be conducted by the Fisheries Department supported by a graduate student.
7. An economic and marketing study on the lobster products (from fishers selling in landing sites, small vendors, entrepreneurs, cooperatives, processing plants, and export agencies) will be done. Economic information and details of processing of catch (kept on ice, no freezing, etc); sale on catch (details on proportions for export, local consumption, origin of the fleet, etc.) Data on the amount of lobster consumed locally in restaurants and hotels and the price per individual crawfish or per pound should be determined, as well as the price that the general consumer has to pay for crawfish. The purpose of the study is to better understand the marketing situation and the economic contribution of the lobster fisheries to the local and national economy. The study will make recommendation for improving the contribution of the resource to local stakeholders and local communities as well as the sustainable utilization of the resource. University students will conduct studies of marketing and economics of the crawfish fishery or the studies should be done by a private consultant, with the support and supervision of the CFU and the Fisheries Department staff, whichever option is chosen.
8. The results of the above studies, along with the catch and effort information, will be integrated and used to formulate a comprehensive plan for sustainable development and management of the lobster fisheries in The Bahamas. The plan will include specific recommendations on minimum size and closed season.

Output

Reports will be prepared documenting the results and recommendations of each study.

The results of these activities will provide the government of The Bahamas and other stakeholders with a better understanding of the status of the spiny lobster resource and , the tools and information needed for sustainable co-management of the *P. argus* fisheries in The Bahamas. A comprehensive description of

the biological, economic and marketing aspects of the fishery and a management plan based on the most recent information will be prepared.

WBS 410.1 Baseline survey in Marine Protected Areas

It is clear that traditional fisheries management measures, which in most of the cases are based on single-species population models, are insufficient to achieve the sustainable use of the fisheries resources, especially where biodiversity conservation is an important component of the management plan. It has been demonstrated that Marine Fisheries Reserves are cost-effective tools where other measures of management have not been successful. Also, most MPAs have a "no-take" area which is close to any extractive consumption and has the purpose of protecting the habitat and segments of reef fish populations from over exploitation in specific geographical areas to ensure the conservation of fish and fisheries, to maintain a critical biomass of spawners, to preserve the intra-specific genetic diversity, to maintain age structure of the populations, to provide new recruits and to maintain the balance of the ecosystem (Plan Development Team, 1990; Alcalá & Russ, 1990; Cole et. al.; 1990; Bennett y Attwood, 1991; Roberts & Polunin, 1991; Roberts, 1995). The number and status of marine protected areas in The Bahamas, including their success as management tool should be addressed.

Purpose

A survey of Marine Protected Areas, their number, location and status will be conducted in Bahamian waters.

An assessment on the number and type of species of commercial importance in fisheries, their abundance and distribution could be made by visual censuses in shallow waters and by analysis of catch composition.

Essential fish habitat studies including mapping of these habitats (visual surveys or by side scan sonar) should be made together with censuses of fishes in their different ontogenetic stages.

Approach

The Baseline study of the Marine Reserves in The Bahamas will include three interrelated but discrete components which will be conducted to improve understanding of the state of the marine protected areas in The Bahamas and to formulate recommendations for their management and conservation. These components are:

1. A literature review. DF staff, CFU staff or a private consultant, should make a literature review on the existing marine protected areas. That review will include number and location of MR, past and actual projects conducted. This activity will also review the success of marine protected areas of The Bahamas in promoting sustainable fisheries and conserving marine biodiversity.
2. An assessment on the catch composition of commercially important species (if any kind of fishery is taking place) could be made, together with the national fisheries census. In "no-take" reserves a visual survey of fishes should be conducted and their abundance and distribution by ontogenetic stage will be determined (because many of them occupy different habitats during the various stages of their cycle of life). The visual survey of fishes should be conducted by University students of the region and with the collaboration of local and international NGOs engaged within marine conservation and management in The Bahamas, with the supervision and support of the Fisheries Department and CFU staff. The visual survey could be complemented with the information obtained by an activity focused on mapping of the various habitats. That activity will be addressed in component 3.
3. In a collaborative manner, external support (NOAA, University of P. Rico, local and international NGOs) will be required to conduct mapping of the marine bottom by Side Scan Sonar profiles in deep areas, combined with aerial photographs and visual censuses for shallow areas. CFU staff will provide technical assistance. Proposal being prepared to obtain funding from Natural Scientific Foundation.

Output

To get information on essential habitat requirements for each species to be used for the sustainable management of population of fishes and for a better understanding of the entirely marine environment. Useful information on the distribution of organisms among habitats and their changing distribution over ontogenetic stages will be obtained. In essence, these activities will help to visualize the habitat as a management unit, supporting the various biological communities. The map will be a prerequisite to start managing the various habitats.

WBS 430.4: Modelling of the Fisheries Biological/Ecological System

A major gap at this time is the limited information and understanding of the fisheries within the context of the overall ecosystem. The collection of data and construction for an ecosystem model would provide very useful information for the sustainable development and conservation of the fisheries.

The study would include the following:

- Construction and validation of mass-balance trophic models of the ecosystem using the ECOPATH Model.
- Studying the ecosystem impact of various fishing regimes including development of the pelagic stocks, using the EcoSim, computer model.
- Formulation of fisheries and ecosystem management policies based on the results obtained
- Identification and collection of additional data to improve the models of the fisheries ecosystem

Construction of the ECOPATH Model of the fisheries of The Bahamas could be undertaken by a student from The Bahamas or another CARIFORUM state undertaking an advance degree in fisheries related discipline. The student would be supervised by the university with support and co-ordination provided by the Fisheries Department and CFU staff.

