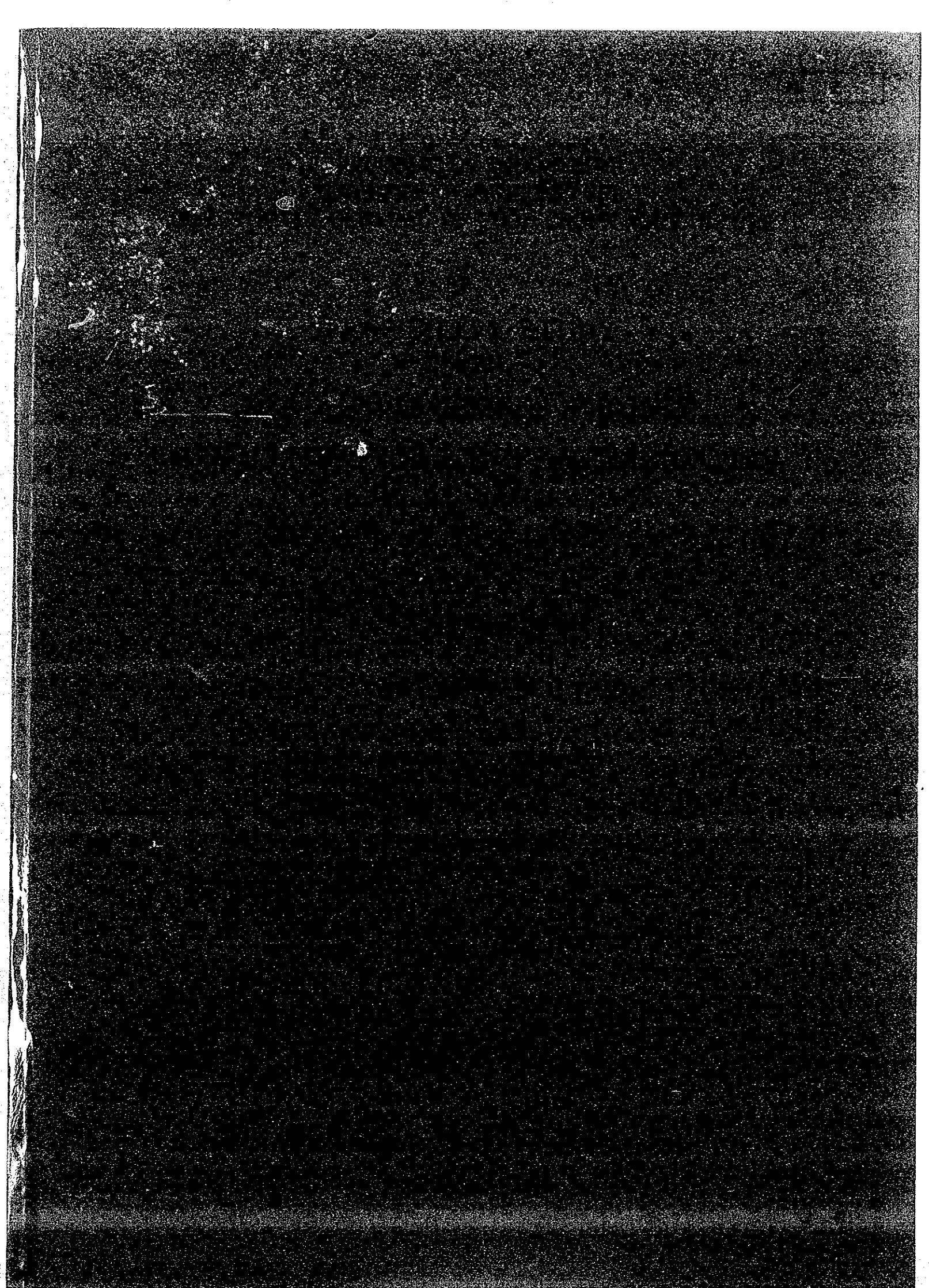

REPUBLIC OF INDONESIA
MINISTRY OF AGRICULTURE
DIRECTORATE GENERAL OF FOOD CROPS AGRICULTURE

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

VOLUME II

APPENDIX

OCTOBER, 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

TOKYO, JAPAN

FEASIBILITY STUDY
FOR
LAND DEVELOPMENT PROJECT
IMPROVEMENT OF LAND & IRRIGATION SYSTEM AT FARM LEVEL

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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

Province	Technical Irrigation	Semi Technical Irrigation	Simple Irrigation	Total Area	No. of Projects	Average Area
	ha			nos	ha	
North Sumatra	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	13,524	931	16,930	88	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 Rekapitulasi Konstruksi Pengairan Desa Propinsi Sumatera Utara, 1969/70-1990/91

South Sulawesi: Data Inventarisasi Irigasi Pedesaan Prop. Dati I Sulawesi Sulatan, 1991 March

West Nusa Tenggara: List of Inventarisasi Pengairan Pedesaan Propinsi Nusa Tenggara 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 Area
	nos	ha	ha/scheme
North Sumatra	845	121,775	144
South Sulawesi	962	149,260	155
NTB	328	35,499	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
	nos	nos	nos
North Sumatra	50	308	358
South Sulawesi	19	374	393
NTB	45	189	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. O & 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.

4. IMPLEMENTATION OF INVENTORY SURVEY

4.1 Record of Procedure

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	Total
	nos		
North Sumatra	50	308	358
South Sulawesi	19	374	393
West Nusa Tenggara	45	189	234
Total	114	871	985

Note; A part of above areas, 142 areas were investigated during Sep. and Oct.,1991 in South 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;

Province	Team leader, supervisor, etc		Surveyor		
	Staff	Work Period	No. of Group	Staff	Work Period
	person	month	group	person	month
North Sumatra	9	3.0	3	28	1.5
South Sulawesi	11	4.5	10	47	3.0
NTB	6	3.0	6	31	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.

