

P1-CFA 306

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FILE

PROJECT PAPER

BANGLADESH

AGRO CLIMATIC / ENVIRONMENTAL MONITORING

388-0046

USAID/DACGA
December, 1980

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

November 24, 1980

ACTION MEMORANDUM FOR THE ACTING ASSISTANT ADMINISTRATOR, BUREAU FOR ASIA

FROM: ASIA/PD, G. R. Van Raalte *R*

Problem: You are requested to authorize the \$5.9 million Bangladesh Agro-Climatic/Environmental Monitoring Project. All project funds will be obligated in FY 1981. The Project Assistance Completion Date is September 30, 1984.

Discussion: On September 21, 1979, a project entitled Disaster Alert was authorized by the Mission Director, USAID/Dacca, under a Delegation of Authority from you. The Disaster Alert Project was an outgrowth of an earlier activity, the "interim cyclone warning system," which was established in October 1978 through the collaborative efforts of the Bangladesh Government (BDG), USAID, the Office of Disaster Assistance (OFDA), the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The Disaster Alert Project was designed primarily to improve the flood and cyclone warning system of the BDG by providing equipment and training personnel to collect, analyze and disseminate satellite imagery data. A secondary purpose of the project was to utilize the satellite imagery data to assist the BDG in agriculture sector planning. Because of the project's dual objectives, the Asia Bureau intended to fund it under the Selected Development Activities (SDA) account. However, the Senate Appropriations Committee, while not disputing the merits of the project, stated in Report No. 96-358 that the project should be funded under the International Disaster Assistance account (IDA). The IDA account was unable to absorb the total cost of the project and, as a result, the Disaster Alert Project, as originally approved by the Mission, was never funded.

In FY 1980, the Asia Bureau and OFDA worked closely to develop a funding mechanism which would meet Bangladesh's needs both for flood and cyclone warning capability and for application of remote sensing data to development problems. In late FY 1980, OFDA provided \$546,000 for a High Resolution Picture Transmission (HRPT) receiving capability to improve the forecasting accuracy for cyclones, flooding and storm surges. While that equipment is highly complementary and useful to the development purposes of the proposed project, it is primarily intended as a disaster prediction and preparedness measure.

The Agro-Climatic/Environmental Monitoring Project has been designed to focus on the development applications of remote sensing technology. Through the project, AID will provide to the BDG the equipment, technical assistance, and training necessary to collect and employ remote sensing data made available by LANDSAT and other satellites as well as hydrological data obtained from data collection platforms placed in major rivers. The data collected will enable the BDG to improve the management of its natural resources. Among other things, this project will, in conjunction with data from other sources, assist the BDG in the preparation of a land use map and the development of an in-country resource management information system; estimation of acreage in production and yields of principal crops; the completion of a forest resource inventory; and the delineation of areas near rivers, pinpointing which areas are prone to inundation and which are safe to farm. Data from meteorological and LANDSAT satellites and hydrological data from data collection platforms placed in rivers will greatly increase understanding of the hydrological system of the area and its implications for agricultural development.

The project was approved by the APAC on October 8, 1980, subject to the modification of several components of the Project Paper. In accordance with the APAC recommendations, the PP has been revised to include the services of a full-time project monitor to be acquired through either a PASA or a contract; to describe more fully the hydrological and environmental applications of the project along with the agricultural applications of remote sensing; to modify the implementation schedule to allow adequate time for the procurement and installation of equipment (it was not necessary to extend the life of project); and to increase the life of project funding level to \$5.9 million to provide for inflation and to include the cost of the project monitor. The Mission and BDG have concurred in these changes. However, the BDG requested in its Letter of Request the \$4.5 million originally planned. We have, therefore, advised the Mission that the Letter of Request must be revised to include the amount increased during project review in AID/W. The revision must be received by the Mission (but not necessarily in AID/W) prior to signing of the project agreement.

A notification advising Congress of AID's intention to obligate \$5.9 million of Section 103 grant funds for this project was forwarded November 14. The waiting period will expire November 28. If the project is approved, the Mission plans to obligate these funds in the first quarter.

Recommendation: That you sign the attached Project Authorization.

Attachments:

TAB A - Project Authorization

Tab B - Project Paper

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

PROJECT AUTHORIZATION

Name of Country: BANGLADESH Name of Project: AGRO-CLIMATIC/
ENVIRONMENTAL
MONITORING
Number of Project: 388-0046

1. Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Agro-Climatic Environmental Monitoring Project (the "Project") for Bangladesh (the "Cooperating Country") involving planned obligations of not to exceed Five Million Nine Hundred Thousand United States Dollars (U.S. \$5,900,000) in grant funds over a three year period from date of authorization, subject to the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project.

2. The Project is designed to improve the management of soil, water and sylvan resources in the Cooperating Country by upgrading the capability of the Bangladesh Government to obtain, analyze and disseminate a wide variety of data on the local agro-climatic environment that relate to agriculture, meteorology, forestry, fisheries and overall ecosystems.

The Project will also provide necessary training in the use of environmental data to be obtained from satellites and other remote sensing instruments.

3. I hereby authorize the initiation of negotiations of the Project Agreement and its execution by the officers to whom such authority has been delegated in accordance with A.I.D. regulations and delegations of authority. The Project Agreement that may be negotiated and executed shall be subject to the following essential terms and major conditions, as well as such other terms and conditions as A.I.D. may deem appropriate:

4. Source Origin.

Except for ocean shipping, goods and services financed by A.I.D. under the grant shall have their source and origin in the Cooperating Country or in the countries included in A.I.D.

Geographic Code 941, except as A.I.D. may otherwise agree in writing. Training in the United States or in third countries shall be undertaken in accordance with the provisions of A.I.D. Handbook Number 10. Ocean shipping financed by A.I.D. under the grant shall be procured only on flag vessels of the United States or the Cooperating Country, except as A.I.D. may otherwise agree in writing.

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5. Terms and Conditions.

Except as A.I.D. may otherwise agree in writing, prior to the disbursement of funds for the procurement of goods and services to be used in conjunction with the Indian Geostationary Satellite ("INSAT"), the Cooperating Country will furnish, in form and substance satisfactory to A.I.D., evidence that it has executed an agreement with the Government of India, or an agency thereof, pursuant to which the Cooperating Country will have the right to use outputs, including imagery, of INSAT.

Clearances:	Date	Initial
ASIA/TR:TArdt	11/25	TMA
Asia/PD:GRVan Raalte	11/25	R
GC/Asia:HEMorris	11/26	HEM
Asia/DP:RHalligan	11/26	RH
Asia/BI:JNorris	11/25	C. J. Norris

Signature Frederick W. Schick
 Assistant Administrator (Acting)
 Bureau for Asia

November 26, 1980
 Date

GC/Asia:JFRogan:hp:11/19/80

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5/6

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET	1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	Amendment Number _____	DOCUMENT CODE 3
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2. COUNTRY/ENTITY BANGLADESH	3. PROJECT NUMBER 388-0046
--	--------------------------------------

4. BUREAU/OFFICE ASIA	<input type="checkbox"/> 04	5. PROJECT TITLE (maximum 40 characters) Agro-Climatic / Environmental Monitoring
---------------------------------	-----------------------------	---

6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 09 30 84	7. ESTIMATED DATE OF OBLIGATION (Under "B:" below, enter 1, 2, 3, or 4) A. Initial FY <input type="checkbox"/> 81 B. Quarter <input type="checkbox"/> C. Final FY <input type="checkbox"/> 81
---	---

8. COSTS (\$000 OR EQUIVALENT \$1 =)						
A. FUNDING SOURCE	FIRST FY 81			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant)	(5,900)	()	(5,900)	(5,900)	()	(5,900)
(Loan)	()	()	()	()	()	()
Other U.S. 1.						
Other U.S. 2.						
Host Country		737			2,890	2,890
Other Donor(s)						
TOTALS						8,790

9. SCHEDULE OF AID FUNDING (\$000)									
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) FN	180 B	053		0		5,900	-	5,900	-
(2)									
(3)									
(4)									
TOTALS				-	-	5,900	-	5,900	-

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each) 050 876 873	11. SECONDARY PURPOSE CODE
---	-----------------------------------

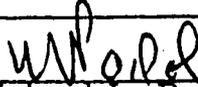
12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each) A. Code TNG B. Amount 250	
---	--

13. PROJECT PURPOSE (maximum 480 characters).

To improve the planning and management of resources in Bangladesh related to agriculture and water development through upgrading BDG's capability to obtain, analyze and disseminate agro-climatic data.

14. SCHEDULED EVALUATIONS Interim MM YY MM YY Final MM YY 09 81 09 82 09 83	15. SOURCE/ORIGIN OF GOODS AND SERVICES <input type="checkbox"/> 000 <input checked="" type="checkbox"/> 941 <input type="checkbox"/> Local <input type="checkbox"/> Other (Specify) _____
--	--

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY	Signature:  Title: Richard L. Podol, Acting Director	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION MM DD YY 07 10 80
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AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT IDENTIFICATION DOCUMENT
FACESHEET (PID)

1. TRANSACTION CODE
A = Add
C = Change
D = Delete
Revision No. 01

DOCUMENT CODE
1

2. COUNTRY/ENTITY
BANGLADESH

3. PROJECT NUMBER
388-0046

4. BUREAU/OFFICE
ASIA
A. Symbol
B. Code **04**

5. PROJECT TITLE (maximum 40 characters)
**Agro-Climatic/
Environmental Monitoring**

6. ESTIMATED FY OF AUTHORIZATION/OBLIGATION/COMPLETION
A. Initial FY **811**
B. Final FY **811**
C. PACD **0984**

7. ESTIMATED COSTS (\$000 OR EQUIVALENT, \$1 =)
FUNDING SOURCE LIFE OF PROJECT
A. AID 4,500
B. Other U.S. 1.
2.
C. Host Country 2,890
D. Other Donor(s)
TOTAL 7,390

8. PROPOSED BUDGET AID FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. 1ST FY <u>81</u>		E. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) FN	180B	053		4,500		4,500	
(2)							
(3)							
(4)							
TOTALS				4,500		4,500	

9. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)
05 876 873

10. SECONDARY PURPOSE CODE

11. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)
A. Code TNG
B. Amount 250

12. PROJECT PURPOSE (maximum 480 characters)

To improve the planning and management of resources in Bangladesh related to agriculture and water development through upgrading BDG's capability to obtain, analyze and disseminate agro-climatic data.

13. RESOURCES REQUIRED FOR PROJECT DEVELOPMENT

Staff:

None

Funds

14. ORIGINATING OFFICE CLEARANCE
Signature: Richard L. Podol
Title: Acting Director
Date Signed: MM DD YY (4/7/81)
15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

16. PROJECT DOCUMENT ACTION TAKEN
S = Suspended CA = Conditionally Approved
A = Approved DD = Decision Deferred
D = Disapproved

17. COMMENTS

18. ACTION APPROVED Y
Signature
Title

19. ACTION REFERENCE

20. ACTION DATE: MM DD YY

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GLOSSARY

AID	Agency for International Development.
APT	Automatic Picture Transmission - Low resolution imagery obtained from meteorological satellites.
BDG	Government of the People's Republic of Bangladesh.
BLP	Bangladesh Landsat Programme.
CPP	Cyclone Preparedness Program - A joint venture between the Ministry of Relief and Rehabilitation and the Bangladesh Red Cross.
DCS	Data Collection System - A system of automatic sensors which relay remote ground information to a central station via satellite.
EDT	Environmental Data Transmitter (Also called DCP).
ERIM	Environmental Research Institute of Michigan.
FX	Foreign Exchange.
GMS	A Japanese geostationary weather satellite located near Guam.
HRPT	High Resolution Picture Transmission.
INSAT	An Indian geostationary weather satellite to be launched in 1982 and located over Sri Lanka.
Meteor	A USSR polar orbiting weather satellite.
MSS	Multispectral Scanner.
NOAA	U. S. National Oceanic and Atmospheric Administration.
NOAA V	A polar orbiting operational weather satellite operated by NOAA.

OFDA Office of Foreign Disaster Assistance.

PASA Participating Agencies Service Agreement.

SARC Space and Atmospheric Research Center

SPARRSO Bangladesh Space Research and Remoting Sensing Organization.

TIROS N A polar orbiting experimental weather satellite operated by NOAA.

TOVS Tiros Operational Vertical Sounder.

WEFAX Weather Facsimile.

WMO World Meteorological Organization.

PART I: PROJECT DESCRIPTION

I. Background

Serious interest in space science and its application began in Bangladesh during the mid and late 1960's with the formation of the Pakistan predecessor to the Bangladesh Space and Atmospheric Research Center (SARC). Its activities at first were research-oriented using data obtained from a variety of sources outside of East Pakistan. However, in 1967 the country's first satellite receiving station was purchased and began receiving real time, low resolution satellite imagery from U.S. meteorological satellites.

