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MOSAIC PHOTOMAP PROJECT  
OF  
THE DOWNSTREAM AREA OF THE NEGARA RIVER BASIN  
IN  
SOUTH KALIMANTAN IN THE REPUBLIC OF INDONESIA

FINAL REPORT

MARCH 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団	
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LETTER OF TRANSMITTAL

Mr. Keisuke Arita

March, 1986

President  
Japan International  
Cooperation Agency

Tokyo

Dear Sir,

Upon the successful completion of the mosaic photomap project of the downstream area of the Negara River Basin in South Kalimantan Province, Republic of Indonesia, which was started from July 1983 at your request, I herein submit to you the final report on the project comprising a progress report and a technical report.

The results of the project can be attributed to the concerted efforts made by members of the survey team and Indonesian counterparts from the Ministry of Public Works. Truly, our technical cooperation has been brought to fruition through the project.

It should be our great pleasure if the results of the project would be of any use for the planification of agricultural development projects of the survey area.

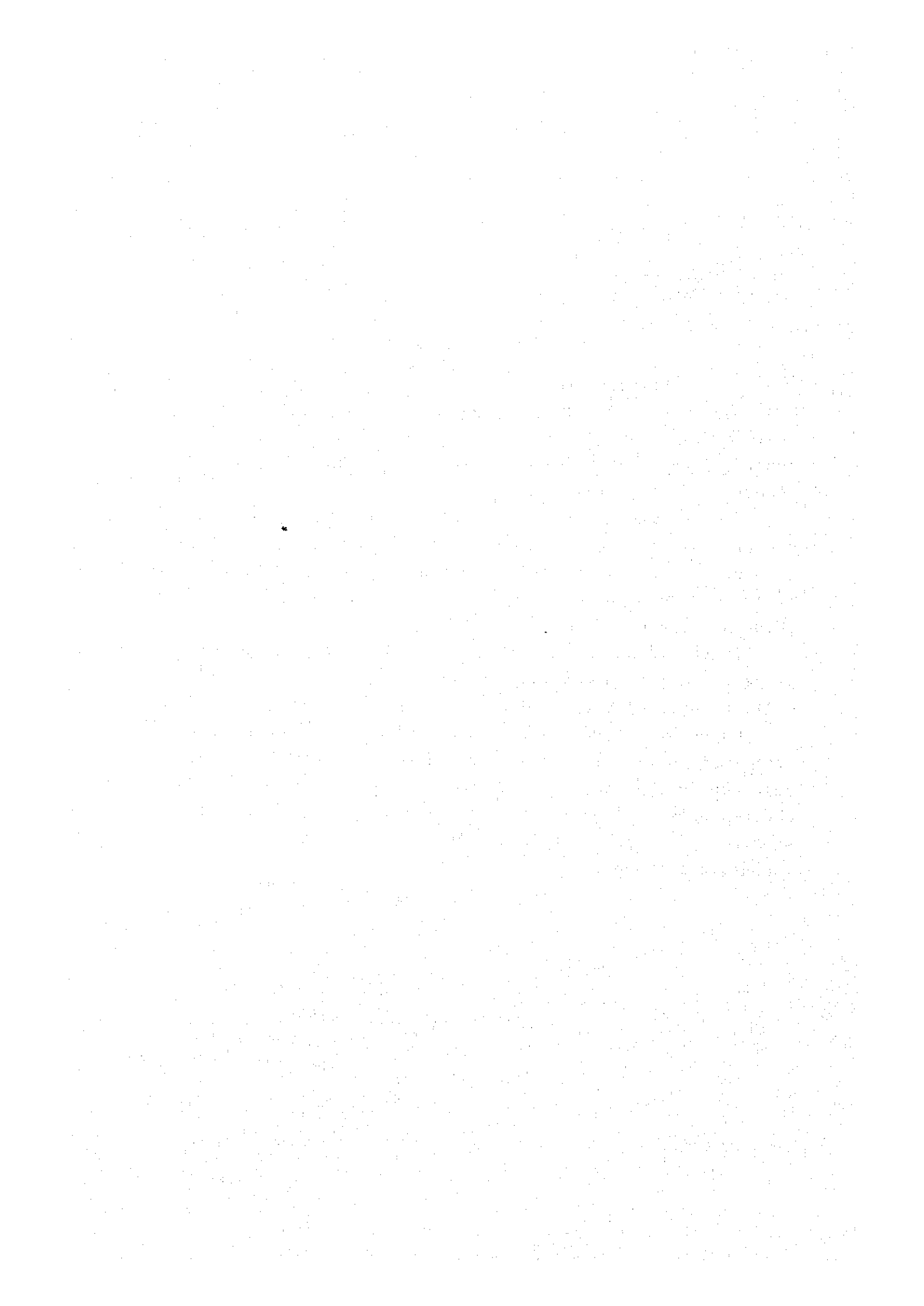
On behalf of the survey team I hereby express my heartfelt gratitude to the officials of our government for their kind guidance during the execution of the project, the officials concerned of the government of the Republic of Indonesia for their close cooperation and those of the Japanese Embassy in Indonesia for their advice.

Yours sincerely,



Kazuo Muraoka

Leader, Survey Team  
Mosaic Photomap Project of  
the Downstream Area of the  
Negara River Basin in  
South Kalimantan  
Republic of Indonesia





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PLATE I.  
 False Colour Composite (Bands 4, 5, 7) of the  
 LANDSAT Imagery of the Barito River Basin

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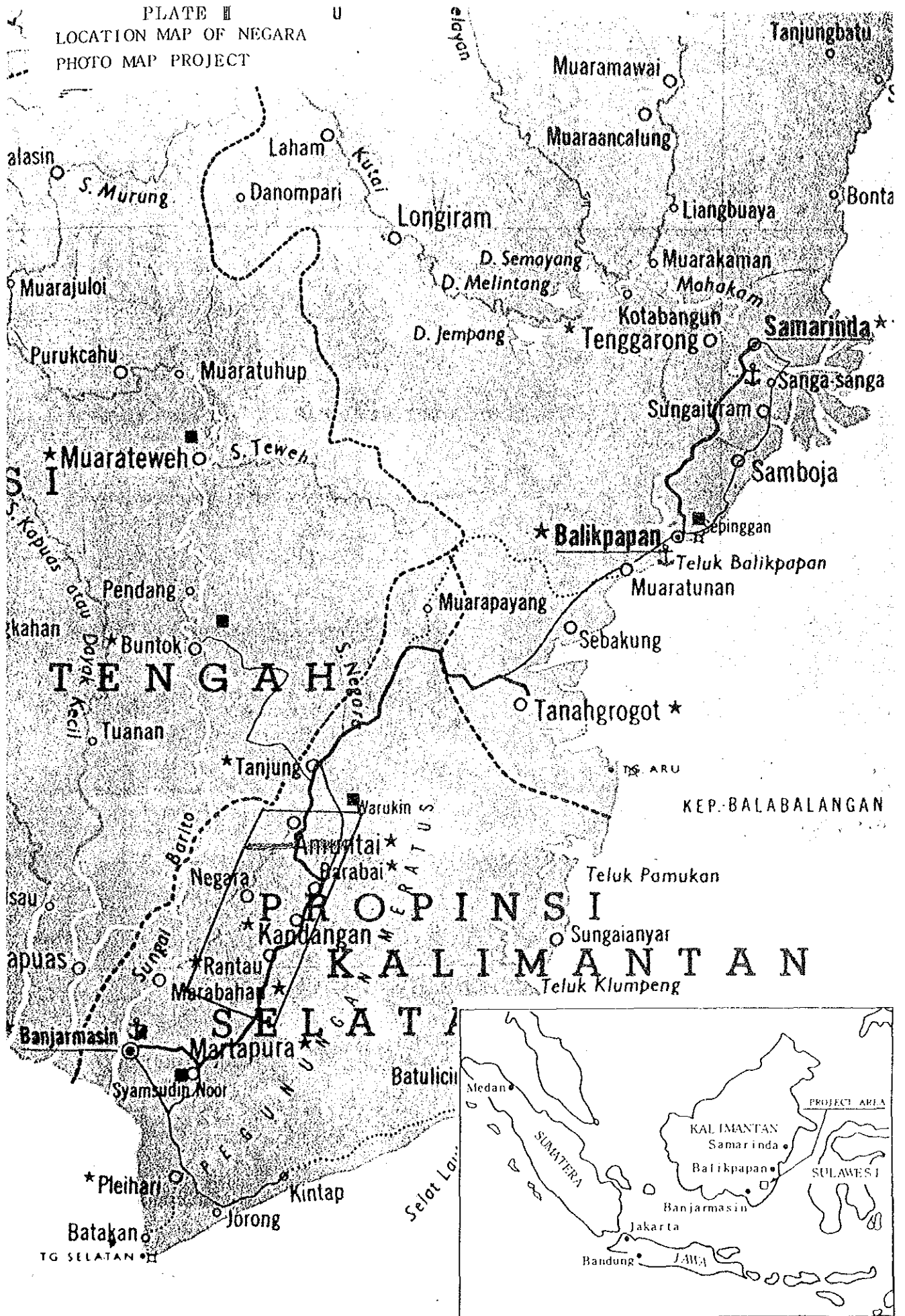
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PLATE II.  
 LANDSAT Imagery (Band 5) of the Barito River Basin