Output

A report with a mass-balanced trophic model of the fisheries of The Bahamas would be prepared. The report will include recommendations for fisheries and the ecosystem management based on the results of the analyses and simulations. The student who conduct the study would obtain a degree and specialized knowledge of coral reef ecosystem modeling.

WBS 400.1 Monitoring

The Biologist will make 2 visits per year to The Bahamas over the life of the program to monitor the progress of the activities associated with the resource assessment and research of the WP and to provide assistance and advise during implementation of the projects activities.

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WBS 500 FISHERIES RESOURCE MANAGEMENT

Introduction

This component constitutes one of the main expected results of the project, viz. the strengthened national and regional institutional management capacities. It is the key to the rational utilisation of the resources, and is the product of the articulation of biological, social, economic, statistical and environmental knowledge. Although there are gaps in the information available there is evidence to suggest that the major fisheries are being exploited at or near their optimum sustainable levels. Fisheries management therefore needs to be improved, and the type of measures that are needed are also clear even though more research is needed to determine the most optimum measures and strategies for implementation. It should be clearly understood that a thorough multi-disciplinary knowledge is required for effective management, and that this field cannot be claimed by a single discipline. This is reflected in the project's strategy of establishing multidisciplinary survey teams to collect integrated information on the resource users, their numbers, attitudes, strategies, expectations, frustrations, perception of need for management and suggested solutions to problems. The activities have been organized and described under the following headings:

WBS 510	Strengthened National Fisheries Management
WBS 520.	Strengthened Regional Fisheries Management
WBS 530	Support Fishers and Community Involvement/Education
WBS 540	Long-term training
WBS 550	Monitoring, control and surveillance
WBS 560	Post-harvest Handling, Processing and Marketing.

The Fisheries Resource Management approach of the project will be similar to the one adopted by CFRAMP, consisting of: strengthening of national fisheries management capability through training, technical assistance and support in the preparation of Basic Fisheries Policy Documents, Fishery Management Plans, establishment of mechanisms for planning and decision making, the establishment and strengthening of a Regional Fisheries Management mechanism, which is expected to continue to provide support for the regional fisheries initiatives.

WBS 510 Strengthened National Fisheries Management

Overview

There are certain important features that distinguish The Bahamas from other CARIFORUM countries and that must be taken into consideration when seeking to address the problems and promote sustainable fisheries development. The per capita GDP in The Bahamas is approximately US\$19,000. The standard of living and the socio-economic conditions of the Bahamians, including the fishers and their families tend to be much better compared to the other countries. Based on the available information the average fisherman earns approximately \$15,000 per annum. The fisheries, particularly in the northern islands, are highly commercial activities where economic considerations will be significant factors influencing decision making by fishers. There appears to be substantial inequalities in the level of development of the islands in the North and those in the south, both in the general level of economic development and with respect to the fisheries. In the South it appears that the fisheries are less developed from a commercial stand point but are nonetheless more important to the local economies. The cost of living in The Bahamas is generally higher than in other CARIFORUM States. The maritime space of The Bahamas is in excess of 90,000 sq. miles and is much larger than any other CARIFORUM country.

Tourism is the largest and most important sector in the Bahamian economy. The tourism product is based mainly on the extensive coastal and marine ecosystems available in The Bahamas. In this regard the

tourist industry and the fishing industry tend to be either in direct or indirect competition for access to the coastal and marine resources including, beaches, safe harbours, coral reefs, and the shallow coastal waters. In addition there is competition for the limited on-shore space and facilities for storage of equipment, berthing, fuelling and victualling of boat. This has naturally lead to conflicts over the use of these limited resources. Conflict resolution is therefore a major issue affecting the fishery sector.

The national Fisheries Department at this time is not able to adequately carry out their duties related to fisheries management and sustainable development due to limited capacity and limited financial and other operational resources. At the same time the demands on the fisheries department appears to be growing as the government accepts and pursues the principles of sustainable use of fishery resources, responsible fisheries, protection of the aquatic environment, and other measures endorsed by the international community in support of sustainable development. The Fisheries Department has modest resources to plan and execute its responsibilities. Over the past 20 years, the work of the Fisheries Department related to data collection, resource assessment and resource management have benefited from financial and technical assistance provided by donor organizations through short to medium-term projects, with contributions from the Government. The government has received significant support from FAO. Several universities and fisheries research institutions from the United States have over the years maintained active marine research and training programs in The Bahamas. Some of these organizations have establish permanent research and training facilities in The Bahamas, eg., CMRC at Lee Stocking Island. These projects have contributed to the development of the institutional capability of the Fisheries Department and the information base for development of fisheries sector policies.

In The Bahamas, there seems to be is a high level of awareness of environmental issues and the need for management and conservation of fisheries and other marine resources. The Government of The Bahamas in collaboration with NGOs have implemented bold initiatives to manage, protect and conserve the fisheries and marine biodiversity under their jurisdiction. The concept and practice of responsible fisheries, sustainable use, resource management, conservation and stewardship of the resource are issues that have to be discussed among the authorities, entrepreneurs, fishers, technicians and others with interests in the sector.

For the lobster fishery overcapacity is a major concern. For the conch and snapper/grouper fisheries overcapacity could become a major problem in the future if proper management regulations are not implemented. Overcapacity, which can be measured as the number of fishermen, number and size of boats and amount of gear used in a particular area, is perhaps the single most important factor threatening the long-term viability of the fish stocks and the fisheries. More specific policies have to be designed and implemented, in order to ensure sustainable development and management of the fisheries resources. These policies should be oriented towards controlling fishing effort and transforming the open access, common property nature of the resource system to a closed access system with clearly defined and equitable rights of access to the resource. Policies, based on the actual state of the different fisheries present in the country, have to be defined and implemented with the participation of all stakeholders.