With this new tool, SARC was able to pursue an independent program of research into the formation and movement of cyclones in the Bay of Bengal. In addition, the ground station provided the country with its first opportunity to apply space technology to solve a recurrent national problem since the real time imagery formed the basis for the country's first early warning of cyclone formation.

By 1970, Bangladesh interest in applied space science had become quite strong and the country sought to participate in the newly announced Earth Resources Technology Satellites (ERTS) program of the U.S. However, the war of independence interrupted the planned participation in this program although SARC still actively continued its meteorological research activities.

In 1973, a few Bangladeshi scientists obtained ERTS (Landsat) imagery of the country and undertook preliminary land use mapping studies. This activity led the government of Bangladesh to organize in 1974 the Bangladesh ERTS program and to initiate a \$1,000,000 project of training and research assisted by the UNDP/FAO. In the same year the Bangladesh ERTS program formally entered into a cooperative agreement with NASA's worldwide ERTS program.

During the past six years, the Bangladesh ERTS program, renamed the Bangladesh Landsat Program (BLP), carried out an active and relevant program of study of the national resources and environment of Bangladesh. Of particular importance have been studies of deforestation in the Chittagong Hill Tracts and the siltation of Kaptai Lake, the accretion rate and cropping potential of new land forming in the Bay of Bengal, estimation of acreage and yield of major crops, investigation of wet and dry monsoon seasons for the development of a cropping calendar related to peak flood and drought periods and the investigation of the structure, dynamics and intensity of cyclonic storms and storm surges in order to develop programs to

minimize their devastating effects. In addition to the above activity, the BLP has been supplying real time satellite imagery to the Meteorological Department and the Water Development Board for their daily weather reports and storm and flood warnings. 14

In 1978 a revised organizational plan for the BLP was prepared and submitted to the Government for approval. The plan called for the establishment of a permanent organization under the Science and Technology Division, Cabinet Secretariat, called the Space Research and Remote Sensing Organization (SPARRSO). SPARRSO is now being formed by merging the Bangladesh Landsat Program and the SARC into a single entity responsible for the construction, operation and maintenance of all space science related activity in Bangladesh for which SPARRSO is specifically authorized exempting only communications satellite facilities operated by the Bangladesh T and T Board. The reorganization will be completed in 1980.

Organizationally, SPARRSO will consist of a core staff of researchers, technicians and trainers and a temporary staff of analysts from user ministries and agencies. The core staff will concentrate on improving the scope and techniques of applying remote sensing technology to problems relevant to Bangladesh while the temporary staff will conduct the investigations and analyses of particular interest to their respective ministries and agencies. SPARRSO and its core staff will provide the facilities and technical support to the temporary staff.

In 1977, the BLP began discussions with AID and NASA regarding their future program of remote sensing. As a result of NASA's decision to authorize a regional Landsat ground receiving station in India, Bangladesh was encouraged to develop its Landsat data and imagery analyses capabilities but not pursue its long standing desire to obtain a Landsat ground receiving station. However, it was suggested by AID and NASA that a number of recent technological advancements in meteorological satellites and their related ground equipment made these satellites more directly relevant to the remote sensing needs of Bangladesh than a Landsat receiving station. The new, high resolution imagery of meteorological satellites coupled to the data obtained from related ground based Environmental Data Transmitters (nicknamed Data Collection Platforms (DCP)) has immediate application in assessing the status of the highly weather dependent agricultural production in the country. A significantly upgraded meteorological satellite receiving and analysis facility would also improve the existing national flood and cyclone warning systems. In addition, since the technology of the new meteorological satellites is similar to Landsat technology, the facilities required to analyze the data and imagery from both satellite systems are the same. In building its capability around the new meteorological satellites, Bangladesh will, therefore, not need to make separate expenditures for

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16 continued development of its Landsat program. The development of this Agro-Climatic/~~Environmental~~ Project is a direct result of these initial discussions and the subsequent project design activity.

The Agro-Climatic/~~Environmental~~ Project is closely related to and builds upon the remote sensing capabilities provided to the Bangladesh Government under two assistance efforts carried out by AID's Office of Foreign Disaster Assistance (OFDA). The first was an Interim Cyclone Warning System provided in 1978 as an emergency response to the loss of the existing satellite receiving capability in Bangladesh when the U. S. meteorological satellite NOAA V failed. With the loss of imagery from NOAA V, Bangladesh was faced with the possibility of being without satellite data for cyclone monitoring during the 1978 October/November cyclone season. However, the interim system was installed in September 1978 and provided a new Automatic Picture Transmission Station (APTS) capable of accessing the low resolution imagery from three satellites - the Japanese geostationary satellite (GMS), the U. S. polar orbiting Tiros N, and the Russian polar orbiting Meteor.

Supplementing this interim system is a High Resolution Picture Transmission (HRPT) receiving capability provided in FY 1980 by OFDA to improve the forecasting accuracy for cyclones, flooding and storm surges. This is being provided primarily as a disaster prediction and preparedness measure, but the equipment is directly applicable to the development problems of concern in the proposed project.

2. Purpose of the Project

The purpose of the Agro-Climatic/Environmental Project is to improve the planning and management of resources in Bangladesh particularly related to agriculture and water development. The project will significantly upgrade the capability of the BDG to obtain, analyze and disseminate a wide variety of data on the agro-climatic environment of Bangladesh in order to improve the informational basis upon which resource allocation decisions are made.

To achieve this objective, the project will provide the facilities and training necessary to more comprehensively employ environmental data obtained from satellites and other remote sensing technologies. Specifically the project will complete the equipping

of SPARRSO's Advanced Meteorological Ground Station, provide an array of ground based remote Data Collection Platforms and provide the equipment necessary to upgrade the analysis of high resolution meteorological satellite and Landsat imagery from the present visual and manual techniques to more precise digital techniques. Along with the above equipment and its related installation, the project will provide factory and on the job training to the ground station operators and repair technicians and training, consultants and commodities for remote sensing applications. The project will be carried out in conjunction with several UNDP projects with SPARRSO and a number of user ministries including the Water Development Board and the Meteorological Department which provide extensive training and consultants in the application of remote sensing technology. 16

The equipment and training provided in this project will have wide application in the fields of agriculture, meteorology, forestry, water management, fisheries, oceanography, demography, transportation, geography, cartography and geology. However, the program of research and applications prepared by SPARRSO for completion during the next five years is primarily concerned with the areas of agriculture, meteorology, water development, forestry and fisheries. Of particular concern is (a) the interaction of the weather and food production in term of early identification of seasonal floods and drought and storm damage; (b) the secular changes in the water and land resources caused by shifts in the size and location of rivers, (c) the patterns of siltation and the emergence of new land particularly in the Bay of Bengal; and (d) an assessment of the development potential of the forested areas and fish habitats. The use of data collection platforms yielding growth-based measurements of hydrologic information, together with the high resolution imagery from TIROS and LANDSAT, will provide a wealth of information on the water parameters in Bangladesh and the deforested areas in eastern Nepal and northern India which eventually affect Bangladesh by increasing silt and water run-off. A better understanding of these problems can help delineate which areas near rivers are prone to inundation or which are safe to farm, thus allowing a managed effort to increase farmed land by predicting water movement.

3. Outputs

After completion of the implementation stage, the direct outputs of the project will be as follows:

A. An advanced meteorological groundstation will have been installed in Bangladesh and will be receiving satellite data on a 24 hour basis. The groundstation will received high resolution picture transmissions from the U.S. Tiros series satellites, the Japanese geostationary satellite (GMS) and INSAT (when launched) and back up low resolution picture transmissions from Tiros, GMS and the Russian Meteor series satellites. In addition, the groundstation will receive the transmissions from the ground based Data Collection Platforms as they are rebroadcast via Tiros and INSTAT. 15

B. An array of thirty Data Collection Platforms will have been placed in relatively inaccessible locations throughout the country and will be monitoring a number of environmental measures including temperature, barometric pressure, humidity, rainfall, river stage and flow, wind speeds and wind direction.

C. The SPARRSO Applications Center will have been constructed and all analytical equipment provided by the project will have been installed and operating. The Application Center will be functioning as the site of the various investigations conducted by the SPARRSO core staff and the temporary staff from the user ministries and agencies.

D. Six Bangladeshi groundstation operators will have received two to three months factory and on the job training on the operation and maintenance of the system. In addition, short term training in the U.S. and other remote sensing training centers will have been provided to the core and temporary staff of SPARRSO related specifically to their investigations in agro-climatic forecasting.

E. For the daily forecast of weather, storm prediction and river stage, SPARRSO will be providing the Meteorological Department and the Water Development Board with copies of all real time imagery and DCP data within 20 minutes of its reception at the groundstation.

The following ongoing activities and new investigations will be carried out as a result of the above direct project outputs A through E. It is these subsequent outputs which will result in the achievement of the project's purpose.

<u>Objective of Investigation</u>	<u>User Ministries Involved</u>
1. Preparation of a categorized land use map and development of an incountry resource management information system.	Agriculture, Forestry, Water Development Board.
2. Study of the cropping pattern and intensity and development of identification keys for major crops.	Agriculture, Forestry.

Objective of Investigation

User Ministries Involved

- | | | |
|-----|--|--|
| 3. | Estimation of acreage and yields of principal crops including extent of damage by natural disasters. | Agriculture, Meteorology, Water Development Board. |
| 4. | Determination of crop calendar. | Agriculture, Meteorology |
| 5. | Development of a planning strategy for moderately and severely flood prone areas of Bangladesh. Delineation of areas prone to inundation, allowing a managed effort to increase land farmed. | Water Development Board, Agriculture, Forestry, Meteorological Department. |
| 6. | Follow-on studies of land accretion in the Bay of Bengal. | Forestry, Agriculture, Water Development Board. |
| 7. | Forest resources inventory. | Forestry. |
| 8. | Mapping and monitoring of coastal afforestation activity | Forestry, Agriculture. |
| 9. | Study of the monsoon clouds over Bangladesh for a better understanding of rainfall, flood and drought. | Meteorology, Water Dev. Board. |
| 10. | Determination of the structure, dynamics, intensity and movement of storms and storm surges. | Meteorology. |

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4. Inputs

The Agricultural/Climate/Environmental Project provides resources in support of the BDG's program to develop the Space Research and Remote Sensing Organization (SPARRSO). The first phase of this Scheme, entitled Scheme for the Bangladesh Landsat Program, was started in 1974 and received a \$683,000 grant from the UNDP in support of a total Scheme costs of \$1,000,000. The present Scheme for SPARRSO builds on the previous effort and is estimated to cost \$12.8 million. This total includes the \$8.79 million described in this Project Paper, the \$546,000 (plus BDG counterpart) provided by OFDA in FY 80 specifically for cyclone preparedness, a \$2.5 million follow on grant from the UNDP for training and the balance for facilities expansion and aerial photography which has not as yet received a firm pledge of foreign donor support.

A. Inputs - USAID

1) Equipment and Services

The system consists of the equipment, spares and services shown below to be provided by NOAA/NASA through a prime contractor. The equipment related to the reception of satellite imagery and data has been selected so that each system can operate independently. Thus a failure of one component will not impinge on the operation of another so that the flow of real time meteorological data is not interrupted. However, where feasible, the system utilizes similar components for interchangeability and compatibility with the equipment provided under the two OFDA supported efforts described in Part I, Section 1 above.

Equipment List and Cost

<u>Item</u>	<u>Cost</u>
Equipment	(in \$1,000)
Antenna, 12 Meter, Pointable	200
INSAT Receiver	26
Tape Recorders (2)	59
Data Processor (INSAT)	500

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Ink Jet Plotter	50
Data Processor (TIROS)	200
DCP (30)	350
DCP Receiver	100
Data Processing Computer (METSAT & LANDSAT)	550
Hard Copy Display	75
TIROS TOVS Data Port	<u>100</u>
Total Equipment Costs:	2,210
Spares	230
Test Equipment	150
Systems Design, Direct Engineering (Inc. contractor related travel)	850
Shipping	<u>200</u>
Total Cost: Design, Procurement and Installation	3,640
NOAA/NASA	<u>40</u>
Total Cost:	3,680

2) Operations and Maintenance Training and Consultants

The project will provide training and consultants for the purpose of improving the operations, maintenance and analytical capability of the personnel associated with the ground station and user agencies.

Operation and Maintenance (O&M) training will be provided to six individuals employed by SPARRSO. The training will be factory based and occur during the fabrication of the actual equipment to be provided by the project. As such, O&M training will be short term primarily in the U.S. and will require Bangladeshi personnel who are familiar with electronic equipment. The project will provide 16.5 person months of factory training as follows:

Factory Training

Antennas	
2 persons - 1 month each	2 PM
Receivers	
2 persons - 2 weeks each	1 PM
Data processing	
2 persons - 1 month each	2 PM
Research computer and display	
2 persons - 1 month each	2 PM
Hard copy image generator	
4 persons - 2 weeks each	2 PM
System familiarization & operation	
6 persons - 1 month each	6 PM
Contingency	<u>1.5 PM</u>
<u>Total Factory Training</u>	16.5 PM

In addition to the above, the prime contractor will provide on the job training during installation and checkout of the system and 10 person months of consultants for in-country follow up O&M training.

