

MBAL-742  
UNITED STATES GOVERNMENT  
memorandum

DATE: July 10, 1981  
REPLY TO  
ATTN OF: Ben Stoner, PDO  
SUBJECT: Fisheries Assessment Project (685-0254)  
TO: See distribution, below

Please find attached the subject PP for your files.

Distribution:

DIR: DSHEAR

PRM: SREA

PDO: PWENGER

RCON: RKING

ADO: JBALIS

PSO: PLACERONE

C&R: IBA (2)

DOC: FKADER

AID/W: (3) -- Joel Schlesinger, AFR/DR  
cc: for Dr. G. Posner, NOAA

AID/W: SER/COM/ALI

FISHERIES ASSESSMENT PROJECT (685-0254)

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Categorical Exclusion for IEE

ACTION MEMORANDUM FOR THE MISSION DIRECTOR

From: Program Office, Sam Rea

Subject: Support to Fisheries Resource Assessment Project (685-0254)

Problem: Your approval is required to execute a grant of One Hundred and Fifty Thousand U.S. Dollars (\$150,000) from the Sahel Development Fund (SH) to the Government of Senegal (GOS) for support to the Fisheries Resource Assessment Project.

Discussion:

The Goal of this project is to enhance the quality of fishery stock assessment data while the specific purpose of the project is to provide CRODT (Centre de Recherches Oceanographiques de Dakar - Thiaroye) with essential fish-finding and assessment equipment, and the capacity to utilize and maintain this equipment.

The project supports the national and sectoral objectives of the GOS Plan de Redressement (Economic Reform) for expansion of pelagic fishing to the highest level compatible with sustained yields and maintenance of species balance.

The project also supports USAID country program objectives to improve Senegal's economy and, via better nutrition, the health of its population.

Senegal has a continental shelf of nearly 24,000 square kilometers and a coastline of 718 kilometers and fisheries represent one of the country's most important sectors. Approximately 50,000 fishermen engage in this business and so provide a major source of protein for the people. Fish exports now rank second to peanuts in importance. Since 1970, due mainly to the motorization of 20% of the canoes, fishing production has doubled. While the demand for export and domestic consumption is expected to increase, the catch has leveled off.

In order to better determine the availability, distribution and variety of fish on the coastline, and avoid collapse of pelagic fishery experienced in other countries, the GOS requested AID to finance scientific equipment for installation on board the research vessel Laurent Amaro, which is operated by the Center for Oceanographic Research at Dakar-Thiaroye (CRODT), an agency of Senegal's Secretariat for Scientific and Technological Research (SERST).

The vessel is 25 meters long, is equipped with radio-telephones, radar, satellite navigation, radio direction finder, automatic pilot, and is operated by a master, a crew of thirteen, and a scientific party of four.

CRODT is presently limited to net sampling and fish landing techniques for identifying fish production and estimating their size. This method, based on towing a trawl in a strip of 5 miles and taking two hauls per hour, presumes a specific distribution of fish, though fish distribution is often difficult to anticipate, and samples can be abnormally large or small, depending on whether trawling happens to hit or miss a school of fish. The new equipment would enable CRODT to explore the water more comprehensively (a water column to a depth of 200 meters and 11 miles in length), faster (in an hour), with a reduced crew.

The equipment proposed is as follows: transducers, scientific sounder, recorder and oscilloscope, echo-integrator, tape recorder calibration apparatus, net sound and three wire system, and spectrophotometer.

Budget Items

Echo Integration Equipment	82,500
Spectrophotometer, equipment	24,000
Installation	11,000
Training	17,000
Shipping	3,000
Pelagic net system	6,000
Contingency	6,500
 Total:	 150,000

Implementation Plan

USAID/Dakar will administer the project while NOAA will provide technical staff, prepare the purchase orders, conduct necessary technical discussion with suppliers, and assist in any other appropriate manner, including on-the-job training and evaluation.

Suppliers will be instructed to ship all items directly to CRODT, and to notify AID of the date of shipment. The Director of CRODT will be responsible for receiving the equipment, clearing it through customs, and inspecting and installing it.

Recommendation

That you authorize the proposed project.

Clearances: RCon:RKing RK  
 PSO:PLacerte PL  
 PRM:SRoa SR  
 PDO:PWenger PW  
 DDIR:MMcCaw MM

Auth:DIR:DSheaf

Drafter:PDO:JOwen

PROJECT AUTHORIZATION

Name of Country/Entity: Senegal

Name of Project: Fisheries Resource  
Assessment

Number of Project: 685-0254

1. Pursuant to Section 121 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Fisheries Resource Assessment Project for the Government of Senegal (GOS) involving planned obligations of not to exceed \$150,000 in grant funds over the planned life of project of 2 years from the date of initial obligation, subject to the availability of funds in accordance with AID OYB/Allotment process, to help in financing foreign exchange and local currency costs for the project.