Finally, policies consistent with international laws, conventions and agreements signed by The Bahamas and related to the use of the fisheries and other marine resources, should be developed and implemented, in order to discharge the responsibilities assumed by the government, manage the resource and resolve conflicts with other countries of the region.

The Fisheries Department has responsibility for sustainable development and management of the fisheries resources. As such, the Department must be equipped, organized and staffed to undertake the complex tasks associated with these responsibilities. At present the Department has a small team of qualified staff and an annual budget of approximately US\$2 million. The Department is therefore not able to fully carry out its responsibilities given the numerous Islands and large expanse of maritime waters under its jurisdiction. There is a need to review the organizational structure and develop a program to strengthen and upgrade the capability of the Department through staff training, provision of equipment, as well as recruitment of new staff.

At the moment, the Government Fisheries Department doesn't have an updated Fisheries Management Plan focused on management and conservation of the fisheries. A plan should therefore be prepared with technical assistance from CFU staff, local, regional or EU consultants or through TCDC collaboration with expertise from another CARIFORUM country. The Plan will draw heavily on the results of the multi-disciplinary survey and the results of past research conducted on the fisheries of The Bahamas.

PLANNED ACTIVITIES

WBS 511: National Fisheries Policy, FMP and Advisory/Decision Making Mechanism

Purpose

The specific goal of this activity is to strengthen the fisheries management and planning capabilities of the fisheries department at The Bahamas. Technical assistance will be provided to The Bahamas to:

- i) Prepare, and implement a comprehensive national fisheries policy,
- ii) Define and implement a national fisheries management plan and,
- iii) Support and strengthen the existing National Fisheries Advisory Committee.

Approach

The first step is formulation of a fishery policy and a fisheries management plan. The CFU will work in cooperation with the Government and other stakeholders to develop and document a comprehensive Fishery Policy for The Bahamas. A study tour will be organized to sensitise officials of the government of The Bahamas with successful cases of fisheries and aquaculture development in the region.

Preparation of Fisheries Management Plans and strengthening of the National Fishery Advisory Committee will be addressed during the life of the project.

The fisheries management plan must be fishery specific and will be based on the most complete description of the fisheries possible with existing information. The Bahamas has already compiled information on their fisheries that have to be organised, analysed and used as input into the FMPs. In addition the results of the multi-disciplinary survey under this project and the dialogue group discussions, will be used in the development of the fisheries management plans.

The fishery management plan should also be dynamic, and should be reviewed at least annually. These processes are most effective when there is a formal procedure for acquiring inputs and for review. Therefore the national Fishery Advisory Committee will be supported and strengthened. Reports of the body will be one indication of the extent to which it is functional.

For the Fisheries Department to take action on the fishing policy document and the FMP, they must be prepared with the participation of the entrepreneurs and fishers representatives. The contents should be publicised, in order that the stakeholders can clearly understand what the Government intends to do. The policy and plan should at least be published in a form that can be distributed and discussed by the national dialogue group and other stakeholders in the industry.

The main input in this activity will be technical assistance and funding to the Fisheries Department to define and implement the planned activities. The technical assistance will be from CFU staff, local, regional or EU consultants or through TCDC collaboration with expertise from another CARIFORUM country.

Terms of reference will be developed for provision of technical assistance in preparing and implementing:

1. The National Fishery Policy
2. Fisheries Management Plans based on the policies of the Governments and the available information regarding the status of the major fisheries and
3. Options for improving the national advisory/decision making mechanisms.

Consultant/resource person will be recruited, logistical arrangements made for their work and the Fisheries Policies, Fisheries Management Plan and options for national advisory/decision making mechanism prepared.

The process will involve extensive consultations with all stakeholders including government officials, the private sector and the resource users. A series of consultations will be organised at the national level and

at community level to discuss the issues and obtain broad base input and support for the exercise. These consultations will begin with the National Dialogue group which will be formed to review and discuss the results of the Multi-disciplinary Survey. The results of the Multi-disciplinary survey will provide valuable information to facilitate the planning and formulation of fisheries sector policies and programs on research, resource development and management, conservation, data collection, human resource development, community involvement and public education, infrastructure development, monitoring control and surveillance, quality control and post-harvest technology, regional cooperation, aquaculture development, and marketing and trade in fish and fishery products.

Output

The overall output will be that fishery management policy is formulated with stakeholder participation and insofar as possible within the time frame of the project, implemented

WBS 512.1: Strategic Review and Up-grading the Organizational Structure and Capability of the Fisheries Department

Purpose

The purpose of the work is to assist in strengthening the organizational and institutional structure of the Fisheries Department to enable The Bahamas to discharge its national and international responsibilities regarding sustainable development and management of the fisheries sector in an effective and efficient manner. The specific objective is to provide the Government of The Bahamas with a plan for restructuring and enhancing the capacity of the Fisheries Department in The Bahamas.

Approach

The Fisheries Department has been vested with the responsibility and authority to promote sustainable development and management of the fisheries resources for the benefit of the people and the social and economic development of the country. As such, the Department must be empowered, equipped, organized and staffed to undertake the complex tasks associated with these responsibilities.

An external strategic management assessment of the Fisheries Department will be undertaken during which the key variables that offer opportunities for achieving the overall goal of ensuring sustainable socio-economic benefits from the fisheries sector, and threats that should be avoided, are identified and or validated. The external assessment should focus on identifying and evaluating the trends, events and developments locally, regionally and globally, which could have significant implications for the functioning and success of the Fisheries Department. This will include examination of International Conventions and Agreements such as UNCLOS and the UNFAO Code of Conduct for Responsible Fisheries, regional initiatives such as CRFM and WECAFC, and national developments.