Summary of O&M Training Costs

	<u>Cost</u> (in \$1,000)
16.5 PM Short term factory training	45
10 PM O&M consultants	<u>80</u>
Total Cost	125

3) Applications Support

The project will provide \$300,000 for training, including course work, seminars and conferences, consultants and specialized commodities related to the application of remote sensing data to priority areas described in the Project Purpose above. Short term training will be provided to SPARRSO core and temporary staff involved in application activities. All training will be provided to in-service employees selected by the user ministries and agencies who are already familiar with their respective fields. In addition, these funds will finance short term experts for in-country consultations with applications analysts. Finally, the funds will be available for the procurement of a limited amount of commodities required by field personnel who are implementing an information system or field experiment directly related to the application of remote sensing data to planning and development problems in Bangladesh. An illustrative allocation of these funds is as follows:

Applications Support

<u>Item</u>		<u>Cost</u> (in \$1,000)
Training	16 PM Short term	142
Consultants	5 PM	80
Commodities		<u>78</u>
	Total	300

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4) Project Monitor

\$210,000 is provided for a Project Monitor to be assigned full time for the first two years to assist in project management and implementation. Both technical and managerial expertise will be required. The monitor will assist in such functions as ground station management, data management and dissemination, and remote sensing analytical methods.

5) Evaluation costs of \$80,000 are provided for two annual evaluations and a special in-depth evaluation at project completion.

Summary of Budget-USAID Inputs

Equipment: Design, Procurement and Installation	3,680
O&M Training and Consultants	125
Applications Support	300
Evaluation	80
One Long-Term Project Monitor, two years	210
Contingencies	605
Inflation	<u>900</u>
	5,900

B. Inputs - Bangladesh Government

The BDG contribution to this project is principally composed of the local currency component required for the Scheme for SPARRSO. The main local cost items are: (1) a parcel of land in Savar Thana (about 20 miles northwest of Dacca) for the groundstation receiving facilities; (2) a three acre site at Agargaon adjacent to Sher-e-Bangla Nagar, Dacca for the SPARRSO Applications Center and related buildings; and (3) salaries and administration expenses.

Both sites for the facilities will be fully prepared by the BDG with the provision of all necessary utilities, boundary walls, access roads and residences for the station operators. The sites will be linked together by an electronic data repeater so that real time data is received in the SPARRSO Applications Center from the groundstation.

The BDG will construct all necessary foundation pads for the antennas to be provided by the project. In addition, they will finance the relocation of the existing 6 meter antenna from the present site of the interim groundstation at Sher-e-Bangla Nagar, to the Savar site.

The SPARRSO Applications Center will be located across the street from the Meteorological Department's facilities and will be a four story office and laboratory building. The Application Center will be furnished and suitably air-conditioned for the protection of the laboratory equipment.

The BDG will finance the round trip air travel of all trainees to the U. S. and third countries from Bangladesh to the farthest point served by their national carrier, Bangladesh Biman. All salaries of trainees will be paid by their respective Bangladesh offices.

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Summary of Budget - BDG Inputs
(in \$1,000)

Data Collection and Analysis:

Site for groundstation and SPARRSO Center	400
Site preparation	60
Antenna pads	10

Buildings:

Laboratory/offices (Application Center)	1,330
Residences	670

Salary/allowances/air travel	80
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Contingencies and Inflation	<u>340</u>
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Total BDG Input:	2,890
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PART II: PROJECT FEASIBILITY

1. Technical Feasibility

This section begins with a brief description of the technology underpinning the project in terms of satellite design, operation and capability. It then discusses the satellites (and their applications) which will be utilized by the project and finally concludes with an overall assessment of the feasibility of the technology in offering useful solutions to specific planning and resource management needs of Bangladesh. This section is based on a number of reports and articles prepared by NASA, NOAA, the Corps of Engineers, U.S. research institutes such as the Environmental Research Institute of Michigan (ERIM) and studies conducted by researchers of the Bangladesh Landsat Program. Frequent site visits in Bangladesh have been made by experts from NASA, NOAA and the Corps of Engineers.

A. Satellite and Groundstation Technology

The most widely used instrument on board remote sensing satellites is a multispectral scanner (MSS). This device measures the amount of solar radiation reflected by a unit of area on the earth's surface. MSSs are sensitive to a number of different frequencies in both the visual range (i. e. green & red) and the infrared range of the electromagnetic spectrum and, as the name implies, scan the earth's surface under the satellite, recording and transmitting the multispectral data on a very large number of small area units of the earth's surface. The groundstation which receives the stream of data from the MSS reproduces the information as an image of the earth's surface. Each image provides a visual picture of the pattern, intensity and wavelength of the solar energy reflected by the earth.

The capability of an MSS is determined by the type of problem addressed by the satellite. The MSS on board Landsat satellites measures the reflected radiation of each 4800 square meter unit of area along a path from the north to the south pole which is 185 kilometer wide. A new version of Landsat to be launched in 1980/81 will have improved capability and will measure each 900 square meter ($\frac{1}{4}$ acre) unit of area over the same path. Meteorological satellites, on the other hand, do not have such a high resolution

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requirement as Landsat. For example, the High Resolution Picture Transmission system (HRPT) on board the Tiros satellites measures each 1.21 square kilometer unit of area along a pole to pole path 5200 kilometers wide. The high resolution GMS measures each 4 square kilometer area and views approximately one third of the entire planet. Thus ground features are highly detailed by Landsat imagery while Tiros and GMS provide a very useful synoptic view of large cloud and weather system formations.

In addition to the multispectral scanner, most of the remote sensing satellites to be used by this project carry a Data Collection System (DCS). A DCS is merely an electronic data repeater which receives ground broadcasts from a number of widely scattered remote environmental sensors (DCP) and rebroadcasts the information to the central groundstation receiving facility. While the DCPs could be manufactured to have sufficient power for direct overland broadcasts, the use of the satellite as a data repeater greatly improves the reliability of the broadcast by avoiding the radio interference (mountains and storms) which affect overland transmission and reduce the size and power requirement of the DCPs. Thus DCPs can be operated on a solar collector - battery power source.

The ground based DCPs are small, selfcontained units which are instrumented to monitor a variety of environmental conditions in their immediate areas. The particular instrument configuration depends on the environmental problem to be measured. In this project, the purpose of the DCPs is to monitor the meteorological and hydrological conditions along the principal river systems in Bangladesh measuring, among other parameters, precipitation and river stage and discharge. Information obtained by the DCPs will be used to determine the irrigation potential of the various river systems, routine hydrologic forecasts and flood and drought warning.

In addition to the above systems, the Tiros series satellites contain several additional scientific packages which are particularly relevant to meteorology. These systems are described in more detail below.

B. Satellites to be used by the Project

This section discusses the satellites whose output will be used by the project in the achievement of its purpose. The discussion includes brief notes on the advantages and disadvantages of each satellite.

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1. Landsat

The Landsat series of polar orbiting satellites has been operational since 1972 and has been widely used throughout the world in a large number of resource assessment studies by governments, private corporations and universities. Currently there are two Landsat satellites orbiting the earth with a third to be launched in 1980-81. While this project will not provide any Landsat receiving equipment, it will provide equipment needed to analyze the data and imagery procured from the U. S., India and, shortly, Thailand.

In Bangladesh, Landsat data is currently relevant to the study of undiscovered resources or resources which change slowly over time such as surface and subsurface water, forest products, land accretion and land use mapping. To cite a few examples, studies carried out by the Bangladesh Landsat Program show that Landsat data are particularly useful in establishing land and water boundaries and the pattern of siltation/erosion both in inland waterways and along the coast. Imagery has also been useful in delineating forested area from cropland and with SPARRSO's existing inventory of Landsat imagery dating back to 1974, the degree of forest encroachment can be assessed. Landsat's ability to provide a synoptic view of subsurface water and ground moisture makes it a unique tool for the study of the suspected desertification occurring in the Bogra-Pabna-Rajshahi area of the country. Early assessment of this environmental change is critical to the prevention of a Sahel type famine.

Since Landsat is unable to see through clouds, its usefulness is limited throughout the early monsoon season. Additionally, its current approximately 70 x 70 meter resolution restricts its accuracy in crop forecasting due to the very small size and highly fragmented cropping pattern in the country. However, the soon to be launched Landsat D

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will largely overcome this latter problem with its 30 meter x 30 meter resolution. In areas where larger acreages prevail, SPARRSO is currently determining the spectral crop signatures in anticipation of the more accurate crop forecasting capability of Landsat D for amon and winter crop production estimates.

Landsat has an on board Data Collection System but this will not be available to Bangladesh.

2. The Japanese Geostationary Meteorological Satellite (GMS)

The GMS is a high altitude (36,000 km) equatorial orbiting satellite whose eastward speed corresponds to the rotation of the earth thereby fixing the satellite over one point on the earth's surface - thus the term "geostationary".

The satellite provides a set of eight images of the earth each hour encompassing the entire western Pacific Ocean, China, Southeast Asia, Australia, Indonesia and the Bay of Bengal. It has excellent application to Bangladesh in the identification and tracking of large storm systems which originate anywhere in the northern hemisphere of its field of view and move toward Bangladesh. Its hourly, high resolution imagery permits the preparation of time lapse displays with good picture quality.

Its disadvantage is that Bangladesh is located in the extreme western edge of the imagery and the distortion prevents the computation of detailed wind vectors over the Bay of Bengal as storms approach Bangladesh.

The GMS has a Data Collection System which is only available to Japanese users.

3. INSAT (Indian Geostationary Satellite)

INSAT, when launched, will become one of the two most important meteorological satellite data sources for Bangladesh. Like GMS it will be placed in a geostationary equatorial orbit in the vicinity of Sri Lanka. Its hourly high resolution, undistorted imagery of Bangladesh and the Bay of Bengal will allow for the preparation of detailed weather forecasts for the country and the Bay.

INSAT will contain a limited data collection system which will be fully utilized by India.

A Condition Precedent to disbursement of funds for the procurement of goods and services to be used in conjunction with INSAT will require that the Bangladesh Government reach agreement with the Government of India regarding Bangladesh's use of imagery from INSAT.

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3/ 4. The Russian Meteor

The Meteor is a very high resolution polar orbiting meteorological satellite which provides excellent imagery of Bangladesh. Because of its high resolution and narrowness of path width, it is particularly useful in the analysis of cloud structure. In addition, it has good capability to differentiate land and water and its real time imagery makes it very useful for the very rapid general assessment of flooding.

Its primary disadvantages are its occasional interruptions in transmissions (up to several weeks at a time) and its narrowness of path width which could allow for the formation of a storm system to be completely missed if the cloud formation is off the edge of the imagery.

The Meteor has no Data Collection Capabilities.

5. Tiros - N and NOAA series

The Tiros N and its follow on operational satellites in the NOAA series are the complementary satellites to INSAT in achieving the meteorology related objectives of this project. Tiros consists of two polar orbiting satellites which provide high resolution imagery of Bangladesh and the Bay of Bengal every six hours in four different spectra (visible, near infrared and two infrared). In addition, it contains a number of other meteorological sensors which permit the calculation of a vertical temperature profile including surface temperature, water vapor content of three layers of the atmosphere and ozone content.

The Tiros satellites have an on board Data Collection System which will be available to Bangladesh .

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C. Appropriateness of Technology to Bangladesh

Remote sensing for the acquisition of information needed for the solution of a wide variety of planning and resource management problems is a proven technology in the U.S. and other developed countries. Landsat imagery is regularly used in conjunction with other data sources in the agricultural sector for crop forecasting, crop damage surveillance, drought assessment and pollution monitoring to cite a few examples.

In terms of current applications in Bangladesh, Landsat is a very appropriate tool for obtaining information on large area phenomena which is either generally inaccessible or subject to significant errors by ground observation. One important example is the estimation of irrigated winter wheat and boro rice. Since intercropping is not significant in the dry season and irrigation is generally done in blocks larger than one acre (the resolution of the present satellite) more accurate data on this issue can be obtained from Landsat imagery than from the methods of ground observation anticipated over the next ten years. In addition, the imagery from Landsat D will be useful for crop production estimation since its $\frac{1}{4}$ acre resolution will overcome the current estimation problem caused by the small size of farmed plots. Another example is the use of Landsat imagery, acquired over several dry seasons, to clearly

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33 depict the changing relationship between forest land and cropland and to identify those areas of Bangladesh's remaining forest which are under the greatest encroachment pressure. Studies using Landsat data on the issue of forest depletion have been successfully carried out in other developing countries and, in the case of Thailand, resulted in a significant effort by the Thai Government to initiate a major forest resources management program to reduce encroachment and replant deforested areas.

