PROPOSAL PROJECT PAPER (PROP)

1. PROJECT IDENTIFICATION

Img. 9310997 (2)
pd-
PD-AAD-237-B1

1. PROJECT TITLE

REMOTE SENSING CENSUS PROJECT

931-11-995-997

3. RECIPIENT (specify)	4. LIFE OF PROJECT	5. SUBMISSION
☐ COUNTRY Ethiopia	BEGINS FY 73	☒ ORIGINAL 11/25/72 DATE
☐ REGIONAL ☒ INTERREGIONAL Afghanistan Brazil	ENDS FY 77	☐ REV. NO. DATE
		CONTR./PASA NO. Hp

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	(B) BUDGET
1. PRIOR THRU ACTUAL FY												
2. OPN FY 73	200							50	12			
3. BUDGET FY 74	240						5	75	24			
4. BUDGET +1 FY 75	260						5	75	24			
5. BUDGET +2 FY 76	260						5	75	24			
6. BUDGET +3 FY 77	215						20	75	24			
7. ALL SUBQ. FY		*Breakdown subject to PROAG negotiation with each country.										
8. GRAND TOTAL	1,175*	See attachment 2 for Ethiopia plan					35	350				

9. OTHER DONOR CONTRIBUTIONS

(A) NAME OF DONOR	(B) KIND OF GOODS/SERVICES	(C) AMOUNT
Participating Countries; See Budget Plan	Technical Services and facilities	Up to: $340,000

III. ORIGINATING OFFICE CLEARANCE

1. DRAFTER	TITLE	DATE
John Fry, TA/OST	Staff Member	11/25/72
2. CLEARANCE OFFICER	TITLE	DATE
Glenn E. Schweitzer, TA/OST	Director	2/12/73

IV. PROJECT AUTHORIZATION

1. CONDITIONS OF APPROVAL

2. CLEARANCES

BUR/OFF.	SIGNATURE	DATE	BUR/OFF	SIGNATURE	DATE
PHA/POP/AE	J.W.Brackett	1/24/73	PHA/POP	J.K.Shafer	
PHA/POP/AE	M.Towne		TA/OST	G. Schweitzer (phone 1/19/73)	
PHA/POP	E.R.Packlund		AFR/ESA	R. Ellison (phone 1/19/73)	
PHA/POP	R.T.Havenhol[illegible]		ASIA/NE	M. DiLegge (phone 1/19/73)	
PHA/FRS	C. Coleman see memo 1/25/73 SAT		ARA/LA/BR	P. Schwab phone 1/19/73	
			TA/PM	RCorrel/DMathiasen	

3. APPROVED/DISAPPROVED BY (AID/W OFFICE DIRECTOR)

SIGNATURE: Joel Bernstein DATE: 2/22/73

TITLE: Assistant Administrator for Tech. Assistance

4. CLEARANCE/APPROVAL BY (FIELD MISSION DIRECTOR)

SIGNATURE DATE

TITLE: ADMINISTRATOR, AGENCY FOR INTERNATIONAL DEVELOPMENT

ADDENDUM TO PROP - REMOTE SENSING CENSUS PROJECT

1. Add sentence item 7, top page 6, to read, "If this evaluation indicates promise in developing new techniques, and if the cooperating countries continue to support the project, the course of action for the fourth and fifth years will be undertaken."

2. Page 11 states that all 3 countries do not need to participate to demonstrate applicability of the techniques. Our expectation at this time is that three countries in different environmental settings and patterns of human settlement will participate in the project. Should only one country participate in the project, extrapolation of project results may be limited to similar environmental settings. At a minimum it is desirable to include both arid land and semi-tropical/tropical environments.

3. NASA has announced (February 1973) that the launch of ERTS B will be postponed until 1976. However, NASA scientists now believe ERTS 1 will continue to operate satisfactorily beyond its design life of one year. Therefore, proposals for participation in ERTS B will be considered as augmentation of the ERTS 1 project. ERTS 1 imagery would thus be utilized for this project.

4. The funding totals in column B of the PROP face sheet reflect three components: the funds to be transferred under project agreements (PROAGS) with cooperating countries; the funds identified in column F reflecting evaluation costs; and the funds identified in column G reflecting costs associated with PASA arrangements with the Bureau of Census which will serve as intermediary for the project. The breakdown of funds for cooperating countries will be negotiated and specified in project agreements; the breakdown of PASA funds for the Bureau of Census will be specified in the PIO/T.

