

FISH AGGREGATING DEVICES (FAD) FISHERY MANAGEMENT WORKSHOP FOR OECS COUNTRIES



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**Report of the CRFM / JICA Fish Aggregating Devices (FAD) Fishery
Management Workshop for OECS Countries, 13 March 2013, Roseau,
Dominica**

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Workshop for OECS Countries, 13 March 2013, Roseau, Dominica

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1. Background

The CRFM / JICA Workshop on FAD Fishery Management built on work completed under the FAD pilot component of the CARICOM / CRFM / JICA Project: Study on Formulation of a Master Plan on the Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean. This study commenced in 2009 and was completed in 2012. The full reports are available at www.caricom-fisheries.com.

1.1 Meeting Objectives

The CRFM / JICA FAD Fishery Management Workshop reviewed and shared research results and best practices in the construction, use and management of FADs as tools for sustainable development, management and conservation of large pelagic resources in the region.

2. Opening Ceremony

The workshop was held at the Garraway Hotel, Dominica and was attended by representatives from Antigua and Barbuda, Dominica, Grenada, St. Lucia, St. Kitts and Nevis, and St Vincent and the Grenadines. Also in attendance were officials from the IFERMER of France, University of Florida / Florida Sea Grant, OECS Secretariat, Japan International Cooperation Agency (JICA) and the CRFM Secretariat.

Following opening salutations and invocation, a brief overview of the workshop was given by Mr. Milton Haughton, Executive Director, CRFM Secretariat. The Workshop, an undertaking jointly financed by the Japan International Cooperation Agency (JICA) and the CRFM, was an exercise to share and review the best practices for Fish Aggregating Devices (FADs) management and development in the sub-region. The Executive Director commended the various governments (notably the Government of Dominica) and agencies who made the present exercise a reality. He singled out the effort of Mr. Nariaki Mikuni, JICA Fisheries Expert for his special work in the transfer of technology among fisher-folks.

A brief project background and update on the FAD pilot component of the CARICOM / CRFM / JICA Project: Study on Formulation of a Master Plan on the Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean completed in January 2012, was presented by Mr. Nariaki Mikuni of JICA. He expressed JICA's gratitude for the gathering and for the various stake-holders' participation which had rendered the initiative up to this point a success. He went further to outline the format which the ensuing deliberations would take. The six participating Parties made presentations on the current situation regarding management of FADs, followed by collaborating agencies. CRFM gave a review of the findings on the status of the large pelagic stocks targeted by the FAD fishery.

Mr. Mikuni noted the absence of ACP, CLME and FAO which would have been important parties to participate in exchanges on the workshop findings but recognized and commended the presence of University of Florida / Florida SEA Grant and the IFREMER/ MAGDELESA Project for their complementary works.

He recognized the resource person from Okinawa, Mr. Tohru Yoshida who gave the experience of JICA in the Pacific region where a similar FAD project was being executed and explained the nature and content of the FAD project in the Pacific.

He also shed some light on the training initiative planned later this year in Okinawa for the sub region. He requested the assistance of donor parties to form a network of donors to increase the output of the project

A list of meeting participants is attached at **Appendix 1**.

3. Country Reports - Presentations

Individual countries presented a ten (10) minute status report on the current situation relative to FAD management and development in their respective countries.

3.1 Antigua and Barbuda

Mr. Hilroy Simon, Assistant Fisheries Officer presented the country report (**Appendix 2**)

A brief overview of the fisheries resources of Antigua and Barbuda was highlighted. It was found that the demand for pelagic fish species is on the rise. The pelagic fisheries and fishing methods was considered fuel consumptive, and as such attracted mainly sports fishermen. With the introduction of FADs, these species are more meaningful to fishers and therefore a shift from the dominant reef fishery has resulted. FADs were deployed in 750m depth of water approximately 10 miles south of Antigua by the Fisheries Department with JICA's assistance. Other FADs by individuals are also known to have been deployed, their locations area not clear to fisheries authorities. There are also reported incidents of FAD deployment and fishing activities by external / foreign parties in the Fishery waters of Antigua on the eastern side of the island.

Deployment and Use

The new fisheries regulations have been enacted in 2013 and this makes provisions for the deployment of FAD's with permission from the Chief Fisheries Officer. The registration and licensing of vessels and fishers as well as the display of identification marks and numbers on vessels are all tied to the conditions for FAD fishing.

FAD Fishing Data

There are provisions in the data collection system to tabulate collected FAD fishing data. The forms used in collecting data are presently modified to cater for FAD caught fish. Collectors have also been trained and fisheries personnel are encouraged to identify possible FAD fishing operations.

FAD development and deployment is still in its infantile stage in Antigua and Barbuda. Last year was the first time a FAD was deployed. Antigua's Fisheries authority is working towards co-management of FADs with the fishers. There are no set conditions pertaining to the maintenance of FADs. The Fisheries Division will as a part of the JICA Master Plan project identify all the persons who are currently utilizing or are interested in the use of these devices and organize small groups that would help to draft policies which outline the management, maintenance and conduct, around designated FADs and FAD fishing grounds.

3.2 Dominica

The report was presented by Jullan DeFoe, Liaison Officer (**Appendix 3**).

A brief outline of the evolution of FAD development in Dominica was given highlighting the genesis of the initiative from 1987 by an FAO Expert and the early setbacks it suffered before being readily accepted by the average fisher-folk. Today there is a growing interest in this method of fishing which has been as a result of a series of ingenuity on the part of the Fisheries Department, The National Association of Fisheries Cooperatives (NAFCCOP) and the fishermen.

Deployment and Use

FADs deployment and fishing first took effect on the west coast and later spread to the east. The locations of FADs are influenced by past knowledge of the migratory path of pelagic fishes, water depth and distance from the land which would serve as a deterrent to individuals considered as 'FAD pirates'.

Landings of yellowfin tuna, Atlantic blue marlin, skipjack and blackfin tuna, both on the East (Windward) and West (Leeward) coast of the island increased, as a result of FAD fishing.

Because of the manner in which FADs were allowed to be deployed, numerous conflicts among fishers and other users of the fishery waters of Dominica were prevalent. Ownership of FADs initially was by individuals or groups of persons.

FAD Management

In 2009 and 2010, twelve FAD workshops were held island wide along with two national FAD consultations to charter a way for the future of FAD Development and Management. Mechanisms for building capacity of NAFCOOP through training (local, regional) and supply of FAD construction material to NAFCOOP for management and distribution were some of the strategies used to strengthen FAD management following the aforementioned events.

FAD co-management was initiated under the umbrella of the National Association of Fisheries Cooperatives (NAFCOOP).

To combat the shortcomings of the then non-regulated FAD management system the following were FAD management rules developed by NAFCOOP following consultation with affiliates and fishers.

1. All boats engaged in FAD fishing must be registered with the Fisheries Division
2. Approval to fish off a FAD shall be given by the Fisheries Division and NAFCOOP.
3. Fishers must be willing to pay the FAD registration fee to NAFCOOP of \$100 per boat, per year.
4. Fishers must be willing to pay the daily FAD user fee of \$20 for every 100 pounds of fish landed and \$30 per 100 pounds of fish landed for non-coop members where applicable.
5. Boats must be certified as seaworthy by the Fisheries Division / Coast Guard: Seaworthy means – equipped with coolers / ice boxes, adequate safety and navigation equipment (compass, GPS), reliable engines, and any other requirements by law.
6. Licence fee: \$100 per year per boat shall be paid prior to issuance of the licence.

FADs costs varied according to where they were deployed. FADs on the east coast were more expensive than those made for deployment on the west. There are 7 FADs that were erected between 2010 to the present that are under the management of the NAFCOOP. These FADs were established under different programmes including two under the MAGDELESA Project, one under the JICA project and the others government and locally funded. The FADs range in depth from 1000 – 2600 meters.

Data Collection

Fishing data inclusive of FAD fishing activities are collected in Dominica at nine dedicated sites. Three additional data collection sites were activated as of 1 March 2013 under the MAGDELESA Project. Under that Project additional FAD fishery data such as operational cost and area fished geographically will be collected. New data collection forms generated under the JICA FAD pilot project in Dominica and with some modifications under the MAGDELESA project will be put into use at three fish landing sites for a one-year trial instance. The information derived from the analyzed catch and effort data were made available to policy makers, fishers, stakeholders as well as to regional and international organizations. The Fisheries authorities also meet with fishers at organized meetings to apprise them of the production trends in this sector and showcase top producers as a means to motivate fellow fishers.

FAD Maintenance

There was a FAD monitoring and maintenance plan following consultation with the FAD fishers and NAFCOOP during an initial FAD pilot project. This remained intact with satisfactory results until the financial support to such activities ended. Further monitoring and maintenance of FADs by NAFCOOP continued but was short-lived because of financial shortcomings. The licensing fees for FADs and the user fee scheme proposed under the pilot project could not generate sufficient funds to meet the cost of fuel and remunerations to conduct this activity.

Conclusions

Dominica has made strides but has come up against several challenges in dealing with the management of FADs. These include; no enacted regulations, a significant number of fishers not having purchased FAD licences so that the user paid maintenance scheme cannot work effectively, the need to improve reporting of catch and effort data around FADs, no user fees are collected, limited enforcement options outside of voluntary compliance, and insufficient FADs. There is still a need to look into an appropriate mechanism to finance the management and maintenance of FADs.

The program so far has brought about; significant reduction in user conflict reports, increased fish production, lower submersion rates of FADs, a voluntary purchase of licence (slow but steady) trend.

The future focus has to improve data collection around FADS, include cost benefit analysis to fisher and communities and develop co-management of resources. These hopefully will be achieved with works of partners such as Texas A&M University, University of Florida, IFREMER (MAGDELESA Project).

3.3 Grenada

Mr. Francis Calliste, Fisheries Officer presented the report (*Appendix 4*)

A brief outline of the expanse of the fisheries marine space and the features that are dominant therein, as well as the major fishing activities per region was outlined.

FAD development in Grenada and its Grenadines (Carriacou and Petit Martinique) began as an experiment in the 1990's. Most FADs are deployed in the Eastern (Atlantic Ocean) waters. Several agencies (Government of Grenada, FAO, OECS, JICA, MAGDELESA Project) have assisted Grenada in the past in development of FADs. The initially deployed FADs in Grenada were short lived because of a "knowledge gap". These were deployed in areas that did not render them to last long. These included shipping lanes and / or areas where they were prone to being vandalized by long-line fishers.

There are no policy guidelines to address a mechanism for collecting FAD derived data from FAD operations. The FAD management regime in Grenada can be considered to be non-existent. There are no regulations on FAD ownership and therefore there is no single ownership of FADs, it is considered as a “free for all”.

A series of shortcomings were highlighted for the failure of FADs in Grenada; a lack of maintenance, no monitoring, inadequate consultation with fishers, and poor site selection for deployment were among the major causes.

Currently there is only one FAD deployed that is active. It is part of the MAGDELESA FAD Project from IFREMER. The Fisheries Division is the designated management entity. There are 28 fishing vessels executing fishing operations off the said FAD.

FAD deployment in Grenada’s waters requires approval of the Fisheries Division. There are laws that govern the licensing and registration of fishing vessels and fishers but these laws do not make it compulsory to display identification or marks on vessels. Registered fishers are provided with photo identification cards.

A database system has been established for the recording of FAD fishing data. Records of fish caught near FADs are being identified and collected for further analysis.

A system of co-management of FADs has not been looked into, and ownership of FAD has not been addressed.

FAD fishing should be encouraged but with supporting legislation and policies to minimize irregularities. FAD fishing represents 1% of fish landed and engages 4% of the fishing fleet in Grenada. In this regard FAD fishing can be considered significant. Mechanisms should be established for monitoring, maintenance and co-management of FAD fishing. Data collection systems also need to be enhanced to conduct analysis for decision making regarding FAD fishing. Fisher-folks must be properly trained before being allowed to engage in FAD fishing. Workshops must be organized and conducted to inform fisher-folks of the use of appropriate gear to maximize catch in FAD fishing.

3.4 St. Kitts

The report was presented by Lorinston Asim Jenkins, Assistant Fisheries Officer (**Appendix 5a**).

A profile of the fisheries resources in the marine space of the Federation of St. Kitts and Nevis was featured to reflect the composition of the pelagic resources and the nature and size of the fleet that harvest that resource.

St. Kitts is relatively at an infantile stage in the area of FAD management although the idea of FAD fishing was introduced in the 1980’s with assistance from the USA Environmental Research Project, North Carolina. Initially, the type of FAD constructed during the early experimental stages was called “kite” design structure.

Over the past 5 years the concept of FADs was resuscitated through a series of workshops that were held island wide. 18 privately owned FADs were constructed and deployed in the waters of the Federation. FADs were seen as measures to; reduce fishing pressure on reef fishery, lure new entrants to the sector, enhance food security and sports fishing.

The Department of Marine Resources received 2 FADs from JICA and 2 from the French as part of the MAGDELESA Project, costing EC\$2500 and €5000 each, respectively. These were deployed, one each, in the waters in the vicinity of Basseterre and Charlestown. Some of these FADs were reported to have been affected by maritime traffic.

Currently there are no FAD Regulations or management regimes in place. There are no set criteria for one to engage in FAD fishing, however, all fishers fishing in the waters of St. Kitts and Nevis should be registered with the Department of Marine Resources. Fishermen understand that they should not overcrowd the FADs and encourage poor fishing practices.

Proposed Management Plan

The Department of Marine Resources is working with JICA to establish a 5-year Management Plan for FAD fishing. This will address; user conflict issues, maintenance (user fees), deployment / mapping of FADs, improving FAD technology (sand bags*), increasing landings from FAD Fishery, FAD management, regulations (Laws), marketing and enforcement.

In the absence of a management plan, user conflicts arise among fishers and with sports fishing outfits, vandalism and loss of FADs, poor maintenance and overcrowding of inshore FADs occur. The Department of Marine Resources is often referred to, to settle user conflict issues.

Data collection and Management

The Department of Marine Resources has maintained the same method of data collection and analysis which is based upon the CARICOM regional database system, CARIFIS. In St. Kitts data collection is done on a systematic census schedule using a raising factor. It is a factor or number that is used or calculated from the information from the frame survey to raise the estimation of landings. Data for the FADs are collected at the landing site, telephone surveys / calls. The fisheries complexes also assist in the collection of data. The Fisheries Complexes at Holy Road and Basseterre are areas where FAD fishery catches are landed. Other fish landing data are collected at these points as well.

