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AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT IDENTIFICATION DOCUMENT FACESHEET
TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE
 A = ADD
 B = CHANGE
 C = DELETE

FID 137
 2. DOCUMENT CODE

3. COUNTRY/ENTITY CAMEROON
 4. DOCUMENT REVISION NUMBER

5. PROJECT NUMBER (7 DIGITS) [631-0018]
 6. BUREAU/OFFICE
 a. SYMBOL AFR
 b. CODE 106
 7. PROJECT TITLE (MAXIMUM 40 CHARACTERS) [CAMSAT]

8. PROPOSED NEXT DEDUMENT
 a. 2 = PP
 b. DATE 11/77

9. ESTIMATED COSTS (\$000 OR EQUIVALENT, \$1 =)
 10. ESTIMATED COSTS (1000 OR EQUIVALENT, \$1 =)

FUNDING SOURCE	AMOUNT
a. AID APPROPRIATED	650
b. FIRST COUNTRY	270
c. OTHER COUNTRIES	
TOTAL	920

11. ESTIMATED FY OF AUTHORIZATION/OBLIGATION
 a. INITIAL FY [79]
 b. FINAL FY [81]

12. PROPOSED BUDGET AND APPROPRIATED FUNDS (\$000)

A. APPROX. PROJECTION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY 79		LIFE OF PROJECT	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	H. GRANT	I. LOAN
(1)	230	090		270		650	
(2)							
(3)							
(4)							
				TOTAL	270	650	

13. SECONDARY TECHNICAL CODES (maximum six codes of three positions each)
 051 | 091 | 092 | 095 | 096 | 053

14. SPECIAL CONCERNS CODES (maximum six codes of four positions each)
 15. SECONDARY PURPOSE CODE

16. PROJECT GOAL (maximum 250 characters)
 [To increase the level of living of the rural population through the optimal utilization of available resources as well as to reduce the deterioration of the environment due to the mismanagement of natural resources]

17. PROJECT PURPOSE (maximum 400 characters)
 [Improve planning, implementation, and monitoring of CURC resource development programs and institutionalize within CURC technical and educational agencies the use of satellite imagery as a tool for studying, planning, and implementing national programs for resource development.]

18. SPECIAL RESOURCE REQUIREMENTS (additional)
 2 pm Remote Sensing Specialist (applications) in Yaounde (1.5 pm) and US (.5pm)
 AG. EC: [] FID: [] CONT: []

19. ORIGINATING OFFICE CLEARANCE
 20. DATE DOCUMENT RECEIVED (1. 230/V, OR FOR AID/M DOCUMENTS, DATE OF DISTRIBUTION)
 21. REGIONAL DEVELOPMENT OFFICER
 JOHN W. KOENRIG
 22. DATE ISSUED
 23. MONTH DAY YEAR
 24. MONTH DAY YEAR

SUBJECT IDENTIFICATION DOCUMENT

CAMSAT

CAMEROON SATELLITE APPLICATION AND TRAINING

STATEMENT OF THE PROBLEM TO BE ADDRESSED AND THE PROPOSED RESPONSE TO THE PROBLEM

A. Problem Statement and Summary

The United Republic of Cameroon covers 475,000 sq. kilometers (183,000 sq. miles) of diverse terrain in west-central Africa - an area slightly smaller than that of France. Within this area there is a tremendous variety of vegetation, climates, landforms and peoples. The vast majority of Cameroon's seven million inhabitants earn their livelihood from the land, in ways little changed from that of their forefathers - grazing cattle and goats over the northern Sahel-type region, shifting crops from field to field in the western and central highlands, and harvesting forest products in the rainforests in the south. Most of these activities have proceeded without planning or coordination. However increasing conflicts over competitive land uses and pressures for increased economic development require that the GUPC initiate and administer sound plans and policies for resource development.

To develop sound resource plans the GUPC needs basic information regarding the nature, extent and condition of its land resources. It also needs a continuing ability to up-date and monitor resource exploitation as development proceeds. While large-scale generalized maps and aerial photographs exist for Cameroon, most of these are out-of-date and inadequate for detailed planning purposes.

Lack of modern facilities and inadequate numbers of trained staff in various technical departments prevent the GUPC from acquiring the needed resource information in a comprehensive and timely manner. The GUPC currently has no mechanism for keeping up-to-date on the rate of harvest of its forestry, agricultural, rangeland and mineral resources nor on the environmental hazards, such as soil erosion, caused by such harvest and exploitation.