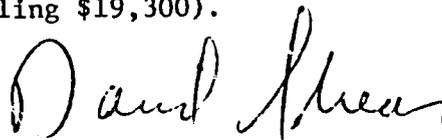
2. The project will assist the Government of Senegal to husband its natural resources by providing equipment which will improve fish finding and assessment. The equipment, which will allow exploration of the water column and the bottom to a depth of 200 or more meters and 11 miles in length in an hour and with a smaller crew, will be located on a fisheries research vessel operated by Senegal's Center for Oceanographic Research at Dakar/Thiaroye (CRODT). U.S. equipment suppliers and the National Oceanic and Atmospheric Administration (NOAA) will provide training for the installation and maintenance of equipment and the interpretation of equipment results.

3. The Project Agreement, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential terms and covenants together with such other terms as A.I.D. may deem appropriate.

a. Goods and Services, except for ocean shipping, financed by A.I.D. under the project shall have their source and origin in the United States.

b. Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

c. A Condition Precedent to the disbursement of funds under this project will be the provision by the Cooperating Country, in form and substance satisfactory to A.I.D., of proof that it has taken responsibility for its component of the project (equipment totaling \$19,300).



Clearances: RCon: RKing (in draft)  
PSO: PLacerte (in draft)  
PDO: PWenger (in draft)  
PRM: SRea (in draft)  
DDIR: MMcCaw (in draft)

Signature: David Shear  
Director  
USAID/Senegal

PROJECT AUTHORIZATION

Name of Country/Entity: Senegal

Name of Project: Fisheries Resource Assessment

Number of Project: 685-0254

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  - b. Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.
  - c. Prior to the date of execution of the Project Agreement, the Cooperating Country shall furnish in form and substance satisfactory to A.I.D., proof that it has taken responsibility for its component of the project (equipment totaling \$19,300).

Clearances: RCon:RKing \_\_\_\_\_  
              PSO:PLacerte \_\_\_\_\_  
              PDO:PWenger \_\_\_\_\_  
              PRM:SRea \_\_\_\_\_  
              DDIR:MMcCaw \_\_\_\_\_

Signature: David Shear  
              Director  
              USAID/Senegal

AGENCY FOR INTERNATIONAL DEVELOPMENT <b>PROJECT DATA SHEET</b>	1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete <input checked="" type="checkbox"/> A	Amendment Number _____	DOCUMENT CODE 3
COUNTRY/ENTITY SENEGAL	3. PROJECT NUMBER [ 685 - 0254 ]		

4. BUREAU/OFFICE AFR	[ 06 ]	5. PROJECT TITLE (maximum 40 characters) Fisheries Resource Assessment
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6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 06 30 83	7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4) A. Initial FY [ ] B. Quarter [ 3 ] C. Final FY [ 84 ]
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A. FUNDING SOURCE	8. COSTS (\$000 OR EQUIVALENT \$1 = 210 CFA)				
	B. FX	C. L/C	D. Total	E. FX	G. Total
All Appropriated Total	150		150	150	150
(Grant)	( 150 )	( )	( 150 )	( 150 )	( 150 )
(Loan)	( )	( )	( )	( )	( )
Other U.S.					
1.					
2.					
Host Country		19	19		19
Other Donor(s)					
<b>TOTALS</b>	<b>150</b>	<b>19</b>	<b>169</b>	<b>150</b>	<b>169</b>

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
		(1) SH	751	876			150		150
(2)									
(3)									
(4)									
<b>TOTALS</b>					<b>150</b>		<b>150</b>		

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each) 874	11. SECONDARY PURPOSE CODE
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12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each) A. Code _____ B. Amount _____	_____
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13. PROJECT PURPOSE. (maximum 480 characters)

To improve the quality of Senegal's fishery stock assessment data by providing CRODT (Centre de Recherches Oceanographiques de Dakar-Thiaroye) with essential fish-finding and assessment equipment.

14. SCHEDULED EVALUATIONS interim MM YY [ 06 82 ] Find MM YY [ 06 83 ]	15. SOURCE/ORIGIN OF GOODS AND SERVICES <input checked="" type="checkbox"/> 000 <input type="checkbox"/> 941 <input checked="" type="checkbox"/> Local <input type="checkbox"/> Other (Specify) _____
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16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a \_\_\_\_\_ page PP Amendment)

17. APPROVED BY	Signature: Lavid Shear <i>Lavid Shear</i> Title: Director USAID/Senegal	Date Signed: MM DD YY [ ] [ ] [ ]	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION MM DD YY [ ] [ ] [ ]
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## FISHERIES RESOURCE ASSESSMENT

(AIP - 685-0254)

### A. Project Goal and Purpose

The goal of this project is to enhance the quality of fishery stock assessment data while the specific purpose of the project is to provide CRODT (Centre de Recherches Oceanographiques de Dakar-Thiaroye) with essential fish-finding and assessment equipment, and the capacity to utilize and maintain this equipment.