FAD Regulations

Pending the development of the FAD Management Plan, these capture the major components of the regulations in place for the FAD fishery:

- No individual shall place a FAD in the water without permission from the Chief Fisheries Officer.
- Permission to place a FAD shall not confer any exclusive right to fish in the vicinity of the device.
- Master / Captain of any vessel placing a FAD shall notify the Chief Fisheries Officer of the nature of the FAD within one month.
- No person shall fish within a radius of one nautical mile from a FAD.

FAD Maintenance

The Department of Marine Resources basically relies on the FAD fishers that fish around the FADs to be updated on the conditions of the FADs. There is an established line of communication between the fishers and the department in times of needed FAD maintenance attention. The department responds to the fishers calls to make the necessary adjustments to FADs.

In 2011 and 2012, JICA conducted a series of workshops on FAD development where hands on training in FAD construction and management were given. The Federation benefited from technical assistance

from Dominica in designing and construction of FADs through a series of workshops facilitated by JICA. Dominica's experiences relative to their successes and challenges were well received.

Competition from fishers from neighbouring islands is a concern that needs to be addressed in future management regimes.

Conclusion

FAD fishing in terms of awareness and its potential has improved over the recent years. Fishermen are eager to venture into this area. Data collection to verify the true impact of this fishery requires further attention. The number of FADs that are deployed and mechanisms to appropriately manage them are needed. Fishermen need to be organized and well informed.

3.5 Nevis

The report was presented by Althea L. Arthurton, Director, Department of Fisheries, Nevis and was complementary to the presentation of the other member of the Federation (**Appendix 5b**).

FAD fishing training was conducted in the 1990's in Nevis. The technology was deemed experimental and not readily ventured into by many fishers. The success of one fisher who continued FAD fishing since then (1999 - 2008) is recorded as having landed 61,160 lbs of pelagic species with dolphin-fish (*mahi mahi*) making up over 70% of the catch.

Current Situation

An Action Plan has been drawn up to develop the FAD fishery over the next 5 years in Nevis and St. Kitts through a bilateral agreement with the Government of St. Kitts and Nevis and the Government of Japan with JICA as the implementing agency.

Fishermen are very receptive to FAD fishing as the deployment of FADs is proving to be very lucrative and a number of fishers are investing in the construction and deployment of FADs.

Almost all the FADs that are deployed are privately constructed and owned due to the fact that the materials necessary to construct them are readily available. There are approximately 16 registered vessels and 41 fishers who fish from FADS.

There are seven known FAD fishers who utilize their own FADs as well as fish from donated FADs (JICA, the French, and CaMPAM). The deployments of these funded FADs have increased revenue for the fishers and serve as the 'ice breaker' for the introduction of FAD technology.

Species caught are: dolphin (*mahi mahi*), tuna, wahoo, marlin, squid, and sail fish.

Catch for the period January 2012 to 8 March 2013, on the locally constructed FAD together with FADs from the MAGDELESA Project and JICA FAD (one each) is 30,842 lbs and is indicative of the productivity of seven fishers.

FAD data sheets provided by French / MAGDELESA Project are currently being used for data collection. Standard Weekly Logs are used to collect statistics (includes species caught from FADs). The statistics are not always provided and only in circumstances where reports are to be prepared for external use then fishers cooperate.

The department has been encouraging field officers to separate the FAD statistics from the other fish landings. The department has also developed a basic FAD database.

Five fishers have indicated that they privately own FADs (11 known). The coordinates are shrouded in secrecy; however this behaviour is contrary to the Fisheries Regulations.

One fisher has deployed five (5) FADs. Three others have deployed two (2) FADs each. All cost related to FAD construction and deployment were personally financed and set at depths between 2000' and 4000'. The costs range from \$540 to \$1,500. Private FADs are personally maintained.

Government FADs (JICA and MAGDELESA) are maintained by the government with some assistance from fishers.

Regulations

The Regulations speak to: seeking permission to deploy FADs in the waters of St. Kitts and Nevis; designating a FAD; the marking of FADs; disposal of unauthorized FADs; registration / license of fishers and vessels; all vessels are registered; all fishers are assigned a number but not a licence.

Management Plan

A Management Plan will be required to manage the expansion of the FAD fishery with the input of fishers (co-management approach). It will address issues such as: data collection; enforcement and penalties; FAD design, location, and maintenance; minimum requirements for FAD fisher licence; monitoring and evaluation.

3.6 St. Lucia

The report was presented by Seon Ferrari, Fisheries Officer (***Appendix 6***).

Following a brief introduction featuring the organizational structure of the Fisheries Department, St. Lucia's geographic location and characteristics of the fishing sector, the positive implications of FAD development were outlined.

FADs have been experimented with in St. Lucia since the late 80's. St. Lucia received assistance from donor agencies such as FAO, JICA, French and EU. The Government of St. Lucia has also contributed in this development.

A program which seeks to establish a system of EC\$0.10 levy on each gallon of gasoline purchased for fishing from a fisheries cooperative fueling facility is being considered for the maintenance of FADs. This measure after adequate consultation may be legislated.

Work is ongoing to make fishers realize the benefits of FAD fishing. It is required that an appropriate Sustainable Management Plan be developed. This should see to the extended life of a FAD and should be cost effective.

Alterations to the FADs being used is being considered to make this gadget more conducive to the rigors of ocean traffic and other adverse elements. This measure will reduce loss of FADs due to marine collision.

FADs are currently being constructed and deployed by fishers in collaboration with the Fisheries Division. FADs are deployed on both the east and west coast of the island.

While permission is required from the Fisheries authorities for FAD deployment, access to it is open to all. Currently there are 13 FADs in the waters out of an approximate 50 of them that have been deployed. For the future it is essential that research and development initiatives as far as FADs go be given due attention. These will include: the need to delve into this venture as a new fishery; the need for technology transfer to improve on fishing efficiency; post-harvest handling which must be kept in focus in light of increased importance of and emphasis on quality; the idea of a mother ship is being given consideration so as to facilitate the small open vessel type of craft that are in use; a sustainable Management Plan for FADs; continued information sharing between states and agencies.

Data collection will play a significant role in the management of the resource base as it pertains to the impacts of the new methodology. Conflicts between users i.e. sports fishers and fishers will be addressed.

3.7 St. Vincent and the Grenadines (SVG)

The report was presented by Hyrone Johnson, Fisheries Officer (*Appendix 7*).

St. Vincent and the Grenadines does not have a long history of FADs development. Attempts were made and FADs deployed in the late 80's as a FAO project and in early 90's as a JICA project off the south-eastern coast of the islands.

In 1997, one bamboo raft FAD was deployed on the south-eastern coast of the island as part of another JICA project. There are no available data on the FADs that were deployed in the early 90s. The bamboo raft FAD lasted for approximately four weeks before it was destroyed. One fisherman stated the he caught over 300lbs of fish on several occasions.

On 19 March 2010, the Fisheries Division deployed two single head buoy FADs on the eastern coast of St. Vincent and the Grenadines.

On 15 March 2012, two FADs were deployed on the western coast of St. Vincent and the Grenadines. The deployment of these FADs are part of a project known as the MAGDELESA project and was done in collaboration with IFREMER and the Fisheries Division. One FAD was deployed 3 miles offshore on the western coast of St. Vincent and the other 5 miles on the western coast of Bequia. They are single head buoy FADs with a GPS indicator that gives real time information on the floatation device's present position.

FAD Management

The policy of the Fisheries Division at present is to work in partnership with the industry stakeholders in constructing and deploying FADs, provide some level of control on the number of FADs being deployed and the areas where they are deployed and to discourage individual FAD ownership.

FAD Maintenance

The maintenance of the FADs is being done in partnership with the fishermen who fish the FADs. No qualification is required to fish around FADs. No fees are collected or charged for FAD fishing.

Data Collection

Data collection is being done. Special data collection forms have been designed and put into use. These forms are given to fishers to assist with the collection of data from FAD fishing. The response from fishers has not been forthcoming. Also, Fisheries Division catch and effort data collection forms have been altered to capture data from FAD fishing.

In follow up discussions after the presentations it was deemed important that control be taken against a too rapidly expanding FAD fishery whereby the waters around any State would be littered with FADs. For this reason it was agreed that zoning areas where FADs are to be deployed should be given serious consideration.

4. Managing FAD Fisheries Pilot Project - University of Florida / Florida Sea Grant

This item was presented by Dr. Charles Sidman, Director of Research of the Florida Sea Grant Project, University of Florida / Florida Sea Grant.

This project is a joint undertaking of the Fisheries Divisions of Dominica and St. Vincent and the Grenadines (SVG), the University of Florida Sea Grant Program (UFSG), and the Caribbean Regional Fisheries Mechanism (CRFM). The presentation was intended to share results and findings so far, as to the best practices for managing FAD fisheries, having analyzed formal and informal governance arrangements, use patterns and influences on catches and economic returns, and testing of best practices developed.

The project is divided into three major phases:

1. Rapid reconnaissance or situation assessment
 - o During February of 2012 the project team held informal discussions with fishers of SVG and Dominica to identify key related fisheries issues including use of FADs. FAD co-management was an area of interest to the team which developed a strategy for data collection, analysis and stakeholder engagement.
2. A data collection and analysis transition phase
 - o In March of 2012 the Fisheries Division of Dominica helped with the setting up and collection of data on fishing effort on FADs at 3 major fishing landing sites; Marigot (on the east), Du-Blanc (on the west) and Fond St. Jean (on the south). Each site illustrated different forms of FAD-fishing customs on individual or private FADs (these were set further offshore and maintained by individuals), small groups FADs (these were maintained by clusters of fishers) and public FADs (these were maintained by the National Association of Fishermen's Cooperatives (NAFCOOP)).
 - o Precursors to data collection included 4 basic elements; mapping of deployments of private and public FADs accessible to fishers at all three sites, a census of boats which fished these FADs, collection of specific information on catch yield of pelagic species caught by fishers and, observed numbers of boats that fished from these FADs reported by fishers. Information from 250 fishing trips is included in the analysis.
 - o The data analysis component of the project compared catches and estimated earnings of fishers who use all three categories of FADs.

- The analysis produced 3 general findings:
 - It is best economically for fishers if FADs are visited by no more than 2-3 boats at a given time.
 - Public FADs attract too many fishers. Fishers who use private and group- owned FADs achieve greater economic returns from fishing than those who use public FADs.
 - The ability to access several FADs on a trip may result in more stable catches.
3. Stake holder engagement phase
- During December 2012 the project team held discussions with stake holders at the three landing sites to share findings and discuss management applications, methods and results of the data analysis, discuss management implications, and possibly facilitate action to address specific challenges and opportunities identified by the more than 100 FAD fishers and community leaders who participated.
- Project partners facilitated small breakout groups to get information. The Fisheries Divisions of Dominica and St. Vincent and the Grenadines, and CRFM assisted.
 - Meetings and small group-discussions were facilitated by a team comprised of project partners. For example, Mr. Magloire, Mr. Sebastien, and Mr. Norris from the Dominica Fisheries Division, Mr. Johnson of the St. Vincent Fisheries Division, and Mrs. Masters from the CRFM helped to facilitate break-out groups and reported to the larger audience.
 - Mr. Riviere Sebastien and Mr. Baylon Fontaine of the Fisheries Division and NAFCOOP respectively were singled out for the efforts to help organize the data collection and meetings with fishers.

4.1 Short-term objectives

Based on the meeting results, short-term effort for this project will focus on addressing a core issue needed to strengthen co-management capacity. As expressed by fishers, promotion of communication and information sharing among each other and with the Fisheries Division will be addressed.

The project team will be working with the Dominica Fisheries Division and with fishers at the three communities to develop and evaluate tools, such as daily activity planners that can help foster greater communication and information sharing.

The project is expected to be completed by December 2013. The results derived therein will be shared among the project partners and the wider Caribbean community through venues such as the annual CRFM Fisheries Forum and the GCFI conference.

5. **Moored Fish Aggregating Device in the Lesser Antilles (MAGDELESA) Project-Issues related to sustainable development: Design and Construction of FADs and Resource Management**

The presentation was prepared by Lionel Reynal, Héloïse Mathieu and Paul Gervain, IFREMER. Lionel Reynal and Héloïse Mathieu delivered the presentation.

This presentation of two aspects of sustainable development of fishing around FADs took place during CRFM / JICA FAD fishery Management Workshop for OECS Countries. It gave an update on the progress of the work carried out within the MAGDELESA project and in the FAO working group / IFREMER concerning the sustainable development of fishing around FAD.

It also provided the opportunity to point out the few interactions that could assist in the process of making choices on the management of the emerging fishery in the Caribbean region.

5.1 Design and Construction of FAD

The existing FADs in the region can be classified into 3 types according to the material used to build them. FADs built by recycling materials are still used by fishermen. However the use of materials found in the market is promoted in order to minimize remains in the seawater and standardize construction which complies with the rules of navigation and allowing a greater FAD lifetime.

FADs designed with specific materials are being tested (FAD PLK600) in order to answer the specifications desired by the FAO working group on FADs. Those FADs are designed with only one buoy for better visibility and to avoid interactions with vessels passing nearby. Their night beacons are also more reliable thanks to the use of solar lights. Because of their more expensive cost, several solutions are suggested to use them for other matters (study of the currents, temperature monitoring, etc.) in order to reduce the cost shared between the fishermen.

PLK Marine Company is also studying a new type of FAD which avoids any remains on the bottom. It is a geostationary FAD charged by solar panels. According to the first theoretical calculations, the additional cost due to their electric motorization could be offset by the absence of anchorage and traveling fees for deployment and maintenance. Indeed those FADs will be able to reach their location by themselves and come back to the coast for maintenance.

The choice on the FAD Management system directly affects the type of FAD used. In the Caribbean region, it was observed that different FAD management systems that can coexist (officially or otherwise) in the waters of the same country. Starting from an individual FAD deployed by a fisherman to collective private FADs deployed by a group of fishermen, by associations, even by the whole fisher community of the country. In some cases, the FADs are managed by the government. The less individuals financially contribute, the simpler the FAD is, complying less with the regulation, deployed far from shore to prevent those who have not contributed to obtain financial benefits from it. Those FADs generally have low buoyancy; and can be easily submerged with strong current or drift. That is why those FADs generate seasonal activity (more used in period with low current).

