AID 1025-1, (7-71) (FACE SHEET) PROJECT PAPER (PRO

PD-AAL-966-D1 (7th) 931090203

I. PROJECT IDENTIFICATION

1. PROJECT TITLE: Remote Sensing

APPENDIX ATTACHED: [X] YES [ ] NO 12p

2. PROJECT NO. (M.O. 095.2): 995-902

3. RECIPIENT (specify): Indonesia, Afghanistan, Sahelian countries, other selected LDCs.
[ ] COUNTRY [ ] REGIONAL [X] INTERREGIONAL

4. LIFE OF PROJECT: BEGINS FY 70 ENDS FY 76

5. SUBMISSION: [X] ORIGINAL 7/30/70 [X] REV. NO. 1, 6/8/73 DATE

CONTR./PASA NO.

II. FUNDING ($000) AND MAN MONTHS (MM) REQUIREMENTS

A. FUNDING BY FISCAL YEAR	B. TOTAL $	C. PERSONNEL (1) $	C. PERSONNEL (2) MM	D. PARTICIPANTS (1) $	D. PARTICIPANTS (2) MM	E. COMMODITIES $	F. OTHER COSTS $	G. PASA/CONTR. (1) $	G. PASA/CONTR. (2) MM	H. LOCAL EXCHANGE CURRENCY RATE: $ US (U.S. OWNED) (1) U.S. GRANT LOAN	(2) COOP COUNTRY (A) JOINT	(2) COOP COUNTRY (B) BUDGET
1. PRIOR THRU ACTUAL FY	110	95					15					
2. OPRN FY 73	192	172					20					
3. BUDGET FY 74	200	180					20					
4. BUDGET +1 FY 75	200	180					20					
5. BUDGET +2 FY 76	200	180					20					
6. BUDGET +3 FY												
7. ALL SUBQ. FY												
8. GRAND TOTAL	902	807					95					

9. OTHER DONOR CONTRIBUTIONS: None

(A) NAME OF DONOR	(B) KIND OF GOODS/SERVICES	(C) AMOUNT

III. ORIGINATING OFFICE CLEARANCE

	TITLE	DATE
1. DRAFTER: John C. Fry, TA/OST	Deputy Director	6/8/73
2. CLEARANCE OFFICER: Henry A. Arnold, TA/OST	Director	6/8/73

IV. PROJECT AUTHORIZATION

1. CONDITIONS OF APPROVAL

2. CLEARANCES

BUR/OFF.	SIGNATURE	DATE	BUR/OFF	SIGNATURE	DATE
TA/PM	Alfred Bisset AB	8/21/73			
TA/PM	D. Mathiasen /D. Mathiasen	8/22/73			

3. APPROVAL AAs OR OFFICE DIRECTORS

SIGNATURE: Ernest J. Corrigan DATE

TITLE: Assistant Administrator, AA/TA

4. APPROVAL A/AID (See M.O. 1025.1 VI C)

SIGNATURE DATE

ADMINISTRATOR, AGENCY FOR INTERNATIONAL DEVELOPMENT

PROP - REMOTE SENSING *

Revision 1
June 8, 1973

A. Statement of the Goal

1. The Goal. The goal of this experimental project is to improve developing country capabilities for inventorying and assessing earth resources through use of modern remote sensing techniques. This project, initiated in FY 1971, is proposed to continue for an additional three years through FY 1976. As noted in AID Policy Determination 51, "Guidance Statement on Selected Aspects of Science and Technology", attention is being given to faster, cheaper, and more effective techniques for identifying and appraising natural resources, including utilization of earth resource satellite data.

2. Measurements of Goal Achievement. Goal achievement will be measured qualitatively by identifying improvements in LDC resource development which can be traced directly to utilization of multispectral imagery derived from either satellite or aircraft remote sensing programs. Owing to the fact that only several developing countries were employing multispectral techniques prior to FY 1971, progress toward this goal should be susceptible to measurement.

3. Assumptions about Goal Achievement. An important assumption concerning progress toward the goal is that the acquisition and use of remote sensing information, to foster improved earth resource planning and management, will be cost-beneficial. Multispectral, multidate ERTS imagery contains resource information that many developing countries, particularly relatively less developed countries, can afford to obtain in no other way. However, continuing LDC use of such imagery under conditions of economic efficiency may depend upon the long term availability and usefulness of ERTS data products from the USG or other source at nominal cost.