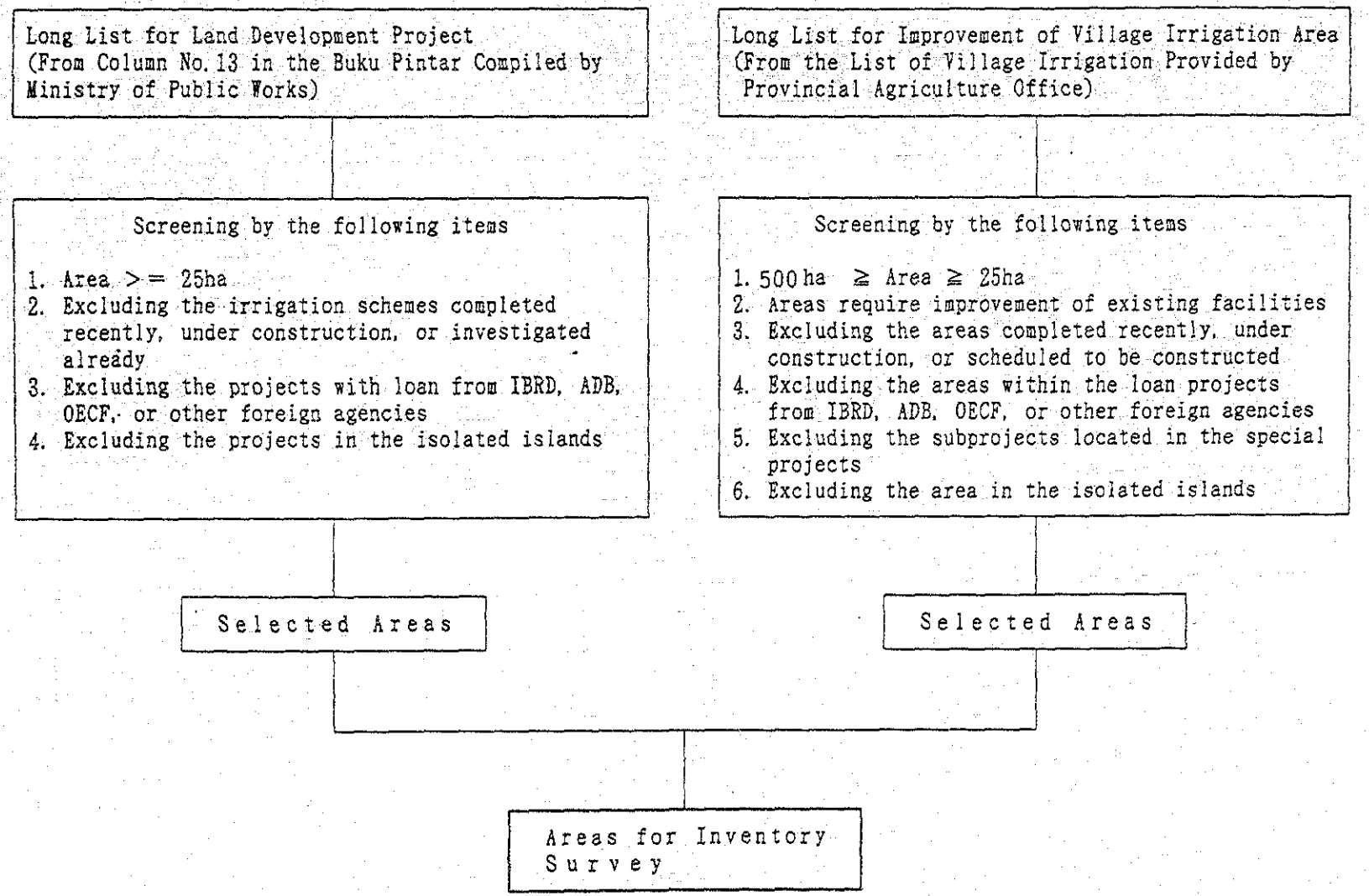


Fig. I-1 GUIDELINE FOR SELECTION OF AREAS FOR INVENTORY SURVEY

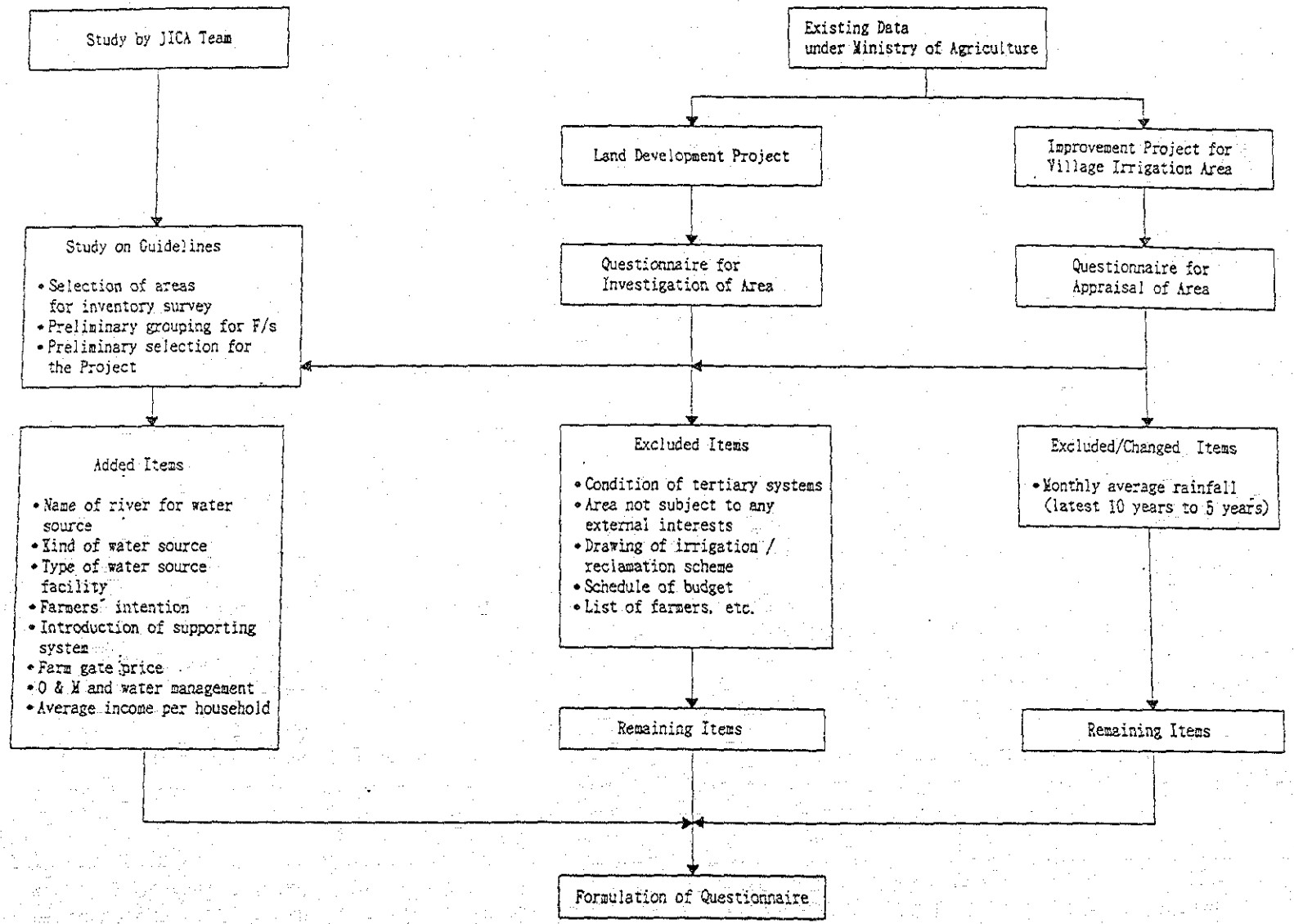


Fig. I-2 FORMULATION OF QUESTIONNAIRE FOR INVENTORY SURVEY

Table I-1 NUMBER OF INVENTORY SURVEY IN NORTH SUMATRA

North SUMATRA PROVINCE

No.	Kabupaten/ Kotamadia	Land Development				Village Irrigation			
		Existing		Selected		Existing		Selected	
		Daerah Scheme	Irigasi Potential	Daerah Scheme	Irigasi Potential	Daerah Scheme	Irigasi Potential	Daerah Scheme	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	-
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	-	-
	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

South Sulawesi Province

No.	Kabupaten/ Kotamadia	Land Development				Village Irrigation			
		Existing		Selected		Existing		Selected	
		Daerah Irigasi Scheme	Potential	Daerah Irigasi Scheme	Potential	Daerah Irigasi Scheme	Potential	Daerah Irigasi Scheme	Potential
		Nos	ha	Nos	ha	Nos	ha	Nos	ha
1	Bantaeng	-	-	5	1,119	45	5,417	12	-
2	Bone	11	367	5	1,627	97	20,122	36	-
3	Barru	-	-	-	-	29	2,035	12	-
4	Bulukumba	2	773	2	600	97	9,416	42	-
5	Enrekang (Sidrap)	-	-	-	-	48	6,420	41	-
6	Gowa (Takalar)	1	50	1	200	24	5,431	12	-
7	Jeneponto (Bantaeng)	7	919	1	250	34	5,966	22	-
8	Luwu	4	1,974	1	50	72	26,424	30	-
9	Majene	-	-	-	-	11	2,121	1	-
10	Mamuju	-	-	-	-	25	5,277	14	-
11	Maros	1	327	1	231	36	4,605	22	-
12	Pangkep (Barru)	1	1,184	-	-	9	1,085	-	-
13	Pinrang	4	298	-	-	15	2,500	-	-
14	Polewalimamasa (Mandar)	4	242	2	150	56	6,237	40	-
15	Selayar	-	-	-	-	-	-	-	-
16	Sidenreng	-	-	-	-	7	3,600	-	-
17	Sinjai	-	-	-	-	34	4,578	13	-
18	Soppeng (Wajo)	1	216	1	638	147	9,428	7	-
19	Takalar	-	-	-	-	-	-	-	-
20	Tanah Toraja	-	-	-	-	108	9,701	45	-
21	Wajo	-	-	-	-	62	18,207	20	-
22	Ujung Pandang (Other)	1	128	-	-	-	-	-	-
23	Pare-Pare	-	-	-	-	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 I-3 NUMBER OF INVENTORY SURVEY IN NTB

NTB PROVINCE, LAND DEVELOPMENT

No.	LD Kabupaten/ Kotamadia	Existing Daerah Scheme	Existing Irigasi Potential	Selected Daerah Scheme	Selected Irigasi Potential	Remarks
		Nos	ha	Nos	ha	
1	Lombok Barat	22	3,250	13	-	
2	Lombok Tengah	6	120	-	-	
3	Lombok Timur	24	4,230	12	-	
4	Sumbawa	19	5,830	10	-	
5	Dompu	11	1,970	6	-	
6	Bima	6	1,530	4	-	
	Total	88	16,930	45	25,073	
	Average		192		-	

NTB PROVINCE, VILLAGE IRRIGATION

No.	VI Kabupaten/ Kotamadia	Existing Daerah Scheme	Existing Irigasi Potential	Selected Daerah Scheme	Selected Irigasi Potential	Remarks
		Nos	ha	Nos	ha	
1	Lombok Barat	37	2,684	26	-	
2	Lombok Tengah	32	4,655	17	-	
3	Lombok Timur	97	9,090	39	-	
4	Sumbawa	67	5,964	57	-	
5	Dompu	43	5,805	15	-	
6	Bima	52	7,301	35	-	
	Total	328	35,499	189	19,984	
	Average		108		106	

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

PROVINCE	TECHNICAL IRRIGATION	SEMI・TECHNICAL IRRIGATION	SIMPLE IRRIGATION	TOTAL	NUMBER OF PROJECTS	AVERAGE
	ha	ha	ha	ha	Nos	ha
SUMATRA	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 Project			VI Project			Total		
	A	B	C	A	B	C	A	B	C
North Sumatra	50	18	32	308	61	247	358	79	279
South Sulawesi	19	9	10	374	25	349	393	34	359
West Nusa Tenggara	45	25	20	189	52	137	234	77	157
Total	114	52	62	871	138	733	985	190	795

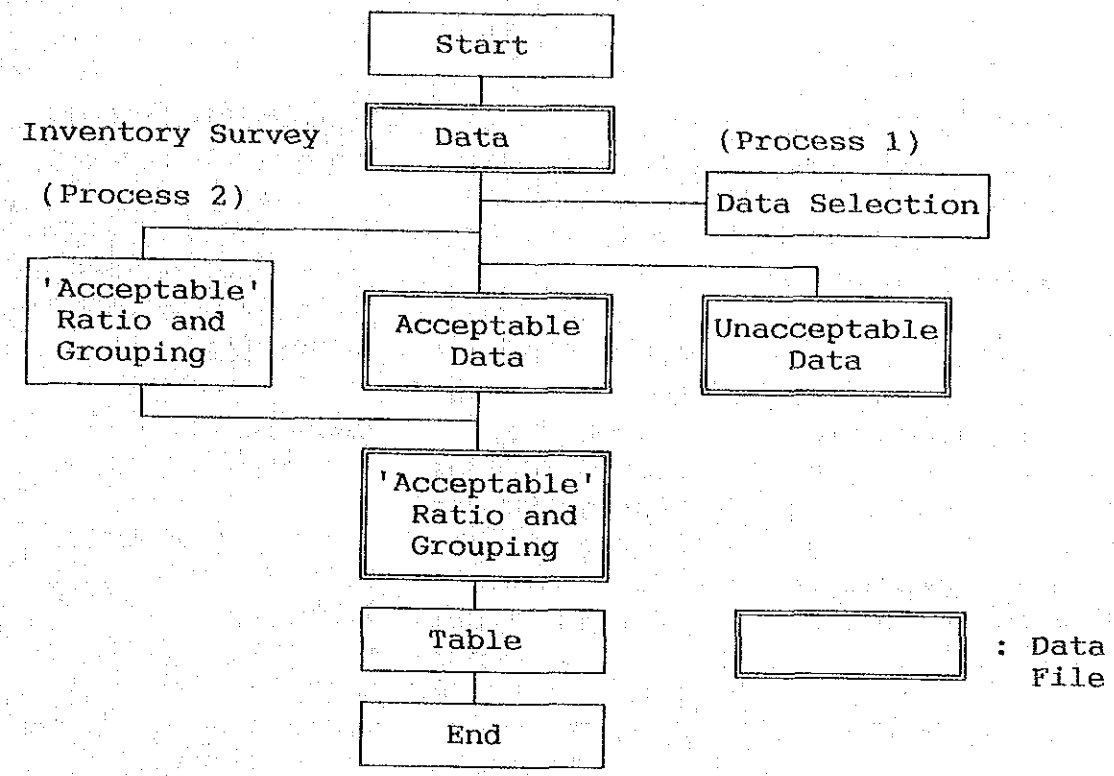
LD: Land development, VI: Village irrigation
A: Total number of sub projects surveyed
B: Number of sub projects excluded form the Project
c: Number of sub projects in the Project

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.