5.2 Resource management

Three levels are studied: the FAD, the exploited stocks and the fishery level. At the FAD level, the work carried out within the “Dauphin” project during the intersession of the first and second working group of the Lesser Antilles, had demonstrated the existence of an important school of tuna with 60 cm of length mostly formed by adult black fin tuna. Those fish are rarely captured except by a few fishermen between 4:00am and 6:00am when the FADs have a reliable beacon to see them by night. Nowadays, more selective fishing techniques are being tested to reduce the capture of juveniles (research of adequate baits like frozen squid or small coastal pelagics) and better target the species captured. The fishing of schools of adult black fin tuna is tried by day thanks to the jigging rod. This work goes with the studies for a better knowledge on stocks. Assessments of the yellow fin tuna and the marlin stocks are carried out by ICCAT. The MAGDELESA project and CRFM are trying to increase the knowledge on the black fin tuna stock.

It is unusual for vessels to fish only around FADs all year long. In Martinique, among 1111 active vessels in 2010, only 310 are FAD fishing. 80% of those vessels have another fishing activity on the island shelf. One third of the FAD vessels also engage in fishing pots. At an economical level, FAD fishing gives one of the best value-added per fishing trip (according to O. Guyader, Guadeloupe data). However this value-

added per man and per hour worked is better for fishing pots than for FADs. Otherwise the catches per fishing trip are more regular with the coastal fishery than the offshore fishery. It can be said that there is a complementarity between these two types of fishery. Finally it can be noted that ageing fishermen will abandon the offshore fishery to focus only on the coastal fishery, which is less physical. Therefore it seems to be very interesting to study and understand better the interactions between different fishing activities, because the exploitation of one type of resource (i.e. offshore species) can affect another resource that looks a priori independent (i.e. coastal species).

6. Products Industry in Okinawa, Okinawa Prefecture, Agriculture, Forestry and Fisheries Department, Fisheries Division

The primary industry sector in Okinawa which includes fish is only 1.8% of the major sectors of the economy of that prefecture. In 2010 fish production declined by 14.5% from 24489 tonnes the previous year.

Fishing operations are divided into capture fisheries and aquaculture. Different techniques are used to harvest different species of fish. 'Payao' (a floating fish bed) or FAD is a major fishing technique that is used to harvest bonito and tuna as they are species that aggregate around floating objects in the sea. A related fishing technique is also used to harvest diamond-back squid.

The main aquaculture industries in Okinawa involve seaweed, some fish species (grouper) and crustaceans (prawns and clams).

The prefecture's 2010 marine fisheries production was made up of tunas (57.8%), squid types (12.3%) and swordfish types (6.2%).

The first FADs were tested in Okinawa in 1980 and grew into a major industry. This fishing technology can be a very successful fishing tool but its management has to be effective.

6.1 PAYAO in Okinawa

The Okinawa Prefectural Government owns 70 FADs, Fishermen's Associations and Municipalities own about 130. The controls of these FADs are under the jurisdiction of the Prefectural Marine Fishery Adjustment Committee, they set the number of FADs Fishermen's Associations and Municipalities are allowed to deploy. The committee also grants permits for setting FADs. It is required by law that all FADs have radar reflectors and flashing lights. Most FADs are surface floating objects anchored at depths of 1000 - 2000m. Consideration is being given to combination of surface and underwater FADs.

Costs of FADs vary depending on whether it was professionally made or by the fishermen themselves. There are different state sponsored subsidies for installing FADs. The life expectancy of FADs is around 5 years to 10 years. Fishing techniques such as trolling, single hook and line, multiple hook fishing are popular around FADs. Night fishing with lights is on the rise. Estimated harvests from FADs annually are in the region of 1500 to 2000 tons.

A summary of the formation and structure of a Fisherman's Association which is consistent with co-operative principles and their geographic distribution was presented. There are two types: Inshore Fishermen Association and Fishermen Associations.

These Associations service their members to facilitate their operations inclusive of credit and insurance. The industry is so designed such that data of the operations can be collected for future processing.

The future plans for the industry includes securing markets, increase revenue, resource management and product processing.

7. CRFM and ICCAT contributions to management of large pelagic fisheries with some emphasis on FAD issues

The presentation was prepared by Susan Singh-Renton, Deputy Executive Director, CRFM Secretariat and delivered by Maren Headley, Research Graduate, CRFM Secretariat.

7.1 Status of large pelagic resources including those usually caught around FADs

A summary of CRFM's LPWG fishery assessments since 2004 of stocks of spanish and king mackerel, dolphinfish, blackfin tuna, wahoo and crevalle jacks as to their stock status and related advice was presented. With the exception of Spanish mackerel, there was indication of near full exploitation. The status of black-fin tuna was unknown due to insufficient data, however the need for continued reliable data to substantiate any management advice remains a priority.

Increased landing trends of black-fin tuna as a result of FAD fishing operations could be linked to the use of the fishing technique more than an increase in abundance.

The work of ICCAT's Scientific Committee (SC) on catches by species and stock status report with the latest 2012 stock status advice followed. Both CRFM and ICCAT are concerned about the reported increased landings of some species and the related impacts by FAD fishing. CRFM's interest focused on its inability to explain the increased black-fin catch rate in the sub-region because of the substantive data problem of where no clear differentiation in FAD associated catches existed.

From ICCAT's perspective, marlin and sailfish species are both considered overfished and require time to recover. Lack of information limit the type of advice that can be given. Artisanal FAD fisheries from the Eastern Caribbean sub region is an area where catch rates have increased and no clear data seem to be available. The rate of juveniles harvested off FADs in the Caribbean was also a concern.

Consequently CRFM's LPWG had recommended from a research standpoint; (1) specific data to link fish catches near or at a FAD, (2) more accurate reporting of landings proportionate to total catch, (3) determination of migration patterns through length frequency data collection, (4) participation in proposed genetics studies with IFREMER to help define stocks.

From a management perspective CRFM LPWG recommends evoking the precautionary approach principle so as not to increase current catch levels. Also under the JICA Master Plan project, improvement on all stages of FAD fishery management including the participatory management in Dominica and St. Lucia was undertaken

8. Training for Extension Officers in Island Countries

This presentation was delivered by Tohru Yoshida, Secretary General, Non-Profit Organization, Okinawa Environment Club (OEC)

JICA Okinawa and Okinawa Environment Club (OEC), a non-profit organization of children and adults interested in environmental conservation and preservation, collaboratively provide aid to people living in

the developing countries intending to enable them to be able to solve problems in their countries on their own.

The two organizations operate the Okinawa International Center, a facility that is intended to receive and train participants in the area of sustainable tourism, fisheries extension and environmental conservation. It is anticipated that some 521 persons through 68 courses will be trained at that center. The program at that institution focuses on technical knowledge and also caters for training of young leaders.

The center offers an extension training course meant to equip participants with knowledge and techniques necessary for fisheries extension officers.

The extension training course offered at the center goes beyond the basic conventional subject areas of fisheries but extends to emerging wide ranging issues such as conservation of coastal ecosystems, participatory fisheries management and support for fisher organizations.

The structure of the course along with possible field trips runs from 9 September to 1 November 2013. The institution also partners with local organizations in Okinawa to support international cooperation. Okinawa shared lessons it has learned from experiences in community-based resource management, co-management, and counteracting coastal resources

9. Caribbean Fisheries Co-Management (CARIFICO) Project

This presentation was delivered by Nariaki Mikuni, JICA Fisheries Expert.

CARIFICO is a project designed in light of the changing trend in Japan's Fisheries Cooperation for the OECS countries from the 1990's to 2013 and beyond. That trend takes a gradual shift from the provision of physical infrastructure to capacity development for fisheries management through technical cooperation projects on a mixed bi- and multi-lateral basis.

A master plan for the execution of the CARIFICO project has been conceptualized. The project is structured to target sustainable use of fisheries resources for coastal development in the Caribbean. The project proposes options for a comprehensive resource management approach in the sub-region to include: (a) the government and communities (from the design process and beyond) in the optimal use of the fisheries resources. Examples of such involvement are pilot projects; (1) the FAD project in Dominica and St. Lucia, (2) aquaculture in Jamaica and Belize, (3) fisheries statistics in St. Vincent and the Grenadines and Guyana.

The project's long, medium and short term goals are set to include development of a practical co-management model for sustainable use and management of fisheries resources, legal and regulatory structures that complement co-management models and, information on practical co-management models. The CARIFICO project aims are espoused as establishing real fishery co-management examples and sharing experiences on fishery co-management from areas within the sub-region.

Anticipated outputs at the end of the project period will include: (1) appropriate fishery management rules and regulations which will govern use, deployment and maintenance of FADs, (2) a fishery co-management mechanism meant to assist in the enforcement of rules and regulations, (3), fishery information (catch and effort, resource evaluation etc.) for management.

Actions to be undertaken in the execution of the project will include: (1) collecting, organizing and updating of information relative to lessons from good practices, (2) baseline survey for the detail design

of the pilot activity, that would determine characteristics of sector, (3) formulation, development and strengthening of fishermen's organizations, (4) planning and implementing the operations of fisher groups in a business-like manner to sustain the group, (5) administering and governance of fisheries centers by fishers group, (6) institutional capacity building to execute fishery co-management, and, (7) sharing information derived from regional pilot activities.

In the design process of the 5-year project, the most ideal FAD fisheries co-management concepts will be selected and focused on. These should feature tangible outputs that will contribute to sustainable management of fisheries resources cognizant of how new the FAD fishery is to the region. In this vein, co-operation of JICA can be utilized in areas of fisheries infrastructure, FAD fishing techniques, quality assurance and marketing.

Actions will be pursued to formulate, consolidate and develop fishermen's organizations. This will entail the proper management of fisheries centers used by the group. Maintenance and financing of these centers and securing government subsidy and assistance will be pivotal.

This project will require that the fisheries department develop the requisite capacity to execute fishery co-management.

Sites for the 5-year pilot project have been determined, i.e. St. Kitts and Nevis, Antigua, Dominica, St. Lucia, St. Vincent and the Grenadines and Grenada. This project will require Japanese technical expertise, local administration and public relations, counterpart training, regional seminars / workshops in order to share lessons learnt, availability of equipment and material and, funding for experts' activities.

Several approaches will be adopted during the life of the project. It will involve capacity development, field testing, sharing knowledge of good practice, regional and value chain approach. The project will be supply driven, will demand technical cooperation and lead to capacity development.

A holistic approach to integrate all levels of capacity development from individual to institutional to societal will be a major feature of the project.

It is important that there be regional and international networking among international organizations and institutions in order to share knowledge, experiences, perspectives, the concept of CARIFICO and the consolidation of the linkages among networks for FAD Fishery management.

10. Conclusion

Each presentation was followed by brief interactions among participants seeking clarity on some aspects of the elucidated information.

The Workshop came to an end with a brief talk by the Chief Fisheries Officer of the Dominica who thanked JICA, CRFM and all the parties in attendance for what was considered a very enlightening and thought provoking dialogue which can only strengthen FAD fishery management in the sub-region.

Appendix 1: List of Workshop Participants

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Appendix 2: Country Report on Current FAD Fishery in Antigua and Barbuda

Country Profile

The State of Antigua and Barbuda is made up of three main islands, Antigua being the largest with a land area of 280km² and a population of approximately 85,000. Our sister island of Barbuda lies 42km to the north of Antigua and covers an area of 160km² with a population of 2,000. Redonda lies 44km to the south west of Antigua covering 2km² and remains uninhabited. The islands sit on a shelf of approximately 3,568km².

Tourism, for many years has been the most dominant driving force within the country's economy. With the downturn in the world's economy, the true potential of Antigua and Barbuda's marine resources is now being realized with more and more of the population becoming involved in fishing and fishing related activities as a source of income.

Sector Overview

Antigua and Barbuda has small-scale artisanal fisheries with a fishing fleet of approximately 350 active vessels ranging from small open boats less than 4m to larger (up to 15m) mechanized vessels powered by one or more marine diesel engines. Antigua and Barbuda fisheries can be grouped into four major types; (1) the spiny lobster fishery (2) the queen conch fishery (3) the reef and deep slope fishery (4) the pelagic fishery. Traditionally, fishers in Antigua and Barbuda would target the demersal species rather than the pelagics due to the extensive shelf area around the islands. The most popular fishing method utilized by fishers in Antigua and Barbuda is fish trap/pot fishing which accounted for the engagement of as much as 51% of the fishing fleet in 2004.

Large Pelagics

Traditionally, high fuel cost and far fishing grounds have resulted in very few fishers venturing out to target pelagic fish leaving only "recreational vessels" and sport fishing charter vessels in the pelagic fishery. However as the demand at local hotels and restaurants for pelagic species continue to increase, the number of commercial fishers venturing out to target pelagic fish is on the increase. To date there are only a few commercial fishing vessels that target pelagics exclusively although some fishers wishing to capitalize on the market for pelagic fish would occasionally plan a fishing trip to target these species usually around a fish aggregating device (FAD).

FADs

Antigua and Barbuda has very little history of the deployment and utilization of FADs. In May 2012, the Fisheries Division and the fishers operating within the Urlings Fisheries Complex (Southern side of the island) with financial assistance from JICA constructed and deployed a FAD on the south coast of Antigua. The yield from the single FAD was encouraging enough to the fishers for them to place two additional FADs in the area four months later. Some fishers on the eastern side of the island reportedly reaped the benefits of FADs placed illegally in the waters of Antigua and Barbuda by fishers from the neighbouring French overseas territory of Guadeloupe. Occasionally there are conflicts between the local fishers and the French fishers that sometimes result in the Coast Guard intercepting the illegal foreign fishing vessels and charges laid against them, the most recent being December 2012. The news of the fishers landings from the utilization of FADs have been spreading across the fishing fraternity resulting in fishers frequently requesting information from the Fisheries Division as to the location of existing FADs, the techniques used and about the materials for gear construction.