B. The AID Response

USAID sponsored a series of demonstrations in developing countries to show the capabilities of current U.S. communications and remote sensing satellites; the AIDSAT program. In October 1976 simultaneous broadcasts to Yaounde, Douala, and Victoria via the ATS-6 communications satellite presented the advantages and utility of earth resources data collected by the Landsat series of satellites to various GUPC officials. These satellites have been collecting data of Cameroon since 1972 and will be available for additional data collection for many years. As a result of the AIDSAT demonstration, individual interest on the part of various GUPC officials has evolved into official governmental interest to acquire and use Landsat data.

The Ministry of Posts and Telecommunications (PTT) was given the responsibility to coordinate the development of a national program by the Prime Minister's Office. In March 1977 a representative of PTT had a series of productive meetings with AID, USAID, IBRD and National Academy of Science officials in Washington to determine in what way the PTT could proceed with its request for needed assistance.

As a result of these meetings, AID arranged for two remote sensing experts, under contract to TAM's office of Science and Technology, and a PEDSO/MA mining engineer to visit Cameroon to help determine the need for and feasibility of implementing a national program. After individual and collective meetings with officials of various Ministries (including the Ministries of Posts and Telecommunications, Agriculture, Livestock, Mines, and Transport), ONAREST's Centre Geographique National (CGN), the University of Yaounde and PTO, it was concluded that there is a definite need for satellite data applications in Cameroon on the basis of the initiative and enthusiasm shown by the GURT officials. A sound basis for developing such a program. Concurrently, the various concerned Ministries are preparing a set of recommendations to the Prime Minister's Office to request assistance in implementing a national satellite applications program.

C. Project Description

The overall project goal is to assist the GURC in improving its capability to design, plan and implement economic and social development programs. An incremental step toward this goal can be achieved by institutionalizing within GURC Ministries and technical departments the use of satellite-derived data as an informational resource for improved development programs.

Among alternative sources of data (ground surveys, aerial photography, etc.) the use of satellite data provides a flexible, low-cost option which is well-suited to the Cameroon situation.

Methods of obtaining equivalent spatial resource information are costly and tedious to implement and in most cases would over-tax the limited survey or inventory capabilities of the GURC. Present aerial photography is limited in extent and quality and periodic coverage for forest, rangeland, or coastal zone monitoring activities currently is not possible.

- * To achieve the institutionalization of Landsat data applications in the GURC development process, a single facility capable of linking the Landsat technology to practical applications is required. The alternative of establishing separate units in individual Ministries is unnecessarily duplicative and beyond the technical capacity of most departments.

A mechanism is required that can bridge the gap between the satellite technology and the potential users and create a continuing demand on the part of the user-departments to eventually support the Center with their own resources.

Actual investment in establishing a Cameroon Satellite Applications and Training (CAMSAT) Center is not great. A small technical staff (2 or 3 people) needs to be formed, and some equipment and facilities, acquired. To complement the existing OAI photo-duplication facilities, specialized image enhancement equipment should be acquired. Short-term technical training should initially be provided to 4 Cameroonian resource scientists. Technical assistance needs to be provided by AID to assist the CAMSAT Center in orienting itself to the specific activities of the various technical departments. Technical assistance will consist of a long-term (2 year) user-facility applications specialist who can assist in the day-to-day operation of the CAMSAT Center, and help identify and arrange for short-term user-specific technicians. Short-term specialists would be made available to participate in certain applications projects or demonstrations.

The CAMSAT Center is not conceived of as having the resources necessary to implement actual resource surveys, but rather to provide potential users with satellite data, survey design expertise, instruction in data manipulation, and technical consultants for specific projects involving the use of remote sensing technology. It is also desired to have available special equipment which can be used for extracting or enhancing information from the satellite data.

The Centre Geographique National is part of the National Office of Research and Technology (ONAREST). ONAREST provides research and technical services to all GURC Ministries and is a logical place to develop the CAMSAT Center as it will also provide services to a wide variety of Ministries, other government agencies, and other donor agencies.

CAMSAT CENTER

A major service of the CAMSAT Center will be the ordering and archiving of all available Landsat data of Cameroon in positive and negative image form. Cameroon has been completely recorded, at least by Landsat, and many areas have been recorded on several different dates since the launch of Landsat I in 1972. With the launch of Landsat III in late 1977 and the establishment of direct Landsat data reception for Cameroon from a station in Ougadougou within 3 years, it is anticipated that substantial additional satellite data will become available routinely.

The Center will be responsible for cataloging, reproducing and distributing copies of this imagery to appropriate user departments and organizations.