The changing relationship between land and water is also eminently suitable for Landsat based analysis. Changes in the volume and course of rivers, siltation, erosion, turbidity and pollution are clearly identified and analyses based on Landsat imagery yield a more comprehensive and accurate description of these conditions in Bangladesh than ground based studies. This capability has been successfully employed in other developing countries. For example, Pakistan, through the use of Landsat imagery, was able to identify a site for the development of a new port complex near Karachi which minimized annual dredging requirements. In this case, the Landsat imagery provided the only method of observing the offshore pattern of siltation and open channels.

Data from meteorological satellites are an important input to the regular weather forecasts of a large number of countries throughout the world and play the principal role in the early identification and tracking of severe storms. Bangladesh itself has been using meteorological satellite data since 1969 for these purposes and has based most of its cyclone warning system on this technology since there are no alternative data sources providing accurate and timely information about the weather condition in the Bay of Bengal. While the existing facilities in Bangladesh provide low resolution imagery and OFDA will finance in FY 80 the installation of high resolution Tiros and GMS receiving equipment, a NOAA study carried out in Bangladesh in March 1979 concluded that the optimum type of satellite data for tropical cyclone analysis is provided by a high resolution geostationary satellite located approximately over the cyclone region. The equipment to receive INSAT, financed by this project, will provide this capability to Bangladesh.

Meteorological satellite imagery is an important data source for Bangladesh for the regular forecast of the weather if used in conjunction with conventionally obtained data, (i. e. ground radar and decentralized weather observation stations). The high resolution

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imagery from Tiros and the geostationary satellites permit the study of cloud formation, structure, wind speed, temperature, water vapor content and movement. Combined with the instantaneous ground information obtained from the Data Collection Platforms (DCPs), accurate estimates of rainfall can be obtained. Thus, the timing and strength of the monsoon can be carefully monitored in order to advise farmers on cropping schedules and the potential need for supplementary irrigation at the start and finish of the monsoon season. Additionally, the combination of satellite imagery and DCP data can be used to advise farmers of the likely extent of inundation which may result from storms in Bangladesh and further up the watershed in India and Nepal and from snowmelt occurring in the Himalayas. A better understanding of the water parameters in Bangladesh, siltation and runoff will help delineate areas safe for farming from those which are flood prone.

Tiros, in addition to its meteorological uses, has a direct application to the Bangladesh fishing industry since its capability to measure sea surface temperature allows for the identification of warm areas in the Bay of Bengal which have relatively higher concentrations of fish.

D. Technical Feasibility Conclusions

The technology to be transferred to Bangladesh by this project is widely used throughout the world and has been successful in providing reliable, accurate and timely data to planners and managers in developing countries. Bangladesh analysts have, in fact, used this technology in facilities in the United States and other developing countries. Therefore, the development of the remote sensing capability provided by this project is considered a technically feasible solution to the agricultural resource and meteorological information needs of Bangladesh. Engineering, technical and other plans necessary to carry out the project are available and reasonably firm cost estimates have been developed. Thus, the requirements of Section 511(A) (1) of the FAA are considered met.

2. Administrative Feasibility, Operation and Maintenance

As described in Part I.1. above, the BDG has approved the reorganization of its agencies concerned with space science and remote sensing. The reorganization will result in a single agency-- SPARRSO--which will have the responsibility to operate and maintain the groundstation facilities and the Applications Center which will be the principal residency for application investigations. SPARRSO's core staff of administrators, researchers and equipment operation and maintenance technicians will be supplemented by the temporary

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staff of investigators from the user ministries and agencies. This arrangement is a continuation of the organizational structure established for the Bangladesh Landsat Program and over the past six years it has resulted in the development of productive working relationships between the BLP staff and temporary investigators from user ministries. A particularly close relationship has been maintained between the BLP and SARC so that their merger as planned in the reorganization will have no disruptive effects. The organizational structure of SPARRSO, following closely that of the BLP, is similar to the very successful remote sensing agency established in Bolivia. In both cases, the findings of the investigating staff are immediately internalized in the decision making process of the user agencies and ministries since the identification of priority problems, their study and presentation of findings are conducted by employees of the user agencies and ministries themselves. While the facilities and core staff of SPARRSO assist the investigators to conduct their studies, SPARRSO as an autonomous agency will not be conducting research for subsequent external imposition on a development ministry or agency.

Since SPARRSO is a continuation of BLP and SARC, its capability can be assessed by a review of the performance of these predecessor agencies. Since its formation in 1974, BLP has provided the BDG with immediately useful information and has been able to win for itself support from the government budget as well as from foreign donors. Two examples of studies which caused BLP to obtain resources from the BDG for a laboratory and office space are: (a) a study of Kaptai Lake which showed that it did not inundate non-Bangladeshi lands; and (2) a study and mapping of the coastal region which showed the extent of new land accretion. The BLP has most recently completed a comprehensive land use map of the country. Since 1974 the BDG has supplied all local currency requirements of the program and the BLP has obtained assistance from the U.S., the Australians, UNDP, IDRC and the World Bank for its FX capital equipment requirement. A continuing need after project termination for training in computer applications and other technical specialties is expected to be met through a planned UNDP follow-on project with SPARRSO which will develop in-house training capabilities. In addition, the training capabilities at the Asia Regional Remote Sensing Training Specialties Institute in Thailand will be drawn upon.

Closely linked to BLP is the Space and Atmospheric Research Center (SARC) of the Bangladesh Atomic Energy Commission. The personnel of SARC have been on the BLP Task Force and the APT equipment at SARC has been used whenever helpful in BLP's analyses. The APT equipment was purchased in 1967 by the then Government of Pakistan from its own FX (approx. \$30,000) and the BDG has continued to supply the annual FX needs for its operation and maintenance.

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Another demonstration of the organizational capability of the BLP and BDG commitment was the implementation (including the provision of all local currency) of the Interim Cyclone Warning System which from the time of project conceptualization to project completion was only 5 months. The BDG provided land, personnel and funds to carry out site preparation and to construct a laboratory. The total cost excluding the value of land of the interim system to the BDG was approximately Tk. 900,000 (\$60,000). Finally over the past year and one half, the BDG has procured imported operating supplies (tapes and paper) and spare parts for this interim station from its own FX. The most recent procurement occurred in April 1980 and cost \$13,000. This Interim Cyclone Warning System has been in continual operation since its inauguration and supplies imagery to the Meteorological Department for its daily weather forecast. On several occasions, analyses of the Interim System's imagery by the Meteorological Department have resulted in the issuance of cyclone warning to the coastal populations and limited area evacuations of people residing along the predicted path of the cyclone and storm surge.

For the first two years, SPARRSO (FY 1980-81) has a funding level approved by the Planning Commission of \$2 million in local currency. These funds are from the BDG development budget. On the recurrent side (i.e. funds from the BDG's revenue budget) SPARRSO is budgeting Tk. 90 lac (\$600,000) per year of which Tk. 20 lac (\$133,000) is FX. The recurrent budget will start in 1982. The BDG, in approving this project, also agrees that FX required for operation and maintenance of the groundstation during the period between the installation of the equipment (1980) and the start of the recurrent budget in 1982 will be provided as necessary. Approximately \$150,000 may be required for this period. In addition, the current recurrent budget of SARC (\$40,000 per year of which \$10,000 is FX) will be added to this. The above budgeted amounts are considered adequate to operate and maintain the HRPT system.

The past performance of the BLP and SARC in carrying out activities and obtaining the support of the BDG and foreign donors has been remarkable considering their relatively short period of operation and their involvement in what is considered by many to be high technology. There is no indication that the financial interest of the BDG will shift away from SPARRSO or that the personnel will be removed from the organization without proper replacements being assigned.

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In reviewing the current operation, NASA concluded that "..... though the satellite and ground system are new technology, the BDG will have no difficulty in operating or maintaining the system as long as the proper training and follow-up are provided". (From Report for Phase 2 - Intermediate System Description, September 1978, USAID). The AID budget projected for this project includes \$125,000 specifically for maintenance training and upto 10 person months of follow-up consultants if required. Additional funds will be provided within the equipment installation contract for training personnel to operate the equipment.

3. Social Soundness

A. Social Impact

The impact of this project on the people of Bangladesh is a function of the kinds of decisions made and actions taken as a result of the data provided by the satellites and DCPs. The project assumes that a better information base will result in better decisions and actions by the responsible users of the information. Consequently, the social soundness and the distribution of benefits of this project follow from the general social consciousness and equity interest of the government itself. While this project seeks to improve the knowledge base of the responsible users, the spreading and maturing of the youthful democratic institutions must continue to occur in order to avoid adverse social consequences. One possible adverse social consequence is the tendency of the project to reinforce central decision making. However, given existing BDG regulations which require the consent of local bodies for project implementation, actions which result from data provided by this project will be reviewed and approved by decentralized decision makers.

B. Beneficiaries

The impact of this project on the production and incomes of the rural people in Bangladesh is indirect since the remote sensing data must be interpreted and the findings acted upon by people working in the various relevant agencies such as Agriculture, Forestry, Fisheries, Water Development Board and Meteorology.

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However, as noted in the Technical Feasibility above, remote sensing information is relevant to a number of agriculture related questions in Bangladesh and could effect food production and incomes in the following ways:

- 1) Better preliminary estimates of crop production could lead to a significantly improved foodgrain procurement program by the BDG.
- 2) A more comprehensive understanding of soil types and water availability could result in a better cropping pattern with increased farm output and incomes.
- 3) A forest inventory could revitalize forest management practices and result in more jobs in the forest products industry.
- 4) Early knowledge of sea-surface temperature could result in larger fish catches with the resultant increase in job and incomes.
- 5) The early notification of floods and cyclones could reduce losses by allowing affected people to protect their lives and movable property so that post-disaster agriculture could be more rapidly re-started.

The capability to estimate crop production is perhaps the most important output of the project in terms of potential national benefits. The current method of crop production estimation is prone to sizable errors and not avoidable when needed. However, knowledge of domestic production, particularly of the aron crop, is crucial in the determination of the Government's domestic food-grain procurement and the estimate of required international procurement. An improvement in crop production data which reduces the frequency of unexpected foodgrain gluts and shortages would represent a significant and valuable management tool for the Government of Bangladesh particularly in its dealings with the food donors. Early identification of production shortfalls particularly those which result from infestations of disease or natural disasters could be rapidly assessed by remote sensing so that external procurement would be undertaken commensurate with domestic needs. In addition,

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the fluctuations in the domestic rice price would be reduced as accurate knowledge of production and inventory would eliminate the speculative pressures which now arise when rumors of glut or shortfalls cannot be verified.

The project will contribute to the BDG's efforts to estimate crop production, prepare comprehensive soil type and water maps. Over the long term, as the state of the art and its applications in Bangladesh develop, these capabilities will affect total food production and farmers incomes as cropping patterns are developed which are most compatible with the environmental conditions. Knowledge of soil types and water availability is particularly important in the development of extension promotional programs which seek to introduce cash crops which may be new to target farmers groups.

It should be noted that with the exception of the Cyclone Preparedness Program (see Annex F) which is heavily reliant on satellite imagery, the information systems now in use in Bangladesh do not encourage the development of effective extension outreach to the rural areas. However, given improved information on such topics as the status of crop production, disease infestation, soil types, water availability and flood and drought conditions, the quality and responsiveness of these extension systems are expected to evolve to the same degree of effectiveness as the presently successful Cyclone Preparedness Program.

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C. Involvement of Women

For the past six years the BLP has had a strong policy to employ women professionals and staff. The result has been that the current SPARRSO core of 26 employees consists of almost 20% women. On the professional level there are two women scientific officers and one librarian. On the staff level, there are two women secretaries. SPARRSO is currently recruiting an additional woman for the position of senior scientific officer in the Instrumentation Division. The involvement of women in SPARRSO is quite unusual when compared to the employment of women in other areas of the government and results from the high degree of dedication to this outcome by the leadership of SPARRSO. This project will support and enhance the continued involvement of professional women in the development problems of Bangladesh by providing the support necessary to effectively practice their profession.

While the project is expected to have a beneficial impact on women in Bangladesh, the indirect benefits will not be catalogued separately from those discussed above.

D. Equity Issues

In a project of this nature, equity issues for the most part do not arise. As the output elements of the project are disseminated through established agencies--described in preceding sections and in the Technical Analysis--all Bangladeshis will essentially benefit equally. Improvement of forecasting and warning systems, which in turn can improve planning and execution of BDG operations, will over time improve economic and social conditions in the country.

4. Economic Feasibility

The project's economic feasibility is considered in terms of its cost effectiveness rather than the more frequent benefit/cost analysis since benefit estimation will remain highly subjective until experience has been gained on the actual uses of data by the development ministries and agencies. However, the use of cost effectiveness analysis is also not without subjectivity since a number of applications of satellite data do not have a realistic alternative technology by which a fair cost comparison can be made.