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*For a more complete description of remote sensing technology and programs, see TA/OST Report 73-15, "Remote Sensing: A developmental Framework and Case Studies." An overview paper from Science is attached for ready reference (Attachment 1).

B. Statement of Project Purpose

1. The Purpose. The purpose of this project is to determine the feasibility and effectiveness of remote sensing as a tool for solving selected development problems by:

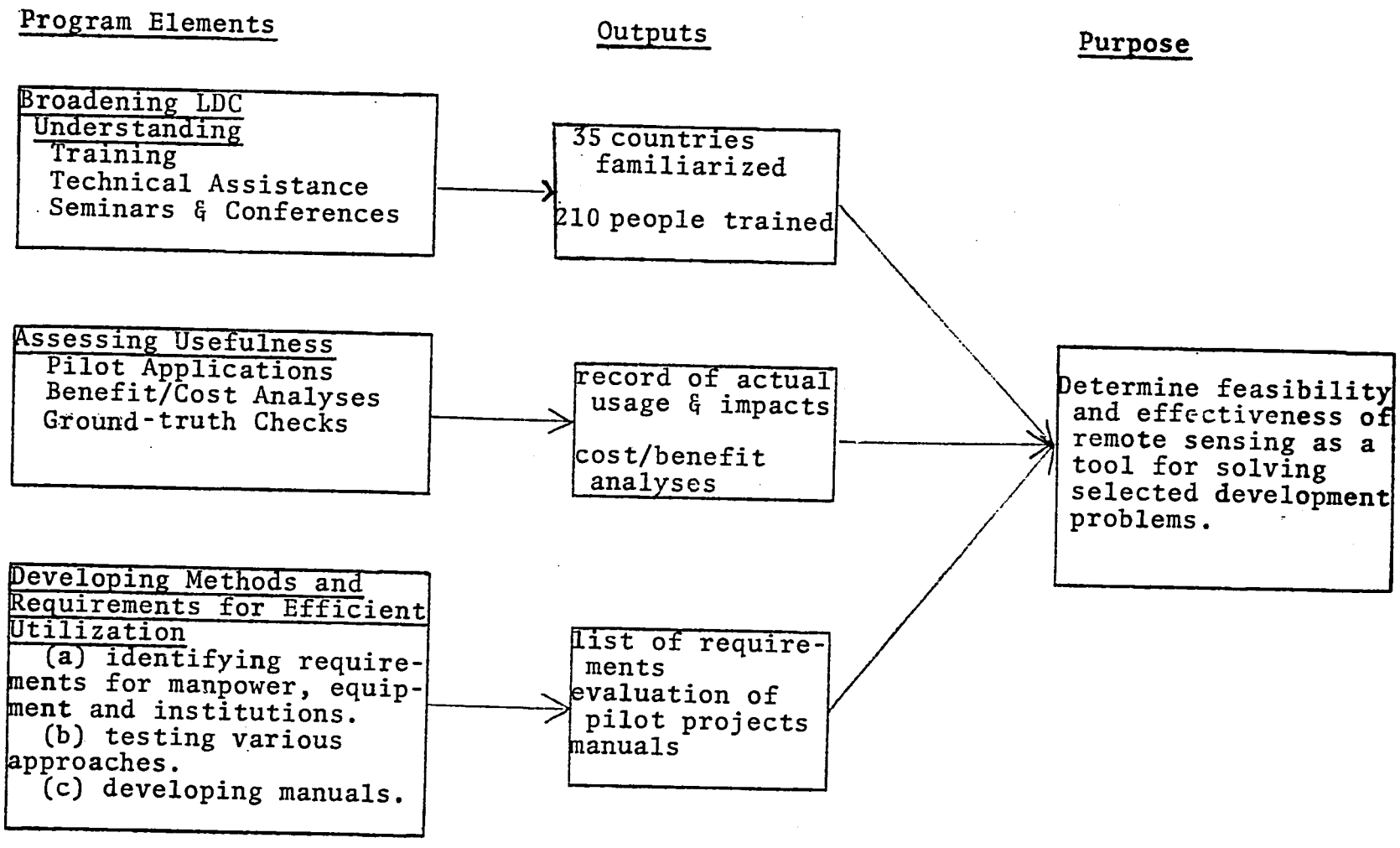
- -- broadening understanding of remote sensing technology and use of its products within interested developing countries;
- -- identifying requirements and methods for efficient LDC use of remote sensing; and
- -- assessing the usefulness of remote sensing in agricultural, hydrological, geological, oceanographic, and related earth resource applications in selected developing countries.

