PD-ABK-584

EVALUATION REPORT
Sederhana Assessment Study (*)

Basic Project Identification Data

1. Country : Indonesia

2. Project Titel : Sederhana Irrigation II

3. Project Number : 497-0252

4. Project Dates : August 31, 1978 - December 31, 1985 (*)

   a. First Project Agreement : August 31, 1978
   b. Final Obligation : December 23, 1980
   c. Project Activity Completion Date (PACD): December 31, 1985

5. Project Funding:

   a. AID Bilateral Funding (approved LOP) $35.345 mil ($11.3 mil grant $24.045 mil loan)
   b. Other Major Donors
   c. Host Country Counterpart Funds 24.5 mil

   Total $59.845 mil.

6. Responsible Mission Officials:

   a. Mission Director : William P. Fuller
   b. Project Officer : Nancy M. Tumavick
   c. Evaluation Advisor: David Seckler (JCC)

7. Previous Evaluation and Reviews:
   Impact Evaluation No. 29 Sederhana: Indonesia Small-Scale Irrigation (February, 1982) PN-AAJ-608.

8. Cost of Present Evaluation:

   a. Direct Hire: 4 months equivalent U.S. and FSN Direct Hire
   b. Contract : PT EXSA (Indonesian Company): $ 118,073
   c. Other : 6 months equivalent JCC Staff

(*) Evaluation focuses on construction component of the project which was completed December 31, 1983. Experimental water users association components (HPSIS) continues to December 31, 1985.

P.T. EXSA INTERNATIONAL CO. LTD.

– Jl. Raya Jakarta – Puncak Km 72,6 Cibogo – Bogor
Telp. (0251) 4138 – 4256 P.O. Box. 93 Bogor

– Jl. Let.Jen. S.Parman 78,Jakarta,Telp.(021) 593675-542178

FINAL DRAFT

MASTER COPY

THE SEDERHANA ASSESSMENT STUDY
in Four Provinces :

WEST JAVA .
WEST SUMATERA
NORTH SUMATERA
SOUTH SULAWESI

MARCH 1985

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P R E F A C E

It has been great honor for PT EXSA International Co. Ltd. to serve United States Agency for International Development (USAID) of US Embassy, Jakarta to carry out this Sederhana Assessment Study.

The study covers a sample of 30 of the projects sponsored by USAID in the four provinces of West Java, North and West Sumatera, and South Sulawesi. The execution of this study was commenced in January 1984 through March 1985 .

Upon the completion of this study, we would like to extend our gratitude and appreciation to the following :

- Director and staffs of USAID of US Embassy,Jakarta; Especially to Dr. David Seckler, who gave us guidance and conselling from the beginning to the end of this study.
- Director and staffs of Directorate of Irrigation, Ministry of Public Works;
- Director and staffs of Directorate of Agriculture Area Development, Ministry of Agriculture;
- Director and staffs of Directorate of Rural Development, Ministry of Home Affair.

We sincerely hope that the report serves its objectives.

Bogor, March 1985

Dr. Soekotjo Tjokrosoewarno.

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PART A. The Framework of the Study

1. Introduction

By 1981, the Government of Indonesia (GOI) had constructed and rehabilitated over 1,800 small-scale (less than 2,000 ha) irrigation projects throughout the country. These were called "Sederhana Projects". The GOI now refer to these small scale projects as "Irigasi Kecil". However since "Sederhana" was the name of the project it will be used here. Under this program, 885 projects assisted by the United States Agency for International Development (USAID) in the Sederhana I (1974-1979) and Sederhana II (1979-1984) programs, were completed by December, 1983 (IEC Report, 1983).

In 1983, the Directorate of Irrigation, Ministry of Public Works; Directorate of Agriculture Area Development, Ministry of Agriculture; and Ministry of Home Affairs; and USAID agreed that it would be valuable to survey a sample of projects that had been in operation for at least two years to determine their impact on irrigated area, the present condition of the works, and other items of interest. Accordingly, USAID contracted with EXSA, an Indonesian consulting firm, to survey a sample of 30 of the projects sponsored by USAID in the four provinces of West Java, North and West Sumatera, and South Sulawesi.

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This Master Copy and the "Project Profiles" (PPs) for each of the sample projects present the results of that survey. This material has been reviewed by provincial and local GOI officials and USAID. Where substantial question have arisen the projects have been checked by EXSA along with provincial and local officials and USAID, and all correction have been incorportated in the final Master Copy and PPs .

The results of this study are presented in two forms. First, in this Master Copy the methodology and an overview of all thirty projects is presented along with a summary of technical conclusions. Second, a Project Profile (PP) has been prepared for each of the 30 sample projects. All the data collected in the study is presented in the PPs so that others may perform their own analysis if they wish. This data is also entered on Apple Computer disks, and copies are available, at cost of reproduction, with the approval of the GOI.

In the following discussion, reference to the Tables, Figures, and Maps shown in each PP are presented under the relevant headings.

2. Objectives and Scope of Work

The objectives of the study were essentially two :

(1) To assess the performance of a sample of USAID sponsored Sederhana projects in terms of performance criteria discussed in Part B.

(2) To develop a cost-effective methodology for use in planning new small-scale irrigation projects and in monitoring the performance of existing projects.

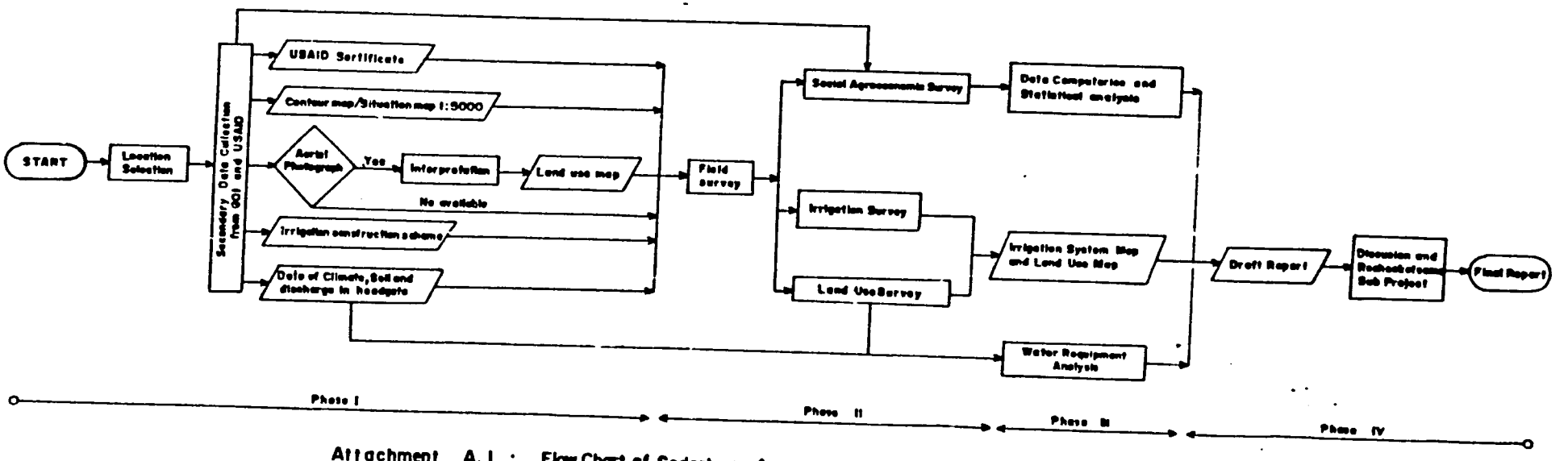
The Scope of Work can be seen in the flow chart of Attachment A1. The work was divided into essentially four phases.

Phase 1 (Preparation)

The work carried out in this phase covered selection of locations, and secondary data collection from the Indonesian Government and USAID-such as certificates from each sub-project, contour maps of irrigation planning, diagrams of irrigation networks, and climatic data. In one [redacted] case (Libanten), where aerial photographs were available, the result of the land survey technique were checked against the photographs. The land survey was accurate to within +/- 5%. In this phase survey permits for each project were obtained from the GOI.