PLATE II  
 LOCATION MAP OF NEGARA  
 PHOTO MAP PROJECT



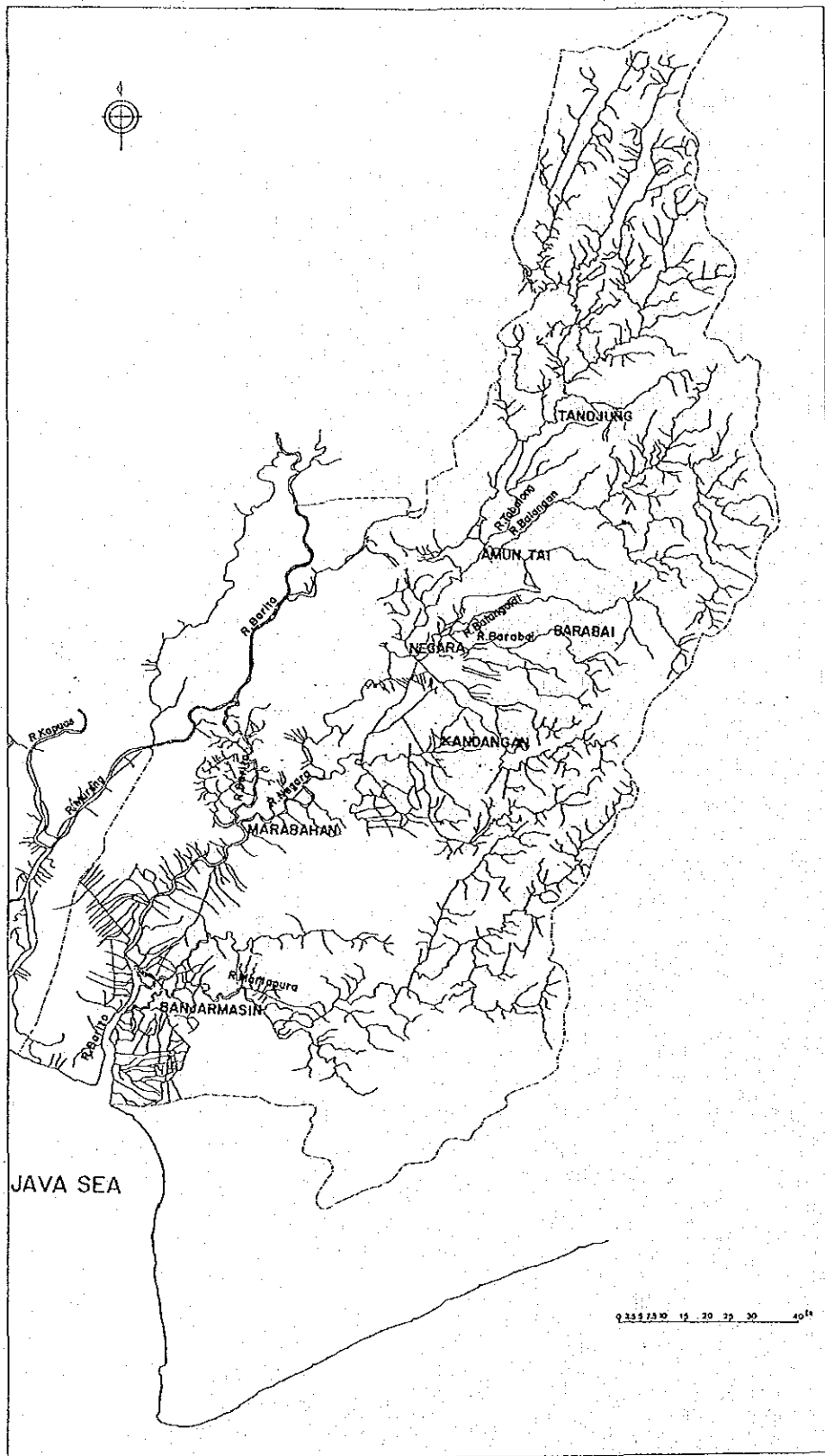


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PART I INTRODUCTION



## PART I INTRODUCTION

In response to the request for technical cooperation in planification of agricultural development projects raised by the government of the Republic of Indonesia in June, 1982, the government of Japan decided to take up a photomap project in Indonesia, as a technical cooperation program to foreign countries. The project was carried out by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of projects of technical cooperation programs of the government of Japan.

The proposed area lies in the low swampy area of the downstream area of the Negara River basin in the Province of South Kalimantan, including important cities of Amuntai, Barabai, Negara, Kandangan, etc. The scope of the project is included in the document "Scope of Work for the Topographic Mapping Project of the Negara River Basin in South Kalimantan in the Republic of Indonesia" agreed upon between the Ministry of Public Works of Republic of Indonesia and JICA in April, 1983, which reads, [5] for the Amuntai region of about 1,200km<sup>2</sup>,

- (1) Black and white panchromatic aerial photography at the scale of about 1/20,000 in two times of dry and rainy seasons,
- (2) Mosaic photomapping at the scale of 1/10,000 by using aerial photos taken in dry season; for hilly area intermediate contour interval being 5 m., supplementary contour interval 2.5 m. and for flat area height being represented by spot height,

- (3) Thematic mapping on the basis of the above photomap by the method of geographical survey representing micro-topography of the area using aerial photos taken in dry season and water covered area by aerial photos taken in rainy season,

and for the area of about 5,100km<sup>2</sup> extending to the south of the proposed area,

- (4) Black and white panchromatic aerial photography at the scale of about 1/20,000 in dry season. (PLATE III)

The project was started in 1983 with three-year program and completed in March 1986. As a preliminary study to get quantitatively the micro-topography of swampy area of slight relief like the present proposed area by surveying method, landform classification map was prepared by photo-interpretation to get micro-topography even though qualitatively. (As a deduction from the present survey, a sketch is shown in Fig. 13.9 representing overview of relative height of the survey area with respect to the average water level.) At the same time, other geographical surveys, such as land-use and vegetation surveys, were applied to get their relationship between topography to classify landform of the area covered by vegetation with field verification. This leads to the confirmation of the effectuality of adopting land-use and vegetation surveys as auxiliary means to help landform classification.

At the occasion of completing the present project, we would like to submit final report of the work. In Part II of the report, are given the summaries of the progress of the work upto the first stage of the second year's work, the progresses of the second stage of the second year's work and of the third year's work.

It is expected that the results of the present work would be of any use for the planification of agricultural development projects in the area in consideration. The Indonesian counterpart agency for the project is the Planning Bureau, General Directorate of Water Resources, Ministry of Public Works (Departemen Pekerjaan Umum, Direktorat Jenderal Pengairan, Direktorat Bina Program Pengairan, hereinafter referred to as "DPU").



PART II PROGRESS REPORT





## PART II PROGRESS REPORT

### 1. Contact Mission

The terms of reference (TOR) of a mapping project including the present project were submitted by the government of Indonesia in January 1981. In June 1982, at the sixth annual meeting concerning the technical cooperation between Japan and Indonesia, a request for the technical cooperation in a mapping project was raised up by the Indonesian party in the form slightly modified from the original TOR. Accepting the request, in December 1982, the government of Japan dispatched a contact mission to Indonesia to discuss the scope of the project headed by Mr. Toshitomo Kanakubo, then Deputy Director General of the Geographical Survey Institute, Ministry of Construction of the Government of Japan. The mission, after discussing with the Indonesian party the details of the request and feasibility of implementing the work as a project, reached to a point acceptable by both parties.

### 2. Preliminary Survey Mission

Based on the report of the contact mission, a preliminary survey mission was dispatched to Indonesia, from February to April 1983, headed by Mr. Toshitomo Kanakubo, to formulize the scope of work (S/W) of the project. The summary of the S/W of the present project is given in Part I of the present report [5].

3. Summary of the Progress of the Survey until the First Stage  
(in Dry Season) of the Second Year's Survey [5]

3-1 First Year's Survey

3-1-1 Number of Persons in Field Survey

Japanese side	5 persons
Indonesian side	3 persons

3-1-2 Period of Field Survey

From: July 4, 1983 To: November 2, 1983

3-1-3 Items of Survey

(1) Selection and monumentation of geodetic control points  
and confirmation of existing points

	Newly set-up points	Confirmation of existing points
Horizontal control points	22 points	2 points
Vertical control points	29 points	24 points

(2) Establishment of aerial photo signals

	Newly established points	Existing points
Horizontal control points	22 points	1 point

(3) Aerial photography

Scale : 1/20,000  
Area covered : 6,300km<sup>2</sup>  
Number of photos: 1,720 pieces

3-2 First Stage (in Dry Season) of the Second Year's Survey

3-2-1 Number of Persons in Field Survey

Japanese side 15 persons  
Indonesian side 17 persons

3-2-2 Period of Field Survey

From: July 5, 1984 To: October 8, 1984

3-2-3 Items of Survey

(1) Satellite geodesy

Existing point	1 point	Selected in the second year's survey (pricked)
Newly set-up points	1 point	" ( " )

(2) Direct levelling

Third order	385km.
Minor order	53km.
Total:	411km.