FY 73/74 Project Analysis Matrix

Project Analysis Matrix

Title: Remote Sensing Census Project

Proj. Manager John Fry Extn 20545

Contractor/P.A./Grantee Bureau Census, LDC Institutions

Contract/PASA/Grant No.

Contract. Officer Extn

7. Major Country/Countries

Brazil, Afghanistan, Ethiopia

73 7

9. 73 7

10. PROP Status: See C4

11. Evaluation Schedule(mo/yr)

Logical Framework

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to Date
PURPOSE: Test the usefulness of satellite remote sensing imagery (ERTS) in planning and implementing census and related statistical programs in Brazil, Afghanistan and Ethiopia or alternative countries.	B2 End of Project Status: In participating countries: a. institutional capabilities established for interpreting remote sensing imagery in terms of census objectives; b. cost/benefit relationships established for use of remote sensing imagery in census programs; and c. government commitment to continue use of remote sensing imagery in national census programs, if benefits warrant.	B3 Assumptions for Achieving Purpose: a. LDC institutions can generate useful census related information from ERTS imagery; b. ERTS imagery will be competitive with some sources of census information. B4. Progress to date: Investigations by Wray and others suggest assumptions are reasonable.
OUTPUTS: In each of the countries: a. Maps for census operations. b. Baseline statistical data on rural agriculture and urban development; and c. Evaluation of new technological capabilities for detecting significant changes in rural and urban population.	C2 Output Indicators: a. Areal delineations for census - taking. b. Empirical models for relating land use to population distribution and densities in rural and urban areas. c. Cost/benefit studies related to use of remote sensing in terms of census objectives.	C3 Assumptions for Achieving Outputs: a. ERTS B is launched and operates satisfactorily. b. Empirical relationships can be established between land use and population using ERTS imagery, in connection with ground survey. C4 PROP circulated for Bureau clearance. Proj being considered by governments of Brazil, Afghanistan, Ethiopia. BUCEN has agreed to se as intermediary. TA/OST will provide project monitor. Expect Mission and LDC concurrence early 1973.
D1 INPUTS: a. ERTS imagery provided by NASA as requested by proposals submitted by GOB, IEG and RGA. b. Training about 15 participants from LDC institutions and financial and equipment support for LDC institutions (INPE, IBGE, CSO, ACI, MGI). c. Project management, coordination, and technical and training advice by BUCEN. d. LDC institutional support for project activities.	III A. Relation to Category Statement: This project will investigate the usefulness of new means for acquisition of important demographic data in developing countries which, if successful, will contribute to more effective national planning and development. B. Supplementary Rationale: None	

PROP - REMOTE SENSING CENSUS PROJECT

A. Statement of The Goal

1. The goal

The goal of this 5-year experimental project is to contribute to improving the availability of census and related statistical data in developing countries for decision-making related to national planning. The population in many countries is increasing in number faster than schools can be built to educate their youth, faster than hospitals can be built to serve health needs of their people, faster than the economy can be developed to provide jobs for their workers, and faster than the governments can meet the social and economic needs of the people. An essential element for national planning related to human needs is adequate information on the size and geographical distribution of population and relationships of population to land use.

In many developing countries current census information, both for rural areas and expanding urban centers, is inadequate or unavailable as a basis for national planning. In Afghanistan, for example, the total population is estimated at about 17 million people, however, the uncertainty in this figure is at least 20 percent. At the same time, new technologies are becoming available which may be useful in strengthening census efforts by providing needed technical inputs at lower cost than could be obtained through conventional methods.

2. Measurement of goal achievement

The achievement of this goal will be measured by the degree of success in demonstrating the feasibility of new techniques for census preparation, implementing and reporting and future use of these techniques as may be feasible in census and related statistical programs in developing countries.

3. Assumptions about goal achievement

An important assumption is that LDC Governments will increasingly employ least cost techniques if feasible in census operations and use census and related statistical data to the extent of their availability in national, regional, and local planning.

B. Statement of Project Purpose

1. The purpose

The purposes of this project are to test the usefulness of satellite remote sensing imagery in preparing for, implementing, and reporting census operations in developing countries in each geographical region; and to develop and strengthen the capabilities of existing institutions

in these countries to utilize remote sensing in continuing census surveys and other statistical programs. Ethiopia, Afghanistan and Brazil are tentatively identified as the countries in which the project will be conducted. Remote sensing is the term currently used to describe the process of viewing the earth's surface in the electromagnetic spectrum from the atmosphere or space. As used herein the term denotes the use of earth resource satellite (ERTS) imagery and multispectral aerial photography, along with ground truth surveys, simplified data interpretation devices, and statistical analysis techniques in census and related statistical operations. For a description of the ERTS program see Section E.

