

PD-AAR-545

100-40902



INTERAGENCY REMOTE SENSING STUDIES

FINAL REPORT

by

Christine Specter

Environmental Research Institute of Michigan
Ann Arbor, Michigan 48107

Report 176505-1-F

JUNE 1985

936-1406

68

000475

000180

S

I.

INTRODUCTION

The Environmental Research Institute of Michigan (ERIM) has completed four interagency reports dealing with information requirements on research and applications of cartographic and remote sensing technology. This information related not only to activities of the 1981-85 time period, but also to projected activities as well. A summary of the completed work is provided in section II.

The reports were required by the following interagency committees:

- (1) The Land Processes Subcommittee, Committee on Space-Based Earth Science Research, White House Office of Science and Technology Policy, referred to below as the Land Processes Report.
- (2) The Working Group for Remote Sensing Plans, Interagency Board on Civil Operational Earth-Observing Satellite Systems (IB-COESS), National Oceanic and Atmospheric Administration (NOAA), referred to below as the Report to Congress on a Unified National Remote Sensing Plan.
- (3) The Envirosat-2000 Report, a second report required by IB-COESS.
- (4) The Technology Exchange and User Application Working Groups, Federal Interagency Coordination Committee for Digital Cartography (FICCDC), referred to below as the Digital Cartography Report.

II.

SERVICES PROVIDED

1. LAND PROCESSES REPORT

Data collection and analysis of AID activities through the Central Bureau and the Missions for the period 1981-1985 led to the inclusion of 34 projects with remote sensing components in the Land Processes Report. As a starting point, ERIM reviewed the existing data base of projects with remote sensing components. This review encompassed projects included in the IBM PC Data Base II system as well as the document, AID Environmental and Natural Resource Activities, September 1983. (These sources listed annual expenditures on the projects, but did not provide the remote sensing component expenditures.) The list of projects was expanded to include those from a table called "Ongoing AID Projects Employing Remote Sensing Technology", by Dr. Charles K. Paul, dated February 8, 1984.

The next step involved the review of proposals and evaluation reports, as well as interviews with AID personnel and project contractors, to check the validity of the projects list, adding and deleting projects as necessary. Once the list of projects was finalized, proposals and evaluation reports were reviewed more thoroughly and in-depth interviews with AID personnel and project contractors were conducted in order to isolate expenditures for the remote sensing component of each project funded between 1981-1985.

The activities outlined above led to the construction of tables, according to subcommittee guidelines, listing all projects with remote sensing components, total expenditures and remote sensing expenditures on each project by year for the period 1981-1985.

As a result of the preceding tasks, a narrative summarizing AID's activities related to remote sensing during the period 1981-1985 was prepared.

While the tasks listed above were being completed, a narrative was prepared summarizing AID's current and future goals and missions related to remote sensing activities. In order to provide a narrative summarizing AID's authorities to undertake these activities, the Foreign Assistance Act of 1961, as amended, was reviewed. In addition, since S&T/FNR has a leadership mandate for remote sensing in the Agency, the FY 1985 Annual Budget Submission (ABS) for this Office was used to summarize its global charter in providing services and support to the Agency in forestry, environment and natural resources areas.

The determination of future data requirements and coordination/-planning improvements related to remote sensing activities required technical analysis of current and future satellite systems in relation to future applications of remote sensing technology. Dr. Charles Paul provided technical guidance for this analysis.

At the conclusion of the research and analysis described above, the background report was prepared.

2. REPORT TO CONGRESS ON A UNIFIED NATIONAL REMOTE SENSING PLAN

AID's environmental activities in developing countries were analyzed and evaluated in order to determine the current state of applied research involving remote sensing technology. This analysis focused on agriculture, forestry, geology/geography, hydrology, and atmospheric remote sensing as project categories. Expenditures for each category during the 1981-1985 time frame were determined.

Exemplary projects that could serve as models for further environmental research were identified. The Remote Sensing for Agriculture project was identified for its contribution to agricultural research. This project involved the use of the Area Sampling Frame methodology to predict total crop production at the national level. Project results were summarized for activities in the Philippines, Morocco, Sierra Leone, and Ecuador. Forestry research has focused on the use of Landsat

data as a significant tool in forest resource development and in the monitoring of deforestation. Exemplary projects were identified in Peru, Thailand, and the Philippines. The Mineral, Petroleum, and Groundwater Assessment project in Egypt was identified as a model for future research related to geology/geography. While little has been done in hydrology research, a project to use Landsat data in concert with depth-soundings was used to provide estimates of total lake volume for Lake Volta. The Agro-Climatic/Environmental Monitoring Project in Bangladesh was identified as a model to be used in future atmospheric remote sensing research. Finally, the activities of the AID Office of U.S. Foreign Disaster Assistance were discussed in relation to climatic impact assessment research.

Remote sensing technology "knowledge gaps" that may interfere with the technology's application in developing country environments were explored. Data requirements, verification of crop statistics, and the stratification of tropical rainforests emerged as the leading areas requiring future amelioration.

Based on the outlook for future availability of data from earth observing-satellites, the following research opportunities were identified: (1) applications to regional environmental problems; (2) geographic information systems; and (3) collaborative efforts among U.S. agencies as well as collaborative efforts between the U.S. and other nations with earth-observing satellites.

The background report was cast within the guidelines required by IB-COESS. In addition to a description of the research activities, knowledge gaps, and future opportunities relevant to remote sensing technology, the guidelines required a restatement of AID's goals and objectives and a description of the historical perspective from which current remote sensing activities have evolved.

3. ENVIROSAT-2000 REPORT

ERIM employees coordinated efforts with the AID Office of U.S. Foreign Disaster Assistance to enumerate current projects using geostationary and polar-orbiting environmental satellites. The resulting list included the Early Warning Assessments Program of the NOAA/NESDIS Assessment Information Services Center, the Agro-Climatic/Environmental Monitoring Project in Bangladesh, and the Weather Modification Project in Morocco. Potential future uses of these satellite systems were also identified, including research on the El Nino and the Southern Oscillation, uses related to disaster prevention and mitigation, the possibility of building the meteorological capacity in developing countries, uses related to crop reporting systems, and the verification of crop statistics. Based on these projections, a detailed summary of data requirements through the year 2000 was prepared and three sets of system design characteristics were determined and presented in tabular form.

As a result of the activities described above, the background report was prepared.

4. DIGITAL CARTOGRAPHY REPORT

ERIM employees collected information from AID Missions and reviewed the thrust of Central Bureau activities in order to update the FY 1984 response and to prepare the FY 1985 response to the Federal Digital Cartographic Activities Questionnaire. Those countries included in the final report were Bangladesh, Egypt, El Salvador, Peru, and Thailand. (The response from Tegucigalpa, Honduras, arrived too late to be included; however, no funds were allocated for such activity in Honduras in FY 1985.)

The information collected related to data requirements (in terms of national mapping agency products used and thematic map layers generated); data standards (in terms of data exchange standards needed and

important issues in establishing standards); user applications (including estimated expenditures for applications during FY 85 and FY 86); and technology information (in terms of estimated expenditures for software and hardware in FY 85, as well as the names and acronyms of software and hardware purchased).

In addition, a short statement was prepared, based on information collected from the Missions, summarizing current major activities in research, development, and implementation of digital cartographic and geographic information systems. Problems requiring R&D attention were also identified.

Based on the activities listed above, the background report was written.