The relationship between program elements, outputs, and purpose is shown schematically on the following page. While these elements are only slightly different from those identified for the project at its inception, emphasis is shifted in this second phase from in-house studies, conferences with experts, and ERTS proposal assistance to training, pilot application programs, and delineation of cost effective methodologies suitable for LDC use. Milestones during the first three years were, briefly:

FY 1971. Smithsonian Conference, "Potential Application of Remote Sensing to Economic Development in Developing Countries."

FY 1972. TA/OST Report 71-3, "Role of Remote Sensing in Developing Countries"; assistance to Mali and Lesotho in preparing ERTS proposals for NASA; completion of project agreement with Indonesia in June, 1972, for an 18 month experimental aircraft program to complement ERTS investigations in Bali.

FY 1973. Regional seminars in Mali (April 1973), Philippines (May 1973), and remote sensing training course Sioux Falls (June 1973), each accommodating about 30 LDC students; one year contract cost benefit assessment of usefulness of ERTS imagery commencing in June 1973; TA/OST Report 73-15, "Remote Sensing: A Developmental Framework and Case Studies"; assistance to Guinea, Upper Volta, Niger, Algeria, Kenya, Swaziland, and Afghanistan in formulating ERTS programs.


Program Elements
Outputs
Purpose
Broadening LDC Understanding
Training
Technical Assistance
Seminars & Conferences
35 countries familiarized
210 people trained
Assessing Usefulness
Pilot Applications
Benefit/Cost Analyses
Ground-truth Checks
record of actual usage & impacts
cost/benefit analyses
Developing Methods and Requirements for Efficient Utilization
(a) identifying requirements for manpower, equipment and institutions.
(b) testing various approaches.
(c) developing manuals.
list of requirements
evaluation of pilot projects
manuals
Determine feasibility and effectiveness of remote sensing as a tool for solving selected development problems.

2. Conditions Expected at End of Project. Conditions are expected to be:

- -- knowledge of appropriate methodologies for application of aircraft and satellite imagery to resource planning and management, including principal LDC institutional, technological, facility, and manpower constraints;
- -- established rational basis for LDC investment decisions concerning techniques for acquiring resource data; and
- -- tested approach and syllabus for remote sensing applications training programs.

3. Basic Assumptions about Achievement of Purpose. The most critical assumption is that remote sensing imagery can provide cost effective information needed for economic development, particularly in fields of agriculture, hydrology, natural resource development, and land use planning.

C. Statement of Project Outputs

1. Outputs and Output Indicators. Outputs intended for the project are:

- -- established methodologies for implementing low cost aircraft multispectral surveys and ERTS analysis programs in developing countries;
- -- broader understanding within LDCs of advantages and limitations of remote sensing to improve technological choice for resource inventory and assessment;
- -- strengthened institutional capabilities for remote sensing applications to development problems in selected countries; and
- -- cost benefit assessment of usefulness of ERTS imagery for development purposes.

The output indicators are:

- -- quantitative increase in the number of developing countries utilizing remote sensing techniques for resource assessment in FY 1976 as compared with FY 1971;
- -- increase in number of developing countries actively experimenting with new remote sensing development applications; and
- -- resource development initiatives directly attributable to remote sensing efforts in selected LDCs.

While major activities were not initiated during the first phase of the project (FY 1971-73) until FY 1973, some progress toward goals of the project has already been achieved. LDC demand for training in remote sensing techniques, particularly, effective means for interpreting ERTS imagery, is especially strong, and the number of developing countries requesting to join NASA's experimental ERTS B program has increased 50 percent compared with ERTS 1 (27 vs 18) (see Attachment 2). While the launch of ERTS B has been postponed until mid-1975, a large quantity of ERTS imagery -- now available for analysis -- has been obtained from developing countries.

