



REPUBLIC OF INDONESIA MINISTRY OF AGRICULTURE DIRECTORATE GENERAL OF FOOD CROPS AGRICULTURE

FEASIBILITY STUDY FOR LAND DEVELOPMENT PROJECT IMPROVEMENT OF LAND AND IRRIGATION SYSTEMS AT FARM LEVEL

VOLUME II

APPENDIX

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FEASIBILITY STUDY

LAND DEVELOPMENT PROJECT

IMPROVEMENT OF LAND & IRRIGATION SYSTEM AT FARM LEVEL

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APPENDIX-I

APPENDIX-I INVENTORY SURVEY

APPENDIX I INVENTORY SURVEY

1. GENERAL

1.1 Purpose of Inventory Survey

In Indonesia there are about 1.0 million ha of irrigation systems at farmers' level out of about 5.3 million ha of irrigated land and 2.6 million ha of rainfed/upland paddy fields as of 1984.

These small scale irrigation blocks lie sporadically at the site of around villages in rural area. Number of this village irrigation schemes is counted more than 2,100 places in three provinces of North Sumatra, South Sulawesi and West Nusa Tenggara.

At present, provincial agricultural offices have long list showing the irrigation name, village name, potential irrigation area, present irrigation area and occasionally with short explanation of present facilities' condition. At the time of improvement of village irrigation, however, those information is too a few to plan their development.

From the above present long list by each village irrigation scheme, inventory survey should be carried out to grasp more detailed dimension, to know their actual field condition and use the results as fundamental data for development planning. Concerning on land development schemes, the same type of inventory survey should be also carried out to confirm their scheme's feature.

1.2 Potential of Land Development & Village Irrigation

The objective provinces for the land development project are three provinces of North Sumatra, Southeast Sulawesi and West Nusa Tenggara. The project is composed of land development schemes which have development potential area for paddy field, and rehabilitation and improvement plan of village irrigation schemes.

(1) Long List of Land Development Schemes

In Indonesia the target area of land development of paddy field is scheduled to be about 375,000 ha consisting of about 340,000 ha of the potential area of existing PU irrigation projects, 20,000 ha of swamp development area and 15,000 ha from village irrigation area during the period of Palata V(1989/90 - 1993/94).

In the whole provinces the total achievement of land development area of paddy field has been recorded about 218,000 ha since the beginning of palata V to February 1992 including development by farmers themselves, which is called as Swadaya Masyarakat.

As the said target area, new planning area of land development in all indonesia are mainly selected from the existing PU projects area where have already major irrigation and drainage facilities, but where not yet developed by farmers for paddy field owing to the local site conditions. Those potential area of paddy field are corresponded to the area of Column No.13 in the projects registration book (Buku Pintar) for existing irrigation projects under controlling by the Ministry of Public Works. The present land use of such area consist of forest, bush, upland field, fish pond and swamp, etc. where can be converted to paddy field in future.

According to the record published by PU on April 1989, the total figure of the Column No.13 is summed up for the potential area of land development of paddy field in three (3) provinces of North Sumatra, South Sulawesi and Nusa Tenggara as bellow.

Potential Area of Land Development in DPU Projects

	rechnical Irriga- tion	Semi Technical Irriga- tion	Simple Irriga- tion	Total Area	No. of Pro- jects	Aver- age Area
North Sumatra South Sulawes NTB		11,589 1,339 13,524	1,572 1,132 931	nos 17,535 6,483 16,930	ha 208 40 88	84 162 192
Sub Total	10,861	26,452	3,635	40,948	336	122
All Indonesia	135,262	119,343	49,230	303,835		

Note: Projects under construction are not included. Source: Buku Pintar 1989, DOI-I, PU

From the above table, the total area of 40,948 ha and 336 schemes in three province will be considered to major long list for land development project.

(2) Long List of Rehabilitation of Village Irrigation Schemes

Village irrigation project is defined to be irrigation areas where were constructed by farmers' group themselves, and the operation and maintenance of the projects are being carried out by farmer themselves. However the material costs for cement, reinforcement bar and/or steal material, etc. are provided using subsidy from Directorate of Food Crops Agriculture, Ministry of Agriculture, Directorate of Regional Development, Ministry of Home Affairs, local self-government of province or regency and other special body.

The following shows the title of long list for village irrigation projects that are grasped at present by each provincial agriculture service office. These lists are not uniform.

North Sumatra:	List	of	Rekapitu	lasi	Konstruksi
		iran De 70-199	sa Propin	si Suma	tera Utara,
South Sulawesi:	Data	Inven	tarisasi	Irigasi	Pedesaan
All de Maria de Caralle de Sala de Caralle d Promoto de Caralle de Promoto de Caralle de		Dati			atan, 1991
West Nusa Tenggara:	List	of	Inventar	isasi	Pengairan
	Pedes	aan Pro	opinsi Nus	sa Tengg	gara Barat

According to the above lists, the number of village irrigation project is summed up as below;

Number and Total Area of Village Irrigation

Province	Total Number of Project	Total Area (Potential)	Average Ar
North Sumatra South Sulawesi NTB	nos 845 962 328	ha 121,775 149,260 35,499	ha/scheme 144 155 108
Total	2,135	306,534	144

2. SELECTION OF INVENTORY SURVEY AREA

The object of inventory survey is to catch hold of present conditions and development potential for land development schemes including rehabilitation of village irrigation schemes, and also to apply the collected data as basic figure for the further study of Project formulation in three (3) Provinces of North Sumatra, South Sulawesi and Nusa Tenggara Barat.

2.1 Selection of Land Development Area

From the above-mentioned long lists, object areas for inventory survey are selected in accordance with the following selection guideline.

- a. Potential area for land development of paddy fields is more than 25 ha.
- b. The area is not under construction and/or there is no schedule as land development project.
- c. The area has no budgetary assistance by foreign aid such as IBRD, ADB and OECF.
- d. The area has no periodical transportation means, such as isolated island etc. should be excluded.

2.2 Selection of Village Irrigation Area

As well as the selection of land development area, object areas for inventory survey are selected from the above-mentioned long lists in accordance with the following selection guideline.

- a. Potential area is larger than or equal to 25 ha and less than 250 ha.
- b. The area has necessity to rehabilitate or upgrade their present irrigation and drainage facilities.
- c. At present there is no schedule which has budgetary arrangement for rehabilitation and/or upgrading, construction works, or not under construction.
- d. Excluding the areas completed recently and good condition.
- e. The area has no budgetary assistance by foreign aid program.
- f. Excluding the subprojects located in the special projects.
- g. The area has no periodical transportation means, such as isolated island etc. should be excluded.

The above both selection guidelines and flow are shown in Fig.I-1.

2.3 Scheduled Areas for Inventory Survey

After the check and examine about above each condition, number of the study for land development area is 114 schemes and that of village irrigation is 871 schemes.

Scheduled Areas for Inventory Survey

Province	Land Development Project	Village Irrigation Project	Total
North Sumatr South Sulawe		nos 308 374 189	nos 358 393 234
Total	114	871	985

Note; The total potential area is about 154,000 ha.

3. FORMULATION OF QUESTIONNAIRE

3.1 Material of Questionnaire Forms

Ministry of Agriculture has both inventory forms for land development project and village irrigation project and the inventory data is evaluated using their standard for the decision of project formulation and implementation.

- In case of land development project (Pencetakan Sawah)

The inventory form were made on August 1989 by the Directorate of Rehabilitation and Land Development (DRLD), Directorate General of Food Crops Agriculture (DGFCA), Ministry of Agriculture, and inventory survey is carried out by Indonesian consultants.

Name of Questionnaire Form:
PETUNJUK PELAKSANAAN SURVEY (INVENTIGASI) LOKASI
PENCETAKAN SAWAH

- In case of village irrigation project (Irigasi Pedesaan)

As well as the land development survey, questionnaire form of village irrigation which was prepared by DRLD are used in each province. The inventory survey is carried out by agricultural service in district level and village, after that, such inventory data is submitted to the provincial agricultural service (PRAS) in order to keep budget of subsidy from national or provincial level.

Name of Questionnaire Form:

DAFTAR PERTANYAN APPRAISAL CALON LOKASI PEMBAMGUNAN
DAN PENGEMBANGAN PENGAIRAN PEDESAAN

Questionnaire form which is utilized for the Study, was arranged into one form using the above two questionnaires by the Study team at the beginning stage of Phase I Field Survey (II). (refer to Attachment)

3.2 Formulation of Questionnaires

The questionnaire form was made in both English and Indonesian, however, Indonesian version was applied in field survey. Following items were added, deleted and changed to and from the original form at the time of new arrangement of questionnaire for the Study.

Added items: a. Name of river for water source

- b. Kind of water source
- c. Type of water source facility
- d. Farmers' intention

- e. Introduction of supporting system
- f. Farmgate price
- g. 0 & M and water management
- h. Average income per household, etc.

Deleted items: (from LD form)

- a. Condition of tertiary systems
- b. Area not subject to any external interests
- c. Drawing of irrigation/reclamation scheme
- d. Schedule of budget
- e. List of farmers, etc

Changed items: (from VI form)

a. Monthly average rainfall latest 10 years to 5 years

Further some part of the questionnaire was revised by discussion among the Study team, the staff of DRLD and the staff of Directorate of Programming, DGFCA. Those revision are as below.

- a. Addition of project code column
- b. Set up the question number
- c. Change of question sequence
- d. Addition of intention of farmers' participation
- e. Addition of land in dispute
- f. Classification of cropping area and yield in rainy season and dry season
- g. Change of unit of cultivation labour force
- h. Revision of Indonesian language

The following table shows a flow chart of formulation of questionnaire foe inventory survey.

IMPLEMENTATION OF INVENTORY SURVEY 4.

Record of Procedure 4.1

Inventory survey itself were almost entrusted to know the present condition on land development project and village irrigation project by the Study team to the three (3) Indonesian consulting firms which have experience in the same field survey in Indonesia. The entrusted works between JICA Study team and each consultant firm entered into the contract on May 7, 1991 at DRLD Jakarta for the three provinces of North Sumatra, South Sulawesi and West Nusa Tenggara. The entrusted firms are as follows:

Entrusted Works-I, South Sulawesi : PT. Indeco Duta Utama

Entrusted Works-II, NTB

:pT.Bimaseta Cipta

Optimal

Entrusted Works-III, North Sumatra : Pusat Pengembangan

Agribisnis

Number of Inventory Survey

Province	LD project	VI Project	Tota1	
North Sumatra South Sulawesi West Nusa Tenggara	50 19 45	nos 308 374 189	358 393 234	
Total	114	871	985	

Note:

areas areas, 142 of above part during Sep. and Oct., 1991 in South investigated Sulawesi Province and 6 areas were added by Birna office during Mar. 1992.

The inventory survey which was actually carried out in the 3 provinces is almost followed as below procedure.

a. Preparatory work

- Delivery of questionnaire form in Indonesian and explanation on the question items by JICA Study team-Delivery of tentative short list of inventory survey schemes
- Organization of survey team of each entrusted firm
- Delivery of available data from JICA Study team (Topo maps, administration maps, etc.)