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For example, the hourly synoptic imagery of the Bay of Bengal for routine weather forecast which will be provided by INSAT cannot be exactly duplicated by an aircraft or surface observation even if a very large deployment of ships and planes is initiated. Not only would less data be obtained but the approach of serious weather would force the termination of this information collection system precisely when it is most needed. On a cost basis the groundstation operation is likely to require \$75,000 per year for materials, supplies and spares and \$1,000 per year per employee. Therefore, twenty employees could operate and maintain the proposed groundstation 24 hours per day, everyday of the year for a total of \$95,000. On a daily basis the acquisition of satellite data costs \$260. Aircraft, on the other hand, costs approximately \$1,500 per hour and would be required for at least four hours per day resulting in a daily data acquisition cost of \$6,000, a cost 23 times greater than that required for the satellite data assuming the twenty groundstation employees were solely employed for the purpose of handling the meteorological satellite imagery.

However, these same twenty employees are also able to receive the data from the remote DCPs. Assuming Bangladesh could hire personnel to reside and work in these remote locations, a manned information collection system to replace the DCPs would require 110 persons, assuming three shifts at each of 30 locations and three shifts of Dacca based radio operators plus extra personnel to cover leave time and maintenance. If the personnel required for the manned stations are paid one half of the salary paid to the groundstation operators and their ground based communications system costs \$5,000 per year to maintain, the total cost would be \$60,000. Therefore, the operation of the groundstation could be dedicated 63% of its time to the DCP system and still cost less than a manned system. Again, when weather conditions deteriorate, the reliability of the manned system would decline while DCPs would be essentially unaffected.

A similar, but more comprehensive cost analysis can be made to underscore the relative economy of remote sensing to obtain information related to agricultural production and forestry. Such a study was undertaken for AID by the Environmental Research Institute of Michigan in 1974. The study, entitled "An Economic Evaluation of the Utility of ERTS Data for Developing Countries", by Lowe Summess and Greenblat, concluded that Landsat data has the potential

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for significant economic benefits to developing countries if the program is user oriented and decisions and actions are made on the basis of the information obtained. The reader is referred to this study for a more comprehensive treatment of remote sensing applications and their benefits.

5. Cost Estimate and Financial Plan

Cost estimates for the major components of the project are tabulated in the Summary of Cost Estimates in Table I.

The estimates for the equipment for the groundstation were prepared by USAID experts who visited Dacca in March 1980. (See Inputs for a listing of the equipment to be provided). The estimated cost of installation includes the contractor's expenses for labor, overhead, fixed fee, and on-the-job training of Bangladeshis to take place during the installation and checkout of the system. However, the main cost of training of personnel in the operation and maintenance of the system is separately shown in Table I. The noted resources will finance approximately 16.5 persons months (pm) of factory training in the U.S. (shown in the Inputs section above) based on an average cost of \$2,600 per person month. In addition, 10 person months of consultants for operation and maintenance are included to provide follow-up training after the start up of the system. The total resources programmed for these consultants is based on an estimated person month cost of \$8,000.

The value of the land to be used by the project has been estimated by the BDG at the current market value of the sites. The land has in fact been owned by the BDG for several years. The land value is included since it reflects the opportunity cost to the government. Site preparation costs were determined by the Public Works Department for the SPARRSO.

The amount shown for salaries/allowances/misc. is part of the budget for the first two years of the Scheme for SPARRSO. The total number of personnel to be involved has been approved by the Planning Commission and the salaries and allowances are in accordance with standing BDG scales.

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TABLE I

SUMMARY OF COST ESTIMATES
In \$1,000)

	<u>AID</u>	<u>BDG</u>	<u>TOTAL</u>
I. <u>FACILITIES AND SERVICES:</u>			
A. <u>Sites</u>			
Acquisition	-	400	
Preparation		70	
B. <u>Buildings</u>			
Labs & Offices		1,330	
Residences		670	
C. <u>Equipment</u>			
Procurement	2,590		
Shipping	200		
Installation	890		
D. <u>BDG Salaries/allowances/ musc.including air travel</u>		80	
Total of I:	<u>3,680</u>	<u>2,550</u>	<u>6,230</u>
II: <u>TRAINING:</u>			
A. <u>Factory Training</u>	45		
B. <u>Consultants</u>	80		
Total of II:	<u>125</u>		125
III: <u>APPLICATIONS SUPPORT:</u>			
A. <u>Training</u>	142		
B. <u>Consultants</u>	80		
C. <u>Commodities</u>	78		
Total of III:	<u>300</u>		300
Subtotal (I+II+III):	<u>4,105</u>	<u>2,550</u>	<u>6,655</u>
<u>IV. Project Monitor; two years:</u>	210		210
<u>V. Evaluation</u>	80		80
<u>VI: Inflation</u>	900	100	1,000
<u>VIII: Contingencies</u>	605	240	845
TOTAL (I to VII)	<u>5,900</u>	<u>2,890</u>	<u>8,790</u>

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Contingencies and inflation have been estimated at approximately 25% of FX costs and 13% of local costs. The principal intent of the FX contingencies is to hedge against inflation during project implementation. Local currency contingencies are actually 16% of planned L.C. expenditures since the cost of land has already been incurred.

Total project costs are, therefore, estimated at \$8,790,000 with \$5,900,000 in FX provided by AID and \$2,890,000 in local currency provided by the BDG.

Table II relates the total cost of inputs to outputs. The separation of the cost to outputs #1 and #2 is somewhat arbitrary because the equipment, installation and O & M training costs are highly interrelated. If the project had only provided output #1, the marginal cost of adding equipment at a later date to obtain output #2 would be less than that shown on Table II (perhaps as low as \$400,000). However, output #1 would have appeared more costly than that shown and the equipment would not have been used in accordance with its design capacity.

The phasing of expenditures is shown in Table III. Since the BDG Planning Commission has approved the Scheme for SPARRSO, the government has allocated the sites and has provided the funding for construction. Site preparation and construction of the required buildings is underway.

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TABLE II
COSTING OF PROJECT OUTPUTS/INPUTS
(In \$1,000)

	Outputs				Line item Totals
	#1	#2	#3	#4	
	Ground receiving Station	Data Collection System	SPARRSO Operation Center	Applications Support	
<u>AID:</u>					
Equipment, spares & test equipment	578	355	1,657	78	2,668
Training	20	5	20	142	187
Consultants	35	10	35	80	160
Contractor services & shipping	720	160	210	-	1,090
Monitor	50	50	50	60	210
Evaluation	20	20	20	20	80
Contingencies & inflation	605	300	500	100	1,505
Subtotal(AID):	2,028	900	2,492	480	5,900
<u>BDG:</u>					
Sites & site development	80	10	380	-	470
Buildings	250	50	1,700	-	2,000
Training	5	2	-	7	14
Salaries	20	5	30	11	66
Contingencies & Inflation	40	2	270	28	340
Subtotal(BDG):	395	69	2,380	46	2,890
Total(AID plus BDG):	2,423	1,552	4,872	526	8,790

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TABLE III
PROJECTION OF EXPENDITURES BY FISCAL YEAR
(In \$1,000)

Category	Fiscal Year				Total
	1980	1981	1982	1983*	
<u>AID:</u>					
Equipment	-	2,590	70	8	2,668
Training	-	145	32	10	187
Consultants	-	40	40	80	160
Contractor services	-	1,090	-	-	1,090
Monitor	-	80	105	25	210
Evaluation	-	10	10	60	80
Contingencies & Inflation	-	500	700	805	1,505
<u>Subtotal (AID):</u>		4,455	957	888	5,900
<u>BDG:</u>					
Sites & Preparation	470	-	-	-	470
Buildings	1,500	500	-	-	2,000
Training	-	7	2	5	14
Salaries	-	30	36	**	66
Contingencies & Inflation	-	200	140	-	340
<u>Subtotal (BDG):</u>	1,970	737	178	5	2,890
<u>Total (AID plus BDG):</u>	1,970	5,192	1,135	493	8,790

* Expenditures required to complete activity started in FY 81
** BDG salaries in FY 82 not counted as counterpart for this project.

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The major expenditure of AID resources will occur in FY 81. It is expected that all equipment will be procured in FY 81 and shipped and installed in FY 81 and 82. O & M training will also occur in FY 81 but the training of the analysts will be programmed through FY 83. The consultants, notably of O & M, are also programmed largely in FY 82 and 83.

BDG funding of construction is expected to be disbursed through both FY 80 and 81.

Local currency contingencies decline in FY 82 reflecting pressure to spend in this category during FY 81 since new contingency funds will be made available when the next two years of the Scheme are approved (FY 83 and 84).

6. Project Implementation

AID financed inputs will be managed by SPARRSO. SPARRSO will receive, operate and maintain all equipment related to the satellite groundstation to be supplied under the project. In addition, SPARRSO will receive all operation and maintenance training resources. SPARRSO will be responsible for all site preparation and construction of all antenna pads and related groundstation buildings. SPARRSO will insure that the site is supplied with the required water, power and sanitation facilities.

The provision of all groundstation related equipment and supplies, their installations, start up, checkout and the training of operation and maintenance personnel will be under the direct responsibility of NOAA through a Participating Agency Service Agreements (PASA) with AID and NASA. Within 90 days after execution of the PASA, NOAA will submit to SPARRSO a detailed schedule of procurement, shipping, installation and operation and maintenance training. In addition, NOAA will supply SPARRSO with all necessary technical details required by SPARRSO for the construction of the antenna pads and related groundstation support facilities.

Because SPARRSO's organizational structure includes representatives of the various user ministries on its supervisory national committee and as investigating staff, SPARRSO will be the sole coordinating agency for the project's resources provided for training, consultants and commodities in applications. These resources will be

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shared by SPARRSO and the user ministries and agencies and will be released to the BDG upon submission for AID approval of training/consultant plan within 120 days of the signing of the Project Agreement. Project monitoring and evaluation will be done by a full time monitor who will combine technical and managerial expertise and will assist in project coordination, data management and ground station management and remote sensing analytical methods. The monitor may be either a US Government employee provided through the PASA or a personnel services contractor.

USAID/Dacca staff will also participate in project monitoring and will be assisted as needed by experts provided by PASA arrangements with NOAA, NASA and the Corps of Engineers.

Schedule of Project Events

Month

Pre Project	Site preparation completed. Building construction commenced.
0	Approval of Project by BDG/USAID. Signing of Project Agreement between BDG/USAID.
2	Signing of AID/NOAA PASA.
4	Submission of NOAA implementation plan.
5	NASA begins equipment contracting.
5	Submission of BDG training consultant plans.
6	Building construction completed.*
6-10	O & M training initiated. Equipment procured. Training of analysts initiated.
23-27	Equipment installed.
28-30	Equipment checkout period.
18-36	Training completed.

*Construction already in progress.

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7. Evaluation Plan

Routine evaluations will be conducted during the three years of the project. Depending on the activities schedule, these evaluations will be based on the monitoring reports and inspection of the physical facility. The evaluations will determine that project inputs are being provided as planned, that conditions and covenants of the Project Agreement are being met, and that project outputs are being accomplished as planned. More specifically, each annual or routine evaluation will assess the following elements of the project:

- A.) Progress in generating the outputs specified in the project paper;
- B.) Identification of the scientific investigations which have been completed and the quality and usefulness of same;
- C.) Examine the ways in which such scientific investigations have been utilized by BDG planning agencies and line ministries in the agriculture and weather sectors.

The evaluations will be used to recommend alterations of project inputs, if required, to achieve the project purpose. A special in-depth evaluation will be conducted upon completion of the project which will evaluate achievement of the project purposes. This final evaluation will be conducted by the BDG and USAID and will assess the utilization of the project's outputs by the various development ministries and agencies in forming policies, plans and programs.

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ANNEX A

Other Donor Activities

1. Assistance to the Bangladesh Meteorological Department WMO - UNDP Financed

The World Meteorological Organization (WMO) is currently implementing a three year UNDP financed project entitled "Strengthening of the National Meteorological Service". The project was started in July 1977 and will be completed in June 1980. The anticipated UNDP input will be \$1,026,000. The project has established a Climatology Division, an Electronics Laboratory, a Mechanical Workshop and a Training Institute within the Bangladesh Meteorological Department.

In establishing the Climatology Division, the WMO project has trained staff in long range weather forecasting and data processing. The project is also providing a computer to this division. In addition, a WMO Climatology expert has been in Bangladesh for one year and will remain for $1\frac{1}{2}$ years more.

The Electronics Laboratory was set up at the Storm Warning Center to repair the Meteorological Department's electronic equipment such as radar and telecommunications equipment. Its staff has received training. Test and repair equipment and spare parts were also provided. In addition, a Meteorological Instrumentation specialist is being provided for $2\frac{1}{2}$ years and an Electronics Advisor for two years.

The Mechanical Workshop was set up to repair the mechanical equipment used at the Storm Warning Center. It was provided with repair equipment, training and spare parts.

The Training Institute was established at the Storm Warning Center and has been offering in-service courses in various aspects of weather forecasting. Thus far, 50 persons have completed courses at the Institute. WMO provided a training consultant who has just completed a nine month tour in Bangladesh. A second training consultant will arrive in October-November for a three-month assignment. In addition, a Research consultant in storm surge prediction will be provided for three months in 1979 and three months in 1980.