While the recording and reception of earth resources data by satellite represents a sophisticated technology, the most readily usable satellite products are in the form of photographic-type images. These images can be modified and enhanced in several different ways to provide better resource information. Optical image enhancement techniques require the use of several specialized pieces of equipment, such as zoom transfer scopes, microchrome developers and printers, color-additive viewers, and image densitometers. It is anticipated that appropriate image enhancement equipment will be obtained and made available to the user agencies through the facilities of the CGR.

TRAINING

A key element of this project will be the training of four resource specialists in the applications of Landsat data in the U.S. Currently it is thought that a specialist from each of the four principle user organizations will supply one professionally qualified trainee to attend the Geological Survey EROS Workshop in Sioux Falls, South Dakota. This workshop, conducted for a one-month period twice a year, provides comprehensive introduction and training in the manual uses of remote sensor data and is appropriate to the background of the Cameroonian trainees.

First year trainees will include a geologist, a range manager, an agriculturalist and a cartographer. Upon completion of the training, these individuals will provide liaison and incorporate Landsat data into the operational activities of their respective institutions. Additional training opportunities will be made available and it is expected that by the second and/or third year of the project the regional remote sensing centers in Nairobi and Ouagadougou will be utilized for training purposes also.

The Center will arrange for and provide satellite data technical consultants at the request of individual Ministries. It is anticipated that certain Ministries will seek to undertake Landsat application projects which will require the services of foreign specialists. The Center will coordinate the visit of appropriate AID or contract personnel to provide guidance and support in carrying out the GURC-proposed Landsat project.

REGIONAL WORKSHOP

During the second or third year of the project it is anticipated that a regional remote sensing workshop will be held under the auspices of the GUPRC Center. This workshop will be designed to make widely known the results and objectives of the use of satellite data in Cameroon. Experiences of remote sensing and applications specialists from neighboring countries and the U.S. will be invited to share their experiences and to discuss problems of mutual interest.

UTILIZATION OF SATELLITE IMAGERY DATA

After the available Landsat data is acquired, the photo-reproduction facilities installed, and some training has been accomplished, the photo interpreters will undertake a number of resource inventories and studies. Some of the primary needs have been identified by GUPRC officials and include:

Ministry of Agriculture

- a. Service of water and forestry: Identification of large units of forest, savannah and cultivated lands and monitoring of the changes that occur throughout the year;

Identification of areas of stagnant water, rivers, lakes, and potential ground water;

Continuous monitoring and evaluation of land being cleared by brush fire;

Identification of major morpho-geological units; and

Investigate the possibility of using remote sensing for insect and disease control.

- b. Service of Agriculture: Estimate the production of main food crops, the areas cultivated and the growing cycles;

Determine acreage of land being cultivated in the forests, along the roads and in agro-industrial areas;

Investigate possibility of using remote sensing for monitoring and control of plant diseases; and

Investigate the possibilities of using remote sensing techniques to establish land capability maps, surface water, soil and natural vegetation maps.

c. Service of Agricultural engineering:

Monitoring surface water;

Determining methods to detect presence of ground water and

Determining criteria to select sites that are suitable for building small dams.

d. Service of Agriculture Development Projects and Studies:

Timber extraction, forest management, soil conservation, extension of new agricultural lands and laying out of roads must be undertaken in such a way as to maintain an equilibrium among forest, agriculture and range management needs.

2. Ministry of Livestock

Overgrazing is a severe problem in the Northern part of the country; in addition, extensive areas do not have an adequate water supply. It is therefore felt that a development program in range management is urgent.

Adequate maps, showing spatial distribution and fluctuation of range land is needed. In addition, proper methods must be implemented to help detect the presence of underground water.

3. Ministry of Mines

Mineral exploitation in Cameroon is severely limited. Currently, the only commercial mineral being exploited and yields only 35 tons of ore per year. There is a desire to increase mining operations. But such expansion is not possible unless sites of important deposits can be located.

The service needs good geological maps besides the reconnaissance maps (1:1,000,000 and 1:500,000) available now. These maps could be used to help outline the boundaries of structural units. These maps could also serve as a base for geological (mineral) survey being presently conducted by the FAO.

The service needs a field geologist to help identify sites of major ore deposits and conduct appropriate 'on-the-ground' investigations.

OUTPUTS

1. Trained individuals capable of utilizing modern remote sensing data for specific applications purposes.
 - Relative Landsat data products readily available in Cameroon for use by interested Ministries and agencies.
 - Laboratory facility available for the manipulation and extraction of thematic information from the satellite and other types of imagery.
 - Resource studies resulting from the use or incorporation of satellite data.
5. Established course in airphoto and other remote sensing techniques within the University
6. Nationally organized seminar/workshop concerned with the applications of satellite data in sub-sahara Africa.