(3) Indirect levelling

Use of river surface	11 points
----------------------	-----------

(4) Traversing

Existing satellite geodesy point	1 point
Newly established satellite geodesy point	1 point
Newly set-up horizontal control points	23 points

4. Second Stage (in Rainy Season) of the Second Year's Survey

In order to get acquainted with the photomapping area in rainy season, a survey team was dispatched to the survey area for aerial photography and field reconnaissance from January 20 to April 25, 1985.

4-1 Organization of the Survey Team and the Survey Period

Mr. Yoshihira Ogawa (Field reconnaissance)

From January 19 to March 10, 1985

Mr. Teruo Iimuro (Contract and inspection of aerial photography)

From January 20 to April 25, 1985

For field reconnaissance, Mr. Agus Susanto was dispatched from the Service of Public Works of South Kalimantan (Dinas Pekerjaan Umum, Kalimantan Selatan, hereinafter referred to as "DPUKS") as counterpart and cooperated Mr. Yoshihira Ogawa.

For aerial photography, subcontract was made to a local aerial survey firm, P.T. EXSA International, who executed aerial photography are as follows:

Mr. Memet Syarief	navigator	P.T. EXSA
Mr. Sumardi	navigator	P.T. EXSA
Mr. Subandi	cameraman	P.T. EXSA
Mr. Muhidin	photographic engineer	P.T. EXSA

Mr. Tan Guan	pilot	P.T. EXSA
Mr. Martono	pilot	P.T. EXSA
Mr. Evie Sufian	mechanic	P.T. EXSA
Mr. Suwarko	mechanic	P.T. EXSA

#### 4-2 Aerial Photography in Rainy Season

Having taken time in obtaining flight permission, the airplane for aerial photography could not go into the project site until March 8. Meanwhile, the fall down of the water level of rivers was afraid, but on account of rainfall, they could carry out aerial photography under the conditions not so much differed from the state of the highest water level. Covered area is the same as the proposed area for photomapping.

##### 4-2-1 Specifications

The specifications for aerial photography are as follows:

Scale	:	1/20,000
Overlap	:	60 ± 5%
Sidelap	:	30 ± 5%
Inclination of camera	:	$\kappa$ ; less than 10°, $\phi$ and $\omega$ ; less than 5°
Amount of cloud	:	less than 10% in five successive photos
Film	:	black and white, panchromatic

##### 4-2-2 Results

Results of aerial photography are as follows:

Working days	:	22 days
Number of courses	:	19 courses
Number of photos	:	382 pieces

#### 4-3 Field Reconnaissance in Rainy Season

Field reconnaissance survey was carried out mainly in swampy area in rainy season in order

- (1) to take a overview of water coverage and relationship between water coverage and topography, vegetation and land-use,
- (2) to study the difference of the area in rainy season from that in dry season using aerial photos taken in dry season,
- (3) and to get keys for photo-interpretation of aerial photos taken in rainy season.

Main items surveyed are state of water coverage, micro-topography, vegetation (forest, shrub, tall humidherbosa, short humidherbosa, dry meadow (alang-alang) and floating grasses) and land-use.

The survey was executed paying attention that, as the relationship between micro-topography and vegetation and change of mode of land-use in dry and rainy seasons are influenced by aquatic circumstances, by grasping the state of land-use in dry and rainy seasons, it is considered that it is possible to get indirectly the relationship between land and water areas and that, from the above, it is suggested to supplement micro-topography even though insufficiently represented by contour lines.

#### 5. Third Year's Survey

As the third year's survey, followings were done in the field:

- (1) Collection of data necessary for preparing photomap such as items for annotation (place names, administrative names, etc.) and road classification.

- (2) Confirmation of photo-interpreted items of geographical survey (landform classification, vegetation survey and land-use survey) and supplementary survey necessary for preparing thematic map representing micro-topography.

And, as office works, followings were conducted in Japan:

- (3) Aerial triangulation, controlled mosaicing and stereo-plotting,
- (4) Compilation of photomap and thematic map,
- (5) Reproduction of the above maps, (Fig. 1.5)
  - a) 1/10,000 scale photomap : neat lines 60cm x 60cm, 48 sheets in 2 colours
  - b) 1/10,000 scale thematic map: neat lines 60cm x 60cm, 48 sheets in 6 colours,
- (6) Before starting the third year's survey, discussions were made with Indonesian side on the basis of proposed plan of operations. The plan was agreed upon by both sides after applying some modifications on the draft.

(Appendix to Part II: "Minutes for the Plan of Operations (3rd Year) for Mosaic Photomap Project of the Downstream Area of the Negara River Basin in South Kalimantan")

## 5-1 Field Survey

### 5-1-1 Outline of the Survey

Main items surveyed are as follows:

- (1) Collection and verification of administrative names,

geographical names (region, river, lake and swamp, hill, etc.), names of important public buildings, classification of roads for four wheeled vehicles and administrative boundaries,

- (2) Field verification of the results of photo-interpretation of landform classification, vegetation and land-use surveys and their supplementary survey.
- (3) Discussions concerning map specifications and their applications with DPU and DPUKS in Jakarta and Banjarmasin respectively.

#### 5-1-2 Organization of the Survey Team and Work Period in the Field

Team leader (superintendence)	Dr. Kazuo Muraoka From Aug. 9 to Aug. 29, 1985
Team member (field identification)	Mr. Sadao Watanabe From Aug. 7 to Aug. 31, 1985
Team member (field identification)	Mr. Teruo Iimuro From July 18 to Aug. 31, 1985
Team member (field identification)	Mr. Kiyomi Ito From July 18 to Aug. 31, 1985
Team member (geographical survey)	Mr. Yoshihira Ogawa From July 13 to Aug. 26, 1985
Team member (geographical survey)	Mr. Ryota Nagasawa From July 13 to Aug. 26, 1985

Mr. Watanabe discussed with Indonesian side mainly on the application of map specifications, cartography and printing.

During the period,

Mr. Kiyoshi Mimura      Chief, Topographic Division, Topographic  
Department, Geographical Survey Institute,  
Ministry of Construction



Mr. Hiroyasu Kihara Chief, Namioka River Irrigation Office,  
Tohoku Regional Bureau, Ministry of Ag-  
riculture, Fishery and Forestry  
visited Indonesia for supervising the field survey.

DPUKS dispatched following persons as counterparts for the  
field survey:

Ir. Ahsani Fauzan Anwar	leader
Mr. Noor Wahyudi B.E.	chief surveyor
Mr. Suriansyah	surveyor
Mr. Muhammad Ilmi	surveyor
Mr. Yaniansyah	surveyor
Mr. Achmad Sarbaini	surveyor

The survey team is indebted to the following organization and  
personnel for useful data and information:

Bogor Museum, Bogor Botanical Garden (Herbarium Bogoriense,  
Lembaga Biologi Nasional - LIPI),  
Faculty of Agriculture, Lambung Mangkurat University, Banjar-  
baru (Fakultas Kehutanan, Universitas Lambung Mangkurat, Ban-  
jarbaru)

Prof. Muhammad Zukaidi  
Assist. prof. Achmad Rivai Noor  
Assist. prof. Darni P. Fadillah

## 5-2 Aerial Triangulation

Aerial triangulation of aerial photos for the survey area tak-  
en in dry season was carried out analytically by block adjustment  
with independent models using PAT-M43 program. Number of models is  
376 and 25 horizontal and 171 vertical controls were used for ori-  
entation. Standard deviation of residuals after adjustment in

horizontal coordinates is 0.89m (0.30 ‰ of flight height) and the maximum deviation is 1.83m and those in height are 0.37m (0.12 ‰ of flight height) and 1.41m respectively.

### 5-3 Stereo-plotting

Stereo-plotting was carried out at the scale of 1/10,000 with stereo-plotter by using aerial photos of the scale of 1/20,000 taken in dry season. Plotting was done only for hypsography. For hilly area, hypsography was represented by intermediate contours of 5m interval with supplementary contours of 2.5m interval when necessary. For flat area, spot height was measured at the interval of about 4cm x 4cm on the 1/10,000 map. Plotted area is about 1,200km<sup>2</sup>.

### 5-4 Controlled Photo Mosaicing

From the result of stereo-plotting, as it was found that almost all parts of the area are flat except small hilly area in the eastern part of the mapping area, photos were rectified by conventional method and mosaiced to serve as the base for photomap.