- Preparation of detailed survey schedule by each entrusted firm (3 months)
- Application of permission to enter to field (Provincial Government, Ministry of Man Power, Police)
- Mobilization to field

b. Field survey

- Meeting on implementation of inventory survey with Provincial agriculture service (PRAS)
- Request of cooperation on the survey work in each district (Kabupaten) to offices concerned from PRAS
- Decision of surveyor in province and district agricultural office
- Meeting on detailed survey items among surveyor, survey team and staff of agricultural office
- Implementation of inventory survey in the district, sub district and village
- Hearing survey from farmers, extension service office water management association, LKMD, etc.
- Mapping of irrigation and drainage system
- Collection of secondary data (rainfall, yield, geology, soil, etc.)
- Field sample check by JICA Study team
- A partial change of inventory schemes in accordance with discussion among province, district, JICA study team and survey team
- Carry out re-survey for the schemes revised
- Check of filling up on the questionnaire form and reception of signature by province or district agriculture service

c. Office work

- Delivery of form of summary sheet from JICA Study team
- Data entry to summary sheet
- Check and revision of entryed data
- Printing and making of summary sheet and final report
- Mapping of project location
- Arrangement of secondary data
- Preparation of monthly report

4.2 Working staff and survey period

Working staff and period of each consultant firm is as follows;

	Team lea	ader,	Sı	rveyor	
Province	supervis	sor, etc Work Period	 No. of Group	and a contract of the contract of	Work Period
North Sumatra South Sulawesi NTB	person 9 11 6	month 3.0 4.5 3.0	group 3 10 6	person 28 47 31	month 1.5 3.0 2.3

4.3 Revision of candidates for inventory survey

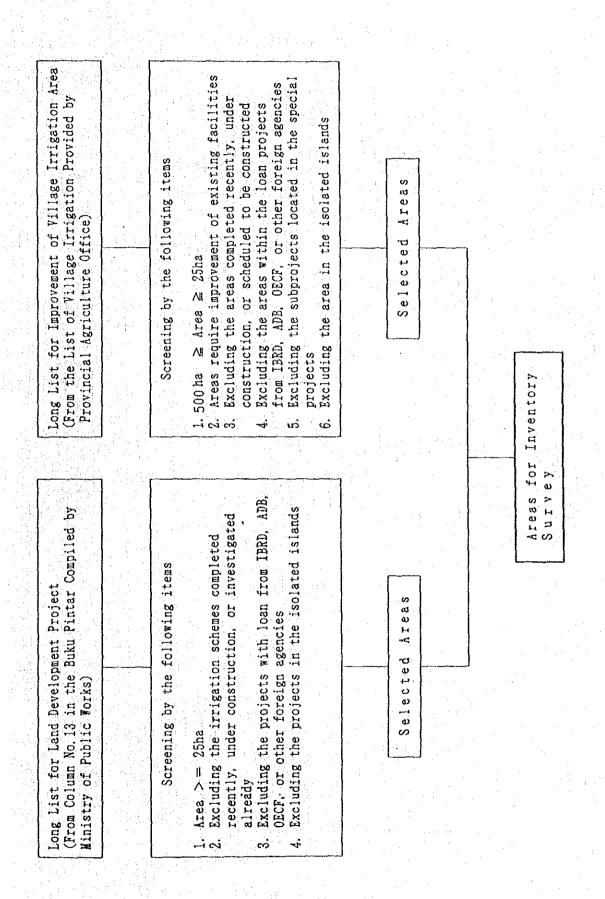
As the results of actual field reconnaissance survey by the Study team and consulting firms during Phase I Field Survey (II), it was found that among selected candidates no longer can be included in the inventory survey due to different reasons as follows;

- a. unavailable land for further development
 - -already converted to housing area
 - -changed to plantation area
 - -water resource is not available
- b. change of the irrigation status
 - -converted to irrigation project under controlled by DPU

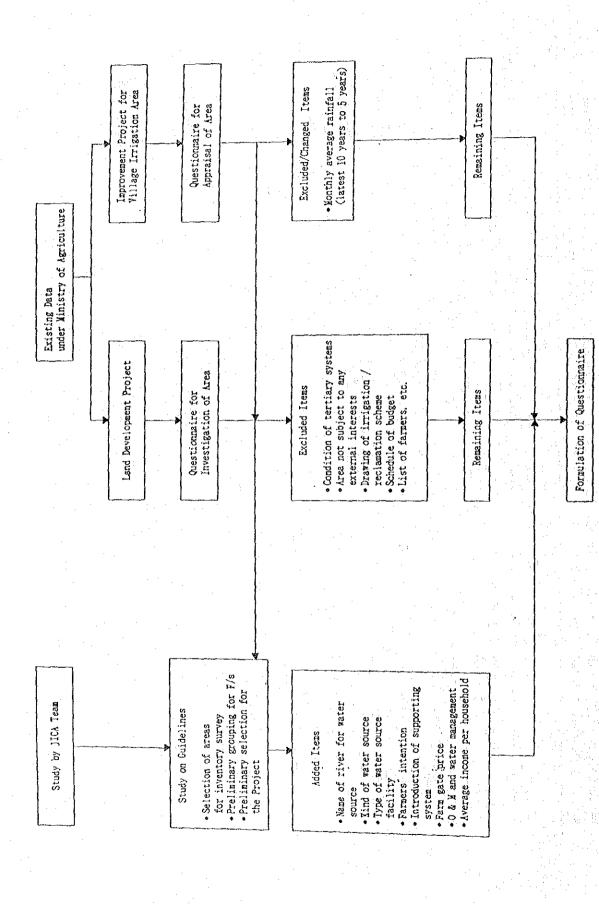
Due to those reasons, some of the selected locations were replaced by the survey team to other area as much as possible according to the discussion with province and district agricultural office, and order of JICA Study team.

4.4 Preparation of Summary Sheet

The volume of summary sheets was prepared each province, which has about 150 major data out of about 640 answer per one scheme, in order to see the total, mean value and to check the survey data preliminary, also to check unusual data.



GUIDELINE FOR SELECTION OF AREAS FOR INVENTORY SURVEY IT Fig.



FORMULATION OF QUESTIONNAIRE FOR INVENTORY SURVEY Fig. I-2

Table I-1 NUMBER OF INVENTORY SURVEY IN NORTH SUMATRA

North SUMATRA PROVINCE

			Land Deve			Village Irrigation				
			ing			Exis	ting	Select	ed	
						The second secon	Irigasi Potential			
::		Nos	ha	Nos	ha	Nos	ha	Nos	ha	
. 1	Asahan	2	91	:: -	-	71	11,996	24	. ·	
2	Binjai	·	-		-	1	714	_	: 😛	
3	Dairi	26	2,037	20	3,410	63	7,566	44		
4	Deli Serdang	11	1,511	5	1,730	86	12,361	21	~	
5	Labuhan Batu	8	838	5	1,354	64	13,743	- 30		
6	Langkat	5	749	. 2	1,534	68	8,625	22		
7	Medan				-	16	2,304	·		
8	Nias	3	114	·	· -	80	6,673	-	-	
. 9	Simalungun	51	3,945	· _		63	12,003	-	· · · -	
10	Tanah Karo	25	1,731	-	-	81	10,578	33		
11	Tanjung Balai				_	2	200	-	- -	
12	Tapanuli Selatan	38	1,614	9	1,360	75	9,482	40	<u></u>	
13	Tapanuli Tengah	11	2,785	5	935	76	11,161	38		
14	Tapanuli Utara	28	2,120	4	1,115	95	13,719	56	· · · · ·	
15	Tebing Tinggi					. 4	650	· · · · -	<u> </u>	
	Total	208	17,535	50	11,438	845	121,775	308	46, 157	
	Average		84		229		144			

Table I-2 NUMBER OF INVENTORY SURVEY IN SOUTH SULAWESI

			Land Deve	lopment			Village I	rrigation	
No.	Kabupaten/ Kotamadia	Exis Daerah Scheme		Selec Daerah Scheme	Leigagi	Exis Daerah Scheme	ting Irigasi Potential	Select Daerah Scheme	Irigasi
		Nos	ha	Nos	ha	Nos	ha		
	D -1	100		5		45	5.417	12	
	Bantaeng	11	367	5	1,627	97	20.122	36	-
	Bone			· · · · · · · · · · · · · · · · · · ·	· .	12%	2,035	12	
-	Barru	. 2	773	2	600	97	9,416	42	ha e je e i
	Bulukumba	-	-			48	6,420	41	
	Enrekang (Sidrap)	1	50	1	200	24	5,431	12	
	Gowa (Takalar)	7	919	–	050		5,966	22	
	Jeneponto (Bantaeng)	4	1,974		50	and the second		the state of the s	-
-	Luwu	-	4,013	_	-	11	14 No. 10 Percent (1997)	1	
	Majene		· _		· .	25	1.1	14	
	Mamuju Maros	. 1	327	1	231			22	
	Pangkep (Barru)	. 1	1,184			. 9			· · · · · · · · · · · · · · · · · · ·
	Pinrang	4	298					- 1	_
	Polewalimamasa (Mandar)	-	242		150		100	40	
	Selayar	- T	-	. ~	-	-			
	Sidenreng	_		_	·	7	3,600	1	_
	Sinjai		~	-		34		13	; -
	Soppeng (Wajo)	. 1	216	. 1	638	1		7	
	Takalar		- 210				-	· · · · · ·	
	Tanah Toraja	_	_	-	· <u>-</u>	108	9,701	45	
	Wajo	_	· 	_	٠ ـ	62			
	Ujung Pandang (Other)	1	128	_		~	- 101 601		· · · · · · · · · · · · · · · · · · ·
	Pare-Pare	<u>.</u>	-	-	-	6	690	5	
	Total	37	6,478	19	4,865	962	149, 260	374	44,079
	Average		175	 -	256		155		118

VLIST3.WJ2

Note; Kabupaten () shows administrative area for DPU.

Table 1-3 NUMBER OF INVENTORY SURVEY IN NTB

NTB PROVINCE, LAND DEVELOPMENT

	LD	Exist	ting	Select	 ted	
No.	Kabupaten/ Kotamadia		Irigasi Potential			Remarks
	Laskah Data		ha			
2	Lombok Barat Lombok Tengah	22 6	3,250 120			
4	Lombok Timur Sumbawa	24 19	5.830		· · · · · · · · · · · · · · · · · · ·	
	Dompu Bima	11 6		6 4		
	Total	88	16,930	45	25,073	
	Average		192			

NTB PROVINCE, VILLAGE IRRIGATION

0.	Kabupaten/ Kotamadia			Irigasi Potential			Remarks
			Nos	ha	Nos	ha	
1	Lombok Barat	.:	37	2,684	26	· -	
2	Lowbok Tengah	. '	32	4,655	17	·	
3	Lombok Timur		97	9,090	39		
4	Sumbawa		67	5,964	57		
5	Dompu	1	43	5,805	15	. –	
6	Bima	÷.	52	7,301	35		
	Total		328	35,499	189	19,984	

Table I-4 POTENTIAL AREA FOR LAND DEVELOPMENT UNDER DPU PROJECT

PROVINCE	TECHNICAL	SEMI · TECHNICAL	SIMPLE	TOTAL	NUMBER OF	AVERAGE
	IRRIGATION	IRRIGATION	IRRIGATION	4	PROJECTS	
	ha	ha	ha	ha	Nos	ha
SUNATRA	4, 374	11, 589	1. 572	17, 535	208	84
SOUTH SULAWESI	4.012	1, 339	1, 132	6, 483	40	162
NTB	2.475	13, 529	931	16, 930	88	192
TOTAL	10, 861	26, 452	3, 635	40, 948	336	122
ALL INDONESIA	135. 262	119, 343	49, 230	303, 835		

Source : BUKUPINTAR 1989, DOI-I, DGWRD NOTE 1 : EXDEPT FOR ON-GOING PROJECT

2 : Area shows the figure of Column No.13 in DPU irrigation

project registered books.

5. DATA ARRANGEMENT OF INVENTORY SURVEY

5.1 System Design

Data base of the surveyed projects on personal computer is developed for systematic arrangement and analyses of collected data. The system was designed with dBASE IV which is a software for data base programming. During the works at Directorate General of Food Crops Agriculture, Ministry of Agriculture, operation methods of the system were guided to counterparts for arrangement of the inventory survey data from the five provinces by Indonesian side.

Procedure of system designing and programming for input, search and output of collected inventory data was as follows.

(1) Designing of Input File

Form of input files was designed so that the data could be smoothly handled along each item.

(2) Programming for Input, Correction and Delete

Programs to input, correct and delete numerous data were composed on DBASE IV, in order to make those processes correct and easier.

(3) Programming for Output of Check List

Program to output data as check list was composed on DBASE IV.

5.2 Check List and Data Correction

By using of the composed programs data files was made by province and project type. The uncertain answers were corrected by asking the original surveyors during inputting process. Moreover, each expert checked inputted data with the check lists, and corrected data files. The final data files were used for data analyses grouping and selection of feasibility study schemes and selection of implementation schemes for construction.

5.3 Examination of Sub Project

It was found during examination on district level that some sub projects did not suit to the criteria on land development project and village irrigation project in the study. Such sub projects were excluded from data analyses, grouping and other treatments, as following table. The reasons of exclusion are mainly its present project status, project size, water availability and so on after field checking survey. However, original data base included every surveyed sub projects so that they could come into the implementation list when they satisfied the project criteria in future.

Province	LD A	Proj	ect C	VI VI	Project B C	A	Tota B	1 C
North Sumatra South Sulawesi West Nusa	50 19 45	18 9 25	32 10 20	308 374 189	61 247 25 349 52 137	358 393 234	79 34 77	279 359 157
Tenggara Total	114	52	62	871	138 733	985	190	795

LD: Land development, VI: Village irrigation

A: Total number of sub projects surveyed

B: Number of sub projects excluded form the Project

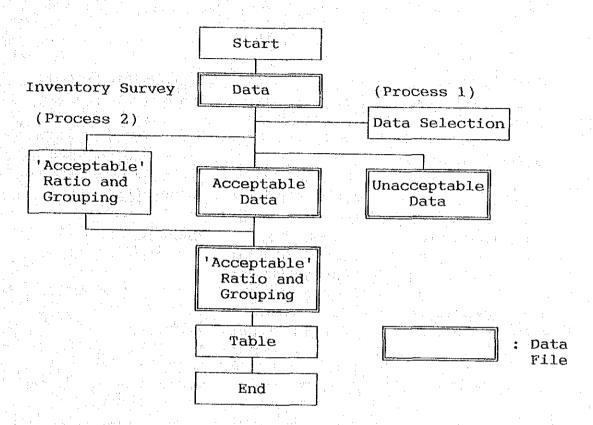
c: Number of sub projects in the Project

5.4 Data Arrangement of Inventory Survey

The all collected data of the inventory survey were kept as master files by province and project type. These data were divided into acceptable and unacceptable data. Then, programs for calculating 'acceptable' ratio and grouping sub projects were developed. The programs were composed directly in the programming language of dBASE IV. The methods for data arrangement are described below. For data analyses, the original data files of dBASE IV was converted into Lotus 1-2-3 files.