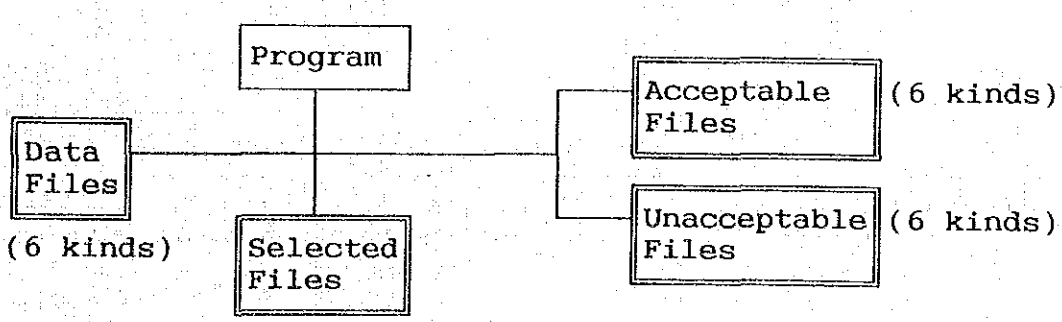
(2) Explanation of Processes

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

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

d) Acceptable and Unacceptable File

These files are made on each kind of data files.

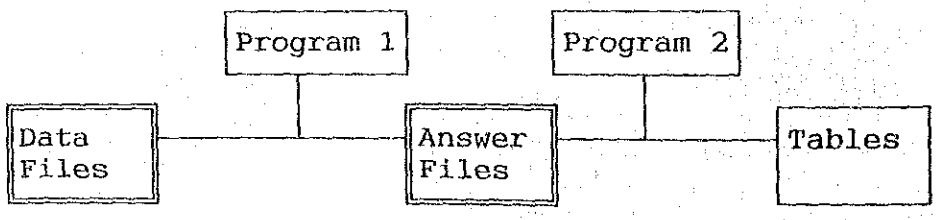
Acceptable file:	(selz0100.dbf - selz0112.dbf) - (selz0600.dbf - selz0612.dbf)
Unacceptable file:	(seld0100.dbf - seld0112.dbf) - (seld0600.dbf - selz0612.dbf)

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)

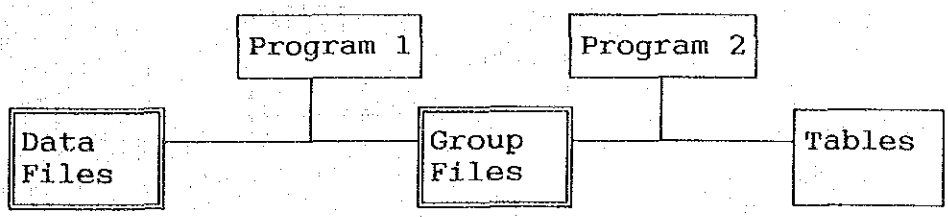
d) Answer File

The answer files have results of counting acceptable answers on specified items from data files.
Answer file: ans1.dbf
Index file: ans1ndx.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



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

c) Program 2

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

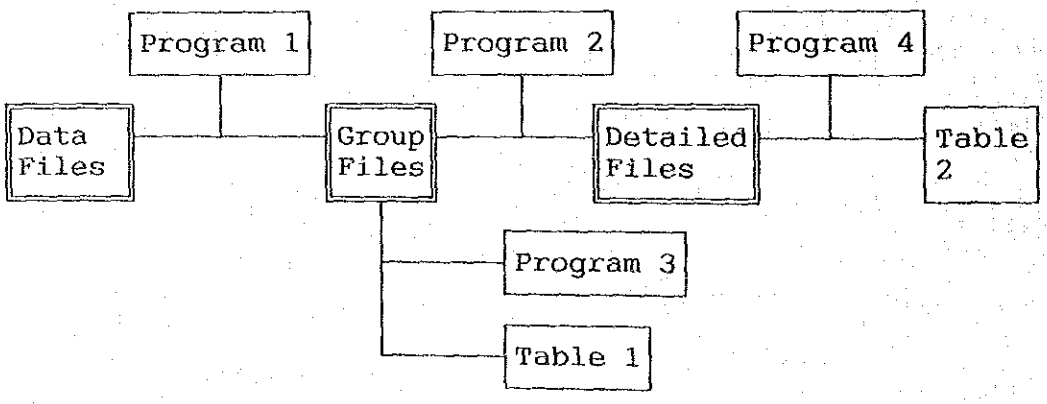
d) Group File

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: grp1ndx.ndx

d) Detailed File

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

gm1L1.dbf - gm1v6.dbf and gm1L0.dbf
gm1L2.dbf - gm2v6.dbf and gm2L0.dbf
gm1L3.dbf - gm3v6.dbf and gm3L0.dbf
gm1L4.dbf - gm4v6.dbf and gm4L0.dbf
gm1L5.dbf - gm5v6.dbf and gm5L0.dbf
gm1L6.dbf - gm6v6.dbf and gm6L0.dbf

Where, gm1L0.dbf - gm6l0.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

= (FU801×2 + 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 ≥ 0.25
5 point:	0.25 >	Value

A1 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 < 0.8
Point 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

Name of Province	Surveyed Kabupaten	Land Development Scheme	Village Irrigation Scheme	Total Surveyed Scheme
	nos	nos	nos	nos
Aceh	7	4	139	143
Lampung	4	26	117	143
Southeast Sulawesi	4	4	59	63
Central Sulawesi	4	-	82	82
NTT	8	21	43	64
Total	27	55	440	495

b. Excluded Schemes by DLRD

Name of Province	Land Development Scheme	Village Irrigation Scheme	Total Scheme
	nos	nos	nos
Aceh	-	-	-
Lampung	-	-	-
Southeast Sulawesi	-	-	-
Central Sulawesi	-	10	10
NTT	-	10	10
Total	-	20	20

c. Present Irrigated Paddy Field Areas

Name of Province	LD Schemes No. of Scheme	LD Schemes Paddy Area	VI Schemes No. of Scheme	VI Schemes Paddy Area	Total No.of Scheme	Total Paddy Area
	nos	ha	nos	ha	nos	ha
Aceh	4	445	113	9,283	137	9,778
Lampung	25	3,734	115	9,643	140	13,377
Southeast Sulawesi	3	206	45	7,458	48	7,664
Central Sulawesi	-	-	69	6,515	69	6,515
NTT	19	4,974	31	916	50	5,890
Total	51	9,359	393	33,815	444	43,618

Average:98ha/nos

Note-1; Except for excluded schemes by DLRD.
2; Areas with unsure area excluded.(both of present and future lands have no area data)

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 PROJECT

PROVINCE	TECHNICAL IRRIGATION	SEMI・TECHNICAL IRRIGATION	SIMPLE IRRIGATION	TOTAL	NUMBER OF PROJECT	AVERAGE 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 SULAWESI	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

DISTRICT	SCHEME	POTENTIAL	PRESENT PADDY	REMARK
	Nos	ha	ha	
Kotamadya Banda Aceh	3	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	–	
Aceh Tenggara	72	9,865	–	
Aceh Barat	56	4,508	–	
Aceh Selatan	43	3,941	–	
TOTAL	598	57,523	32,213	
AVERAGE		96	54	

Source : SURVEY POTENSI DAN PEMAN FATAN LAHAN
AREAL IRIGASI DALAM PROPINSI D.I.ACEH
Feb. 1991.

Source-2 : PRAS, DAFTAR INVENTASISASI IRIGASI PEDESAAN
DALAM PROPINSI D.I.ACEH

* : ASSUMED, POTENTIAL X 56%

Table I-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.

DISTRICT	SCHEME	POTENTIAL	PRESENT PADDY	REMARKS
	Nos	ha	ha	
Kendari	136	22,972	8,233	WITH SCHEME NAME
Kolaka	66	8,715	6,100	〃
Buton	48	7,019	3,511	〃
Muna	13	1,660	238	〃
TOTAL	263	40,366	18,082	
AVERAGE		153	69	

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

DISTRICT	SCHEME	POTENTIAL	PRESENT PADDY	REMARK
	Nos	ha	ha	
Sumba Barat	24	969	436	WITH SCHEME NAME
Sumba Timur	32	6,417	2,159	〃
Kupang	265	20,553	17,236	〃
Timor Tengah Selatan	17	1,395	709	〃
Timor Tengah Utara	14	4,211	2,192	〃
Belu **	10	1,130	680	*from other data 〃
Alor **	9	815	50	* 〃 〃
Flores Timur **	28	2,568	1,540	* 〃 〃
Sikka	17	936	726	〃
Ende	50	2,417	1,393	〃
Ngada	23	3,175	824	〃
Manggarai	16	2,645	357	〃
TOTAL	305	47,231	28,302	
AVERAGE		155	93	

* : Assumed (60 % of potential area)

** : OTHER:DAFTAR INVENTARISASI PENYERARAN
PENGAIRAN PEDESAAN PROPINSI NUSA
TENGGARA TIMUR, 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

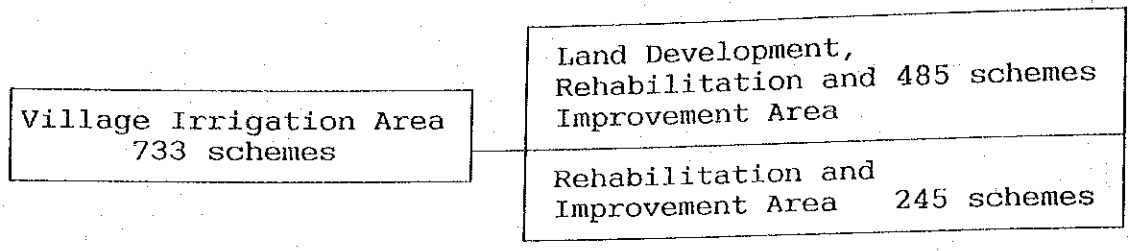
As the results of field survey, the sites of inventory survey are originally classified into the following three groups.

All Inventory Survey 985 schemes		
	Land Development Area	62 schemes
	Village Irrigation Area	733 schemes
	Excluded Area	190 schemes

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.



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:

1. 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	279 nos	9 nos	10 nos
South Sulawesi	359 nos	18 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.