### 5-5 Photo-interpretation

To grasp details of the topography of the survey area, surveys of landform classification, vegetation and land-use were carried out by photo-interpretation as auxiliary means to supplement ground surveying and plotting. Prior to execute field survey, photos were interpreted in office and final compilation manuscript was prepared by verifying and supplementing the photo-interpreted items in the field. Interpretation of aerial photos taken in rainy season, however, was executed in Indonesia when the survey team visited there, because no clearance was gotten to take them out of Indonesia.

#### 5-6 Compilation

Corresponding to the photo mosaic, place names, geographical names, etc. collected and information on landform classification, distribution of vegetation and mode of land-use verified and supplemented in the field were compiled as overlays ready for final drawing.

#### 5-7 Cartography

Neat lines are 60cm x 60cm (corresponding to 6km x 6km in actual scale). Original manuscript for reproduction was prepared as follows: Scribing method was applied to draw contour lines and enclosures showing landform classification, vegetation distribution and land-use pattern necessary for overprinting thematic elements. Mask sheets were prepared by optical printing method. Marginal information and map specifications and their application were determined after discussing with the Indonesian side.

#### 5-8 Reproduction

Plate-making was carried out by using positive films. Films were composed from scribed sheets, mask sheets, etc. so that one composite film corresponds to one colour when printing. Photomap was printed in two colours and thematic map in six colours.

### 6. Flow and Schedule of the Project

Flow of work of the present project is shown in Fig. II-1 and its time schedule in Tab. II-1.

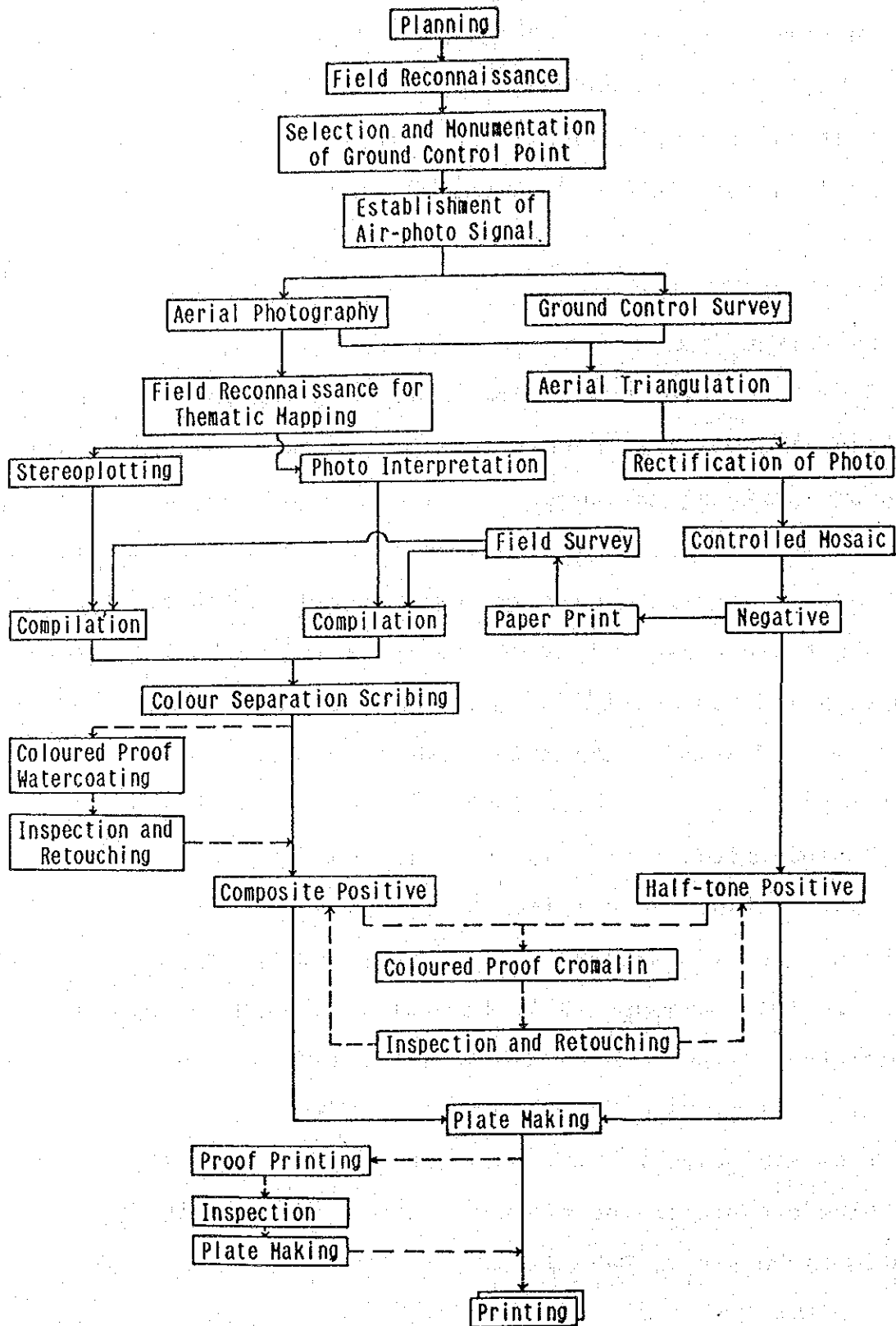


Fig. II-1 Flow of the Project



## 7. Final Results

Final results are as follows:

### a. Aerial photography

- 1) Contact paper prints
- 2) Photo index sheets

### b. Geodetic control survey

- 1) Horizontal control results
- 2) Vertical control results
- 3) Computation sheets
- 4) Field notes
- 5) Description of points

### c. Photo mapping

- 1) Pricked photos and identified photos
- 2) Diapositives
- 3) Aerial triangulation results
- 4) Original manuscript
- 5) Colour separation composite positives for reproduction
- 6) 1/10,000 scale photomap and 1/10,000 scale thematic map ..... 48 sheets respectively

## 8. Progress of the Project

Following is the progress of the photomap project of the downstream area of the Negara River Basin in South Kalimantan.

Date	Item	Contents
Jan. '81	TOR	Submittal of TOR by the government of Indonesia
June '82	Request	Submittal of the request of a "mapping project of the Negara River basin by photogrammetry" at the "6th annual meeting concerning technical cooperation between Japan and Indonesia"
Dec. 2 '82 - Dec. 22 '82	Contact mission	Dispatch of contact mission for the discussion on the outline of the above project
Feb. 22 '83 - Apr. 15 '83	Preliminary survey mission	Dispatch of preliminary survey mission on the "topographic Mapping project of the Negara River basin, Indonesia" (agreement of S/W and field reconnaissance)
July 4 '83 - Nov. 2 '83	First year's survey	Field survey (selection and monumentation of geodetic control points, establishment of aerial photo signal and aerial photography)
July 9 '84 - Oct. 8 '84	Second year's survey (first stage)	Field survey (satellite geodesy, traversing and levelling)
Jan. 20 '85 - Apr. 25 '85	Second year's survey (second stage)	Field survey in rainy season (field reconnaissance for geographical survey and aerial

		photography)
July 13 '85 - Aug. 31 '85	Third year's survey	Field survey (field identifica- tion and geographical survey)
Sept. 1 '85 - March 31 '86	Third year's survey	Office operation (aerial trian- gulation, stereo-plotting, com- pilation, controlled photo mosa- icing, cartography and reproduc- tion)
Feb. 13 '86 - March 12 '86	Visit of Messrs. Surono and Endang Sumarsana B.E. to Japan	Individual training (cartography and reproduction)



Appendix: Minutes of meeting for the plan of operations  
(3rd year) for the Mosaic Photomap Project of  
the Downstream Area of the Negara River Basin  
in South Kalimantan.



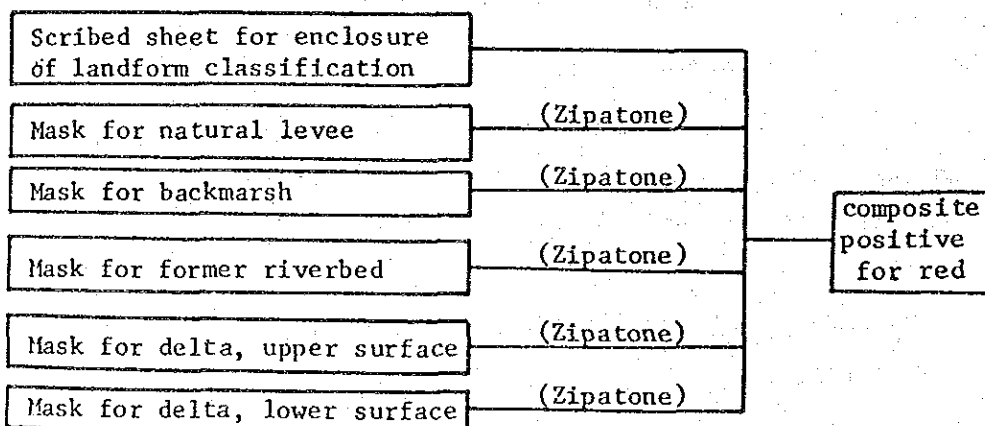
MINUTES OF MEETING  
FOR  
THE PLAN OF OPERATIONS (3rd year)  
FOR  
MOSAIC PHOTO MAP OF THE DOWNSTREAM AREA  
OF  
THE NEGARA RIVER BASIN IN SOUTH KALIMANTAN