Phase II (Field Survey)

The field survey covered the physical condition of irrigation works, land-use, the extent of irrigated and non-irrigated land, collection of socio-economic and agricultural data from government offices, and interviews with farmers in the sub-project areas.



Attachment A. I : Flow Chart of Sederhana Assessment Study

Phase III (Mapping and Data Analysis)

In this phase irrigation networks, land-use, and irrigated land were mapped. A topographical map of 1:5,000 was used as a base map. Also, data collected from interviews with 40-50 farmers in each project were compiled and analyzed. Irrigation water requirements were also analyzed.

Phase IV (Reporting and Discussion)

The draft Master Copy and PPs were reviewed with provincial and local GOI officials. Field checks were made and corrections incorporated in the final Master Copy and PPs.

3. Methodology

3.1 Selection of Project

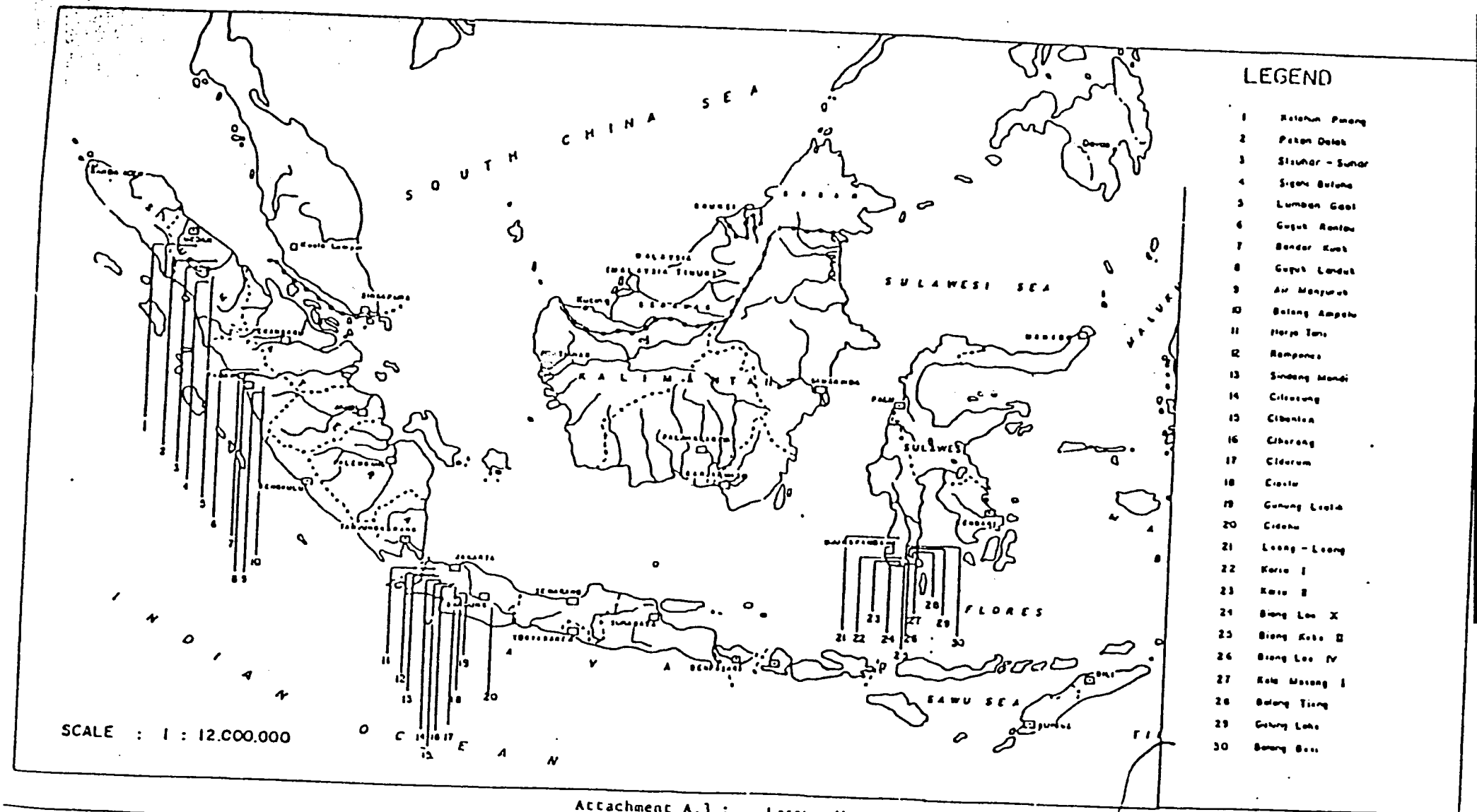
The selected projects are shown in Attachments A2 and A3. The selection process was random, subject to certain conditions.

(1) Projects were selected within provinces of greatest interest to GOI in terms of future small-scale irrigation projects. This criterion resulted in the selection of West Java, South Sulawesi, and North and West Sumatera.

Attachment A.2 : Description of each Sub-Project

No.	District	Sub-Project No.	Sub-Project Location	Designed Irrigated Area	Year Programme SI	S II 79/80	S II 80/81	Status N	Status C	Status I **)
A.	NORTH SUMATERA									
I.	DELI SERDANG	1.	Kelahun Pinang *)	530		X	X			X
		2.	Pekan Dolok	625		X	X	X		X
II.	TAPANULI UTARA	3.	Sisuhar-suhar	600			X	X		
		4.	Sigohi Butuha	196			X	X		
		5.	Lumban Gaol	217	X	X				X
B.	WEST SUMATERA									
I.	SOLOK	6.	Guguk Rantau	416			X	X		
		7.	Bandar Kuok	525	X					
		8.	Guguk Landuk	236			X	X		
		9.	Air Manyuruk	314	X					
		10.	Batang Ampalu	191			X	X		
C.	WEST JAVA									
I.	SERANG	11.	Harja Tani	92		X		X		
		12.	Rampones	125			X	X		
		13.	Sindang Mandi	109		X		X		
		14.	Cilesung	215		X		X		
II.	BOGOR	15.	Cibanten	326		X	X	X		
		16.	Ciherang	299			X	X		
		17.	Ciderum	150	X					
III.	CIANJUR	18.	Cipetir A	80	X					
		19.	Gunung Leutik	50		X		X		
IV.	GARUT	20.	Cidahu	280		X		X		
D.	SOUTH SULAWESI									
I.	MAROS	21.	Leang-leang *)	709	X	X			X	
II.	BANTAENG	22.	Kariu I	448	X					
		23.	Kariu II	185	X					
		24.	Biang Loe X	170			X	X		
		25.	Biang Keke II *)	218		X		X		
		26.	Biang Loe IV	450	X					
		27.	Kalimasang I	726		X		X		
III.	BULU KUMBA	28.	Balang Tieng	358		X		X		
		29.	Calung Lohe	961		X		X		
		30.	Balang Besi	668			X			

*) Project HPSIS (High Performance Sederhana Irrigation System)
**) Status : N = New, C= Continuation, I= Improvement



Attachment A.3 : Location Map of Sederhana Irrigation Sub Project

(2) Within these provinces clusters of five to ten projects were selected to minimize transportation costs and time spent between projects.

(3) Projects were chosen that had been officially opened for at least two years.

(4) Availability of basic irrigation design maps for each project was required.

Together, the 30 projects represent an approximately 10% of the total Sederhana Projects in the 4 provinces.

3.2 Secondary Data Collection

Data from each sub-project were collected both from USAID and the Indonesian Government at provincial, kabupaten, kecamatan and kelurahan levels.

The material collected covered data on certificates of each project, contour maps of irrigation network planning on a scale of 1 : 5,000, irrigation network diagrams, population and farms, land-use, kinds of crops and production, Water User Association (P3A), data on irrigation discharge, extent of irrigated land, climatic data and other data supporting the research. If climatic data such as rainfall, evaporation, percolation, etc. was not available on the location of the sub-projects, the data was obtained from the nearest station.