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The project includes 22 short-term fellowships for foreign study tours. The fellowships are provided for training in forecasting, climatology, agro-meteorology, instrumentation and electronics. Six persons have completed courses including two who attended a six-month course in meteorological satellite imagery interpretation.

This project will be followed by a five year Phase II. Phase II is projected at \$2 million and will concentrate on the training of forecasters, the establishment of three agro-meteorological centers (Joydepur, Mymensingh and Bogra) and the provision of communications equipment to link the principal field offices with district offices and Dacca.

The Meteorological Department will also be provided with a new S or C band radar unit for Dacca under a project described below called "Flood Forecasting and Warning System".

2. Assistance to the Water Development Board
WMO - UNDP Financed

WMO will begin in late 1979 a three year institutional support project to the Bangladesh Water Development Board to improve the Board's capability to carry out flood forecasting. The project has a planned budget level of \$1,652,200. The project will provide equipment for gathering and transmitting hydrological data from up to 42 field stations in Bangladesh. In addition, a new S or C band radar will be provided to the Bangladesh Meteorological Department for rainfall estimation.

The project will provide 90 person-months of technical assistance including an expert in flood forecasting (36 pm), experts in radar, electronics and telecommunications (24 pm) and several experts in hydrologic installation and substation management.

The project will provide 51 person-months of short-term training (six months or less) in river forecasting, meteorological radar analysis and electronic equipment maintenance and two one year fellowships in electronic engineering.

The project has been carefully prepared to coordinate with on-going or planned projects in water resources management and flood forecasting especially in regard to the placement of SPARRSO's DCPs

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with the manned field stations. In addition, the project will utilize the data and analysis of an ongoing (3 year) UNDP financed Hydrological Surveying Project and the research and training facilities of the proposed River Research Institute.

3. Assistance to SPARRSO
FAO - UNDP Financed

The UNDP has provided \$683,000 to finance the FX portion of the Scheme for Bangladesh Landsat Program BLP Phase I. Since early 1977 the project has financed an FAO expert in remote sensing attached to the Bangladesh Landsat Program and has provided basic equipment and training for satellite imagery analysis. This project is the predecessor to the Scheme for SPARRSO (which the present AID assistance will support) and has contributed greatly to the establishment and organizational development of SPARRSO.

Under this UNDP project, the BLP has obtained additional UNDP and other donor assistance to carry out specific studies. For example, an additional \$150,000 was provided to BLP for a study supervised by The Environmental Research Institute of Michigan (ERIM) to map and project new land accretion in the Bay of Bengal. Also the World Bank has financed BLP to update the land use map of Bangladesh.

The UNDP will evaluate their support to the Bangladesh Landsat Program and consider follow-on assistance in support of the Scheme for SPARRSO.

4. Disaster Preparedness
FAO - UNDP Financed

Approximately \$150,000 is being provided to develop model Thana level agricultural plans for rapid post disaster recovery. The FAO is providing consultants who are assisting the BDG to identify alternative crops which can quickly be planted in areas which experience a flood or cyclone disaster in order that local producers will be able to realize some production output despite the loss of their main crop.

ANNEX B

THE INTERIM CYCLONE WARNING SYSTEM

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In early 1978 the U.S. satellite, NOAA V, which the BDG was accessing for their existing cyclone warning system, failed. Realizing the new AID assisted Disaster Alert Project under development would not be completed before the October/November 1978 cyclone season, the BDG requested the U.S. to assist in an interim effort.

In June 1978, USAID informed the BDG that the U.S. would provide emergency assistance for the establishment of a minimum satellite receiving station so that coverage of the country could be available during October and November 1978. In July, a four man team from AID's Office of Foreign Disaster Assistance (OFDA), NASA and NOAA came to Bangladesh and assessed the immediate needs. By the end of July, using OFDA funds, NASA entered into a contract with P and P Industries of Maryland to provide and install the interim system. The contract called for the system to be operational by October 1, 1978.

During August and early September, P and P Industries air shipped all of the equipment and the BDG completed all site preparation including the construction of a building foundation and antenna pad.

In the third week in September, a six man team from NASA, NOAA and P and P Industries arrived in Dacca to set up and check out the system. Working seven days a week and twelve hours a day, with their Bangladeshi counterparts, the U.S. team successfully completed the installation and the first pictures were received on October 1, on schedule. An additional week was spent in checking out the system and training the operators.

To avoid the past problem of dependence on one satellite, the interim system provides sufficient redundancy so that the low resolution imagery of three separate satellites can be obtained. The system includes two separate antennas - a 20' parabolic to receive broadcasts from the Japanese Geostationary Satellite (GMS) and a small omni-antenna for the polar orbiting U.S. Tiros N and the Russian Meteor satellites. There are two receivers and three separate image facsimile machines (printers) so that the BDG can get useful data even if two of the three satellites fail or if one component of the ground station fails. Spare parts and testing and repair equipment were also provided and the Bangladeshis were trained in their use. Since the first week of October, the system has been fully operational 24 hours a day, and has provided information to the Storm Warning Center of the Bangladesh Meteorological Department on the size and movement of three separate cyclones.

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OFDA Disaster Alert System - FY 80

OFDA will assist the Government of Bangladesh upgrade its cyclone detection system by financing the procurement, shipment, installation and start up of high resolution GMS and Tiros receiving and display equipment. This assistance is planned to be completed by December 1980. The equipment list and estimated cost is as follows :

1.	<u>GMS High Resolution WEFAX:</u>	<u>Costs (\$1,000)</u>
	-Receiver	12
	-Subcarrier Discriminator	3
	-Model 9500 Alden	35
	-Preamp/Downconverter	10
2.	<u>TIROS HRPT</u>	
	2.5 Meter Antenna, Auto-turck	150
	Receiver	12
	Tape Recorder	37
	Alden 9500 Display	35
	Bit Sync/Frame Sync	15
	Equipment Total :	<u>309</u>
3.	Systems Installation, Integration, Direct Engineering & Travel (Contractor Related)	190
4.	Shipping (Air)	15
5.	O&M Training (On Site)	20
	Contract Costs Total:	<u>534</u>
	NOAA/NASA Costs	
	Travel	<u>12</u>
	Cost Total	<u>546</u>

ANNEX D

STORM WARNING CENTER (SWC)

Organization

The Storm Warning Center is a field office of the Bangladesh Meteorological Department under the Ministry of Defense, Government of Bangladesh. The Center is headed by a Deputy Director under the supervision of the Director of Bangladesh Meteorological Department. This Center is the sole authority which issues all weather forecasts/warnings in normal and abnormal times.

This Center is responsible for the issuance of severe weather warnings for tropical cyclones, local storms (nor'westers/tornadoes) and heavy rainfall, besides the routine issuance of Bay Bulletins for the Bay of Bengal and fleet forecasts for the Bay of Bengal north of latitude $18\frac{1}{2}^{\circ}\text{N}$ for the benefit of merchant as well as naval shipping and the daily weather forecasts for the general public.

The central control office in Dacca is manned by about forty trained technical personnel and operates 24-hours a day.

The Center is directly linked by SSE landline teleprinter, telegraph and telephone to field offices, other EDG agencies and the mass media.

Function

Synoptic Weather Charts: Observations of weather conditions at the earth's surface and at higher atmospheric levels form the basis for synoptic weather charts. Weather conditions are observed by meteorological satellites, radar and through a network of 40 land stations in Bangladesh. Observations from the neighboring countries and adjoining high seas between latitude 10°S and 30°N and Longitude 60°E and 130°E are also received through interception of the regional broadcasts from New Delhi through Eutlounia Communications Satellite Ground Station.

Surface weather charts are prepared and analyzed at this Center for 00, 03, 06, 09, 12, 15 and 21 hours GMT observations and also for 15 hours GMT observations whenever required. Upper winds charts are prepared and analyzed for 00, 06, 12 and 18 hours GMT observations. Constant pressure charts are prepared and analyzed for 00 and 12 hours GMT observations. Besides 03 and 12 hours GMT change charts, 00 GMT Showalter Index Charts, 00 GMT Thermo-dynamic charts, 00 GMT Sea-Level prognostic charts are prepared, analyzed and compared with global weather charts received through FAX on a routine basis.

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By the studies of the synoptic weather charts, surface and upper air, at different consecutive hours, the forecasters obtain a complete picture of the three dimensional structure of the atmosphere and also a picture of the displacement of the weather disturbances and the change they undergo while they travel.

Warning System

(a) General Procedure of Warning: A tropical cyclone is first detected by the weather charts and satellite imageries while in the formative stage of its development. When the storm comes within the range of weather surveillance radar at Cox's Bazaar, hour to hour position of the storm is available. Alert messages are issued generally 36 or more hours ahead and warning messages are issued 24 hours ahead. Danger/great danger messages are issued 8-12 hours ahead. All these messages are telegraphically issued to 239 warnees of various interests including the CPF and Radio Bangladesh. On receipt of these messages the seaport and riverport authorities immediately hoist appropriate signals (11 for seaports and 4 for riverports) at the ports to warn distant steamers and country crafts. Similarly, the steamers while leaving the port/ghats will also hoist signals to warn other steamers. Country crafts plying in the river will immediately go to safer anchorage and all outgoing traffic from the port/ghat will be suspended until "All Clear" is given. All other warnees take precautionary measures in their respective spheres for safety of lives and properties. These messages include: (a) Position and severity of the storm; (b) Speed as well as direction of movement of the storm; (c) The maximum sustained wind speed of the storm; (d) The probable height of storm surge; (e) The time and the locality of its crossing the coast; and (f) Advice for evacuation, if necessary.

(b) Facilities Provided by Bangladesh Meteorological Department: Bangladesh Meteorological Department provides the following services in connection with storm warning services:-

(i) Weather Bulletins for the Benefit of Ships in the High Seas:

These bulletins are telegraphically issued once a day during normal weather and 2-6 times a day during disturbed weather according to its severity for broadcast by the coast radio station at Chittagong.

(ii) Fleet Forecasts for the Benefit of Naval Shipping:

These forecasts are telegraphically issued twice a day to Navy Headquarters, Dacca.

(iii) Storm Warning Signal Advisories for the Seaport Authorities at Chittagong, Chalna and S. E. O. Cox's Bazaar for the Benefit of Shipping:

These are issued telegraphically 2-6 times a day according to the severity of the storm.

(iv) Weather Bulletins and Storm Warning Advisories for the Benefit of Inland Riverports and Shipping:

These bulletins are issued four times a day to Radio Bangladesh for broadcast at the specified times. In addition, the advisories for signals are issued telegraphically to specified recipients related to the waterways sector.

(v) Tropical Cyclone Warnings for the Benefit of Aviation:

These warnings are issued during various phases of a cyclone to specified aviation authorities and meteorological aviation forecast centers in Bangladesh.

(vi) Hurricane Informatories and Danger Warnings:

These messages to senior government officials and the CPP, are telegraphically issued 3 to 6 times a day according to the severity of the storm. They start at the earliest stage of the development of a cyclonic storm and continue through its after phase.

(vii) Hurricane Great Danger Warnings:

These warnings are issued telegraphically 3-6 times a day for the districts likely to be affected. These are sent to administrative authorities such as the CPP for taking precautionary measures for evacuation, if necessary.

(viii) Special Weather Bulletins for the Benefit of the Public:

These bulletins are issued to Radio Bangladesh 3-6 times a day according to severity of the storm for frequent broadcast whenever a cyclonic storm is expected to affect Bangladesh.

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(ix) Heavy Rainfall Warning for the Benefit of Engineering and Hydrology:

These warnings are issued telegraphically once a day to railway authorities and the Flood Forecasting and Warning Center. The warnings are issued when the rainfall is predicted to be greater than 2 inches.

(x) Warning for Storm of Land Origin (Nor'westers/Tornadoes etc.)

These warnings against storms of land origin (nor'westers, tornadoes, etc.) are issued to various authorities and agencies concerned including Radio Bangladesh for broadcast in 24 hours.

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ANNEX E

WATER DEVELOPMENT BOARD (WDB)
FLOOD FORECASTING AND WARNING DIVISION

This Division, presently under the Directorate of Surface Water Hydrology II, BWDB was established in April, 1972 as the center for the issuance of flood forecasts and alerts within Bangladesh.

The Flood Forecasting and Warning Division is headed by a Deputy Director who is responsible to the Director, Surface Water Hydrology II, Water Development Board under the Ministry of Power, Flood Control and Water Resources, Government of the People's Republic of Bangladesh. The Deputy Director is supported by 66 technical and non-technical staff as well as 44 logistics support staff.

This Division is responsible for forecasting floods and issuing warnings during the flood season. During the dry season, the Division issues low flow forecasts, conducts training to improve flood forecasting techniques and compiles an annual flood report.

The Flood Forecasting and Warning Division operates a Flood Information Center around the clock from May to October each year. The Information Center monitors water level from 34 stations and rainfall from 33 stations within the country. These data are collected through 10 wireless stations under the jurisdiction of the WDB and by 10 wireless sets operated by the police and Telephone and Telegraphs.