1. Date and Time :
  - 13th August 1985 09:30 - 11:30
  - 15th August 1985 10:30 - 11:30
  - 24th August 1985 10:30 - 11:30
  - 27th August 1985 09:30 - 11:30
2. Place :
  - 13th August 1985 DPU Jakarta
  - 15th August 1985 DPU South Kalimantan
  - 24th August 1985 DPU South Kalimantan
  - 27th August 1985 DPU Jakarta
3. Attendants : Attachments-1, 2, 3, 4.
4. Dr. Kazuo Muraoka Leader of the Mosaic Photo Map Project of the Downstream Area of the Negara River Basin, South Kalimantan, briefed the report on the Project for the first and second year works and the draft the Plan of Operation for the third year prepared by JICA.
5. The following matters were discussed and confirmed.
  - (1) Page 6 of P/O, 1-1 :
    - a. Kampung shall be read as Desa.
      1. Kandangan, Amuntai, Barabai shall be noted as Ibukota Kabupaten.
      2. Lettering rules shall be changed as shown in the sheet on next page.
    - b. For the name of rivers or tributaries, each desa gives different names for the same river or tributaries.  
Name at the center of the map shall be adopted.
    - c. Kantor Kecamatan shall be read as Kantor Camat.  
Important Mosques shall be included.
  - (2) Page 10 of P/O, 2-4-1 :
    - a. alluvial fan shall be taken off, because there is no alluvial fan in the project area.
    - b. delta shall be classified into upper and lower surfaces in accordance with the relative height to water surface and difference of time of formation.

- (3) Page 11 of P/O, 2-4-3 :  
For the Land Use, Shifting Field (field which is burnt and used temporarily) shall be classified, because of its large area.
- (4) Page 12 of P/O, 2-4-4 :  
Nipa palm shall not be classified, because of small area.
- (5) In connection with change in classification, diagram of cartography (Figure 4 of P/O) shall be changed as follows :

MODIFICATION IN THE SCHEMATIC DIAGRAM FOR  
CARTOGRAPHY AND PRINTING

1. Diagram for red shall be modified as follows :



2. Diagram for green :

"Mask for Nipa palm" shall be taken off.

3. Diagram for brown :

Following mask shall be added :

Mask for shifting field	(Zipatone)
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- (6) Both parties accepted the following report submitted by the JICA Survey Team last year :

"Checking and Adjustment of Elevation of the Existing Bench Mark in and around 1:10,000 scale Photo Map Making Area Based on the Available Existing Data, 25th August 1984".

# NEGARA RIVER BASIN PROJECT

<b>LETTERING RULES</b>					
CLASSIFICATION	SIZE	SPACE	STYLE TYRESETTING	SAMPLE	
IBUKOTA(KABUPATEN) KECAMATAN	5.0mm 15pt 4.5mm 14pt	¼ ~ ½	News Gothic E08-24	PANDAWAN	
IBUKOTA(KECAMATAN) DESA	4.0mm 12pt 3.5mm 10pt	¼	News Gothic E08-24	PADAWANGAN Padawangan	
RIVER	(Big) 4.0mm 12pt	¼ ~ ½	News Gothic Italic E08-25	S.Negara	
	(Small) 3.0~3.5mm 10~11pt	¼ ~ ½	News Gothic Italic E08-25	S. Barabai	
BUILDING	2.5mm 8pt	¼	News Gothic Condensed E08-22	BARABAI RUMAH SAKIT	
CONTROL POINT AND SPOT HEIGHT	2.0mm 7pt	¼	News Gothic E08-24		
SPOT HEIGHT (Photogrametric)	1.5mm 5.5pt	¼	News Gothic Italic E08-25		
GRID VALUES	2.0mm 7pt	¼	News Gothic E08-24	9750	
SHEET INDEX	2.0mm 7pt	¼	News Gothic E08-24	VI-7	
ADMINISTRATIVE (KABUPATEN)	2.5mm 8pt	¼	News Gothic E08-24	KAB. BARABAI	
BOUNDARIES (KECAMATAN)	2.0mm 7pt	¼	News Gothic E08-24	KEC. PANDAWAN	
SHEET NUMBER	4.5mm 14pt	¼	News Gothic E08-24	V-6	

## LETTERING SIZE

IBUKOTAKABUP. 15pt	ABCDEFGHIJKLMNOPQRSTUVWXYZ
NAMA KEC. 14pt	ABCDEFGHIJKLMNOPQRSTUVWXYZ
	ABCDEFGHIJKLMNOPQRSTUVWXYZ
IBUKOTAKEC. 12pt	ABCDEFGHIJKLMNOPQRSTUVWXYZ
	ABCDEFGHIJKLMNOPQRSTUVWXYZ
DESA	10pt ABCDEFGHIJKLMNOPQRSTUVWXYZ
	9pt ABCDEFGHIJKLMNOPQRSTUVWXYZ
	8pt ABCDEFGHIJKLMNOPQRSTUVWXYZ
	7pt ABCDEFGHIJKLMNOPQRSTUVWXYZ

Jakarta, 28th August 1985.

*M. Sidharto*

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Ir. M. Sidharto  
Chief of Sub Directorate of  
River Basin Development  
Planning.  
Directorate of Planning and  
Programming.

*Kazuo Muraoka*

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Dr. Kazuo Muraoka  
Team Leader of Mosaic Photo  
Mapping Project of the Downstream  
Area of the Negara River Basin in  
South Kalimantan.

PLAN OF OPERATION  
FOR  
MOSAIC PHOTO MAP PROJECT OF THE DOWNSTREAM AREA  
OF  
THE NEGARA RIVER BASIN IN SOUTH KALIMANTAN  
IN  
THE REPUBLIC OF INDONESIA

--- 3rd Year ---

July, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

## I. INTRODUCTION

In response to the request made by the Government of the Republic of Indonesia, the Government of Japan has decided to conduct a mosaic photo map project of the downstream area of the Negara River basin, South Kalimantan, Republic of Indonesia (hereinafter referred to as the "Project").

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for implementation of technical cooperation programs of the Government of Japan, will carry out the Project in close cooperation with the Indonesian authorities concerned.

## II. OBJECTIVE

A topographic map is one of the basic materials which are indispensable for the planning of agricultural development projects. The objective of the Project is to cover the area by aerial photographs of a suitable scale and, in the part of that area where agricultural planning is urgently required, to prepare photo-maps with micro-topographic information on them related to water conditions.

## III. SCOPE OF WORK

The scope of Work of the Project is included in a document entitled "scope of Work for the Topographic Mapping Project of the Negara River Basin in south Kalimantan in the Republic of Indonesia", the contents of which were agreed upon between the Ministry of Public Works (hereinafter referred to as "DPU") and JICA (Annex I), and which read as follows:



1. Black and white panchromatic aerial photography in dry season at the scale of 1:20,000 covering the area of approximately 1,200 km<sup>2</sup> in the Amuntai region. (Fig. 1)
2. Black and white panchromatic aerial photography for getting information of the land situation in the rainy season at the scale of 1:20,000, covering an area of approximately 1,200 km<sup>2</sup> in the Amuntai region (the same area as that in the above item).
3. Topographic mapping in the form of a 1:10,000 scale controlled mosaic photo map, which is produced based on the aerial photographs (taken in the dry season, including the necessary land information), in the above area. (Fig. 1)
4. Black and white panchromatic aerial photography in the dry season at the scale of 1:20,000 covering an area of approximately 5,100 km<sup>2</sup> in the region between Amuntai and Banjarmasin. (Fig. 1)

#### IV. WORKING PLAN

The entire work shall be carried out under a three year program starting from July, 1983 and shall consist of the following phases. (Phase 1 and phase 2 were completed in 1983 and 1984 respectively.)

1. Phase I. (First Year) Aerial Photography, Selection and Monumentation of Ground Control Points and Establishment of Aerial Photo Signals

1-1. Aerial Photography

Aerial photography shall be taken in the dry season at the scale of approximately 1:20,000 with a wide angle camera and shall cover the whole area (III - 1 and 4).

1-2. Establishment of Aerial Photo Signals

23 points of aerial photo signals shall be established on the selected control points prior to the aerial photography in the photo-map area (III-1).

1-3. Selection and Monumentation of Ground Control Points and Bench Marks

22 control points (one point was added in Phase II) and 29 bench marks shall be selected and monumented in the photo map area in accordance with the specifications of Indonesia.

2. Phase II. (Second Year) Ground Control Point Survey, Field Survey and Aerial Photography in the Rainy Season

2-1. Satellite Geodesy

To establish reference points for minor order control point survey by traversing, two points shall be observed by satellite geodesy in translocation mode, one of which is regarded as the given point whose coordinates were already determined by the Indonesian side.

#### 2-2. Traversing

23 minor order control points shall be established by traversing for photographic control starting from the points established by satellite geodesy (Item 2-1).