3.3 Project Surveys

Three different kinds of surveys were made for each project.

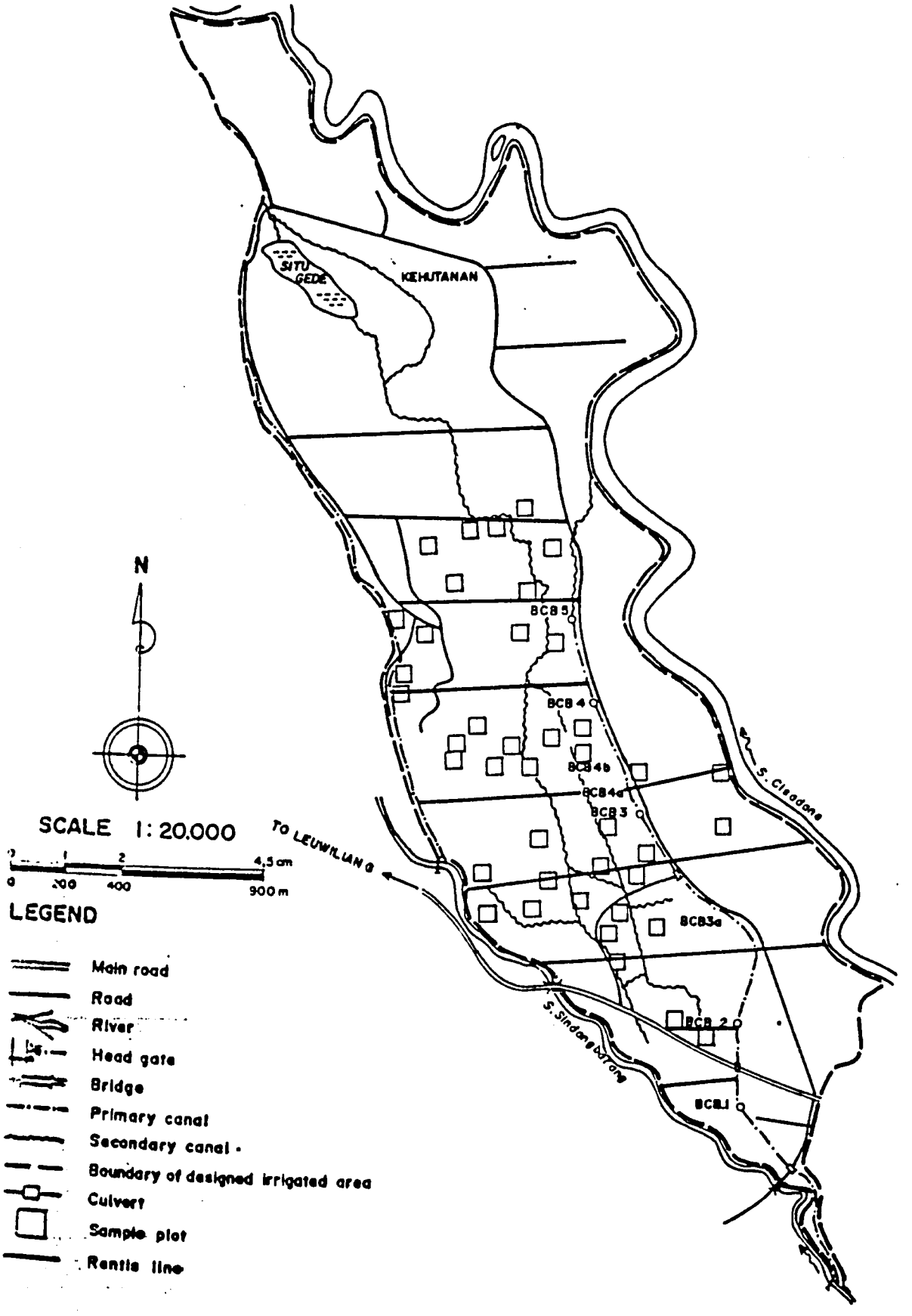
(a) Survey of the Irrigation Works

The physical works from the weir to the tail of the primary canals were inspected. Their condition and the condition of the canal (good, fair, poor) was recorded and photographed and reported on the PPs.

(b) Survey of Irrigated Areas and Land-use

Beginning with the original design maps of the project, lines perpendicular to the primary canal (rentis lines) were drawn to the edge of the designed irrigated area (DIA) at a distance of between 100 to 300 m, depending on the size of the DIA of the project. (See Attachment A4). A minimum of 10 rentis lines were used for each project. Distance measurements were taken along the rentis lines using a Suunto compass.

The surveyors walked the entire length of each rentis line observing and recording: (a) the presence / absence of irrigation facilities; (b) crops being grown; and (c) fields with and without irrigation. Informal interviews were also conducted with farmers along the rentis lines to determine if the area was irrigated in the wet season or not, and the boundaries of the irrigated area. A sample of the farmers that have wet season irrigation was selected for formal



Artachment A4. RENTIS LINE OF CIBANTEN

interviews, as explained below. The basic maps of irrigated area and land-use in the PPs were obtained from these observations and the interviews.

In certain large systems (in W. Sumatera) the irrigated area was so fragmented that the rentis line survey method would not yield sufficiently accurate observations. In these systems the closed polygon method was used. This system consists simply in finding the irrigated areas and mapping their peripheries.

It should be noted that these field survey methods, designed to obtain accurate maps of actual irrigated area (AIA) and land-use, are much more labor intensive than simple surveys designed to estimate the proportions of AIA and land-use in an area. In the latter case, a random sample of farmers within the DIA would suffice. However, it was believed to be well worth while to go through the more difficult mapping process so that the irrigated and non-irrigated areas, and crop areas could be clearly defined and seen for diagnostic purposes.

A subject for future studies to address is optimization of these field surveys so that maps within reasonable confidence intervals can be obtained with minimal survey work. This subject is not addressed in this report. However, as noted before, tests against aerial photographs and varying spacing of the rentis lines in the Cibanten project indicate the maps are within ± 5% error This may be too accurate, from a cost point of view, for studies of this nature.

(c) Farmer Survey

A sample of 40-50 farmers was selected at the head, middle, and tail of the AIA as defined by the irrigation map, both along the length and width of the the system. These were systematic samples, mainly along the rentis lines. While sample selection was not strictly random, there is no reason to believe a bias was introduced. The survey questionaire is shown in Appendix A. The original data are presented in the FPs. Also, a correlation matrix for this data is presented in each PP. All cells in the correlation matrix with value less than 0.20 ($R^2 = 0.04$) have been omitted to highlight the more important correlations.

In all but a few of the projects, noted in the PPs, the interviews were only with farmers who do have irrigation in the wet season--i.e., with few exceptions, farmers without irrigation were not interviewed. Neglect of farmers without irrigation in the sample was clearly a mistake that should be rectified in future studies. A sample of farmers without irrigation would provide valuable information for the study on crops, yields, income, and the economic returns to irrigation.

There is also a remote possibility that failure to interview farmers without irrigation could lead to underestimation of AIA. However, it is believed that this did not occur here. The reason is because, when preparing the map of irrigated area, farmers at the periphery of the

AIA were asked if they had ever received irrigation. Thus AIA was checked with farmers at the map-making stage.

Since the study was conducted in all the projects during the months of February-April, 1984 when water supplies are generally high, the wet season AIA can be assumed to be at, or near, its maximum. Precipitation during this period in 1984 is assummed to be normal (the data are not yet available). Therefore, there should be no bias in estimating wet season AIA because of timing or precipitation.

With two exceptions (Projects Kariu I and Biang Keke II), which practise rotation between different areas in the wet and dry seasons, all farmers who have irrigation in the second and/or third season also have irrigation in the wet season. Thus the set of farmers with wet season irrigation includes all farmers with irrigation at any time (with the two exceptions, which were specifically studied to correct this possible error).