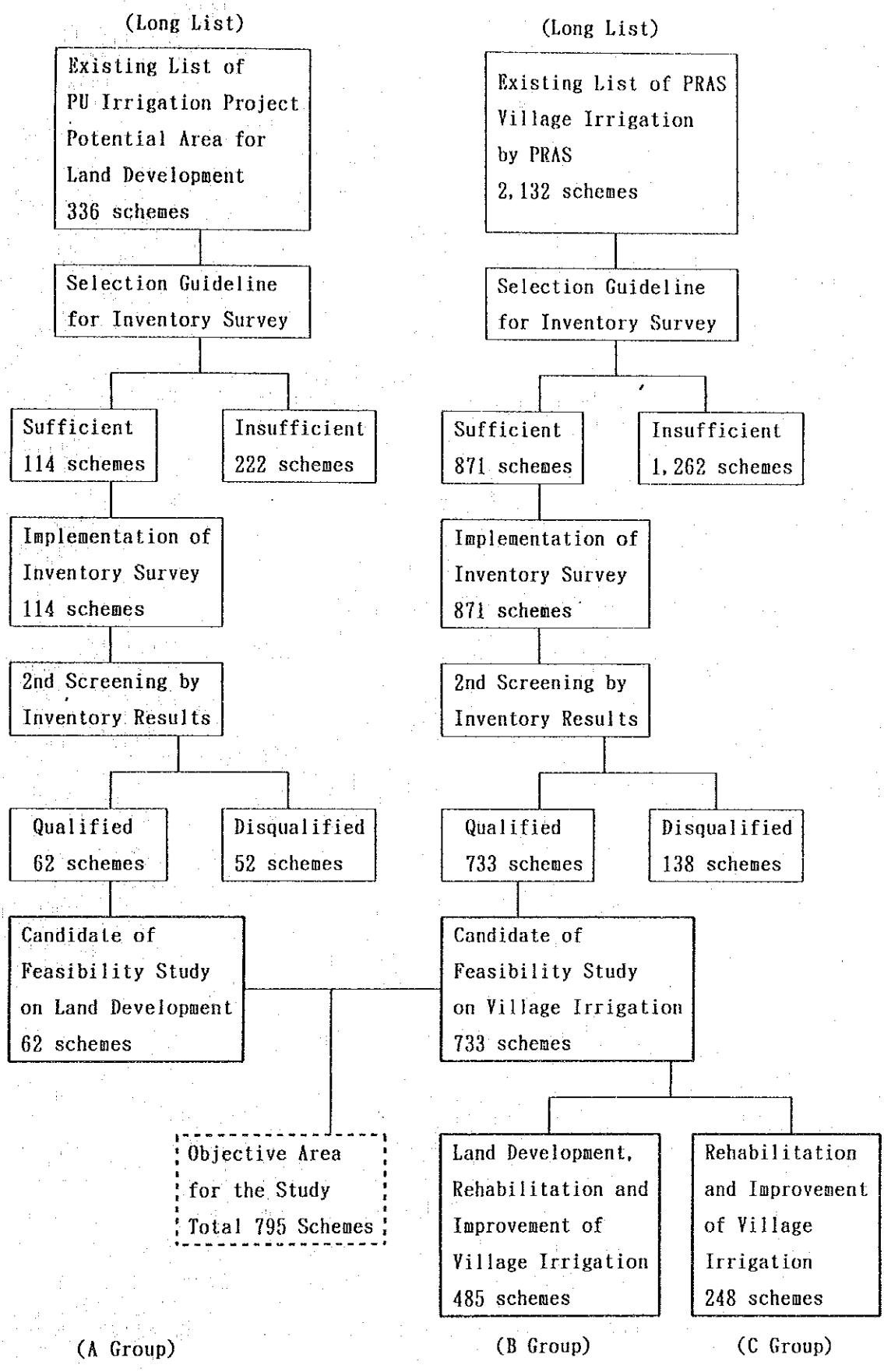


Fig. II-1 SELECTION OF OBJECTIVE AREA FOR THE STUDY

Table II-1 SUMMARY OF INVENTORY SCHEMES

(1) SUMMARY 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)
	nos	ha	ha	nos	ha	ha	nos	ha	ha	ha
North Sumatra	50	11,438	6,968	308	46,157	27,333	358	57,595	34,301	23,294
South Sulawesi	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

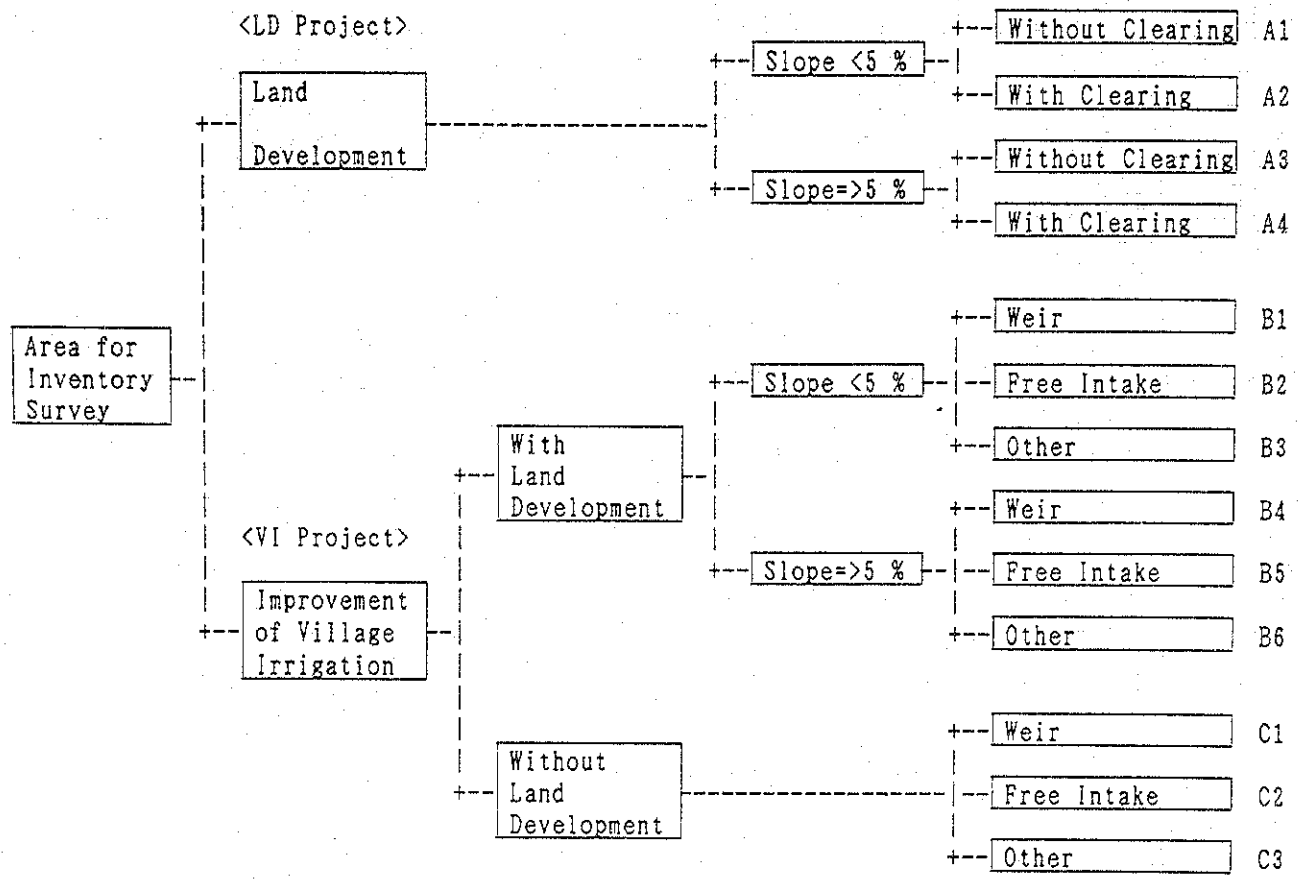
(Objective Scheme)

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)
	nos	ha	ha	nos	ha	ha	nos	ha	ha	ha
North Sumatra	32	6,916	3,477	247	30,500	18,184	279	37,416	21,661	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

(Exclude Scheme)

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)
	nos	ha	ha	nos	ha	ha	nos	ha	ha	ha
North Sumatra	18	4,522	3,491	61	15,657	9,149	79	20,179	12,640	7,539
South Sulawesi	9	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			
		SUMUT	SULSEL	NTB	TOTAL
Without Clearing	A1	3	4	15	22
With Clearing	A2	12	1	1	14
Without Clearing	A3	5	4	3	12
With Clearing	A4	12	1	1	14
Weir	B1	75	49	30	154
Free Intake	B2	10	9	6	25
Other	B3	17	21	1	39
Weir	B4	88	76	17	181
Free Intake	B5	14	35	12	61
Other	B6	6	16	3	25
Weir	C1	33	110	54	197
Free Intake	C2	1	28	11	40
Other	C3	3	5	3	11
TOTAL		279	359	157	795

Fig. II-2 GROUPING FOR FEASIBILITY SURVEY

Name of Region	Land development				Village Irrigation									Total
					With Land Development						Without Land Development			
	Less than 5%		More than 5%		Less than 5%			More than 5%						
	Without Clearing A1	With Clearing A2	Without Clearing A3	With Clearing A4	Weir B1	Free Intake B2	Other Intake B3	Weir B4	Free Intake B5	Other Intake B6	Weir C1	Free Intake C2	Other Intake C3	
North Sumatera														
1 Dairi	1	2	2	9	8			13			21		2	58
2 Langkat		2			7	2		6	4		3			24
3 Karo					6			18	3		3	1		31
4 Deli Serdang					5	1		1			2		1	10
5 Asahan					1		2	1		1				5
6 Labuhan Batu		3			10		7	2	1	1				24
7 Tapanuli Utara			2	2	8	2	1	29	1	3	2			50
8 Tapanuli Tengah	1	2			18	2	6		1	1	1			32
9 Tapanuli Selatan	1	3	1	1	12	3	1	18	4		1			45
Sub Total	3	12	5	12	75	10	17	88	14	6	33	1	3	279
South Sulawesi														
1 Bantaeng			1	1				3	5		1			11
2 Barru					4		1				5			10
3 Bone	2		2		8		6	15		1	2			36
4 Bulukumba					6	7		18	9		2	1		43
5 Enrekang					1		1	10	2	1	16	3		34
6 Gowa	1								6		2	4		13
7 Jeneponto			1		5	1	5	5	3	1	2			23
8 Luwu					6			1			13	7		27
9 Majene											1			1
10 Maluju					3	1	1	1			8			14
11 Maros					4			11	2	2	7		1	27
12 Pare-pare					3						1			4
13 Polmas		1			3			2	1		23	10		40
14 Sidrap											1			1
15 Sinjai							1	1	4	6			1	13
16 Soppeng	1				2					2	5	1		11
17 Tana Toraja					2			6	3		21	2	1	35
18 Wajo					2		6	3		3			2	16
Sub Total	4	1	4	1	49	9	21	76	35	16	110	28	5	359
West Nusa Tenggara														
1 Lombok Timur	2		2	1	2			8	9	2	1	3		30
2 Lombok Tengah							1	5	2	1	3	2		14
3 Lombok Barat	3	1			3			2	1		11		3	24
4 Sumbawa	10				16	4					14	5		49
5 Dompu								2			7	1		10
6 Bima			1		9	2					18			30
Sub Total	15	1	3	1	30	6	1	17	12	3	54	11	3	157
Total	22	14	12	14	154	25	39	181	61	25	197	40	11	795