#### 2-3. Direct Leveling

Third order leveling of 358 km to establish 29 bench marks and height of control points. Minor order leveling of 53 km shall be executed to obtain vertical control for aerial triangulation and mapping works starting from existing bench marks.

#### 2-4. Indirect Leveling

Indirect leveling using the water surface shall be done to obtain vertical control for 11 points in the field where direct or trigonometric leveling for aerial triangulation cannot be executed.

#### 2-5. Aerial Photography in Rainy Season

To get information of the land situation in the rainy season, aerial photographs shall be taken at the scale of approximately 1:20,000 with a wide angle camera.

#### 2-6. Field Survey in Rainy Season

Field survey in the rainy season shall be executed to study the land situation of the mosaic photo map area in the rainy season.

3. Phase III. (Third Year). Field Identification and Geographical Survey, Aerial Triangulation, Stereo Plotting and Preparation of Photo Maps.

3-1. Field Identification and Geographical Survey

Place names, geographical names and administrative boundaries shall be identified in the field. They shall be confirmed by Indonesian counterparts.

Field verification and sample survey for photo-interpretation of land form classification, land use and so on, shall be executed. Such executed works will be those that will be needed for succeeding investigations.

3-2. Aerial Triangulation

Aerial triangulation shall be carried out by an analytical method using comparators and an electronic computer. Adjustment shall be carried out by the method of independent models.

3-3. Stereo Plotting

Plotting of spot heights shall be carried out for flat areas, and contours shall be plotted at 5 m intervals for hill-sides.

3-4. Preparation of Photo Maps

Photo maps shall be prepared by mosaicing rectified aerial photos. On the photo maps, contour lines, spot heights and other useful information shall be represented.

Sheet lines shall be 6 km x 6 km (60 cm x 60 cm on the map).

#### IV. PLAN OF OPERATION FOR THE THIRD YEAR

The work for this year is devoted to Phase III of the Project. The flow of the work is shown in Figure 3.

##### 1. Field Survey

###### 1-1. Collection and verification of items to be annotated on the 1:10,000 scale photo-map.

Items to be annotated and their scope are as follows:

- a. Place names: important villages (the smallest unit to be noted shall be kampung).
- b. Geographical names: area names, rivers, tributaries, lakes, hills, etc. which are regarded as important.
- c. Building names: important public buildings such as kantor kecamatan, high schools, hospitals, police stations.
- d. Administrative boundaries: the smallest unit to be shown shall be boundaries of kecamatan.
- e. Verification of roads for four-wheeled vehicles.

###### 1-2. Geographical Survey

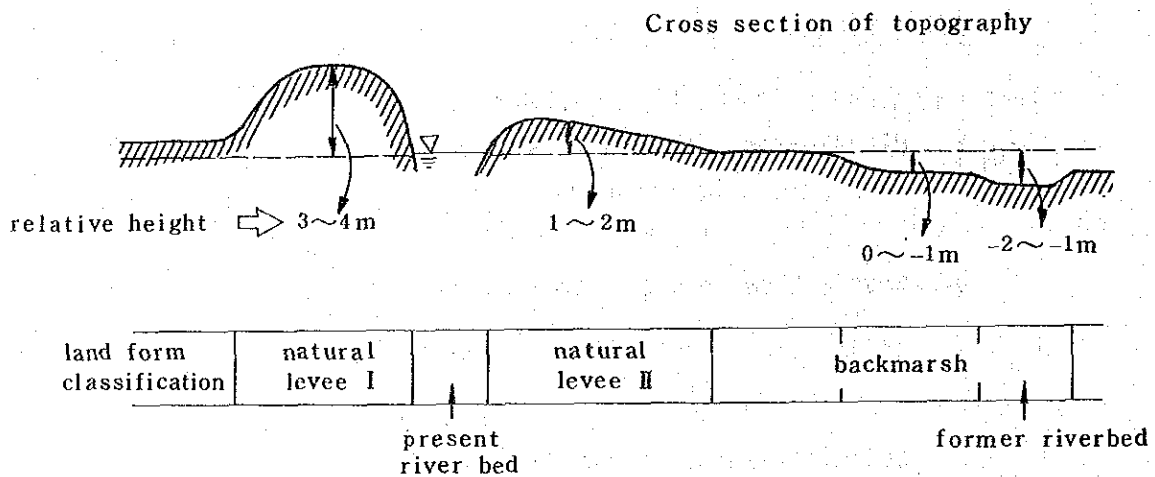
The results of photo-interpretation on vegetation, land-use and land form classification shall be checked and identified in the field. Related information which is needed shall be collected.

Change in vegetation, land-use and range of hydrosphere during the dry and rainy seasons shall also be surveyed.

1-2-1. Topography

Observing micro-topography and obtaining the relationship between micro-topography and ground height; then, measuring relative height shall be done with respect to surroundings with simple instruments (hand-level, etc.) at sampling points.

For example:

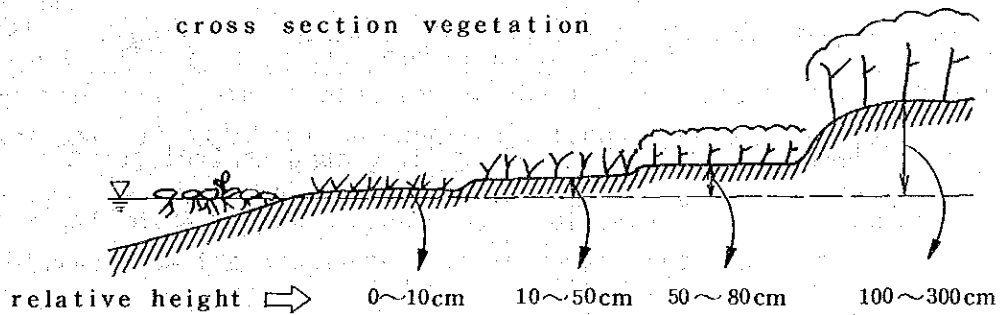


1-2-2. Shoreline

Collection of available data concerned. For example, meteorological data to find out degree of rainfall (or water level) in comparison with the average and maximum rainfalls that have ever occurred.

### 1-2-3. Land-use and Vegetation

Observation of land-use and vegetation is done to find the relationship between vegetation and micro-topography, which leads to the possibility of finding ground height from vegetation. For example, verification of the following example shall be done.



classification of vegetation	floating grass	short grass	high grass	low forest	high forest
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For this purpose, predominant species of vegetation are classified and relative heights of the points shall be measured at sampling points with simple instruments (hand-level, etc.) with respect to surroundings.

## 2. Office Works

### 2-1. Aerial Triangulation

To obtain necessary data for rectification and plotting of aerial photos, aerial triangulation shall be executed using 1:20,000 scale aerial photos taken in Phase I and the results of the ground control survey done in Phase II. Number of models to be dealt with shall be about 340 and adjustment shall be done by analytical method (PAT-M) by using stereo-comparators and electronic computer. Taking the distribution and accuracy of ground control points into consideration, standard deviation of the discrepancy of ground control points after adjustment will be expected to be between 0.4% and 0.6% of the flight height.

### 2-2. Stereoplotting

Stereoplotting shall be done on the scale of 1:10,000 for:

- a. intermediate contours with intervals of 5 m, index contours of every 25 m for hilly areas,
- b. spot heights at identifiable spots in flat areas every 5 cm x 5 cm on the photo-map.

### 2-3. Preparation of Controlled Mosaic

Mosaicing of rectified photos shall be done. As the Project area is generally flat, conventional method of rectification shall be applied. However, for the northeastern part of the Project area, where topography is hilly, differential rectification shall be done when necessary.



#### 2-4. Photo-interpretation

Before commencing the field survey, preliminary photo-interpretation shall be done for topography (landform classification), vegetation, land-use and shoreline of the Project area and the sampling area to be surveyed in the field shall be selected. The results of the preliminary study shall be noted on the photo-map at the scale of 1:10,000. The items to be classified are as follows:

##### 2-4-1. Topography (Landform Classification)

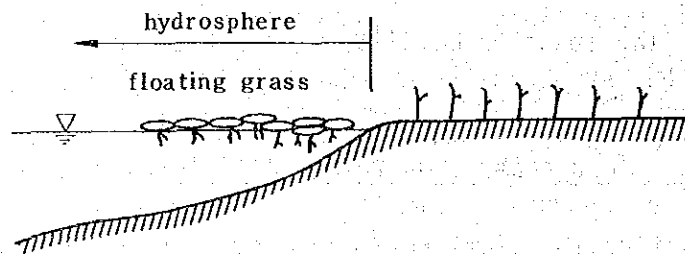
Classification of micro-topography, such as natural levee, backmarsh, etc., obtained by photo-interpretation, shall be expressed on the photo-map. It is considered that such information by photo-interpretation will help in obtaining slight differences in ground height and will be effective in allowing us to get a picture of micro-topography of the area in combination with measurement in the field ( 1-2-1 ) and spot heights obtained by photogrammetry.