These considerations are important for understanding some of the recall and subjective questions in the survey. For example :

(a) A project may irrigate only a small part .of the DIA, but 100% of farmers interviewed my be satisfied with the irrigation service. This is because only those farmers receiving irrigations were interviewed. It would be absurd to ask a farmer without irrigation if he were satisfied with the irrigation system. This "satisfaction" question, while

highly subjective, possibly indicates : (1) the reliability of delivery of irrigation water; (2) the quality of service the farmers has historically received; (3) the desire of farmers who have irrigation for improvements in the system; or; (4) all of the above.

(b) An irrigation system is dynamic, changing over time, while this study is only cross-sectional, at a point in time. In an attempt to capture some of the dynamic changes in this cross-sectional study, recall questions were asked of farmers about their pre-project irrigation and yields by seasons. While the responses may be questioned, there is no particular reason to doubt the farmer's veracity to the best of their ability to recall the pre-project status of irrigation and yields.

It is important to realize that since these recall questions were asked of the set of farmers with current wet season irrigation, it is unlikely that any farmers who had irrigation before the project were missed. Again, however, there is one exception--project Cidahu, which experienced a landslide. We understand that this problem has been corrected since the study. However, the data reflect the state of the project at the time. ~~In this case, a special study was conducted to account for this event~~.

These two special study cases show the importance of having general background information for each project, obtained from conversations with farmers and local officials, prior to conducting detailed interviews so that appropriate adaptations in the structure of the study can be made.

(c) The farmers were also asked about their yields after the project. Actual yield measurements were not taken on this study since it is very difficult and time consuming, and this is principly an irrigation study. However, there is no particular reason to doubt the accuracy of these yield figures, to the best of the farmer's ability to estimate their yields. In fact, as noted in the conclusions below, the reported yield figures appear to correspond quite closely with official yield statistics.

The original data has been repeatedly inspected for errors, outlyers, and inconsistencies. However, in a set of over 1200 observations, some mistakes undoubtly remain. The reader is urged to mark any problems detected and send them to EXSA for correction.

3.4 Irrigation Requirements

Basic data was gathered for each project on monthly precipitation and other climatological variables for 10 years, and presented in the PP. Pan evaporation data, was used to make rough estimates of the irrigation water requirement in each project. No attempt has been made to measure or estimate effective rainfall, or actual percolation and transpiration/evaporation losses. The figures shown are based on generally used coefficients for paddy in Indonesia. Total rainfall has been used in the estimates because all the paddy fields are bunded and therefore, all the rainfall is captured and held for irrigation up to the level of the spillway on the bund

These are only estimates . Readers may wish to use this data for their own estimations of irrigation requirements.

3.5 Organization and Management of Irrigation Systems

Without detailed and prolonged study it is extremely difficult to understand how any system is organized and managed. Interviews were conducted with farmers, local officials, and village leaders to attempt to understand the organization and management of the systems. However, this is highly subjective information . Irrigation management is not a variable of great accuracy, or emphasis, in this report. The intent throughout this study has been to describe what is happening in these projects, with all but the most obvious and technical answers as to why and how it is happening beyond the present scope of work.

3.6 A Further Note on Sampling Procedure

An important statistical problem, which was not sufficiently appreciated at the beginning of this study, is the importance of a rigorously random sample of farmers with respect to location in the DIA to define before and after project changes in AIA. A systematic sample, if not very carefully controlled, can yield biased results.

The reason is that any expansion of AIA due to the project is likely to occur on the periphery of the previous AIA. If the proportion of farmers interviewed that are on the periphery of the old AIA is equal to the proportion of the farmers benefiting from additional AIA, the estimate is

correct. However if the sample is biased toward, or away from, farmers on the periphery then the additional AIA will be over-, or under-, estimated.

For example, USAID recommended that samples be taken on each rentis line as follows.

1. A sample on the outer right hand periphery of the AIA.
2. A sample on the outer left hand periphery of the AIA.
3. A sample in the middle of the AIA on the rentis line.

So long as the additional AIA occured toward the tail of the system, not on the sides of the system, this systematic sample would yield accurate results. If, however the additional AIA occured through widening, rather than lengthening, the system, this procedure could <u>over-estimate</u> the increase in AIA, since 2 out of 3 samples would be on the ends of the rentis lines.

Analysis of the data in the FF's shows that, fortunately, most of the samples are concentrated toward the tail of the system, not along the width. Therefore, the sample should not be biased due to the systematic sample procedure.

In principle the best way to sample is to over-lay a numbered grid on a map of the DIA (of, say, 2 ha cells) and randomly sample the grid to locate sample farmers. Of course given the home addresses of sample farmers, it would

not be necessary to interview farmers on the fields--but rather, in the evenings at their homes. This would be the quickest and easiest way to to do surveillance--level analysis of projects. After this data is analyzed, then, where necessary, another sample could be taken--stratified by irrigated and non-irrigated areas. In projects where more detailed diagnostic analysis is needed for remedial action, the field survey techniques discussed above would be used to produce maps.

It is recommended that in future studies this rigorously random sample, and step process, be followed. Where the surveillance level observations (including inspection of works) show either that a project is performing very well or is non-operational no further survey work is needed. The much more labor-intensive mapping process, and second stratified sampling, would be used only for projects requiring remidial action. In the case of the present set of projects, for example, perhaps less than 50% would require the second stage.

PART B. Performance Criteria

1. Objectives of the Project and Performance Indicators

The Sederhana Irrigation Project had three major objectives :

(1) To upgrade and extend physical works of the irrigation system-the weirs, primary and secondary canals, outlets, and drop structures.

(2) To provide reliable irrigation to farmers in the DIA, at least during the wet season.

(3) In so-far-as water is available, to provide irrigation in the second and third seasons.

These are the objectives of the Sederhana project *per se*. Of course, the ultimate *goals* to be served by these objectives are increased agricultural production and income of rural peple.

The primary index of performance in this assessment is the relationship between the actual irrigated area (AIA) in the wet season (WS), as determined by the surveys, and the DIA, - or the percentage : AIA/DIA (WS).

This percentage is computed both for AIA in the wet season only, and for the sum of AIA in all seasons (or the irrigation intensity). The primary criterion for project effectiveness is AIA/DIA (WS). Obviously, a project that irrigates the same amount of land in two or more seasons is better than one that irrigates in only one. However, WS

irrigation has been chosen as the primary criterion to avoid discriminating against projects that do not have second or third season water supplies.

The AIA/DIA performance indicators are considered in essentially two dimensions : first, in terms of their present state; second, in terms of the amount of change before and after the project. Since there were no base line studies of the pre-project status of AIA, information on the change in AIA depends on farmer's recall of whether they had irrigation or not.

One the most difficult problems encountered in this study was not, as expected, measuring AIA but, rather, arriving at a realistic definition of DIA. While the certification papers provide the official DIA for each project, problems arise because in the planning and design stage of Sederhana projects, surveys are taken only at 2.5 m intervals and there is inadequate land-use survey. Therefore, the DIA may contain :

(1) Settlement, roads, State forests, and other non-agricultural land, some of which may have developed since the original DIA survey.

(2) Land with elevation above the irrigation systems, ecpecially in undulating areas.

(3) Land that has not been cleared of trees and shrubbery, or otherwise prepared for irrigation- and, in some cases, rocky, sandy land not suitable for paddy irrigation.

(4) Rubber plantations and other perennial crops that

do not need irrigation and which farmers do not want to change to irrigated crops.

(5) Many systems obtain a significant amount of their water supply, not from the weir, but from drainage from higher irrigation systems. On the other hand, drainage from a project may irrigate land outside their DIA, while they fail to irrigate all the land within their own DIA.

These complications are discussed in the relevant PPs. For present purposes, the most important point is the problem of defining a "Project" where two different, or inter-mixed, irrigation systems irrigate the same DIA. The question is whether to include the AIA of the other system in the DIA of the project or not. It has been decided to subtract the AIA of the other system from the DIA of the project. The reasons are : (a) the project should not be penalized for failing to irrigate area that is already irrigated; nor (b) should it be rewarded for AIA that it does not irrigate--even though that area is included in the project DIA.