The project will test the feasibility of:

— improving the frames for census operations and graphic presentations of results through image mapping;

— detecting changes in rural population by developing land use population relationships; and

-- detecting changes in urban population by approximating limits of urbanization and land use.

For each of these activities there is an important need in developing countries, which may be met -- at least in part -- through remote sensing applications.

First, there is a need for improved frames for census-taking. Regardless of the specific kinds of population data to be collected or the collection procedure to be used, some kind of frame is needed. The frame may consist of areas delineated on maps or aerial photographs, lists of villages, lists of tribes and other population groups, or a combination of the The frame serves two statistical purposes. In a census, it identifies the administrative sub-divisions for which separate data are to be presented, and is used to define work assignments for data collectors, so that the country can be covered completely and without duplication. In a sample survey it assists in providing the framework for initial stages of sample selection. In addition, an up-to-date frame will be useful for many nonstatistical purposes related to administrative, economic, and social planning and other governmental and nongovernmental activities. A major purpose of the project is to test whether frames for census taking can be delineated on photomaps prepared from remote sensing imagery and the necessary techniques for so doing developed.

Second, there is a need for more complete information on the distribution of population in rural areas of developing countries. Identified with this second objective is an experiment to understand better the relationships between agricultural acreage, the nature of human settlement, and population density in rural areas. In view of the nature of agricultural patterns in many developing countries, it is believed such

relationships can be developed from spacecraft imagery and selected field (ground truth) surveys, in which case their value can be assessed in enhancing administrative census data.

Third, since cities usually grow faster in population than rural areas and generally require more government services, there is a need for more timely indications of change in urban population. While remote sensing imagery cannot indicate a count of population directly, it is believed that it can be utilized to identify areas undergoing urbanization as a benchmark for measuring future urban development. Also, it is believed it will be useful in classifying urban land use in such a way as to aid in estimating urban population and population change.

Urban population statistics are frequently lacking or are misleading in developing countries owing not only to lack of data, but also to non-standardized methods of reporting. For example, under methods employed in some countries, the population of the Washington, D.C. metropolitan area would be reported as the population of the District of Columbia, thus handicapping full use of census data for purposes of business, labor, research and planning organizations, and government at all levels. The delineation of boundaries of built-up areas by remote sensing would aid in urban statistical reporting.

2. Conditions expected at the end of project

The principal condition expected at the end of the project is knowledge of a methodology broadly applicable in developing countries for using remote sensing techniques in facilitating census programs and determining the feasibility, cost, and value of the method.

Other benefits expected at the end of the project are:

1. institutional capabilities strengthened in up to three countries for the interpretation of remote sensing imagery in terms of population and agricultural census objectives;

2. determination of costs and benefits of the use of remote sensing imagery in census projects in up to three countries; and

3. commitment of governmental authorities to continue use of remote sensing techniques to strengthen national census programs if benefits warrant.

3. Basic assumptions about achievement of purpose

The assumptions implicit in achieving the principal condition are that different kinds of land use can be related to labor intensity and to population density in rural areas by some observable and measurable indices; and that satellite imagery beyond the operational life of ERTS A and B, will be made available by the U.S. Government through follow-on

earth resources satellite programs to developing countries at no cost, or minimal cost related to processing and reproduction. This will be considered explicitly in the cost benefit analysis.

The assumptions implicit in achieving the other conditions mentioned above are that the first will be met, the second will indeed show benefits favorable to costs, and the third will follow as a logical consequence of the second. If the value of remote sensing in population and agricultural census projects is demonstrated, the project purpose will be achieved when one or more of the countries makes commitments to integrating remote sensing techniques in national census programs.

C. Statement of Project Outputs

1. Outputs and output indicators

The kinds of outputs expected from this project are trained and experienced staff and leadership, and specific products and studies based on remote sensing techniques relevant to census objectives in the selected countries. This would include in each of the countries participating, improved frames for census operations and reporting, statistical data on rural agricultural and urban development, and improved capabilities for detecting significant changes in rural and urban population. Specific output indicators and their target completion date for each year of the project are cited in Table 1.