The items to be classified shall be:

- a. alluvial fan
- b. flood plain: natural levee, backmarsh, former riverbed, etc.
- c. delta
- d. others: hills, etc.

### 2-4-2. Shoreline

By photo-interpretation, the shoreline shall be obtained. Special attention should be paid to reading the floating grass which grows in the hydrosphere in order to identify the shoreline.



### 2-4-3. Land-use

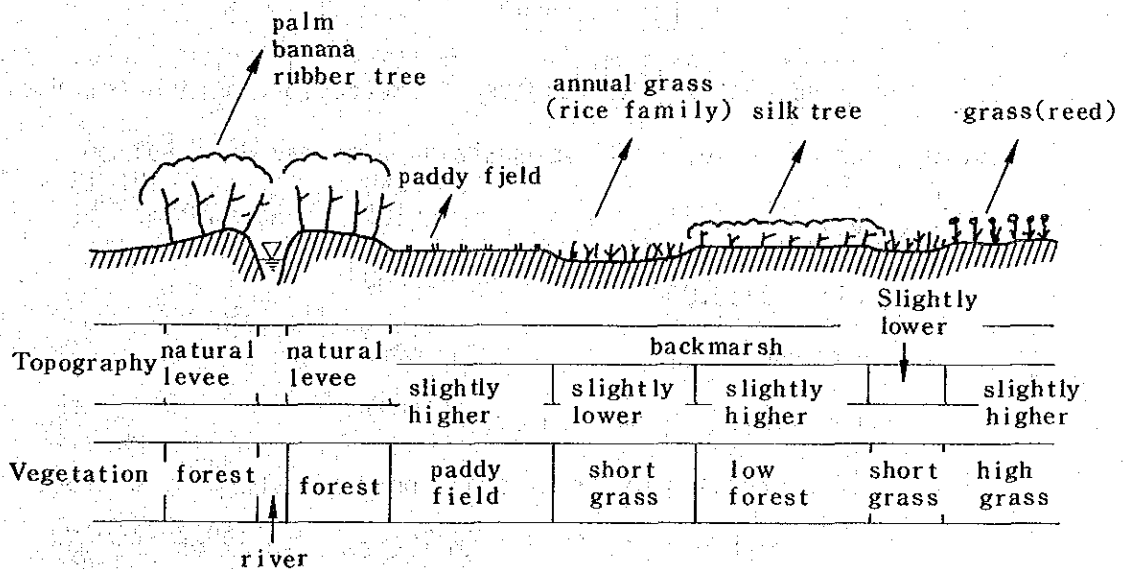
From findings obtained by the reconnaissance survey in the field in the previous phase, the state of land-use differs greatly between the dry and rainy seasons. Only in high land areas such as Barabai and Kandangam do they cultivate paddy (wet) fields in both seasons. However, in swampy areas, they do cultivation only in the dry season and abandon fields in the rainy season due to submersion. By knowing the difference in land-use in the two seasons, the change in water level can be estimated, although indirectly.

Items to be classified are as follows:

- wet (paddy) field
- dry field
- pasture
- residential area

#### 2-4-4. Vegetation

Distribution of vegetation depends on the condition of micro-topography, water, soil, etc. In swampy areas, formation of vegetation depends especially on micro-topography. In other words, it may be possible to estimate micro-topography from the state of the vegetation. At the time of the reconnaissance survey in the previous phase, the following state was observed between micro-topography and vegetation.



It is possible to classify micro-topography by classifying vegetation or land-use when terrain is covered by vegetation. Items to be classified are: high forest, low forest, high grass, short grass, nipa palm and alang-alang.

#### 2-5. Representation on the Photo-map

The results of photo-interpretation shall be represented on the photo-map in accordance with the specifications to be discussed. Results of verification and materials obtained in the field shall also be referred to. The information will help to supplement the photo-map and allow the user to get an idea of the micro-topography of the area as well as contours or spot heights obtained by photogrammetry. Knowledge of the state of the water level will also help in the succeeding study.

#### 2-6. Preparation of the Photo-map

Using mosaiced photos, the results of stereoplottting and the field survey, two series of photo-maps shall be prepared as follows:

##### a. Base Map

- scale: 1:10,000
- projection: UTM
- sheet line: 60 cm x 60 cm
- grid: crossing of grids shall be represented by a cross mark every 1 km x 1 km (10 cm x 10 cm on the map)
- format: format shall be finalized after discussion
- colour: unicolor black

##### b. Thematic Map

On the basis of the base map, the results of the geographical survey shall be superimposed.

- colour: six colours
- photo image: grey
- contour: brown

- marginal information: black
- notations, spot heights: black
- paddy fields, drainage: blue
- vegetation: green
- land form classification: red

The flow of cartography and printing works is shown in Figure 4.

#### V. ORGANIZATION OF THE SURVEY TEAM

Organization of the survey team is as follows:

<u>Duty</u>	<u>Member</u>	<u>Number in a Party</u>	<u>Number of Parties</u>	<u>Total</u>
Field Identification	Japanese Surveyor	1	3	3
	Counterpart	1		3
	Boat	1		3
	Vehicle	1		3
Geographical Survey	Japanese Surveyor	1	2	2
	Counterpart	1		2
	Boat	1		2
	Vehicle	1		2

#### VI. WORKING SCHEDULE

The working schedule is shown in Table 1.

## VII. FINAL PRODUCTS

Final products of the third year's work are as follows:

### 1. Aerial Triangulation

- computation notes of aerial triangulation 1 set

### 2. 1:10,000 Scale Photo-map

- half-tone positive 1 set

- printed photo-map

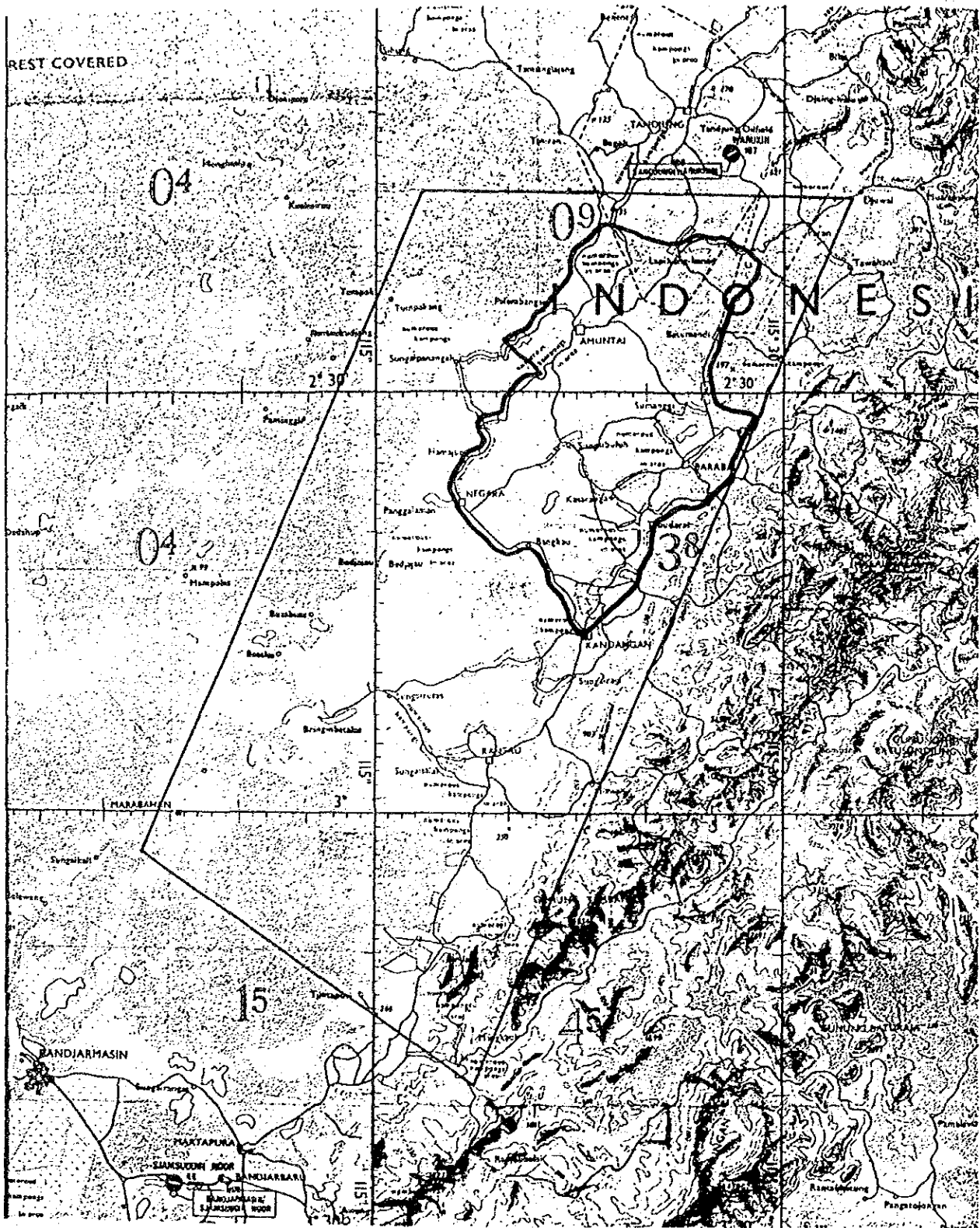
a. Base Map ( 1 colour ) 200 copies

b. Thematic Map ( 6 colours ) 200 copies

Table - 1 Work Schedule (Third Year's Work)