In certain projects, as explained in the PPs, farmers in the AIA of the other systems were not interviewed. The interviews were restricted to farmers in the AIA of the project. This should not cause a significant problem, so long as it is recognized.

2. Non-Operational and Problem Projects

In addition to the one project (Leuwi Bitung, West Java) that was found to be non-operational and therefore rejected from the sample of 30, in the original survey because the weir had been damaged, 4 of the 30 selected projects are also considered to be basically non-operational due to clearly identifiable flaws in ~~design~~ site selection or structures. These non-operational projects, and the causes, are listed below.

(a) B. Ampalu (W. Sumatera), 90% of the DIA is in an established rubber plantation.

(b) Biang Keke II (S. Sulawesi) has a severe shortage of water supply at the weir, and rocky land that has not been prepared for irrigation.

(c) Kalamasang I (S. Sulawesi), same as (b) above

(d) Balang Bassi (S. Sulawesi), a large rock blocks the right bank canal, which supplies over 60% of the DIA. This rock existed before the project and was not removed, or avoided, in constructing the canal. Also part of the canal appears to be higher than the inlet .

In addition there are 3 cases that are not considered non-operational, but have notable problems.

(e) Pekan Dolok (W. Sumatera) is subject to heavy and continuous sedimentation of sand in the canal. Most of the DIA is irrigated from breaks in the embankment of the river.

(f) Galung Lohe (S. Sulawesi), the left bank, which supplies over 70% of the DIA, is not completed due to the refusal of a land owner to permit construction on his land.

(g) Cidahu (W. Java) was damaged by a landslide after the project was constructed. However, DIA has not been adjusted in this case. The damage has been [redacted] corrected after the survey was carried out.

It is notable that of these 7 non-operational and problem cases, 4 occur in S. Sulawesi. Similarly, in the 6 adjusted DIA projects, 5 are in South Sulawesi. Differences between provinces are discussed further below.

PART C. Summary of the Technical Finding

1. Criteria

The effectiveness of the Sederhana Irrigation Project is assessed in terms of the following criteria :

(1) The condition of the physical works and canals.

(2) The Actual Irrigated Area (AIA) in the wet season (WS) as a percentage of the Designed Irrigated Area (DIA) : AIA/DIA (WS).

(3) The same for all seasons (AS) - i.e., the sum of the wet; second and third seasons : AIA/DIA (AS).

(4) Padi yields in the wet season and second seasons.

(5) The change in the above three factors from before the project (BP) to after the project (AP): AP/BP.

Of these five criteria, the AIA/DIA (WS) ratio, and the change in this ratio from before the project to after the project, is considered to be the primary index of performance of irrigation system *per se*. The AIA/DIA (AS) ratio is of course more important, but it may be constrained by non-availability of water in the second and third seasons.

2. Results

Attachment C1 shows the projects, grouped by provinces, by major variables consider in this study. Attachment C2 explains the columns in the table. It was found that there are four basically non-operational projects, which are not

Attachment C1

PERFORMANCE OF SAS SUB-PROJECTS SASM4 SASTF112C

	PROJECT	PROV	IRRIGATION PROJECT YEAR 1	NOMINAL PROJECT BIA 2	FROM OTHER SYSTEMS 3	PROJECT DIA ADJ 4	PROJECT AIA/DIA ADJ WSI 5	PROJECT AIA/DIA ADJ ASI 6	CHANGE IR WS AP/BP 7	CHANGE IR AS AP/BP 8	STRUCT GOOD % 9	CANAL GOOD % 10	IRR FARM SAT % 11	YEILDS YIELD AP WS KG/HA 12	CHANGE YLD WS AP/BP 13	YIELD AP 2S KG/HA 14	CHANGE YLD 2S AP/BP 15	INCOME TOTAL INCOME PA 16	INCOME FROM FARMING 17	INCOME FROM OTHER 18	FACTORS NO. VILLAGES 19	WIER TEN=1 IMP=2 20	OWNER-SHIP % 21	IMPRO VARIETY PADI % 22	UREA PADI WS KG/HA 23	INMAS 1=YES 0=NO 24	BINAS 1=YES 0=NO 25
1	CIMERANG	W JAVA	81	229		229	0.90	1.79	1.00	1.00	100	100	71	4397	1.23	4595	1.21	314	211	103	4	1	93	93	192	1	1
2	G. LEUTIK	W JAVA	80	50		50	0.88	1.84	1.00	1.05	85	100	100	4853	1.17			342	118	224	2	2	37	0	270	1	1
3	CIDAHU	W JAVA	80	280		280	0.60	1.22	1.00	1.52	90	75	31	3735	1.01	3888	1.00	568	295	273	2	2	44	20	262	1	1
4	CIPETIR	W JAVA	81	80		80	0.85	1.70	1.00	1.00	65	75	100	5071	1.28	4628	1.49	301	130	171	1	1	8	95	274	1	1
5	CIDERUM	W JAVA	77	150		150	0.67	1.33	1.02	1.37	88	100	93	5766	1.38	5553	1.32	640	267	373	2	2	88	78	380	1	1
6	CILESUNG	W JAVA	80	215	63	152	0.64	1.28	2.94	3.13	87	80	100	4718	1.01	4818	1.06	580	486	94	2	2	87	71	176	1	1
7	HARJATAMI	W JAVA	80	92		92	0.35	0.60	1.03	1.17	75	40	70	4643	1.08	4259	1.06	490	482	8	1	1	100	93	134	1	1
8	RAMPONES	W JAVA	81	125		125	0.70	1.41	1.43	2.67	85	75	60	3952	1.06			186	109	77	1	2	97	0	106	0	0
9	CIBAWTEN	W JAVA	77	326		326	0.52	1.15	1.01	1.18	100	95	68	5160	1.04	4752	1.11	517	387	130	3	2	60	10	272	1	0
10	S.NANBI	W JAVA	80	109		109	0.35	0.70	1.01	1.01	33	30	63	4567	1.03	3813	0.90	272	138	134	2	1	100	0	200	0	0
11	G. LANDUK	W SUM	81	236		236	0.81	2.01	1.01	1.46	100	100	100	3218	1.23	3194	1.22	261	206	55	1	1	51	100	188	1	0
12	B. KUOK	W SUM	79	525		525	0.70	2.10	1.09	2.95	100	93	100	3214	1.18	3227	1.08	466	416	50	4	1	61	100	175	1	1
13	G. RANTAU	W SUM	81	416		416	0.76	2.29	1.04	1.70	100	97	100	3332	1.22	3333	1.22	227	168	59	4	1	60	100	200	1	0
14	A. MANYURUK	W SUM	79	341		341	0.67	0.93	1.00	1.00	97	85	98	2774	1.09			308	237	71	1	2	89	41	17	1	0
15	P BOLOK	W SUM	80	625		625	0.86	1.72	1.00	1.00	80	80	50	6095	1.54	5557	1.67	1216	1149	67	6	2	100	97	200	0	1
16	SISUNAR-SUNAR	W SUM	81	600		600	0.85	0.98	1.51	1.48	87	90	87	4094	1.37			539	417	122	6	1	100	0	171	0	1
17	L.GAOL	W SUM	80	217		217	0.98	1.23	1.68	1.93	94	95	53	5239	1.16			476	388	88	2	1	100	0	141	0	1
18	S BUTUHA	W SUM	82	221		221	0.81	0.87	1.00	1.07	83	35	36	4711	1.75			659	449	210	2	1	100	11	132	0	1
19	K PINANG (1)	W SUM	75	530		530	0.43	0.85	1.30	1.40	93	100	97	5495	1.46	4857	1.58	1853	1698	165	6	2	100	100	161	0	1
20	KARIU II	S SUL	77	185	74	111	0.98	1.96	1.00	1.00	90	74	68	3157	1.12	2722	1.23	382	225	157	1	1	82	100	179	1	1
21	KARIU I	S SUL	77	432		432	0.44	0.87	1.00	1.00	100	96	50	2594	0.98	2410	0.93	301	247	54	1	2	95	78	116	1	0
22	B. LOE IV	S SUL	77	401		401	0.89	1.79	1.00	1.00	100	72	32	4841	1.01	4036	1.05	895	875	20	1	2	49	87	237	1	0
23	B. TIEWS	S SUL	80	358	82	276	0.83	2.48	1.00	1.73	73	61	25	3165	0.96	2848	0.96	86a	837	29	1	1	86	100	172	1	1
24	G. LOHE	S SUL	80	961	652	309	0.90	1.61			100	78	11	3413	1.01	2183	1.02	688	660	28	1	1	68	100	151	1	0
25	L. LEANG (1)	S SUL	80	709	81	628	0.43	0.47	1.00	1.00	85	47	42	3252	3.29			338	301	37	2	2	81	100	251	1	0
26	B. LOE I	S SUL	81	170		170	0.91	1.81	1.00	1.00	50	100	69	4218	1.13	3564	1.12	449	353	95	1	0	31	98	195	1	1
NOT OP 27	B. AMPALU	W SUM	81	191		191	0.09	0.09	1.00	1.00	100	100	100	3084	1.22			182	124	58	1	2	77	62	79	1	0
28	B. KEKE II (1)	S SUL	60	218		218	0.17	0.26	2.94	3.00	100	67	48	1672	1.12	1567	1.21	443	300	143	1	1	73	35	131	1	0
29	KALAMASANG	S SUL	80	726		726	0.17	0.19	1.54	1.78	100	89	4	3168	1.11			377	279	98	1	1	90	100	156	1	1
30	BALANGBASI	S SUL	81	449	178	271	0.25	0.51	1.00	1.09	100	93	35	3812	1.05	2765	1.17	759	715	44	1	1	68	94	180	1	0
OPERATIONAL PROJECTS		AVER	79.50	330		294	0.72	1.42	1.16	1.43	86	80	68	4218	1.26	3907	1.17	544	432	111	2.31	1.42	76	64	190	0.73	0.62
(1) WPSIS SITES		SD	1.72	218		174	0.19	0.53	0.46	0.66	16	21	27	950	0.45	948	0.87	350	353	84	1.64	0.57	26	42	69	0.44	0.49
		MIN	75.00	50		50	0.35	0.47	0.00	0.00	33	30	11	2594	0.96	2183	0.89	186	109	8	1.00	0.00	8	0	17	0.00	0.00
		MAI	82.00	961		628	0.98	2.48	2.94	3.13	100	100	100	6095	3.29	5557	0.85	1853	1688	373	6.00	2.00	100	100	380	1.00	1.00
		WJAVA	79.70	166		159	0.64	1.30	1.24	1.51	81	77	76	4686	1.13	4538	1.14	421	262	159	2.00	1.60	71	46	227	0.80	0.70
		WSUM	80.00	380		380	0.73	1.83	1.04	1.78	99	94	100	3135	1.18	3251	1.17	316	257	59	2.50	1.25	65	85	145	1.00	0.25
		NSUM	79.60	439		439	0.78	1.13	1.30	1.38	87	80	65	5127	1.46	5207	1.63	949	818	130	4.40	1.40	100	42	161	0.00	1.00
		SSUL	78.86	459		332	0.77	1.57	1.00	1.12	85	75	42	3520	1.36	2961	1.05	560	500	60	1.14	1.29	70	95	186	1.00	0.43