An internal management assessment of the Fisheries Department will also be conducted to identify its existing internal strengths and weaknesses in the functional areas that are considered necessary for the successful operation of the Department including management and administration (including finance and accounting), fisheries data and information systems, fisheries conservation and management, fisheries development, monitoring and enforcement, trade and quality assurance, training, the provision of extension and other support services to the aquaculture and fisheries sector.

The review should examine and identify the relationship among the various units and functional areas of the Department, including important aspects of the organizational structure that will assist in strengthening the organizational structures. The key success factors and distinctive competencies of the Fisheries Department which have been acquired since its inception and which cannot be easily matched by other organizations should be clearly identified. The review should also examine and document the current mandate, functions and responsibilities of the Fisheries Department and the organizational structure and human resources available to discharge these responsibilities

Based on the above review, a revised organizational structure will be developed for the Fisheries Department to create the organizational and institutional capability necessary to effectively and efficiently discharge the mandate, functions and responsibilities in accordance with the Government policy

directives, the evolving needs of the fishing sector, technological advances particularly in information systems, and the new challenges and opportunities presented by the new millennium.

The CFU will provide Technical assistance and funding to undertake this review and assist with the implementation of the recommendations to upgrade and strengthen the Fisheries Department.

Output

This will be undertaken as one of the first major activities under the project since the upgraded Fisheries Department will facilitate the implementation of the other planned activities.

The output of this activity will be a management review of the organizational structure of the Fisheries Department and a plan for restructuring and enhancing the capacity of the Fisheries Department in The Bahamas.

WBS 512.2: The Bahamas/Dominican Republic Fisheries Committees

Introduction

Fishermen and/or fishing boats from the Dominican Republic operate in the waters of The Bahamas. Dozens of fishermen and other fisheries workers from the Dominican Republic are employed as fishermen and workers on The Bahaman fishing boats. Several fishermen from the Dominican Republic also operate, without proper authorization, in The Bahamas. Sustainable development and management of the fisheries of these countries will be possible only if there is close cooperation between the policy makers, administrators and stakeholders in these countries.

Purpose

The purpose of this activity is to facilitate closer cooperation between The Bahamas and the Dominican Republic by improved sharing and exchange of information, harmonization of programs for data collection, research and management. A bi-national committee to promote dialogue, greater exchange of information and closer co-operation between The Bahamas and the Dominican Republic will be established.

Approach

The bi-national committee would be made up mainly of technical and senior administrative personnel from the fisheries departments of the countries supported by representatives from the fisheries sector including representatives of fisher's organizations and the fishing processing industry. Through this bi-national committee, the process of effective management of the shared resources can be arranged and issues of mutual interest to the countries dealt with. The Committee will discuss common problems and formulate recommendations for initiatives to improve cooperation and promote sustainable use and management of the fisheries resources. This may lead to the development of more formal bilateral cooperation agreements between the countries. The CFU will support and facilitate the work of the bi-national committee. It is envisaged that the Committee will meet at least once per year. This will facilitate the building of a foundation of a closer regional cooperation in fisheries in keeping with the initiative to establish a Caribbean Regional Fisheries Mechanism and that may include in the future such countries as the Turks and Caicos Islands.

The Project will provide support for the Committee for up to 4 years. It is expected that at the end of the project the Governments will continue to support the committee as its successor and to meet regularly to discuss common fisheries issues and plan future programs for sustainable development of their shared fisheries.

Output

During the first two year cycle the Dominican Republic/The Bahamas Committee will be established and at least one meeting convened. The main output during the first two year will therefore be the

establishment of a bi-national committee between The Bahamas and the Dominican Republic. The governments of these countries should begin to work closer with each other to plan and manage their fisheries.

WBS 512.3: Mechanism for Conflict Resolution/Management

Resolution of conflicts within the fisheries sector and between fisheries and other users of the coastal and marine environment has been identified as a priority activity for The Bahamas. The fisheries sector in The Bahamas is made up of a number of distinct groups of stakeholders, including artisanal fishers, industrial fishers, entrepreneurs, processors and exporters, etc. In addition the coastal and marine resources are used by several other interests, including those associated with tourism, which are often in conflict with the fishers. Conflict has been identified as a major issue confronting the industry. These different groups are often in conflict with each other.

Purpose

The purpose of the study is to identify and characterise the conflicts affecting the fisheries sector and recommend measures for building positive relationships among stakeholders as a means of reducing conflict and promoting co-operation and sustainable management of the fisheries resources.

Approach

The project will assist by conducting a socio-economic study to identify and characterise the major types of conflicts affecting the fisheries of The Bahamas. The scope of the study will include all types of conflict which are having a negative impact on efforts to use and manage the fisheries resources in a sustainable manner. The work should consider trans-boundary conflicts as well as intra-sectoral conflicts and inter-sectoral conflicts e.g. between fisheries and other users of the coastal zone, such as the tourism sector. The study will also evaluate the ways in which conflict can be managed or resolved. It should develop a better understanding of the impact of factors of change on the fisheries systems, and in particular how such changes can lead to conflict by affecting traditional operations and existing institutional arrangements. In addition, the study should examine the possibilities for predicting conflict, and how this facility might be used to manage conflict and its impacts. The study should identify and recommend policy measures and practical modalities for building positive formal and informal relationships among stakeholders as a means of reducing conflict and promoting co-operation and sustainable management of the fisheries resources.