TABLE 1. OUTPUT INDICATORS AND TARGET COMPLETION DATES FOR REMOTE SENSING CENSUS PROJECT

(Note: Specific land areas are preliminarily identified and may be modified by mutual agreement)

FY 1973. First Year

1. Five-year work breakdown structure developed by Project Coordinator, U.S. Bureau of the Census, in consultation with government officials in participating countries which may include Brazil, Ethiopia, Afghanistan or alternative countries. Herein, Brazil, Afghanistan and Ethiopia will be identified as participating countries for convenience in presentation.

2. Proposals prepared in Ethiopia and Afghanistan and submitted to NASA for participation in the ERTS B satellite experiment. See attachment 1 for example.

FY 1974. Second Year

1. Image maps prepared from ERTS B and aircraft photography for selected rural and urban areas of Brazil, Ethiopia and Afghanistan.

2. Frames for census-taking and reporting prepared from image maps for rural areas of Brazil and Ethiopia.

3. Empirical models developed for relating population to various kinds of land use in selected rural areas of Brazil or another country.

4. Delineation of approximate urban boundaries and broad classification of land use for urban centers in Brazil, including Sao Paulo, Rio de Janeiro, and Belo Horizonte or another country.

FY 1975. Third Year

1. Frames delineated for future census projects in Afghanistan or another country.

2. Empirical models for relating population to land use in rural areas in Ethiopia and Afghanistan.

3. Delineation of baseline urban boundaries and broad classification of land use for urban centers of Ethiopia and Afghanistan.

4. Direct estimates, if possible, from repetitive ERTS B imagery of the migratory population of Afghanistan. (The size of normal encampments may be at the threshold of resolution of ERTS imagery. If encampments can be observed and population estimates derived therefrom, this could be very significant in planning census projects in this country.)

5. Empirical models developed and tested for relating population to land use within boundaries of urban centers in Brazil or another country.

6. Regional workshop in Brazil or another participating country to disseminate interim results to census specialists from the region and key participants from other countries.

7. Report of mid-term project evaluation.

FY 1976. Fourth Year

1. Report of benefit/cost study of utilizing remote sensing techniques in census projects in Brazil.

2. Empirical models for detecting significant change in rural population in test areas of Ethiopia and Afghanistan based on land use/population models developed for the two areas.

3. Empirical models developed and tested for relating population to land use within boundaries of urban centers of Ethiopia and Afghanistan.

FY 1977. Fifth Year

1. Report of benefit/cost studies of utilizing remote sensing techniques in census studies in Ethiopia and Afghanistan.

2. Regional workshops in Ethiopia and Afghanistan to disseminate final results to census specialists in Africa and Asia, respectively.

3. Report of project evaluation study group.

2. Basic assumptions about production of outputs

Assumptions implicit in achieving the specific outputs of the project are that the governments concerned will commit educated manpower and technical services to the project and share in the cost of providing facilities and logistics; that the ERTS satellites are launched satisfactorily and meet performance expectations and imagery is provided by NASA; that feasibility can be demonstrated in developing countries for empirical modeling of land use/population relationships in rural and urban areas; and that remote sensing is a cost effective technique for supporting census projects in these countries.

D. Statement of Project Inputs

1. Inputs

Inputs for the project will be of several kinds, including technical consultation with the government officials in Brazil, Ethiopia and Afghanistan;

the training of personnel from up to three participating countries; technical advisers provided by the United States; the availability of ERTS imagery and supplementary aerial photography, if required; minor instrumentation provided by the United States; instrumentation and facilities provided by the other governments; and financial support of the governments involved.

Specific inputs and their appropriate timing are cited in Table 2.

TABLE 2. INPUTS AND TIMING FOR REMOTE SENSING CENSUS PROJECT

1. A Project Agreement will be negotiated with each country which chooses to participate (up to three); it will designate the specific institution responsible for implementation of the project. See attachment 2 for example. Contractual agreements by each institution will be developed to provide professional and technical services and other supporting activities as necessary.

a. Training of 3 to 5 geographers, or professionals in statistics, cartography, or agronomy with related training, from each country in remote sensing applications for 4 weeks at the Earth Resources Observation System (EROS) facility, Sioux Falls, South Dakota and U.S. Bureau of the Census, and for other periods at regional seminars as may be required, FY 1973.

b. Services of 3 to 5 professionals from each of the three countries for developing census frames, land use/population models, and base data for comparison and cost/benefit factors; FY 1973-1977.

c. Technical and professional services related to enlarging and preparing mosaics of the imagery, photographic processing, printing, and ground surveys and possibly limited aerial photography for data collection and verification, FY 1973-76.

d. The three countries involved will provide facilities and equipment for effective in-country operation of the project.