ATTACHMENT C2 - GLOSSARY

(please refer to Attachment C1)

Column #	Description
1	The budget year in which work started on the project e.g. 1979-1980 shown as 1980
2	As defined in project reports (DIA - Designed Irrigated Area, wet season)
3	An area in DIA irrigated not from the [redacted] source project
4	Column 2 minus column 3
5	Actual Irrigated Area (AIA) divided by column 4 in wet season (WS)
6	Same as column 5, but for all season (AS) - the sum of WS, second season [2s], and third season [3s]
7	AIA (WS) AP (after project) divided by AIA (WS) BP (before project)
8	Same as column 7 but for AS
9	clear enough
10	clear enough
11	percentage of farmers who have irrigation (WS) and are satisfied with the irrigation system
12	yield of dry gabah (unhulled rice) (x 0.62 = polished rice) in the wet season.
13	change yield (yld) in WS between AP and BP
14	~~[illegible]~~ Same as 12 but in the second season
15	same as column 13 but for 2s
16	net income per household not counting out of household earners
17	clear enough
18	income from other than farming
19	number of villages in the DIA
20-25	Inmas Bimas

34

Column #	Description
20	clear enough
21	clear enough
22	clear enough
23	clear enough
24	clear enough
25	clear enough

included in the average for the remaining 26 operational projects. The average results for the five criteria listed above are as follows (the numbers in parenthesis refer to column numbers in Attachment C1).

1. Eighty-six per cent of the physical structures (9), and 80% of the canals (10), are in good condition.

2. The projects irrigate 72% of their DIA in the wet season (5).

3. The projects irrigate 142% of their DIA in all seasons (6)**

4. Padi yields (dry gabah; on the irrigated area) averaged 4218 kg/ha in the wet season (12), and 3907 kg/ha in the second season (14). This compares with an all Indonesian average of wet land rice of 5141 kg/ha under Bimas/Inmas and 3509 kg/ha without Bimas/Inmas

5. The change in AIA/DIA from before the project to after the project was 16% in the wet season (7) and 43% for all seasons (8)

6. The increase in yields before and after the project is 26% in the wet season (13), and 17% in the second season (15) over an average period of four years (1).

** Note that this figure is ~~very slightly~~ inflated by counting third season irrigation as a full season, for a maximum potential irrigation intensity of 300%, while as it should probably be counted as only one-half season, with a potential maximum of 250%).

Assessment

In order to assess these results it is necessary to have some criteria of good performance. Also, simple averages tend to hide the important diversity of results between projects and provinces. This section provides an illustrative analysis of these considerations.

First Attachment C3 shows the rank ordering of the projects of Attachment C1 (excluding the non-operational projects) in descending order by the AIA/DIA (WS) ratio. This table orders all of Attachment C1 so that comparisons can be made across the rows. Attachment C4 shows the results of a rather arbitary classification of performance in terms of the AIA/DIA (WS) criteria as "excellent" (>.89%); "good" (89%<75%); "fair" (75%<60%); and "poor" (<60%); for all 30 projects, by propinces . It is seen that about one-half of all the projects are in the excellent to good classes, with the other one-half fair to poor. The data on the provinces speak for themselves. However, it is interesting to note that S. Sulawesi had the highest frequency of both excellent and poor projects.

Technical Analysis

This section attempts to identify the major problem areas discovered in the SAS. The focus is naturally on the "poor" and "fair" projects, so that in the future these problems can be avoided and improvements made. The analysis