FAD Locations

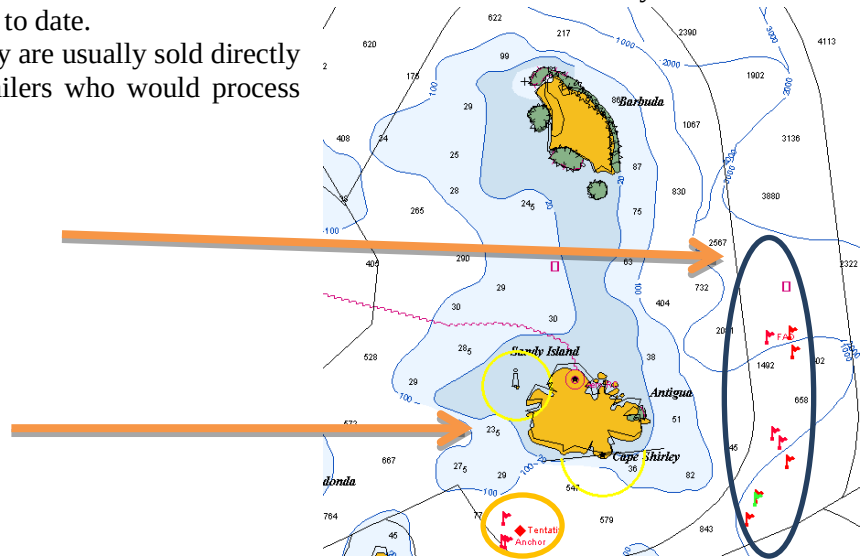
- | | | |
|----|-------------|--|
| 1. | 16° 52.543N | 061° 56.731W (Set by FD-Depth 750m-cost approx. XCD 4,000) |
| 2. | 16° 51.125N | 061° 55.075W (Set by Fishers – Depth 760m) |
| 3. | 16° 49.750N | 061° 56.514W (Set by Fishers – Depth 750m) |

The FAD set by the Fisheries Division and the fishers was lost in October of the same year while the two set by the fishers remain in place to date.

Fish landed from the FAD fishery are usually sold directly to the hotels or one of two retailers who would process and sell the fish.

French FADs reported by fishers

FADS set by FD and Fishers.



FAD Deployment, Use and Regulations

The Fisheries Regulations of 2013 has provisions governing the deployment of FADs in the waters of Antigua and Barbuda. No person is allowed to deploy a FAD without first applying and receiving approval from the Chief Fisheries Officer. For a fisher to utilize a FAD, he / she must be a licensed local fisher operating a local licensed fishing vessel.

Registration and Licensing of Fishers and Fishing Vessels

There are three categories of local fishing licences; Commercial, Sport and Recreational. The maximum allowable landings from Sport and Recreational vessels are 50 and 20 pounds of fish per day respectively therefore FAD exploitation will be by Commercial fishing vessels. Prior to 2013 the vessel registration number being displayed on the port and starboard bow of the vessel was a prerequisite for vessel licensing. The Fisheries Regulations of 2013 now makes it mandatory that the approved vessel's name be displayed along with the registration number. Fishers who fulfill the requirements for registration and licence as a local fisher are issued a photo ID (licence) upon payment of the prescribed fees. The ID displays the Fisher's licence category and also the permits granted to the Fisher.

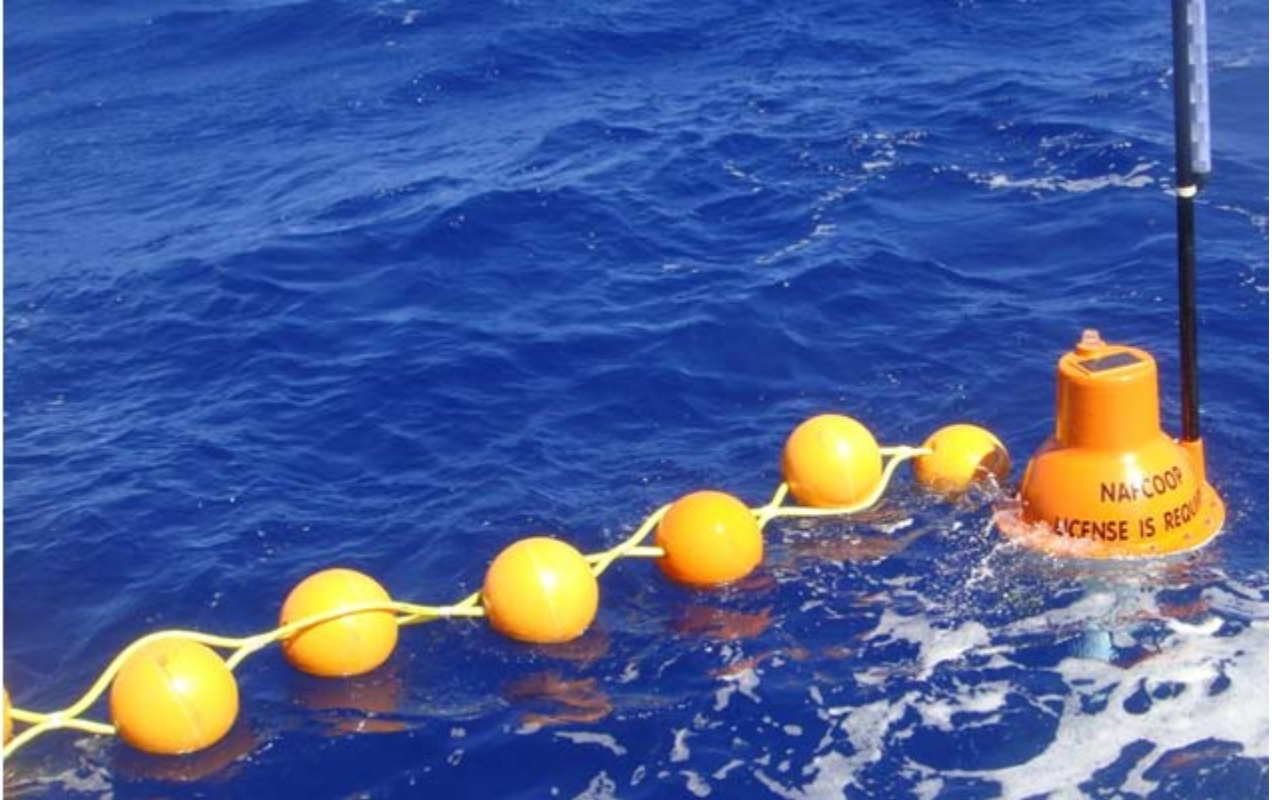
Data collection and Management

Data is collected by random sampling from landing sites across the islands. The data is verified by the statistician and stored electronically in Excel, then later analyzed. Fisheries Officers tasked with data collection duties are trained to examine landings and identify possible FAD fishing operations. The data collection sheets have received some minor modifications to highlight trips where fishing around FADs would have been undertaken. The catch from fishers is normally separated by fishing method.

FAD Maintenance

Since FAD deployment and utilization is still in the infant stage in Antigua and Barbuda there are no set conditions pertaining to the maintenance of FADs. The Fisheries Division will in the near future identify all the persons who are currently utilizing or are interested in the use of these devices and organize small groups that would help to draft policies that would outline the management, maintenance and conduct around designated FADs.

Appendix 3: Country Report on Current FAD Fishery Management in Dominica
FAD Fishery Management Workshop
Dominica
13 March 2013



JULLAN DEFOE
FISHERIES LIAISON OFFICER

HISTORY

Fish Aggregating Devices (FADs) were first introduced to Dominica in 1987 by FAO Master Fisherman Richard Mounsey. At this time the Dominican fishermen did not understand the concept. In 1990, another FAO Expert attached to the Fisheries Division re-introduced the idea but was confronted with the same response as his predecessor in fishers cutting the FAD anchor ropes and taking the buoys. A few years later, Dominican fishermen began paying closer attention to the FAD idea due to the persistence of the Fisheries Division in an effort to increase fish landings. Consequently Dominican fishermen began constructing and deploying deep water FADs for the purpose of attracting and catching coastal and migratory pelagic fish. Since, there has been a significant increase in catch landings of Yellow Fin Tuna, Atlantic Blue Marlin, Skipjack and Black Fin Tuna, both on the East (Windward) and West (Leeward) coast of the island. However, this new activity has resulted in numerous conflicts among fishers and other users of the Fishery Waters of Dominica.

In Dominica FADs were deployed by individual fisherman or by groups of fishers working together. The criteria for selection of the deployment location are biased towards the personal feelings of the owner and often technical and scientific data are not incorporated. The main selection criteria for many fishermen were the depth of the area. Since proper bathymetric charts and appropriate sounding equipment were not readily available fishermen devised local methods to determine the depth. Banana rope which is cheap and readily available with weight attached to one end was used to measure the depth of the area.

Some fishermen choose to deploy FADs in areas that are traditionally known as a migratory route for certain pelagic species. Other fishermen choose to deploy FADs in areas with no traditional knowledge or observation of fish migration. Their primary reason was to lure fish and create a new resource area. The dominance of FADs and its benefits first started on the west coast. This boosted the need for FADs on the east coast by fishermen in order to benefit from the targeted fish species which eventually migrated in the Atlantic Ocean.

Since all FADs were personalized, sailing distance between FADs was becoming less dependent on logical and scientific reasons such as fish behavior and sailing time between the device and landing site. Rather sailing time was being determined by the capability and ambition of fishermen to isolate themselves around their FAD. However these actions were often debated and were fairly justified by many prominent fishermen.

There had been a steady increase in FAD fishermen and existing FADs were becoming more crowded and contentious. In addition, many fishermen refused to contribute towards building and maintaining of the device and were described as “pirate fishers”. These fishermen are a major factor in determining the distance a fisherman or group would place a FAD, to get it out of their reach.

Table reveals information of FADs under NAFCCOP's management

	FAD 1	FAD 2	FAD 3	FAD 4	FAD 5	FAD 6	FAD 7
Position('N, 'W) coordinates	15 22.001 N 61 43.801 W	15 10.054 N 61 46.037 W	15 18.037 N 61 41.019 W	15 25.997 N 61 41.094	15 31.817 61 32.890	15 27.041 60 55.955	15 13.803 61 05.640
Water depth (m)	2345 M	2600 M	2500 M	2010 M	1051 M	1300 M	1000 M
Distance from main fish market / landing site (NM)	20 NM	24 NM	16.7 NM	15 NM	26 NM	19 NM	11 NM
Date of deployment	20 / 10 / 2010	20 / 8 / 2011	16 / 12 / 2011	17 / 12 / 2011			
Design of FAD			PLK	PLK			
Estimation cost			5200 EURO	5200 EUR			
Funding agency	FD / JICA	DOM GOV	MAGDELESA	MAGDELSA	DOM	DOM	DOM
Management body	NAFCOOP	NAFCOOP	NAFCOOP	NAFCOOP	NAFCOOP	NAFCOOP	NAFCOOP
Number of fishing boats utilizing the FAD							
Fishing community to which the majority of boats belong	Roseau	Roseau	Roseau	Mahaut Portsmouth Dublanc	Marigot	San Sauveur	Fond St Jean
Fish market where the boats land the catch	Roseau & other	Roseau & other	Roseau & other		Marigot	San Sauveur	Fond St Jean
Fishing gear and methods utilized and main target species	HL DL TL	HL DL TL	HL DL TL	HL DL TL	HL DL TL	HL DL TL	HL DL TL

Rules on FAD Management by NAFCOOP based on Consultation with Affiliates and Fishers

Conditions for participation in NAFCOOP Pilot FAD management project

1. Boat must be registered with the Fisheries Division.
2. Approval shall be given by the Fisheries Division and NAFCOOP.
3. Must be willing to pay the FAD registration fee to NAFCOOP of \$100 per boat, per year
4. Must be willing to pay the FAD user fee of \$20 for every 100 pounds of fish landed
5. Boat must be certified as seaworthy by the Fisheries Division/Coast Guard: Seaworthy means—equipped with coolers / ice boxes, adequate safety equipment, navigation equipment (compass, GPS), reliable engines, and any other requirement by law.
6. Licence fee: \$100 per year per boat shall be paid prior to issuance of the licence.
7. User fee: \$20 per 100 lbs of fish landed for coop members and \$30 per 100 lbs of fish landed for non-coop members shall be paid daily where applicable.

Data Collection and Management

The Fisheries Division collects catch and effort data at nine landing sites around Dominica. The data collection method is random sampling with the exception of Marigot Fisheries Port facility where census data is collected. However, effective 1 March 2013 three additional data collectors were contracted under the MAGDELESA project to expand data collection efforts. These data collectors were issued a modified form which captures the usual catch and effort data and which also includes additional data on FAD fishery such as operational cost and area fished geographically. Also three existing data collectors will participate in utilization of this new form at their respective landing sites for one year in the first instance. The form was generated under the JICA-FAD pilot project in Dominica and with some modifications under the MAGDELESA project.

Catch and effort data are analyzed at the end of every year and the information is circulated to policy makers, fishers and other stakeholders including regional and international organizations. Meetings are held at various landing sites to present information to fishers on productions trends and highlight top producers as a means to motivate fellow fishers.

FAD Maintenance

During the implementation of the FAD pilot project a monitoring and maintenance plan was developed in consultations with FAD fishers through NAFCOOP. The project provided financial support so execution of these activities was satisfactory. However after the project ended NAFCOOP continued with the same monitoring and maintenance concept for its national FAD deployment program but was not successful. This was mainly due to lack of resources to pay for logistical support such as fuel and remunerations for fishers charged to conduct this activity. Instead they relied upon the “good faith” of fishers to voluntarily monitor and maintain these FADs because funds generated through the purchase of FAD licences was insufficient and the user fee scheme proposed under the pilot project did not work due to various reasons.

Appendix 4: Country Report on Current FAD Fishery Management in Grenada

GRENADA'S COUNTRY REPORT ON FAD FISHERY 2013

Introduction

Grenada and its dependencies form the southern end of the lesser chain of island (approximately 90 miles north of Trinidad and Tobago). It is the largest of the three islands which makes up the nation of Grenada. The other two are Carriacou and Petit Martinique located in the Grenada Grenadines. Grenada's geographic coordinates, located between latitude 11° degrees 58 minutes / 12° degrees 13 minutes north and longitude 61° degrees 20 minutes / 61° degrees 35minutes west, which also lies on the edge of the hurricane belt.

Grenada has a total land area of 344 sq km, a coast line of 121km, a maritime claim of 12 miles, territorial sea and an economic zone of 200 miles.

Grenada also lies between two water bodies, the Caribbean Sea to the west where longlining is done and the Atlantic Ocean to the east where trolling and FAD fishing is mainly done.

Grenada has a relatively large insular shelf area of approximately 3,000 sq km, the width of shelf is quite narrow on the west coast measuring approximately 0.5 miles however to the east it extends to an excess of 12 - 20 miles.