The project supports the national and sectoral objectives of the GOS Plan de Redressement (National Development Plan) for limiting pelagic fishing to the highest level compatible with sustained yields and maintenance of species balance.

The project also supports USAID country program objectives to improve:

- (1) Senegal's economy, and,
- (2) the health of its population via improved nutrition.

### B. Project Background

With a continental shelf of nearly 24,000 square kilometers, a coastline of 718 kilometers, and a coastal sea experiencing seasonal upwellings, it is not surprising that fisheries represent one of the most important sectors of the economy of Senegal. The 50,000 fishermen provide a major source of protein for the people. Besides providing food for domestic consumption (35 kg/person/year), marine fisheries contribute significantly to the country's foreign exchange earnings averaging around \$100,000 million per year in exports over the last three years. Indeed, fish exports now rank second only to peanuts in importance, having passed phosphates in 1977.

In the first five years of the 1970s, fisheries production doubled, mainly as a result of the motorization of approximately 50 per cent of the canoes used by artisanal fishermen. Despite increasing industrialization, some

65 per cent of the catch is still brought in by the canoes and is sold fresh for immediate consumption in the locality of the landing. However, the total catch may now be leveling off, or even declining slightly, a warning sign that cannot be ignored. An effort is underway by the Senegalese to install regional refrigeration facilities in the interior so as to extend the availability of fresh fish. This action will increase domestic demand for fish, and apply pressure for additional landings. For all the above reasons, but especially because of current supply and demand, it is important that establishment of a safe exploitation rate for Senegal's fisheries receive prompt attention.

This situation is critical in the context of the fact that of the five major upwelling areas in the world, three (Peru, California and Namibia) have experienced the collapse of a major pelagic fishery. So far Senegal has escaped such a disaster, but there is a clear danger, and Senegal needs to have the best information it can obtain about the abundance, distribution, and variety of its fish stock. Moreover, this knowledge is important to the other nations of the region, to the people of the Sahel who are seldom far from famine, and to the United States as the food provider of last resort.

It is in the United States' best interests to foster the acquisition of such knowledge because :

- a stable fishery is essential to the economic health of Senegal, especially as peanut prices decline and rainfall remains undependable;
- assisting Senegal in this matter encourages and supports a regional allocation effort by that nation, the Gambia , Mauritania, Guinea Bissau, and Cape Verde;

- if at some future time the U.S. fishing industry should wish to fish in Senegal's waters, they would be helped by a rational allocation policy, and;
- good will generated by this project can only assist the United States.

International events are forcing developing countries to assess their living marine resources. Whether from the viewpoint of wise exploitations, evaluation of the adverse effects of fishing by foreign vessels or measuring the losses caused by pollution, it is incumbent on all coastal states to know as well as possible the size and diversity of their fishery resources. Effective fisheries management is simply not possible unless there is an accurate fishery stock assessment.

These considerations are especially true in Senegal, where marine fish are of vital importance to the economy of Senegal and adjacent nations, both as an essential diet component for the Senegalese, and as a key export commodity.

In July 1980, the Third Regional Conference on the Preservation, Conservation, and Exploitation of Marine Resources was attended by delegations from Senegal, Cape Verde, Mauritania, the Gambia and Guinea Bissau. As a regional group they agreed to cooperate in fisheries management and training, and they are working well together. The main component of this effort is Senegal's Centre de Recherches Oceanographiques du Dakar-Thiaroye (CRODT), and while no other nation in the group has anything like this capability now, in the last month France (Office de la Recherche Scientifique et Technique Outre-Mer:ORSTOM) signed a cooperative marine research agreement with Mauritania.

In cable State 249488, § September 19, 1980, AID/Washington approved the text of the PID-type letter of intent (see cable Dakar, 6749§, September 3, 1980) on the Fisheries project. In accord with Articles

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§ Annex I

2 and 3 of that Agreement, dated September 1980, AID expressed its intention of providing the Senegalese with the capability of improving fish resource assessment surveys. CRODT conducts stock assessments for Senegal and some of its neighbors. The information it gathers, and the conclusions it reaches concerning fishing allocations, are transmitted through Senegal's Fisheries and Foreign Ministry to the four other members of their regional organization. This group then finalizes the decision on fish allocations within the 200-mile wide zone from Mauritania to Guinea-Bissau. However, while CRODT has a highly professional staff, it is grossly under-instrumented for the task at hand. They operate a research vessel, the Laurent Amaro, but all assessment studies are by means of trawls and studies of fish landings. As noted below, these techniques have many shortcomings, and, used alone, may result in significant errors.