Attachment C3

PERFORMANCE OF SAS SUB-PROJECTS — SASM4 — SASTF112C

	PROJECT	PROV	IRRIGATION PROJECT YEAR 1	NOMINAL PROJECT BIA 2	FROM OTHER SYSTEMS 3	PROJECT BIA ADJ 4	PROJECT AIA/BIA ADJ WSZ 5	PROJECT AIA/BIA ADJ ASZ 6	CHANGE IR WS AP/BP 7	CHANGE IR AS AP/BP 8	STRUCT GOOD % 9	CANAL GOOD % 10	IRR FARM SAT % 11	YEILDS YIELD AP WS KG/HA 12	CHANGE YLD WS AP/BP 13	YIELD AP 2S KG/HA 14	CHANGE YLD 2S AP/BP 15	INCOME TOTAL INCOME PA 16	INCOME FROM FARMING 17	INCOME FROM OTHER 18	FACTORS NO. VILLAGES 19	WIER MEM=1 IMP=2 20	OWNER-SHIP % 21	IMPRO VARIETY PADI % 22	UREA PADI WS KG/HA 23	INMAS 1=YES 0=NO 24	BIMAS 1=YES C ..D 25
20	KARIU II	S SUL	77	185	74	111	0.98	1.96	1.00	1.00	90	74	68	3157	1.12	2722	1.23	382	225	15.	1	1	82	100	179	1	1
17	L.GAOL	N SUM	80	217		217	0.98	1.23	1.68	1.93	94	95	53	5239	1.16			476	388	88	2	1	100	0	141	0	1
26	B. LOE I	S SUL	81	170		170	0.91	1.81	1.00	1.00	50	100	69	4218	1.13	3564	1.12	448	353	95	1	0	31	98	195	1	1
24	G. LOME	S SUL	80	961	652	309	0.50	1.61			100	78	11	3413	1.01	2183	1.02	688	660	28	1	1	68	100	151	1	0
1	CIHERANG	W JAVA	81	229		229	0.90	1.79	1.00	1.00	100	100	71	4397	1.23	4595	1.21	314	211	103	4	1	93	93	192	1	1
22	B. LOE IV	S SUL	77	401		401	0.89	1.79	1.00	1.00	100	72	32	4841	1.01	4036	1.05	895	875	20	1	2	49	87	237	1	0
2	G. LEUTIK	W JAVA	80	50		50	0.88	1.84	1.00	1.05	85	100	100	4853	1.17			342	118	224	2	2	37	0	270	1	1
15	P DULOK	N SUM	80	625		625	0.86	1.72	1.00	1.00	80	80	50	6095	1.54	5557	1.67	216	1149	67	6	2	100	97	200	0	1
4	CIPETIR	W JAVA	81	80		80	0.85	1.70	1.00	1.00	65	75	100	5071	1.28	4628	1.49	391	130	171	1	1	8	95	274	1	1
16	SISUHAR-SUHAR	N SUM	81	600		600	0.85	0.98	1.51	1.48	87	90	87	4094	1.37			539	417	122	6	1	100	0	171	0	1
23	B. TIENG	S SUL	80	358	82	276	0.83	2.48	1.00	1.73	73	61	25	3165	0.96	2848	0.96	866	837	29	1	1	86	100	172	1.	1
18	S BUTUHA	N SUM	82	221		221	0.81	0.87	1.00	1.07	83	35	36	4711	1.75			659	449	210	2	1	100	11	132	0	1
11	G. LANDUK	N SUM	81	236		236	0.81	2.01	1.01	1.46	100	100	100	3218	1.23	3194	1.22	261	206	55	1	1	51	100	188	1	0
13	G. RANTAU	N SUM	81	416		416	0.76	2.29	1.04	1.70	100	97	100	3332	1.22	3333	1.22	227	168	59	4	1	60	100	200	1	0
8	RAMPOMES	W JAVA	81	125		125	0.70	1.41	1.43	2.67	85	75	60	3952	1.06			186	109	77	1	2	97	0	106	0	0
12	B. KUOK	N SUM	79	525		525	0.70	2.10	1.09	2.95	100	93	100	3214	1.18	3227	1.08	466	416	50	4	1	61	100	175	1	1
5	CIDERUM	W JAVA	77	150		150	0.67	1.33	1.02	1.37	88	100	93	5766	1.38	5553	1.32	640	267	373	2	2	88	78	380	1	1
14	A. MANYURUK	N SUM	79	341		341	0.67	0.93	1.00	1.00	97	85	98	2774	1.09			308	237	71	1	2	89	41	17	1	0
6	CILESUNG	W JAVA	80	215	63	152	0.64	1.28	2.94	3.13	87	80	100	4718	1.01	4818	1.06	580	486	94	2	2	87	71	176	1	1
3	CIDAHU	W JAVA	80	280		280	0.60	1.22	1.00	1.52	90	75	31	3735	1.01	3888	1.00	568	295	273	2	2	44	20	262	1	1
9	CIBANTEN	W JAVA	77	326		326	0.52	1.15	1.01	1.18	100	95	68	5160	1.04	4752	1.11	517	387	130	3	2	60	10	272	1	0
21	KARIU I	S SUL	77	432		432	0.44	0.87	1.00	1.00	100	96	50	2594	0.98	2410	0.93	301	247	54	1	2	95	78	116	1	0
25	L. LEANG (1)	S SUL	80	709	81	628	0.43	0.47	1.00	1.00	85	47	42	3252	3.29			338	301	37	2	2	81	100	251	1	0
19	K PINANG (1)	N SUM	73	530		530	0.43	0.85	1.30	1.40	93	100	97	5495	1.46	4857	1.58	1853	1688	165	6	2	100	100	161	0	1
10	S.MANDI	W JAVA	80	109		109	0.35	0.70	1.01	1.01	33	30	63	4567	1.03	3813	0.90	272	138	134	2	1	100	0	200	0	0
7	HARJATANI	W JAVA	80	92		92	0.35	0.60	1.03	1.17	75	40	70	4643	1.08	4259	1.06	490	482	8	1	1	100	93	134	1	1
OP 27	B. AMPALU	N SUM	81	191		191	0.09	0.09	1.00	1.00	100	100	100	3084	1.22			182	124	58	1	2	77	62	79	1	0
28	B. KEKE II (1)	S SUL	80	218		218	0.17	0.26	2.94	3.00	100	67	48	1672	1.12	1567	1.21	443	300	143	1	1	73	35	131	1	0
29	KALAMASANG	S SUL	80	726		726	0.17	0.19	1.54	1.78	100	89	4	3168	1.11			377	279	98	1	1	90	100	156	1	1
30	BALANGBASI	S SUL	81	449	178	271	0.25	0.51	1.00	1.09	100	93	35	3812	1.05	2765	1.17	759	715	44	1	1	68	94	180	1	0

Attachment C4. Frequency Distribution of Projects : AIA/DIA (WS)

*	EXCELLENT > 89%		GOOD 89%<75%		FAIR 75%<60%		POOR <60%		TOTAL
W. JAVA	1	10%	2	20%	3	30%	4	40%	10
W SUMA.	0	0%	2	40%	2	40%	1	20%	5
N SUMA.	1	20%	3	60%	0	0%	1	20%	5
S SULA.	3	30%	2	20%	0	0%	5	50%	10
TOTAL	5	17%	9	30%	5	17%	11	37%	30

* % = percentage of Total of the province except for total.

of problems here concentrates on observable, technical factors that are verifiable. Problems of management, which was not specifically studied in the SAS, can be analyzed by others as a residual factor, after the technical factors have been acounted for.

Attachment C5 shows the same ordering of the projects as Attachment C3 with a brief statement of the problem in term of low to moderate :(1), or serious : (2), degrees. A fuller statement is included in Appendix B and in the project profiles.

Most of the problems occur mainly in the site selection and project design stage. The major problems are :

I. Adverse physical conditions of land and/or water supply beyond the control of project managers that were not anticipated in selection of project sites, or which occured after site selection and designs were finished.

II. Selection of unfavourable sites in terms of crops systems and farmer's preferences. This leads to attempts to irrigate non-irrigated crops, like perennials, that the farmers do not want to irrigate; or in one case (No 10), to divert water from existing padi areas that are not in the DIA to areas of non-irrigated crops within new DIA.