REG-LOC2.WK1

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

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

North Sumatra

NO.	CODE	NAME OF SCHEME	DIVISION	GROUP	VILLAGE	DISTRICT	REGENCY	Present Paddy ha	Present Rainfed ha	Future Paddy ha	Scheme Whole Area ha	Land Development ha	Water Resource	Intake	Ground Slope	Land Condition
	CODE	IRR			VIL	DIS	REG	PR101		FU101	FU110		SOU31	FAC32	TOP21	
1	60011	Sumbari	LD	A4	Sumbari	Silima Pungga2	Dairi	34	1	77	163	42	River	Weir	>= 5%	with clearing
2	60038	Rauning (B)	LD	A2	Siture	Batang Angkola	Tapanuli Selatan	5	14	66	99	47	River	Weir	< 5%	with clearing
3	50025	Sumbul Berampu	VI	C1	Sumbul Berampu	Silima Pungga2	Dairi	124		124	234	0	River	Weir	>= 5%	
4	50057	Sidomukuti	VI	B1	Berulap	Selesai	Langkat	12	15	27	68	3	River	Weir(Temporary)	< 5%	with clearing
5	50091	Aek Palia	VI	B1	Gunung Melayu	Kualuh Hulu	Labuhan Batu	34		38	64	4	River	Weir	< 5%	with clearing
6	50129	Pangambatan (B)	VI	B2	Pelita	Sorkam	Tapanuli Tengah	30	12	48	56	6	River	Free Intake	< 5%	with clearing
7	50141	Aek Siparbue	VI	B4	Unte Mungkur	Muara	Tapanuli Utara	23	1	26	37	2	River	Weir	>= 5%	with clearing
8	50218	Kutamale	VI	B4	Buluh Naman	Munte	Tanah Karo	32		40	69	8	River	Weir	>= 5%	with clearing
9	50240	Asahan VIII Pengajian	VI	B3	Tinggi Raja	Buntu Pane	Asahan	45	2	66	100	19	River	Pump	< 5%	with clearing
10	50256	Aek Sihim	VI	B5	Gapuk Julu	Batang Toru	Tapanuli Selatan	40		48	103	8	River	Free Intake	>= 5%	with clearing
		Total						379	45	560	993	139				

Note: Area of rainfed includes old paddy field due to damaged irrigation facilities.
Figure of area was estimated using surveyed topo-map.
Sumbari scheme was replaced from former Scheme Lae Pinagar, Type A4.

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

South Sulawesi

NO.	CODE	NAME OF SCHEME	DIVISION	GROUP	VILLAGE	DISTRICT	REGENCY	Present Paddy ha	Present Rainfed ha	Future Paddy ha	Scheme Whole Area ha	Land Development ha	Water Resource	Intake	Ground Slope	Land Condition
	CODE	IRR			VIL	DIS	REG	PR101		FU101	FU110		SOU31	FAC32	TOP21	
1	20003	Kalu	LD	A3	Liliriawang	Lappariaja	Bone	47		70	101	23	Spring	Water Tank	>= 5%	without clearing
2	10059	Pajjenge	VI	C1	Toapo	Barru	Barru	100	43	143	160	0	River	Weir	< 5%	
3	10099	Kadieng	VI	B1	Tambangan	Kajang	Bulukumba	171		224	270	53	River	Weir	< 5%	without clearing
4	10115	Kaindi	VI	B4	Mampu	Anggereja	Enrekang	67		124	195	57	River	Weir	>= 5%	without clearing
5	10140	Lembang Bata	VI	B5	Kelurahan Malino	Tinggimocong	Gowa	72		76	175	4	River	Free Intake	>= 5%	with clearing
6	10168	Panrita	VI	B2	Palantikang	Bangkala	Jeneponto	55		65	78	10	River	Free Intake	< 5%	with clearing
7	10182	Mario I-II-III	VI	B4	Cempaniga	Camba	Maros	50		57	74	7	River	Weir	>= 5%	without clearing
8	10201	Pakelli II	VI	B5*	Kassi Buleng	Sinjai Barat	Sinjai	13		54	168	35	River	Free Intake	>= 5%	with clearing
9	10227	Limpua/Padaelo	VI	B3	Tua/Lampulung	Majauleng/Pammana	Wajo	77		138	161	61	River	Pump	< 5%	with clearing
10	10287	Malimbu	VI	C2	Malimbu	Sabbang	Luwu	0	32	32	44	0	River	Free Intake	< 5%	
11	10332	Salu Akung	VI	C1	Pangli Palawa	Sesean	Tana Toraja	25		25	30	0	River	Weir	< 5%	
12	10354	Mariri	VI	B1*	Tadisi	Sumarorong	Polmas	0	34	63	151	29	River	Weir	< 5%	without clearing
		Total						684	109	1,072	1,607	279				

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.
kalu Scheme was replaced from former Scheme, Taretta Type A3.
Kaindi also from S. Durian Type B4.
Pakelli II was replaced from Ladope Scheme, Type B6.

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

West Nusa Tenggara

NO.	CODE	NAME OF SCHEME	DIVISION	GROUP	VILLAGE	DISTRICT	REGENCY	Present Paddy ha	Present Rainfed ha	Future Paddy ha	Scheme Whole Area ha	Land Development ha	Water Resource	Intake	Ground Slope	Land Condition
	CODE	IRR			VIL	DIS	REG	PR101		FU101	FU110		SOU31	FAC32	TOP21	
1	45010	Danar Jengkang	LD	A4*	Kelongkong	Sukamulia	Lombok Timur	5		120	227	115	River	Weir	>= 5%	with clearing
2	32013	Mada Manini	VI	C2	Adu	Huu	Dompu	70		70	98	0	River	Free Intake	< 5%	
3	33050	Uma Lebang	VI	B1	Plampang	Plampang	Sumbawa	68		89	96	21	River	Weir	< 5%	without clearing
4	34004	Lokok Tripas	VI	C1	Bayan	Bayan	Lombok Barat	34		34	57	0	River	Weir	>= 5%	
5	35035	Lengkok Dudu	VI	B1	Tanjung	Selong	Lombok Timur	24		26	45	2	River	Weir	< 5%	with clearing
6	35045	Kelokos Udang	VI	B5	Priggajurang	Terara	Lombok Timur	105		111	128	6	River	Free Intake	>= 5%	without clearing
7	36015	Raba Sangga	VI	C1	Kendo	Rasanae	Bima	111		111	125	0	River	Weir	< 5%	
8	37003	Montong Sapah/Puri	VI	C1*	Montong Sapah	Praya Barat	Lombok Tengah	13	20	33	37	0	River	Weir	>= 5%	
	Total							430		594	813	144				

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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.