2. PASA services of one U.S. census remote sensing specialist, including administrative support and travel, FY 1973-77.

3. Technical consultation with government officials in Brazil, Ethiopia and Afghanistan, FY 1973 and continuing.

4. Most equipment is available locally and will be provided for under the project agreements cited above. However, certain image interpretation equipment will need to be purchased in the U.S.

5. Inputs not covered in the cost of this project include ERTS imagery available from NASA, for the three countries involved, FY 1973-74.

2. Budget

An estimated ratio of shared costs of the project is given below (in thousands). Specific cost breakdowns will be determined in negotiating project agreements in one or more countries. The funding table indicates approximate total costs and a suggested contribution ratio, although not all of the countries may request to participate. The project will be activated when one country requests participation.

Project Agreement Cost:		FY 73	FY 74	FY 75	FY 76	FY 77
BRAZIL - Total Annual Costs		$ 140	$ 130	$ 130	$ 130	$ 60
	U.S.	90	80	80	80	40
	Brazil	50	50	50	50	20
ETHIOPIA - Total Annual Costs		$ 30	$ 55	$ 65	$ 65	$ 55
	U.S.	30	40	50	50	40
	Ethiopia	-	15	15	15	15
AFGHANISTAN - Total Annual Costs		$ 30	$ 55	$ 65	$ 65	$ 55
	U.S.	30	40	50	50	40
	Afghanistan	-	15	15	15	15
OTHER COSTS						
Bureau of the Census (PASA)	U.S.	$ 50	$ 75	$ 75	$ 75	$ 75
Project Evaluation	U.S.		5	5	5	20
TOTALS	U.S.	$ 200	$ 240	$ 260	$ 260	$ 215
	Country	$ 50	$ 80	$ 80	$ 80	$ 50
TOTALS		$ 250	$ 320	$ 340	$ 340	$ 265

E. Rationale

The rationale for this project is based on two related premises:

— a priority need exists in developing countries for census and related statistical data to aid national and regional planning; and

— the high NASA investment in earth resources satellites represents an opportunity to obtain imagery relevant to census needs at no direct cost.

A great majority of the least developed countries lacks the basic socio-economic data needed for decision making. Fourteen of these countries have never had a

population census; six countries have never had a demographic survey, in which cases even the size of the population is based on unreliable estimates or conjectures. Ethiopia and Afghanistan are included within the six countries never having had a population census.1/ At the same time, demographic data are indispensable tools in national planning and development of social and economic systems responsive to national needs. Indeed, a continuing lack of such data tends to perpetuate underdevelopment.

The economic impact of census data in the United States is particularly great.2/ "As the United States experiences rapid and volatile growth in terms of population and internal mobility, many census users correctly conclude that a census every decade is simply not adequate.... The decennial census taken in 1970 cost approximately $220 million. The cost of a mid-decade census...has been approximated at $150 million in 1970 dollars. A little over a year and a half ago, some ten billion dollars per year were being distributed on a basis of some use of population as a criterion. Relying on outdated statistics from the decennial census in the latter years of the decade costs our government probably considerably more than $150 million."

This project will not provide all the demographic data needed by the countries participating. It is designed, however, to strengthen their census efforts by demonstrating the feasibility of new techniques for acquiring information indispensable for census planning and for estimating rural and urban populations and population change.

In regard to taking advantage of the huge national investment in earth resource satellites, the government has invited all nations to participate in NASA's earth resource satellite program by submitting proposals for the use of ERTS imagery (geography is one of six disciplines included within earth resources). This project thus builds on established procedures for other countries to participate in the ERTS program, by providing supplementary support for ERTS investigations related to census objectives. The ERTS imagery provided through this project may be useful for other earth resource studies in agriculture, geology, hydrology, forestry and land use management, but herein we are concerned only with census and related statistical applications.