FREQUENCY OF MAJOR PROBLEMS

PROJECT		PROBLEM I	II	III	IV	OTHER	DESCRIPTION
20 KARIU II	S SUL				2		
17 L.GAOL	N SUM		1				EXCESS DIVERSIONS UPSTREAM
26 B. LOE X	S SUL				2		
24 G. LOHE	S SUL	1					LANDOWNER REFUSED PERMISSION FOR PART OF CANAL
1 CIHERANG	W JAVA				2		
22 B. LOE IV	S SUL				2		
2 G. LEUTIK	W JAVA				2		
15 P DOLOK	N SUM	1			2		HIGH RATES OF SEDIMENTATION
4 CIPETIR	W JAVA				2		
16 SISUHAR-SUHAR	N SUM						
23 B. TIENG	S SUL				2		
18 S BUTUHA	N SUM				2		
11 G. LANDUK	W SUM				2		
13 G. RANTAU	W SUM	1			2		PART OF DIA HIGH GROUND AND NEW SETTLEMENTS
8 RAMPONES	W JAVA			1			• • •
12 B. KUOK	W SUM				.2	1	CANAL NOT YET FINISHED DUE TO A DEATH
5 CIDERUM	W JAVA	1		1	2		PART OF DIA HIGH GROUND AND ANNUAL CROPS
14 A. MANYURUK	W SUM	1		1	2		• • •
6 CILESUNG	W JAVA			1			SETTLEMENTS AND ANNUAL CROPS
3 CIDAHU	W JAVA	1			2		LANDSLIDES
9 CIBANTEN	W JAVA				2		FOREST AND SETTLEMENT
21 KARIU I	S SUL	2	2		2		DEFICIENT WATER SUPPLY AND POOR SOILS FOR PADI
25 L. LEANG (I)	S SUL		2		2		FLUME IS BROKEN
19 K PINANG (I)	N SUM						CANALS NOT COMPLETED
10 S.MANDI	W JAVA			2	2		POOR DESIGN FROM PADI TO ANNUAL CROPS
7 HARJATANI	W JAVA		2		2		WATER SUPPLY DRIED UP FOR UNKNOWN REASON
30 BALANGBASI	S SUL				2	2	CANAL TOO HIGH FOR INLET AND ROCK IN CANAL
28 B. KEKE II (I)	S SUL	2	2				POOR SOILS FOR PADDY, VERY ROCKY, HIGH CONVEYANCE LOSS
29 KALAMASANG	S SUL		2	2	2		FOREST AREA, DEFICIENT WATER SUPPLY, LARGE DIA
27 B. AMPALU	W SUM		2		2		RUBBER PLANTATION

PROBLEM TYPE

I. ADVERSE PHYSICAL CONDITIONS
II. DEFICIENT WATER SUPPLY
III. CROP SYSTEMS AND FARMERS PREFERENCES
IV. "REIRRIGATION" OF EXISTING IRRIGATED AREA; NO CHANGE AP/BP DIA ABOVE OPTIMUM

PROBLEM PRESENT
SERIOUS PROBLEM

III. Irrigation of areas in the DIA that were already being well irrigated before the project. Thus, of the 26 operational projects, wet season irrigated area increased less than 10% in 21 projects, and less than 10% in 14 projects in all seasons.

IV. Related to III, above, there appears to be over-reliance on rehabilitating the existing physical system, as contrasted to creating new and different diversion and conveyance systems to serve new areas. Existing systems tend to irrigate the same area; new areas often require new and separate facilities.

V. DIA may be designed at too large a scale for the system and/or water supply. As shown in Appendix C, this study indicates that the optimal size of a sederhana system is below 300 ha DIA.

Appendix A : Kuestioner Petani

No. Kuestioner :
Sub Proyek :
Propinsi :
Kabupaten :
Kecamatan :
D e s a :
Pewawancara :
Tanggal :

I. IDENTITAS PETANI

1. N a m a : .....
2. U m u r : ..... th
3. Pendidikan : SD/SMTP/SMTA
4. Bisa membaca : ya/tidak
5. Bisa menulis : ya/tidak
6. Luas petak yang dimiliki : ..... ha
7. Letak petak* : - dari bendung : ..... m
   - dari saluran primer : ..... m
8. Jenis pemilikan lahan :

Macam pemilikan	Ha	Jumlah petak	Irigasi atau tadah hujan
Milik sendiri			
Sewa			
Bagi hasil			
Lainnya			
T o t a l			

9. Pendapatan petani per tahun
   a. Dari hasil pertanian *) Rp. .....
   b. Dari buruh tani Rp. .....
   c. Dari lainnya ..... Rp. .....
   Total Rp. .....

*) Perinciannya disajikan dalam bagian ke III.

II. POLA TANAM DAN KEBIASAAN PETANI MENGGUNAKAN AIR

Pola Tanaman	Sebelum ada irigasi (< th .....)						Sesudah ada irigasi (> th .....)					
	MT I		MT II		MT III		MT I		MT II		MT III	
	Jenis tanaman	Masa tumbuh	Jenis tanaman	Masa tumbuh	Jenis tanaman	Masa tumbuh	Jenis tanaman	Masa tumbuh	Jenis tanaman	Masa tumbuh	Jenis tanaman	Masa tumb
Fase Pertumbuhan	Waktu (hari)	Tinggi air (cm)	Waktu (hari)	Tinggi air (cm)	Waktu (hari)	Tinggi air (cm)	Waktu (hari)	Tinggi air (cm)	Waktu (hari)	Tinggi air (cm)	Waktu (hari)	Tingg air (cm)
- Pengolahan tanah												
- Penanaman												
- Pertumbuhan												
- Pemupukan I												
- Pemupukan II												
- Pemupukan III												
- Pemetangan												
- Panen												
- Produksi kg/petak												

III. BIAYA PRODUKSI DAN PENDAPATAN DARI HASIL PERTANIAN

Musim tanam : I/II/III *)

Jenis tanaman yang diusahakan : .....

Luas petak yang diusahakan : ..... ha

A. Nilai sewa tanah Rp. .....

Ipeda Rp. .....

Sub. Jumlah Rp. .....

B. Sarana produksi dan lain-lain

1. Bibit .... kg a Rp. ..... Rp. .....
2. Pupuk buatan :
   - Urea .... kg a Rp. ..... Rp. .....
   - TSP .... kg a Rp. ..... Rp. .....
   - ... . kg a Rp. ..... Rp. .....
3. Pupuk organis .... kg a Rp. ..... Rp. .....
4. Obat-obatan .... lt a Rp. ..... Rp. .....

Sub. Jumlah Rp. .....

C. Tenaga Kerja

Proses	HOK			Biaya
	Pria	Wanita	Ternak	
1. Persiapan lahan	....	.....	.....	Rp. .....
2. Persemaian	....	.....	.....	Rp. .....
3. Penanaman	....	.....	.....	Rp. .....
4. Penyiangan	....	.....	.....	Rp. .....
5. Pemupukan	....	.....	.....	Rp. .....
6. Penyemprotan	....	.....	.....	Rp. .....
7. Pemeliharaan lain	....	.....	.....	Rp. .....
8. Panen	....	.....	.....	Rp. .....
Sub. Jumlah	....	.....	.....	Rp. .....

Keterangan :

Upah tenaga kerja Pria Rp. ...../hari

Wanita Rp. ...../hari

Ternak Rp. ...../hari

Jumlah A + B + C Rp. .....

D. Produksi sebelum/setelah dikurangi bawon *)

..... a Rp. ..... Rp. .....

..... a Rp. ..... Rp. .....

..... a Rp. ..... Rp. .....

Jumlah Rp. .....

E. Pendapatan bersih per musim Rp. .....

*) Coret yang tidak perlu.

IV. INTENSIFIKASI PERTANIAN

1. Keikutsertaan dalam program Bimas : ya atau tidak,
   ya, dalam hal : .....

2. Keikutsertaan dalam program Insus : ya atau tidak,
   ya, dalam hal : .....

3. Keikutsertaan dalam program penyuluhan : ya atau tidak,
   ya, dalam hal : .....

4. Pemasaran produksi : a. memasarkan sendiri
   b. memasarkan ke KUD
   c. Lainnya.

5. Keikutsertaan dalam organisasi P_3A : ya atau tidak,
   ya, dalam hal : .....

6. Sistim pembagian air : a. setiap hari (tidak ada aturan) } sekali
   b. ..... hari/minggu } sekali

V. KARAKTERISTIK ORGANISASI DESA

1. Kondisi organisasi Koperasi Unit Desa :
2. Kondisi organisasi Persatuan Petani Pemakai Air :
3. Kondisi program Bimbingan Masyarakat :
4. Kondisi program Insus :
5. Kondisi program Penyuluhan :

VI. TANGGAPAN PETANI TERHADAP PROYEK :