This Study will be conducted by a student from the Bahamas or another CARIFORUM country pursuing an advanced degree in a fisheries related area. The student would be supervised by a professor from the university at which the student is enrolled with support and co-ordination provided by CFU staff. Recruitment of the student and identification of the training institution that would be responsible for the study will commence during year one. The student should be available and arrangements finalized with the university for the study to commence during year 2 of the project and will run for 2-3 years.

Output

The main output expected is a report on the conflicts affecting the fisheries with practical recommendations for promoting cooperation and building institutional mechanisms for resolving conflicts affecting the fisheries. A staff from the Fisheries Department of The Bahamas or another Participating State will also gain an advance degree specializing in conflict resolution in fisheries in the Caribbean.

WBS 520: STRENGTHENED REGIONAL FISHERIES MANAGEMENT

The CARIFORUM Countries have been working to define and establish a Caribbean Regional Fisheries Mechanism (CRFM) to facilitate management of shared stocks and promote cooperation among Caribbean States. Development of the CRFM is one of the main focal areas of the CFRAMP project at this time. The ICRAFD project will provide support for officials of the Government of The Bahamas to fully participate in this initiative to define and establish the Caribbean Regional Fisheries Mechanism. Funding will be provided to enable representatives of The Bahamas to attend the workshops and regional meetings on the CRFM.

Output

This activity will be completed during the second year of the project. The objectively verifiable indicator that this activity has been completed will be the establishment of the CRFM as an organization serving regional fisheries interest.

Introduction

Between the 23rd – 30th of July, 2000 a four-member technical team from the CARICOM Fisheries Unit, Belize, went on a fisheries development and planning mission to The Bahamas. The objective was to collaborate with the Fisheries Department of The Bahamas in developing a five-year work plan for the latter mutually agreed upon by the two institutions. The process of information gathering, upon which most of the decisions for formulating the work plans were based took the form of a multi-disciplinary survey comprising the following elements:

- Baseline Survey of Fishing Communities, administered to 120 respondents
- Baseline Survey of the Fisheries Department: 2 respondents.
- Key Informant Interviews: 14 respondents
- The status of the Data Collection program: 5 respondents.
- The status of the fisher folk organizations: 3 respondents.

These activities will be deemed completed after the findings have been published.

The government of The Bahamas contributes significantly to the development of the industry, through a series of incentive schemes such as:

The provision of duty-free concessions on fishing vessels, bonefish skiffs, fishing gear, processing equipment, aquaculture equipment and other goods imported for use in the commercial fishing industry.

The provision of a joint Department of Fisheries and The Bahamas Development Bank “Fisheries Small Loan Programme” that provides loans up to B \$10,000.00 for the purchase of small fishing vessels, bonefish skiffs, outboard engines or any fishing gear or equipment deemed necessary and destined for the commercial fishing industry. [This program lasted from 1994-1999. The government is in the process of arranging for more funds to continue the program].

The provision of technical assistance in the form of information for project development, advice on government policy, approved standards for processing plants and fisheries product export standards.

The provision of extension services in the form of consultancy services and advice on aquaculture development in The Bahamas.

The provision of fisheries training programs inclusive of training courses in fish trap and gear construction, basic navigation, HACCP training, small engine maintenance and repair and seamanship.

The Bahamas has already built a foundation in four of the most critical areas of Community Involvement & Public Education that this program will need to solidify and expand. These are:

- A Public Education and training program in the areas of resource conservation, fisheries rules and regulations, and other post-harvest technologies, from which not only fishers, but also other stakeholders and students and teachers in the fishing communities benefit.
- The development of educational materials through the desktop printing technique in support of the public education and awareness building programs.
- An impressive list of active, semi-active and dormant fisher folk organizations:

South Andros Co-operative Society- South Andros

North Abaco Fishermen's Co-operative – Fox Town

Northern Bahamas Fishermen's Association – Grand Bahamas

Montague Vendors and Fishermen's Association – New Providence

Potter's Cay Vendor's and Fishermen's Association – New Providence

Arawak Cay Vendor's and Fishermen's Association – New Providence

Coral Harbour Fishermen's Association

Spanish Well's Fishermen's Association – Spanish Wells, Eleuthra.

Cat Island Co-operative – Cat Island

Bahamas Bone Fishing Guides Association

An efficient staff complement in this area that only needs to be effectively deployed and their capacity strengthened.

However, the Directorate of the fisheries administration identifies several areas of weaknesses in the fishing industry that need to be addressed partly through this CARIFORUM project. These include problems and issues created by:

- Poaching
- Tourists' Over fishing
- Difficulties in meeting international HACCP and Quality Control standards.
- Fish Piracy
- Bleaching of Reefs
- Oil Spills
- Violent Fisher Conflicts
- Captive Marine Mammals
- Conch Poisoning
- Ghost Fishing by Lost traps etc

This work plan will build upon the strengths of the department in this area whilst addressing the weaknesses listed above through institutional strengthening and capacity building activities.

Objectives

- To build upon the strengths of the Fisheries Department in this sub-project area.
- To develop and implement activities that will address the socio-economic issues facing the fishing industry.
- To strengthen the capacity of the fisheries staff to support the fishers' organizations in developing co-management capabilities.
- To strengthen the capacity of the fishers organizations to participate effectively in the co-management of the fisheries resources of The Bahamas.
- To develop and implement strategies that would improve the existing functional relations between the fisheries administrators and the fisher folk organizations.

WBS 530.1: Multi-disciplinary Survey

This activity will involve the analyzing of data from the five mini-surveys conducted during the Planning Mission to The Bahamas in July, 2000. This activity ends with the publication of the findings of these surveys.