In addition, the Flood Information Center is connected to the Bangladesh Meteorological Department through a teleprinter link for collection of data from 20 Indian stations.

On the basis of analysis of these data, a daily Flood Information Bulletin is issued. A press release is also issued containing forecast information whenever relevant.

ANNEX F

CYCLONE PREPAREDNESS PROGRAM (CPP)

Organization

In Bangladesh, disaster prevention and preparedness is the responsibility of the Ministry of Relief and Rehabilitation (MRR). The MRR has control over and coordinates all government and private activities. While other Ministries such as Defense, Home Affairs, Health, Local Government, Rural Development and Cooperatives, Finance, etc. have critical roles in disaster prevention and preparedness, it is the MRR that sets guidelines and plans and implements the overall national programs.

/(BRC)

The CPP was initially, however, a Bangladesh Red Cross Project, organized with the assistance of the League of Red Cross Societies and the Swedish Red Cross. Originally known as the Pre-Disaster Pilot Scheme, it was started in 1966 with the primary purpose of providing a mechanism that would transmit warnings during impending disasters and at the same time provide first aid and rescue in time of emergencies. This primary purpose has not changed, but the structure has grown more organized and sophisticated.

Upon reorganization in 1971, the CPP became a joint venture between the BDG and BRC. Policy and implementing direction is provided by the MRR and BRC with warning alerts and emergency relief given locally by the CPP volunteers.

The Policy Committee of the CPP is headed by the Minister of Relief and Rehabilitation and program implementation is under the direction of the Secretary of the same Ministry. Yet, despite the MRR occupancy of key positions, the CPP retains a close link with the BRC program as shown in the following committee compositions.

Policy Committee

Chairman: Minister of Relief and Rehabilitation.

Vice Chairman: Minister of Local Government, Rural Development and Cooperatives and Chairman, BRC.

Members: (2) BRC representatives.

(1) Planning Commission Representative.

Member/Secretary: Secretary, Ministry of Relief and Rehabilitation.

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Implementing Board

Chairman: Secretary, MRR

Member: Secretary General, BRC

- (2) BRC Representatives
- League of Red Cross
- Rep. Planning Commission
- Rep. Ministry of Finance
- Rep. MRR
- Rep. Ministry of Local Government, Rural Development and Cooperatives

Member/Secretary: Director of CPP (A BRC official)

The CPP receives its financial support (approximately \$350,000 per year) from the MRR through the above two committees. Nonetheless, the BRC is the government's grassroots implementing agency for the CPP and has imbued it with a non-bureaucratic vigor. This unique relationship of the CPP with both the BDG and the BRC creates a well organized highly efficient disaster organization. Although financed by the BDG, the CPP, because of its attachment to the BRC, is not part of the government bureaucracy in that volunteers are used as the final links to the villager. This unique organizational model explicitly utilizes the inhabitants in rural village areas who are most likely to be severely affected by cyclone related disasters. In fact, many of these volunteers have already experienced great personal loss during the 1970 cyclones and are dedicated to minimizing future losses from severe storms.

The lowest level of the Bangladeshi community structure is the ward which consists of approximately 2,000 inhabitants. Physically a ward forms a constituency within approximately 1 to 2 square miles. In the coastal districts affected by cyclones, wards seldom consist of traditional village formations but rather of 4 or 5 dwellings together, housing around 50 related individuals. A Union is typically composed of 3 to 6 wards and has 20,000 persons. It is part of a thana which may have 200,000 persons. There are 24 coastal thanas containing 201 Unions and 1843 Wards in an approximate area of 7,000 square miles which is served by the CPP through its 18,668 Ward volunteers. Group identification for cooperative efforts in cyclone warning and relief self-help occur within the framework of the Ward. Therefore, the team volunteers (2 each for spreading warnings, arranging shelters, rescue, first-aid and providing food and clothing) in each ward select a leader who becomes a member of the Union level coordinating committee. Each Union in turn chooses a leader

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who is a member of the thana level coordinating committee. The elected leader of the thana coordinating committee is then the principal contact between the volunteers and the paid full-time CPP staff. Without self-help of this kind within the relatively well defined community groups, the CPP cannot be effectively established - either organizationally or financially - for Bangladesh.

Paid full-time CPP personnel who staff the Dacca headquarters, and the regional and field offices are BDG employees seconded to the CPP but are supervised by the Director of the CPP, a member of the BRC.

Implementation

The CPP has three activity stages. They are.

- (1) preparatory
- (2) alert
- (3) rescue / relief

Various activities for each of the three stages have been designed in detail and assigned to CPP personnel from the Director to the Ward volunteer. Stage 2 alert actions have the most significance for this project.

When a storm warning notice is made by the Meteorological Department's Storm Warning Center, it is received in the CPP Dacca headquarters by telephone and cable. The CPP immediately communicates the warning to any or all 24 thana field level CPP officers through single side band transceivers (SSB). Four additional units are located in regional food and equipment centers. In addition the police at the district and thana headquarters are also alerted.

Seventy-two of the 201 CPP Unions are connected by telephone to their respective thana seats. In the remainder of Unions, CPP volunteers handcarry the warning alert message from the thana radio center. Between the Union and Ward all communications are done without radio or telephone assistance, relying totally on the CPP volunteer network.

Storm severity is rated by the Meteorological Department on a scale from 1 to 11, with 8 through 11 signifying winds greater than 75 mph. From signal 2 upward CPP personnel are communicators and monitor storm alerts. Their warning alert responsibilities follow:

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Signal II

- All thana level development officers informed by Dacca headquarters.
- All unions are informed by union volunteers from thana HQ.
- All volunteers are alerted and requested to listen to Radio Bangladesh reports if available.
- Ward volunteers organize equipment and liaison with union control office.

Signal IV

- All thana level development officers and volunteers reminded of increased danger.
- Liaison between CPF volunteers and thana HQ for possible evacuation orders.
- People warned of signal number through megaphone and signal flags.

Signal VIII (great danger)

- CPF volunteers make sure evacuation orders are known to everyone in areas to be evacuated through use of siren, megaphone, signal flags, beating drums, etc.
- All villagers are informed of great danger and increased signal numbers.

The alert stage signals given by the Meteorological Department automatically result in a variety of activities being undertaken by the CPP personnel. In addition, warning dissemination, sheltering, rescue, first-aid and food and water preparation actions depend upon the signal level.

A critical service provided by the CPP is the acquisition and communication of data concerning local conditions to be radioed among thanas and to the Dacca headquarters. In effect, the CPP offers a two way system relaying village conditions to Dacca headquarters, but, most importantly, it enables more sophisticated exact data to be available to the villager.

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

ANNEX G

Life of Project: _____
 From FY 1981 to FY 1984
 Total U.S. Funding \$4,500,000
 Date Prepared: _____

Project Title & Number: Agro Climatic/Environmental Monitoring (388-0046)

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>Increased agricultural production.</p>	<p>Measures of Goal Achievement:</p> <p>Foodgrain production will increase to 17.2 million tons by '985/86.</p>	<p>BDG national agricultural statistics.</p>	<p>Assumptions for achieving goal targets:</p> <p>There will be no significant interruption in steady agricultural growth due to calamities.</p>
<p>Project Purpose:</p> <p>Improve planning and management of resources in Bangladesh, particularly related to agriculture and water development.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>The BDG will have implemented at least one new agricultural program or modified existing agricultural policy as direct result of information attained by the remote sensing system.</p>	<p>Joint BDG-USAID Project evaluation.</p>	<p>Assumptions for achieving purpose:</p> <p>BDG planners and resource managers will employ the findings obtained by remote sensing in their planning and decision processes.</p>
<p>Outputs:</p> <p>a. Meteorological data collection system installed and operating.</p> <p>b. Technical and managerial personnel trained.</p> <p>c. Applications of data per PP pages 5 & 6 being carried out.</p>	<p>Magnitude of Outputs:</p> <p>a. Advanced satellite groundstation installed and operating by 1982. Data Collection Platforms installed by 1982. SPARRSO Application Center construction completed by June 1981.</p> <p>b. 6 groundstation operators trained in operation and maintenance of the systems.</p> <p>c. 5 investigations completed by 1983.</p>	<p>Consultant progress reports. Joint BDG-USAID Project evaluations</p>	<p>Assumptions for achieving outputs:</p> <p>1. BDG's selection of qualified personnel.</p> <p>2. Maintenance of good working relation between officials and different agencies.</p>
<p>Inputs:</p> <p>Equipment and spare parts for satellite based data collection system. Consultant services, Technical assistance and project evaluation. On the job/participant training.</p>	<p>Implementation Target (Type & Quantity)</p> <p>For details - see Inputs section of Project Paper.</p>	<p>BDG & USAID Project records.</p>	<p>Assumptions for providing inputs:</p> <p>Availability of funds by BDG and USAID</p>

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COUNTRY CHECKLIST

A. GENERAL CRITERIA FOR COUNTRY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights?
Benefits to the needy will be indirect. The Department of State has not so determined.
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the comprehensive Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?
No, Department of State has not so determined.
3. FAA Sec. 620(b). If assistance is to Government has the Secretary of State determined that it is not controlled by the International Communist movement?
Yes.
4. FAA Sec 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or order-

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ed where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government ?

5. FAA. Sec 620 (e). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?

In 1972 the BDG nationalized five firms which were fully or partially owned by U.S. entities. The BDG has announced a compensation policy and is taking steps to discharge its obligations toward U.S. citizens and entities.

6. FAA. Sec. 620 (a), 620 (f), ; App. Sec. 108, 114 and 606. Is recipient country a Communist Country ? Will assistance be provided to the Socialist Republic of Vietnam, Cambodia, Laos, Cuba, Uganda, Mozambique or Angola ?

a) No.
b) No

7. FAA. Sec. 620 (i). Is recipient country in anyway involved in (a) subversion of, or military aggression against, the United States, or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression ?

No
No

8. FAA. Sec 620 (i). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property ?

No

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9. FAA, Sec. 620(l). If the country has failed to institute the investment guarantee program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason ?

OPIC bilateral agreement was signed January 15, 1975.

1D. FAA, Sec. 620(o). Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters.

Not applicable.

a. has any deduction required by Fishermen's Protective Act been made ?

b. has complete denial of assistance been considered by AID Administrator ?

11. FAA, Sec. 620; App. Sec. 603.

(a) Is the government of the recipient country in default for more than six months on interest or principal of any AID loan to the country ? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds ?

a) No
b) No

12. FAA, Sec. 620(e). If contemplated assistance is development loan or from Economic ^{Support} Fund, has the Administrator taken into account the percentage of of the country's budget which is for military expenditures, the amount of

Not applicable

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foreign exchange spent on military equipment and the amount spent for the purchase of sophisticated weapons systems ? (An affirmative answer may refer to the record of the annual "Taking Into Consideration" memo: "Yes, as reported in annual report on implementation of Sec. 620(s) " This report is prepared at time of approval by the Administrator of the Operational Year Budget and can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

13. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States ? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption ? No

14. FAA Sec. 620(u) What is the payment status of the country's U.N. obligations ? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget ? Not in arrears.

15. FAA Sec. 620A; App. Act Sec. 607. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism ? No

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16. FAA.Sec.666. Does the country
object, on the basis of race,
religion, national origin or sex,
to the presence of any offices or
employees of the U.S. there to
carry out economic development
program under FAA ? No.
17. FAA.Sec.669,B7D. Has the country
after August 3, 1977 delivered or
received nuclear reprocessing or
enrichment equipment materials or
technology, without specified
arrangements on safeguards ?
Has it detonated a nuclear device
after August 3, 1977 although not
a "nuclear-weapon State" under the
nonproliferation treaty ? No.
No
- 1-8

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B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

a. FAA Sec. 102(b)(4). Have criteria been established, and taken into account to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution and (5) unemployment, and (6) increased literacy.

- 1. Yes
- 2. Yes
- 3. Yes
- 4. Yes
- 5. Yes
- 6. Yes

b. FAA Sec. 104(a)(1). If appropriate, is this development (including Sahel) activity designed to build motivation for smaller families through modification of economic and social conditions supportive of the desire for large families in programs such as education in and out of school, nutrition, disease control, maternal and child health services, agricultural production, rural development, and assistance to urban poor?

Yes, by improving the efficiency of rural investment in order to improve the rural economic conditions.

2. Economic Support Fund Country Criteria

a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights?

No

b. FAA Sec. 509. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

Not applicable

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c. App. Sec. 113. Will security assistance be provided for the purpose of aiding directly the efforts of the government of such country to repress the legitimate rights of the population of such country to the Universal Declaration of Human Rights ?

Not applicable

C. GENERAL CRITERIA FOR PROJECT.

1. App. 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) ?

a) Grant project was included in Congressional Presentation for FY 1980.

b) Yes

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
Yes

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 ?

No further legislative action required.

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4. FAA Sec. 611(b); App. 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 ?

Not applicable

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 ?

Yes, certificate included herein .

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 .

No

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 .

The project will improve the efficiency of planning and management in the agriculture sector.