This document proposes a short-term, technically-simple, low-cost, small-scale project. Most importantly, the project will improve markedly the basis for wise fishery management--rapid and accurate fish stock assessments. There will be particularly favorable consequences for the artisanal fishermen, whose equipment limitations make it essential that species accessible to them not be overfished.

### C. Project Description

Effective management of a fishery, by which we mean protecting the fish from overfishing and the fishermen from "underutilization", is based upon an accurate knowledge of the species present, and their abundance and distribution. It requires data on the abundance and success of each year class (i.e. all the individuals born in the same years), and their survival in future years to maturity and capture or other death. Also needed is information on the horizontal and vertical movements of the different species so that the ones you want to catch can be caught more efficiently and the others left alone.

On the entire west coast of Africa, north of the Union of South Africa, only Nigeria (Nigerian Institute of Oceanography and Marine Research) has the capacity to study fish with hydroacoustic equipment, but there is evidence that this equipment is inoperative. The Senegalese are limited to net sampling and fish landing techniques for identifying fish populations and estimating their size. Sampling by net and by analysis of fish landings are useful, and can form the basis of certain analytical approaches, but when employed alone often give false impressions.

The reason this is so is that any pattern of sampling by towing a trawl presumes a specific distribution of fish. Yet fish distribution is often difficult to anticipate. Their distribution is dependent upon physical, chemical, and biological factors (temperature, salinity, nature of the bottom, oxygen, light, food, presence of predators, etc.). The ocean is not uniform in respect to any single factor, and what is more, a species tolerant of warm water at one salinity, may not accept water at this temperature but at a higher salinity. Many species of fish form aggregations, and most fish are migratory. Furthermore, some species are fast enough to avoid a trawl. Fishing is a "random hunting" type of activity in that as a fisherman (or scientist) lowers a trawl net, the fish are ordinarily not in view. Consequently, if in trawling one happens to either hit a school of fish or miss them, the sample will be abnormally large or small. Whatever fish are caught are studied as to age, length, weight, sex, and reproductive condition (ripe, immature, etc.). Age can sometimes be determined from studies of rings present in the scales or ear "bones" (otoliths), in much the same way as annual rings in a tree trunk. Weight and length information can often be used to imply age, or at least age groups.

It is possible through mathematical (statistical) analysis to "adjust" the numbers to give a more realistic estimate of the total fish population, but the derived estimate, is just that--an estimate and more likely expressed as a range of values "probably not less than--nor more than--."

The equipment proposed in this project reduces this sampling dilemma by making it possible to not only "see" the fish as the vessel passes over them, but also to give the total weight of fish in the water column and on the bottom. The echo-integrating unit is a sonar system. It sends out high frequency sound which is reflected back to the ship in accordance with the size and distance of the target.

Since these sounds neither injure nor disturb the fish, and since the system is operated from a moving ship, much larger areas can be "sampled" in this manner than by a trawl.

For example, the two hauls taken in an hour would sample a strip some five miles long in the ocean. They would fish at only a single depth and would involve more crew on duty. On the other hand, in a single hour the sonar system would scan a column of the sea, from the ship to the floor, of about eleven miles in length.

Furthermore, the accessory equipment, which is included as a contribution from the Government of Senegal, would make it possible to know the exact depth at which the net is fishing. Consequently, the fish brought on deck would be those identified by the sonar.

By a judicious combination on the part of the researchers of experience, familiarity with the behavior of the different species (depths which they prefer, non-aggregating or schooling, size and shape of schools, etc.), and target image ordinarily presented by a particular species, it is frequently possible to identify the species detected by the equipment. This type of experience is also assisted by the equipment listed for purchase with Government of Senegal funds.

With the hydroacoustic system in place, CRODT staff would be able to explore the water column and the bottom to a depth of 200 or more meters of more, employing the equipment on board the Laurent Amaro.

We have been advised by FAO representatives that this fisheries research vessel, operated by CRODT but owned by FAO, will be transferred to CRODT ownership. The boat is 25 meters long and is well-equipped with radio-telephones, radar, satellite navigation, radio direction finder, automatic pilot, and standard bridge furnishings. It has two 28 KW generators (220 v.a.c., 50 cycle), and is single screw, and diesel propelled. Endurance of 20 days at sea is limited by the availability of fresh water. The vessel has a master and crew of thirteen, all professionals, and carries a scientific party of four. The wet laboratory is small and some rearrangement may be necessary in the future to provide a dry laboratory facility.

CRODT will transmit fish stock assessment data to the Office of Oceanography and Marine Fisheries, which will use it to develop national and regional fishing strategies. Thus, during the life of this project, fish assessment data will remain at a macro planning level within the confines of the Office of Oceanography and Marine Fisheries. The data will not be disseminated at a micro level to individual fishermen or to fishing companies. Only when the Government of Senegal has a handle on its fish resources will it begin to deal with such legal matters as fish resources conservation at a micro level.