(1) Flow of Data Arrangement

General work flow in data arrangement is as follows.



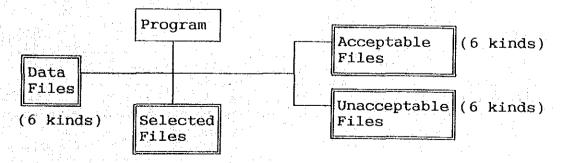
(2) Explanation of Processes

The processes are to run the programs on data files of the inventory survey, and to calculate along the way.

1) Process 1

This process is to select important data form the all inventory data and to run the program on data by province and project type. The process 1 is as follows.

i) Files



- a) Inventory Survey Data
 - Each data file by province and project type consists of 12 files. (qus00.dbf qus12.dbf)
- b) Select File

Select files are made on 'assist' of dBASE IV. The files have codes indicating unacceptable. (sel0.dbf index file sel0ndx.ndx)

- c) Program
 - (for qus00.dbf qus03.dbf) c-1) hen01.prg (for qus04.dbf) c-2) hen011.prg (for qus06.dbf - qus06.dbf) c-3) hen02.prg (for qus07.dbf) c-4) hen03.prg (for qus08.dbf) c-5) hen031.prg (for qus09.dbf) c-6) hen04.prg (for qus10.dbf) c-7) hen041.prg (for qus11.dbf) c-8) hen05.prg (for qus12.dbf) c-9) hen051.prg
- d) Acceptable and Unacceptable File

These files are made on each kind of data files.

Acceptable file: (selz0100.dbf - selz0112.dbf) - (selz0600.dbf - selz0612.dbf)

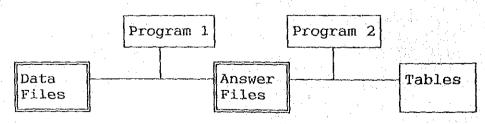
Unacceptable file: (seld0100.dbf - selz0612.dbf) - (seld0600.dbf - selz0612.dbf)

2) Process 2

2-1) Acceptable Answer-1

The process is to count the acceptable answers on the specified items form the data files, and output the results as tables. The process is as follows.

i) Files



a) Inventory Survey Data

Each data file by province and project type consists of 9 files. (qus00.dbf - qus08.dbf)

b) Program 1

```
b-1) kai01a.prg
                     (for qus00.dbf - qus03.dbf)
b-2) kai01b.prg
                     (for qus00.dbf - qus03.dbf)
b-3) kai011.prg
                     (for qus04.dbf)
b-4) kai02a.prg
                     (for qus05.dbf - qus06.dbf)
b-5) kai02b.prg
                     (for qus05.dbf - qus06.dbf)
b-6) kai03a.prg
                     (for qus07.dbf)
b-7) kai03b.prg
                    (for qus07.dbf)
b-8) kai03c.prg
                     (for qus07.dbf)
b-9) kai031a.prg
                     (for qus08.dbf)
b-10)kai031b.prg
                     (for qus08.dbf)
```

c) Program 2

c-1) kaip01.prg (for making tables)
 (sub program kprfe00.prg)
 (sub program kprfr01.prg)
 (sub program kprli01.prg)
 (sub program kprli0a.prg)

d) Answer File

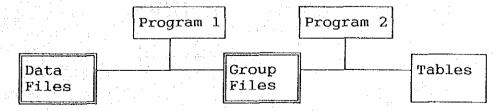
The answer files have results of counting acceptable answers on specified items from data files.

Answer file: ansl.dbf
Index file: anslndx.ndx

2-2) Acceptable Answer-2

The process is to count the acceptable answers on the items in one record form the data files, and output the results as tables. The process is as follows.

i) Files



Inventory Survey Data a)

Each data file by province and project type consists of 9 files. (qus00.dbf - qus08.dbf)

Program 1 b)

```
(for qus00.dbf - qus03.dbf)
b-1) kai201.prg
                    (for qus04.dbf)
b-2) kai2011.prg
                    (for qus05.dbf - qus06.dbf)
b-3) kai202.prg
                    (for qus07.dbf)
b-4) kai203a.prg
                    (for qus07.dbf)
b-5) kai203b.prg
                    (for qus08.dbf)
b-6) kai2031.prg
```

Program 2 c)

```
c-1) grpp05.prg (for making tables)
     (sub program gprfe05.prg)
     (sub program gprfr05.prg)
     (sub program gprli05.prg)
```

Group File d)

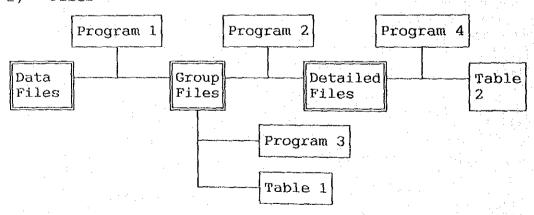
The answer files have results of counting acceptable answers on items in each record from data files. Group file: grp01.dbf - grp06.dbf

Index file: grplndx.ndx

2-3) Grouping 1

The process is to make grouping based on the criteria from the data files, and output the results as tables. The process is as follows.

i) Files



a) Inventory Survey Data

Each data file by province and project type consists of 5 files. (qus00.dbf - qus04.dbf)

b) Program

Program 1: grp011.prg Program 2: grp021.prg

Program 3: grpp011.prg (for table 1) Sub program:

gprfr11.prg

Program 4: grpp021.prg (for table 2) Sub program:

grpfe21.prg, gprfr21.prg, gprli21.prg

c) Group File

The group files are made for each kind of data files

Group file: grp01.dbf - grp06.dbf

Index file: grplndx.ndx

d) Detailed File

The files have the data grouped by main items for each kind of data files.

gmlL1.dbf - gmlv6.dbf and gmlL0.dbf

gm1L2.dbf - gm2v6.dbf and gm2L0.dbf

gmlL3.dbf - gm3v6.dbf and gm3L0.dbf

gm1L4.dbf - gm4v6.dbf and gm4L0.dbf

gm1L5.dbf - gm5v6.dbf and gm5L0.dbf

qm1L6.dbf - qm6v6.dbf and gm6L0.dbf

Where, gm1L0.dbf - gm610.dbf are files not belonging to L1 - V6.

2-4) Grouping 2

The process is to make grouping based on the following conditions from the data files, and output the results as tables.

a) Water Resources

Grouping by chapter 3, section 1 (a - f).

- b) Project Type 1

 Grouping by chapter 0, section 1 (a d).
- C) Project Type 2 Grouping by chapter 0, section 2 (a - b).
- d) Intake Facility Type Grouping by chapter 3, section 2.
- e) Elevation

Grouping by chapter 2, section 3-2. a: 0 <= * < 10, b: 10 <= * < 50, c: 50 <= * < 100, d: 100 <= *.

f) Annual Rainfall

Grouping by annual rainfall based on monthly rainfall data in chapter 2, section 3-1. a: 0 <= * < 500, b: 500 <= * < 1000, c: 1000 <= * < 1500, d: 1500 <= * < 2000, e: 2000 <= * < 2500, f: 2500 <= *.

g) Land Slope

Grouping by chapter 2, section 1 (a - d).

h) Area

Grouping by present/future irrigated paddy field area and present/future total project area in chapter 4, section 1, respectively.

a: 0<= * < 25, b: 25<= * < 50, c: 50<= * <100, d: 100<= * <150, e: 150<= * <250, f: 250<= * <500, g: 500<= *.

i) Cropping Intensity

Grouping by chapter 4, section 5. a: 0<= * <100, b: 100<= * <150, c: 150<= * <200, d: 200<= * <250, e: 250<= *.

5.5 Evaluation Points of All Schemes

An evaluation program was developed using Dbase IV system in accordance with selection criteria for implementation of scheme. This evaluation does not include the estimation of Benefit and Cost ratio, and condition of O&M, Water Users' Association.

The program has been attached to the Menu program. However, consecutive calculation is still troublesome, so the conversion into Lotus file would be recommended for evaluation and sum up of each score.

The process of evaluation by DBASE IV is as follows; A2 for LD:

Expansion of paddy field (Question 41)

Future paddy field = Present paddy field - 1 = (FU101 + FU102) = (PR101 + PR102) - 1

15 point: Value ≥ 0.50 10 point: 0.50 > Value ≥ 0.25

5 point: 0.25 < Value

A2 for V1:

Increase of crop intensity (Question 44)
Future Crop intensity of paddy - present crop intensity of paddy

- = $(FU801\times2 + FU802x2 + FU803x1 + FU804x1 + FU805x1)$
 - = (FU801 + FU802 + FU803 + FU804 + FU805 + FU806)
 - (PR801x2 + PR802x2 + PR803x1 + PR804x1 + PR805x1)
 - = (PR801 + PR802 + PR803 + PR804 + PR805 + PR806)

15 point: Value ≥ 0.50

10 point: $0.50 > Value \ge 0.25$

5 point: 0.25 > Value

Al for B/C, B1 for water availability and O&M are evaluated by other analysis using Lotus files.

B2: Soil (Question 46)

5 point: CON461 = a

3 point: CON461 = b

0 point: CON461 = c

C2: Boundary of Land (Question 58)
5 point: STA58 = a
2 point: STA58 = b

C3: Road Condition (Question 13)
5 point: CON13 = a
3 point: = b, c, d

D1: Land Ownership (Question 563)
5 point: AMO563 = 0
2 point: AMO563 ≥ 1

D2: Property of Land (Question 571)
PRI5711 = (PRI5711 + DIS5721 + STA5731)
5 point: Value ≥ 0.60
2 point: Value < 0.60

D3: Average Income
AVE764 = Provincial Average
Provincial average: Sumut = Rp736,000
Sulsel = Rp487,000
NTB = Rp294,000

Point 5: Value < 0.8Point 3: 1.2 > Value ≥ 0.8 Point 1: Value ≥ 1.2

As to the evaluation of D3, the inventory data itself has doubtful value, such as per family or per capita. Then the evaluation used each Kabupaten's regional income per capita in practice.

The above mentioned answer code such as PR101, FU101 and so on are shown in the Inventory form attached to the end of this volume.

6. INVENTORY SURVEY BY MINISTRY OF AGRICULTURE

6.1 Summary

In the following five (5) provinces, Ministry of Agriculture is now carrying out the same inventory survey for land development schemes and rehabilitation of village irrigation scheme from May 1991 in accordance with the Scope of Work and Minutes of Understandings for land Development Project between JICA and MOA Indonesia.

- 1. Aceh
- 2. Lampung
- 3. Central Sulawesi
- 4. Southeast Sulawesi
- 5. East Nusa Tenggara

After technical guidance by the Study team, each provincial agriculture service has started to carry out the inventory survey using the same questionnaire from. The results of inventory survey are arranged by DRLD in order to make development plan in the above 5 provinces. Those inventory survey of 495 schemes have been carried out by Indonesian side until now.

Data of each inventory survey table has been already programmed in dBASE4 and printed out. The works were mostly classified by village irrigation. Points to consider are that there were many unsure present and scheduled land utilization areas in data. This requires to confirm such values and modify in future.

6.2 Classification and Potential Areas by Inventory Survey Results

a. Classification

	Village Irrigation Scheme	Total Surveyed Scheme
nos	nos	nos
4	139	143
26	117	143
4	59	63
	82	82
21	43	64
55	440	495
	nos 4 26 4 - 21	n Development Scheme nos nos 4 139 26 117 4 59 - 82 21 43

b. Excluded Schemes by DLRD

Name of Province	Land Developme Scheme	Village ent Irrigation Scheme	Total n Scheme
Security of the second second security of the second second security of the second secon	nos	nos	nos
Aceh			
Lampung	1 		
Southeast Sulawesi		North Arthur Alberta	
Central Sulawesi		10	10
NTT		10	10
Total		20	20

c. Present Irrigated Paddy Field Areas

Name of Province	LD No. of Scheme	Schemes Paddy Area	No. of	chemes Paddy Area	Total No.of Paddy Scheme Area
Aceh Lampung Southeast Sulawes Central Sulawesi NTT	nos 4 25 i 3 -	ha 445 3,734 206 -	nos 113 115 45 69 31	ha 9,283 9,643 7,458 6,515 916	nos ha 137 9,778 140 13,377 48 7,664 69 6,515 50 5,890
Total	51	9,359	393 3	3,815	444 43,618

Note-1; Except for excluded schemes by DLRD.

2; Areas with unsure area excluded. (both of present and future lands have no area data)

Average: 98ha/nos

d. Potential Development in Inventory Schemes

Rough estimation of potential development from present and future paddy field area of the investigated inventory data provides as follows, except the areas not satisfying the conditions of the guideline to select the objective schemes and having unsure area.