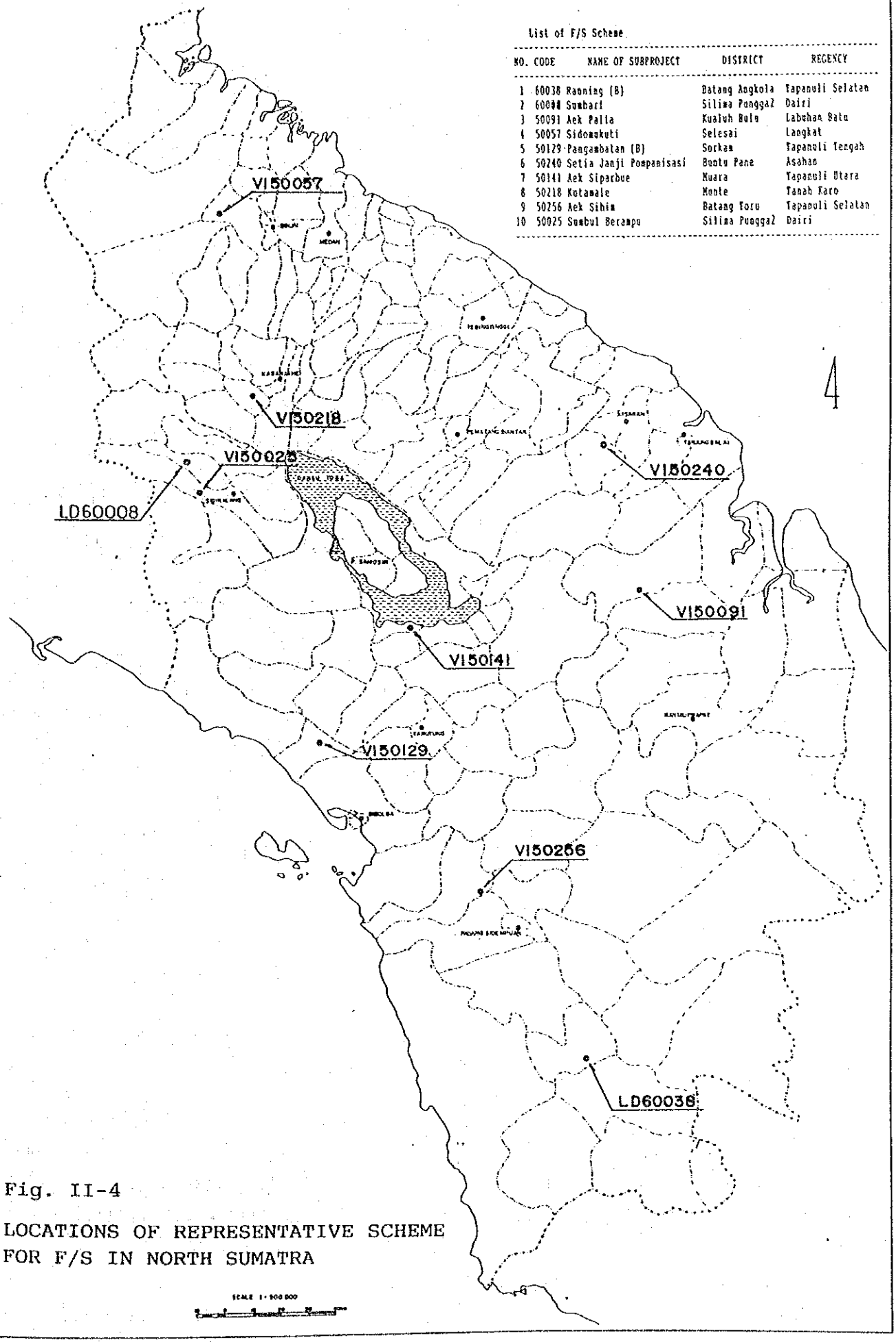
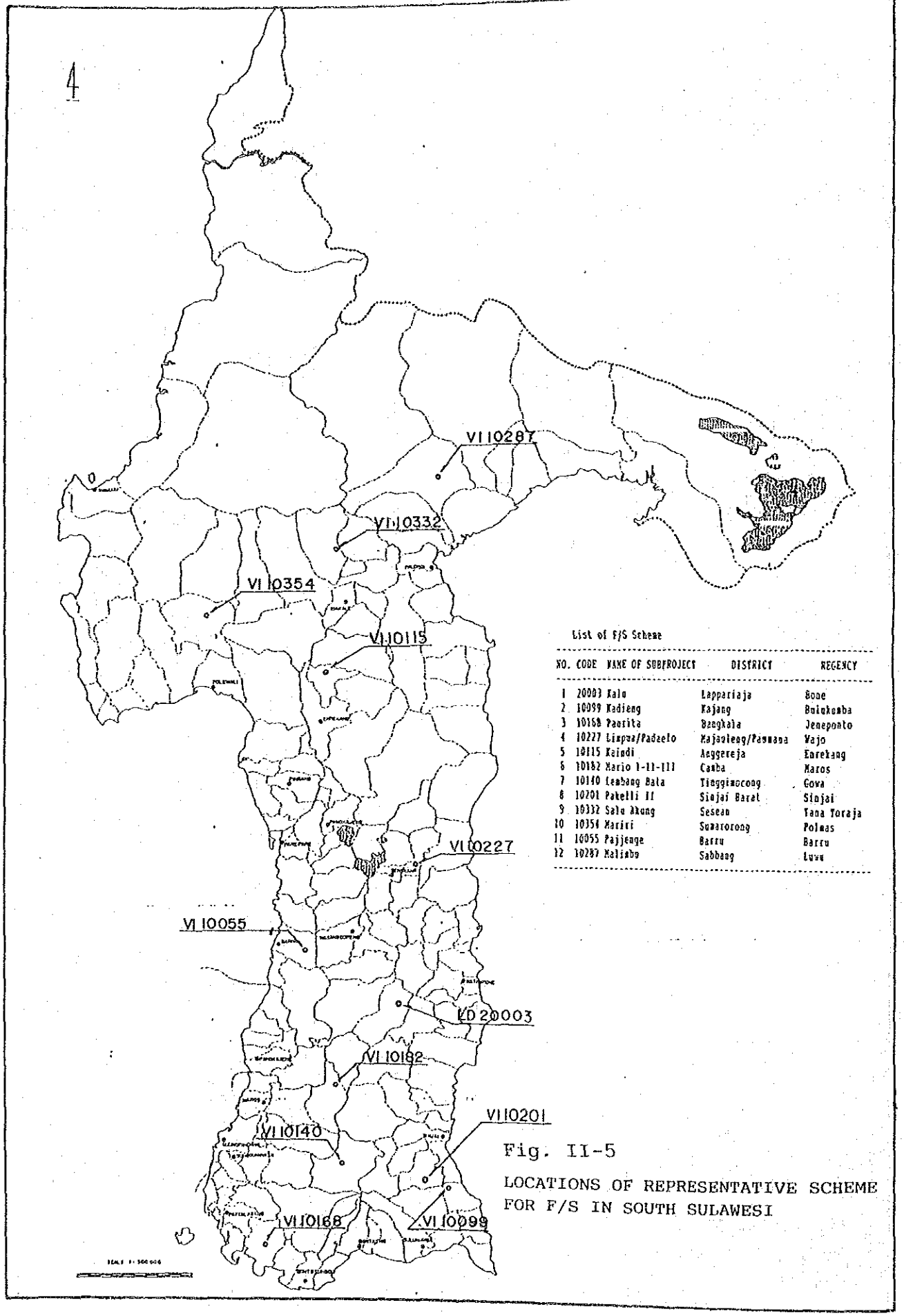


Fig. II-4

LOCATIONS OF REPRESENTATIVE SCHEME FOR F/S IN NORTH SUMATRA

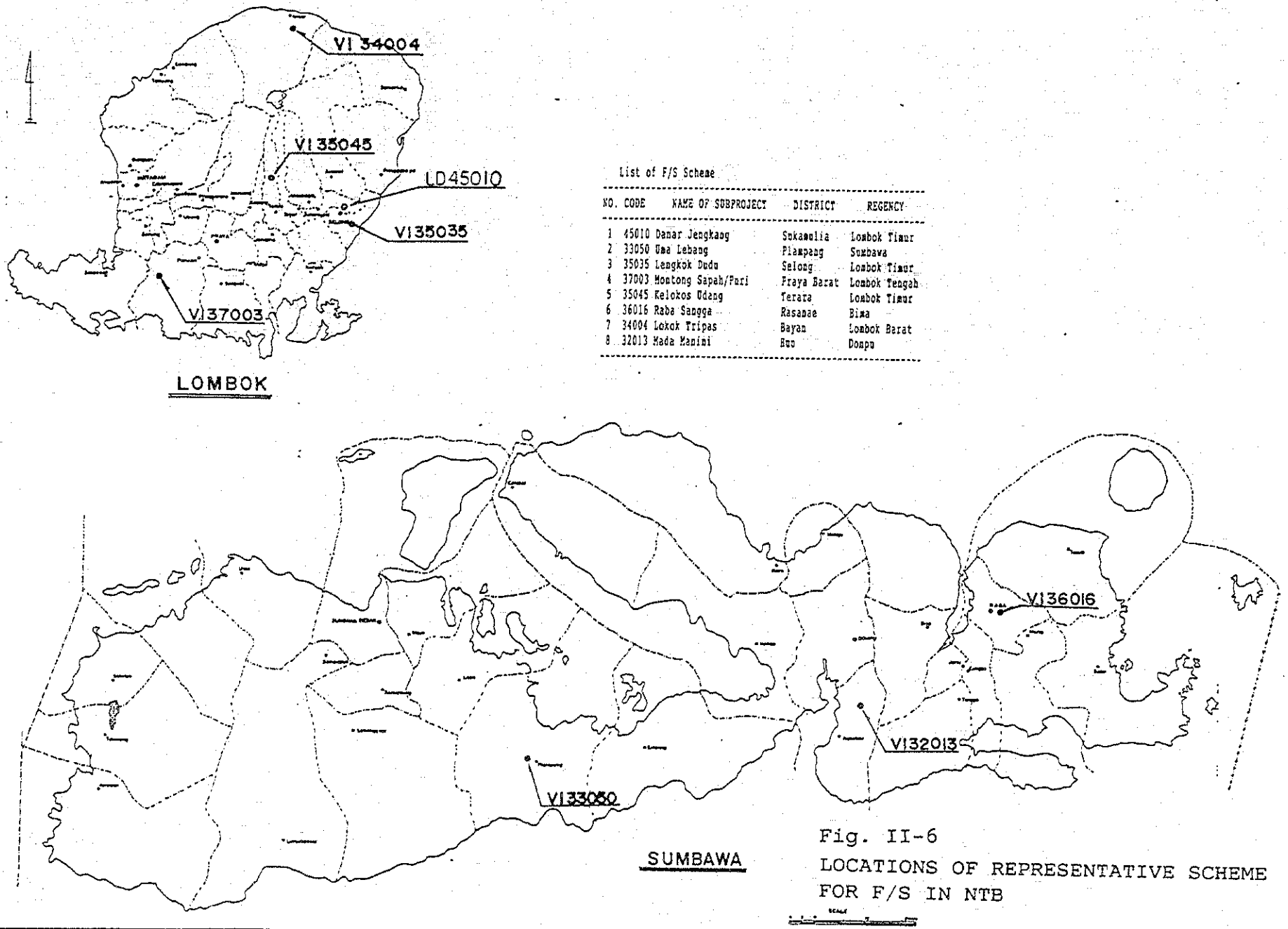


List of F/S Scheme

NO.	CODE	NAME OF SUBPROJECT	DISTRICT	REGENCY
1	20003	Kalu	Lapparlaja	Bone
2	10099	Kadieng	Kajang	Bulukumba
3	10168	Paerita	Bangkala	Jeneponto
4	10227	Limpue/Padaelo	Majauleng/Pammana	Wajo
5	10115	Kalndi	Anggereja	Enrekang
6	10182	Mario I-II-III	Camba	Maros
7	10140	Lembang Bata	Tinggimoncong	Gowa
8	10201	Pakelli II	Sinjai Barat	Sinjai
9	10332	Salu Akung	Sesean	Tana Toraja
10	10354	Mariri	Sumarorong	Polmas
11	10055	Pajjenge	Barru	Barru
12	10287	Maliabo	Sabbang	Luwu

Fig. II-5

LOCATIONS OF REPRESENTATIVE SCHEME FOR F/S IN SOUTH SULAWESI



List of F/S Scheme

NO.	CODE	NAME OF SUBPROJECT	DISTRICT	REGENCY
1	45010	Danar Jengkang	Sukamulia	Lombok Timur
2	33050	Una Lebang	Plampang	Sumbawa
3	35035	Lengkok Dudu	Selong	Lombok Timur
4	37003	Montong Sapah/Puri	Praya Barat	Lombok Tengah
5	35045	Kelokos Udang	Terara	Lombok Timur
6	36016	Raba Sangga	Rasanae	Bima
7	34004	Lokok Tripas	Bayan	Lombok Barat
8	32013	Mada Manini	Huu	Dompu

Fig. II-6
LOCATIONS OF REPRESENTATIVE SCHEME FOR F/S IN NTB

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 inventory 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)