D. Technical Analysis

The equipment selected, of whatever manufacturer, is designed to function as a cohesive system. In discursive terms: a transducer (either mounted on the hull of the ship, or towed behind) converts electricity to sound, and back again. Under the control of a scientific sounder, the transducer sends out a sound at a very high pitch and then waits for an echo before sending out the next sound. The signals received by the transducer are transmitted to the scientific sounder which relays these impulses to display devices or a tape recorder or echo-integrator. The display devices are an oscilloscope and paper recorder. The tape recorder provides a back-up for the echo-integrator in that if the latter malfunctions, the magnetic tape record stores the signal for later analysis.

The echo-integrator is an electronic device which, receiving the signals from the scientific sounder, further processes these signals to correct for relative target strength of different species, distance from the vessel, etc.. It then determines the total bio-mass of fish beneath the vessel in water down to 200 meters or more. This output is continuous and instantaneous, all the while the ship is moving.

The remaining equipment supports this system and the picture of fish abundance it attempts to draw. The net sound and three wire system, proposed as a contribution of Senegal, is needed to verify the species detected by the acoustics. The net sound consists of a transducer attached to the net, and a research sounder set to its frequency, and winch for controlling the necessary cables. A spectrophotometer allows analysis of the water to determine the amounts present of phytoplankton and mineral nutrients. By employing this instrument, insight can be gained into the primary productivity which supports the sardine and other fish population.

The equipment to be ordered is described as follows:

Transducers. Hull-mounted and towed. These items emit the high frequency sounds, and they receive the echo from fish, the bottom, etc.

Scientific sounder. High precision general purpose sonar transceiver, crystal-controlled (60 KHz and 120 KHz), and digitally controlled time varied gain. This apparatus causes the transducer to emit a sound at the proper intervals and for a pre-set length of time. It also receives the sound echo perceived and converted by the transducer into electrical impulses, and relays these sound reflections to a display device or echo integrator for display or quantification.

Recorder and Oscilloscope. These items allow visual display of echo sounder information, one making a paper record and the other presenting a florescent screen picture.

Echo-Integrator. Digital, hydroacoustic signal processor, portable. This instrument further processes the echo signals to provide quantitative information about the fish targeted by the transducer. In essence the echo-integrator accepts information on the biomass of fish beneath a unit area of the surface layer and totals the biomass incrementally to the desired depth. The output is continuous, instantaneous, and integrated with respect to range over the entire sampled column. The

result is an estimate of fish biomass while-the ship is moving.

Tape Recorder. Precision, quality controlled record/playback speed. This instrument allows recording the echo sounder output on magnetic tape, thus facilitating computer processing of the information ashore and permitting data storage should the echo-integrator malfunction.

Calibration Apparatus. Consists of an oscilloscope, millivoltmeter, a calibrated hydrophone, and a fish cage. This equipment system is necessary for calibration of the electronic equipment for the fish species present.

Net Sound and Three-Wire System. Studies using the above equipment must be verified against precise trawl sampling. To be certain of the location of the net relative to the site of the fish school, a net sound is required. The net sound must be connected to deck equipment, and this attachment requires a three-wire winch system.

Spectrophotometer. A device essential for chemical analyses requiring light of precise wavelengths (colors). Here it would be used for determining the amount of phytoplankton and mineral nutrients present. By employing this instrument, insight can be gained into the primary productivity which supports the Sardinella and other fish populations.

The above systems, except for actual trawling operations, do not influence the fish at all, and they are environmentally benign.

The state of the art and the flexibility of the equipment are such that while improvements in these techniques will be occurring, this equipment will be useful for five to ten years. The greatest short-coming of the system--that it is least accurate with small, schooling pelagics (such as sardines, etc.)--can be overcome largely by emphasizing nocturnal studies and by spot checking with trawls.

The scientific staff at CRODT is well trained. The six senior personnel are from the Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM) and two have recently returned from special

training in the United States. One was at NOAA's Southeast Fisheries Center (Miami) and the other was receiving training in Hydroacoustics at NOAA's Northwest Fisheries Center (Seattle). There are six divisions at CRODT: tuna, small pelagic fishes, demersal fishes, artisanal fisheries, environmental problems, and data information systems. Dr. Fontana of CRODT heads the Scientific Committee of the International Commission for the Conservation of Atlantic Tunas. The laboratory is likely to receive a powerful computer (an IBM 4331) in 1981.