Potential in Land Development Schemes

Name of Province	Number of Scheme	Potential Area	Average Area
	nos	ha	ha/nos
Aceh	1	25	25
Lampung	. 21	2,938	140
Southeast Sulawesi	3	349	116
Central Sulawesi			
NTT	14	1,564	112
Total	39	4,876	125

Potential in Village Irrigation Schemes

Name of Province	Number of Scheme	Potential Area	Average Area	
	nos	ha	ha/nos	
Aceh	93	8,039	86	
Lampung	67	6,218	93	
Southeast Sulawesi	44	8,025	182	
Central Sulawesi	67	9,396	140	
NTT	28	2,088	75	
Total	299	33,766	113	

Table I-5 POTENTIAL AREA FOR LAND DEVELOPMENT UNDER DPU

PROVINCE	TECHNICAL	SEMI · TECHNICAL	SIMPLE	TOTAL	NUMBER OF	AVERAGE	
	IRRIGATION	IRRIGATION	IRRIGATION		PROJECT	AREA	
	ha	ha	ha	ha	Nos	ha	
ACHEH		1, 895	4, 580	6, 475	126	51	
LAMPUNG	59, 164	2, 695	4.364	66, 223	76	871	
S. E. SULAWESI	14, 868	7, 761	· · · .	22, 629	53	427	
CENTRAL SULAY	ESI 8, 947	12, 746	3, 666	25, 359	112	226	
NTT	2. 202	7, 107	1, 762	11, 071	45	291	
TOTAL	85, 181	32, 204	14, 372	131. 757	412	320	
ALL INDONESIA	135, 262	119, 343	49, 230	303, 835			

Source : Boku Pintar 1989, DOI-I, DGWRD, DPU

Note 1 : EXCEPT FOR ON-GOING PROJECT

2: Area shows the figure of Column No. 13 in DPU registered books.

Table I-6 (1/5) VILLAGE IRRIGATION IN 5 PROVINCES
VILLAGE IRRIGATION IN ACHE

	Nos 3	ha	ha	
	3		the contract of the contract o	and the second of the second o
Kotamadya Banda Aceh		291		
Aceh Besar	50	3, 531	_	
Pidie	93	12, 358		Source-2
Aceh Tengah	144	8, 113	· -	
Aceh Utara	111	10, 544	-	
Aceh Timur	26	4.372	_	er en
Aceh Tenggara	72	9, 865		
Aceh Barat	56	4.508	_	
Aceh Selatan	43	3, 941	of the section of the	and the second s
TOTAL	598	57, 523	32, 213	
AVERAGE		96	54	

Source : SURVEY POTENSI DAN PENAN FATAN LAHAN

AREAL IRIGASI DALAN PROPINSI D. I. ACEH

Feb. 1991.

Source-2: PRAS, DAFTAR INVENTASISASI IRIGASI PEDESAAN

DALAM PROPINSI D. I. ACEH

* : ASSUMED, POTENTIAL X 56%

Table 1-6 (2/5) VILLAGE IRRIGATION IN 5 PROVINCES
VILLAGE IRRIGATION IN LAMPUNG

DISTRICT	SCHEME	POTENTIAL	PRESENT PADDY	REMARKS
	Nos	ha	ha	
Lampung Selatan	37	10, 780	4. 111	WITH SCHEME NAME
Lampung Tengah	24	12, 476	6, 225	"
Lampung Utara	20	1, 768	870	"
Lampung Barat	49	4, 755	2, 860	
TOTAL	130	25. 815	14, 066	
AVERAGE		199	108	

Source: HASIL STUDI KELAYAKAN PENGEMBANGAN LAHAN
DI DAERAH IRIGASI NON PU/IRIGASI DESA DI
PROPINSI LAMPUNG, PRAS, 1991.

Table I-6 (3/5) VILLAGE IRRIGATION IN 5 PROVINCES

VILLAGE IRRIGATION IN SOUTHEAST SULAWESI

As of 1991, Oct.

TOTOTOT	SCHEME	POTENTIAL	PRESENT PADDY	REMARKS
DISTRICT	Nos	ha	ha	
Kendari	136	22, 972	8, 233	WITH SCHEME NAME
Kolaka	66	8.715	6, 100	"
Buton	48	7, 019	3, 511	
Nuna	13	1.660	238	
TOTAL	263	40.366	18.082	
AVERAGE		153	69	
			IDDII IDICICI	

Source: INVENTARISASI JARINGAN IRIGASI DAN AREAL IRIGASI DAN RAWA/PROPINSI SULAWESI TENGGARA, Jan. 1992.

Table I-6 (4/5) VILLAGE IRRIGATION IN 5 PROVINCES
VILLAGE IRRIGATION IN CENTRAL SULAWESI

 DISTRICT	SCHEME	POTENTIAL	PRESENT PADDY	REMARK
 	Nos	ha	ha	
Donggala	31	3, 729	2. 598	WITH SCHEME NAME
Poso	63	5, 689	3, 559	"
 Buol Toli-Toli	30	2.865	1. 976	"
Luwuk Banggai	10	1.520	85	"
 TOTAL	134	13, 803	8, 218	
AVERAGE		103	61	

Source: KEGIATAN PENCETAKAN SAWAH, PRAS, 1991.

Table 1-6 (5/5) VILLAGE IRRIGATION IN 5 PROVINCES
VILLAGE IRRIGATION IN NTT PROVINCE

DISTRICT	SCHENE	POTENTIAL	PRESENT PADE	DY REMARK
	Nos	ha	ha	
Sumba Barat	24	969	436	WITH SCHEME NAME
Sumba Timur	32	6, 417	2. 159	<i>"</i>
Kupang	265	20.553	17. 236	μ
Timor Tengah Selatan	17	1, 395	709	<i>"</i>
Timor Tengah Utara	14	4, 211	2. 192	"
Belu **	10	1, 130	680 *	from other data "
Alor **	9	815	50 *	<i>"</i>
Flores Timur **	28	2, 568	1.540 *	" "
Sikka	17	936	726	"
Ende	50	2.417	1, 393	"
Ngada	23	3, 175	824	<i>"</i>
Manggarai	16	2.645	357	<i>"</i>
TOTAL,	305	47. 231	28, 302	
AVERAGE		155	93	

* : Assumed (60 % of potential area)

**: OTHER:DAFTAR INVENTARISASI PENYERARAN

PENGAIRAN PEDESAAN PROPINSI NUSA

TENGGARA TINUR, PRAS.

Source: DAFTAR LOKASI IRIGASI DESA, PRAS, Mar. 1991

APPENDIX-II

STUDY ON REPRESENTATIVE SCHEMES

APPENDIX II STUDY ON REPRESENTATIVE SCHEMES

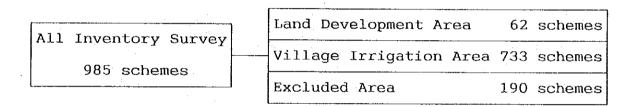
1. OBJECTIVE

Study of representative schemes is to improve the planning of the Project implementation.

2. SELECTION OF REPRESENTATIVE SCHEMES

2.1 Grouping of Irrigation Schemes

As the results of field survey, the sites of inventory survey are originally classified into the following three groups.



The above 190 schemes are against to the selection guideline on the Study as below for land development project or rehabilitation of village irrigation project judging from the field check on the answer of inventory data in regional level, therefore such schemes were excluded from the objective area for the Study.

- a. Not village irrigation project.
- b. Less than 25 ha.
- c. Facility is good condition.
- d. Under construction or just finished.
- e. Scheduled scheme in near future.
- f. Special project by PU such as PIK, PISU.
- g. Foreign aid project.
- h. No water source area.
- i. No potential area in case of Land development scheme.
- j. Other.

The above village irrigation group is still classified into two groups which are schemes with future potential area for paddy field and without area.

Village Irrigation Area 733 schemes Land Development, Rehabilitation and 485 schemes Improvement Area

Rehabilitation and Improvement Area

245 schemes

Then the objective area for the Study is more divided into the following three groups.

A group : Land Development Schemes

B group: Land Development, Rehabilitation and Improvement

Schemes

C group: Rehabilitation and Improvement Schemes

The difference of construction cost for the above A and B groups is affected strongly on the ground slope. Then each group was divided into two groups which the slope is less than 5 % and more than 5 %.

As to the C group of rehabilitation of village irrigation, classification by canal density was studied using the inventory data. However the answer to the question about length of main canal, secondary canal and tertiary canal has poor rate, then they could not use as an index of groping. The classification by canal density was not made.

On the other hand the A group of land development is subdivided into two groups, such are the two schemes which clearing work is need and needless. Clearing work is not necessary in the case of upland fields or rainfed.

As to the B and C groups of rehabilitation of village irrigation are subdivided every typical kind of intake facility into three groups , they are weir, free intake and other. The group of weir includes dam and pond type from the view of its function, and pump is treated as a model of other group considering the demand in future.

2.2 Selection of Representative Study Area

The detailed study is carried out in order to estimate project cost and benefit with accuracy, and several representative schemes as the feasibility study are selected from the above each group. The group, however, with only a few schemes will be except for the representative scheme.

The number of objective area for detailed study is around 10 sites in each province, then the feasibility study of 30 schemes will be carried out in total to get the basic estimation method for cost and benefit.

As the condition of selection for detailed study, each group was classified mainly from the view of construction cost such as project purpose, ground slope and kind of intake facility. The other side from the view of benefit, the mean value of irrigation area can be considered to be the representative scheme.

Furthermore distribution of location and project priority by regional agricultural service office are added to the selection of the scheme.

The process of selection of detailed study area is as below:

 According to the number of schemes in each province, scheduled number of schemes for detailed study is decided as follows;

Province	Number of Objective Area	Number of Regency	Number of Representative Scheme
North Sumatra South Sulawesi	279 nos 359 nos	9 nos 18 nos	10 nos 12 nos
NTB	157 nos	6 nos	8 nos

2. In the case of land development, several schemes of mean area of incremental potential area are selected. In the case of village irrigation, several schemes of mean area of present paddy fields are selected.

- 3. In the case with the both purpose of land development and rehabilitation, the sequence of average value is calculated as a reference condition.
- 4. More than 2nd sheet of project priority by regional office is selected.
- 5. The number of feasibility study is controlled within 2 places in the same regency.
- 6. Considering the above condition, F/S sites are selected based on the distribution table of each group of province.
- 7. It is conformed whether the regency with many schemes has F/S sites or not.
- 8. It is conformed whether the distribution of location is uniformly or not.
- 9. It is conformed whether the kind of water source and type of intake structure are included widely or not.
- 10. Insufficient case against item 7,8 and 9, re-selection is carried out continuing to item 6.

The selected schemes for representative scheme using the above procedure are listed in the Table II-2 and Fig.II-4,II-5, II-6. The selected representative schemes, however, have been changed to other candidate in accordance with the detail discussion at province and Kabupaten agricultural offices. The table II-2 and Fig.II-4,II-5 and II-6 show the replaced schemes.

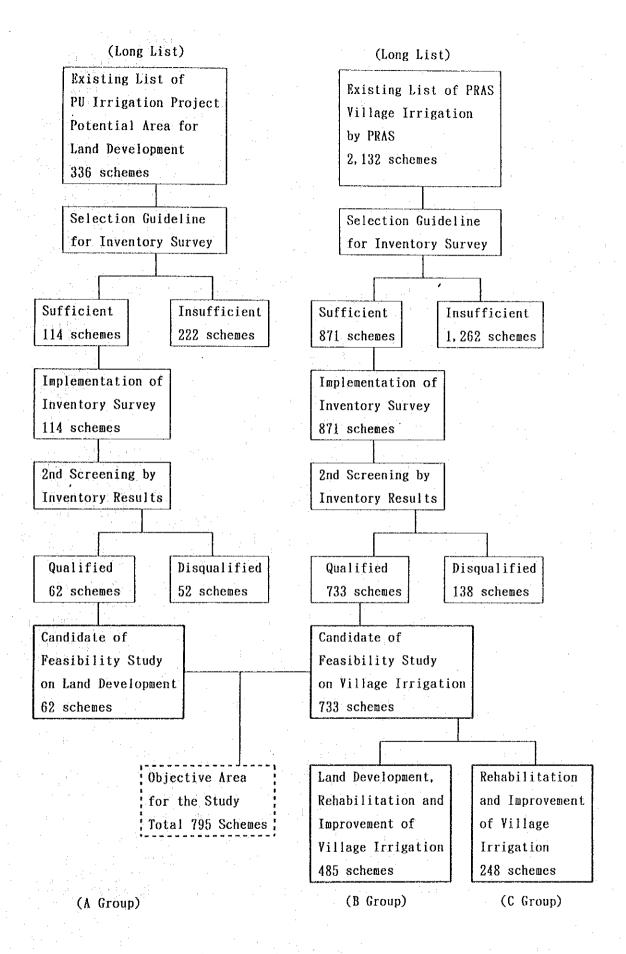


Fig. II-1 SELECTION OF OBJECTIVE AREA FOR THE STUDY

(1) SUBMARY OF AREA FOR ALL SCHEMES BY INVENTORY SURVEY

1	2	3	4	5	6	7	8	9	10	11
Province	LD No. of Scheme	LD Potential Area	LD Present Area	VI No. of Scheme	VI Potential Area	VI Present Area	Total No. of Scheme	Total Potential Area	Total Present Area	Difference (9-10)
North Sumatra	nos 50	ha 11, 438	ha 6, 968	nos 308	ha 46, 157	ha 27, 333	nos 358	ha 57, 595	ha 34, 301	ha 23 , 294
South Sulavesi	19	4, 886	3, 466	374	44, 079	29, 943	393	48, 965	33, 409	15, 556
Nusa Tenggara Barat	45	25, 073	19, 462	189	19, 984	16, 420	234	45, 057	35, 882	9, 175
Total	114	41, 397	29, 896	871	110, 220	73, 696	985	151, 617	103, 592	48, 025

Note-1 Figure of each area is the results of Inventory survey.

