

## TA COMPLETION REPORT

Division: AEFN

TA NO./NAME: TA NO. 1910-INO: Remote Sensing Applications for Natural Resource Management	TA AMOUNT APPRVD: \$600,000	SOURCE:  JSF
EXECUTING AGENCY: Agency for Assessment and Application of Technology (BPPT)	REVISED AMOUNT: ---	
DATE: APPROVAL:      SIGNING:      FIELD:  20 July 1993      10 November 1993      18 April 1994	TA AMOUNT UNDISB.:	TA AMOUNT UTILIZED: \$527,850.76
	CLOSING: ORIGINAL:      ACTUAL: April 1995      30 October 1995	

### TA DESCRIPTION

The Government of Indonesia (see Repelita VI, 1994/95-1998/99) recognizes the importance of sustainably managing the country's natural resources. Resource management, however, is not possible without sufficient, accurate and timely information about natural resources. In Indonesia, real time information of the environment is scarce and it is therefore critical to improve the resources data base and to acquire and analyze data using modern technology such as remote sensing.

### TA OBJECTIVES AND SCOPE

The objectives of the TA were to: (i) evaluate the potential for the application of satellite-derived imaging radar data for natural resources management and formulate cost effective methodologies of using the data; (ii) identify the scope for specific projects in areas identified by concerned user agencies; (iii) study the data processing and distribution systems of LAPAN (Lembaga Penerbangan dan Antariksa Nasional - National Institute of Aeronautics and Space), and recommend steps to ensure more efficient dissemination of processed data so as to sustain LAPAN's operations, and (iv) provide institutional strengthening through lectures, workshops, and on-the-job training.

### TA INPUTS EVALUATION

The TA was carried out in three phases. Phase I concentrated on the identification of specific subprojects, the institutional assessment of the user agencies and the assessment of problems associated with the reception and processing of data as well as the assessment of remote sensing activities undertaken by the concerned user agencies prior to TA commencement. During Phase II, the satellite overpass dates were determined, data obtained, a survey undertaken of the educational facilities for remote sensing available in Indonesia and a market survey conducted, to assess the military and commercial demand for remote sensing data and satellite imageries. Phase III focused on the transfer of remote sensing technology, the application of this technology at selected subprojects, on-the-job training of user agencies personnel, and presentation of the TA results at an international conference on remote sensing held at Jakarta in June 1995.

The Consultant's performance was fully satisfactory. They worked closely with the EA and user agencies personnel, and provided guidance to the user agencies' personnel in the preparation of their technical papers that were presented at the international conference. Similarly, the EA fully cooperated with the consultants and implemented the TA fully satisfactory.

### TA OUTPUTS EVALUATION

The objectives of the TA were satisfactorily met and the value of remote sensing for natural resources management, was recognized as an important management tool by the user agencies. A considerable amount

of technology was transferred to the user agencies and their staff was assisted in the preparation of technical papers which they presented at the international conference in June 1995. The final report was of high quality and included (i) the Main Report; (ii) Appendices; (iii) Workshop Proceedings; and (iv) Color Plates for each subproject site.

At the international conference, the user agencies demonstrated their technical competence acquired through the TA in the field of remote sensing and that the techniques used under the TA had a realistic and practical role to play in natural resources management in Indonesia.

The TA consultants assisted LAPAN in identifying constraints in receiving and processing satellite data, made recommendations to make the system more functional, and set up an operation and maintenance program for LAPAN. Furthermore, the consultants identified human resources development needs at the user agencies, BPPT and LAPAN, as well as needs to further upgrade equipment necessary to meet the needs of a rapidly changing technology.

#### TA OVERALL ASSESSMENT

The TA had clearly demonstrated that remote sensing can be used as an effective tool for managing natural resources and that the Bank can play a key role in assisting the Government in developing their remote sensing programs. Furthermore, regular training and capacity building of concerned agencies will be required to take full advantage of the technology.

#### MAJOR LESSONS LEARNED

- (i) LAPAN will need to improve their on-line capabilities and products distribution system within Indonesia in order to compete with outside suppliers.
- (ii) To diminish the country's reliance on external consultants, there is a need to strengthen the capabilities of the respective user agencies through human resources development programs, external training, and possibly development of national training centers and/or university degree programs.
- (iii) There is a considerable market for remote sensing data within Indonesia in particular in sectors such as oil, mining, forestry, and fisheries. The market, however, primarily relies on the supply of remote sensing products from sources outside of Indonesia as LAPAN has only recently started to provide finished products of acceptable international standards and within a reasonable period of time.

#### FOLLOW-UP ACTION AND RECOMMENDATIONS

Indonesia, despite having a significant internal market demand for remote sensing products, relies to a significant extent on external sources in the provision and generation of information and provision of final remote sensing products. However, to utilize the full potential of the remote sensing technology for the sustainable management of the country's natural resources, strengthening of the in-country remote sensing capabilities is necessary. Because Indonesia has not developed the full capacity to effectively utilize the technological advanced remote sensing facilities that are owned and operated by LAPAN or the equipment that has been procured by various user agencies through loans, grants or government sources, capacity building of the country's institutions involved in remote sensing will continue to be important. Therefore, considerations could be given to further support the development of human resources in the application of remote sensing technology.

Prepared by:  
WILLIAM H. MENNINGER

Designation:  
PROJECT ENGINEER, AEFN