U.S. Contribution

a) Detailed Financial Analysis and Plan

- Echo Sounder, 60 khz and 120 khz, for use on 220 v.a.c. 50 cycle, Bio Sonics Model 101	\$ 17,400
- Echo Integrator, digital, for use on 220 v.a.c. 50 cycle, Bio Sonics Model 120	16,000
- Recorder, chart for use on 220 v.a.c., 50 cycle Rose Laboratories Fine Line	2,500
- Oscilloscope and Voltmeter, for use on 220 v.a.c., 50 cycle, Sony/Tektronix Model 305	2,300
- Recording Paper, for chart recorder and Model 120 printer paper. One year's supply	300
- Calibration Standard Transducer, Bio Sonics	2,000
- Calibration Equipment, low-power pulsed transmitter, variable delay generators, etc, custom designed and assembled by Bio Sonics. To operate on 220 v.a.c. 50 cycle.	1,500

Transducers:

- 60 khz 20-25° beam width (2 at 2,500 each)	5,000
- 120 khz, 10-12° beam width	5,000
- 120 khz, 20-25° beam width (2 at 2,500 each)	5,000
- Tape deck, cassette, 3 motor, speed controlled by Quartz timer, accepting metallized tape for operation on 220 v.a.c., 50 cycle, and climatized for the tropics with 20 blank cassettes	8,000

- Spare circuit cards for Bio Sonics 101	\$ 7,000
- Spare printer and circuit cards for Bio Sonics 120	4,000
- Towing system, for 60 and 120khz, consisting of towed-body, cables, hardware and testing	7,500
- Echo-Integration System, installation hull mounted transducers (includes o/a \$1,790 for training).	10,450
- Echo-Integration System, installation, towed system	1,340
- Echo-Integration System, training, Bio Sonics engineer 14 days in Dakar	8,600
- Echo systems training in interpretation of results, Biosonics Fishery Biologist, o/a 12 days, Dakar.	6,810
- Spectrophotometer. 190-900 m, with photomultiplier, continuous/peristaltic pump, and six (6) 10 mm. silica cells, for operation on 220 v.a.c., 50 cycles, Beckman Model 35	23,812
- Shipping, echo-integration system	2,000
- Shipping spectrophotometer	1,000
- Net, pelagic, experimental, with rope around square mouth, and heavy twine and canvas at closed end. (See attached diagram where "mailles" means "meshes" and the "force de fil nylon" is the meshes/kilogram). U.S. suppliers to be provided by NOAA. Diagram describes one of four such sections to be sewn in a "square". Shipping included.	6,000
- Contingency	<u>6,488</u>
Total	\$150,000

Systems' Cost Summary

- Echo-integration, equipment	82,500
installation	11,000
training	17,200
shipping	<u>2,000</u>
Echo-Integration System Sub-Total	\$112,700

- Spectrophotometer, equipment	\$ 23,812
- Shipping	<u>1,000</u>
Spectrophotometer System Sub-Total	\$ 24,812
- Pelagic Net System Sub-Total	6,000
- Contingency	<u>6,488</u>
Total	\$ 150,000

GOS Contribution

Trawl Sound System (Simard) consisting of:

- Transducer, 50 khz, in a special housing for connection to the headrope of a trawl net.	
- Cable, "twin-flat", for connection between the transducer and winch, 650 meters.	
- Cable block, stainless steel and nylon, to carry twin-flat cable.	
- Winch, hydraulic, self-contained, self-tensioning pump to operate on 220 v.a.c., 50 cycle, 5 feet-wide with 32 inch drum.	
- Remote control unit for the winch.	
- Echo sounder/recorder. Skipper 603.	
- Splicing set for the cable paper, recording, 24 rolls	
- Delivered price of system	\$ 19,300
Total U.S. and GOS contributions	<u>\$169,300</u>

F. Social Analysis/(Project Beneficiaries)

Since this is a research project of primarily long-term impact, a social analysis is not presently possible. However, through improving the quality and quantity of fishing stock assessment data, the project will, in the long run, benefit both commercial and artisanal fishermen, by diminishing the risk of species depletion which could wipe out their livelihood.

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The potential longer term benefit to Senegal's population at large is that the project's research related findings should lead to effective measures safeguarding a major component of the nation's daily diet and long-range economic security, as well as maximizing its ongoing productivity.

#### G. Economic Analysis

Again, the research nature of this project renders impossible a standard action project economic analysis. However, it is clearly in the long-range economic interest of the country to maintain its fish stocks at a sufficient density to allow renewal, while at the same time permitting optimum taking of "surplus" stock, that is, those individuals whose survival is not essential to maintenance of the stock. If too many fish are caught, renewal will not be adequate for several years (if ever). On the other hand, if fewer fish are captured than is compatible with stock renewal, less edible protein will be available, and the Senegalese economy and living standards will suffer.

Determining the level of optimum capture is complicated by several factors:

- sea conditions, such as temperature, salinity, food availability, etc., will result in differential survival of each year class;
- predator effectiveness and abundance will remove variable numbers of each age group;
- migration (immigration and emigration) will alter the number of fish present relatively quickly, and;
- effectiveness of fishing may alter the numbers of individuals surviving to reproduce.