At the time of planning, reducement coefficient (0.70) would be adopted.

Note-2 Potential Area means future irrigable area, Present area means present irrigable area.

(2) SUMMARY OF AREA FOR OBJECTIVE SCHEMES

(Objective Sch	eme)							:		
1	2	3	4	5	δ	7	8	9	10	11
Province	LD No. of Scheme	LD Potential Area	l.D Present Area	VI No. of Scheme	VI Potential Area	VI Present Area	Total No. of Scheme	Total Potential Area	Total Present Area	Difference (9-10)
North Sumatra	nos 32	ha 6, 916	há 3, 477	nos 247	ha 30, 500	ha 18, 184		ha 37, 416	ha 21,661	ha 15, 755
South Sulawesi	10	3, 046	1, 676	349	41, 479	27, 960	359	44, 525	29, 636	14, 889
Nusa Tenggara Barat	20	10, 568	7, 197	137	15, 750	12, 083	157	26, 318	19, 280	7, 038
Total	62	20, 530	12, 350	733	87, 729	58, 227	795	108, 259	70, 577	37, 682

(3) SUMMARY OF AREA FOR EXCLUDED SCHEMES

1	2	3	4	5	6	7	8	9	10	 11
Province	LD No. of Scheme	LD Potential Area	LD Present Area	VI No. of Scheme	VI Potential Area	VI Present Area	Total No. of Scheme	Total Potential Area	Total	Difference (9-10)
North Sumatra	nos 18	ha 4, 522	ha 3, 491	nos 61	ha 15, 657	ha 9, 149		ha 20, 179	ha 12, 640	ha 7, 539
South Sulawesi		1, 840	1, 790	25	2, 600	1, 983	34	4, 440	3, 773	667
Nusa Tenggara Barat	25	14, 505	12, 265	52	4, 234	4, 337	77	18, 739	16, 602	2, 137
Total	52	20, 867	17, 546	138	22, 491	15, 469	190	43, 358	33, 015	10, 343

No. of Schemes in Each Province

Fig. II-2 GROUPING FOR FEASIBILITY SURVEY

795

157

359

279

TOTAL

			Land dev	elopment		 !			Villag	e Irrig	ation	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			1
				 1		t 		With La				Withou	t Land 1	Development)
	Name of Region	Less	than 51	Hore	than 5t	} } }		aa 51	1	Nore th		 			Tota
			Clearing	Clearing	With Clearing	\ !	Free Intake 82	Intake	Weir Bi	Free Intake B5	INTAKE	Weir C1	10.0.0	Other Intake C3	
		} Al	75	\ \X3	14	 ! Bī									
	North Somatera			1	9	8			13			21		2	58
	Dairi Langkat	1	2	. 2	3	7	. 2		6			3			24 31
	Karo					6			18			3		. 1	10
	Deli Serdang					5	1	_	l		1	Z			5
	Asaban					1		2	1 2						: 24
	Labuhan Datu	-	3	2	1	10 8	2	1	29		3	2			50
	Tapanuli Utara		,	2	2	18		6	:	ĺ	1	1			32
	Tapanuli Tengah Tapanuli Selatan	. 1	2 3	1	1	12		1	18	4		1		•	45
									88	14	 6	33	 }	3	279
	Sub Total	3	12	5	12	75	10	17	90	14	Ů	73	•		
	South Sulavesi								3	5		1			11
	Bantaeng			1	1			1	3			5		:	10
	Batto	1		. 2		4.		6	15		1	2			36
	Bone Bolokomba	2		. 4		6	1	•	18			2	1		43
	Enrekang					1		1	10			16	3		34
	Gowa	i								6		2	4		13
	Jeneponto			1	-	5	1	5	5		1	13	7		23 27
	Lumo					b			1			13	,		i
	Kajene Varada					3	1	1	l			8			14
	Mazuju Maros						1	•	11		2	7		1	27
	Pare-pare		:			3						ì			4
	Polmas		1			3			2	1		23	10		40
	Sidrop											1			. 1
	Sinjai	-				4		i	. 1	4	δ .2	r		I,	13
	Soppeng	1				2			6	3	_	5 21	1 2		11 35
	Tana Toraja Vajo					2		8	3		3	*1		2	18
_ = =	Sub Total	4	1	1	l	49	9	21	76	35	16	110	28	5	359
	West Nusa Tenggan	a										•			:
1	Loudok Timer	2		2	1	2			8		2	1	3		3(
	Lombok Tengah							1	5			3			1
	Lombok Barat	- 3 10				3 16	4		2	1		11		3	2/
	Sumbawa Dompo	10				10	•		2			14 7		*	49 10
	Bina			1		9	2		6			18			3(
	Sub Total	15	1	3	}	30	8	· 1	17	12	. 3	54	11	3	157
	Total	22	14	12	14	154	25	39	181	61	25	197	40	11	799
	G-LOC2.WK1											• • • • • • • • • • • • • • • • • • • •		**	•••••

Fig. 11-3 DISTRIBUTION OF EACH GROUP AT REGION LEVEL

LIST OF REPRESENTATIVE SCHEMES IN NORTH SUMATRA Table II-2 (1/3)

North Sumatra

no, code name of scheme	DIVISION GROUP	GROUP	VILLAGE	DISTRICT	REGENCY	Present Paddy 1	Present F Painfed F	Present Present Future Scheme Land Paddy Rainfed Paddy Whole Area Devel	heine Ne Area	Present Present Future Scheme Land Water Paddy Rainfed Paddy Whole Area Development Resource	Water t Resource	Intake	Ground	Land
CODE 1RR	. 4		VIL	210	REG	ha PR101*	ž.	ha FUIO1 FUIIO	. ha.	.2	SOUSI FACIZ	FAC3Z	T0P21	!
1 60011 Sumbari	9	*	Sumbari	Silina Pungga2	Dairi	34		77	153			B. F.		
2 60038 Rauning (B)	9	3	Siture	Batang Angkola	Tapanuli Selatan			16	9	7	0.00	, de 1.		/= 54 With clearing
3 50025 Sumbul Berampu	ΙΛ	ដ	Sumbul Berampu	Silima Pungga2	Dairi	124	•	124	234	, -	Ricer	1125	日本 カング	52 Fith clearing
4 50057 Sidomukuti	IA.	81	Berulap	Selesai	Langkat	12	ţ,	7.	8		2	Wells Weign/Townson		
5 50091 Ack Palia	14	31	Gunung Helayu	Kualuh Hutu	Labuhan Batu	7		ê	. 2		121116	main transporary) - 34 With clearing	報告 と	to clearing
5 50129 Pangambatan (B)	۲۱	- 82	Pelita	Sorkan	Tabanuli Tengah	E	13	48		u	5 6	For Tabel	를 : 참 & ~ \	of With clearing
7 50141 Ack Siparbue	ľΛ	Ä	Unite-Mungkur	Muara	Tapanuli Utara	23		2.6	. 25	· ·	3 0	נוכב יוורפעב	最 当 きょう	u clearing
B 50218 Kutamale	ΙΑ	Z	Buluh Kaman	Munte	Tanah Karo	2	•	3	ű	4 0	u pare	1104		- 35 Vith clearing
9 50240 Asahan VIII Pengajian	ľ	83	Tinzzi Raja	Suntu Pane	Asahan	1 2		9	ě			#62F	第 3 2 4 2 4 2 4	>= 5% with clearing
10 50258 Aek Sihim	۲۸	:S	Gapuk Julu	Batang Toru	Tapanuli Selatan	4	•	8 84	1 2	7 S		rum Free Intake	報報 特別	5 % with clearing % 5% with clearing
Total			P	1 3 5 5 5 5 5 5 5 5 5		379	57	550	1.00	06.5				
Note: Area of rainfed includes old paddy field due to damaged irrigation facilities	s old paddy	field	due to damaged i.	rrigation faciliti	ęs,	;	2	3	3	2			•	
Figure of area was estimated using surveyed topo-map.	mated using	surve:	ved topo-map.	٠.										

LIST OF REPRESENTATIVE SCHEMES IN SOUTH SULAWESI Table II-2 (2/3)

NO. CODE NAME OF SCHEME	E OF SCHEME	DIVISION		GROUP VILLAGE	DISTRICT	REGENCY	Present Paddy	Present Present Future Scheme Paddy Rainfed Paddy Whole Are	uture So addy Ah	Present Future Scheme Land Water Rainfed Paddy Whole Area Development Resource	pment Re	Fater	Intake	Ground Slope	Land
CODE IRR				VIL	DIS	REG	ha PR101	25	ha FU101 FU110	ka 110	B.	SOU31 FAC32	C32	10021	
1 20003 Kalu	5	3	12	Liliriawang	Lappariaja	Bone	4		20	101	23	Spring Water Jank	ter Jank	おおれ	>= SI without clearing
2 10055 Pajjenge	jenge	ΙΛ	2	Tompo	Вагл	Вагп	100	5	143	160	0	River Weir		. A	
3 10099 Kadteng	ระบร	7	22	โล ต bลกฐลภ	Kajang	Bulukuaba	171		224	270	53	River Weir		12 N	5% without clearing
4 10115 Kaindi	ndi	5	¥	Mamph	Anggereja	Enrekang	67		124	195	57	River Weir	. 1		>= 5% without elearing
5 10140 Lembang Bata	bang Bata		83	Kelurahan Malino	Tinggimocong	Gova	72		76	175	4		Free Intake		St with clearing
5 10168 Panrita	rita	5	82	Palantikang	Bangkala	Jeneponta	55		53	78	27	River Fre	te Intake		St with cleaning
7 10182 Mario 1-11-111	io 1-11-111	A	쬬	Cempaniga	Camba	Maros	S		23	74	·	River Wei	Seir	1	> St without clearing
8 10201 Pakelli li	elli 11	ΛĬ	82	Kassi Buleng	Sinjai Barat	Sinjal	13		Z	158	ri Li	River Fre	Free Intake		>= 5% with clearing
9 10227 Limpua/Padaelo	oua/Padaelo	A.	83	Tua/Lampulung	Majauleng/Pasmana Wajo	Wajo	11		138	161	. 19			1 M	h clearing
10 10287 Malimbu	nqæj	Ä	2	Malimbu	Sabbang	(nan	0	32	35	44	0		Free Intake		2
11 10332 Salu Akung	i Akung	W	5	Pangli Palawa	Sesean	Tana Toraja	92		26	98	В				
12 10354 Mariri		· IA	81+	Tadisi	Sumarorong	Polmas	0	34	S	151	. 62	River Weir	. 1.	## ##: * *	5% without clearing
Total			-			9 2 9 8 £ F L L F T T T T T T T T T T T T T T T T	684	100	1 072	1 607	9.76				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Note: Arez Grou	Note: Area of rainfed includes old paddy field due to damaged irrigation facilities. Group with manked was reviewed from the field condition	es old paddy reviewed fr	r field	due to damaged in field ecodition	rigation facilitie	y <u>i</u>					e .				
Figu	Egure of area was estimated using surveyed topormap.	imated using	surves	ed topormap.											
Kair Kain	Kalu Schome was replaced from former Scheme, Taretta Type A3. Kaindi also from S Barrian Tone Rd	ed from form lan Tyme Rd	ser Sche	me, Taretta Type	A3.										
Pake	Pakelli II was replaced from Ladope Scheme, Type 86,	from Ladop	e Scher	c, Type 86.	:					•					