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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). Not applicable.
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 host country contribution is 93% of the local currency and 39% of the total project cost.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release? No
11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Project will be executed by a PASA with NOAA. NOAA's procurement procedures therefore apply.
12. FY 79 App. Act Sec. 608. If assistance is for 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? Not applicable.

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FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(a); Sec. 111; 113;

Sec. 281a. Extent to which activity 1(a)

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 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?

1(a) The project is designed to provide a management information system primarily for the agricultural sector based on remote sensing data.

The data obtained by the facilities to be provided by the project will improve the efficiency of agricultural programs such as foodgrain procurement, cropping patterns, irrigation development and forest management.

(b) Agricultural information obtained via remote sensing will be disseminated to farmers mainly through the national and local cooperative structure.

(c) The project supports the BDG goal of foodgrain self-sufficiency.

(d) The BDG implementing agency is an active employer of women professionals.

(e) The Project can be expanded if the BDG so desires to enhance regional cooperation in agro-climatic and environmental matters.

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available :

[103] for agriculture, rural development or nutrition, if so (a) extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, full amount shall be taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in coordination with programs carried out under Sec. 104 to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

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

The Project is designed to improve the management of soil, water and sylvan resources in the Cooperating Country by upgrading the capability of the Bangladesh Government to obtain, analyze and disseminate a wide variety of datum on the local agro-climatic environment that relate to agriculture, meteorology, forestry, fisheries and overall ecosystems.

Yes

FIA 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 later cost-sharing requirement been waived for a "relatively less-developed" country)?

Yes, 39%

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a. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?

No

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.

Project will utilize only locally available skills in hydrology and meteorology. The project addresses an important felt need of the Government of Bangladesh and has received its full support throughout the planning phase.

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

Yes

STANDARD ITEM CHECKLIST

D. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?

Yes

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2. FAA Sec. 604(a). Will commodity procurement be financed from the U.S. except as otherwise determined by the President or under delegation from him ? Yes
 3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed ? Yes, agreement will so provide .
 4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity ? Not applicable.
 5. FAA Sec. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items ? Yes
 6. FAA Sec. 603. Compliance with requirement in section 901(b) of the Merchant Marine Act of 1936 as amended that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent that such vessels are available at fair and reasonable rates. Project Agreement will so provide .

7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis ? If the facilities of other Federal agencies will be utilized are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs ?

Yes
Yes

8. International Air Transport Fare Competitive Practices Act, 1974.

If air transportation of persons or property is financed on grant basis, will provision be made that U.S. flag carriers will be utilized to the extent such service is available ?

Yes

9. App. Act. Sec. 105.

Does the contract for procurement contain a provision authorizing the termination of such contract for the convenience of the U.S. ?

Yes

B. Construction.

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest ?

Yes

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable ? Yes
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million ? Not applicable.

C. Other Restrictions

1. FAA Sec. 122(e). If development loan is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? Not applicable.
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization does Comptroller General have audit rights ? Not applicable
3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S. ? Yes
4. FAA Sec. 635(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction ? Such is not permitted.

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5. Will arrangements preclude use of financing:

- a. FAA Sec. 101(f). to pay for performance of abortions or to motivate or coerce persons to practice abortions etc. ? Yes
- b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property ? Yes
- c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs ? Yes
- d. FAA Sec. 662. for CIA activities ? Yes
- e. App. Sec. 104. to pay pensions, etc., for military personnel ? Yes
- f. App. Sec. 106. to pay U.N. assessments ? Yes
- g. App. Sec. 107. to carry out provisions of FAA Sections 209(d) and 251(h) (transfer to multilateral organization for lending). Yes
- h. App. Sec. 601. to be used for publicity or propaganda purpose within U.S. not authorized by Congress ? Yes
- i. App. Act. Sec. 112. to finance the export of nuclear equipment, fuel, or technology or to train foreign nationals in nuclear fields ? Yes

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BANGLADESH
AGRO-CLIMATIC/ENVIRONMENTAL MONITORING

CERTIFICATION PURSUANT TO SECTION 611(e) OF THE FOREIGN ASSISTANCE
ACT OF 1961, AS AMENDED

I Richard L. Podol, Acting Mission Director, the principal officer of the Agency for International Development in Bangladesh, having taken into account, among other things, the maintenance and utilization by the Bangladesh Government and its agencies of projects previously financed by the United States, do hereby certify that in my judgment Bangladesh has the financial and human resources capability to effectively utilize the project to be financed by this grant.

This judgment is based upon considerations discussed in the Project Paper to which this certification is attached.

Richard L. Podol
Richard L. Podol
Acting Director
10 Jul 80
Date

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From Dr. Muhammad A. Lannan,
Deputy Secretary.

Ministry of Finance
External Resources Division

Government of the People's Republic of Bangladesh
Sheer-E-Bangla Nagar
Dacca-15

D.O.No. ERD/USA(P)-30/78

November 14, 1980

Sub: Agro-climatic/Environmental
Monitoring Project.

Dear Mr. Podol,

Please refer to the USAID Project Paper entitled Agro-climatic/Environmental Monitoring which describes the subject project jointly developed by experts from the Space Research and Remote Sensing Organization of Bangladesh and USAID. The proposed project is intended to upgrade the capability of Bangladesh Government to obtain, analyse and disseminate a wide variety of information on agro-climatic environment of Bangladesh and improve the planning and management of resources in the country.

In view of the importance of the project, the Government of the People's Republic of Bangladesh requests USAID to provide the required approximately U.S. dollars 5 million and initiate implementation as soon as possible.

With kind regards,

Yours sincerely,

(Muhammad A. Lannan)

Mr. Richard L. Podol,
Acting Director,
USAID, Mission, Jibon Bima Bhaban(4th Floor),
Motijheel Commercial Area,
Dacca.



ACTION TO:	
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From: Dr. Muhammad A. Mannan,
Deputy Secretary.

ANNEX 3
PAGE 2 of 2



Ministry of ~~Planning~~ Finance. *RV*
External Resources Division
Government of the People's Republic of Bangladesh
Sher-E-Bangla Nagar
Dacca-15

Secretary
D.O. No. ERD/USA(P)-30/78

December 1, 1980.

Sub:-Agro-Climatic/Environmental Monitoring
Project.

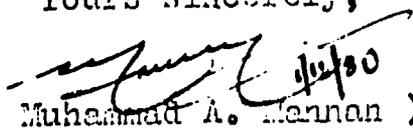
Dear Mr. Kimball,

Please refer to our letter of even number dated November 14, 1980 wherein we made a request for providing a grant of \$ 4.5 million for the Agro-Climatic/Environmental Monitoring Project. The cost estimate for the project have since been reviewed and it is now estimated that an amount of \$ 5.9 million will be required to complete the project.

The Government therefore, requests USAID to provide an amount of \$ 5.9 million instead of \$ 4.5 million for this project.

With regards,

Yours sincerely,


(Muhammad A. Mannan)

Mr. Frank B. Kimball,
Director,
USAID Mission, Jibon Bima Bhaban,
(4th Floor), Motijheel C/A,
Dacca.

Department of State
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TELEGRAM

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 SER-01 RELO-01 STA-10 PDPR-01 I-00 /036 A3

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 ASIA/PD: HSHARLACH (DRAFT)
 PPC: KPOE (INFO)

PDC/OFDA: JMITCHELL (DRAFT)

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TAGS:

SUBJECT: DISASTER ALERT PROJECT (388-0046)

1. FOLLOWING MEETING WITH AMBASSADOR SCHNEIDER AND
 NUMEROUS DISCUSSIONS WITHIN AID, AA/ASIA AND D/OFDA DISCUS-
 SED PROJECT FUNDING ISSUE AT LENGTH WITH SENATE FOREIGN
 RELATIONS STAFF. IT HAS NOW BEEN AGREED THAT:

A. PHASE I WILL BE FUNDED FROM THE IDA ACCOUNT IN FY 1980
 AT A LEVEL OF APPROXIMATELY DOLS 546,000. THIS WILL PRO-
 VIDE FOR THE HIGH RESOLUTION WEFAX SYSTEM. FUNDS WILL BE
 RELEASED FROM THE IDA ACCOUNT AS NECESSARY AND AFTER THE
 PASSAGE OF THE 1980 DISASTER SUPPLEMENTAL NOW UNDER CONGRES-
 SIONAL REVIEW.

B. PHASES II AND III (APPROXIMATELY DOLS 4.5 MILLION) WILL
 CONSTITUTE A NEW PROJECT ENTITLED QUOTE BANGLADESH AGRO-
 CLIMATIC FORECASTING UNQUOTE. WE FORESEE NO SUBSTANTIVE
 CHANGE IN PROJECT COMPONENTS CURRENTLY LISTED IN SUBJECT
 PAPER. WE WILL ATTEMPT TO FULLY FUND THIS NEW PROJECT FROM
 SECTION 103 AND/OR 106 ACCOUNT(S) AS APPROPRIATE IN FY
 1981, BUT WILL INCLUDE THE PROJECT IN THE FY 1982 CONGRES-
 SIONAL PRESENTATION TO BE ON THE SAFE SIDE SINCE FULL FUND-

ING MAY NOT BE AVAILABLE IN FY 1981. NO IDA FUNDS WILL BE
 REQUESTED FOR THE NEW PROJECT.

2. SINCE THE INSAT SATELLITE, ON WHICH PHASE II IS DEPEND-
 ENT, WILL NOT BE LAUNCHED UNTIL LATE 1982, THE IMPACT OF
 THE DELAY IN IMPLEMENTING PHASES II/III SHOULD BE MINIMAL.

3. IF MISSION CONCURS IN ABOVE APPROACH, AID/W, IN CONSUL-
 TATION WITH PAUL O'FARREL, PREPARED TO REWORK PROJECT 388-
 0046 PAPER IN AID/W AND THEN FORWARD NEW PROJECT PAPER TO
 USAID/DACCA PRIOR TO AID/W APAC REVIEW AND APPROVAL. MUSKIE

UNCLASSIFIED

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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

PROJECT AUTHORIZATION

Name of Country: BANGLADESH Name of Project: AGRO-CLIMATIC/
ENVIRONMENTAL
MONITORING
Number of Project: 388-0046

1. Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Agro-Climatic Environmental Monitoring Project (the "Project") for Bangladesh (the "Cooperating Country") involving planned obligations of not to exceed Five Million Nine Hundred Thousand United States Dollars (U.S. \$5,900,000) in grant funds over a three year period from date of authorization, subject to the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project.

2. The Project is designed to improve the management of soil, water and sylvan resources in the Cooperating Country by upgrading the capability of the Bangladesh Government to obtain, analyze and disseminate a wide variety of data on the local agro-climatic environment that relate to agriculture, meteorology, forestry, fisheries and overall ecosystems.

The Project will also provide necessary training in the use of environmental data to be obtained from satellites and other remote sensing instruments.

3. I hereby authorize the initiation of negotiations of the Project Agreement and its execution by the officers to whom such authority has been delegated in accordance with A.I.D. regulations and delegations of authority. The Project Agreement that may be negotiated and executed shall be subject to the following essential terms and major conditions, as well as such other terms and conditions as A.I.D. may deem appropriate:

4. Source Origin.

Except for ocean shipping, goods and services financed by A.I.D. under the grant shall have their source and origin in the Cooperating Country or in the countries included in A.I.D.

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Geographic Code 941, except as A.I.D. may otherwise agree in writing. Training in the United States or in third countries shall be undertaken in accordance with the provisions of A.I.D. Handbook Number 10. Ocean shipping financed by A.I.D. under the grant shall be procured only on flag vessels of the United States or the Cooperating Country, except as A.I.D. may otherwise agree in writing.

5. Terms and Conditions.

Except as A.I.D. may otherwise agree in writing, prior to the disbursement of funds for the procurement of goods and services to be used in conjunction with the Indian Geostationary Satellite ("INSAT"), the Cooperating Country will furnish, in form and substance satisfactory to A.I.D., evidence that it has executed an agreement with the Government of India, or an agency thereof, pursuant to which the Cooperating Country will have the right to use outputs, including imagery, of INSAT.

Clearances:	Date	Initial
ASIA/TR:TArdt _____		_____
Asia/PD:GRVan Raalte _____		_____
GC/Asia:HEMorris _____		_____
Asia/DP:RHalligan _____		_____
Asia/BI:JNorris _____		_____

Signature _____
Assistant Administrator (Acting)
Bureau for Asia

Date

GC/Asia:JFRogan:hp:11/19/80

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9/7/98*

ANNEX M

ENVIRONMENTAL ASSESSMENT

Construction performed under the Project will have no negative direct environmental consequences. The building complex for the ground station will occupy approximately one-half acre which has been prepared and designed for public buildings and is located within an existing government office complex. The twelve cubic foot volume Data Collection Platforms which are solar powered and placed on platforms in or near rivers will not alter the surrounding environment or remove any land from agricultural production.

There are no significant indirect environmental consequences.

Note: IEE approved per State 150177
dated June 11, 1979.

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