WBS 532.0: National Fisheries Workshop

A two-day national workshop will be convened in The Bahamas to discuss and evaluate the findings of the multidisciplinary survey conducted during the planning mission to The Bahamas. The participants would be representatives of the fisher folk organizations and other stakeholders

groups drawn from the various islands that constitute The Bahamas.

The outcome would be a number of policy recommendations for the consideration of the government; a list of issues to be further deliberated upon by regional fisheries dialogue groups around the country, and by a National Fisheries Dialogue Group at a later date. It could also generate some issues to be incorporated into this five-year work plan. The general report will be published and distributed region-wide.

WBS 533.1: Community Mobilizing and Institutional Strengthening

As has been shown above, there is an impressive list of fisher folk organizations that can act as the conduit for mobilizing and organizing fisher folk for training and awareness programs, and be the legitimate representatives for consultative purposes. These organizations are however not as active as should have been the case. This activity is therefore, first and foremost, to invigorate these organizations and make them active participants in activities meant to ensure the sustainable fisheries resources of the country.

Special short-term training workshops will be organized for the benefit of Fisheries Field Officers, in order to build their capacity to coordinate the tasks of rejuvenating these organizations and making them more responsive. The subject areas for these short term training programs include:

- Social, Stakeholder and Power Analysis.
- Processes of Community Integration
- Techniques of Community Canvassing
- Leadership Training
- Planning and Organizing Community Meetings
- Organizing Annual General Meetings
- Managing Finances and Accountability
- Exploring Extra-Income Generating Avenues
- Strengthening Organizations and Empowerment.

The Fisheries Field Officers will be responsible for organizing special training programs for fishers in the areas of group dynamics, mobilization, organization management, fiscal responsibility, book keeping and basic accounting etc. for the existing fisher folk organizations. Assistance could be solicited from the Co-operatives Department in the training of fishers on Cooperative Principles and Management, and Co-operative Law.

WBS 533.2: Fisheries Training Programs

The Department already organizes training programs for fishers, teachers, students and other stakeholders in the fishing communities. The objective of this activity is to provide technical and material assistance to enable the department to consolidate the program and to expand it.

At present the program is planned for only the part of the year when the lobster season is closed, and hence not much is done in this area during the lobster season. It will be expected that rather than the fishers sharing this limited period with other stakeholders, the latter should have their programs scheduled for the season period, so that the fishers have the whole of the off-season for themselves.

Second, the topics covered tend to be biased in the direction of technology transfer and post-harvest technology issues. It is being recommended that issues relating to resource conservation, fisheries biology, biodiversity conservation, and fisheries management and co-management be given more prominence in these programs.

Third, issues which will enable the stakeholders to understand the biological and socio-economic basis for other program activities such as data collection, licensing and registration, fisheries management planning, fisheries legislation, and to solicit their support for such activities will be given more attention.

WBS 533.3: Educational Materials Production

The Department has already established itself as capable of producing its own print educational materials in the form of posters, handouts, public notices, brochures, comics, booklets etc. These are being utilized in support of the public awareness and training programs organized by the department, and have become an integral part of the information dissemination process.

The department has the requisite desktop printing equipment and the capability to use them in designing and producing instructional and motivational materials. There will however be the need to supplement these with the following information dissemination equipment:

- 2 computers (with adequate graphics manipulating and storage capability)
- 5 TV/VCR for video shows in the following islands: New Providence, Abaco, Andros, Grand Bahama and Eleuthra

Besides, the department will be supplied with posters on resource conservation prepared by CFU, Belize on the following topics: licensing and registration, scuba diving, fish poisoning, dynamiting, data collection, artificial reefs, lobster closed season, mesh sizes, and over fishing.

Finally, the department will be supplied with copies of at least 15 videos from the collection of the CFU in Belize for training programs and community meetings. The majority of these videos will illustrate aspects of fisheries and organization management in other parts of the Caribbean, from which the fishers of the Bahama could learn a lesson or two.

Preparations will be made for the production of two videos in the Bahama on its lobster industry and peculiar features/characteristics of its commercial fishing industry some time in the third and fourth years of this work planning period.

WBS 534.1: First Fisheries Officers (Extension) Training Workshop

The task of providing technical support to the fishers groups and communities to develop their institutions to become involved in the planning and decision making process lies with the fisheries officers who interact with the resource users on a daily basis. Their capacity to perform these tasks needs to be built and strengthened. For this purpose, all fisheries officers who, by the nature of their jobs need to interact constantly with fishers and other stakeholders at the landing sites and in the fishing communities, need to benefit from training programs. This training will be available to all Extension Officers, Data Collectors and other fisheries officers who interact on and off with the stakeholders, and selected High School teachers in the fishing communities.

The first of these two-week training workshops will be held in the latter part of PY 2000-2001 and the second in PY 2002-2003. Additionally, there would be a number of shorter-term seminars, lectures, workshops etc., when the need arises.

The first training workshop will include the following subject areas:

- Extension Principles and Methods
- Co-operative Principles and Methods
- Leadership Training
- Group Dynamics
- Public Relations & Social Interaction
- Community Organizing
- Communication Techniques
- The Rationale for Data Collection and Licensing & Registration.
- Elements of Resource Conservation and Management
- Work Planning Techniques

WBS 534.2: Second Fisheries Field Officers Training Workshop

This workshop is scheduled for PY 2002-2003. It will concentrate primarily on addressing the weaknesses and problems encountered in the field by the participants of the first workshop. Additionally, it will take on board, issues relating to Fisheries Management Planning and Plans and the role of fishers in the process, the Fisheries Advisory Committee and the role of fishers and Post Harvest Technologies for fishers and fisheries co-management.