Ratio of Measured Area

North Sumatra		Measured Area			Inventory Data			Ratio		
NO.	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 %	Future Paddy %	Scheme Whole Area %
	CODE IRR	PR101	FU101	FU110	PR101	FU101	FU110	PR101	FU101	FU110
1	60011 Sumbari	34	77	163	175	300	300	0.19	0.26	0.54
2	60038 Rauning (B)	19	66	99	50	230	230	0.38	0.29	0.43
3	50025 Sumbul Berampu	124	124	234	130	130	130	0.95	0.95	1.80
4	50057 Sidomukuti	12	27	68	45	55	55	0.27	0.49	1.24
5	50091 Aek Palia	34	38	64	75	110	110	0.45	0.35	0.58
6	50129 Pangambatan (B)	42	48	56	135	235	235	0.31	0.20	0.24
7	50141 Aek Siparbue	23	26	37	80	200	200	0.29	0.13	0.19
8	50218 Kutamale	32	40	69	35	65	85	0.91	0.62	0.81
9	50240 Asahan VIII Peng	45	66	100	25	220	220	1.80	0.30	0.45
10	50256 Aek Sihim	40	48	103	50	65	97	0.80	0.74	1.06
	Total	405	560	993	800	1,610	1,662	0.51	0.35	0.60

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

South Sulawesi		Measured Area			Inventory Data			Ratio		
NO.	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 %	Future Paddy %	Scheme Whole Area %
	CODE IRR	PR101	FU101	FU110	PR101	FU101	FU110	PR101	FU101	FU110
1	20003 Kalu	47	70	101	50	100	150	0.94	0.70	0.67
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
9	10227 Limpua/Padaelo	77	138	161	100	150	250	0.77	0.92	0.64
10	10287 Malimbu	32	32	44	100	100	100	0.32	0.32	0.44
11	10332 Salu Akung	26	26	30	110	110	130	0.24	0.24	0.23
12	10354 Mariri	34	63	151	116	116	400	0.29	0.54	0.38
	Total	793	1,072	1,607	964	1,319	2,443	0.82	0.81	0.66

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

West Nusa Tenggara		Measured Area			Inventory Data			Ratio		
NO.	CODE NAME OF SCHEME	Present Paddy ha	Future Scheme Paddy ha	Whole Area ha	Present Paddy ha	Future Scheme Paddy ha	Whole Area ha	Present Paddy %	Future Scheme Paddy %	Whole Area %
	CODE IRR	PR101	FU101	FU110	PR101	FU101	FU110	PR101	FU101	FU110
1	45010 Danar Jengkang	5	120	227	15	115	315	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	0.16	0.21	0.23
	Total	430	594	813	585	994	1,292	0.74	0.60	0.63
	Grand Total	1628	2226	3413	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
l. Present land use for land development and so on

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

Province : North Sumatra

Code No.	60011	60038	60025	60057	60091	60129	60141	60218	60240	60256
Project name	Sumbari	Rauning B	Sumbul Berampu	Sidomukuti	Aek Palia	Pangambatan B	Aek Siparubue	Kutamale	Asahan VIII Pengajian	Aek Sihim
District	Dairi	Tapsul	Dairi	Langkat	Labuhan Batu	Tapanuli Tengah	Tapanuli Utara	Tana Karo	Asahan	Tapanuli Selatan
Group	LO	LO	VI	VI	VI	VI	VI	VI	VI	VI
Construction/ repairing year	1989	1979	1978, 1981		1990	1979/80, 1990/91	1920's, 1976	1989	1971, 1985	1982, 1984
Executing agency	DPUP	DPUP	Farmers, DPUP DPUP	Farmers	Farmers & Bangdes	Farmers & DIPERTA	Farmers	Farmers	Farmers PRAS	Farmers BANGDES
Topographic condition	Mountainous & hilly area	Plain area	Mountain/ hilly area	Alluvial plain	Alluvial plain	Alluvial plain	Mountainous & alluvial	Mountainous & hilly area	Plain area	Hilly area
Elevation	675 m	225 m	875 m	39 m	20 m	5 m	900 m		50 m	135 m
Water source	Kaninjou river tributary of Kentara river	Angkola river, tributary of Sibara-bara R.	Lenuaha river	Bekulap river	Palia(Goti) river	Sitadiang river	Siparubue river	Lauberas river /Spring	Piasa river	Sigemuruh river
River discharge Average	0.6 m3/s	3.0 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/s		0.45 m3/s
River discharge Wet S.	0.8 m3/s	3.5 m3/s	1.5 m3/s	0.8 m3/s	0.75 m3/s	0.80 m3/s	0.50 m3/s	0.8 m3/s		0.6 m3/s
River discharge Dry S.	0.4 m3/s	2.5 m3/s	1.2 m3/s	0.2 m3/s	0.025 m3/s	0.15 m3/s	0.05 m3/s	0.2 m3/s		0.3 m3/s
Irrigated paddy field	35 ha	5 ha	124 ha	12 ha	34 ha	30 ha	23 ha	32 ha	45 ha	40 ha
Damaged paddy field	-	14 ha	-	-	-	12 ha	-	-	-	-
Rainfed paddy field	1 ha	-	-	15 ha	-	-	1 ha	-	2 ha	-
Planted area Wet S.	36 ha	19 ha	124 ha	27 ha	34 ha	42 ha	24 ha	32 ha	47 ha	40 ha
Planted area Dry S.	35 ha	-	-	-	-	21 ha	20 ha	20 ha	-	-
Intake facility & intake direction	Weir made of wet masonry LxH=7.5x7.0 m, left side	Left side by weir & free intake for right side	Weir made of natural stones filled with concrete LxH=6.0x1.0 m, left side	Both sides by several temporary weirs	Both sides by weir HxL=0.65x2.7 m	Weir made of wet masonry, left side	Weir made of wet masonry LxH=15.8x1.2 m, right side	Weir with LxH=15x1.5 m, left side	Centrifugal pump with 200 mm in diameter, right side	Free intake, right side
Canals	Earthen canal 7 Km	Earthen canal	Earthen canal 2 Km	Earthen canal	Earthen canal 0.5 Km in left 1.0 Km in right	Earthen canal	Earthen 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 free intake and it leaves as it is	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 protection, 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.	Much leakage from canal, Damaged in free intake
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, especially in dry 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	Damaged in wet season every year	Damaged in wet season	Damaged in wet season every year
Possibility of land development	Possible	Possible	Impossible	Possible	Possible	Possible	Possible	Possible	Possible	Possible
Present land use for land development	Upland field & mixed field	Upland field, mixed field, forest & coconut garden		Oil palm forest	Rubber, swamp	Forest & swamp	Upland field & oil palm forest	Upland field & swamp	Upland field & mixed field	Mixed field

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

Province : South Sulawesi

Code No.		20003	10055	10099	10115	10140	10168	10182	10201	10227	10287	10332	10354
Project name		Kalu	Pajjenge	Kadieng	Kaindi	Lembang Bata	Panrita	Mario I-II-III	Pakeli II	Padaelo	Malimbu	Salu Akung	Mariri
District		Bone	Barru	Bulkumba	Enrekang	Gowa	Jeneponto	Maros	Sinjai	Wajo	Luwu	Tana Toraja	Polmas
Group		LD	VI	VI	VI	VI	VI	VI	VI	VI	VI	VI	VI
Construction/ repairing year		1982	1960	1982	1950, 1951 & 1955	1938	1989	1970		1985/87, 1990/91	1950	1600	1971
Executing agency		DPUP	Farmers & BANGDES	Farmers & army	Farmer	Farmer	Farmers & BANGDES	Farmer	Farmer	Farmer	Farmer	Farmer	Farmer & IMPRES
Topographic condition		Mountainous area	Alluvial plain	Alluvial plain	Mountainous area	Hilly area	Hilly area	Mountainous area	Mountainous area	Alluvial plain	Alluvial plain	Mountainous & alluvial plain	Hilly area
Elevation		222 m	5 m	150 m	900 m	800 m	58 m	600 m	800 m	19 m	200 m	1300 m	1000 m
Water source		Spring water in Lonrong river basin	Barang river	Kadieng river	Dewata river	Bulan river	Panirita river & Cangkureng stream	Tributary of Mario river & spring water	Pakeli river	Walanae river	Benuang river	Akung river	Mariri river
River discharge	Average	0.125 m3/s	3.65 m3/s	1.75 m3/s	1.8 m3/s	2.25 m3/s	0.125 m3/s	0.2 m3/s	0.7 m3/s	4.25 m3/s	20.75 m3/s	15.4 m3/s	4.25 m3/s
	Wet S.	0.15 m3/s	7.0 m3/s	2.5 m3/s	3.0 m3/s	3.0 m3/s	0.15 m3/s	0.3 m3/s	1.0 m3/s	7.0 m3/s	40.0 m3/s	30.0 m3/s	6.4 m3/s
	Dry S.	0.10 m3/s	0.3 m3/s	1.0 m3/s	0.6 m3/s	1.5 m3/s	0.10 m3/s	0.1 m3/s	0.4 m3/s	1.5 m3/s	1.5 m3/s	0.8 m3/s	2.1 m3/s
Irrigated paddy field		47 ha	100 ha	171 ha	67 ha	72 ha	55 ha	50 ha	19 ha	77 ha	-	26 ha	-
Damaged paddy field		-	43 ha	-	-	-	-	-	-	-	32 ha	-	34 ha
Rainfed paddy field		-	-	-	-	-	-	-	-	-	-	-	-
Planted area	Wet S.	47 ha	100 ha	171 ha	67 ha	72 ha	55 ha	50 ha	19 ha	77 ha	20 ha	26 ha	34 ha
	Dry S.	37 ha	10 ha	103 ha	67 ha	50 ha	25 ha	35 ha	19 ha	50 ha	-	15 ha	-
Intake facility & intake direction		Reservoir for spring water 5.0x8.0 m	Weir made of wet masonry LxH=22.0x1.0 m, 2 places in left side	Weir made of gabion LxH=20.0x1.0 m, right side	Weir made of dry masonry LxH=4.0x1.5 m, 2 places in right side	Free intake, right side & other stream intakes	Free intake for left side	Weir at downstream & free intake at upstream left side	Free intake right side	Centrifugal pump with 150 mm in diameter in temporary station, 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
Canals		Earthen canal 0.9 Km	Earthen canal 1.5 Km	Earthen canal 4 Km	Earthen canal 2.5 Km	Earthen canal 1 Km	Earthen canal 0.8 Km	Earthen canal	Earthen canal 4 Km	Earthen canal	Earthen canal 4 Km	Earthen canal	Earthen canal
Condition of facility		Damaged in canal slope, necessary to repair middle stream weir to collect supplement water	Damaged by floo in intake facility	Intake facility functions well, necessary to repair weir body into wet masonry	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 wall	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
Water shortage & its cause		Short in dry season, leakage from canals	Short due to damaged intake facility	Short in wet season	Short due to structual problems in intake facility	Short	Short	Short in dry season	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 year	Damaged by flood every year	Damaged by flood
Possibility of land development		Possible	Impossible	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Impossible	Impossible	Possible
Present land use for land development		Upland field		Upland field & sparse forest	Upland field	Mixed field	Upland field & mixed field	Upland field	Upland field & grass	Upland field, oil palm forest, grass & mixed field			Upland field & grass