MAJOR ASSUMPTIONS

1. The major assumption associated with this project is that better natural resource information will indeed result in better resource development. The GURC technical departments readily appreciate that significant improvements in inventory or map accuracy will result from the use of satellite data, but, in the past, the GURC planning functions have operated in an environment of considerable uncertainty. It is assumed that they will take advantage of an improved resource information base in planning and monitoring resource development.

That regional remote sensing receiving centers are established in Nairobi, Ouagadougou and Kinshasa.

2. MAJOR ACTIVITIES

1. Currently the only use of Landsat data of Cameroon is by several FAO experts who are assisting the GURC in carrying-out certain resource surveys. These surveys are concerned with forest and mineral inventories in the southeastern portion of the country and a generalized vegetation update for the entire country. These experts rely on FAO Rome for ordering Landsat images from the USGS Data Center and find the procedure sometimes results in the wrong type of imagery after long delays. The FAO experts have not successfully introduced the operational use of satellite data to their Cameroonian colleagues due, in part, to the lack of available data and interpretation facilities.

2. AID has been concerned with the potential uses of satellite data in developing countries since the inception of the Landsat program in the late 1960s. AID has sponsored workshops and seminars in the U.S. and abroad to help acquaint developing country scientists and planners with the nature and availability of Landsat data. No AID-supported satellite-data user assistance facilities have yet been established in developing countries, but national or regional assistance centers are planned for Nairobi, Kinshasa, and Ouagadougou in the near future. These centers are conceived as effective mechanisms of providing local users with rapid access to these data in an environment conducive to their productive use.

The Department of Geography at the University of Yaounde is interested in establishing an environmental resource planning course. The availability of satellite imagery data will greatly enhance the course content. The technical assistant provided by the project will assist in the development of appropriate imagery for this course.

4. The North Cameroon Agricultural and Livestock project 631-0064 is concerned with improved range management practices and could benefit from the availability of satellite imagery of the project area. The Mandara Mountains Water Resources project 631-0012 could use the imagery for continual evaluation of the environmental effects of the small dams.

The AIDSAT demonstration generated interest among GURC officials for the utilization of satellite imagery and for communications technology that would reach the rural areas; this project addresses the former interest. The GURC is interested in improved communications technology and is pursuing the matter with AID. Initial discussions have been held between GURC officials (Ministries of PTT, Education, and Information & Culture) and Academy for Educational Development Representatives. Two communications technologists (program content and curriculum development) are expected to continue discussions with the GURC in July. The Ministry of Agriculture is particularly interested in improved communications in the rural areas and views the field as complementary to the activities carried out by the AIDSAT project.

7 ALTERNATIVES

BEST AVAILABLE COPY

Collection of photography from aerial rather than orbital platforms is the only technical alternative to the acquisition of resource imagery. However, as a matter of economics it is impractical to consider routine aerial photographic collection for the entire area of Cameroon on a monthly or even yearly basis. While some disciplines, such as geology, need only one good set of imagery obtained over a decade or longer period, other disciplines, such as agriculture and range management, require yearly or seasonal up-dates. The high cost of aerial photography, in contrast to current satellite imagery, limits aerial photography to small-area

missions requiring high spatial resolutions - such as highway route planning or urban development. Current comprehensive cartographic coverage is at a scale of 1:50,000 and is based on aerial photographs taken in 1968. For limited areas, the photos were taken in 1957.

BENEFICIARIES

Ultimately the project seeks to benefit the general population of the United Republic of Cameroon by improving the GURC planning and development process. Better planning based on a more accurate knowledge of the natural resource base should lead to economically and environmentally sound development policies. These policies will result in a rate of resource utilization that is consistent with national aims while ensuring the greatest level of environmental protection. All Cameroonian people can be expected to benefit from the wisest allocation of development resources.

The initial direct project beneficiaries will be the technical departments which participate in the training and take advantage of the satellite data reproduction and interpretation facilities. These departments will receive experience and training in the utilization of satellite imagery which will facilitate the performance of their duties. A significant body of satellite imagery will be available to those concerned with various types of resource surveys and the monitoring of environmental conditions. The Centre Geographique National will house the capital equipment and material associated with the CAMSAT center, while the Ministries of Agriculture, Animal Husbandry, Mines and Geology, and Transport are expected to be the major GURC users.