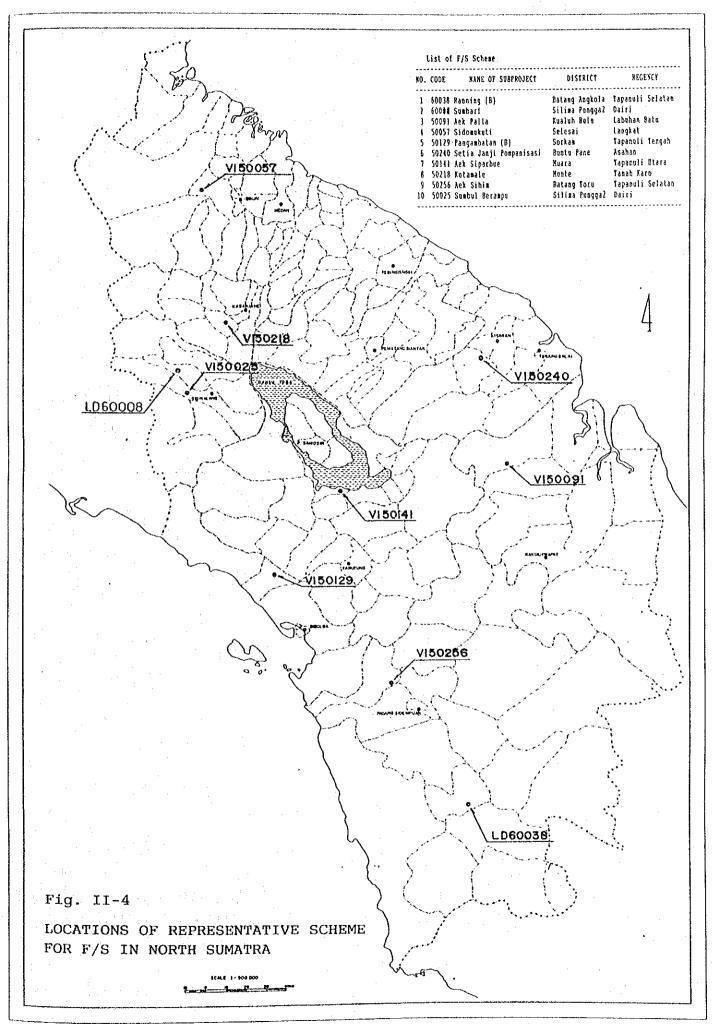
LIST OF REPRESENTATIVE SCHEMES IN WEST NUSA TENGGARA Table II-2 (3/3)

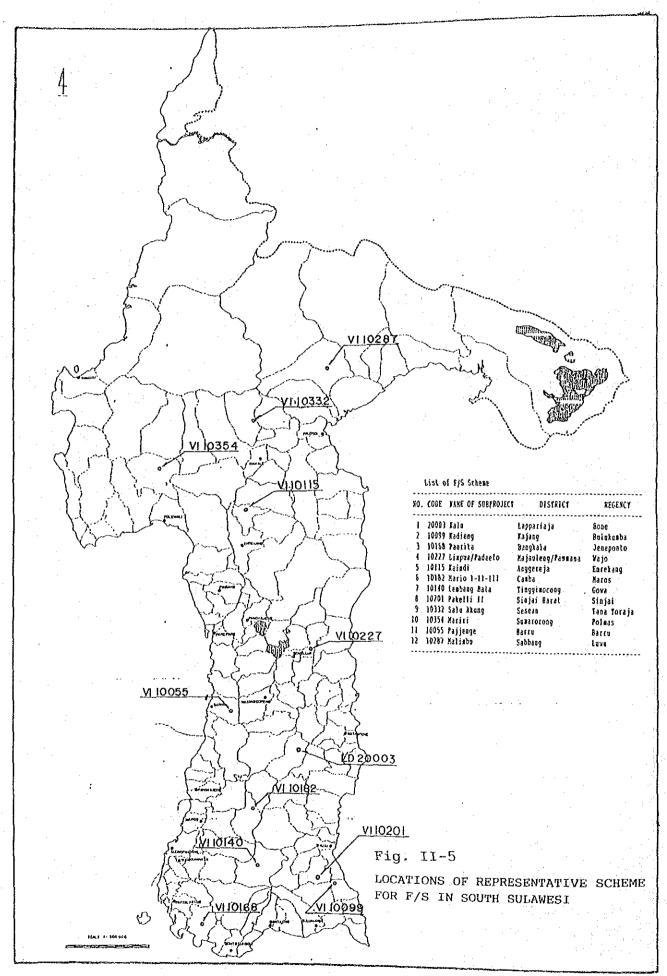
West Nusa Tenggara

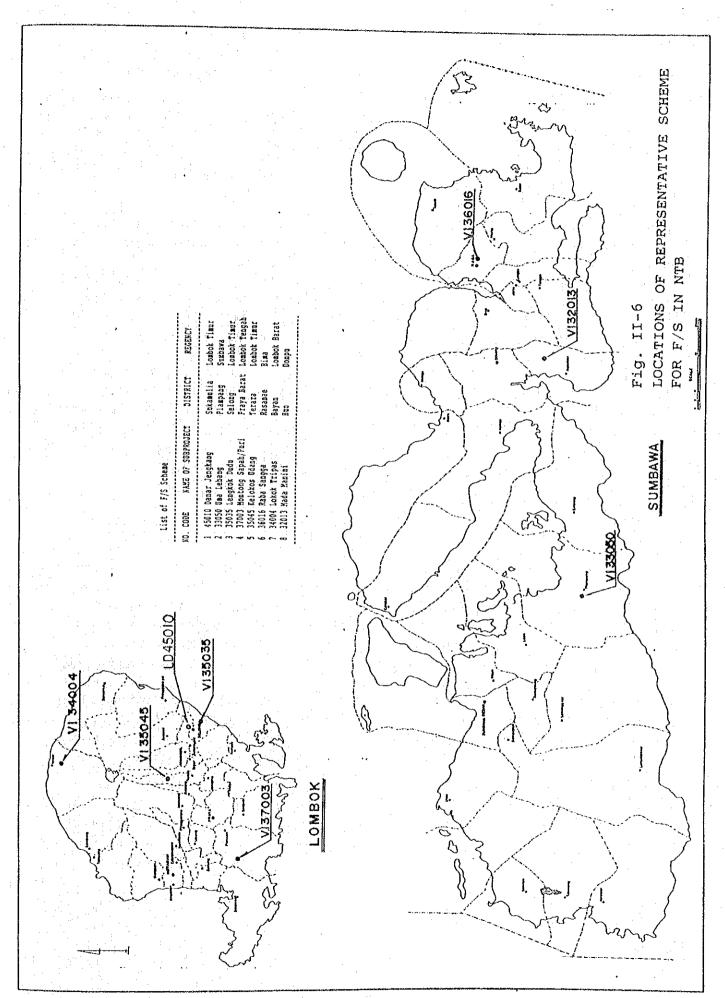
NO. CODE NAME OF SCHEME	DIVISION	GROUP	VILLAGE	DISTRICT	REGENCY	Present Present Future Scheme Land Paddy Rainfed Paddy Whole Area Devel	esent from Pointed P	uture Sc addy Th	heme ole Area	Present Present Future Scheme Land Water Paddy Rainfed Paddy Whole Area Development Resource	Water nt Resourc		Intake Ground Slope	nd Land ope Condition
CODE IRR			VIL	SIQ	REG	his PR101	E E	ha FUIOI FUIIO	ha 0111	:	ra SO	ha S0U31 FAC32	10P21	
1 45010 Danar Jengkang LD	9	A4•	Kelongkong	Sukamulia	Lembok Timur	w		120	227		115 Riv	er Weir		3% with clearing
2 32013 Mada Manini	Ν	ឌ	Adu	ita	Dompu	2		70	88		O Riv	er Free In		***
3 33050 Uma Lebang	ĪΛ	ಷ	Plaspang	Plampang	Sumbawa	58		88	98		21 814	ser Weir		5% without clearing
4 34004 Lokok Tripas	ΙΛ	ដ	Bayan	Bayan	Lombok Barat	%		24	57		O Riv	rer Weir		ST 人
§ 35035 Lengkok Dudu	Ν	젊	Tanjung	Selong	Lombok Timur	24		26	45		2 Riv	er Weir		SX with clearing
6 35045 Kelokos Udang	M	8	Priggajurang	Terara	Lombok Timur	105		111	128		6 Ri	Free	Intake >=	>= 5% without clearing
7 35015 Raba Sangga	M	2	Kendo	Rasanae	Bina	Ξ		111	125		0 81	ver Weir		35
8 37003 Montong Sapah/Puri	Œ.	ដ	Montong Sapah	Praya Barat	Lombok Tengah	13	20	g	37		0 Ris	River Weir	٨	54
11111111111111111111111111111111111111			******			65		207	813		77			

Note: Area of rainfed includes old paddy field due to damaged irrigation facilities. Group with *marked was reviewed from the field condition.
Figure of area was estimated using surveyed topo-map.

Darar Jeng Kang was replace from Tarusan Scheme, Type A1. PS30L1ST, WK1







3. Accuracy of Existing Area and Application of Data obtained by Inventory Survey

Topographic survey, canal route survey, plan survey for intake facility, land use survey and soil tests for the selected thirty(30) projects in the previous chapter are entrusted to the Indonesian consultants.

The survey areas amount to 5,000 ha in total and the scale of topographic survey is 1/2,000. Based on the survey maps, the boundary of the respective 30 projects together with the present paddy areas and future paddy areas are measured. The results of this measurement and the results of the inventory survey are compared as shown in Table II-3. The average ratio of 30 representative schemes by each comparison are as follows:

Province	(Measured area)/	(Area in inventor	y survey) in %
	Present paddy area	future paddy area	Total area
N.Sumatra	51	35	60
S.Sulawesi	82	81	66
NTB	74	60	63
Average	69	57	63

Judging from the ratios in the table above, a development plans based on the inventory survey results offer less accuracy. Therefore, the ratio of the present paddy area(0.7) which is the most important among three ratios is applied for planning. That is, areas concerning land use for the planning are obtained by multiplying 0.7 by the areas shown in the inventory survey.

Whereas the surveyed areas for the representative 30 projects are used directly. If the future paddy area(FU101) is zero(0 ha), the future paddy area is counted as the same as the present paddy area. The inventory survey results concerning land use are attached at the Clause 5.7.

Table II-3 (1/3) COMPARISON OF AREA (NORTH SUMATRA)

	of Measured Area th Sumatra							· .	Ratio	
	E NAME OF SCHEME E IRR	Present Paddy ha	Future Paddy ha	Scheme Whole Area ha	Present Paddy ha	Future Paddy ha	Scheme Whole Area ha FUIIO	Paddy %	Paddy %	Whole Area
1 600	11 Sumbari	34	77	163	175	300	300	0.19	0. 26	0.54
	No. 1 Control of the	19								
1.0	25 Sumbul Berampu		124	234	130	130	130			
- 1 P	57 Sidomukuti	12				55	5.5	0. 27	0.49	1. 24
5 500	91 Aek Palia	34	3,8	64	75	110	110	0.45	0.35	0.58
6 501	29 Pangambatan (B)	42	48	56	135	235	235	0.31	0.20	0.24
7 501	41 Aek Siparbue	23	26	37	80	200	200	0.29	0.13	. 0.19
8 502	18 Kutamale	32	40	. 69	35	65	. 85	0.91	0.62	0.81
40.0	40 Asahan VIII Pen			100	. 25	220	220	1.80	0.30	0.45
10 502	56 Ack Sihim			103	50	65	97	0.80	0.74	1.06
Tot	al	405	560	993	800	1,610	1,662	0.51	0.35	0.60

Table II-3 (2/3)	COMPARISON OF	AREA
	(SOUTH SULAWES	SI)

		Sulawesi								Katio	
		NAME OF SCHEME	Present	Future	Schene	Present	Future	Scheme	Present	Future	Scheme
	CODE		PR101	FU101	FU110	PR101	FU101	ha FU110	PR101	PU101	FU110
1	10 mm (F)	Kalu	47			50				0.70	
2	10055	Pajjenge	143	143	160	100	100	470	1.43	1.43	0.34
3	10099	Kadieng	171	224	270	80	100	152	2.14	2. 24	1.78
4	10115	Kaindi	67	124	195	23	23	71	2.91	5.39	2.75
5	10140	Lembang Bata	72	76	175	70	125	125	1.03	0.61	1.40
6	10168	Panrita	55	65	78	120	200	270	0.46	0.33	0.29
7	10182	Mario I-II-III	50	57	74	20	100	100	2.50	0.57	0.74
8	10201	Pakelli II	19	54	168	75	95	225	0. 25	0.57	0.75
		Limpua/Padaelo		138	161	100	150	250	0.77	0.92	0.64
	4 4 4 4 4 4	Malimbu			. 44	100	100	100	0.32	0.32	0.44
	Sec. 3	Saiu Akung	26		30	110	110	130	0.24	0.24	0.23
		Mariri	34	63				400			0.38
	Total	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	793	1.072	1,607					0.81	0.66

Table II-3 (3/3) COMPARISON OF AREA (WEST NUSA TENGGARA)