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

Province : West Nusa Tenggara

Code No.		45010	32013	33050	34004	35005	35045	36016	37003
Project name		Damar Jengkang	Mada Manini	Uma Lebang	Lolok Tripas	Lengkok	Kelokos Udang	Raba Sanga	Monton Sapah/ Puri
District		Lombok Timur	Dompu	Sumbawa	Lombok Barat	Lomok Timur	Lomok Timur	Bima	Lombok Tengah
Group		LD	VI	VI	VI	VI	VI	VI	VI
Construction/ repairing year		1986	1970, 1990		1984, 1989	1970, 1978	1981, 1989	1971/72	1989
Executing agency		DPUP Farmers	Farmers & DPUK	Farmers	Farmers & PRAS	Farmers	Farmers & INPRES	Farmers & DPUP	Farmers
Topographic condition		Mountainous/ hilly area	Hilly area	Hilly area	Mountainous area	Alluvial plain	Mountainous/ hilly area	Alluvial plain	Hilly area
Elevation		100 m	25 m	20 m	200 m	156 m	303 m	15 m	188 m
Water source		Selimbing river	Manini river & spring water	Pemasar river	Lokok Tripas river	Belimbing	Kelokos Udang river & return flow from U/S	Kendo river & mountain torrent	Puri river
River discharge	Average	0.6 m3/s	0.115 m3/s	0.3 m3/s	0.2 m3/s	1.375 m3/s	0.275 m3/s	0.195 m3/s	0.25 m3/s
	Wet S.	0.7 m3/s	0.20 m3/s	0.5 m3/s	0.3 m3/s	2.50 m3/s	0.40 m3/s	0.30 m3/s	0.50 m3/s
	Dry S.	0.5 m3/s	0.03 m3/s	0.1 m3/s	0.1 m3/s	0.25 m3/s	0.15 m3/s	0.09 m3/s	-
Irrigated paddy field		5 ha	70 ha	58 ha	34 ha	24 ha	105 ha	111 ha	13 ha
Damaged paddy field		-	-	-	-	-	-	-	-
Rainfed paddy field		-	-	-	-	-	-	-	20 ha
Planted area	Wet S.	5 ha	70 ha	58 ha	34 ha	24 ha	105 ha	111 ha	33 ha
	Dry S.	5 ha	10 ha	10 ha	34 ha	24 ha	87 ha	35 ha	-
Intake facility & intake direction		Weir made of wet masonry & free intake left side	Free intake left side	Weir made of dry masonry LxH=7.0x1.4 m right side	Weir made of wet masonry LxH=7.0x4.6 m both sides	Weir made of wet masonry LxH=25.0x3.5 m right side	Free intake 2 places of right side river width : 4.6 m	Weir for left side LxH=12x4.5 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
Condition of facility		Crest elevation of weir is too low to take water from downstream free intake need to repair free intake	Necessary to repair intake and canal	Necessary to line on weir to prevent imperfect intak	Damaged in weir body, eroded in downstream epro need to repair weir body	Collapse of half of weir body, erosion in downstream epron being repaired using bamboo, wood & stone	Intake facility functions well but much sedimentation	Facilities well maintained, leakage from embanked canal	Weirs are often damaged by flood because simple ones without gates i.e. imperfect facilities
Water shortage & its cause		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 canal every year			Damaged	Damaged in facilities every year	Damaged in facilities every year		Damaged in facilities every year
Possibility of land development		Possible	Impossible	Possible	Impossible	Possible	Possible	Impossible	Impossible
Present land use for land development		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 km2	Speci.Dis m3/s/km2	River Q m3/s
1	60011	Sumbari	Rainy		0.038	0.137
			Dry	3.6	0.025	0.090
2	60038	Rauning (B)	Rainy	DPU Project		
			Dry		0.025	
3	60025	Sumbul Berampu	Rainy		0.038	1.296
			Dry	34.1	0.025	0.853
4	60057	Sidomukuti	Rainy			
			Dry	8.5	0.025	0.213
5	60091	Aek Palia	Rainy		0.038	0.080
			Dry	2.1	0.025	0.053
6	60129	Pangambatan (B)	Rainy			
			Dry	6.3	0.025	0.158
7	60141	Aek Siparbue	Rainy			
			Dry	22.0	0.025	0.550
8	60218	Kutamale	Rainy		0.038	0.087
			Dry	2.3	0.025	0.057
9	60240	Asahan VIII Pengajian	Rainy			
			Dry	342.0	0.025	8.550
10	60256	Aek Sihim	Rainy		0.038	0.106
			Dry	2.8	0.025	0.070
		TOTAL	Rainy			
			Dry			

Table II-5 (2/3) WATER SOURCE DISCHARGE

Province :SOUTH SULAWESI

NO	CODE	IRRIGATION SCHEME		C.A km2	Speci.Dis m3/s/km2	River Q m3/s
1	20003	Kalu	Rainy	Spring	0.048	0.150
			Dry		0.010	0.100
2	10055	Pajjenge	Rainy		0.048	0.336
			Dry	7.0	0.010	0.070
3	10099	Kadieng	Rainy		0.063	3.276
			Dry	52.0	0.013	0.676
4	10115	Kaindi	Rainy		0.064	0.294
			Dry	4.6	0.027	0.124
5	10140	Lembang Bata	Rainy		0.063	1.014
			Dry	16.1	0.013	0.209
6	10168	Panrita	Rainy		0.063	0.088
			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	Padaelo	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			
			Dry			

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

Province : WEST NUSA TENGGARA

NO	CODE	IRRIGATION SCHEME		C.A km2	Speci.Dis m3/s/km2	River Q m3/s
1	45010	Danar Jengkang	Rainy		0.048	4.032
			Dry	84.0	0.009	0.756
2	32013	Mada Manini	Rainy		0.044	0.132
			Dry	3.0	0.003	0.009
3	33050	Uma Lebang	Rainy		0.044	0.176
			Dry	4.0	0.003	0.012
4	34004	Lokok 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
			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 Requirement Wet Season	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 Discharge Wet season	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		0.8Q m3/s	POTENTIAL AREA ha	RAIN PADDY AREA ha	POT./RAIN Ratio	Ratio adapted	RAIN x Ratio ha	DRY FIELD ha
1	60011	Sumbari	Rainy	0.109	91.2	69				
			Dry	0.072	48.0		0.69	0.69	48	48
2	60038	Rauning (B)	Rainy			59				
			Dry					0.30	18	18
3	60025	Sumbul Berampu	Rainy	1.037	863.9	112				
			Dry	0.682	454.7		4.07	1.00	112	112
4	60057	Sidomukuti	Rainy			24				
			Dry	0.170	113.3		4.66	1.00	24	24
5	60091	Aek Palia	Rainy	0.064	53.2	34				
			Dry	0.042	28.0		0.82	0.82	28	28
6	60129	Pangambatan (B)	Rainy			43				
			Dry	0.126	84.0		1.94	1.60	43	43
7	60141	Aek Siparbue	Rainy			23				
			Dry	0.440	293.3		12.54	1.00	23	23
8	60218	Kutamale	Rainy	0.070	58.3	36				
			Dry	0.046	30.7		0.85	0.85	31	31
9	60240	Asahan VIII Pengajian	Rainy			59				
			Dry	6.840	4560.0		76.77	1.00	59	59
10	60256	Aek Sihim	Rainy	0.085	70.9	43				
			Dry	0.056	37.3		0.86	0.86	37	37
		TOTAL	Rainy							
			Dry							

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

Province :SOUTH SULAWESI

NO	CODE	IRRIGATION SCHEME		0.8Q m3/s	POTENTIAL AREA ha	RAIN PADDY AREA ha	POT./RAIN Ratio	Ratio adapted	RAIN x Ratio ha	DRY FIELD ha
1	20003	Kalu	Rainy	0.120	100.0	63				
			Dry	0.080	53.3		0.85	0.85	54	54
2	10055	Pajjenge	Rainy	0.269	224.0	129				
			Dry	0.056	37.3		0.29	0.29	37	37
3	10099	Kadieng	Rainy	2.621	2184.0	202				
			Dry	0.541	360.5		1.79	1.00	202	202
4	10115	Kaindi	Rainy	0.236	196.3	112				
			Dry	0.099	66.2		0.59	0.59	66	66
5	10140	Lembang Bata	Rainy	0.811	676.2	68				
			Dry	0.167	111.6		1.63	1.00	68	68
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				
			Dry	0.021	13.9		0.27	0.27	14	14
8	10201	Pakelli II	Rainy	0.141	117.6	49				
			Dry	0.022	14.9		0.31	0.31	15	15
9	10227	Padaelo	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				
			Dry	0.045	30.2		1.05	1.00	29	29
11	10332	Salu Akung	Rainy	0.205	170.7	23				
			Dry	0.086	57.6		2.46	1.00	23	23
12	10354	Mariri	Rainy	15.360	12800.0	57				
			Dry	6.480	4320.0		76.19	1.00	57	57
		TOTAL	Rainy							
			Dry							

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

Province : WEST NUSA TENGGARA

NO	CODE	IRRIGATION SCHEME		0.8Q m3/s	POTENTIAL AREA ha	RAIN PADDY AREA ha	POT./RAIN Ratio	Ratio adapted	RAIN x Ratio ha	DRY FIELD ha
1	45010	Danar Jengkang	Rainy	3.226	2481.2	108				
			Dry	0.605	403.2		3.73	1.00	108	108
2	32013	Mada Manini	Rainy	0.106	81.2	63				
			Dry	0.007	4.8		0.08	0.08	5	5
3	33050	Uma Lebang	Rainy	0.141	108.3	80				
			Dry	0.010	6.4		0.08	0.08	6	6
4	34004	Lokok Tripas	Rainy	0.422	324.9	31				
			Dry	0.079	52.8		1.73	1.00	31	31
5	35035	Lengkok Dudu	Rainy	0.845	649.8	23				
			Dry	0.158	105.6		4.51	1.00	23	23
6	35045	Kelokos Udang	Rainy	0.538	413.5	100				
			Dry	0.101	67.2		0.67	0.67	67	67
7	36016	Raba Sangga	Rainy	0.141	108.3	100				
			Dry	0.010	6.4		0.06	0.06	6	6
8	37003	Montong Sapah/Puri	Rainy	0.154	118.2	30				
			Dry	0.029	19.2		0.65	0.65	19	19
		TOTAL	Rainy							
			Dry							