Grenada also has a tropical climate, tempered by the north east trade winds, which makes fishing possible throughout the year. The terrain is volcanic in origin with central mountains. The elevation lowest point is the Caribbean Sea which represents zero meters and the highest point mountain Saint Catherine 840 m.

Outline of FAD fisheries

History of Fish Aggregate Device (FAD) in Grenada

Research conducted by the Cubans and Russians during the late 70s and early 80s revealed that large stocks of pelagic species migrate throughout the territorial waters of Grenada annually. In spite of the knowledge on the available stock abundance there was a lack of appropriate technology to exploit the resource. However, it was not until 1979 when the surface longline was introduced into Grenada which targets the large pelagics. Prior to this period trolling, beach seine, fish pots and demersal hand line fishing were the main methods employed for fishing in Grenada.

However, during the 1990s another innovative method was introduced into the fishing industry for the first time known as a Fish Aggregate Device (FAD) which was deployed on the east coast of Grenada in a joint collaborative project between the Fisheries Division and the FAO aimed at improving fish landings. The result was that an overwhelming large quantity of black fin tuna and yellow fin tunas were caught. Fishers no longer had to go on the edge of the shelf and spend lots of time searching for fish. The fishers used the opportunity to go directly to the FAD resulting in less time spent at the fishing grounds, less fuel consumed by the engines, a decrease in operation cost and an increase in monetary gains.

From there after, several FADs programmes have been funded by donor agencies in collaboration with the Fisheries Division such as FAO, OECS, JICA, Government of Grenada and most recently the MAGDELESA Project. Fishers have also deployed FADs which were poorly constructed and short lived resulting in loss of resources and investments due to inadequate information, knowledge and techniques.

The FAD project and programmes have encountered problems over the years for instance:-

- FADs were deployed in the shipping lane without having consultation with the maritime authority.
- Inadequate capacity in the construction and deployment of FADs.
- A lack of policy and mechanisms in place for collecting FADs data separately from commercial fish landing data and governance of FADs.
- The theft of buoys on FADs by longline fishermen which is a grave concern.

Alternative methods of construction can be employed to curb the problem of theft of buoys.

Position, structure and owner of existing FADs

To date Grenada has one FAD deployed since June 2012 on the east coast of Grenada approximately 13.5 nautical miles from the Grenville Fish Market. The FAD is located 12°.07.271 N / 61°.24.005N. The water depth where the FAD is deployed is 840 meters with a rope length totaling 1300 meters. The FAD was funded and constructed by Indereg / IFREMER under the MAGDELESA Project. The FAD is owned by the Fisheries Division Government of Grenada for the fishermen on the east coast. Fishing on the FAD is open access.

Number of fishing vessels and fishermen using FADs by communities

Data at the Grenville Fish Market reveal that approximately thirty boats are engaged in the FAD fishery comprising 60 fishermen (two fishermen per boat). Over 90% of the fishermen engaged in the FAD fishery come from the fishing village of Soubise, the other 10% come from other fishing communities within the parish of St. Andrew's.

Registration and Licence

The Fisheries Act makes provision for registration and licensing of local fishing vessels. Section 11 of the Act 1986 states that no local fishing vessel may be used for fishing or related activities in the fishing waters without a valid licence issued under this section in respect of that vessel. Application for a fishing vessel licence is done in a prescribed form and the Chief Fisheries Officer is responsible for issuing of licences in a prescribe form.

A minimal licence fee is charged and is based on the size of the vessel after inspection and certification, this process takes place annually. A licence certificate is issued by the Chief Fisheries Officer which expires after a one year period.

As it relates to a specific licence for the FAD fishery this is non-existent within the Fisheries Act or regulations. It is also illegal to deploy fishing devices in the fisheries waters of Grenada without seeking the permission and approval of the Chief Fisheries Officer.

Registration is an ongoing process. Within the Fisheries Division all fishing boats engaged in FAD fishing are registered and issued with a registration number beginning with J3- as Grenada's identification code number. It is a rule of the Fisheries Division that registration numbers be placed on all registered fishing boats. Although it is not written in law it is a requirement and is enforced during the annual fishing vessel licence inspection. Registered fishers are also issued with photo ID processed by the Fisheries Division.

Rules and regulations for FAD fisheries management

Currently there is no legal legislation governing the regulations for FADs fisheries in Grenada. However, under the CARIFICO project and consultation with fishers some form of local arrangement could be made and adopted. In spite of the absence of rules there are management issues that need to be addressed, for instance the maintenance of FADs, monitoring, rules of engagement, collection of user fees, penalties, average distance to engage in fishing activities around the FADs, catching of juveniles, issuing of IDs for FAD fishers, a need to employ community based co-management systems and site selection for deploying of FADs are issues for discussion.

Catch and Effort data

As of August 2012 management has implemented measures to enhance the collection and recording of catch and effort data for FAD fishing. A data base has been established at the Fisheries Division for inputting FAD data. Fish caught around the FAD is weighed and recorded separately from commercial fish landings. The monitoring of species and size of fish caught around the FAD is an ongoing process. In spite of the effort made there is a need for the improvement in the capture and recording of data, including length frequency and biological data. Additionally, stock assessments and evaluation of the status of the fisheries resources associated with FAD fishing are necessary.

Fishermen's organization

The strengthening of fisher folk organization is of paramount importance for further development of the fishing industry. Fisherfolk organizations are faced with numerous challenges and deficiency in areas of capacity building, financial business management, and good governance among others. The Fisheries Division is in the process of reorganizing the Soubise Fishermen Co-operative as part of the CARIFICO project. Preliminary work has commenced for the revitalization of the co-operative.

The Soubise Fishermen Co-operative is located on the east coast of Grenville where FAD fishing is done. It is a registered co-operative which has a constitution, by-laws and fixed assets (i.e. building and gas station). Currently business activities at the co-operative are dormant, on the other hand all other activities and assets associated with the Co-operative have been transferred to the Co-operative league which is the body responsible for governing co-operatives in Grenada.

Fisheries Facilities

The fisheries facilities at Grenville consist of a fish market which provides for the sale of fish both wholesale and retail. Other services provided are the sale of ice, storage of fish, renting of locker rooms, data collection and revenue collection.

Management and maintenance of the facility is done by the Fisheries Division under the Ministry of Agriculture / Fisheries, with financial support from the Government of Grenada.

Conclusion

The benefits derived from FAD fishing are tremendous, notwithstanding the importance of fishers' livelihoods and financial rewards. FAD fishing contributes to 1% for fish landings in Grenada which appears to be small but significant. With the launching of the CARIFICO project a number of new FADs are expected to be constructed, deployed, maintained and co-managed by fishers.

The CARIFICO project is expected to address the short comings of previous FAD project and lessons learnt, taking into account, the importance of FAD fishing and the contribution it provides to food security and socio economic development among others.

The management of FADs in Grenada is currently nonexistent; however the CARIFICO objective is to change the attitude of fishers by employing a co-management system among users. Moreover there is no legislation governing the operations of FADs and CARIFICO seeks to address this issue by consulting with fishers to develop rules governing FAD fishing. Currently there is no maintenance structure in place and CARIFICO aims at applying community based co-management involvement to deal with this problem. The maintenance and monitoring of FADs have to be carried out collectively among fishers. The collection of data for analysis needs to be strengthened hence the reason discussions have been ongoing to make provisions for equipment and employment of at least one person to be utilized as a data collector. The project also aims to encourage consultation and communication among fishers to make the best choice when selecting sites for deploying of FADs in order to minimize lost of equipment and investments.

Appendix

1. Maps of Grenada





2. FAD Construction in Grenada



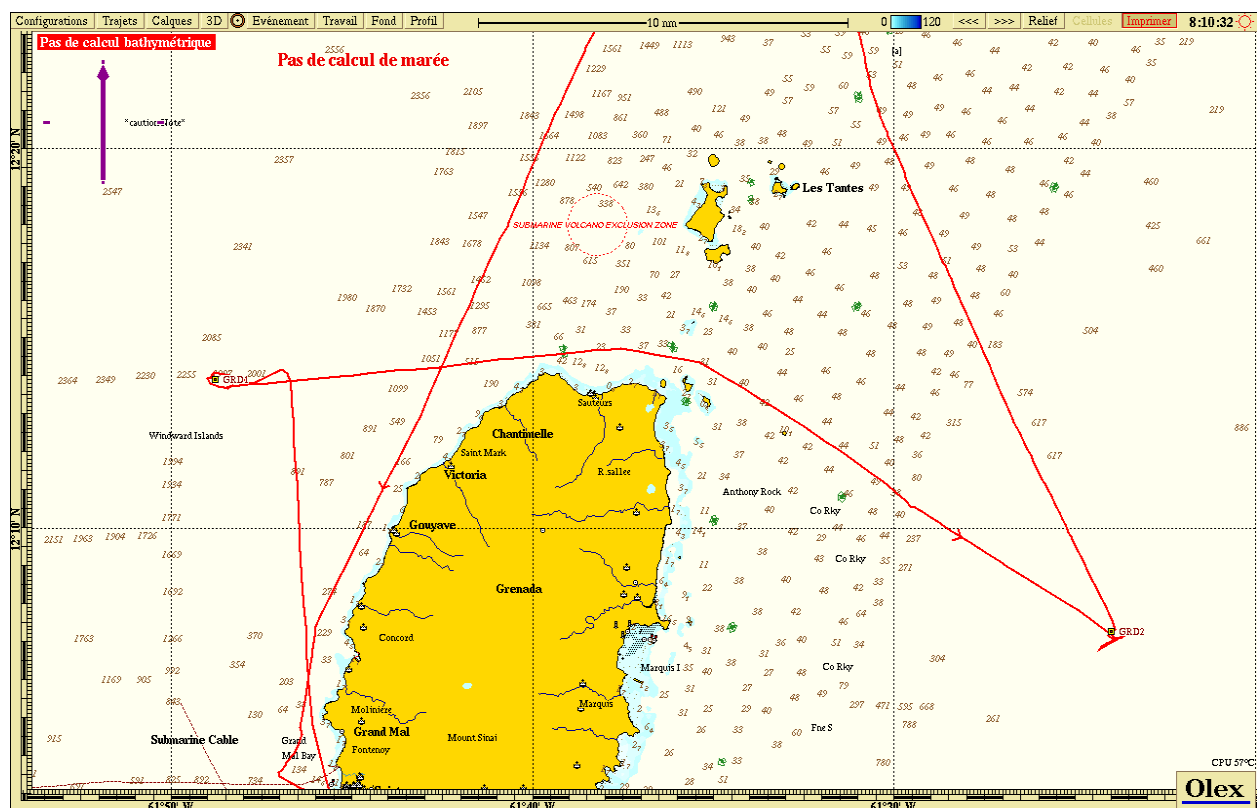


3. Deploying of FAD





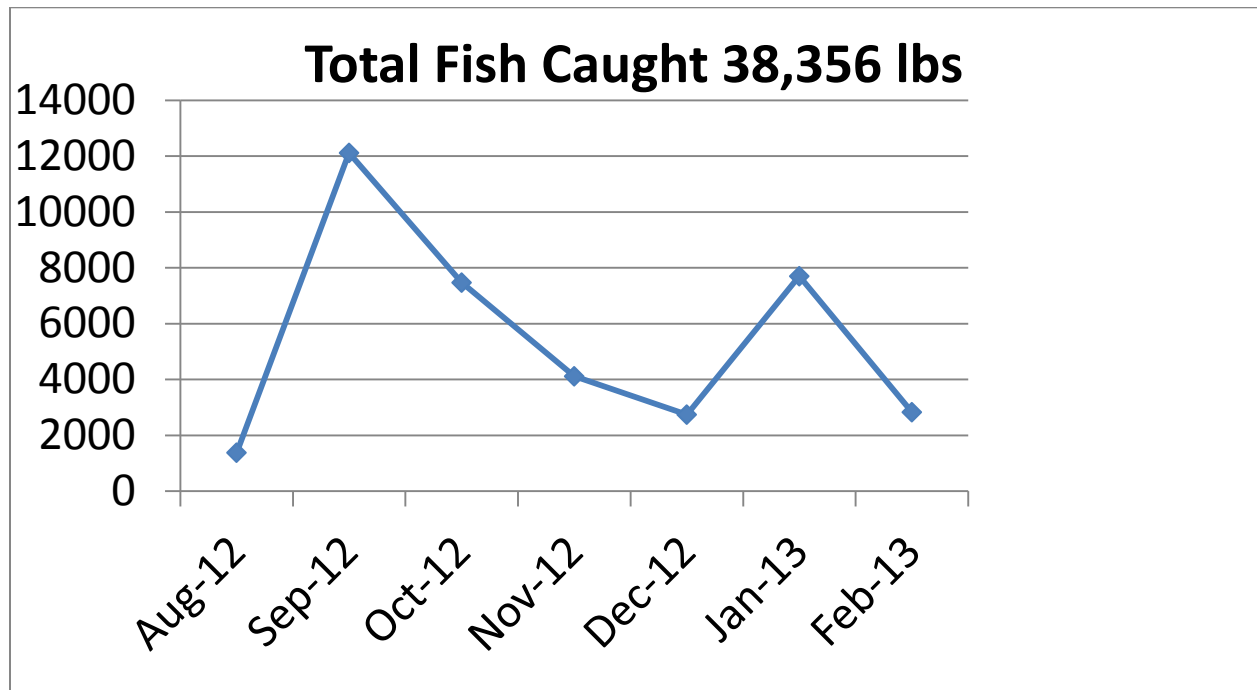
4. Location of FAD deployed by Magdelesa Project



5. FAD Data showing monthly species of fish recorded (lbs) at Grenville Fish Market

Months	BFT	Wahoo	Dolphin	Cavalli	Barracuda	Rain Bow Runner	Little Tunny	Yellowfin tuna	King Mackerel	Skip Jacks	Monthly Total
August 2012	730	44	316	188	43	48		9			1,378
September 2012	7775	44	1757	1089	345	355		702		52	12,119
October 2012	3210	80	744	1059	317	717		1336	9		7,472
November 2012	1522		141	439	982	641	3	337	21	29	4,115
December 2012	804	37	36	495	132	363	10	839	26		2,742
January 2013	3716	229	87	97	182	322	8	2816		244	7,701
February 2013	1313	31	42	68	15	159		1076		125	2,829
Total by Species	19,070	465	3,123	3,435	2,016	2,605	21	7,115	56	450	38,356 Lbs