The specific topics to be covered in this second workshop will include:

- Elements of Fisheries Management
- Introduction of Co-Management
- Structures of Co-Management
- Extension Principles
- Video Production & Use
- Extension Methods 1
- Extension Methods 11
- Extension Methods 111
- Extension Methods 1V
- Social & Economic Issues in Management
- Participatory Research Techniques
- Case Studies of Community-Based Resource Co-Management in the Caribbean

WBS 534.3: First Institutional Strengthening Workshop for The Bahamas Fishers Organizations

Institutional Strengthening is a core objective of the Community Involvement & Education sub-project. As part of the package of strategies geared towards the realization of this goal, a number of Bahamian active fishers and members of fisher folk organizations will be invited to participate in this first institutional strengthening workshop. Preference will be given to the leadership and potential leaders of these organizations.

The overall objective will be to strengthen the fisheries resource user organizations in the country. The specific objectives are:

- To promote dialogue and exchange of information among fisher folk organizations in the country.
- To encourage resource user organizations to learn from each others' strategies, operations and problems.
- To lay the foundation for the development of a network of operations among the fisher folk organizations in the country.

The subject areas to be covered at this workshop will include:

- Co-operative Formation and management
- Harvesting Techniques
- Processing Techniques
- Marketing Techniques
- Resource Conservation and Management
- Data Collection and Resource Assessment

Classroom activities will be complemented with out-door activities such as visits to Marine Protected Areas, Co-management sites, and video shows.

WBS 534.4: Second Institutional Strengthening Workshop

The second workshop will follow the same pattern as the first but will involve new candidates drawn from the same formal groups and any new ones that might have emerged since the first workshop. The subject matter will weigh heavily in the direction of resource co-management.

WBS 535: Intra-island Dialogue Groups

The peculiar geographical spread of the Commonwealth of The Bahamas makes it economically prudent to decentralize some activities which should have national attention. For this reason, regional fisheries dialogue groups made up of the fishers groups and other stakeholders on the islands of New Providence (Nassau), Grand Bahamas (Freeport), Abaco (Marsh Harbour), Long Island (Deadman's Cay), Eleuthera (Spanish Wells) and Andros (Mangrove Cay) will be the locations of these regional dialogue groups.

The subject matter for deliberating on, will include the matters arising from the National Fisheries workshop; the list of problems and issues identified by the Director of Fisheries as needing urgent attention during the Planning mission; the list of legal prohibitions relating to the various fisheries of The Bahamas, which form part of the rules and regulations governing these fisheries; and any other regional and national matters which the fisher folk organizations and the stakeholder groups deem critical for consideration.

These regional institutional set-ups will remain as the main advisory mechanisms for policy considerations by the government and will provide feedback to the Fisheries Department and the National Fisheries Advisory Board.

WBS 536: Monitoring

The Sociologist will be making periodic monitoring visits to The Bahamas over the life of the sub-project to assess progress of activities being implemented, and to provide technical assistance to the fisheries department and to organize short-term training programs. Information will also be gathered on issues to be included in subjects for the second Fisheries Field Officers Training Workshop.

WBS 540: LONG TERM TRAINING

Objectives

The aim of this activity is to enhance institutional capability in The Bahamas for sustainable fisheries development and management. This will be accomplished by training of staff of the Fisheries Department in Bahamas through long term scholarships, short courses and short term attachments.

Planned Activities

Scholarships and Short-term Training

The development of the necessary skills for fishery assessment and management in Fisheries Divisions of participating countries is the cornerstone of a long-term approach to improved fisheries management. New concepts and methods for data analysis and resource assessment are continually being developed. The Fisheries Department staff will be best able to carry out the resource assessments and resource management activities if they are familiar with these concepts and competent in the newest methods. There is a need within the Fisheries Department for expertise in data collection, data management, resource assessment and resource management. Advanced degree training is therefore needed in data collection and management, resource assessment and resource management. At least two scholarship years of advanced level (Masters degree) training in fisheries will be provided to the fisheries staff in Bahamas. Scholarships are tenable at universities in the CARIFORUM states or EU member countries. Candidates receiving scholarship support are expected to conduct research in priority areas that are of direct relevance to sustainable development and management of the fisheries in their countries. Several of these study topics have been described under WBS400 and WBS 500. In addition support will be provided for existing staff of the Fisheries Department to upgrade their skills and or conduct research projects at a local College of The Bahamas in areas directly relevant to the sustainable development of the fisheries sector. Full or part sponsorship will be provided to successful candidates.

NAME	PROGRAM	INSTITUTION
Fisheries Dept. staff	M.Sc. degree in Fisheries Assessment and management	University in the CARIFORUM Region or a EU Country)
Fisheries Dept. staff	B.Sc. Degree in Fisheries related discipline	College of The Bahamas and other regional university
Fisheries Dept. Staff	Short-term training courses or attachments	Regional or in EU countries, training courses

Output

The expected outputs are enhanced capability within the Fisheries Department for sustainable fisheries development and management through trained Fisheries Officers, Fisheries Assistants and Field Officers.

WBS 550: Surveillance and Enforcement

Surveillance and enforcement need to be improved in the CARIFORUM region to successfully manage the fisheries. The purpose of this activity is to promote regional co-ordination of surveillance and policing of marine fisheries resource. To better understand the problems and needs of the countries regarding surveillance and enforcement and develop a co-ordinated regional approach, a consultant will be engaged to study the issues and develop proposals to resolve the problems. This is a regional initiative which will benefit all the CARIFORUM Countries. The Bahamas will participate in the study, including the development of the project proposal. Resources will be provided to support the participation of Bahamas in the regional workshop.