The ERTS 1 satellite was launched in July 1972 into a 900 kilometer, near-polar orbit permitting observation of the same area of the earth under clear skies at constant sun angle every 18 days. It is planned that ERTS B will be launched in November 1973 to provide continuity in earth resource observations. The sensors include a return beam vidicon camera to record virtually undistorted images in three color bands with a ground resolution in the range 92 to 185 meters, depending on contrast. A four-channel

1/ Annex to The Problems of the Least Developed Countries, DAC/EA(71)9, Development Assistance Committee, OECD, Paris, November 15, 1971

2/ Congressional Record, November 17, 1971, pg. 12325

scanner is also included to extend spectral coverage to the near infrared with a ground resolution of about 100 meters. Each color image will cover an area of 185 by 185 kilometers in a 9½ by 9½ inch format. Positive transparencies will be provided at no cost by NASA for approved experiments. These can be used separately or in enlarged or mosaic form with a light table and/or color additive viewer to trace features of special interest for census purposes.

The rationale underlying the stated premises for the project is to dovetail the successful U.S. experience in remote sensing applications and census activities, in order to develop census and related statistical techniques broadly applicable to developing countries. Substantial progress has been achieved during the past decade in the United States in utilizing remote sensing techniques for mapping and rural and urban land use studies. In the Phoenix pilot project related to land use mapping it was concluded that land use maps and accompanying statistical information of reasonable accuracy and quality can be compiled at a scale of 1:250,000 from orbital imagery.3/ Under the Census City Project involving 26 urban test sites in the United States remote sensing imagery from aircraft is being used to detect changes in boundaries of urbanized areas and patterns of land use; the principal investigator has stated that ERTS imagery will contribute substantially to this project when it becomes available.4/5/

Another rationale relates to why the achievement of purposes of the project is important to the developing countries and why the approach outlined for achieving these purposes appear to be most appropriate at this time. Mention has been made of the significant value of U.S. census results and priority needs for census data in many developing countries, to aid governmental decisions which must be based on considerable knowledge of population size, distribution, and density.

This project will test the feasibility of new techniques for obtaining up-to-date map frames essential for the conduct of any census and techniques for detecting rural and urban population change. These techniques may be particularly useful for census planning and for obtaining more timely estimates of population shifts within rural areas and from rural areas to urban centers.

What this project offers is testing of a new technology which may contribute to accelerating census efforts in the three countries at lower cost in terms of manpower and financial resources compared with competitive approaches. Moreover, a technical readiness exists in these countries to assimilate this technology, that is, to translate satellite and other imagery

3/ Anderson, J. R. and J. L. Place; Regional Land Use Mapping; The Phoenix Pilot Project; Proceedings of the International Workshop in Earth Resources Survey Systems, Vol. II, May 3-14, 1971; GPO, Washington, D.C.

4/ Wray, James P.; The Census Cities Project and Atlas of Urban and Regional Change; Proceedings of the International Workshop on Earth Resources Survey Systems, Vol. II, May 3-14, 1971

5/ Personal Communication, Mr. James Wray, U.S. Geological Survey

into information relevant to census objectives. The project thus endeavors to match low cost (to the countries concerned) remote sensing technology to important census needs.

A further rationale relates to the selection of the three countries for the project. An important consideration is that the countries be dispersed geographically with different human settlement and agricultural land use patterns. Another consideration is the need perceived by the governments of developing countries for assistance in their census and related statistical programs.

In this regard, A.I.D. is currently assisting Brazil and Afghanistan through the U.S. Census Bureau in further development of census and statistical programs. A sample household survey being conducted by representatives of the State University of New York (Buffalo) in Afghanistan to assess population characteristics, including family composition, is a separate but related project. Ethiopia will be conducting a population census in 1974 with UN assistance and is currently considering a project for remote sensing assistance.

The experience gained from this project should facilitate the diffusion of new technological approaches to census programs, if feasibility testing and cost/benefit factors warrant, to other countries. Ethiopia, Afghanistan and Brazil represent a variety of physical terrain, land use practices and vegetation patterns, so that results obtained in this project should have wide application in other countries. Geographical diversity will thus give impetus to the technology transfer aspects of this project, but not all three countries need participate to demonstrate applicability of the techniques. Nonetheless, the participation of all three countries will lower the unit cost of the aggregate of outputs as compared with each undertaking these activities independently.