6. FAD month Production of Fish Caught at Grenville Fish Market



THANK YOU

By: Francis Calliste

Grenada

Appendix 5a: Country Report on Current FAD Fishery Management in St. Kitts



THE DEPARTMENT OF MARINE RESOURCES



Description of national fishing industry

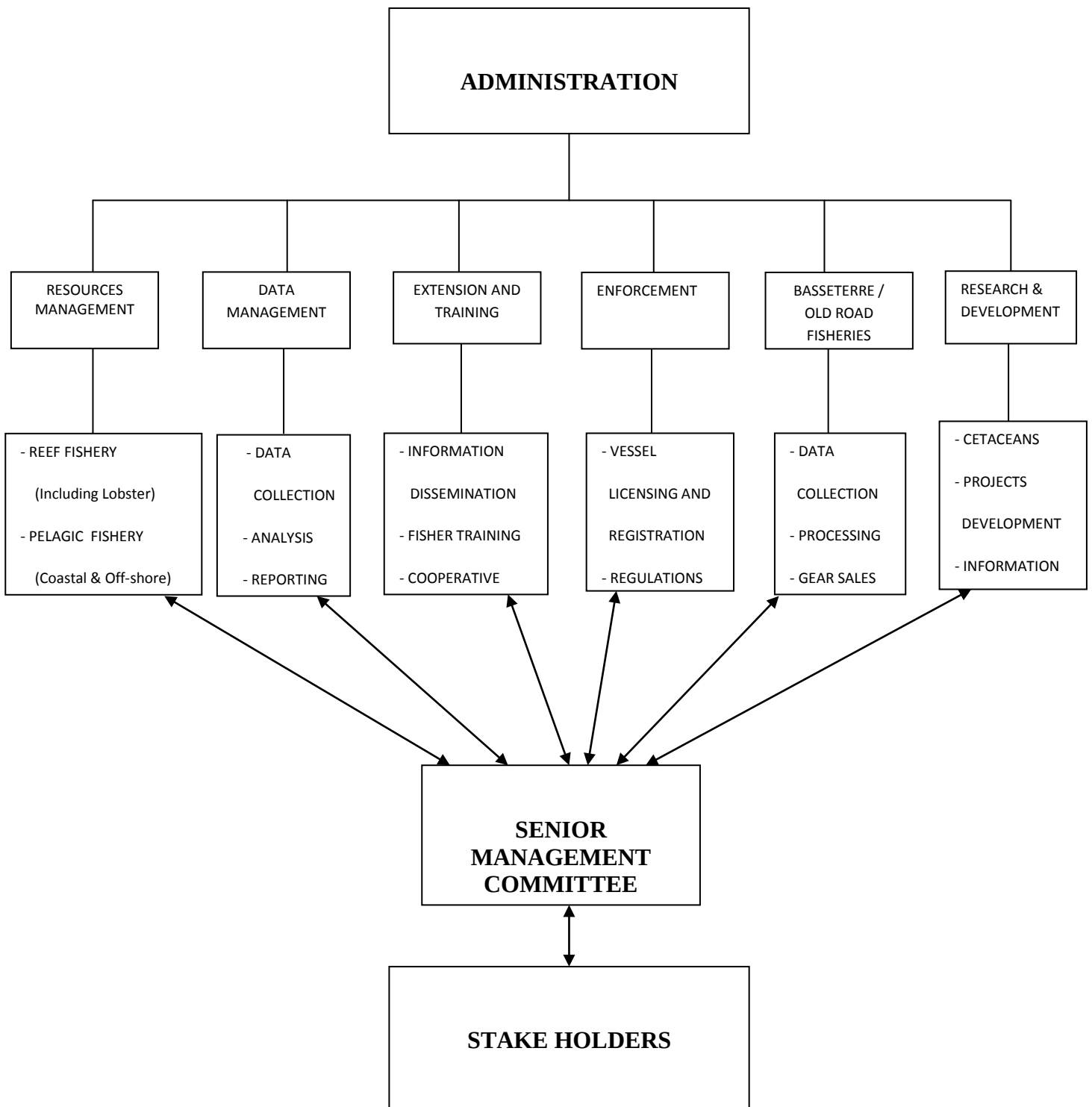
Over the years major fish species formed the basis for management of the fishing industry of St. Kitts and Nevis. This gave rise to five major fisheries management objectives using each major fish species / family as a separate category. These are Queen Conch (*Strombus gigas*), Caribbean Spiny Lobster (*Panulirus argus*), small coastal pelagic, large or ocean pelagic and reef / bank and slope fisheries.

In 2010, the Department of Fisheries on St. Kitts was renamed and reorganized as the Department of Marine Resources. This gave rise to a new dynamic structure where the Department is now headed by a Director instead of a Senior Fisheries Officer. This breathed life into the Department's mandate and strengthened its responsibilities in not only fisheries but also other areas of marine resource management. However, Nevis still retains the name of Fisheries Department.

On St. Kitts there are five major landing sites while on Nevis there are only three. Some of these sites are characterized by their major or unique fishing activity. For example, most conchs are landed at the Basseterre Fisheries Complex (BFC) in East Basseterre on St. Kitts. Old Road another major landing site is known for its coastal pelagics like jacks, ballyhoo and gars and Dieppe Bay is famous for lobster landings. Boats from Nevis that land their catch in St. Kitts do so by using the West Basseterre landing site. The largest landing area in Nevis is adjacent to the Fisheries Complex in Charlestown. This facility provides gear and equipment, ice and walk-in freezers, outboard motor repairs, fish processing and stalls for marketing of fish.

The fishing vessels used are mainly open pirogues ranging in length from 10 – 25 feet and powered by outboard engines 40hp – 200hp. A number of vessels are powered by twin engines. Less than 10 vessels are over 30 feet and powered by inboard diesel engines.

The fisheries industry is dominated by multi-fishery / species operations. Vessels / fishers are usually involved in multi gear / fishery activities. (e.g. Trap / hand-line, Trap / hand-line trolling, Trap / hand-line / spear fishing, spear fishing / conch fishing, Trap / hand-line / Beach seine). Fishing trips are usually day trips ranging from two (2) to twelve (12) hours. The distance travelled from home port varies depending on fishing activity and landing site. Large pelagic fishers usually travel the furthest distance (usually over 20 nautical miles) while seine and trap fishers travel the least distance (usually less than 10 nautical miles).



THE DEPARTMENT OF MARINR RESOURCES- Organizational Structure
OPERATIONAL FRAMEWORK (current)

RESOURCES MANAGEMENT

PROGRAMS

LARGE (OCEAN) PELAGIC FISHERY

Catches of pelagics are seasonal. Larger pelagics are harvested by commercial and sport fishermen mainly by trolling during the months of January - June. The commercial fishery is conducted by about 25 fishers using fifteen vessels, outfitted with trolling hooks and lines. Most vessels have a crew of 2 - 3 including the captain. Trolling lines are normally 80 – 100 lbs. test with a single hook. Artificial lures are sometimes used especially for the tuna and mackerel. Fishers prefer to use ballyhoo or flying fish to catch dolphin fish. Some fishers have been using Fish Aggregation Devices (FADs) in conjunction with long lines to catch yellow fin tunas.

An unknown quantity of large pelagic species is caught illegally by foreign vessels in the waters of St. Kitts and Nevis. Nevis is instituting a fishing tournament targeting mainly wahoo.

- **Objective**

Promote the positive aspects of the traditional nature of this fishery and encourage new entrants.

- **Focus**

Enforcement of fisheries regulations.

SMALL (COASTAL) PELAGIC FISHERY

- Targeted fish are mostly caught by beach seines. Seining is discouraged in Nevis because of the damage to the bottom and coral reefs. Gill nets (fixed or drifting) are used sometimes for catching jacks. Cast nets are also used along the beach. Fish are sold fresh at the landing site by fishermen or by vendors. Market demand may limit catches at certain times. Inshore pelagics are also used as bait in long line, trolling and trap fisheries.

- Approximately seven vessels using seine nets are involved in the fishery.

- Approximately 30 persons are employed in this fishery.

Objectives

- Increase landings
- Increase use of Fish Aggregating Devices (FAD)

Main Focus

- Catch handling and preservation.
- Availability of gear

REEF FISHERY

- These species are taken with traps, hand lines, gill nets and spear guns and are fished at various depths throughout the extensive shelf area. The quality of the catch ranges from miscellaneous reef fish (more commonly taken in shallow areas) to snappers and groupers (more commonly taken in deeper areas). Because of the high local demand for reef fish of any size, the fishery is susceptible to overfishing.
- At most locations demersals are fished from small open boats, but a few larger boats (29 - 45 ft) now specialize in deep-water line fishing for snapper and groupers. In the past traps were only baited to catch lobster, however recently traps are baited to catch a variety of fish.
- In Nevis, Antillean Z-traps of various sizes are mainly used as are rectangular and arrowhead traps in St. Kitts. Fishermen haul their traps 2 - 3 times a week, and may haul 25 - 45 traps each trip. Often traps (pots) are set without buoys to reduce pot stealing which accentuates the problem of ghost fishing by lost traps.

Objective

- Promote stock recovery

Focus

- Reduction in landing of juvenile species
- Regulation enforcement and conservation measures

CONCH FISHERY (*Strombus gigas*)

This fishery is carried out by SCUBA and free divers usually over sea grass beds and coral rubble, with some fishers operating without permits and others being uncertified divers. The majority of the fishing is undertaken from small wooden open fishing boats with an average length of 5 m with motors ranging from 25 to 40 HP. Each boat fishes with approximately three persons. Conch populations are considered to be heavily exploited within the Federation especially on the leeward side of the islands. However, conch are beginning to reappear in near shore areas in response to the concentration of fishing effort in deeper waters and the slowdown in exports to EU markets.

Objective

- Promote stock recovery.

Focus

- Education and certification of conch divers.
- Preparing industry to deal with international requirements (HACCP).

LOBSTER FISHERY (*Panulirus argus*)

- The lobster is part of the reef fishery, but has been separated by management due to its importance to the economy and very long life cycle. Lobsters are taken in the same traps that catch reef fish and to a lesser extent by divers. Lobsters are usually caught in small numbers and stored in holding cages until they are sold. Most of the catch is exported but sales to local restaurants and hotels are increasing.
- Lobster populations are considered to be over-exploited in near shore areas. Fishermen report increasing scarcity in a number of areas in St. Kitts.

Objective

- Promote stock recovery

Focus

- Control the landing of and exportation of juveniles and lobsters with eggs.
- Regulation enforcement.

TURTLE FISHERY

Objectives

- Rehabilitate turtle populations

Focus

- Activities relating to sand mining, beach front lighting, regulation enforcement.

What is a FAD?

Fish Aggregative Device is any method, object or construction used for the purpose of facilitating the harvest of fish by attracting and thus aggregating them. In simpler words a manmade object used to attract commercial pelagic fishes such as dolphin fish, tunas, marlins, wahoo etc.

Types of FADs

Drifting FADS - can be natural objects of manmade (logs)

Moored FADs- fixed position using anchor, and have buoys for detection

History of FADs

The introduction to FADs came in the late 1980's. A Fisheries research officer by the name of Melvin Goodwin from the USA Environmental Research Project base in North Carolina came to St. Kitts and Nevis and introduced the concept of FAD fishing. He conducted a number of workshops explaining, what is a FAD, the type of fish you catch around the FAD and construction and setting of the FAD.

The fisheries department started to encourage the use of FADs in St. Kitts and Nevis shortly afterwards.

The type of FADs that were constructed back then was the Kite type FAD.

The Department of Fisheries constructed fourteen (14) FADs. Eight (8) were placed off Old Road and six (6) were placed in Basseterre a few miles out. These FADs were set in about 600 feet of water.

Shortly after deployment, FADs in the Old Road area went missing. It was thought the FADs fell off the edge of the drop off, the type of anchor that they used at that time was heavy engine blocks. After the FADs were lost the fishermen in Old Road were still catching plenty of ocean pelagic fishes in the area where the FADs were set. Over the years the Department of Fisheries on both islands has encouraged fishermen to set their own FADs and target the ocean pelagic species.

Why do St. Kitts and Nevis need FADs

To help the country in obtaining food security, reduce pressure on the reefs resources, encourage new entrance to fisheries for future commercial development of value added products and enhance sport fishing (tourism).

JICA and Magdelesa Projects FADs

	FAD1(JICA)S	FAD2(JICA)N	FAD3(MAD)S	FAD4(MAD)N
Position('N, 'W) coordinates	N-17° 06 886 W-062° 51.953	N-16°54.525 W-062°49.83	N-17°11.588 W062°56.609	N17°00.872 W-062°51997
Water depth (m)	850m	1200m		1200
Distance from main fish market/landing site (NM)	13.5 miles	22 miles	21miles	18miles
Date of deployment	4 / 10 / 2011	4 / 10 / 2011	22 / 12 / 2011	22 / 12 / 2011
Design of FAD Materials Tires, tubes , rubber hose, Nylon monofilament, shackles, swivels, poly-ethylene and poly-propylene ropes, metal drums cement anchors	FADs consist of 3 sections floating, anchoring and attraction. Floating section has Marker and Buoys. Anchoring has rope, joint and anchor. Attraction has attachment materials	FADs consist of 3 sections floating, anchoring and attraction. Floating section has Marker and Buoys. Anchoring has rope, joint and anchor. Attraction has attachment materials	FADs consist of 3 sections floating, anchoring and attraction. Floating section has Marker and Buoys. Anchoring has rope, joint and anchor. Attraction has attachment materials	FADs consist of 3 sections floating, anchoring and attraction. Floating section has Marker and Buoys. Anchoring has rope, joint and anchor. Attraction has attachment materials
Estimation cost	\$2500.00ec	\$2500.00ec	\$10.000euro	\$10.000euro
Funding agency	JICA	JICA	Magdelesa	Magdelesa
Management body	SKF / NEVF	SKF / NEVF	SKF / NEVF	SKF / NEVF
Number of fishing boats utilizing the FAD	25	16	25	16
Fishing community to which the majority of boats belong	Basseterre west, old road, Dieppe Bay sandy point		Basseterre west, old road, Dieppe Bay sandy point	
Fish market where the boats land the catch	Basseterre fisheries Complex and the Old Road fisheries Complex	Basseterre fisheries Complex and the Old Road fisheries Complex	Basseterre fisheries Complex and the Old Road fisheries Complex	Basseterre fisheries Complex and the Old Road fisheries Complex
Fishing gear and methods utilized and main target species	Gears Trolling, hand line fishing , vertical long line Species Yellow Fin Tuna, Black Fin Tuna, Dolphin, Marlin, Wahoo	Gears Trolling, hand line fishing , vertical long line Species Yellow Fin Tuna, Black Fin Tuna, Dolphin, Marlin, Wahoo	Gears Trolling, hand line fishing , vertical long line Species Yellow Fin Tuna, Black Fin Tuna, Dolphin, Marlin, Wahoo	Gears Trolling, hand line fishing , vertical long line Species Yellow Fin Tuna, Black Fin Tuna, Dolphin, Marlin, Wahoo

FAD Deployment regulations

FAD Regulations

- No individual shall place a FAD in the water without permission from the Chief Fisheries Officer.
- Permission to place a FAD shall not confer any exclusive right to fish in the vicinity of the device.
- Master / Captain of any vessel placing a FAD shall notify the Chief Fisheries Officer of the nature of the FAD within one month.
- No person shall fish within a radius of one nautical mile from a FAD

At this moment there are no qualifications required for fishers to use a FAD, but all fishermen fishing in the waters of St. Kitts and Nevis should be registered with the Department of Marine Resources.