Year	1985												1986			Remark
	Month	6	7	8	9	10	11	12	1	2	3					
Aerial Triangulation				_____												
Controlled Mosaic				_____												
Field Identification and Geographical Survey				_____												
Photo-interpretation				_____												
Stereo Plotting				_____												
Cartography										_____						
Printing															_____	

Figure 1



- INDEX
- Area covered by aerial photos in dry season (6,300 km<sup>2</sup>)
  - Area covered by aerial photos in rainy season (1,200 km<sup>2</sup>)

Location map of aerial photography



Figure 2

SHEET INDEX OF NEGARA  
PHOTO MAP PROJECT

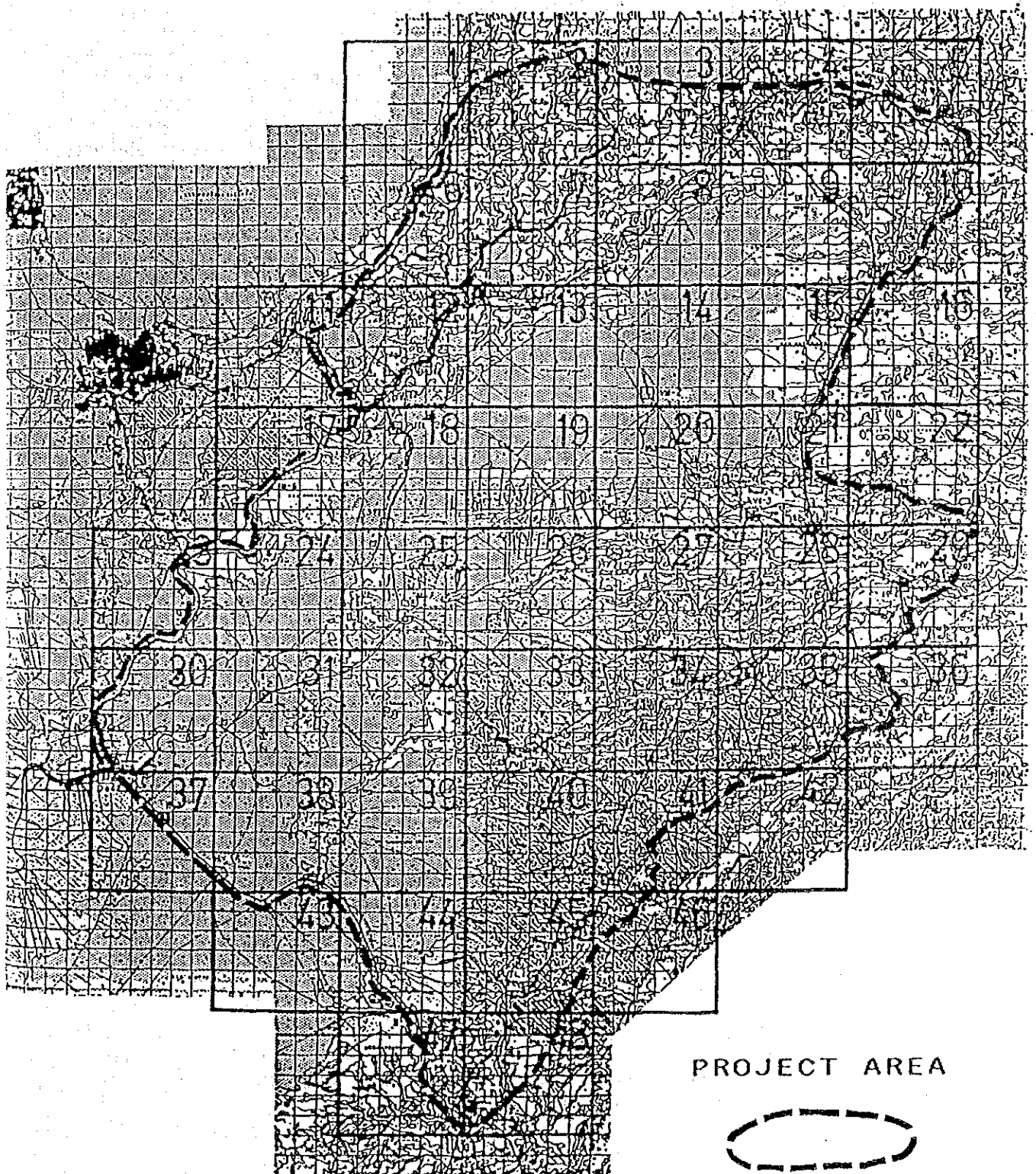


Figure 3

FLOW CHART OF WORKS IN PHASE III

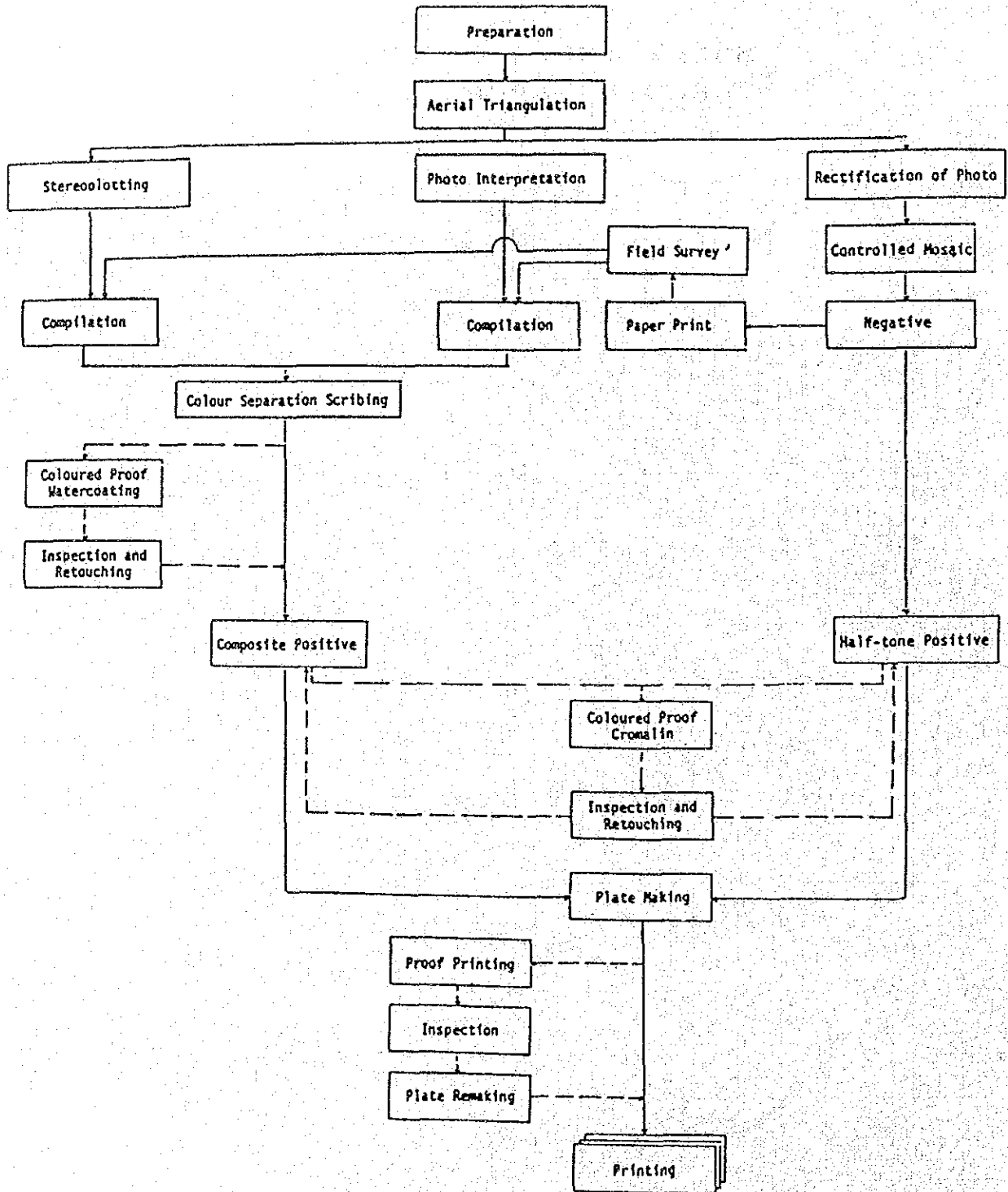


Figure 4

SCHEMATIC DIAGRAM FOR CARTOGRAPHY AND PRINTING