D. Statement of Project Inputs

1. Inputs. Inputs for the project, apart from financial support for contractors and agencies, include technical information, consultation, and analysis provided by U.S. experts; regional and U.S. training activities; institutional, manpower, and facility support by developing countries; and ERTS imagery and specialized equipment for data processing and interpretation. In the case of our 18 month aircraft remote sensing project in Indonesia, both AID/TAB and GOI are providing $100,000 in funds or services toward its implementation. Similarly, other developing countries are contributing significantly toward objectives of the project.

2. Budget. The budget for the second phase of the project during the years FY 1974-1976 is, tentatively:

FY 1974	$200,000
FY 1975	200,000
FY 1976	200,000
Total	$600,000

This compares with $302,000 obligated during the years FY 1971-1973. To illustrate the scope and balance of activities at this stage, funding for FY 1974, roughly split between training and experimental investigations related to determining the usefulness of ERTS imagery in LDC applications, has been preliminarily allocated to requested activities as follows:

-- twelve week Latin American regional training seminar in Panama, $45,000;

-- pilot study to test usefulness of remote sensing in connection with disaster relief, $10,000;

-- pilot agricultural, hydrological, and land use ERTS analysis projects in Upper Volta, Niger, and Mali, $50,000;
-- two week East African regional training seminar in Nairobi, $25,000;
-- pilot geological ERTS analysis project in Afghanistan. $30,000;
-- short term advisory services by U.S. experts and participation by LDC principal investigators in ERTS utilization seminar at the State Department, $20,000; and
-- second remote sensing training course (four weeks) at Sioux Falls, South Dakota, $30,000.

In the final two years, emphasis will shift further toward experimental applications, to delineate concretely the usefulness of ERTS data products in international development. Apart from the importance of this information to AID, it will also contribute to a USG decision on transition from an experimental to an operational ERTS program.

3. Basic Assumptions about Management of Inputs. Except for the availability of funds, there are no other important assumptions regarding successful management of project inputs. The first phase practice of utilizing intermediaries mainly to implement project activities and to achieve quality performance will be continued.

E. Rationale

The rationale for this project is based on three related premises:
-- an important need exists in developing countries for more complete and comprehensive resource inventory and land use data for national and local development planning;
-- the large USG investment in experimental earth resource satellites represents an opportunity for developing countries to meet current information needs, in part, through the ERTS program at very low cost; and
-- the experimental phase should be designed to broaden LDC understanding of the technology, and determine from experimental efforts the advantages and limitations of the uses of information from continuing earth resource satellite operations in LDC development programs, both to improve future LDC technological choice.

During the first phase of the project, LDC demand for information, assistance, and training in remote sensing, particularly in relation to NASA's earth resources satellite program, has been particularly strong and continues to grow as LDC's recognize the broad coverage of ERTS imagery and the significance of initial results in countries which embarked on early experiments. The number of developing countries requesting to join NASA in the ERTS B experimental program has already increased 50 percent as compared with ERTS 1, and owing to a delay in the launch of ERTS B to mid-1975, the number will probably increase further by that time.

At the same time, ERTS continues as an experimental program and is continuing within AID under TAB financing mainly to resolve uncertainties as to its long term potential in international development. While this question will not be answered finally during the next three years, the project is oriented to:

- -- clarifying the importance of complementary multispectral aircraft surveys in the interpretation of ERTS imagery and appropriate low cost methodologies for the activation of such surveys in developing countries;
- -- determining the costs associated with ground surveys needed to facilitate image interpretation for various functional applications;
- -- assessing equipment requirements for image interpretation at various levels of information extraction;
- -- determining the most useful form for presenting ERTS information for various uses; and
- -- defining as may be possible at this stage of LDC ERTS experimentation, the most probable costs and benefits of continuing ERTS data utilization in LDCs, at different levels of economic development.

The information will not be derived from any single activity but rather from several project components including pilot experiments, cost/benefit assessments, and judgments of expert panels, including distinguished LDC representatives.