	West	Nusa Tenggara					Invento				Ratio	
	CODE	NAME OF SCHEME	Present Paddy ha	Future Paddy ha	Scheme Whole	Area ha	Present Paddy ha	Future Paddy ha	Scheme Whole Area ha	Present Paddy %	Paddy %	Whole Area
	CODE						PR101			PR101	FU101	10110
1	45010	Danar Jengkang	5			227			and the second second	0.33	1.04	0.72
2	32013	Mada Manini	70	70		. 98	170	170	200	0.41	0.41	0.49
3	33050	Uma Lebang	. 68	89		96	90	90	110	0.76	0.99	0.87
4	34004	Lokok Tripas	34	34		57	0	75.	75	_	0.45	0.76
5	35035	Lengkok Dudu	24	26		45	28	169	207	0.86	0.15	0.22
6	35045	Kelokos Udang	105	111		128	87	100	110	1. 21	1.11	1.16
7	36016	Raba Sangga	111	111		125	115	115	115	0.97	0.97	1.09
8	37003	Montong Sapah/Pu	13	33		37	80	160	160		0.21	0.23
1	otal		430	594		813	585		1, 292		0.60	0.63
(rand	Total	1628	2226	3	413	2349	3923	5397	0.69	0.57	0.63

4. PRESENT FIELD CONDITION OF REPRESENTATIVE SCHEMES

Main feature of the thirty (30) representative schemes was described in the Progress Report II briefly, The description are based on the field survey conducted by the Study Team from January to March 1992. As the results of field survey, topographic survey and land use survey, the present feature of each scheme is briefly filled up in the following table. Described items of each scheme are as below;

- a. Code No., Project name, District name, Kind of project
- b. Construction or rehabilitation year, executing agency
- c. Topographic condition, Ground elevation
- d. Water source, River discharge
- e. Area of irrigated paddy field, Damaged irrigated field, Rainfed
- f. Wet and dry season's planting area
- g. Kind and scale of intake facilities, intake direction
- h. Canal type and length
- i. Condition of structures
- j. Water shortage and its cause, damage by flood
- k. Possibility of land development
- 1. Present land use for land development and so on

PRESENT FACILITY'S CONDITION FOR 30 REPRESENTATIVE SCHEMES Table II-4 (1/3)

Province : Nort	North Sumatra)N)	(NORTH SUM	SUMATRA)	
Code No.	160011			50057	1		1-	50218	50240	50256
Project name	Sumbarı	Rauning B	Sumbul Berampu	Sidomukuti	Aek Palia	an B	Aek Siparubue	4	Asahan VIII A	Aek Sihim
District	Dairi	Tapsul	Dairi	Langkat	Labuhan Batu	Tapanuli Tengah	Tapanuli Utara	Tana Karo		Tapanuli Selatan
(continuition)	1000	0.03	- 4	1/1					: 0	- 1
repairing year	1000	6761	1978, 1981		7:		1920's, 1976	1989	385	1982, 1984
executing agency	di) dia		farmers, DPUP OPUP	Farmers	Farmers & Bangdes	ু				Farmers
Topographic	Mountainous & hilly area	Plain area		Alluvial		-	Mountainous &	Mountainous &	Plain area	Hilly area
Elevation	675 m	-	875 ก	39 m						35 п
170S	Kaninjou river tributary of Kentara river	Angkola river, tributary of Sibara-bara R				Sitadiang river		Lauberas river /Spring	river	Sigemuruh river
River Average	0.6 m3/s		1.35 m3/s	0.5 m3/s	0,38 m3/s	0.475 m3/s	0.275 m3/s	0.5 m3/5		0.45 m3/s
	0. 4 m3/s		3/s					0, 2 m3/s		3 = 3/5
irrigated paddy field	35 ha							32 ha	45 ha	
Damaged Paddy field	1	14 ha			,	12 ha		,	 	
Rainfed paddy field	t ha	1	-	15 ha			1 ha		2 ha	
Planted Wet S. area Dry S.	36 ha 35 ha	19 ha	i	27 ha	34 na	42 ha 21 ha	24 ha 20 ha	32 ha 20 ha	47 ha	40 ha
te fac	Weir made of	Left side by	Weir gade of	Both sides by	Both sides by	ade of	lade of	11:1		Free intake,
intake direction	LXH=7.5x7.0 m.	intake for	filled with concrete LxH*6.0x1.0 m,	temporary weirs	Mell Hxt=0,65x2,7 m	left side	61 61	left side	200 mm in diameter, right side	2016
Canals	Earthen canal 7 Km	Earthen canal	Earthen canal	Earthen canal	Earthen canal 0.5 Km in left	Earthen canal	farthen canal	Earthen canal 4 Km	Lined canal 0.7 Km, earth canal 1,5 Km	Earthen canal with partly lined, 0.4 Km
Condition of facility	Damaged in side wall of spillway. collapse in side slope of canals	Damaged in Co free intake and si it leaves as it ca is in in	Collapse in side slope of canal & flood with sand flows into canal	No permanent facilities, required stop log in two places	No intake gate, required one stop log	Damaged in river pro- tection necessary to repair damaged free intake	No intake gate, cllapse in canal bank	Collapse in earthen canal	Much leakage from canal, high flood water level, not enough in intake W.L.	
Water shortage & its cause	Leakage from canals	Weir is too downstream	Leakage from canals	Short but not defined	Short, especially in dry season	Short even in wet season	Short, especially in dry season	Water is not stable even in wet season		Short even in wet season
Damage by flood	Damaged in earthen canal every year		Damaged in earthen canal every year		Damaged in canals	Damaged in some facilities		Damaged in wet season every	Damaged in wet season	Damaged in Wet season every year
Possibility of land development	Possible	Possible	[mpossible	Pessible	Possible	Possible	Possible		Possible	Possible
Present land use for land development	Upland field & mixed field	Upland field, mixed field, forest & coconut garden		Oil paim forest	t Rubber, swamp	Forest & swamp	Upland fleld & oil palm forest	Upland field &	Upland field & mixed field	Mixed field

PRESENT FACILITY'S CONDITION FOR 30 REPRESENTATIVE SCHEMES (SOUTH SULAWESI) Table II-4 (2/3)

Province South Sulamesi

Code No.	20003	110055	10090	10115	UPIUI	TINIER	101.89	10201	56601	10007	10333	75005
Project name	Kalu	Pajjenge	Kadieng	Kaindí	Lembang Bata	Panrita	Mario 1-11-111	Pakeli II	Padaelo	Mai imbu	Salu Akung	Kariri
District	1	Barru	Bulkumba	Enrekang	Сожа	Jeneponto	Maros	Sinjai	Wajo	Luwu	Tana Toraja	Polmas
Group	6	M	ln.	Ŋ.	Ā	Δ	Λ	٨	Δ	VI	10	V
Construction/ repairing year	1982	1960	1982	1950, 1951 &	1938	1989	0701		1985/87,	1950	1600	1971
Executing agency	DPUP	Farmers & BANGDES	rarmers &	Гатиег	Farmer	Farmers & BANGDES	Farmer	Farmer	Farmer	Farmer	Tarmer	Farmer &
Topographic condition	Mountainous	Alluvial	Alluvial	Mountainous	Hilly area	Hilly area	Mountainous	tainous	Alluvial	Alluvial	Mountainous &	Hilly area
Elevation	222 ₪		150 m	900 m	800 m	58 m	E 009	800 m	19.2	200 m	1300 =	1000 #
Water source	Spring water in Lonrong	Barang river	Kadieng river	Dewata river		Panirita river & Cangkureng	Tributary of Mario river &	Pakeli river	Walanae river	Benuang river	Akung-river	Mariri river
River Average discharge Wet S.	0.125 #3/s 0.15 #3/s 0.15 #3/s	3. 65 m3/s 7.0 m3/s 0.3 m3/s	1.75 m3/s 2.5 m3/s	1.8 m3/s 3.0 m3/s	2, 25 m3/s 3,0 m3/s	0.125 m3/s 0.15 m3/s 0.15 m3/s	0.2 m3/s 0.3 m3/s	0.7 m3/s 1.0 m3/s	4.25 m3/s 7.0 m3/s	20.75 m3/s 40.0 m3/s	15.4 m3/s 30.0 m3/s	4.25 m3/s 6.4 m3/s
d e Id	47 ha	100 ha	I7i ha	1						1.0 100/3	26 ha	3)
Damaged paddy field		43 ha	4	ŧ		•	1		,	32 ha		34 ha
Rainfed paddy field		,		1				1	1	-	1	ı
Planted Wet S. area Dry S.	47 ha 37 ha	100 ha 10 ha	171 ha 103 ha	67 ha 67 ha	72 ha 50 ha	55 ha 25 ha	50 ha 35 ha	19 ha 19 ha	77 ha 50 ha	20 ha	26 ha	34 ha
facility direction		គំ	-7	•	ress	Free intake for left side	Weir at downstream & free intake at upstream left side	Free intake right side	entrifugal pump with 150 mm in diameter in temporary sta- tion, 5 places for left side	Free intake LxH=3.0x2.0 m right side	Weir for both sides LXH=2.5x1.5 m	Weir for right side LxH=3.0x1.0 m
	Earthen canal O.9 Km	Earthen canal 1.5 Km	Earthen canal 4 Km	Earthen canal 2.5 Km	Earthen canal 1 Km	Earthen canal O.8 Km	Earthen canal	Earthen canal 4 Km	T	Earthen canal 4 Km	Earthen canal	Earthen canal
	Damaged in canal slope, necessary to repair middle stream welr to collect supplement water	Damaged by floo in intake facility	Intake facility functions well, necessary to repair weir body into wet	No permanent facility for irrigation	imperfect intake facility much leakage from damaged slopes, need weir and lining of canal	imperfect intake facility luck of irrigation facility	Necessary to study on irrigation system by dividing river, need permanent intake facility	Temporary weir by placing natural stones. need fixed weir	Use rent-a-pump river water level varies widely	Impossible to take water, necessary to move intake to upstream & to repair canal	Good in canal, need to prolong canal length & to repair Weir	No intale water because weir flushed out by flood in 1972 & imperfect irrigation facility
e.al	Short in dry season, leakage from canals	Short due to damaged intake facility	Skort in wet season	Short due to structual problems in intake facility	Short	Sport		Much leakage from canal	Short in dry season	Water is not stable even in wet season	Short in downstream area	Short
Damage by flood		Damaged by poor drainage		{	Repair intake facility evey year		Repair intake facility evey year	Damaged by flood in wet season		Damaged by flood every		Damaged by flood
Possibility of land development		Impossible	Possible	Possible	Possible	Possible	Possible	ا م	Possible	Impossible	Impossible	Possible -
Present land use for land development	Upland field		Upland field & sparse forest	Upland field	Mixed fleid	Upland field & mixed field	Upland field	Upland field & grass	Upland field, oil palm forest, grass & mixed field			Upland field & grass

PRESENT FACILITY'S CONDITION FOR 30, REPRESENTATIVE SCHEMES Table II-4 (3/3)

	145010	3201	33050	34004	35005	Г		37003	
name	Damar Jengkang	Mada Manini	Uma Lebang	Lolok Tripas	Lengkok	Kelokos Udang	Raba Sanga	Monton Sapah/ Puri	
District	Lombok Timur	Nombu	Sumbawa	Lombok Barat	Lowok Timur	Lonck Timur	Bina	Lombok Tengah	
Group	<u>0</u> 1		٨ï	VI	Г		ΛI	VI	
Construction/ repairing year	1986	1970, 1990		1984, 1989	1970, 1978	1981, 1989	1971/72	1989	
	DPUP Farmers	Farmers &	Farmers	Farmers & PPAS	farmers	Farmers &	Farmers &	Farmers	
Topographic	Mountainous/	Hilly area	Hilly area		Alluvial		Allevial	Hilly area	
	100 m	25 m	20 m	1-		303 74	15 m	138 1	
	Sellmbing river	Manini river & spring water	Pemasar river	Lokok Tripas river	Sujqui	1	Kendo river & mountain	Puri river	
Average Pet S. Dry S.	0.5 m3/s 0.5 m3/s	0.115 m3/s 0.20 m3/s 0.03 m3/s	0.3 m3/s 0.5 m3/s 0.1 m3/s	0.2 m3/s 0.3 m3/s 0.1 m3/s	2.50 m3/s 0.25 m3/s	0,275 m3/s 0.40 m3/s 0.15 m3/s	0, 195 m3/s 0, 30 m3/s 0, 09 m3/s	0.25 由3/s 0.50 由3/s	
	5 ha	70 ha	58 ha	દા		1	111 ha	13 hz	
Damaged paddy field	1		J	1					
Rainfed paddy field	1		ı	,			1	20 ha	
Planted Met S. area Drv S.	S ha 5 ha	70 ha	58 na 10 ha	34 ha	24 ha 24 ha	105 ha 87 ha	111 ha 35 ha	33 ha	
,	Weir made of wet massonry & free intake left side	Free intake left side	ade of sonry Oxi. 4 m	rade of sonry 0x4, 6 m	ade of sonry .0x3.5 m	itake ss of side ridth :	for left. 2x4.5 m	Weir:2 nos. left side (U/S) right side (D/S) river width: 10 m	
Canals	Earthen canal 4 Km	Earthen canal 4 Km	Earthen canal 2.5 Km	Earthen canal 2 Km	Earthen canal 4 Km	Earthen canal 9 Km	Earthen canal	Earthen canal 2.6 Km	
:	18 38 1.	Necessary to repair intake and canal	Recessary to line on weir to prevent imperfect intak	Damaged in wair body, eroded in downstream cpro need to repair weir body	ollapse of alf of weir ody, erosion n downstream pron being epaired using wamboo, wood &	intake facility functions well but much sedimentation	intake facility Facilities well functions well maintained, but much leakage from sedimentation embanked canal	Weirs are often damaged by flood because simple ones without gates i.e. imperfect facilities	
æ	Short dut to imperfection of free intake leakage from canal	Short in dry season, period of wet season is short	Short in dry season	Short	Short in dry season	Short in dry season	Short in dry season	Short in dry season	
Damage by flood	Damaged in intake and anal every year			Бамақес	Damaged in facilities every year	Damaged in facilities every year		Damaged in facilities every year	
Possibility of land development	Possible	[mpossib]e	Possible	Impossible	Possible	Possible	algissodal	Impossible	
Present land use	Mixed field		Upland field		Orchard	Upland field			

5. BASIC IRRIGATION PLAN FOR REPRESENTATIVE 30 SCHEME

5.1 Discharge of Water Source

River or spring discharge of wet and dry season are estimated using the specific discharge which was studied in the Appendix-III, Meteorology & Hydrology. Topographical maps with the scale of 1:50,000 to 1:250,000 were used for the estimation of catchment area. Table II-5 shows calculation of discharge of water source for 30 schemes.