Consequently, it is an economic essential for the assessment of fish stocks to be done as accurately and frequently as possible within the constraints of the economics of putting scientists and ships to sea in order to perform the studies. By adding the hydroacoustic methods given above to their repertoire of assessment techniques, CRODT will be able to get a more accurate picture of fish abundance, and take less staff time to do so.

The impact on the country's and region's economy will be positive in the long-run as the fishermen take more nearly the optimum quantity of fish.

#### H. Implementation Plan

Administration Arrangements - The plan rests overall administrative responsibility with AID/Dakar, which will continue to furnish technical backup, providing limited staff input as needed, but no travel funds. Thus, although USAID/Dakar will administer the project on site, NOAA will prepare purchase orders, conduct necessary technical discussions with suppliers, and assist in any other appropriate manner. The responsibility within USAID/Dakar will rest in the Program Office.

CRODT will be the physical recipient of the equipment from its arrival in Dakar. At SERST the contact person will be Fournier of the Program Planning Office.

Although the sea is a difficult environment, once the period of delivery, installation, training, and check-out is completed, operations should proceed easily. One can anticipate some equipment down time, but this should be a minimum due to the proven ruggedness of the equipment contemplated plus the generally high competence of the CRODT staff. The spare circuit cards will reduce to a minimum the knowledge needed for repairing the equipment. A CRODT staffer has just returned from training on some of this equipment, and an electronic technician at a nearby ORSTOM facility will be available. Contingency funds have been set aside for unanticipated and major problems.

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Implementation Plan - Once the grant is approved and the necessary funds designated, AID/Dakar will notify CRODT and provide NOAA (Dr. Gérald S. Posner, Special Assistant for International Marine Affairs, National Marine Fisheries Service, Office of International Fisheries Affairs) with the authority and funding citation to proceed in procuring the prescribed equipment. NOAA in effect will be completely responsible for equipment procurement, and will keep USAID/Senegal informed of procurement status.

Suppliers will be instructed to ship all items directly to CRODT, and to notify AID of the date of shipment. The Director of CRODT (Dr. Fofana) will be responsible for receiving the equipment, getting it through customs, inspecting it, storing it safely, and notifying AID and NOAA of its arrival and condition. If a defective item is received, CRODT will notify AID which will notify the supplier. NOAA will be advised of problems, such as defective or missing equipment, or unusual delays in delivery, and NOAA will take whatever actions are necessary and appropriate.

#### I. Training

When all the equipment has been received in good order by CRODT, CRODT will notify AID and NOAA, and NOAA will work with the suppliers and CRODT to coordinate installation and training programs. Maximum care will be taken to give training to Senegalese nationals working at CRODT. If it is deemed necessary for a NOAA representative to be on site during the installation and/or training, AID/Senegal will pay the travel cost as a contingency. AID will be kept informed of these plans and schedules, and advised of satisfactory installation, training, and checkout by NOAA and CRODT. Maximum care will be taken to give training to Senegalese nationals working at CRODT

#### J. Equipment Payment and Repair

When both units have notified that the equipment systems are functional, AID will process payment. If CRODT experiences equipment difficulty during

the warranty period, it will contact the supplier directly. In the event that a problem occurs, NOAA will attempt to facilitate discussions with the supplier.

K. Evaluation

NOAA will do the evaluations discussed below:

Evaluation plan - Two aspects of the hydroacoustic system must be evaluated: the ability of the equipment to perform in CRODT hands; the effectiveness of this equipment in improving fisheries resource assessment. Evaluation will be funded by mission operating funds.

At the choice, and cost of AID, the operational status of the systems will be evaluated approximately six months after their use has begun. The choice will be whether to have an on-site or remote evaluation. Since records, data, graphs, and tapes will be produced, it is possible to get some idea of the equipment's effectiveness in CRODT hands from this output. However, an on-site evaluation would allow consideration of such factors as: staff interest, condition and maintenance of the equipment, effect of this equipment on other programs, etc..

Examination of the effectiveness of this system in improving fisheries resource assessment would necessitate a wait of at least one, and possibly two years, and would involve a detailed, comparative study of before and after situations with actual catches.

L. AIP Nature of Project

This project's relatively low budget and limited project scope justify its simplified format. The project is without planned follow-on activities.

M. Environmental Statement

In keeping with Regulation 16, 216.2, C (Categorical Exclusion), 1, (XiV), this project involves a program intended to develop the capability of recipient countries to engage in development planning, without directly affecting the environment, and so is exempt from an Initial Environmental Examination, Environmental Assessment, and an Environmental Impact Statement.