The rationale for the particular set of activities included within this project, both during its initial phase (FY 1971-73) and the next three years rests on evident LDC demand on one hand and U.S. resources and capabilities on the other. A lower level of effort initially would have resulted in less readiness in developing countries to determine for themselves the usefulness of ERTS imagery in generating new resource information. A level much higher than represented by this project and two more specialized experiments in geobotanical and census remote sensing also monitored by TA/OST would be inconsistent with the status of ERTS as an experimental project, even though some imagery is being used for operational studies in developing countries. When the President offered to share space information for the benefit of all countries, it seemed logical within the project to disseminate technical information, respond to developing country requests, particularly those from least developed countries, for assistance which would enable them to participate in the program, and offer opportunities for training -- both to broaden LDC understanding of the technology and its uses and to enable all developing countries, if desired, to make effective use of the imagery obtained of their country. In FY 1973 and FY 1974, about one half of project funding is allocated for training, with little training beyond FY 1974 to be supported by the project. Activities in FY 1975/1976 will be fairly sharply focused on delineating clearly what difference a continuing ERTS program would make in achieving LDC development goals. The effort during the final two years will build on and complement the cost benefit assessment conducted during FY 1974 and pilot ERTS interpretation and application studies initiated that year.

In regard to consideration within the USG of observation, dissemination, and organization options for continuing earth resource surveys by satellite and within the UN of these options and the related legal principles involved, better understanding of the usefulness of ERTS imagery in international development will be needed before major decisions are reached. The fact that worldwide experimentation with ERTS

imagery commenced less than one year ago and remains in an experimental status with much to be learned, suggests that clarification of the developmental relevance of ERTS may take some time. Nonetheless, the final project effort will contribute to AID and USG understanding of the value of earth resource satellite information in development programs, in addition to accelerating resource inventory and assessment efforts in selected LDCs through specific application experiments. The methodologies developed for use in these experiments and described in reports intended for broad distribution should subsequently benefit many more countries in utilizing ERTS imagery for development purposes. Once appropriate methodologies and their cost effectiveness are defined, LDCs may wish to incorporate the most promising of these in national development programs in which case related AID efforts would be funded through Regional Bureau or Mission programs.

F. Course of Action

1. Implementation Plan. The activities projected for FY 1974, mentioned in a previous section, are roughly balanced between training and pilot projects and include:

a. Training: Panama, Nairobi, Sioux Falls, $100,000.

b. Pilot Projects: (agriculture, hydrology, geology) Upper Volta, Niger, Mali, Afghanistan, $80,000.

c. Information Exchange: Consultation and LDC investigator conference, $20,000.

The training will be conducted during FY 1974 in Panama under auspices of the Interamerican Geodetic Survey and in Nairobi and Sioux Falls under auspices of the U.S. Geological Survey. The pilot projects

in agriculture, hydrology, and geology are intended to elaborate the costs and benefits of specific data uses in a series of case studies and also to respond to LDC initiatives and requests for assistance to utilize their ERTS data most effectively. The information exchange item is mainly to provide for international travel of LDC ERTS principal investigators for a two day session at the State Department on experimental results of their ERTS investigations. The session would be timed to coincide with the next NASA principal investigator conference, such as the one convened at Goddard Space Flight Center in March 1973, which was poorly attended by LDC investigators. Such a meeting will not only provide an opportunity for LDC investigators to exchange useful information on their individual experiments, but also will offer AID and State officers the first direct insight into the kinds of ERTS investigations being pursued in developing countries and interim results achieved in these efforts.

Beyond FY 1975, the project will undertake additional case studies in such fields as marine fisheries, cartography, geography, and land use, and collaboration will continue in selected LDCs in agriculture, hydrology, and geology as may be required. In FY 1975, support for training will be reduced to about $30,000 and in FY 1976 phased out completely.

In FY 1976, all case studies will be ended and support will be shifted to a concerted effort to synthesize results of the experimental program in useful form for utilization in developing countries and for guidance to AID and the USG related to responding to future LDC requests for assistance in remote sensing for development purposes. (See Attachment 3.)

2. Narrative Statement (Management Considerations). There are no specific issues in regard to continued monitoring of this project by the Office of Science and Technology, of which we are aware. Management of specific component activities will be performed mainly by intermediaries as during the first phase.

The project was evaluated as part of the TA/OST program evaluation process May 1 - 10, 1973; a PAR was included with the TA/OST FY 1974/75 program submission to TA/PM. Evaluation will be conducted annually through FY 1976.

G. Logical Framework

See Attachment 4.

ATTACHMENTS