Applicants are required to:

- Complete and submit an application form obtainable from the Department of Marine Resources
- Bring identification (passport, drivers licence, voters ID or a social security card).
- Be interviewed by fisheries personnel / Fisheries Officers

There are no practical rules for FAD fishing operations agreed by the fishers, but fishermen understand that they should not over crowd the FAD and encourage poor fishing practices.

Registration and licensing of Fishers and Fishing vessels

All Fishing Vessels fishing in the water of the Federation must be registered and have a valid licence and a registration number for identification.

All captains and crew of Fishing Vessels fishing in the water of the Federation must be registered.

The Department of Marine Resources is in the process of distributing photo identification cards to all fishermen in the federation.

Data collection and Management

The Department of Marine Resources has maintained the same method of data collection and analysis which is based upon the CARICOM regional database system CARIFIS. In St. Kitts, data collection is done on a systematic census schedule whereby we come up with a raising factor. It's a factor or number that is used or calculated from the information from the frame survey to raise the estimation of landings. Data for the FADs are collected at the landing site, by telephone surveys / calls and also the complex assists in the collection of data.

FAD Maintenance

The department basically relies on the FAD fishers that fish around the FADs to update us on the conditions of the FADs. They would call the department or come into the office and explain to us the current conditions and if there is any need for maintenance. They would tell us what the FADs need and we would provide them with materials so that they can make the necessary adjustments to it.

Appendix 5b: Country Report on Current FAD Fishery Management in Nevis

Fishers in Nevis received training in FAD technology since the 1900s. However the technology was deemed experimental and not many fishers ventured into FAD fishing.

Since then, FAD fishing has proven to be a very lucrative alternative to trap fishing and as a result a number of fishers are investing in the construction and deployment of FADs. There are approximately 16 registered vessels and 41 fishers that are actively engaged in that activity.

With the exception of the four FADs that were contributed by JICA and MAGDELESA, all other FADs are privately owned and maintained. One fisher alone has deployed five FADs and is enjoying the great returns on his investments. The designs of the FADs are nothing close to the funded FADs, however they are able to construct and deploy them in quick time due to the readily available materials necessary to construct them. The targeted species are: dolphin (*mahi mahi*), tuna (blackfin and yellowfin), wahoo, marlin, squid, and sail fish

In November 2012 the Government of Japan through JICA has entered into a bilateral agreement with the Government of St. Kitts and Nevis to develop the FAD fishery over the next 5 years. Since then an Action Plan was developed and a number of activities were outlined to expand FAD fishing in St. Kitts and Nevis.

FAD DATA COLLECTION

The Department of Fisheries is currently utilizing FAD data sheets provided by the French / Magdelesa Project for data collection. In addition, the Department uses its own weekly log sheets to collect data.

DEPLOYMENT AND MAINTENANCE

There are 11 known privately deployed FADs. The FADs are reported deployed / set at depths between 2000' and 4000'. The costs range from \$540 to \$1,500. The coordinates are guarded; hence the Department was not able to provide them in this report. A summary of the FADs deployed is attached to this report.

The private FADs are personally maintained while the Government FADs (JICA and Magdelesa) are maintained by the government with some assistance from fishers.

FAD FISHERY MANAGEMENT

The 1995 / 2002 Fisheries Act provides for the management of FAD fishery as it relates to:

- Seeking permission to deploy FADs in the waters of St. Kitts and Nevis
- Designating a FAD
- The marking of FADs
- Disposal of unauthorized FADs
- Registration / License of Fishers and Vessels
- All vessels are registered
- All fishers are assigned a number but not a licence

Notwithstanding, the Department is of the view that a Management Plan is required to guide the implementation and operation of the FAD fishery. This Plan will most likely reduce user conflict, FAD design, location, a maintenance schedule, monitoring and evaluation, etc.

FISHERIES REGULATIONS: FISH AGGREGATING DEVICES (FADs)

Article 31: Fish Aggregating Devices.

- (1) No person shall place a fish aggregating device in the waters of Saint Christopher and Nevis except with the permission of the Chief Fisheries Officer and in accordance with such conditions as he or she may specify or which are otherwise specified in this Part.
- (2) Permission to place a fish aggregating device shall not confer any exclusive right to fish in the vicinity of the device.
- (3) The master of any vessel placing a fish aggregating device shall notify the Chief Fisheries Officer of the nature of the location of the device within one month or such other period as the Chief Fisheries Officer may specify.

Article 32: Designated Fish Aggregation Fishers in Nevis received training in FAD technology since the 1900s. However the technology was deemed experimental and not many fishers ventured into FAD fishing.

- (1) The Chief Fisheries Officer may, by notice published in the Gazette, declare any fish aggregating device to be a designated fish aggregating device for the purpose of this regulation.
- (2) No person shall fish within a radius of one nautical mile from a designated fish aggregating device except with the permission of the Chief Fisheries Officer and in accordance with such conditions as he or she may specify.
- (3) The Chief Fisheries Officer may, by notice published in the Gazette, declare that any class of persons who are citizens of Saint Christopher and Nevis may fish within a radius of one nautical mile from a designated fish aggregating device or a class of designated fish aggregating devices.

Article 33: Marking of Devices.

Any fish aggregating device placed in the Fishery waters of Saint Christopher and Nevis shall:

- (a) be clearly marked with the name of the owner and of the vessel from which the device was placed;
- (b) bear a radar reflector and such other equipment or markings as the Chief Fisheries Officer may from time to time require.

Article 34: Disposal of Unauthorised Devices.

Any fish aggregating device placed in the fishery waters of Saint Christopher and Nevis otherwise than in accordance with a permission given under regulation 31 or found in the Saint Christopher and Nevis waters without a marking or a piece of equipment required under regulation 33 may be used or disposed of in such a manner as the Chief Fisheries Officer may direct.

The fishers on Nevis are looking forward to the expansion of FAD fishing!!!

Appendix 6: Country Report on Current FAD Fishery Management in St. Lucia

DEPARTMENT OF FISHERIES
Ministry of Agriculture, Food Production, Fisheries and Rural Development
FAD DEVELOPMENT PROGRAMME
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1. HISTORY and MANAGEMENT of Fish Aggregating Devices [FADs]

Fish are known to aggregate under some objects which float at sea. These objects can be natural or man-made. The man-made FADs are anchored in place [using concrete filled drums] to assist fishers in locating them, with attached lights, flags and RADAR reflectors to reduce time spent in locating the FADs and minimizing collision with marine traffic. This also has the effect of fishers using less fuel to locate the FADs and if the level of catch is realized or increased, then revenue and profits are increased. Fishers have realized the benefits of fishing near FADs and have taken to repairing the FADs when necessary and even constructing and deploying FADs themselves. This was not always so, as many FADs were cut and vandalized by fishers in the past, as they thought FADs were placed there by foreigners. There was even a case when a FAD was deployed by the Department of Fisheries [DOF] and it was found on shore when the DOF's vessel returned to base, with fishers reporting that they removed something placed there by foreigners.

The Government of Saint Lucia [GOSL] has in the past been responsible for the procurement, construction, deployment and maintenance of FADs. However through the years, a co-management approach has been employed in which fishers and fishers' cooperatives have been engaged at all levels of the FAD Development Programme. All FADs deployed must have prior approval from the DOF, as it can be an obstruction to marine traffic if not done, as the Saint Lucia Air and Sea Ports Authority [SLASPA] is informed and an advisory to marine traffic is sent to minimize collision.

2. FADs: Basic facts and locations

A FAD is an apparatus that is anchored in place, in order to attract or aggregate fish, so that fishers can be at the top of the food chain created. Small fish find shelter and feed near FADs, and in turn attract bigger fish, which the fisher operating near the FAD can catch. There are many designs of FADs and many countries develop their FAD designs over time. Saint Lucia is now working on a new design that requires less material and should minimize the loss of FADs by collision and cutting of anchor lines near the water surface. This new design employs the use of a foam filled drum with chain to a depth of 60 feet, before attachment to the anchor line. This is to cater for vessels with 60 feet draught that pass through waters in which FADs are deployed. Below is a table with information relative to FADs deployed in waters around Saint Lucia, adjacent to fishing communities.

3. FAD Deployment / Use / Regulations

All FADs deployed in water within the EEZ of Saint Lucia have to be approved by the DOF. There are regulations to deal with fishing around and human actions that affect the durability of FADs. When a FAD is deployed, all fishers can fish around such FAD, whether it was deployed by the DOF or an individual. However more rules / regulations must be employed to allow for a FAD fishery that has minimal conflict and maximum benefits to the fishers of Saint Lucia [see attached Act / Regulations]. To fish near a FAD requires of fishers the same conditions to fish anywhere in the EEZ of Saint Lucia. The fisher must be registered with the DOF and possess a valid fisher ID card. The vessel used must be registered and licensed to fish and meet the requirements of such [see Act / Regulations attached]. Fishers must provide information [fishing time, catch, fuel used etc.] to Data Collectors when requested. Fishers

have seen the benefits of FADs and are repairing and also reporting damaged FADs to the DOF. In some communities FAD teams have been organized to maintain FADs on a regular basis and to respond quickly if the need arises. The DOF, fisher cooperatives and fishers have and will continue to contribute to the maintenance cost of FADs by providing fuel and material to help fishers repair FADs, this also provides fuel sales to cooperatives as the more FADs in the water, means more fishers are going out to fish and more fuel is sold.

Fish Aggregating Devices [FADs] Co-ordinates [Saint Lucia]

Last updated: 4 February 2013 [started 22 October 2010]

FAD/Community	CO-ORDINATES
Gros Islet FAD [nd] 5 March 2013/1754m	14° 14' 000 N use of chain for 60' vessel draft 61° 03' 000 W foam filled drum for floatation
Anse la Raye (E.U. FAD) 2008	13° 57' 000 N reported lost 61° 10' 000 W
Anse la Raye [20 November 2012]	13° 56' 000 N 61° 09' 000 W
Canal VFt (experimental FAD)	13° 32' 702 N 60° 57' 452 W
1 st Bank VFt (experimental FAD)	13° 38' 508 N 60° 58' 665 W
Soufriere (experimental shallow FAD)	13° 51' 439 N 61° 05' 258 W lost
Soufriere FAD(m) February 2011 m=modified [Fujii new design]	13° 52' 566 N 61° 10' 126 W
Soufriere FAD(1000m) August 2011 1300m FAD at 1365m depth	13° 52' 000 N 61° 08' 800 W submerged FAD/wrong plot
Soufriere FAD [1000m 2 nd] 12 October 2011	13° 51' 535 N 61° 06' 371 W
Soufriere FAD 14 August 2012	13° 52' 270 N 61° 10' 254 W
Canaries (experimental shallow FAD)	13° 55' 422 N lost 61° 05' 282 W
Canaries FAD(m) 28 July 2011	13° 56' 719 N 61° 09' 944 W
Canaries FAD new design 31January 2013 2.5 miles / 4 kilometers	13° 55' 739 N use of chain for 60' vessel draft 61° 06' 486 W foam filled drum for floatation
Castries FAD (off Gros Islet) February 2011	14° 10' 432 N reported lost 60° 45' 191 W
Castries FAD [1000m] 24 October 2011 Deploy west of Port Castries	14° 02' 470 N 61° 03' 460 W
Dennerly FAD [15 August 2011]	13° 59' 032 N 60° 37' 308 W
Dennerly FAD [18 April 2012]	13° 56' 032 N 60° 44' 108 W
Choiseul FAD 27 October 2011	13° 45' 456 N

	61° 09' 287 W
Choiseul FAD 30 August 2012	13° 44' 134 N 61° 08' 275 W
Laborie (E.U. FAD) 2008	13° 38' 810 N 61° 06' 494 W
Laborie (FAD deployed for YFTP)2010	13° 38' 000 N 61° 02' 000 W
Laborie FAD 21 August 2012	13° 38' 000 N 61° 02' 000 W
Savannes (experimental shallow FAD) 2010	13° 44' 250 N 60° 51' 660 W
Micoud (experimental shallow FAD) 2010	13° 49' 560 N 60° 50' 231 W
Micoud FAD(m) July 2011	13° 48' 901 N 60° 35' 290 W
Micoud 2 (fad constructed and deployed by Micoud Fishers)	13° 45' 313 N 60° 41' 740 W
Micoud (E.U. FAD) 2008	13° 50' 000 N 60° 40' 000 W
Micoud FAD 2012	13° 53' 937 N 60° 40' 696 W
Micoud Sha Sha FAD 2012	13° 46' 750 N 60° 36' 012 W
VFt FAD (deployed by fisher Leus)	13° 33' 069 N 60° 55' 683 W
VFt FAD (deployed by fisher Mac)	
VFt FAD (deployed by fisher Fox)	13° 30' 838 N 60° 57' 301 W
Vieux Fort [off Canal] 18 November 2011 To replace Fisher Fox FAD above	13° 28' 890 N 60° 56' 106 W
New McClement FAD 4 January 2012 Vieux Fort	13° 30' 305 N 60° 49' 570 W
VFt FAD [25mi] 18 October 2012	13° 26' 628 N 60° 43' 875 W
VFt FAD [5mi] 30 October 2012	13° 35' 000 N 60° 50' 000 W
VFT FAD new design 14 February 2013 20 miles / 32 kilometers	13° 28' 723 N use of chain for 60' vessel draft 60° 47' 138 W foam filled drum for floatation

Most fishers return to their communities to sell fish caught after fishing near the FADs, where data collection is done. Castries being the capital is used by fishers on the north-west coast to land and sell their catch. Fishers also sell directly to hotel and restaurants around the island. Large catches are sold to the Saint Lucia Fish Marketing Corporation, which has buying depots in Dennery and Vieux Fort and sometimes in Castries. Fishers from Choiseul, Laborie and Micoud sell large catches in Vieux Fort. Fishers from Micoud and Praslin also land their catch in Dennery. Most FADs on the west coast are in approximately 2000 / 2500 meters of water [average distance from shore is 10 miles / 16kilometers] and

on the east coast where it is shallower; FADs are in mostly 1000 to 1500 meters of water [average distance from shore is 15 to 20miles / 20 to 32 kilometers]. Some FADs are placed closer for experimental purposes and sometimes in heavy marine traffic areas to test durability.