II. FINANCIAL REQUIREMENTS AND PLANS

The project is budgeted for \$870,000, with the AID share of the project amounting to \$650,000, over the three-year project life. The AID share of the project costs are as follows for each fiscal year (a detailed list of project inputs is in Annex I):

CAMSAT PROJECT COSTS
(\$000)

	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>	<u>TOTAL</u>
Personnel	\$ 122	\$ 122	\$ 32	\$ 276
Training	24	60	20	104
Equipment	80	7	-	87
Supplies	9	46	48	103
Inflation & Contingency (15%)	35	35	10	80
	<hr/>	<hr/>	<hr/>	<hr/>
TOTAL	\$ 270	\$ 270	\$ 110	\$ 650

The GURC share of the costs (\$220,000) will include the staff for the CAMSAT Center at the GCI which includes an archivist and photo-processing technicians. Space will be provided for the CAMSAT Center and office space will be provided to the technical assistant and the secretary. The GURC will pay salaries of all technicians attending training courses as well as one-half of the airfare. Staff salaries will be paid to them for work undertaken resource inventory surveys and research and a counterparty will be provided to the technical assistant.

III. DEVELOPMENT OF THE PROJECT

Extensive progress has been made to date in defining the proposed CAMSAT Project. Additional design assistance will be required for preparation of the PP. It is felt that the PRP does not need to be prepared because of the presence of three experts to assist with the definition of the project. Three experts alone do not obviate the need for a PRP, but six days of discussions were held with several participating GURC ministries and agencies. The RDO/Y would like to proceed with the PP in September/October and submit it in November 1977. If FY 1978 funds are available in late FY 1978 the GURC would be prepared to implement the CAMSAT project prior to FY 1979.

Two weeks of a remote sensing rangeland specialist and four weeks of two remote sensing generalists are required in Yaounde to work with the concerned technical departments in completing the project definition. In addition two weeks of technical consultation will be required with AID/Washington, USA, EROS and various equipment manufacturers in remote sensing generalist.

At this stage, the main implementation problem is expected to be obtaining firm commitments on the part of the GURC technical departments for their collaboration in using and administering the CAMSAT Center. A lesser problem is associated with precise budgeting of AID-funded equipment needed for the Center.

IV. ISSUES OF A POLICY OR PROGRAMMATIC NATURE

Is remote sensing an appropriate technology?

A frequently expressed concern is whether satellite technology is appropriate to the differing levels of development within less developed countries. In particular, are the products of this sophisticated technology adaptable to developing country needs without assuming substantial ancillary institutional or technical requirements? Satellite data products can be usefully employed in a wide range of technological settings - from simple interpretation of black-and-white images by eye, to advanced image classification procedures carried out by costly special purpose or large general purpose computers.

In general, most countries have individuals who, through experience and/or training, are capable of obtaining useful information from the manual interpretation of satellite images employing standard airphoto interpretation procedures. These procedures require certain perceptual skills, but little in the way of special facilities or equipment. With the availability of some low cost equipment, such as light-tables, overhead projectors and photographic enlargers, additional information becomes available through the enhancement of specific image characteristics. Most of this equipment is designed to aid the eye in manual image interpretation and, therefore, requires little training or experience to use it. Somewhat more advanced optical equipment, which combines different spectral bands of the same scene, can also be employed with relatively little training. However, the step to the use of computers assumes considerable technical expertise, both in the use of computers as well as the nature of satellite data and their tape formats.

7. ENVIRONMENTAL IMPACT

The proposed project for developing a capability within the GUSC to effectively utilize satellite imagery does not, in and of itself, have any effect upon the environment. While the project itself will be concerned with monitoring environmental conditions, there will be no direct negative environmental effects associated with the utilization of satellite data and data interpretation techniques.

ANNEX I - CAMSAT BUDGET

(\$000)

<u>INPUT</u>	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>
<u>PERSONNEL</u>			
Long-term Technical Assistant	\$ 80	\$ 80	.
Short-term Consultants (4pm/yr)	32	32	32
Secretary (Bilingual)	10	10	-
<u>TRAINING</u>			
Short-Term			
U.S. (4 persons)	24	-	-
Third country (12 persons)	-	20	20
Seminar	-	40	-
<u>EQUIPMENT</u>			
Photo-Lab Equipment	22	-	
Zoom Transfer Scope	6		
Diazo Printer/Developer	1	4	
Color-Additive Viewer	30		
Overhead Projector	.5		
35 mm Projection Equipment	.5		
Office Furnishings	5	3	
Vehicle	10		
Field Survey Equipment	5		
<u>SUPPLIES</u>			
Landsat Data	1	.5	
Photo Chemicals & Paper	3	3	
Office	3	.5	
Vehicle Maintenance	2	2	
Computer Processing (U.S.)		10	10
Aerial Photo Support		30	30
<u>INFLATION AND CONTINGENCIES</u>	35	35	10