In keeping with Regulation 16, Section 216.2, C, 2, USAID/Senegal, as the originator of this project, sought the AID/W Africa Bureau Environmental Officer's approval of the above negative determination on April 1, 1981 by cable.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project :  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total US Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

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Project Title & Number SENEGAL FISHERIES PROJECT (685-0254)

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal : The broader objective to which this project contributes :</p> <p>To enhance the quality of fishery stock assessment data.</p>	<p>Measures of Goal Achievement</p> <p>GOS plans for the management of its fishery resource.</p>	<p>GOS planning documents</p>	<p>Assumptions for Achieving goal targets :</p> <p>GOS planners will devise effective policies based on fishing information produced by project.</p>
<p><u>PURPOSE :</u></p> <p>To provide CRODT with essential fish-finding and assessment equipment, and the capacity to utilize and maintain this equipment.</p>	<p>- fishing stock assessment data - estimates of fishing yields.</p>	<p>CRODT records</p>	<p>Senegalese fishery professionals will be able to make correct and significant use of the data ad-duced from the equipment.</p>
<p><u>OUTPUTS :</u></p> <p>- Fish finding and assessment equipment in place and operating. - Senegalese capable of maintaining and running equipment.</p>	<p>- trained Senegalese performing on the job - reports submitted to fishermen and government.</p>	<p>- project site visits - reading of CRODT reports</p>	<p>Senegalese technicians will learn how to maintain and use project equipment.</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project ;  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total US Funding \_\_\_\_\_  
Date Prepared : \_\_\_\_\_

Project Title & Number SENEGAL FISHERIES PROJECT (685-0254)

PAGE 4

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	. IMPORTANT ASSUMPTIONS
<p>Inputs :</p> <ul style="list-style-type: none"> <li>- Transducers - hull mounted and towed</li> <li>- scientific sounder</li> <li>- recorder &amp; oscilloscope.</li> <li>- echo interpreter</li> <li>- tape recorder</li> <li>- calibration apparatus.</li> <li>- net sound and three wire system</li> <li>- training.</li> </ul>	<p>Implementation Target (Type and Quantity) :</p> <p>(See text for details)</p>	<p>Project site visits</p>	<p>Assumptions providing inputs</p> <p>Equipment will arrive as planned in good condition and installation/training will take place in a satisfactory manner.</p>

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5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual fund sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? **Yes - attached**  
HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PRODUCT? **Yes**

A. GENERAL CRITERIA FOR PROJECT

1. FY 79 App. Act Unnumbered; FAA Sec. 653 (b); Sec. 634A. (a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (b) Is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure)?

C.N mailed to AID/W Feb. 27, 1980 for submission to Congress. As of March 30, 1980, USAID still waiting for notification of expiration date.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Yes. Necessary plans and cost estimates have been established.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

N/A

4. FAA Sec. 611(b); FY 79 App. Act Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973?

N/A

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction) and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?

N/A

6. FAA Sec. 209. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.

The project is best executed on a bilateral basis, but supports a regional fish allocation effort by Senegal, the Gambia, Mauritania, Guinea-Bissau, and Cape Verde.

A.

7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

**NA. The main impact of the project will be upon planning and institution building.**

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

If at some future time the US fishing industry should wish to fish in Senegal's waters, they would be helped by a rational fisheries allocation policy.

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

The Sahelian drought and unfavorable prices for Senegal's primary exports have strained the GOS budget considerably. However, the GOS will provide personnel and in-kind contributions, for a trawl sound system, totaling over 12% of the US input.

No

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes

12. FY 79 App. Act Sec. 608. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar, or competing commodity?

No

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b); 111; 113; 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained

The project seeks to do all of these via improved fisheries resource assessment

## B.1.a.

basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

b. FAA Sec. 103, 103A, 104, 105, 106, 107.  
Is assistance being made available: (include only applicable paragraph which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.)

This project is being funded under the Sahel Development Appropriation

(1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;

(2) [104] for population planning under sec. 104(b) or health under sec. 104(c); if so, extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research.

(3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

(i) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

(ii) to help alleviate energy problems;

(iii) research into, and evaluation of, economic development processes and techniques;

(iv) reconstruction after natural or manmade disaster;

## B.1.b.(4).

(v) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

c. [107] Is appropriate effort placed on use of appropriate technology?

The project seeks to introduce the most efficient mix of technologies available.

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

This requirement doesn't apply to the Sahel Development

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 7 years? If so, has justification satisfactory to the Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?

This requirement does not apply to the Sahel Development Appropriation.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental and political processes essential to self-government.

The project seeks to utilize and improve existing institutions, intent on supporting the socio-economic development of the country.

g. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase or productive capacities and self-sustaining economic growth?

Yes. The use of project information should lead to better use of natural resources for more effective development.

## 2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.

N/A

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

N/A

3. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance support promote economic or political stability? To the extent possible, does it reflect the policy directions of section 102?

N/A

b. FAA Sec. 533. Will assistance under this chapter be used for military, or paramilitary activities?

N/A