Preliminary discussions in Brazil in December 1971 with officials of the Institute of Space Research and Institute of Geography and Statistics confirm the support of these organizations for this project, including provisions for cost sharing. Ethiopia and Afghanistan have indicated interest in the project and it is expected that the governments of both countries will recognize the benefits of the project in terms of their own needs and request to participate in its implementation. A draft proposal for NASA and related project agreement for Ethiopia have been developed in consultation with government officials of that country and these documents are currently (November 1972) being prepared in Afghanistan. It should be noted that Brazil will have access through a bilateral agreement with NASA to ERTS 1 and B imagery for large areas of the country, including the areas tentatively selected for the project.

This project is an inter-regional activity designed to involve up to three countries in such a way as to speed the transfer of this technology to developing countries worldwide. With financial support of Bureau of Population and Humanitarian Assistance, the Office of Science and Technology of the Technical Assistance Bureau will guide the planning and implementation

of the project and provide for objective evaluation.

F. Course of Action

1. Implementation Plan

The project will be subdivided into three phases with activities proceeding generally in parallel in the participating countries.* Activities during each phase will be tailored to the specific needs of each country in relation to experimental objectives as indicated in the draft project agreement for Ethiopia (see attachment 2), but in general will follow this course:

Phase I. Organization, including PASA with the U.S. Bureau of the Census, preparation of a detailed work plan in participating countries, training of participants, acquiring facilities and color additive viewing and related image interpretation equipment, assembling reference data, etc. This phase will extend through the beginning of regular receipt of ERTS imagery in the countries participating -- duration about 12 months.

Phase II. Experimental use of ERTS and other imagery, including preparation of 1:250,000 or larger scale photomaps, periodically delineating limits of urbanization, identifying patterns of human settlement and related agricultural land use, and clarifying land use characteristics associated with semi-nomadic habitation. This phase will extend for 18 months at the end of which a mid-term evaluation and regional workshop for dissemination of mid-term results will be conducted.

Phase III. Correlating information derived from ERTS imagery with census and related statistical data, and as may be feasible developing numerical models for estimating rural and urban population change. This phase will extend for about 2½ years and will include a quantitative assessment of the usefulness of ERTS imagery for census purposes, including mapping and related statistical programs needed to meet census objectives, as compared with obtaining the information required through conventional methods.

For a more complete description of the course of action as it has been planned for Ethiopia, see attachment 2, page 6. Should for any reason ERTS B imagery not be available from NASA, the project would be postponed following Phase I until launch of the next earth resources satellite, ERTS C.

2. Narrative statement

The Office of Science and Technology, in consultation with the Bureau

*If Brazil joins in the experiment, the schedule may be advanced there, owing to the availability of comprehensive ERTS 1 imagery.

of Population and Humanitarian Assistance, will be responsible for the management of this project, including overall implementation, performance, evaluation and agreements with one or more of the countries requesting to participate.

The Bureau of the Census will assist the Office of Science and Technology as an intermediary and be responsible for developing a work and timing breakdown structure in consultation with participants in the countries concerned, providing technical advice and training to the participants, coordinating implementation of elements of the work breakdown structure, and advising the Office of Science and Technology of issues arising in the course of the project that cannot be resolved by the Bureau of the Census. The Bureau of the Census was selected for this intermediary role in view of its capability to provide expertise in both census and related statistical programs and remote sensing applications to census needs. The Bureau of the Census concurs in undertaking this project.

Project managers will be designated in lead agencies in each of the three countries. Based on initial consultations, it is planned that the lead agency in Brazil, if Brazil requests to participate, will be the National Institute for Space Research with major support from the National Institute for Geography and Statistics. The lead agency in Ethiopia will be the Central Statistical Office, with assistance from the Ministry of Land Reform and Administration and Ministry of Agriculture. In Afghanistan it will be the Central Statistical Office, with assistance from the Afghan Cartographic Institute. Lead and supporting agencies will be identified in agreements with the countries which request to participate in this project.

The USAID Missions will not be required to undertake management responsibilities in connection with this project. The Missions can assist the Office of Science and Technology, however, by aiding in concluding the necessary agreements with the three countries and monitoring and reporting progress and issues to the extent that staff resources might permit. In Afghanistan, specialists from the Bureau of the Census assigned to the Mission for other projects, could assist the Office of Science and Technology by providing supplementary guidance and monitoring progress and issues to the extent their time permits.

A mid-term and final evaluation will be arranged by the Office of Science and Technology in the third year and final year of the project respectively. The Bureau of the Census will submit quarterly reports of progress to the Office of Science and Technology.

G. Logical Framework

See attachment 3.