WBS 560: POST-HARVEST HANDLING PROCESSING AND MARKETING

In order to optimise the returns from the fish captured significant improvement is needed in post-harvest handling, processing and marketing of fish in the CARIFORUM region. To better understand the problems and needs of CARIFORUM countries regarding post-harvest handling, processing and quality control these needs will be studied by a consultant and a report prepared. The report will define a strategy and a project proposal for enhancing regional institutional capability to meet these requirements. Possible areas for examination would be quality control, upgrading legislation, strengthening of inspectorate, marketing intelligence and value added processing. The Consultant's report will be discussed by the CARIFORUM Countries at a regional workshop. The Consultant will revise the report and project proposal in light of the discussion and conclusions of the workshop. The proposal will then be submitted to a donor for funding.

This is a regional initiative which will benefit all the CARIFORUM Countries. The Bahamas will participate in the study, including the regional workshop and development of the project proposal. Financial resources will be provided to support the participation of a representative of The Bahamas in the regional workshop.

For the CARICOM Fisheries Unit

Mr. Hugh Saul
Project Director

Mr. Milton Haughton
Scientific Director

DEC 15 2000

For the Government of The Bahamas:

Mr. Ronald Thompson
Permanent Secretary
Ministry of Commerce, Agriculture and Industry

Mr. Michael Braynen
Director of Fisheries

JAN 22 2001

**APPENDIX I
BUDGET SUMMARY**

WBS #	ACTIVITY	BUDGET
WBS300	FISHERIES DATA AND INFORMATION SYSTEM	
310.1/320.	Review and Refinement of the data collection system	8,000.00
312	Enhance data Collection plans to cover the major fisheries	25,000.00
313	Train Fisheries divisions staff in data collection	8,000.00
315/325	Database software for data storage, basic analysis and reporting	10,000.00
310.5/320.	Train DOF staff in data entry, analysis and reporting (TIP & LRS)	8,000.00
316/326	Provides Resources for Implementation(Computers, data collection equipment & supplies)	30,000.00
310.7/320.	Preparation & dissemination of articles and technical reports	4,000.00
320.2	Enhance Licensing and Registration System	7,000.00
310.8/320.	Monitoring and provision of technical assistance	6,000.00
	SUB-TOTAL	106,000.00

400	FISHERIES RESOURCE ASSESSMENT	US\$
410.1	Review and analysis of historical data	7,000.00
410.2	Enhancement of Sampling Program for Reef and Pelagic Fisheries	5,000.00
410.3	Socioeconomic Study & development sampling program for sport fishery	20,000.00
411	Participation in ICCAT activities	4,000.00
412	Assessment of Pelagic, Reef, and Slope Fisheries.	20,000.00
413	Nassau Grouper Spawning Aggregation Studies	20,000.00
414	Reef Habitat Mapping Study	20,000.00
430.1	Assessment of Conch Fishery	35,000.00
430.2	Assessment of the lobster fishery	40,000.00
430.3	Baseline Survey of Marine Reserves	15,000.00
430.4	Ecosystem Modelling of the Reef Fishery Ecosystem	15,000.00
400.4	Monitoring	12,000.00
	SUB-TOTAL	213,000.00

WBS 500	FISHERIES MANAGEMENT	US\$
511.1	Preparation of comprehensive national Fisheries and Aquaculture Policy,including study tour	14,000.00
511.2	Preparation/finalization of FMP	6,000.00
511.3	Support Implementation of FMP	10,000.00
511.4	Preparation of Plan for FAC	6,000.00
511.5	Establishment/Operation of FAC	6,000.00
512.1	Strategic Review and upgrading organizational structure of the Fisheries Department	10,000.00
512.2	Bi-national Fish. Committees (DR/Bahamas)	15,000.00
512.3	Development of Mechanism for Conflict Resolution (Study plus implementation)	12,000.00
512.4	CFU staff Monitoring and provision of technical assistance	6,000.00
	Sub-total	85,000.00

WBS520	Regional Fisheries Management	US\$
520.1	Participation in the Development of the CRFM	5,000.00
520.2	Regional Cooperation: Participation of fisheries staff in regional/international fisheries management fora (including CFRAMP WBS500 Terminal	6,000.00
	SUB-TOTAL	11,000.00

WBS530	COMMUNITY INVOLVEMENT AND PUBLIC AWARENESS	
530.1/330	Multidisciplinary Survey	3,500.00
532/330	National Fisheries Workshop	12,000.00
533.1	Community Mobilization & Organization Formation	20,000.00
533.2	Fisheries Training Programs	10,000.00
533.3	Educational Materials Production	12,000.00
534	Fisheries Field Officers and Institutional Strengthening Workshops	45,000.00
535	Regional Dialogue Group	12,000.00
536	Activities Monitoring & Evaluation	7,000.00
	SUB-TOTAL	102,500.00

WBS 540	HUMAN RESOURCE DEVELOPMENT (TRAINING)	
540.1	Long-term training and scholarships	40,000.00
540.2	Short-term scholarships, training courses and attachments	12,000.00
	SUB-TOTAL	52,000.00

WBS 550	SURVEILLANCE AND ENFORCEMENT	
	Development of a regional approach to MCS. This is a regional activity in which the Bahamas would participate	4,000.00
		4,000.00

WBS 560	POST-HARVEST HANDLING PROCESSING AND MARKETING	
	Development of a regional strategy and proposal for improved post-	4,000.00
		4,000.00

WBS 570	FISHERIES DEVELOPMENT PLANNING	
	SUB-TOTAL	0.00
	TOTAL	\$577,500.00