Table II-5 (1/3)

WATER SOURCE DISCHARGE

Province: NORTH SUMATRA

NO -	CODE	IRRIGATION SCHEME		C. A	Speci.Dis	River Q
				km2	m3/s/km2	m3/s
1	60011	Sumbari	Rainy		0.038	0.137
1			Dry	3.6	0.025	0.090
2	60038	Rauning (B)	Rainy	DPU Proje	c t	.,
			Dry		0.025	
3	50025	Sumbul Berampu	Rainy		0.038	1.296
			Dry	34.1	0.025	0.853
4	50057	Sidomukuti	Rainy			
			Dry	8.5	0.025	0.213
5	50091	Aek Palia	Rainy		0.038	0.080
			Dry	2. 1	0.025	0.053
6	50129	Pangambatan (B)	Rainy			
			Dry	6.3	0.025	0.158
7	50141	Nek Siparbue	Rainy			
			Dry	22.0	0.025	0.550
- 8	50218	Kutamale	Rainy		0.038	0.087
			Dry	2.3	0.025	0.057
9	50240	Asahan VIII Pengajian	Rainy			
			Dry	342.0	0.025	8.550
10	50256	50256 Aek Sihim			0.038	0.106
			Dry	2.8	0.025	0.070
		TOTAL	Rainy			
			Dry			

Table II-5 (2/3)

Province : SOUTH SULAWEST

				C. A	Speci. Dis	River Q
NO	CODE	IRRIGATION SCHEME			m3/s/km2	m3/s
	ļ		Rainy	Spring	0.048	0.150
1	20003	Kalu	Dry	DP1.1.00	0.010	0.100
			Rainy		0.048	0.336
Z	10055	Pajjenge	Dry	7.0	0.010	0.070
	10000	Kadieng	Rainy		0.063	3.276
ð	10033	Madiens	Dry	52.0	0.013	0.676
	10115	Kaindi	Rainy		0.064	0.294
4	10110	Kalliot	Dry	4.6	0.027	0.124
5.	10140	Lembang Bata	Rainy		0.063	1.014
0	10110	Sombang Dava	Dry	16.1	0,013	0.209
6	10168	Panrita	Rainy		0.063	0.088
v			Dry	1.4	0.013	0.018
7	10182	Mario I-II-III	Rainy		0.048	0.125
			Dry	2.6	0.010	0.026
8	10201	Pakelli II	Rainy		0.063	0.176
			Dry	2.8	0.010	0.028
9	10227	'adaelo	Rainy		0.048	144.000
			Dry	3000.0	0.010	30.000
10	10287	Malimbu	Rainy		0.064	0.134
			Dry	2.1	0.027	0.057
11	10332	Salu Akung	Rainy		0.064	0.256
			Dry	4.0	0.027	0.108
12	10354	Mariri	Rainy		0.064	19. 200
			Dry	300.0	0.027	8.100
		TOTAL	Rainy			······································
	f .		Dry	<u> </u>	ļ	<u> </u>

Table II-5 (3/3) WATER SOURCE DISCHARGE

Province: WEST NUSA TENGGARA

NO	CODE	IRRIGATION SCHEME		C. A	Speci. Dis	River Q
				km2	m3/s/km2	m3/s
1	15010	Danar Jengkang	Rainy		0.048	4.032
			Dry	84.0	0.009	0.756
2	32013	Mada Manini	Rainy		0.044	0.132
	1		Dry	3.0	0.003	0.009
2 3 4 5 5 6 7 7 6	33050	Uma Lebang	Rainy		0.044	0.176
			Dry	4.0	0.003	0.012
4	34004	okok Tripas	Rainy		0.048	0.528
			Dry	11.0	0.009	0.099
5	35035	Lengkok Dudu	Rainy		0.048	1.056
			Dry	22. 0	0.009	0.198
6	35045	Kelokos Udang	Rainy		0.048	0.672
	\		Dry	14.0	0.009	0.126
7	36016	Raba Sangga	Rainy		0.044	0.176
			Dry	4.0	0,003	0.012
8	37003.	Montong Sapah/Puri	Rainy		0.048	0.192
	ļ		Dry	4.0	0.009	0.036
		TOTAL	Rainy			
		· .	Dry			

5.2 Intake Discharge

Using the mean value of water requirement of inventory data, the intake discharge for paddy field are estimated as below;

Table II-6 MEAN WATER REQUIREMENT OF EACH SCHEMES

Province	Div.	Number of schemes	Mean Water R Wet Season	Requirement Dry Season		
		nos	lit./s/ha	lit./s/ha		
North Sumatra	LD	32	0.91	1.41		
	VI	247	1.01	1.50		
South Sulawesi	LD	10	0.73	1.20		
	VI	211	1.00	1.44		
NTB	LD	20	1.18	1.39		
	VI	137	1.27	1.40		

From the above water requirement and other project's value, maximum intake discharge is assumed as below taking overall water loss into consideration.

Province	Unit Intake Wet season	Discharge Dry Season
	lit./s/ha	lit./s/h
North Sumatra	1.2	1.5
South Sulawesi	1.2	1.5
NTB	1.3	1.5

5.3 Irrigable Area

Irrigable area is estimated using 80 % of river or spring discharge as upper limit area. Wet and dry season's irrigable area in the representative schemes, are calculated as below;

Table II-7 (1/3) POTENTIAL OF CROPPING AREA FOR PADDY

Province : NORTH SUMATRA

NO	CODE	IRRIGATION SCHEME		0.80	POTENTIAL	RAIN PADDY	POT. /RAIN	Ratio	RAIN x Ratio	
				m3/s	AREA ha	AREA ha	Ratio	adapted	ha	ha ha
1	60011	Sumbari	Rainy	0. 109	91.2	69		l		
		1	Dry	0, 072	48.0		0.69	0.69	48	48
2	60038	Rauning (B)	Rainy			59		1 2		<u> </u>
			Dry					0.30	18	18
3	50025	Sumbul Berampu	Rainy	1. 037	863. 9	112		-	2 2 1 A	
			Dry	0. 682	454.7		4. 07	1.00	112	112
4	50057	Sidomukuti	Rainy			24	11			
	<u></u>		Dry	0. 170	113. 3		4. 66	1.00	24	24
5	50091	Aek Palia	Rainy	0.064	53. 2	34				
			Dry	0. 042	28. 0		0.82	0.82	28	28
6	50129	Pangambatan (8)	Rainy			43				
	<u> </u>		Dry	0. 126	84. 0		1. 94	1.60	43	43
7	50141	Aek Siparbue	Rainy			23				
			Dry	0.440	293. 3		12. 54	1.00	23	23
8	50218	Kutamale	Rainy	0.070	58. 3	36				
			Dry	0.046	30. 7		0.85	0.85	31	31
9	50240	Asahan VIII	Rainy	7		59				
		Pengajian	Dry	6.840	4560.0		76. 77	1.00	59	59
10	50256	Ack Sihim	Rainy	0. 085	70. 9	43				
			Dry	0.056	37. 3		0.86	0.86	37	37
		TOTAL	Rainy						- - - - - - -	
	1	÷	Dry			······	•••••••••••••••••••••••••••••••••••••••	····: • · · · · • •		

Table II-7 (2/3) POTENTIAL OF CROPPING AREA FOR PADDY

Deou	inca ·	SOUTH SULAWEST						1.1		
1101	mee .	DOMIN DOLLING	e de la composición del composición de la compos				200 mg	•		
NO .	CODE	IRRIGATION SCHEME	: 1	0.8Q	POTENTIAL	RAIN PADDY	POT. /RAIN	Ratio	RAIN x Ratio	DRY FIEL
	1.1		4.5	m3/s		AREA ha	Ratio	ndapted	ha	ha ha
1	20003	Kalu	Rainy	0.120	100.0	63	100			
		A Commence	Dry	0.080	53.3		0. 85	0.85	54	54
2	10055	Pajjenge	Rainy	0.269	224. 0	129				
	144	15	Dry	0.056	37. 3		0. 29	0. 29	37	37
3	10099	Kadieng	Rainy	2.621	2184.0	202				T
			Dry	0.541	360.5		1. 79	1.00	202	202
. 4	10115	Kaindi	Rainy	0. 236	196. 3	112				1
	100		Dry	0.099	66. 2		0. 59	0, 59	66	61
5	10140	Lembang Bata	Rainy	0.811	676. 2	68				
	4		Dry	0. 167	111.6		1, 63	1.00	68	6
6	10168	Panrita	Rainy	0.071	58, 8	59				
			Dry	0.015	9.7		0.17	0.17	10	10
7.	10182	Mario I-II-III	Rainy	0. 100	83. 2	51				
	- 2, de		Dry	0.021	13.9		0. 27	0. 27	i4	1
8	10201	Pakelli II	Rainy	0.141	117. б	49				
			Dry	0.022	14. 9		0. 31	0. 31	15	19
9	10227	Padae lo	Rainy	115. 200	96000.0	124				
			Dry	24.000	16000.0		128. 82	1.00	124	124
10	10287	Malimbu	Rainy	0.108	89. 6	29				
	, A	The bridge	Dry	0.045	30. 2		1.05	1.00	29	2
11	10332	Salu Akung	Rainy	0. 205	170.7	23	: .	4 1 1		
1.11			Dry	0.086	57. 6		2. 46	1.00	23	2:
12	10354	Mariri	Rainy	15. 360	12800.0	57				
			Dry	6. 480	4320.0	100	76. 19	1.00	57	5
		TOTAL	Rainy							
			Dry					I	I	

Table II-7 (3/3) POTENTIAL OF CROPPING AREA FOR PADDY

Province: WEST NUSA TENGGARA

NO.	CODE	TRRIGATION SCHEME		0.80	POTENTIAL	RAIN PADDY	POT. /RAIN	Ratio	RAIN x	Ratio	DRY FIEL
1-	1.5		:	m3/s	AREA ha	AREA ha	Ratio	adapted		ha	ha
1	15010	Danar Jengkang	Rainy	3, 226	2481. 2	108	Ţ .				<u> </u>
			Dry	0.605	403.2		3, 73	1.00	<u> </u>	108	108
2	32013	Mada Manini	Rainy	0.108	81. 2	63]		
			Dry	0.007	4.8		0.08	0.08	ļ	5	5
3	33050	Jma Lebang	Rainy	0.141	108.3	80					
٠		1.1 Year - 194 - 17	Dry	0.010	6.4		0.08	0.08		δ	6
4	34004	Lokok Tripas	Rainy	0.422	324. 9	31					
			Dry	0.079	52. 8		1. 73	1.00		31	31
.5	35035	.engkok Dudu	Rainy	0. 845	649.8	23					
	1.		Dry	0. 158	105.6		4. 51	1.00		23	23
6	35045	Kelokos Udang	Rainy	0. 538	413. 5	100			<u> </u>		
			Dry	0. 101	67. 2		0. 67	0. 67		67	67
7	36016	116 Raba Sangga	Rainy	0.141	108. 3	100	<u> </u>				ļ
	1:		Dry	0.010	6.4		0.06	0.06	<u> </u>	6	6
- 8	37003	Montong Sapah/Puri	Rainy	0.154	118. 2	30					
1.1			Dry	0.029	19.2		0.65	0.65		19	19
	·	TOTAL	Rainy								
	1.3		Dry					<u> </u>	1		<u> </u>