Appendix 7: Country Report on Current FAD Fishery Management in St. Vincent and the Grenadines

COUNTRY REPORT

FOR

CRFM / JICA FAD

MANAGEMENT

WORKSHOP

DOMINICA

13 MARCH 2013

FAD DEVELOPMENT IN ST. VINCENT AND THE GRENADINES

1. History of FADs

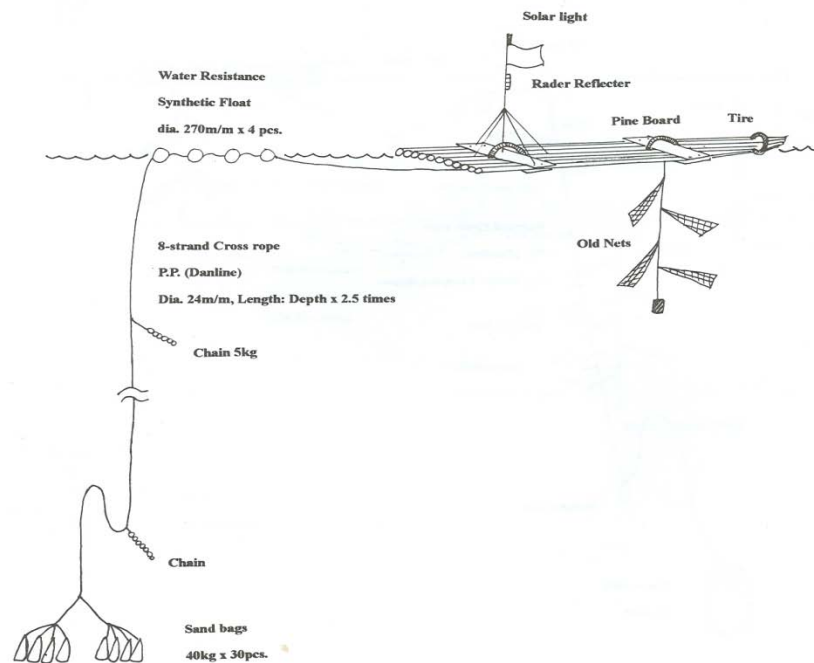
St. Vincent and the Grenadines does not have a long history of FAD utilization. FAD deployment was attempted during the early 90's off the southeastern coast of St. Vincent and the Grenadines. This was part of a project that was supported by the FAO. Unfortunately these FADs were destroyed by the elements soon after deployment.

In December 1997, a bamboo FAD was introduced and deployed after consultations with fishers.

This FAD was deployed at Latitude 12° 51' 45" N and Longitude 61° 03' 15" W, approximately 5 nautical miles east of Battowia, at depth of 50 meters.

The FAD was destroyed after one month of being deployed. It was proven to be very successful despite the short life span. One fisherman reported that he caught over 690lbs of fish in a week around the FAD.

Figure 1: Bamboo raft FAD that was deployed by the Fisheries Division.



Since then, there have been numerous calls from fishers for the deployment of more FADs and on Friday 19 March 2010 the Extension Unit of the Fisheries Division, Ministry of Agriculture, Forestry and Fisheries deployed two Fish Aggregating Devices (FADs) at the following locations and positions. One FAD was deployed five and a half nautical miles east of Battowia at latitude $12^{\circ} 58' 02''$ N and longitude $61^{\circ} 02' 97''$ at a depth of 800 feet and the other FAD was seven nautical miles east of Petit Mustique at latitude $12^{\circ} 51' 28''$ N and longitude $61^{\circ} 05' 62''$ W at a depth of 1000ft.

The shelf east of Battowia extends for approximately five nautical miles at a relatively constant depth of 150 feet, and drops off steeply to a depth of 800 feet. The shelf east of Petit Mustique extends for approximately seven nautical miles at a relatively constant depth of 200 feet, and drops off steeply to a depth of 1000ft. The current in these areas generally move towards land going from east to west. If the anchor should drag, then the FAD should theoretically move towards land in the same depth of water.

These areas are rich fishing grounds and there is always the presence of an abundance of migratory fishes. Setting the FADs close to the edge where there is always an abundance of migratory fishes can result in a lot of fish around the FADs. These areas are where most fishers pass when going to other fishing grounds so they can fish around the FADs on their way to and from other fishing grounds. These FADs lasted for a few months before they were destroyed by hurricane Tomas.

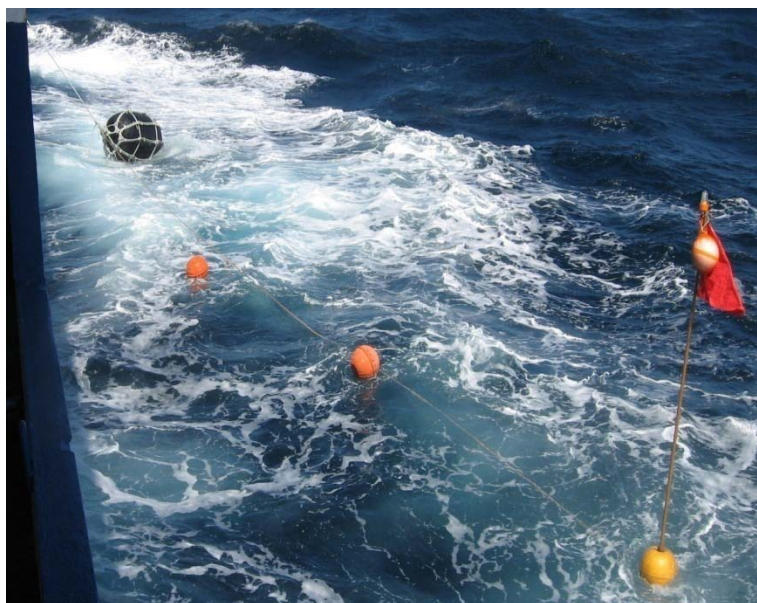


Figure 2: FAD floatation device deploying from vessel

In late 2006, a multi-purpose project to support the sustainable development of moored FADs was developed with representatives from the Lesser Antilles and participants from ICCAT and FAO / WECAFC. The project was submitted to the European Interregional Co-operation for funding who accepted the project and agreed to finance it.

On 15 March 2012 the Fisheries Division, within the Ministry of Agriculture, Rural Transformation, Forestry and Fisheries in collaboration with the French Research Institute for the exploitation of the sea (IFREMER) deployed two FADs in the waters of St. Vincent and the Grenadines.

2. EXISTING FADS INFORMATION

Table 1: Facts of existing FADS

Particulars	FAD ONE	FAD TWO
Position (N, W) coordinates	13° 14.5 N , 61° 19.3 W	12° 58.9 N, 061° 20.3 W.
Water depths (M)		
Distance from main fish market	15 NM	13 NM
Date of deployment	16 / 03 / 2013	16 / 03 / 2013
Design of FAD	Single head buoy	Single head buoy
Estimated cost	N / A	N / A
Funding agency	EIC*	EIC*
Management body	Fisheries Division	Fisheries Division
Fishing boats utilizing FAD	15	10
Fishing community who fish FAD most	Barrouallie	Bequia
Fish market where fish is landed	Kingstown Fish Market	Kingstown Fish Market
Fishing gear and methods utilized and main target species	Trolling and dropline Yellowfin tuna and skipjacks	Trolling and dropline Yellowfin tuna and skipjacks

* EIC is European Interregional Co-operation

3. FAD DEPLOYMENT, USE AND REGULATIONS

One FAD is deployed three nautical miles west of Barrouallie and the other five nautical miles west of Bequia.

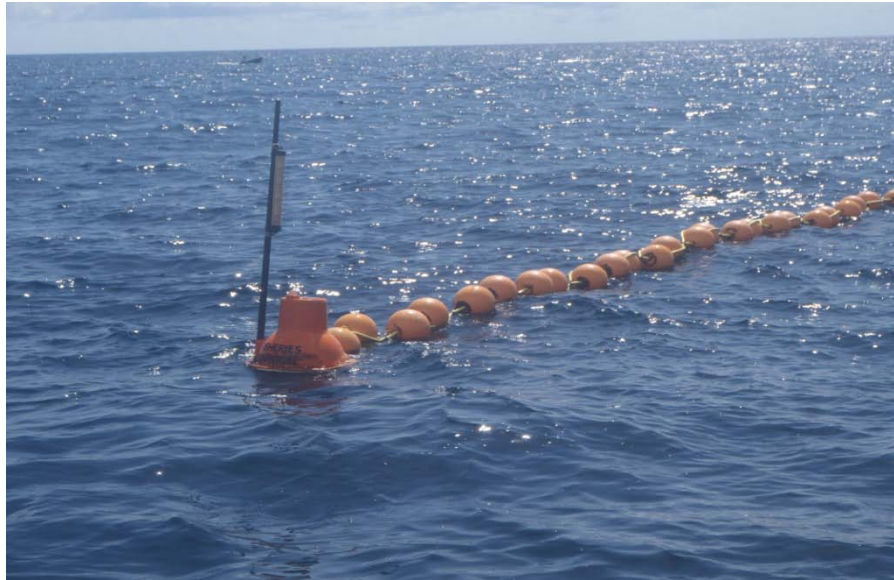


Figure 3: Floatation device of FAD

The deployment of these FADs is part of a project known as the MAGDELESA project. In St. Vincent and the Grenadines it is the policy of the Fisheries Division to construct and deploy FADs after consultations with the industry stakeholders. This would provide some level of control on the number of FADs being deployed, the areas where they are deployed and as such will reduce user conflicts as no one will be able to place ownership to the FAD. Private individuals, groups or any organisation can deploy FADs but they will have to inform the Chief Fisheries Officer of the deployed coordinates and the Chief Fisheries Officer will then publish the coordinates. The private individual, group or organisation cannot prevent anyone from fishing around the FAD.

No qualification is required for fishers to use FADs neither are there any written rules that govern the use of FADs.

Presently, approximately fifteen to twenty (15 - 20) fishing boats fish around the FAD off Barrouallie and five (5) fish around the FAD off Bequia.

4. REGISTRATION AND LICENSING OF FISHERS AND FISHING VESSELS.

All fishing boats are required by law to be registered and display their registration number on their fishing boats, but only approximately 60 percent of the country's fishing fleet is registered and approximately 40 percent display their registration number on their fishing boats. Likewise, it is required by law for fishermen, whether part time or full time to be registered and given a photo identification but less than 50 percent of the fishers are registered. It is not required by law for FAD fishers to be registered or licensed before they can conduct FAD fishing. The Fisheries Division is making an effort to correct this problem by tying all fishermen benefits to the registration of their fishing vessels and them being registered. There is also the possibility of revising the current legislation to make more up to date.

5. DATA COLLECTION AND MANAGEMENT.

Within the agreement IFREMER was responsible for the design, construction and deployment of the FADs while the Fisheries Division was responsible for the management and maintenance of the FADs. The Fisheries Division developed a FAD data collection form that is being used for the collection of catch and effort data from FAD fishers. Presently, the fishermen who fish around the FADs assist the Fisheries Division in completing the forms and return them to the Division. The information collected is being process by the Fisheries Division Data Unit.

6. FAD MAINTENANCE

The Fisheries Division is responsible for the maintenance of the FADs and pay monthly visits to the FADs to conduct maintenance and repair. Also, the fishers who fish the FADs are encouraged to report any unusual activities and problems with the FADs to the Fisheries Division. Fishermen are also taken to sea with the Fisheries Division staff to assist in carrying out maintenance work to the FADs. Fishermen are not allowed to pay for the maintenance, repairs and replacement of FADs.

The deployment of these FADs has been very successful and as a result, the Fisheries Division has submitted the following project to the Ministry of Finance for its approval for the Construction and deployment of five Fish Aggregation Devices during the year 2013. The project is known as Fish Aggregation Devices (FADs) development in St. Vincent and the Grenadines has been approved by the Ministry of Finance and will be executed in 2013

FAD DATA FORM

Date: _____	Departure from Landing Site: _____ a.m. / p.m.
Arrival at Landing Site: _____ a.m. / p.m.	
Boat I.D.: _____	Captain: _____

FAD I.D # _____ Fuel consumption \$ _____ Main Gear Used: TR/HL/DL/RR Total wt caught: _____ lb/kg Total number of fish: _____	FAD I.D # _____ Fuel consumption \$ _____ Main Gear Used: TR/HL/DL/RR Total wt caught: _____ lb/kg Total number of fish: _____
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Individual Species Data			Individual Species Data		
Specie	Number	Weight (lb/kg)	Specie	Number	Weight (lb/kg)
Skipjack Tuna			Skipjack Tuna		
Yellowfin Tuna			Yellowfin Tuna		
Bullet Tuna			Bullet Tuna		
Frigate Tuna			Frigate Tuna		
Blackfin Tuna			Blackfin Tuna		
Big Eye Tuna			Big Eye Tuna		
Albacore Tuna			Albacore Tuna		
Little Tunny			Little Tunny		
Atlantic Bonito			Atlantic Bonito		
Swordfish			Swordfish		
King Mackerel			King Mackerel		
Cero Mackerel			Cero Mackerel		
Blue Marlin			Blue Marlin		
Wahoo			Wahoo		
Dolphin fish			Dolphin fish		

Key to codes

Gear: TR = trolling; HL = hand line; DL = drop line; RR = rod & reel